

Biological Technical Report

Santiago Creek Dam Improvement Project, Orange County, California

Prepared for	Irvine Ranch Water District 15600 Sand Canyon Avenue Irvine, California 92618 Contact: Fiona Sanchez Director of Water Resources
--------------	--

Prepared by	Psomas 5 Hutton Centre Drive, Suite 300 Santa Ana, California 92707 T: 714.751.7373 Contact: Amber Heredia Associate Principal, Resource Management
-------------	--

April 17, 2025

TABLE OF CONTENTS

<u>Section</u>	<u>Page</u>
Executive Summary	ES-1
1.0 Introduction.....	1
1.1 Project Location	1
1.2 Project Background.....	2
1.3 Purpose And Need	4
1.4 Project Objectives	4
1.5 Project Description.....	5
1.6 Additional Geotechnical Investigations.....	7
1.7 Construction Activities	8
1.8 Operation and Maintenance	9
1.8.1 Additional Inundation During Operation.....	11
1.9 Regulatory Setting	11
1.9.1 Federal.....	11
1.9.2 State.....	14
1.9.3 Regional.....	18
2.0 Methods	20
2.1 Literature Review	20
2.2 Vegetation Mapping and General Surveys	21
2.3 Focused Surveys	21
2.3.1 Special Status Plant Species	21
2.3.2 Quino Checkerspot Butterfly.....	23
2.3.3 Crotch's Bumble Bee.....	25
2.3.4 Western Spadefoot.....	26
2.3.5 Arroyo Toad.....	27
2.3.6 Southwestern Pond Turtle.....	29
2.3.7 Coastal California Gnatcatcher.....	32
2.3.8 Least Bell's Vireo/Southwestern Willow Flycatcher	33
2.3.9 Western Yellow-billed Cuckoo.....	36
2.3.10 Jurisdictional Delineation	37
3.0 Existing Biological Resources	39
3.1 Physical Environmental Setting.....	39
3.1.1 Regional Environment.....	39
3.1.2 Climate	39

3.1.3	Local Environment.....	40
3.2	Vegetation Types and Other Areas	40
3.2.1	Sagebrush Scrub (2.3.6).....	42
3.2.2	Disturbed Sagebrush Scrub (2.3.6)	43
3.2.3	Sagebrush – Coyote Brush Scrub (2.3.12)	43
3.2.4	Southern Cactus Scrub (2.4).....	43
3.2.5	Disturbed Southern Cactus Scrub (2.4).....	43
3.2.6	Disturbed Floodplain Sage Scrub (2.6).....	44
3.2.7	Toyon – Sumac Chaparral (3.12)	44
3.2.8	Annual Grassland (4.1).....	44
3.2.9	Ruderal (4.6).....	45
3.2.10	Riparian Herb (7.1).....	45
3.2.11	Southern Willow Scrub (7.2).....	45
3.2.12	Mulefat Scrub (7.3)	46
3.2.13	Disturbed Mulefat Scrub (7.3).....	46
3.2.14	Southern Sycamore Riparian Woodland (7.4).....	46
3.2.15	Southern Sycamore Riparian Woodland/Coast Live Oak Riparian Forest (7.4/7.5).....	46
3.2.16	Southern Black Willow Forest (7.7).....	47
3.2.17	Disturbed Southern Black Willow Forest (7.7)	47
3.2.18	Southern Black Willow Forest/Riparian Herb (7.7/7.1)	47
3.2.19	Coast Live Oak Woodland (8.1)	47
3.2.20	Western Sycamore (8.x).....	48
3.2.21	Cliff (10.0)	48
3.2.22	Open Water (12.1).....	48
3.2.23	Fluctuating Shoreline (12.2).....	48
3.2.24	Vegetated Fluctuating Shoreline (12.2).....	48
3.2.25	Perennial Stream (13.1).....	49
3.2.26	Ornamental (15.5).....	49
3.2.27	Developed (15.6)	49
3.2.28	Disturbed (16.1)	49
3.3	Wildlife Populations and Movement Patterns.....	50
3.3.1	Fish.....	50
3.3.2	Amphibians.....	50
3.3.3	Reptiles.....	50
3.3.4	Birds.....	51
3.3.5	Mammals.....	51
3.3.6	Wildlife Movement	52
3.4	Special Status Biological Resources	54
3.4.1	Definitions.....	55
3.5	Special Status Vegetation Types	57
3.6	Jurisdictional Resources.....	58

3.7	Special Status Plants	59
3.7.1	<i>Braunton's Milkvetch</i>	74
3.7.2	<i>Intermediate Mariposa Lily</i>	74
3.7.3	<i>Many-stemmed Dudleya</i>	75
3.7.4	<i>Mud Nama</i>	75
3.7.5	<i>Coulter's Matilija Poppy</i>	77
3.8	Special Status Wildlife	77
3.8.1	<i>Monarch Butterfly</i>	89
3.8.2	<i>Crotch's Bumble Bee</i>	89
3.8.3	<i>White Sturgeon</i>	90
3.8.4	<i>Santa Ana Speckled Dace</i>	90
3.8.5	<i>Western Spadefoot</i>	91
3.8.6	<i>Southwestern Pond Turtle</i>	91
3.8.7	<i>Orange-throated Whiptail</i>	92
3.8.8	<i>Coastal Whiptail</i>	92
3.8.9	<i>Two-striped Garter Snake</i>	93
3.8.10	<i>White-tailed Kite</i>	93
3.8.11	<i>Bald Eagle</i>	93
3.8.12	<i>American Peregrine Falcon</i>	94
3.8.13	<i>Least Bell's Vireo</i>	94
3.8.14	<i>Coastal Cactus Wren</i>	95
3.8.15	<i>Coastal California Gnatcatcher</i>	95
3.8.16	<i>Southern California Rufous-Crowned Sparrow</i>	96
3.8.17	<i>Grasshopper Sparrow</i>	96
3.8.18	<i>Yellow-breasted Chat</i>	97
3.8.19	<i>Yellow Warbler</i>	97
3.8.20	<i>Mountain Lion</i>	97
4.0	Project Impacts	98
4.1	Significance Criteria	101
4.2	Direct Impacts	103
4.2.1	<i>Vegetation Types and Other Areas</i>	103
4.2.2	<i>Jurisdictional Resources</i>	109
4.2.3	<i>Wildlife</i>	111
4.2.4	<i>Wildlife Movement</i>	112
4.2.5	<i>Special Status Biological Resource Impacts</i>	113
4.2.6	Indirect Impacts.....	124
5.0	Mitigation Measures	129
5.1	Mitigation Measure #1: Coastal Sage Scrub and Coastal California Gnatcatcher	129
5.2	Mitigation Measure #2: Riparian Vegetation and Jurisdictional Permitting.....	129

5.3	Mitigation Measure #3: Tree Survey/Replacement.....	130
5.4	Mitigation Measure #4: Special Status Plant Species	131
5.5	Mitigation Measure #5: Crotch’s Bumble Bee	132
5.6	Mitigation Measure #6: Least Bell’s Vireo.....	134
5.7	Mitigation Measure #7: Bald Eagle.....	135
5.8	Mitigation Measure #8: Pre-Construction Bat Surveys.....	135
6.0	Consistency With the NCCP/HCP	137
6.1	Consistency With Non-Reserve Open Space Policies	137
6.2	Consistency With Coastal Sage Scrub Take Authorization.....	137
6.3	Covered Species	138
6.4	Conditionally Covered Species	139
6.5	Covered Habitats	141
6.6	Migratory Bird Treaty Act	141
7.0	Level of Significance After Mitigation	142
8.0	References	143

TABLES

<u>Table</u>	<u>Page</u>
ES-1	Vegetation Acreage Impacts of the Project..... 2
ES-2	Summary of Project Impacts on Jurisdictional Resources 4
1	IRWD/Lake Operational Modes 10
2	Reference Populations Monitored in the Project Region 22
3	Summary of Quino Checkerspot Butterfly Surveys 24
4	Summary of Crotch's Bumble Bee Surveys..... 26
5	Summary of Survey Conditions for Western Spadefoot Surveys..... 27
6	Summary of Survey Data and Conditions for Arroyo Toad Surveys 28
7	Summary of Survey Conditions for Southwestern Pond Turtle Visual Surveys..... 30
8	Summary of Survey Data and Conditions for Southwestern Pond Turtle Trapping 31
9	Summary of Survey Data and Conditions for Coastal California Gnatcatcher Surveys 32
10	Summary of Survey Data and Conditions for Least Bell's Vireo Surveys 35
11	Summary of Survey Data and Conditions for Western Yellow-Billed Cuckoo Surveys 37
12	Vegetation Types and Other Areas in the BSA 41
13	Summary of Jurisdictional Resources in the Survey Area..... 58
14	Special Status Plant Species Reported from the Project Region 60
15	Mud Nama Population Information 76
16	Special Status Wildlife Species Reported from the Project Vicinity 79
17	Vegetation Acreage Impacts of the Project..... 104
18	Summary of Project Impacts on Jurisdictional Resources 111
19	Mud Nama Population Information 115

EXHIBITS

<u>Exhibit</u>	<u>Follows Page</u>
1	Regional Location and Local Vicinity 1
2	Existing Dam Features..... 1
3	U.S. Geological Survey 7.5-minute Digital Quadrangle..... 1
4	Orange County Central/Coastal NCCP/HCP..... 2
5	Soil Types 42
6	Biological Resources..... 42
7	Jurisdictional Resources – USACE Waters of the United States..... 58
8	Jurisdictional Resources – RWQCB Waters of the State..... 58
9	Jurisdictional Resources – CDFW Jurisdictional Waters 58
10	Special Status Species Locations 74
11	Project Impacts 98
12	Project Impacts – USACE Waters of the United States..... 109
13	Project Impacts – RWQCB Waters of the State 110
14	Project Impacts – CDFW Jurisdictional Waters 110
15	Project Impacts Special Status Species..... 113

APPENDICES

A	Geotechnical Investigations Memorandum
B	USFWS Official Species List
C	Representative Photographs
D	Plant and Wildlife Compendia
E	Special Status Plant Surveys
F	Quino Checkerspot Butterfly Survey
G	Crotch’s Bumble Bee Survey
H	Arroyo Toad Surveys
I	Southwestern Pond Turtle Survey
J	Coastal California Gnatcatcher Surveys
K	Least Bell’s Vireo/Southwestern Willow Flycatcher Surveys
L	Western Yellow-billed Cuckoo Survey
M	Jurisdictional Delineation
N	Project Impacts by Landowner

EXECUTIVE SUMMARY

This report provides baseline data regarding the type and extent of biological resources for the Santiago Creek Dam Improvement Project proposed by the Irvine Ranch Water District (IRWD). The primary objective of the Project is the rehabilitation and replacement of the Santiago Creek Dam outlet tower and spillway facilities, as well as to modify the dam embankment to permit operation of the facilities for a long-term water resource benefit. The Project would also raise the spillway two feet, which would result in a small increase in maximum inundation area of the reservoir. In implementing the Project, the Districts would: (1) create new facilities and dam embankment modifications that will meet or exceed the current seismic, safety and design requirements; (2) satisfy IRWD's operational requirements in the present and future; (3) extend the useful life of the facilities; (4) improve water supply reliability; and (5) minimize impacts to local environmental resources and surrounding property owners.

The Project is located in the Central/Coastal Subregion of the Natural Communities Conservation Plan/Habitat Conservation Plan (NCCP/HCP). IRWD is a participant in the NCCP/HCP. Santiago Creek Dam and its associated structures are located within designated "Non-Reserve Open Space", while Habitat Reserve and Conservation Easements surround the lake; a Special Linkage is located southeast of the lake. Santiago Creek Dam is a permitted existing use under the NCCP/HCP. No amendments to the NCCP/HCP shall be required for constructing infrastructure facilities so long as amended infrastructure plans do not result in incidental take beyond that described and permitted by the NCCP/HCP.

The following vegetation types occur in the Biological Study Area (BSA): sagebrush scrub, disturbed sagebrush scrub, sagebrush-coyote bush scrub, southern cactus scrub, disturbed southern cactus scrub, disturbed floodplain sage scrub, toyon-sumac chaparral, annual grassland, ruderal, riparian herb, southern willow scrub, mulefat scrub, disturbed mulefat scrub, southern sycamore-coast live oak riparian woodland, southern black willow forest, disturbed southern black willow forest, southern black willow forest/riparian herb, coast live oak woodland, and western sycamore, and vegetated fluctuating shoreline. Other landcover includes cliff, open water, fluctuating shoreline, perennial stream, ornamental, developed, and disturbed areas. The Project would impact coastal sage scrub, chaparral, grassland, riparian, woodland (including a limited amount of sycamore woodland), cliff, lakes, reservoirs, or basins (i.e., dewatering Irvine Lake during construction), disturbed, and developed (Table ES-1). Compensatory mitigation is included to mitigate the loss of coastal sage scrub¹, riparian, and woodland, including replacement of western sycamore (*Platanus racemosa*) and coast live oaks (*Quercus agrifolia*) that would be removed by the Project.

¹ IRWD is a participant in the NCCP/HCP and can use their take credits to compensate for the loss of coastal sage scrub.

TABLE ES-1
VEGETATION ACREAGE IMPACTS OF THE PROJECT^a

Vegetation Types and Other Areas	Gray and Bramlet Vegetation Code	Existing (acres)	Permanent Impact (acres)	Temporary Impact (acres)	SCE Realignment Temporary Impact ^b (acres)	Total Permanent/Temporary Impact (acres)	Additional Inundation Area (acres)
Coastal Sage Scrub							
Sagebrush Scrub	2.3.6	115.81	2.39	3.43	0.07	5.89	2.24
Disturbed Sagebrush Scrub	2.3.6	20.11	1.36	0.83	0.00	2.19	0.58
Sagebrush – Coyote Brush Scrub	2.3.12	10.59	0.00	0.03	0.00	0.03	0.06
Southern Cactus Scrub	2.4	17.48	0.00	0.00	0.00	0.00	0.19
Disturbed Southern Cactus Scrub	2.4	10.63	0.00	0.00	0.00	0.00	0.29
Disturbed Floodplain Sage Scrub	2.6	0.48	0.20	0.10	0.00	0.30	0.00
<i>Subtotal Coastal Sage Scrub</i>		<i>175.10</i>	<i>3.95</i>	<i>4.39</i>	<i>0.07</i>	<i>8.41</i>	<i>3.36</i>
Chaparral							
Toyon – Sumac Chaparral	3.12	30.35	2.52	2.18	0.00	4.70	0.18
<i>Subtotal Chaparral</i>		<i>30.35</i>	<i>2.52</i>	<i>2.18</i>	<i>0.00</i>	<i>4.70</i>	<i>0.18</i>
Grassland							
Annual Grassland	4.1	15.59	5.67	3.09	0.01	8.77	0.16
Ruderal	4.6	92.38	0.25	25.72	0.00	25.97	3.07
<i>Subtotal Grassland</i>		<i>107.97</i>	<i>5.92</i>	<i>28.81</i>	<i>0.01</i>	<i>34.74</i>	<i>3.23</i>
Riparian							
Riparian Herb	7.1	13.15	0.00	1.09	0.00	1.09	0.00
Southern Willow Scrub	7.2	0.43	0.43	0.00	0.00	0.43	0.00
Mulefat Scrub	7.3	1.50	1.02	0.33	0.00	1.35	0.00
Disturbed Mulefat Scrub	7.3	26.67	0.00	4.40	0.00	4.40	0.60
Southern Sycamore Riparian Woodland	7.4	20.48	0.00	0.00	0.00	0.00	0.96
Southern Sycamore Riparian Woodland/Coast Live Oak Riparian Forest	7.4/7.5	5.46	0.00	0.00	0.00	0.00	0.00
Southern Black Willow Forest	7.7	83.61	0.00	6.57	0.00	6.57	7.82
Disturbed Southern Black Willow Forest	7.7	35.34	0.00	0.73	0.00	0.73	0.28
Southern Black Willow Forest/Riparian Herb	7.7/7.1	26.01	0.00	22.16	0.00	22.16	0.00
<i>Subtotal Riparian</i>		<i>212.65</i>	<i>1.45</i>	<i>35.28</i>	<i>0.00</i>	<i>36.73</i>	<i>9.66</i>

TABLE ES-1
VEGETATION ACREAGE IMPACTS OF THE PROJECT^a

Vegetation Types and Other Areas	Gray and Bramlet Vegetation Code	Existing (acres)	Permanent Impact (acres)	Temporary Impact (acres)	SCE Realignment Temporary Impact ^b (acres)	Total Permanent/Temporary Impact (acres)	Additional Inundation Area (acres)
Woodland							
Coast Live Oak Woodland	8.1	31.09	0.48	2.78	0.05	3.31	0.50
Western Sycamore	8.x	0.36	0.05	0.21	0.00	0.26	0.00
<i>Subtotal Woodland</i>		<i>31.45</i>	<i>0.53</i>	<i>2.99</i>	<i>0.05</i>	<i>3.57</i>	<i>0.50</i>
Cliff and Rock							
Cliff	10.0	1.63	0.30	0.21	0.01	0.52	0.01
<i>Subtotal Cliff and Rock</i>		<i>1.63</i>	<i>0.30</i>	<i>0.21</i>	<i>0.01</i>	<i>0.52</i>	<i>0.01</i>
Lakes, Reservoirs, and Basins							
Open Water	12.1	312.11	0.33	139.08	0.00	139.41	0.00
Fluctuating Shoreline	12.2	26.31	0.00	13.04	0.00	13.04	0.00
Vegetated Fluctuating Shoreline	12.2	45.13	0.00	31.08	0.00	31.08	0.00
<i>Subtotal Lakes, Reservoirs, and Basins</i>		<i>383.55</i>	<i>0.33</i>	<i>183.20</i>	<i>0.00</i>	<i>183.53</i>	<i>0.00</i>
Watercourses							
Perennial Stream	13.1	6.97	0.00	0.00	0.00	0.00	0.00
<i>Subtotal Watercourses</i>		<i>6.97</i>	<i>0.00</i>	<i>0.00</i>	<i>0.00</i>	<i>0.00</i>	<i>0.00</i>
Developed Areas							
Ornamental	15.5	20.77	0.03	1.21	0.00	1.24	0.47
Developed	15.6	20.98	2.44	2.59	0.00	5.03	1.80
<i>Subtotal Developed Areas</i>		<i>41.75</i>	<i>2.47</i>	<i>3.80</i>	<i>0.00</i>	<i>6.27</i>	<i>2.27</i>
Disturbed Areas							
Disturbed	16.1	25.42	0.03	3.95	0.00	3.98	0.83
<i>Subtotal Disturbed Areas</i>		<i>25.42</i>	<i>0.03</i>	<i>3.95</i>	<i>0.00</i>	<i>3.98</i>	<i>0.83</i>
Total		1,016.85	17.50	264.81	0.14	282.45	20.04
^a The impact by landowner (i.e., IRWD or County of Orange) is included in Appendix N. ^b Within the SCE Realignment, only trees and branches would be removed; other vegetation would not be temporarily removed but may be disturbed by access and movement of construction materials through the area.							

Jurisdictional resources occur throughout the BSA; a summary of jurisdictional resources that would be impacted by the Project is shown in Table ES-2. A total of 203.570 acres of Waters of the U.S. under the regulatory authority of the U.S. Army Corps of Engineers (USACE) would be impacted to construct the Project (wetland: 0.000 acre permanent, 63.915 acres temporary; non-wetland: 1.798 acres permanent, 137.857 acres temporary); an additional 0.673 acre of WOTUS (0.673 acre wetland) with the additional inundation area. A total of 203.641 acres of waters of the State under the regulatory authority of the Regional Water Quality Control Board (RWQCB) would be impacted to construct the Project (wetland: 0.000 acre permanent, 63.915 acres temporary; non-wetland: 1.861 acres permanent, 137.865 acres temporary); an additional 0.711 acre of waters of the State (0.673 acre wetland, 0.038 acre non-wetland) with the additional inundation area. A total of 233.774 acres of waters under the regulatory authority of CDFW would be impacted to construct the Project (3.924 acres permanent; 229.850 acres temporary); an additional 8.980 acres of waters under the authority of CDFW with the additional inundation area. Regulatory permitting would be required prior to impacting jurisdictional resources and compensatory mitigation will be required to mitigate for the loss of these resources.

TABLE ES-2
SUMMARY OF PROJECT IMPACTS ON JURISDICTIONAL RESOURCES

Jurisdiction	Amount of Jurisdictional Water Resource (acres)				
	Existing	Permanent	Temporary	Total Permanent/ Temporary Impact	Additional Inundation Area ^a
USACE WOTUS	Wetland: 101.706	Wetland: 0.000	Wetland: 63.915	Wetland: 63.915	Wetland: 0.673
	Non-wetland: 326.770	Non-wetland: 1.798	Non-wetland: 137.857	Non-wetland: 139.655	Non-wetland: 0.000
	Total: 428.476	Total: 1.798	Total: 201.772	Total: 203.570	Total: 0.673
RWQCB Waters of the State	Wetland: 101.706	Wetland: 0.000	Wetland: 63.915	Wetland: 63.915	Wetland: 0.673
	Non-wetland: 333.499	Non-wetland: 1.861	Non-wetland: 137.865	Non-wetland: 139.726	Non-wetland: 0.038
	Total: 435.20	Total: 1.861	Total: 201.780	Total: 203.641	Total: 0.711
CDFW Jurisdictional Resources	669.630	3.924	229.850	233.774	8.980
USACE: U.S. Army Corps of Engineers; WOTUS: waters of the United States; RWQCB: Regional Water Quality Control Board; CDFW: California Department of Fish and Wildlife					
^a Portions of the Permanent and Temporary impact boundaries overlap the "Additional Inundation Area". This overlap is not being excluded because the Additional Inundation Area represents a long-term, periodic change in maximum lake level as opposed to a permanent structural impact or temporary construction impact.					

Focused surveys for special status plants were conducted downstream of the dam in spring/summer 2020 and upstream of the dam in spring/summer 2022. Three special status plant species, intermediate mariposa lily (*Calochortus weedii* var. *intermedius*), many-stemmed dudleya (*Dudleya multicaulis*), and Coulter's matilija poppy (*Romneya coulteri*), were observed downstream of the dam during the 2020 focused surveys. Four special status

plant species, Braunton's milkvetch (*Astragalus brauntonii*), intermediate mariposa lily, mud nama (*Nama stenocarpa*), and Coulter's matilija poppy, were observed upstream of the dam during the 2022 focused surveys. The Braunton's milk-vetch, intermediate mariposa lily, the larger population of many-stemmed dudleya (810 individuals), mud nama, and Coulter's matilija poppy are all located outside the impact area for the Project. One small population of many-stemmed dudleya (10 individuals) would be impacted by the Project; this impact was determined to be less than significant since the larger population is avoided. The majority of the mud nama would be impacted by the Project's borrow areas; this impact was determined to be significant. Compensatory mitigation is included to mitigate for the loss of mud nama. Additional inundation resulting from raising the spillway is expected to be less than significant on two individual intermediate mariposa lilies.

Focused surveys for several special status wildlife were conducted in the Biological Study Area in spring/summer 2020, spring/summer 2022, summer 2024, and spring 2025. Quino checkerspot (*Euphydryas editha quino*), western spadefoot (*Spea hammondi*), arroyo toad (*Anaxyrus californicus*), southwestern [western] pond turtle (*Actinemys pallida* [*Emys marmorata*]), southwestern willow flycatcher (*Empidonax traillii extimus*), and western yellow-billed cuckoo (*Coccyzus americanus occidentalis*) were determined to be absent based on the results of focused surveys. Several special status species were observed or would be expected to occur. Those that would require additional surveys or mitigation are summarized below.

Suitable habitat is present for Crotch's bumble bee (*Bombus crotchii*) throughout the BSA; one individual was observed during focused surveys conducted in summer 2024. This species is proposed for State listing. Mitigation measures require pre-construction focused surveys for Crotch's bumble bee, avoidance of active nest burrows during construction, and consultation with California Department of Fish and Wildlife (CDFW) to obtain an Incidental Take Permit for this species.

Suitable habitat for coastal California gnatcatcher (*Polioptila californica californica*) is located throughout the BSA; one breeding territory was observed downstream of Santiago Creek Dam near the Project's impact area downstream of the dam. Suitable habitat for least Bell's vireo (*Vireo bellii pusillus*) is located along Santiago Creek, primarily at the upstream end of Irvine Lake; a total of 29 least Bell's vireo locations were observed during the 2022 focused surveys upstream of the dam. Marginally suitable habitat is located downstream of the dam along Santiago Creek; no least Bell's vireo were observed during focused surveys conducted downstream of the dam in 2020 but least Bell's vireo was incidentally observed downstream of the dam in summer 2024. The Project's staging area would be adjacent to the upstream end of Irvine Lake; noise from construction could impact breeding least Bell's vireos at the upstream end of Irvine Lake. Mitigation has been included to mitigate for the loss of coastal sage scrub and riparian habitat primarily through restoration of temporarily impacted habitat following construction, and the restoration of coastal sage scrub and riparian habitat at either an on-site or off-site mitigation site. Use of NCCP/HCP take credits would supplement the restoration and enhancement efforts as necessary. Additionally, standard NCCP/HCP construction minimization measures include pre-construction surveys, biological monitoring, and noise minimization measures to avoid and minimize impacts on these species.

A breeding pair of bald eagle (*Haliaeetus leucocephalus*), State Endangered and California Fully Protected, was incidentally observed nesting in a canyon adjacent to the BSA during focused surveys conducted around Irvine Lake in 2022. The 2022 nesting location was over 1,200 feet (approximately 0.22 mile) from the proposed borrow site/staging area, which is the closest Project activity, and approximately 1.25 miles from Santiago Creek Dam, where construction would be concentrated. Therefore, the nest would not be expected to be directly or indirectly impacted by the construction activities or noise. However, during construction, the lake would be dewatered; the temporary loss of the lake as foraging habitat may cause the bald eagles to leave Irvine Lake for the duration of construction. Avoidance and minimization measures include monitoring the bald eagles during construction if they continue to occupy the area.

Mountain lions (*Puma concolor*) are known to occur throughout the vicinity of the BSA and mountain lion sign (i.e., tracks) were incidentally observed downstream of Santiago Creek Dam during focused surveys. The mountain lion is proposed for State listing due to fragmentation of habitat that isolates populations. The Project would not create a new barrier to movement since it would occur at the existing dam. The speed limit and wildlife crossing signage would be posted along construction access roads.

Several special status bat species have potential to roost in the rocky outcroppings along Santiago Creek, in crevices of structures (e.g., dam structure, spillway, outlet tower, or dam keeper's house), or in large oak (*Quercus agrifolia*) or sycamore (*Platanus racemosa*) trees in the BSA. A pre-construction roosting bat survey (including both day and evening efforts) would be conducted prior to the initiation of construction to ensure that no active day-roosts would be impacted. If roosting bats are observed, the bats will be excluded from the areas prior to the roosts being impacted.

Best management practices to minimize impacts would be implemented to prevent the spread of invasive exotic plant species; treat invasive species during and following construction; ensure that night lighting during construction does not spillover into sensitive habitat areas; includes biological monitoring during vegetation clearing activities to ensure sensitive habitat areas are protected; and conducting a worker environmental awareness program training for all construction staff.

1.0 INTRODUCTION

This Biological Technical Report has been prepared to support California Environmental Quality Act (CEQA) documentation for the Santiago Creek Dam Improvement Project (hereinafter referred to as “the Project”) proposed by Irvine Ranch Water District (IRWD). It will also support regulatory permitting with the U.S. Army Corps of Engineers (USACE), Regional Water Quality Control Board (RWQCB), and California Department of Wildlife (CDFW). This information has been reported in accordance with accepted scientific and technical standards that are consistent with the requirements of the U.S. Fish and Wildlife Service (USFWS) and the CDFW.

1.1 PROJECT LOCATION

The Project is located at Santiago Creek Dam at the northwest end of Irvine Lake in unincorporated Orange County, California (Exhibit 1). It is south of State Route (SR) 261 and east of SR-241 and Santiago Canyon Road. Existing structures include the embankment dam, outlet tower in Irvine Lake, spillway channel, flashboard storage shed, control house/outlet works, energy dissipater structure, dam keeper’s house, a portion of the Irvine Lake pipeline, and dam access road (Exhibit 2).

The Project is located on the U.S. Geological Survey’s (USGS’) Black Star Canyon 7.5-minute quadrangle map (Exhibit 3). It is within the Santa Ana Watershed. The drainage area for the Project encompasses approximately 63.4 square miles. The Project is within the Santa Ana Watershed (Hydrologic Unit Code 18070203). Irvine Lake (named Santiago Creek Reservoir by the USGS) was originally constructed in 1931 to store water for the benefit of the surrounding communities.

Irvine Lake was created by constructing a dam across Santiago Creek. Santiago Creek, a named blueline stream, enters Irvine Lake from the east and continues downstream of the dam flowing north and then west, ultimately reaching the Santa Ana River. It has a relatively broad floodplain above and below the dam. The slopes around the western and northern portions of the lake are relatively steep while the areas to the southeast and east are relatively flat. Three unnamed blueline streams enter the lake from the north and eight unnamed blueline streams enter the lake from the west, southeast, and south. One unnamed blueline stream enters the Project site in the northwest, downstream of the dam, while Fremont Canyon Creek merges with Santiago Creek downstream of the Project site. Elevations on the Project site range from approximately 657 to 996 feet above mean sea level (msl).

Surrounding land use primarily consists of undeveloped open space. Irvine Regional Park is located northwest of SR-241; Limestone Canyon Regional Park is located south of Santiago Canyon Road; and Oak Canyon Park is located at the southeast end of Irvine Lake. The closed Orange County Waste and Recycling (OCWR) Landfill Facility (i.e., Santiago Canyon Landfill) is located adjacent to the west of Irvine Lake. Residential development is located east of SR-241.

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx LV_RL



Regional Location and Local Vicinity

Santiago Creek Dam Improvement Project

Exhibit 1

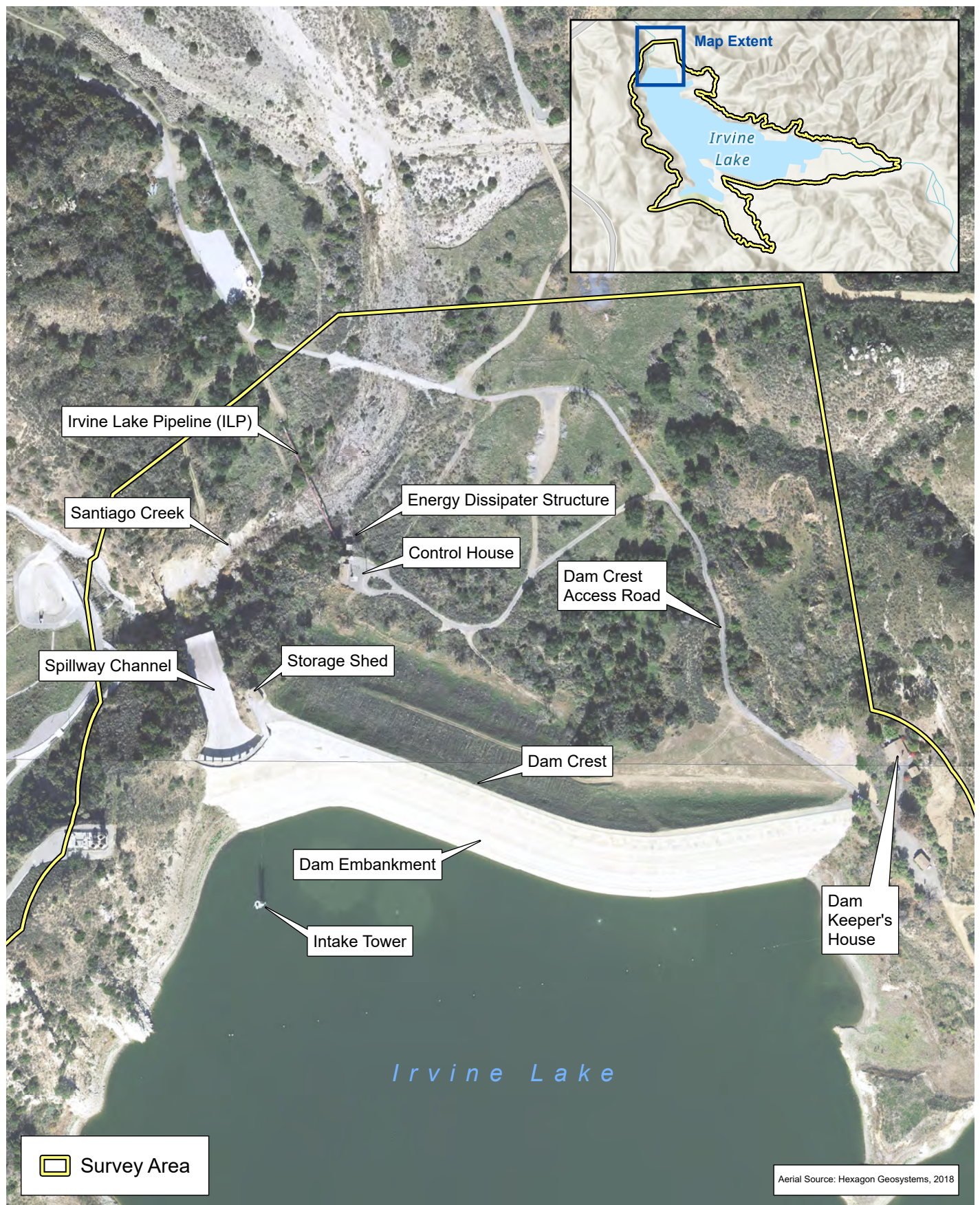


0 2,000 4,000
Feet



(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\BTR\LV_RL.pdf

D:\Projects\31RW\SantiagoCreek\PROJ\SCD\SCD_Project.aprx\ex_Existing_Dam_Features



Existing Dam Features

Santiago Creek Dam Improvement Project

Exhibit 2

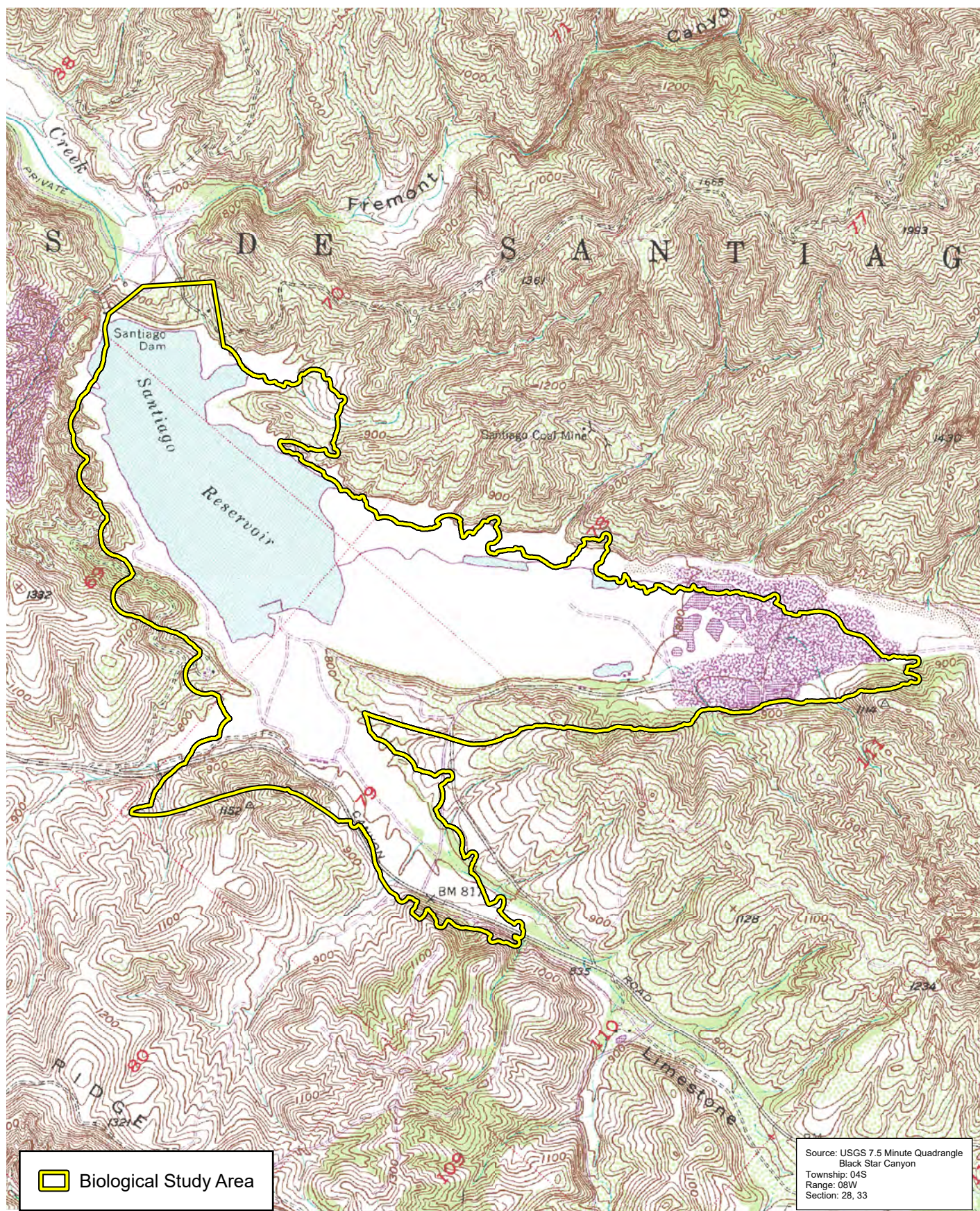


0 150 300
Feet



(Rev: 2-27-2025 JVR) R:\Projects\IRW_IRWD\31RW010205\Graphics\BTR\ex_ExistingDamFeatures.pdf

D:\Projects\31RW\SantiagoCreek\PROJ\SCD\SCD_Proj.apr\ex_USGS



U.S. Geological Survey 7.5-minute Digital Quadrangle

Exhibit 3

Santiago Creek Dam Improvement Project



0 1,000 2,000
Feet



The Project is located in the Central/Coastal Subregion of the Natural Communities Conservation Plan/Habitat Conservation Plan (NCCP/HCP). Santiago Creek Dam and its associated structures are located within designated “Non-Reserve Open Space”, while Habitat Reserve and Conservation Easements surround the lake; a Special Linkage is located southeast of the lake (Exhibit 4). The purpose of this plan is to provide regional protection and recovery of multiple species and habitat while allowing compatible land use and appropriate development. Irvine Ranch Water District (IRWD)² is a participating jurisdiction and, as such, will comply with the terms of the NCCP/HCP Implementation Agreement (IA). Santiago Creek Dam is a permitted existing use under the NCCP/HCP. No amendments to the NCCP/HCP shall be required for constructing infrastructure facilities so long as amended infrastructure plans do not result in incidental take beyond that described and permitted by the NCCP/HCP.

1.2 PROJECT BACKGROUND

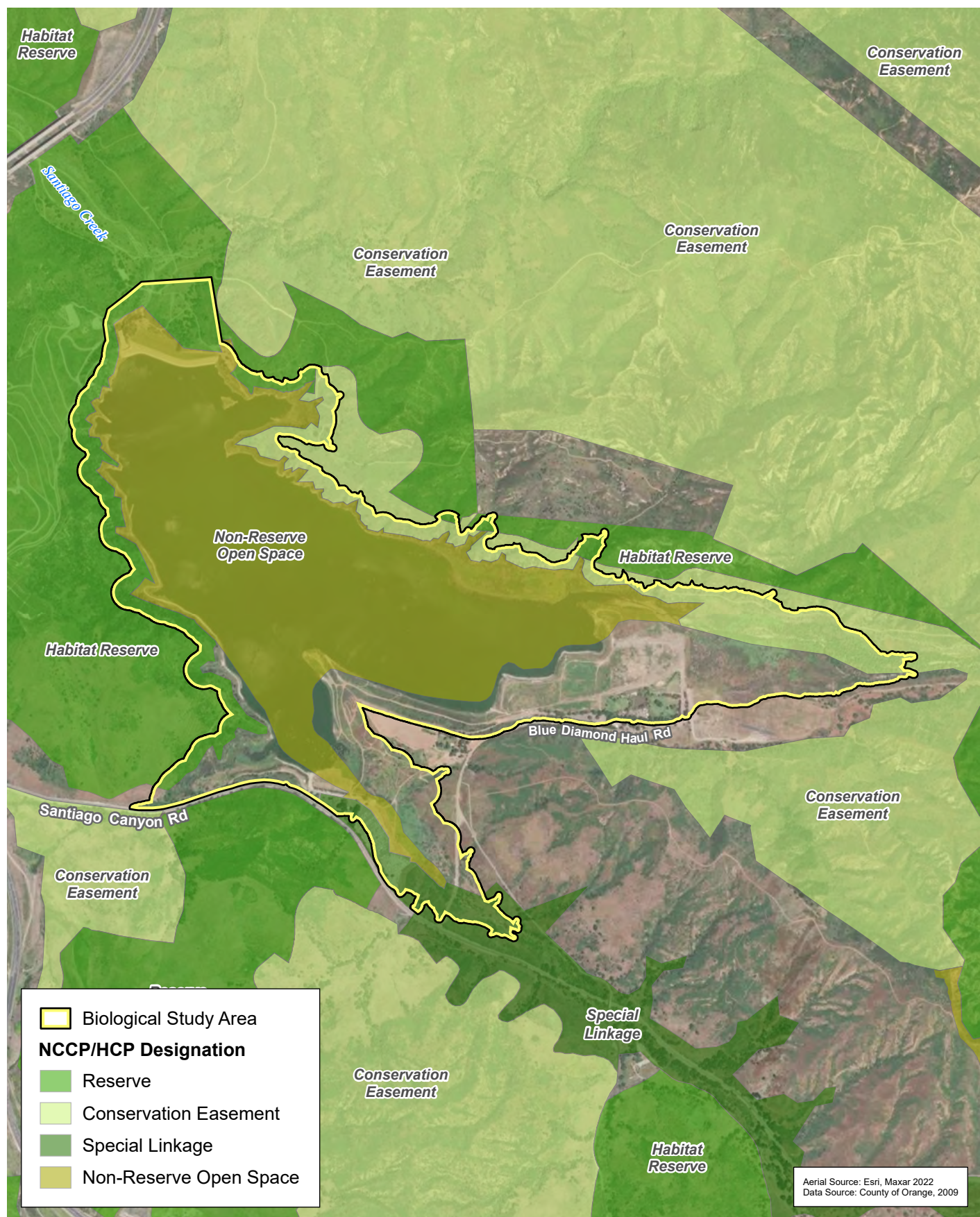
IRWD owns and operates Irvine Lake and the Santiago Creek Dam that serve as a critical water supply reservoir for IRWD’s service area. The Santiago Creek Dam impounds water for Irvine Lake from Santiago Creek, local storm water runoff, and raw water from Metropolitan Water District of Southern California (MWD). It serves as a domestic and non-potable water supply for various cities in Orange County.

Irvine Lake is a reservoir of untreated water located east of Irvine Regional Park. The lake’s capacity is currently approximately 24,000 acre-feet (AF) but can hold an additional 2,700 AF when flash boards are installed on the spillway, temporarily raising the maximum water elevation an additional 4 feet to 795.9 feet. IRWD uses water from Irvine Lake for two purposes: 1) as a source of water for non-drinking purposes, such as irrigation uses, and 2) as a source of water for the Baker Water Treatment Plant, which produces drinking water for an estimated 85,000 homes in Orange County. IRWD can provide water from Irvine Lake to Serrano Water District (SWD) through the Howiler Treatment Plan, which is owned and operated by IRWD, to serve SWD customers in the City of Villa Park and portions of the City of Orange. Per the terms of the Water Service Reliability Agreement executed between IRWD and SWD on December 12, 2024, IRWD can backstop and/or augment use of groundwater to enhance SWD’s water supply reliability using water sourced from Irvine Lake. In the future, IRWD will construct an interconnection between SWD’s and IRWD’s potable system, which will allow IRWD to serve water from the Howiler Treatment Plant to IRWD customers. The construction and operation of the interconnection will be subject to separate environmental review.

Santiago Creek Dam is a compacted earthfill embankment completed in 1933 and certified by the State of California, Department of Water Resources (DWR), Division of Safety of Dams (DSOD), which identifies it as Dam No. 75-000. Santiago Creek Dam is located in Orange County, California and impounds water for Irvine Lake from Santiago Creek, a tributary to the Santa Ana River. Santiago Creek Dam is approximately 136 feet high and 1,425 feet long. It is roughly 760 feet wide at the base and contains approximately 800,000 cubic yards of materials. IRWD has appropriative rights to the flows of Santiago Creek including a right to

² The Santiago County Water District (SCWD) was also a participating jurisdiction in the NCCP/HCP. The SCWD consolidated with IRWD in 2006.

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx_NCCP



Orange County Central/Coastal NCCP/HCP

Exhibit 4

Santiago Creek Dam Improvement Project



0 1,000 2,000
Feet



diversion by storage in Irvine Lake for municipal, domestic, and agricultural uses. The reservoir provides flood control, water supply, fisheries enhancement, and recreational opportunities for the surrounding area. The existing silt level varies throughout the lake; however, it is estimated that the accumulated sediment currently occupies approximately 2,150 AF of the lake.

The sources of water for the Lake are flows from Santiago Creek, local runoff captured during rainfall events and untreated (imported) water purchased from MWD. The imported water is conveyed to the Lake through MWD's Santiago Lateral Pipeline (SLP). When water is drawn from the Lake from the existing outlet tower, water is conveyed via the Irvine Lake Pipeline (ILP) to downstream customers.

The outlet works for the dam consists of a tower, an outlet conduit, and a downstream control house. The outlet works are the normal means of releasing water impounded by the dam. The tower sits above the outlet pipe, or tunnel, and is used to transport water out of the reservoir. The outlet conduit conveys water from the reservoir through, under, or around a dam in a controlled manner. The downstream control house contains, or houses, electrical or other equipment. A concrete-encased welded steel pipe outlet conduit is located at the base of the outlet tower and runs beneath the dam to the toe of the dam where the pipeline splits in a bifurcation valve vault to permit water to flow into a 36-inch main pipe and a 30-inch diverter pipe. The main pipe supplies water to IRWD and the Howiler Water Treatment Plant. The diverter pipe can release water from the lake into the streambed immediately downstream of the control house for dam safety purposes.

The existing dam spillway³ is a reinforced concrete structure located on the left abutment of the dam and consists of an approach, broad-crested weir control structure, chute, and flip bucket at the downstream end. The spillway has vertical reinforced concrete walls through the length and a bridge structure with piers at the spillway crest. The spillway crest is located at elevation 791.9 feet. Historical records of spillway flows at Santiago Creek Dam indicate that the spillway has flowed 24 times between 1937 and 2019 (82 years).

Irvine Lake is held at varying levels depending on the time of year. In the wet winter months, water can be stored up to the 791.9-foot elevational contour.⁴ The height of the existing spillway with the flashboards installed is at the 795.9-foot elevation contour; this is the current maximum capacity of the reservoir and is only permitted in the summer months. Historically, the inflow into the reservoir during storm events is high enough to cause the water to flow over the spillway crest, located at the 791.9-foot elevation, approximately once every four to five years (1937 to 2019). From October 2002 to September 2020, the reservoir has been filled to the spillway crest four times and water has been high enough to flow over the spillway twice. The water levels in the lake during this period (2002 to 2020) fluctuated between the approximately 736-foot elevation contour and the 795-foot elevation contour. Between 2002 and 2020, the longest consecutive period of time that water was stored in the upper two feet of the reservoir (793.9 to 795.9 feet) was approximately 35 days.

³ A spillway is a structure on a dam that allows water to flow around the dam to safely release excess water from a reservoir.

⁴ NAVD88 Datum is used throughout this document.

1.3 PURPOSE AND NEED

In 2012, and in collaboration with DSOD, IRWD initiated seismic evaluations of the existing outlet tower that resulted in a determination that the free-standing structure was seismically unstable. In 2017, at the request of DSOD, IRWD initiated a multi-phase spillway condition assessment. The assessment found that the spillway is nearing the end of its useful life and its design, while acceptable at the time of construction, does not meet current design standards (URS 2015). IRWD has also conducted an assessment of seismic performance of the dam embankment and has determined that modifications to the Santiago Creek Dam embankment are necessary.

In view of the findings of the seismic evaluation for the existing outlet tower and dam embankment, as well as the comprehensive assessment of the existing spillway, IRWD has elected to develop designs for an inclined outlet structure that will be placed near the left abutment of the existing dam, to modify the embankment, and to replace the existing spillway with a side-channel spillway on the left abutment. The spillway crest will also be raised by six feet, which is two feet higher than the top of the flashboards when installed, to regain operational storage capacity that was lost over the years due to sedimentation. The existing outlet tower would be demolished, and the new inclined outlet structure would connect to the existing outlet conduit within the reservoir. The dam embankment would be modified to include a filter drain system.

1.4 PROJECT OBJECTIVES

The primary objective of the proposed Project is to rehabilitate and replace the Santiago Creek Dam outlet tower and spillway facilities to modify the dam embankment to permit operation of the facilities to provide a long-term water resource benefit. In implementing the proposed Project, IRWD would also obtain the following benefits:

- Construct new facilities and dam embankment modifications that will meet or exceed the current seismic, safety and design requirements established by DSOD, which is the governing state agency associated with this Project;
- Satisfy IRWD's operational requirements in the present and future;
- Extend the useful life of the facilities;
- Improve regional water supply reliability; and
- Minimize impacts to local environmental resources and surrounding property owners.

1.5 PROJECT DESCRIPTION

General elements of each portion of the Project are included below. A more detailed description of the proposed facilities is included in the Environmental Impact Report (EIR). The Project Description represents a conservative analysis to accommodate the range of uncertainty regarding the final design. Therefore, the quantities and measurements used throughout the analysis are estimates based on the best available information.

- The existing outlet tower would be demolished; with the portion of the tower located below the sediment to be filled with concrete and capped with a concrete plug or completely removed. A new inclined outlet structure would be constructed on the left abutment, including an approximately 54-inch steel pipe inclined along the slope that would act as the conveyance pipe for water into and out of the reservoir. The concrete-encased steel pipe would be situated in firm bedrock and anchored to the slope by drilled foundation anchors. A series of steel riser pipes would extend vertically from the inclined 54-inch steel pipe and would act as intakes for reservoir water into the 54-inch pipe. Each riser would include an intake fish screen that would inhibit debris, silt, and aquatic life from entering the pipe.
- The inlet/outlet works would be configured to incorporate the new structure, including new valves and fittings. Water from the lake would enter into the new inclined inlet/outlet structure and would convey lake water through an existing conduit under the dam. At the downstream toe of the dam, a new fitting would be installed to bifurcate the flow either to the ILP or the emergency outlet pipeline. Water that enters the ILP would reach IRWD's distribution system. Water that enters the emergency outlet pipeline would be released to the creek at the end of the new spillway.
- The ILP would be increased from 36 inches to 54 inches to match the pipeline coming from the inclined inlet/outlet structure, as well as to increase the capacity of the line to improve the system's hydraulics. The relocation and upsizing improvements would also protect the ILP from future flood events, thereby enhancing the overall reliability of delivering water from Irvine Lake to customers.
- The existing spillway would be demolished and replaced with a new side-channel spillway in a rock cut on the left abutment. The alignment for the new spillway was selected as a result of several constraints including the footprint of the dam embankment, the location of the sloped outlet structure, and the steeply sloped hillside along the left abutment.
- To ensure the spillway structure is constructed on sound foundational material, many areas under the spillway structure would include the placement of roller compacted concrete. In addition, the floor of the spillway would be anchored into bedrock materials that would include drilling, grouting, post-tensioning and securing the anchors into the spillway slab.
- The end of the new spillway would include a stilling basin before discharging to a concrete and riprap apron. At the end of the stilling basin, a scour protection cutoff is included for additional mitigation of head cutting that may occur during significant discharges.

- The dam embankment improvements include removing the upper portion of the dam on the downstream side of the embankment, constructing a filter drain system, and encapsulating the filter drain system with embankment shell material composed of pervious material.
- A new access road and ramp would be constructed to provide vehicle access to the new inlet/outlet structure. A new shotcrete tie-back wall would be needed to cut the roadway into the existing slope without affecting the existing landfill facility above.
- A new dam control building would be constructed to house the valve system at the end of the existing dam crest. The preliminary layout shows a fire-hardened building with the approximate dimensions of 60 feet by 20 feet with a height of 18 feet.
- The dam crest would be widened from 10 feet to between approximately 35 and 45 feet, the dam crest elevation would be raised approximately one foot, which would improve access and safety for dam maintenance. The paved dam crest would include protective railings on both sides of the road and replacement piezometers to monitor the performance of the embankment dam. These embankment improvements would require excavations along the toe of the dam to key in the earthwork improvements to the face of the dam.
- The dam crest would be raised approximately one foot on the upstream side of the dam crest. This would raise the effective dam crest from an elevation of 811.9 feet up to approximately 812.9 feet for DSOD freeboard requirements during a probable maximum flood event.
- The Project would raise the spillway six feet to 797.9 feet, which is two feet higher than the existing maximum water storage elevation of 795.5 feet. Raising the spillway would allow the dam to impound water up to the 797.9-foot elevation contour year-round, which would allow storage of approximately 1,300 AF of additional water.
- A new emergency access walkway (five feet wide) and stair system would be constructed along the left wall of the new spillway channel to reach the inlet/outlet structure and dam crest from the adjacent closed OCWR landfill facility during a spillway event. The walkway would connect to the new access road (described above).
- A new steel bridge structure would be included for vehicles across the new spillway.
- Existing structures would be demolished, including the existing vertical outlet tower and portions of 60-inch outlet conduit, significant portions (or possibly all) of the existing spillway chute and walls, spillway bridge and piers, portions of the upstream dam embankment concrete facing, storage building on the dam crest, outlet works control building and valve vault, outlet works energy dissipator vault, portions of the ILP, catwalk and stairs assembly across Santiago Creek, the dam keeper's house, boat shop (unless re-purposed for IRWD use), and piezometers/monitoring wells. Site demolition activities are anticipated to occur in 2027/2028, and spillway demolition is expected to occur in 2028. The potential removal of the boat shop building would occur at the end of the construction period in 2030. When feasible, demolished materials would be recycled or reused.

- The existing Southern California Edison (SCE) overhead power lines and power poles in the vicinity would be relocated outside the construction limits. This relocation would be completed by SCE. There would be an approximately 15-foot-wide right-of-way (ROW) easement for long-term maintenance.
- Before beginning construction of the dam improvements, the lake would be dewatered, and an access road would be graded along the edge of the dewatered lakebed to allow construction access between the staging area and the dam structure.
- IRWD would maximize withdrawals from Irvine Lake in the time leading up to construction initiation to minimize the amount required to be dewatered. The dewatering process would combine several methods including dewatering using the valves and outlet tower to allow water to flow downstream, implementing a temporary pumping system, and installing a subgrade dewatering system (e.g., dewatering wells). The temporary pumping system would include diesel-driven pumps and temporary above ground piping that would convey the water from the lake to a discharge point along Santiago Creek near the existing Arizona crossing (a type of culvert crossing). Dewatering would be used throughout the year as needed to manage the water level during and after storm events and to maintain a dry work environment. IRWD would coordinate downstream releases with impacted agencies and entities.
- Once the lake is dewatered and before the first dry season, the contractor would construct a temporary diversion berm and access ramp. The temporary diversion would provide a physical barrier to protect the work area from seasonal storms and would provide an elevated access road to allow construction equipment to access the downstream side of the dam.
- During construction, concrete crushing would occur in one of the staging areas. Concrete crushing would be expected to occur intermittently for approximately three weeks during the demolition phase of the Project but may also occur at various stages of the Project as concrete is removed from the existing spillway or dam. When feasible, demolished and removed materials would be recycled or reused.

1.6 ADDITIONAL GEOTECHNICAL INVESTIGATIONS

Although the Districts previously completed geotechnical investigation to support Project design and the development of detailed construction documents (2021–2024), additional geotechnical investigations were conducted in early 2025 to support the final design. These investigations included the performance of exploratory test pits, soil borings, packer testing, and non-intrusive geologic investigations and observations. The additional geotechnical investigations remained within the proposed limits of disturbance defined by the Project and will be mitigated as part of the overall Project. The Biological Resources Memorandums analyzing the Santiago Creek Dam Geotechnical Investigations are included in Appendix A.

1.7 CONSTRUCTION ACTIVITIES

Construction Access and Staging

The primary construction access would lead into the lake from Santiago Canyon Road and Blue Diamond Haul Road. The primary contractor staging and equipment storage area, as well as the required concrete batch plant and construction trailers, would be located in the large, flat plateau area (known as “the Flats”) at the upstream end of the reservoir. The primary construction access/haul road would connect the staging area to the existing dam within the lakebed after the lake is dewatered. An earthen ramp would be constructed up the right abutment of the existing dam to allow construction vehicles to access the downstream side of the dam. To facilitate construction of the downstream features, a secondary staging area would be located on the downstream toe of the dam near the existing outlet structure building. It is anticipated that the secondary staging area would be utilized by the contractor to mobilize the roller compacted concrete batch plant. The secondary staging area may also be used to stage formwork, rebar, raw materials, and other related materials and equipment required to successfully construct the dam improvements. Material from the embankment would be removed, staged, and repurposed within the Project site.

Temporary Construction Water

Water would be utilized for various construction activities. The available water source in the Project vicinity is a 12-inch potable water line running along East Santiago Canyon Road south of Irvine Lake. IRWD would install a temporary highline from Santiago Canyon Road, along Blue Diamond Haul Road to the staging area. The temporary construction water line would be routed above-ground through the Irvine Lake parking area and along the primary contractor access/haul road to the proposed work areas. Construction activities may also use untreated water from the ILP as an additional water source.

Borrow Areas

Project construction would involve the removal and on-site transport of approximately 360,000 cubic yards (CY) of soil from on-site borrow pits, located within the limits of the lake, to serve as source material for the dam embankment. These materials would be moved from one on-site location to another and ultimately balanced on-site. The Project would include importing approximately 200,000 CY of material and exporting approximately 315,000 CY of material over the four-year construction period.

Construction Schedule

Construction work is anticipated to begin in Fall 2027 and the Project is expected to be completed within approximately four years. The approximately four-year construction window assumes down-time associated with weather restrictions and assumes working double 10-hour shifts (i.e., 20-hour workdays with nighttime work). The construction schedule assumes that a minimum of three dry seasons, which are generally between April to October, would be required to build the dam improvements in a systematic and phased fashion. It also assumes that the embankment improvements would be built concurrently with the spillway improvements. The exact date that construction begins is subject to

change. The construction schedule will be refined as Project design plans are developed and finalized.

During construction, concrete crushing would occur in the staging area at the upstream end of the lake. Concrete crushing would be expected to occur during the day from April through November during the demolition phase of the Project. As mentioned above, concrete crushing would be expected to occur intermittently for approximately three weeks during the demolition phase of the Project but may occur at various stages of the Project as concrete is removed from the existing spillway or dam.

Various public agencies (e.g., Orange County Fire Authority, Orange County Sheriff's Department, etc.) currently use portions of the proposed staging area for takeoff and landings associated with training and operational activities. During construction of the proposed Project, HeloPods⁵ would be designated near the eastern edge of the lake near the Flats area at the upstream end of the reservoir for their continued use.

1.8 OPERATION AND MAINTENANCE

Once operational, all Project components would operate and be monitored through IRWD's Supervisory Control and Data Acquisition (SCADA) system. Reservoir level sensors would continue to monitor water levels in the reservoir. In addition, instrumentation and monitoring systems would continuously monitor the stability of the dam and identify situations that may require intervention, such as a controlled emergency release of water from the reservoir. Any upgrades to instrumentation and monitoring equipment would be determined during final design and may include, but are not limited to, survey monuments, inclinometers, seepage weirs, piezometers, reservoir level sensors, strong motion accelerographs, and a weather station.

Irvine Lake is generally operated in four IRWD operational modes as outlined in Table 1. Each mode has general operating parameters that allow for the safe, cost-effective operation of the lake while maximizing the potential average annual water runoff from natural storm events.

⁵ Portable, tactical helicopter dip sources which provide fire crews a water source to refill the helicopters water tanks closer to the location of a wildfire.

TABLE 1
IRWD/LAKE OPERATIONAL MODES

Season	
Winter	During the Winter Mode any available rainfall is captured in the lake and stored for use. This period begins with the first rainfall event in November/December and reduces or eliminates the need to purchase untreated imported water from MWD if runoff equals or is greater than demands.
Spring	During the Spring Mode under the first option, lake storage is evaluated to determine if available runoff captured during the winter will meet demands through October 1. If additional water is needed during a dry year, untreated imported water from MWD is purchased prior to May 1. Under the second option, water is not purchased prior to the summer season.
Summer	During the Summer Mode beginning May 1, under the first option, the lake is drafted down to meet IRWD demands. Under the second option water is purchased on a month-by-month basis to meet demands, which minimizes evaporation losses applied to imported supplies.
Fall	During the Fall Mode beginning October 1, purchased untreated imported water from MWD is used to maintain the Lake at the minimum operational level while maximizing available storage. Once sufficient runoff is received to meet demands or to begin filling the lake, staff transitions to the Winter Mode.
Under some water level and rain event conditions, the spillway may be utilized to pass storm flows around the dam. When the spillway is activated, the emergency outlet valve to Santiago Creek may be opened to release water and lower the water level in the reservoir and orders for untreated imported water are ceased.	
Source: IRWD 2020.	

Similar to the current reservoir, operation of the proposed Project would not require daily onsite staffing but would require only periodic maintenance. Water levels at Irvine Lake would fluctuate seasonally; water would be stored in winter when water supply exceeds demand, and the reservoir would be drawn down in summer when water demand exceeds supply. However, IRWD would develop a new operating plan for Irvine Lake that would be updated each year to set targets for the volume of water to be contained in the reservoir on a daily, monthly, annual, or seasonal basis. Reservoir operations would vary with time based upon a wide variety of factors, such as: seasonal storage needs, water quality considerations, and impoundment requirements based on rainfall projections.

During precipitation events, IRWD may maintain reservoir levels well below the spillway crest to create sufficient space for stormwater runoff to enter the reservoir and avoid use of the spillway. The annual operating plan would identify an operating strategy that would reduce the potential for utilizing the spillway and for maximizing stormwater capture. Reservoir operations would be adjusted by IRWD during the year based on changes in projected demands, and other factors as needed.

Under normal operating conditions, all flow out of the reservoir would be conveyed through inlet/outlet pipeline. In the event of an emergency or for dam safety reasons, IRWD would release water through the cone valve to the creek. IRWD Operations and Maintenance staff

would continue to conduct routine safety and security checks of the site, similar to existing protocols.

1.8.1 Additional Inundation During Operation

The Project includes raising the spillway six feet to 797.9 feet, which is 2 feet higher than the existing maximum water storage elevation with the flashboards installed (759.9 feet). Raising the spillway would allow the lake to impound water up to the 797.9-foot elevation contour year-round, which would allow storage of approximately 1,300 AF of additional water. Under current operations, if Irvine Lake was full and the water was conveyed to the Baker Water Treatment Plant at full production while also feeding the Howiler Water Treatment Plant, the water level in the lake would be lowered by approximately 2 feet in approximately 18 days, assuming no additional inflow into the reservoir and excluding evaporation. IRWD estimates that the upper 2 feet of the reservoir (i.e., 795.9 to 797.9 feet in elevation) could be inundated for an approximate maximum of 30 to 45 days per year but typically would be inundated less often and in some years not at all. As previously discussed, the existing lake capacity is currently approximately 24,000 AF, but it can hold an additional 2,700 AF when the flash boards are installed on the spillway. With proposed improvements, the lake would hold a maximum of 28,000 AF.

Other than raising the spillway, all other operations would remain similar to the existing operations of the dam.

1.9 REGULATORY SETTING

1.9.1 Federal

National Environmental Policy Act

The National Environmental Policy Act (NEPA) establishes a broad national framework for protecting the environment. NEPA's basic policy is to assure that all branches of government give proper consideration to the environment prior to undertaking any major federal action that significantly affects the environment (42 *United States Code* [USC] 4321-4347). NEPA established the U.S. Environmental Protection Agency (USEPA) with the following roles and functions: (1) to establish and enforce environmental protection standards consistent with national environmental goals; (2) to conduct research on the adverse effects of pollution and on methods and equipment for controlling it; the gathering of information on pollution; and the use of this information in strengthening environmental protection programs and recommending policy changes; (3) to assist, through grants, technical assistance, and other means, in arresting pollution of the environment; and (4) to assist the Council on Environmental Quality in developing and recommending to the President new policies for the protection of the environment.

Federal Endangered Species Act

The Federal Endangered Species Act (FESA) protects plants and animals that the USFWS has listed as "Endangered" or "Threatened." A federally listed species is protected from unauthorized "take," which is defined in the FESA as acts to "harass, harm, pursue, hunt,

shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct” (16 USC Sections 1532[19] and 1538[a]). In this definition, “harm” includes “any act which actually kills or injures fish or wildlife, and emphasizes that such acts may include significant habitat modification or degradation that significantly impairs essential behavioral patterns of fish or wildlife” (50 *Code of Federal Regulations* [CFR], Title 50, Section 17.3). Unless performed for scientific or conservation purposes with the permission of the USFWS, take of listed species is only permissible if the USFWS issues an Incidental Take Permit (ITP). When issuing an ITP, all federal agencies, including the USFWS, must ensure that their activities are “not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species” (16 USC 1536[a]). Enforcement of the FESA is administered by the USFWS.

The FESA also provides for designation of Critical Habitat: specific areas within the geographical range occupied by a species where physical or biological features “essential to the conservation of the species” are found and “which may require special management considerations or protection” (16 USC 1538[5][A]). Critical Habitat may also include areas outside the current geographical area occupied by the species that are nonetheless essential for the conservation of the species.

Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act requires consultation with the USFWS and the fish and wildlife agencies of States where the “waters of any stream or other body of water are proposed or authorized, permitted or licensed to be impounded, diverted . . . or otherwise controlled or modified” by any agency under a federal permit or license. Consultation is to be undertaken for the purpose of “preventing loss of and damage to wildlife resources.”

Sections 404 and 401 of the Clean Water Act of 1972

Section 404 of the Clean Water Act (CWA) (33 USC 1251 et seq.) regulates the discharge of dredged or fill material into waters of the United States (WOTUS), including wetlands. The USACE is the designated regulatory agency responsible for administering the 404 permit program and for making jurisdictional determinations. This permitting authority applies to all waters of the United States where the material has the effect of (1) replacing any portion of WOTUS with dry land or (2) changing the bottom elevation of any portion of WOTUS. These fill materials would include sand, rock, clay, construction debris, wood chips, and materials used to create any structure or infrastructure in WOTUS. Dredge and fill activities are typically associated with development projects; water resource-related projects; infrastructure development; and wetland conversion to farming, forestry, or urban development.

The definition of WOTUS has been the subject of shifting regulations. Past federal revisions to regulations addressing the extent of USACE jurisdiction and the definition of WOTUS have been issued by the Obama Administration in 2015 and the Trump Administration in 2020. On January 18, 2023, the United States Environmental Protection Agency (USEPA) published a final Water Rule in the Federal Register that went into effect on March 20, 2023 (“the 2023 Rule”) (USACE and USEPA 2023a).

The definition of WOTUS changed again in response to the Supreme Court decision in the case of *Sackett v. USEPA*⁶. On September 8, 2023, the USEPA and the USACE amended the Code of Federal Regulations to conform the definition of WOTUS to the Supreme Court decision (USACE and USEPA 2023b). This conforming rule amends the provisions of the agencies' definition of WOTUS that were invalid under the Supreme Court's interpretation of the CWA under *Sackett*. Based on these changes, tributaries must have at least relatively permanent flow to be considered WOTUS from the federal definition. This would exclude ephemeral drainages from being WOTUS. This represents a substantial change to areas under federal jurisdiction in the arid west. This report provides interpretations of WOTUS under the Amended 2023 Rule.

Under Section 401 of the CWA, an activity requiring a USACE Section 404 permit must obtain a State Water Quality Certification (or waiver thereof) to ensure that the activity will not violate established federal or State water quality standards. The State Water Resources Control Board (SWRCB), in conjunction with the nine California RWQCBs, is responsible for administering the Section 401 water quality certification program. The SWRCB's and RWQCB's jurisdiction also extend to all "waters of the State" when no WOTUS are present, including wetlands and non-wetland waters of the State (isolated and non-isolated). The USEPA is the federal regulatory agency responsible for implementing the CWA.

Migratory Bird Treaty Act of 1918

The Migratory Bird Treaty Act (MBTA) of 1918 (16 USC 703–711), as amended in 1972, makes it unlawful at any time, by any means or in any manner, unless permitted by regulations, to "pursue; hunt; take; capture; kill; attempt to take, capture, or kill; possess; offer for sale; sell; offer to barter; barter; offer to purchase; purchase; deliver for shipment; ship; export; import; cause to be shipped, exported or imported; deliver for transportation; transport or cause to be transported; carry or cause to be carried; or receive for shipment, transportation, carriage, or export, any migratory bird; any part, nest, or eggs of any such bird; or any product, whether or not manufactured, which consists, or is composed in whole or part, of any such bird or any part, nest, or egg thereof. . . ." (16 USC 703).

The MBTA covers the taking of any nests or eggs of migratory birds, except as allowed by permit pursuant to 50 CFR, Part 21. This regulation seeks to protect migratory birds and active nests. The MBTA protects over 800 species, including geese, ducks, shorebirds, raptors, songbirds, and many relatively common species. Bird species protected under the provisions of the MBTA are identified by the List of Migratory Birds (50 CFR 10.13), as updated by the 1983 American Ornithologists' Union (AOU) Checklist and published supplements by the USFWS.

In 1972, the MBTA was amended to include protection for migratory birds of prey (e.g., raptors). Six families of raptors occurring in North America were included in the amendment: Accipitridae (kites, hawks, and eagles); Cathartidae (New World vultures); Falconidae (falcons and caracaras); Pandionidae (ospreys); Strigidae (typical owls); and

⁶ Further discussion of this court decision is included in Appendix A of the Jurisdictional Delineation.

Tytonidae (barn owls). The provisions of the 1972 amendment to the MBTA protect all species and subspecies of these families.

Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (16 USC 668) provides for the protection of the bald eagle (*Haliaeetus leucocephalus*) and the golden eagle (*Aquila chrysaetos*) by prohibiting, except under certain specified conditions, the taking, possession, and commerce of such birds. The 1972 amendments increased penalties for violating provisions of the Act and strengthened other enforcement measures. A 1978 amendment authorized the Secretary of the Interior to permit the taking of golden eagle nests that interfere with resource development or recovery operations.

The Bald and Golden Eagle Protection Act defines "take" as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb." Regulations further define "disturb" as "to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior" (50 CFR 22.6).

In addition to immediate impacts, this definition also covers effects that result from human-induced alterations initiated around a previously used nest site during a time when eagles are not present, if, upon the eagle's return, such alterations agitate or bother an eagle to a degree that interferes with or interrupts normal breeding, feeding, or sheltering habits, and causes injury, death or nest abandonment.

A 1994 Memorandum from President William Clinton to the heads of Executive Agencies and Departments established the policy concerning collection and distribution of eagle feathers for Native American religious purposes.

1.9.2 State

California Environmental Quality Act

CEQA (13 *Public Resources Code* Sections 21000 et seq.) is a statute that requires state and local agencies to identify the significant environmental impacts of their actions and to avoid or mitigate those impacts, if feasible. The CEQA Guidelines (14 *California Code of Regulations* [CCR] Chapter 3) are the regulations that explain and interpret the law for both public agencies and private development required to administer CEQA.

With regards to plants and animals, CEQA Guidelines Section 15380 independently defines "Endangered" and "Rare" species separately from the definitions of the California Endangered Species Act (CESA). Under CEQA, Endangered species of plants or animals are defined as those whose survival and reproduction in the wild are in immediate jeopardy, while Rare species are defined as those that (1) have such low numbers that they could become Endangered if their environment worsens or (2) are likely to become endangered within the foreseeable future (i.e., "threatened" as used in the FESA). In addition, a Lead

Agency can consider a non-listed species (e.g., species with a California Rare Plant Rank [CRPR], California Species of Special Concern, or species of Local Concern) to be treated as if it were Endangered, Rare, or Threatened for the purposes of CEQA if the species can be shown to meet the criteria in the definition of “Rare” or “Endangered” in the Project region.

The CEQA Guidelines designate certain “trustee agencies” that have jurisdiction by law over natural resources affected by a project which are held in trust for the people of California. CDFW is the trustee responsible for conservation, protection, and management of wildlife, native plants, and habitat necessary to maintain biologically sustainable populations. Trustee agencies are generally required to be notified of CEQA documents relevant to their jurisdiction, whether or not these agencies have actual permitting authority or approval power over aspects of the underlying project. CDFW shall provide the requisite biological expertise to review and comment upon environmental documents and impacts arising from project activities and shall make recommendations regarding those resources held in trust for the people of California (*California Fish and Game Code* §1802).

California Endangered Species Act

The State of California implements the CESA, which is enforced by the CDFW. While the provisions of the CESA are similar to the FESA, CDFW maintains a list of California Threatened and Endangered species, independent of the FESA Threatened and Endangered species list. It also lists species that are considered Rare and Candidates for listing, which also receive protection. The California list of Endangered and Threatened species is contained in Title 14, Sections 670.2 (plants) and 670.5 (animals) of the *California Code of Regulations*.

State-listed Threatened and Endangered species are protected under provisions of CESA. Activities that may result in take of individuals (defined in CESA as acts to “hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill”) are regulated by CDFW. While habitat degradation or modification is not included in the definition of “take” under CESA, the CDFW has interpreted “take” to include the destruction of nesting, denning, or foraging habitat necessary to maintain a viable breeding population of protected species.

If it is determined that the “take” would not jeopardize the continued existence of the species, an ITP can be issued by CDFW per Section 2081 of the *California Code of Regulations*. If a State-listed species is also federally listed, and the USFWS has issued an ITP that satisfies CDFW’s requirements, CDFW may issue a consistency finding in accordance with Section 2080.1 of the *California Fish and Game Code*.

California Fish and Game Code

CDFW administers the *California Fish and Game Code*. Particular sections of the Code are applicable to natural resource management.

Native Plant Protection

Sections 1900–1913 of the *California Fish and Game Code* were developed to preserve, protect, and enhance Endangered and Rare plants in the State of California. The act requires

all State agencies to use their authority to carry out programs to conserve Endangered and Rare native plants. Provisions of the Native Plant Protection Act prohibit the taking of listed plants from the wild and require notification of the CDFW at least ten days in advance of any change in land use that would adversely impact listed plants. This allows the CDFW to salvage listed plant species that would otherwise be destroyed.

Unlawful Take or Destruction of Nests or Eggs

These sections duplicate federal protection under the MBTA. Section 3503 of the *California Fish and Game Code* makes it unlawful to take, possess, or destroy any bird's nest or any bird's eggs. Further, any birds in the orders *Falconiformes* or *Strigiformes* (i.e., birds of prey, such as hawks, eagles, and owls) and their nests and eggs are protected under Section 3503.5 of the *California Fish and Game Code*. Section 3513 of the *California Fish and Game Code* prohibits the take and possession of any migratory nongame bird, as designated in the MBTA.

California Fully Protected Species

The State of California created the "Fully Protected" classification in an effort to identify and provide additional protection to those animals that are rare or that face possible extinction. Lists were created for fish, amphibians and reptiles, birds, and mammals. Most of the species on these lists have subsequently been listed under the State and/or Federal Endangered Species Acts; however, some have not been formally listed.

Various sections of the *California Fish and Game Code* provide lists of Fully Protected reptile and amphibian (§ 5050), bird (§ 3511), and mammal (§ 4700) species that may not be taken or possessed at any time, except as provided in Sections 2081.7, 2081.9, or 2835. CDFW is unable to authorize the issuance of permits or licenses to take these species, except for necessary scientific research.

Natural Communities Conservation Planning Act

The Natural Community Conservation Planning Act, codified in Sections 2800–2835 of the *California Fish and Game Code* and signed into law in October 1991, authorizes the preparation of Natural Community Conservation Plans (NCCPs). The Act is a State of California effort to protect critical vegetative communities and their dependent wildlife species. The purpose of an NCCP is to sustain and restore those species and their habitat identified by CDFW that are necessary to maintain the continued viability of those biological communities impacted by human changes to the landscape. The NCCP process provides an alternative to protecting species on a "single species basis" as in the federal and State ESAs. Under the Act, CDFW is responsible for creating process planning and conservation guidelines for NCCP programs. Local governments and landowners may then prepare the NCCPs so that they comply with the CESA.

California Fish and Game Code (Sections 1600 through 1616)

California Fish and Game Code Sections 1600 et seq. establish a process to ensure that projects conducted in and around lakes, rivers, or streams do not adversely impact fish and wildlife resources or, when adverse impacts cannot be avoided, ensures that adequate mitigation and/or compensation is provided.

California Fish and Game Code Section 1602 requires any person, State, or local governmental agency or public utility to notify CDFW before beginning any activity that will do one or more of the following:

- substantially obstruct or divert the natural flow of a river, stream, or lake;
- substantially change or use any material from the bed, channel, or bank of a river, stream, or lake; or
- deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it can pass into a river, stream, or lake.

Section 1602 of the *California Fish and Game Code* applies to all perennial, intermittent, and ephemeral rivers, streams, and lakes in the State. CDFW's regulatory authority extends to include riparian habitat (including wetlands) supported by a river, stream, or lake regardless of the presence or absence of hydric soils and saturated soil conditions. Generally, CDFW takes jurisdiction to the top bank of the stream or to the outer limit of the adjacent riparian vegetation (outer drip line), whichever is greater. Notification is generally required for any project that will take place in or in the vicinity of a river, stream, lake, or their tributaries. This includes rivers or streams that flow at least periodically or permanently through a bed or channel with banks that support fish or other aquatic life and watercourses having a surface or subsurface flow that support or have supported riparian vegetation. A Section 1602 Lake or Streambed Alteration Agreement would be required if impacts to identified CDFW jurisdictional areas occur.

California Porter-Cologne Water Quality Control Act

The Porter-Cologne Act broadly defines "waters of the State" as any surface water or groundwater, including saline waters, within the boundaries of the State." In 2020, the Office of Administrative Law (OAL) began implementing the State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to waters of the State. Under these new regulations, the SWRCB and its nine RWQCBs assert jurisdiction over all existing WOTUS, and all waters that would have been considered WOTUS under any historical definition.

Impacts to WOTUS are authorized by the RWQCBs through a Water Quality Certification per Section 401 of the CWA. Impacts to "waters of the State" that are not considered WOTUS would be authorized by Waste Discharge Requirements (WDRs) issued by the RWQCB, pursuant to California's Porter-Cologne Water Quality Control Act.

Pursuant to the California Porter-Cologne Water Quality Control Act, the SWRCB and the nine RWQCBs may require permits (known as "Waste Discharge Requirements" or WDRs) for the fill or alteration of the waters of the State. The term "waters of the State" is defined as "any

surface water or groundwater, including saline waters, within the boundaries of the state” (*California Water Code*, Section 13050[e]). The SWRCB and RWQCB have interpreted their authority to require WDRs to extend to any proposal to fill or alter waters of the State, even if those same waters are not under USACE jurisdiction. Pursuant to this authority, the State and Regional Boards may require the submission of a “report of waste discharge” under Section 13260, which is treated as an application for WDRs.

The Porter-Cologne Water Quality Control Act charges the SWRCB and the nine RWQCBs statewide with protecting water quality throughout California. Typically, the SWRCB and RWQCB act in concert with the USACE under Section 401 of the CWA in relation to permitting fill of federally jurisdictional waters. SWRCB and the RWQCBs may require permits (i.e., WDRs) for the fill or alteration of the waters of the State.

1.9.3 Regional

Central-Coastal Natural Community Conservation Plan/Habitat Conservation Plan

On August 30, 1991, the State Fish and Game Commission considered a petition in support of listing the coastal California gnatcatcher (*Polioptila californica californica*). The Commission decided not to list the coastal California gnatcatcher as an Endangered species in favor of pursuing preparation of a NCCP program as proposed by Assembly Bill (AB) 2172 (AB 2172/Natural Community Conservation Planning Act). AB 2172 authorized CDFW⁷ to enter into agreements with any person for the purpose of preparing and implementing NCCPs and to prepare guidelines for development and implementation of NCCPs. AB 2172 also permits NCCPs to be prepared by local, State, or federal agencies independently or in cooperation with other persons and requires CDFW to be compensated for costs incurred in preparing and implementing NCCPs.

The purpose of the NCCP program is to provide regional or area wide protection and perpetuation of natural wildlife diversity while allowing compatible and appropriate development and growth. AB 2172 was designed in recognition of the fact that individual species protection under the state Endangered Species Act and the federal Endangered Species Act (FESA) is costly and historically ineffective as a mechanism for protection or prevention of extinction of plant and wildlife species, and that a habitat-based, multispecies or ecosystem-driven preservation approach has greater potential for long-term success. The focus of the NCCP program represents a dramatic shift from “individual species” to “habitat”.

On March 25, 1993, the U.S. Department of the Interior listed the coastal California gnatcatcher as a “Threatened” species and adopted a special rule in accordance with Section 4(d) of the FESA that authorized landowners and local jurisdictions to voluntarily participate in the State of California NCCP Act of 1992.

The County of Orange, in conjunction with the state and federal resource agencies, local jurisdictions, utility companies (including IRWD), the Transportation Corridor Agencies, and major private landowners, prepared the NCCP/HCP for the Central–Coastal NCCP Subregion

⁷ The California Department of Fish and Wildlife (CDFW) was formerly known as the California Department of Fish and Game (CDFG).

(NCCP/HCP approved on April 16, 1996, and Implementation Agreement [IA] executed on July 17, 1996). The plan is intended to ensure the long-term survival of the coastal California gnatcatcher and other special status coastal sage scrub-dependent plant and wildlife species while allowing for reasonable economic growth in accordance with state-sanctioned NCCP program guidelines. The Project occurs within the NCCP Central/Coastal Subregion.

The Habitat Reserve includes core habitat along the frontal slopes of the Lomas de Santiago and provides high densities of NCCP target species, including coastal California gnatcatcher and coastal cactus wren (*Campylorhynchus brunneicapillus couesi*). In addition, the Habitat Reserve provides linkages with other core habitat areas via a long strip of natural habitat between Portola Parkway and the Foothill Transportation Corridor, and other large blocks of core habitat in the vicinity of the frontal slopes of the Lomas de Santiago, including Syphon Reservoir and Rattlesnake Reservoir. The Habitat Reserve supports the largest subpopulation of coastal California gnatcatchers in the Central Subarea of the NCCP Central/Coastal Subregion Reserve System Design for Orange County (County of Orange 1996a).

The County of Orange has been issued a 10(a) permit as part of the approval of the NCCP/HCP which authorizes the “take” of coastal sage scrub and other specified habitats (e.g., oak woodland, cliff and rock, Tecate cypress) and provides regulatory coverage for a number of “Covered Species”. Potential direct and indirect impacts are fully mitigated through the County’s participation and contribution in the NCCP/HCP Mitigation Program. The participation not only provides mitigation for coastal sage scrub and the coastal California gnatcatcher, but also other special status species designated as Covered Species by the NCCP/HCP. Mitigation measures outlined in the NCCP/HCP Mitigation Program are summarized below:

1. *Creation of a Habitat Reserve System that will include coastal sage scrub and representative habitat of virtually all of the major habitat types currently existing within the Central/Coastal Subregion;*
2. *Creation and funding of an NCCP Non-Profit Corporation to coordinate management of the Reserve System;*
3. *Designation of Special Linkage Areas and Existing Use Areas to enhance biological connectivity within the Reserve System and Central/Coastal Subregion;*
4. *Implementation of the Adaptive Management Program, including specific management plans, defined by the NCCP/HCP, within the Reserve System, including provisions for restoration and enhancement funded both by Participating Landowners and Non-Participating Landowners as provided herein.*

2.0 **METHODS**

This section summarizes survey methods used to conduct biological surveys for the Project. The Biological Study Area (BSA) discussed in this report generally includes the area around Santiago Creek Dam and Irvine Lake. Initial work (spring/summer 2020) was focused north (downstream) of the dam structure in a Project study area provided by IRWD. The BSA was expanded in fall 2020 to south (upstream) of the dam, including the entirety of Irvine Lake, in order to assess potential effects related to raising the spillway and additional staging/access areas in Oak Park. The BSA was developed by adding a 250-foot buffer around the 797.9-foot elevation contour. Where the buffer did not include the 811.9-foot contour, the BSA was extended 50-feet beyond the 811.9-foot contour.⁸ However, the BSA was truncated at the ridgeline adjacent to Irvine Lake and at Santiago Canyon Road because indirect effects (e.g., noise) would not be expected to extend over the ridgeline. This BSA allows for an assessment of indirect impacts of inundation effects and construction activities on surrounding habitat (Exhibit 3).

The focused surveys that Psomas conducted in spring/summer 2020 were limited to the area downstream of the dam, while the focused surveys conducted in spring/summer 2022 were generally conducted upstream of the dam. The survey area for each species varied depending on target habitat and details of each species protocol. Vegetation mapping and the jurisdictional delineation were conducted throughout the BSA. It should be noted that when the term “survey area” is used, it does not refer to the entire BSA.

2.1 **LITERATURE REVIEW**

Prior to the start of surveys, Psomas conducted a literature search to identify special status plants, wildlife, and habitats reported from the vicinity of the BSA. The literature review was updated prior to the 2022 focused surveys and again as documentation was completed; the most recent citation is given below. The BSA region is generally defined as the Central Subregion of the NCCP/HCP. Psomas reviewed the following sources of information:

- CDFW’s California Natural Diversity Database (CNDDDB) (CDFW 2025a)
- The California Native Plant Society’s (CNPS’) Inventory of Rare and Endangered Plants (CNPS 2025)
- CDFW’s *Natural Communities List* (CDFW 2025b), *Special Vascular Plants, Bryophytes, and Lichens List* (CDFW 2025c), and *Special Animals List* (CDFW 2025d)
- Jepson eFlora (Jepson Flora Project 2024)
- County of Orange *Natural Community Conservation Plan and Habitat Conservation Plan* (County of Orange 1996a) and *Implementation Agreement* (County of Orange 1996b)

⁸ The study area extended to the elevation of the dam crest (811.9 feet) because the impact boundary had not yet been developed when the surveys began.

- USFWS Information for Planning and Consultation (IPAC) Database (USFWS 2025, Appendix B)

2.2 VEGETATION MAPPING AND GENERAL SURVEYS

Psomas Senior Biologist Allison Rudalevige performed a general survey and vegetation mapping north (downstream) of the dam on February 25, 2020. Ms. Rudalevige and Psomas Senior Biologist Lindsay Messett performed a general survey and vegetation mapping south (upstream) of the dam on September 16 and 17, 2020. Psomas mapped vegetation in the field on an aerial photograph at a scale of 1-inch equals 175-feet (1"=175') downstream of the dam and 1-inch equals 275 feet (1" = 275') upstream of the dam. Psomas used a boat for navigable access in order to map the vegetation along the northern portion of Irvine Lake. Psomas mapped vegetation along the southern portion of Irvine Lake and upstream into Santiago Creek on foot. Psomas used binoculars to map vegetation that was inaccessible due to steep topography or due to access issues.

Nomenclature of vegetation types generally follows Gray and Bramlet (1992) but is cross-referenced to *A Manual of California Vegetation* (CNPS 2024), which is the most current vegetation classification system used by CDFW for assessing sensitive natural communities (CDFW 2025b). Nomenclature of plant taxa conform to the *Special Vascular Plants, Bryophytes, and Lichens List* (CDFW 2025c) for special status species and the Jepson eFlora (Jepson Flora Project 2024) for all other taxa. Representative photographs of the BSA are included in Appendix C.

Psomas biologists documented all plant and wildlife species detected during the survey in field notes and they are listed in Appendix D. Psomas conducted active searches for reptiles and amphibians that included lifting, overturning, and carefully replacing rocks and debris. Psomas identified birds by visual and auditory recognition. Psomas conducted surveys for mammals during the day and included searching for and identifying diagnostic signs, including scat, footprints, scratch-outs, dust bowls, burrows, and trails. Taxonomy and nomenclature for wildlife follows the *Special Animals List* (CDFW 2025d) for special status species and, for other species, Crother (2017) for amphibians and reptiles, the American Ornithological Society (AOS 2024) for birds, and the Smithsonian National Museum of Natural History (SNMNH 2011) for mammals.

2.3 FOCUSED SURVEYS

2.3.1 Special Status Plant Species

Psomas conducted the botanical surveys consistent with the protocols created by CDFW (2018); therefore, the surveys were floristic in nature. Psomas conducted a literature search prior to both the 2020 and 2022 field surveys to identify special status plant species reported from the vicinity of the BSA. The literature search was updated as technical documentation was updated. Sources reviewed include the USGS's Black Star Canyon, Orange, Tustin, and El Toro 7.5-minute quadrangles in the California Native Plant Society's Inventory of Rare and Endangered Plants (CNPS 2025) and CDFW's CNDDDB (CDFW 2025a).

Many annual and perennial herb species' germination capability are dependent on receiving a certain amount of rainfall in the winter and spring. The region received approximately 17.7 inches of precipitation between August 2019 and July 2020 (data taken from Irvine – South Coast Valleys Station No. 75) (CIMIS 2020). The region received approximately 9.3 inches of precipitation between July 2021 and June 2022 (data taken from Irvine – South Coast Valleys Station No. 75) (CIMIS 2022). The average annual precipitation for this area is between 10 and 13 inches. Therefore, rainfall was considered within normal ranges and conditions should have been adequate for germination of most plant species.

Additionally, reference populations were monitored for annual and difficult-to-detect target species to ensure that the surveys were comprehensive (Table 2). This is especially relevant during periods of unusual rainfall patterns or below average rainfall. If conditions at a nearby reference population are suitable for germination and growth, then it can be inferred that conditions would also be suitable in the BSA. Reference populations were not monitored for species with a CRPR of 3 or 4, large perennials (e.g., Tecate cypress [*Hesperocyparis forbesii*] and chaparral nolina [*Nolina cismontana*]), which would be identifiable throughout the year, or for species lacking a publicly accessible reference population.

TABLE 2
REFERENCE POPULATIONS MONITORED IN THE PROJECT REGION

Species	Date Observed	Location	Phenology
<i>Brodiaea filifolia</i> thread-leaved brodiaea	May 15, 2020	San Clemente	in bloom
<i>Calochortus weedii</i> var. <i>intermedius</i> intermediate mariposa lily	June 1, 2020 May 12, 2022	Peters Canyon Regional Park Santiago Canyon vicinity	in bloom early bloom
<i>Dudleya multicaulis</i> many-stemmed dudleya	April 12, 2017 April 27, 2022	City of Orange Santiago Canyon vicinity	Vegetative in bloom
<i>Pseudognaphalium</i> <i>leucocephalum</i> white rabbit-tobacco	September 8, 2022	San Juan Capistrano	in bloom

Surveys downstream of the dam were conducted on April 30, May 21, and June 4, 2020, by Psomas Senior Biologist Allison Rudalevige. The total number of person-hours spent surveying was approximately 15.75 hours. The 2020 plant survey area included the portion of the BSA located downstream of the dam. A systematic survey was conducted in all areas of suitable special status plant habitat in the survey area.

Surveys upstream of the dam were conducted on March 24, 2022, by Ms. Rudalevige; on April 25, 26, and 28, 2022, by Ms. Rudalevige and Consulting Botanist Sandra Leatherman; on May 23 and 26 by Ms. Rudalevige and Psomas Biologist Erin Ruckman; and on September 13, 2022, by Ms. Rudalevige and Psomas Biologist Sarah Thomas. The total number of person-hours spent surveying was approximately 87.75 hours. The special status plant survey area included all project impact areas upstream, of the dam (i.e., permanent, temporary, and additional inundation areas) plus a 50-foot buffer. A systematic survey was conducted in all areas of suitable special status plant habitat in the survey area. Inaccessible areas (e.g., steep cliffs), were observed remotely with binoculars.

All plant species observed were recorded in field notes. Plant species were identified in the field or collected for future identification. Plants were identified to the taxonomic level necessary to determine whether they were a special status species. Plants were identified using taxonomic keys, descriptions, and illustrations in Jepson Flora Project (2024), Baldwin et al. (2012), Hickman (1993), and Munz (1974). Nomenclature of plant taxa conform to the *Special Vascular Plants, Bryophytes, and Lichens List* (CDFW 2025c) for special status species and the Jepson eFlora (Jepson Flora Project 2024) for all other taxa.

Any special status plant species observed in the survey area were mapped on an iPad loaded with Avenza Maps software or with a handheld Garmin Global Positioning System (GPS) unit. Data were collected on the number and phenology of individuals (estimated for large populations) and microsite characteristics (e.g., slope, aspect, soil texture, surrounding habitat, and associated species). The results of the special status plant survey efforts are included as Appendix E.

2.3.2 Quino Checkerspot Butterfly

Psomas conducted Quino checkerspot butterfly surveys following guidelines from the USFWS Survey Protocol (USFWS 2014) to maximize detection of adults during the flight season. Per the USFWS protocol, surveys consist of an initial site assessment to determine if the Project site contains areas recommended for Quino checkerspot butterfly surveys. If the Project site is determined to be comprised solely of excluded areas (described below), Quino checkerspot butterfly surveys are not recommended. If a Project site has areas suitable for butterfly surveys (non-excluded areas), then surveys should be conducted in those portions of the Project site. Per USFWS protocol, Psomas completed five weekly focused surveys beginning the third week of February and continuing into March.

All areas within 50-feet of the proposed impact footprint (including additional inundation areas) were included in the site assessment. The site assessment was conducted prior to the first focused butterfly survey to identify which portions of the Project site provide suitable habitat for Quino checkerspot butterfly. The assessment was conducted by Psomas Senior Biologist Lindsay Messett (USFWS Permit No. TE 067064-5) on February 15 and 16, 2022.

Per the USFWS protocol, orchards, developed areas, or small in-fill parcels (plots smaller than one acre that are completely surrounded by urban development) largely dominated by non-native vegetation, active/in-use agricultural fields, closed-canopy forests or riparian areas, dense chaparral, and small openings (less than one acre) completely enclosed within dense chaparral, were considered unsuitable and designated as “excluded areas”. Areas outside of excluded areas, regardless of the presence/absence of host plants and nectar sources, were considered potential habitat areas.

All areas that were not excluded were surveyed for Quino checkerspot butterfly, regardless of host plant presence, absence, and/or density. The Quino checkerspot butterfly is generally associated with sage scrub, open chaparral, grasslands, and vernal pools. Within these communities, they are usually observed in open or sparsely vegetated areas (including trails and dirt roads), on hilltops, and on ridgelines.

The survey area contained approximately 308 acres of suitable habitats that could not be excluded per USFWS protocol; two days were required to complete each survey visit. The survey visits were divided into two areas (i.e., upstream of Santiago Creek Dam and downstream of Santiago Creek Dam). Ms. Messett conducted five rounds of focused survey visits in the survey areas during the 2022 flight season. Surveys were conducted once per week (weather permitting) on non-consecutive days during the peak of the flight season on February 18, 19, 25, 27; March 3, 4, 10, 11, 17, and 18, 2022. Table 3 below summarizes the survey conditions during each of the ten surveys.

TABLE 3
SUMMARY OF QUINO CHECKERSPOT BUTTERFLY SURVEYS

Survey Number	Survey Location	Date	Time (Start/End)	Surveyor	Weather Conditions		
					Temperature (°F) (Start/End)	Wind (mph) (Start/End)	Cloud Cover (%) (Start/End)
1	Downstream of Santiago Creek Dam	February 18, 2022	0900/1500	Messett	62/70	0-1/2-5	Clear/Clear
1	Upstream of Santiago Creek Dam	February 19, 2022	0930/1530	Messett	60/70	0-1/4-6	25/20
2	Downstream of Santiago Creek Dam	February 25, 2022	1000/1600	Messett	60/63	2-3/5-7	Clear/Clear
2	Upstream of Santiago Creek Dam	February 27, 2022	1000/1545	Messett	61/70	0-1/5-6	10/10
3	Upstream of Santiago Creek Dam	March 3, 2022	0930/1555	Messett	62/67	1-2/8-10	50/30
3	Downstream of Santiago Creek Dam	March 4, 2022	0915/1530	Messett	63/65	0-1/2-5	50/50
4	Upstream of Santiago Creek Dam	March 10, 2022	0845/1550	Messett	63/71	2-3/4-6	30/Clear
4	Downstream of Santiago Creek Dam	March 11, 2022	0815/1530	Messett	68/74	3-4/6-8	Clear/Clear
5	Upstream of Santiago Creek Dam	March 17, 2022	0930/1600	Messett	65/80	0-1/2-5	25/30
5	Downstream of Santiago Creek Dam	March 18, 2022	0900/1515	Messett	68/74	1-2/4-6	Clear/Clear

Surveys focused on likely breeding areas (host plant patches), feeding areas (nectaring plant patches), and topographical features conducive to detecting the Quino checkerspot butterfly

(ridgelines, hilltops, rock outcrops, dirt roads, and open ground with clay soils). Survey areas were walked at an average rate of 10 to 15 acres per hour. Binoculars were used to identify the majority of butterfly species that could not be seen at close range. General survey forms were filled out for each survey, noting weather conditions, survey date, start and end times, and nectaring sources in bloom.

The results of the Quino checkerspot surveys are included in Appendix F.

2.3.3 Crotch's Bumble Bee

In June 2023, the California Department of Fish and Wildlife (CDFW) issued survey guidelines for Candidate bumble bee species recommending at least three visual surveys conducted two to four weeks apart during the appropriate Colony Active Period (April to August for Crotch's bumble bee) to ensure the highest probability of detecting the species (CDFW 2023). Surveys must be conducted at a rate of three acres per hour within optimal habitat by a qualified Biologist (i.e., one with appropriate permits and experience in the identification of bee species). Psomas Senior Biologist Lindsay Messett (Scientific Collecting Permit [SCP]; 182810004-20009-001⁹) conducted all focused surveys for Crotch's bumble bee. The survey included all suitable foraging and potential nesting habitats for the Crotch's bumble bee in the survey area. Surveys were conducted on June 20 and 21; July 16 and 17; and August 5 and 6, 2024. A summary of weather conditions during each survey is provided in Table 4.

Ms. Messett conducted the surveys by walking meandering transects, slowly across the survey area, through all appropriate habitats, to obtain a 100 percent survey cover. The surveys were paced at approximately three acres per hour in optimal habitats but were more quickly paced in areas lacking available nectar sources. Ms. Messett scanned for bee activity on the ground and spent additional time at any flowering plants to look for foraging bees. Potential nest sites (e.g., forest edges, unmowed areas, and cavities such as mammal burrows) were inspected with binoculars for evidence of bumble bee use. If multiple exiting/entering bumble bees were observed at a cavity, further observation was made until nesting could be confirmed (e.g., multiple individuals entering the cavity).

Surveys were non-lethal (capture, photograph, release) and were conducted in accordance with the CDFW Survey Considerations for California Endangered Species Act Candidate Bumble Bee Species (CDFW 2023) and authorizations in Ms. Messett's SCP and MOU issued by CDFW. All bumble bees observed were captured using a butterfly net. Bees were carefully transferred to a clear, plastic vial and placed in a cooler with ice to chill. Once the bees were cooled, they were removed from the vial and photographed. Photographs focused on specific identifiable areas of the bees (i.e. the top of the abdomen, side of the thorax and abdomen, and the front and side views of the head). The bees were processed within 15 minutes of capture and were released within 100 feet of the capture site. Bumble bee species were identified by Ms. Messett using *Bumble Bees of North America: An Identification Guide* (Williams *et al.* 2014). Photographs of the bumble bees observed during the surveys were

⁹ Lindsay Messett's SCP includes a MOU to allow her to capture and handle Crotch's bumble bee according to the survey guidelines.

also provided to taxonomist Dr. Keng-Lou James Hung, PhD (University of Oklahoma) to confirm species identification.

TABLE 4
SUMMARY OF CROTCH'S BUMBLE BEE SURVEYS

Survey Number	Survey Location	Date	Time (Start/End)	Acres Surveyed (acres)	Surveyor	Weather Conditions		
						Temperature (°F) (Start/End)	Wind (mph) (Start/End)	Cloud Cover (%) (Start/End)
1	Downstream of Santiago Creek Dam	June 20, 2024	9:00 AM/ 3:00 PM	15	Messett	66/80	1-1/1-2	0/0
1	Upstream of Santiago Creek Dam	June 21, 2024	8:10 AM/ 3:55 PM	35	Messett	68/76	0-1/4-5	0/0
2	Downstream of Santiago Creek Dam	July 16, 2024	9:00 AM/ 2:50 PM	15	Messett	68/81	0-1/3-4	10/0
2	Upstream of Santiago Creek Dam	July 17, 2024	8:00 AM/ 3:45 PM	35	Messett	71/80	1-2/1-2	75/30
3	Downstream of Santiago Creek Dam	August 5, 2024	9:00 AM/ 12:50 PM	15	Messett	80/92	1-2/1-2	0/0
3	Upstream of Santiago Creek Dam	August 6, 2024	8:25 AM/ 2:45 PM	35	Messett	71/80	0-1/1-2	0/0
°F: Fahrenheit; mph: miles per hour; %: percent.								

The results of the Crotch's bumble bee surveys are included in Appendix G.

2.3.4 Western Spadefoot

There is currently no standardized survey protocol in place for this species. Survey methods were based on the biology of the western spadefoot and survey protocols for other currently listed anurans (i.e., frogs and toads) to maximize the likelihood of detection.

Focused surveys for this species were conducted throughout the BSA in spring 2025. Three surveys have been conducted, with one in February, one in March, and one in April. Each of the surveys was conducted within three days following rain events. These surveys included diurnal and nocturnal components to search for the presence of egg masses, tadpoles, and adults. The diurnal portion of the survey focused on searches for the presence of egg masses and tadpoles. Nocturnal surveys focused on searches for active juveniles and calling adults. Flashlights and headlamps were used at night to search for and visually identify any toads detected. Because spadefoots can be sensitive to sounds and light, the Biologists stopped and remained still for extended periods to listen for calls.

Psomas Senior Biologists Jonathan Aguayo and Lindsay Messett conducted the focused surveys in all potentially suitable habitat for western spadefoot in the BSA. Mr. Aguayo and Ms. Messett conducted focused surveys for the western spadefoot on February 14; March 13; and April 4, 2025, during favorable weather conditions conducive to good toad activity. The dates and weather conditions during each survey are provided in Table 5.

TABLE 5
SUMMARY OF SURVEY CONDITIONS FOR
WESTERN SPADEFOOT SURVEYS

Survey Number	Date	Time (Start/End)	Biologists	Weather Conditions		
				Temperature (°F) (Start/End)	Wind (mph) (Start/End)	Cloud Cover (%) (Start/End)
1 (Day)	February 14, 2025	2:52 PM–6:03 PM	Aguayo Messett	58/54	7/6	70/60
1 (Night)	February 14, 2025	6:37 PM–8:56 PM	Aguayo Messett	53/52	5/3	50/40
2 (Day)	March 13, 2025	3:58 PM–7:12 PM	Aguayo Messett	52/49	13/11	60/70
2 (Night)	March 13, 2025	7:56 PM–9:55 PM	Aguayo Messett	48/47	9/5	70/80
3 (Day)	April 4, 2025	4:09 PM–7:18 PM	Aguayo Messett	67/61	8/4	10/0
3 (Night)	April 4, 2025	7:59 PM–10:34 PM	Aguayo Messett	59/53	3/2	0/0
°F: Fahrenheit; mph: miles per hour; %: percent; nr: not recorded						

The focused survey report documenting the results of these surveys is in preparation.

2.3.5 Arroyo Toad

USFWS survey protocol for the arroyo toad requires that a minimum of six surveys be performed during the breeding season (i.e., March 15–July 1), with at least one survey conducted in April, one in May, and one in June. The surveys included diurnal and nocturnal searches to determine the presence of eggs, tadpoles, and adults. During the diurnal surveys, water was examined for the presence of arroyo toad (*Anaxyrus californicus*) egg masses and tadpoles. Nocturnal surveys began one hour after dusk during weather conditions conducive to toad activity. Nocturnal search methods included walking along the creek banks and stopping periodically to listen for the breeding calls of adult males. Headlamps and flashlights were used to visually identify toads when a breeding call was heard. If any arroyo toads were found, the individual or population was documented, recorded with a GPS unit, and mapped on an aerial photograph. The number of individuals were noted on each subsequent visit, and data were collected on general habitat characteristics for any arroyo toads observed.

Psomas Senior Biologists Jonathan Aguayo and Lindsay Messett conducted the focused surveys in all potentially suitable habitat for arroyo toad in the survey area according to the survey methodology described above. The 2020 survey area included all suitable habitat downstream of the dam along Santiago Creek, extending 0.62 mile (1 kilometer) downstream of the BSA, which included a tributary from Fremont Canyon. Mr. Aguayo and Ms. Messett conducted focused surveys for the arroyo toad on April 17 and 24; May 15 and 22; and June 12 and 19, 2020. The 2022 survey area included all suitable habitat along Santiago Creek upstream of the dam. Mr. Aguayo and Ms. Messett conducted focused surveys for the arroyo toad on March 25; April 1 and 8; May 27; and June 10 and 23, 2022.

Diurnal surveys were conducted from approximately 4:00 PM until dusk, and nocturnal surveys were conducted from one hour after dusk until approximately 11:00 PM. Surveys focused on detecting toads by visual identification; listening for the advertising call of adult males; and checking potentially suitable breeding habitat for tadpoles and/or eggs. Biologists scanned pools for eggs, larvae, metamorphs, juveniles; breeding and/or calling adults in potentially suitable breeding locations along the creek; and foraging individuals in the adjacent riparian and upland areas. Mr. Aguayo and Ms. Messett moved in an upstream direction during the surveys. Headlamps, flashlights, and binoculars were used to visually identify toads, frogs, and their larvae detected at night. Nocturnal surveys were conducted during appropriate environmental conditions conducive to the activity patterns of the arroyo toad. Generally, these conditions are nighttime temperatures greater than 50 degrees Fahrenheit (°F) at dusk, with low winds (less than 10 miles per hour). Surveys were not scheduled on nights with a full or nearly full moon because arroyo toad activity is lower on these nights due to higher predation risk. Survey dates, times, and weather data are shown in Table 6. Survey conditions and results were documented in field notes.

TABLE 6
SUMMARY OF SURVEY DATA AND CONDITIONS
FOR ARROYO TOAD SURVEYS

Survey	Survey Date	Survey Type	Surveying Biologists	Start/End Time	Wind (miles/hour)		Temperature (°F)		Cloud Cover
					Start	End	Start	End	
2020 Surveys									
1	4/17/2020	Diurnal	Aguayo, Messett	5:00 PM–7:20 PM	6–7	4–5	63	60	70%
		Nocturnal		8:15 PM–10:20 PM	4–5	4–5	59	57	50%
2	4/24/2020	Diurnal	Aguayo, Messett	4:50 PM–7:10 PM	6–7	4–5	93	86	40%
		Nocturnal		8:15 PM–10:15 PM	3–4	3–4	82	79	70%
3	5/15/2020	Diurnal	Aguayo, Messett	5:15 PM–7:40 PM	4–5	0–1	73	68	clear
		Nocturnal		8:30 PM–10:20 PM	0–1	2–3	66	64	clear
4	5/22/2020	Diurnal	Aguayo, Messett	5:25 PM–7:20 PM	4–5	3–4	70	64	clear
		Nocturnal		8:30 PM–10:15 PM	2–3	2–3	61	59	clear
5	6/12/2020	Diurnal	Aguayo, Messett	5:35 PM–7:40 PM	2–3	4–5	73	64	clear
		Nocturnal		8:40 PM–10:30 PM	3–4	1–2	63	61	clear

TABLE 6
SUMMARY OF SURVEY DATA AND CONDITIONS
FOR ARROYO TOAD SURVEYS

Survey	Survey Date	Survey Type	Surveying Biologists	Start/End Time	Wind (miles/hour)		Temperature (°F)		Cloud Cover
					Start	End	Start	End	
6	6/19/2020	Diurnal	Aguayo, Messett	5:40 PM–7:45 PM	3–4	4–5	72	67	clear
		Nocturnal		8:40 PM–10:20 PM	4–5	4–5	63	62	clear
2022 Surveys									
1	3/25/2022	Diurnal	Aguayo, Messett	4:20 PM–6:55 PM	6	4	75	71	30–20%
		Nocturnal		7:42 PM–10:48 PM	4	3	69	58	10%
2	4/1/2022	Diurnal	Aguayo, Messett	3:45 PM–7:07 PM	4	8	69	59	clear
		Nocturnal		8:10 PM–10:49 PM	6	3	57	53	clear
3	4/8/2022	Diurnal	Aguayo, Messett	3:54 PM–7:16 PM	8	4	94	81	20%–clear
		Nocturnal		8:10 PM–10:36 PM	4	3	78	72	clear
4	5/27/2022	Diurnal	Aguayo, Messett	4:40 PM–7:43 PM	6	6	68	61	40%
		Nocturnal		8:39 PM–10:55 PM	5	4	60	57	50%
5	6/10/2022	Diurnal	Aguayo, Messett	4:50 PM–7:52 PM	7	5	80	71	clear
		Nocturnal		8:33 PM–10:42 PM	4	3	68	63	clear
6	6/23/2022	Diurnal	Aguayo, Messett	4:48 PM–7:04 PM	7	5	87	82	clear
		Nocturnal		8:42 PM–10:39 PM	3	1	76	70	clear
°F: degrees Fahrenheit.									

The results of the arroyo toad surveys are included in Appendix H.

2.3.6 Southwestern Pond Turtle

2.3.6.1 *Visual Survey*

There is currently no standardized USFWS protocol in place for the southwestern pond turtle; therefore, surveys generally followed the Visual Survey Protocol for the Southcoast Ecoregion (USGS 2006a). Survey methods were focused on the detection of southwestern pond turtle adults and juveniles through visual observation; the visual surveys did not include dip netting or seining. Any southwestern pond turtles observed would have been documented and recorded using a Global Positioning System (GPS) or iPad to map the location on an aerial photograph.

Psomas Senior Biologist Jonathan Aguayo conducted visual surveys across all potentially suitable habitats for the southwestern pond turtle within the BSA. He walked slowly up the stream channel, either in the water or immediately adjacent to the water, visually searching for pond turtles with and without binoculars, concentrating on pools, surface water, banks, and suitable basking sites within the BSA. He searched aquatic habitat with and without

binoculars for the presence of basking or underwater pond turtles. He observed open pools or possible basking areas from a distance and then approached slowly and quietly to help prevent disturbing basking turtles. He listened for the splash of water, which could indicate possible unseen turtles entering the water. If a splash was heard, he spent additional time observing the area for a turtle to resurface. Visual surveys were performed on August 20 and 30, 2024, during weather conditions favorable for turtle activity (Table 7).

TABLE 7
SUMMARY OF SURVEY CONDITIONS FOR
SOUTHWESTERN POND TURTLE VISUAL SURVEYS

Survey Number	Date	Time (Start/End)	Biologist	Weather Conditions		
				Temperature (°F) (Start/End)	Wind (mph) (Start/End)	Cloud Cover (%) (Start/End)
1	August 20, 2024	8:00 AM/2:30 PM	Aguayo	72/96	2/6	0/0
2	August 30, 2024	9:20 AM/3:40 PM	Aguayo	67/81	1/5	80/0
°F: Fahrenheit; mph: miles per hour; %: percent.						

Turtle Trapping

Trapping surveys follow the methodology outlined in the Western Pond Turtle Trapping Survey Protocol for the Southcoast Ecoregion (USGS 2006b). A five-day/four-night trapping program was conducted in August 2024. Nylon mesh hoop traps and floating basking traps were placed in suitable locations in Irvine Lake, baited with cans of sardines in oil to attract turtles. Traps were set near habitat features likely to be used by pond turtles (possible basking areas, areas with underwater refugia). The hoop traps measured 2.5 feet in diameter by 6 feet long with 1-inch square mesh and featured a one-way funnel entrance. Floating basking traps measured 20 inches wide by 28 inches long and 13 inches deep, with two 13-inch wings. Both hoop and basking traps were equipped with floats and securely fastened to immovable objects to prevent submersion to allow for captured turtles (and other animals) to surface for air.

Traps were left in place for a maximum of 24 hours before being checked by Biologists to retrieve captured turtles and other aquatic species (e.g. fish, frogs, invertebrates). General weather data (i.e., ambient air temperature, sky conditions, wind speed) and water temperature were recorded at the start and end of each trapping session. Two trapping sessions, one on the west side of Irvine Lake and another on the east side of Irvine Lake, were required to adequately cover Irvine Lake. As described above, Santiago Creek was surveyed visually because it was not deep enough for trap placement.

Mr. Aguayo (Scientific Collecting Permit [SCP] ID: S-190310010-20076-001) and Senior Biologist Lindsay Messett (SCP ID: S-182810004-20009-001) were the Principal Investigators for the trapping sessions, with assistance from Psomas Biologists Trevor Bristle, Jack Underwood, Cristina Juran, and Tyler Glaser. Both Mr. Aguayo and Ms. Messett are knowledgeable about the southwestern pond turtle and hold the necessary CDFW

authorization to trap and handle the species. All traps were tagged with Mr. Aguayo's CDFW SCP number, under which the live trapping was conducted.

Trapping sessions were conducted from August 19–23, 2024, on the west side of Irvine Lake and from August 26–30, 2024, on the east side of Irvine Lake. Surveys were conducted during weather conditions favorable for turtle activity (Table 8). A total of 24 hoop traps and 3 basking traps were set in Irvine Lake. Trap locations were selected based on suitable habitat with traps spaced 820 feet (i.e., 250 meters) apart. The number of traps set was proportionate to the overall size of the lake.

TABLE 8
SUMMARY OF SURVEY DATA AND CONDITIONS
FOR SOUTHWESTERN POND TURTLE TRAPPING

Survey Number	Survey Date	Surveying Biologists	Start/End Time	Water Temperature (°F)		Wind (mph)		Temperature (°F)		Cloud Cover (%)
				Start	End	Start	End	Start	End	
West Side of Irvine Lake										
1	8/19/2024	Aguayo, Bristle	9:36 AM/3:33 PM	81.2	84.0	2	6	72	89	0
2	8/20/2024	Messett, Bristle	8:00 AM/10:35 AM	80.5	81.6	1	1	65	87	0
3	8/21/2024	Messett, Bristle	7:00 AM/11:00 AM	79.6	Thermometer broke	1	1	64	86	0
4	8/22/2024	Aguayo, Bristle	7:15 AM/10:25 AM	78.5	80.1	1	1	60	77	0
5	8/23/2024	Aguayo, Messett, Underwood	6:48 AM/10:56 AM	79.7	80.2	4	7	62	75	100
East Side of Irvine Lake										
1	8/26/2024	Aguayo, Bristle, Juran	7:58 AM/9:08 AM	79.2	81.3	1	2	64	88	0
2	8/27/2024	Aguayo, Bristle	7:08 AM/9:08 AM	78.9	79.2	1	2	62	70	0
3	8/28/2024	Aguayo, Bristle	6:52 AM/9:05 AM	78.5	79.0	2	3	61	70	100
4	8/29/2024	Aguayo, Bristle	6:42 AM/8:49 AM	78.8	79.2	1	1	60	65	100
5	8/30/2024	Aguayo, Bristle, Glaser	6:37 AM/9:25 AM	78.8	78.6	2	3	60	68	100
°F: degrees Fahrenheit; mph: miles per hour; %: percent.										

The results of the southwestern pond turtle surveys are included as Appendix I.

2.3.7 Coastal California Gnatcatcher

USFWS survey protocol for the coastal California gnatcatcher requires three visits, conducted at least one week apart, to all potentially occupied habitat areas for surveys within an NCCP area (USFWS 1997a, 1997b). All visits must be conducted between 6:00 AM and 12:00 PM, and no more than 100 acres of suitable habitat may be surveyed per visit.

Psomas Senior Biologist Lindsay Messett (USFWS Permit No. TE 067064-5) conducted all focused surveys for coastal California gnatcatcher. The 2020 survey area for the gnatcatcher surveys included all suitable habitat (i.e., sagebrush scrub, disturbed sagebrush scrub, and disturbed floodplain sagebrush scrub) downstream of the dam and within a 500-foot buffer around the tentative impact footprint. The 2022 survey area for the gnatcatcher surveys includes all suitable habitat upstream of the dam in the BSA. The Biologist reduced the survey area boundary where offsite areas were not accessible due to property boundaries (i.e., Santiago Landfill), topography (i.e., cliff), and where there was no suitable habitat (i.e., Irvine Lake). The 2020 surveys were conducted on April 30, May 27, and June 25, 2020. The 2022 surveys were conducted on March 25, April 4, and June 9, 2022.

Ms. Messett avoided weather conditions that were too cold (i.e., below 55 degrees Fahrenheit [°F]), too hot (i.e., above 95°F), or too windy (i.e., wind speed greater than 15 miles per hour) to comply with USFWS survey protocol requirements. A summary of weather conditions during each survey is provided in Table 9, below. Ms. Messett conducted the surveys by slowly walking through all appropriate habitats while listening and watching for gnatcatcher activity and by using a combination of recordings of gnatcatcher vocalizations and “pishing” sounds to elicit responses from any gnatcatchers present. The frequency of vocalization playback and “pishing” varied depending on conditions such as habitat patch size, topography in each area, and ambient noise conditions.

TABLE 9
SUMMARY OF SURVEY DATA AND CONDITIONS FOR
COASTAL CALIFORNIA GNATCATCHER SURVEYS

Survey Number	Date	Time (Start/End)	Surveyor	Weather Conditions		
				Temperature (°F) (Start/End)	Wind (mph) (Start/End)	Cloud Cover (%) (Start/End)
2020 Surveys						
1	April 30, 2020	7:15 AM–10:30 AM	Messett	65/70	0–1/0–1	100/50
2	May 27, 2020	8:15 AM–11:40 AM	Messett	65/76	0–1/0–1	10/Clear
3	June 25, 2020	6:50 AM–10:00 AM	Messett	68/77	0–1/0–1	90/40
2022 Surveys						
1	March 25, 2022	0700/1300	Messett	55/83	0–1/1–2	100/Clear
2	April 14, 2022	0730/1200	Messett	55/69	0–1/4–5	Clear/20
3	June 9, 2022	0700/1155	Messett	62/76	1–2/3–4	100/Clear
°F: degrees Fahrenheit; mph: miles per hour; %: percent						

The results of the coastal California gnatcatcher surveys are included as Appendix J.

2.3.8 Least Bell's Vireo/Southwestern Willow Flycatcher

USFWS protocol for the least Bell's vireo (*Vireo bellii pusillus*) requires that at least eight surveys be conducted from April 10 to July 31 with a ten-day interval between each site visit (USFWS 2001). The USFWS protocol for the southwestern willow flycatcher requires a total of five surveys, with the first survey conducted between May 15 and May 31; the second and third surveys between June 1 and June 24; and the fourth and fifth surveys between June 25 and July 17 (Sogge et al. 2010).

Psomas Senior Biologist Lindsay Messett conducted all 2020 focused surveys for least Bell's vireo downstream of the dam. The 2020 survey area for the least Bell's vireo surveys included all suitable habitat (i.e., southern willow scrub and mule fat scrub) downstream of the dam and within a 500-foot buffer north of the BSA along Santiago Creek. The Biologist reduced the survey area boundary where offsite areas were not accessible due to property boundaries (i.e., Santiago Landfill), topography (i.e., cliff), and where there was no suitable habitat (i.e., Irvine Lake). Surveys were conducted on April 30, May 12 and 27, June 9, and 25, and July 6, 17, and 28, 2020.

Psomas Senior Biologist Jonathan Aguayo (USFWS Permit No. TE 96514A-3) conducted all focused surveys for least Bell's vireo and southwestern willow flycatcher upstream of the dam. Because the survey area contained more than 80 acres of suitable habitat, 2 days were required to cover the entire survey area for each of the 8 visits. Mr. Aguayo conducted focused surveys for the least Bell's vireo on April 13, 14, 24, and 25; May 12, 13, 25, and 26; June 7, 8, 21, and 22; and July 1, 4, 13, and 14, 2022. Focused surveys for southwestern willow flycatcher were conducted on May 25 and 26; June 7, 8, 21, and 22; and July 1, 4, 13, and 14, 2022. Per guidance issued from the USFWS, focused surveys for least Bell's vireo and southwestern willow flycatcher were not conducted concurrently. During the last five surveys, surveys were conducted for southwestern willow flycatcher first; surveys for least Bell's vireo followed (described below).

As mentioned above, the surveys were conducted sequentially, with surveys for the southwestern willow flycatcher conducted first (i.e., first thing in the morning) and surveys for the least Bell's vireo conducted afterwards. The survey area was split into two mainly linear routes; therefore, southwestern willow flycatchers were surveyed from the starting point to the end, and least Bell's vireos were surveyed on the way back. All bird species detected during the survey were recorded, including notable observations of special status species or other birds (e.g., brown-headed cowbird). A complete list of wildlife species observed during the surveys is included in Appendix D.

Ms. Messett and Mr. Aguayo systematically surveyed the riparian habitats by walking slowly and methodically along their margins; habitat is narrow enough that transects through the habitat were not necessary. Following the willow flycatcher protocol, recorded vocalizations were used to elicit a response from any potentially territorial southwestern willow flycatchers. As the least Bell's vireo survey protocol does not require the playback of least Bell's vireo vocalizations, recorded least Bell's vireo vocalizations were not used during the surveys. Any least Bell's vireos or southwestern willow flycatchers detected were recorded

with a GPS unit (Garmin Vista) or an iPad. Because of the high density of least Bell's vireos in the survey area upstream of the dam, great care was taken in the field to verify that adjacent territories were occupied by distinct males. Although not required during a presence/absence survey, time was also taken to visually observe any individuals detected to identify their sex and age to determine the fate of the territory over the course of the surveys (e.g., juveniles observed indicate successful nesting).

All surveys were conducted under optimal weather conditions and during early morning hours when bird activity is at its peak (Table 10). It should be noted that the timing of a few of the 2020 surveys began later because on these mornings, Ms. Messett was surveying for coastal California gnatcatcher in the adjacent upland habitat. If a least Bell's vireo was singing during the gnatcatcher survey, Ms. Messett likely would have heard it in the adjacent riparian habitat. As mentioned above, the 2022 surveys were conducted sequentially, with surveys for the southwestern willow flycatcher conducted first (i.e., first thing in the morning) and surveys for the least Bell's vireo conducted afterwards. The survey area was split into two mainly linear routes; therefore, southwestern willow flycatchers were surveyed from the starting point to the end, and least Bell's vireos were surveyed on the way back. All bird species detected during the survey were recorded, including notable observations of special status species or other birds (e.g., brown-headed cowbird [*Molothrus ater*]).

TABLE 10
SUMMARY OF SURVEY DATA AND CONDITIONS FOR
LEAST BELL'S VIREO SURVEYS

Survey Number	Survey Dates	Surveyors	Time	Air Temperature (°F) (Start/End)		Cloud Cover (Start/End)	Wind (mph) (Start/End)
2020 Surveys							
1	April 30	Messett	10:00 AM – 11:30 AM	71	75	50/Clear	0-1/0-1
2	May 12	Messett	7:30 AM – 11:00 AM	61	69	10/80	0-1/0-1
3	May 27	Messett	6:30 AM – 8:15 AM	65	76	10/Clear	0-1/0-2
4	June 9	Messett	6:50 AM – 10:45 AM	70	91	Clear/Clear	0-1/1-2
5	June 25	Messett	10:00 AM – 11:40 AM	68	77	90/40	0-1/0-1
6	July 6	Messett	6:45 AM – 10:30 AM	68	83	10/Clear	0-1/1-3
7	July 17	Messett	7:00 AM – 10:10 AM	67	74	100/Clear	0-1/0-1
8	July 28	Messett	6:40 AM – 10:25 AM	65	70	Clear/Clear	0-1/1-2
2022 Surveys							
1A	April 13, 2022	V	6:10 AM-11:00 AM	43	61	0/0	2-4
1B	April 14, 2022	V	6:12 AM-11:00 AM	45	63	0/0	1-5
2A	April 24, 2022	V	5:55 AM-11:00 AM	54	79	0/0	3-7
2B	April 25, 2022	V	6:02 AM-11:00 AM	57	83	0/0	2-6
3A	May 12, 2022	V	5:44 AM-11:00 AM	55	73	15/5	3-6
3B	May 13, 2022	V	5:44 AM-11:00 AM	56	79	0/0	3-4
4A	May 25, 2022	F	5:34 AM-8:22 AM	56	68	40/20	1-2
		V	8:22 AM-11:00 AM	68	74	20/10	2-5
4B	May 26, 2022	F	5:31 AM-8:30 AM	55	62	0/0	1-2
		V	8:30 AM-11:00 AM	62	71	0/0	2-4
5A	June 7, 2022	F	5:38 AM-8:37 AM	56	66	60/10	1-2
		V	8:37 AM-11:00 AM	66	75	10/5	2-4
5B	June 8, 2022	F	5:36 AM-8:34 AM	56	66	30/0	1-2
		V	8:34 AM-11:00 AM	66	75	0/0	2-5
6A	June 21, 2022	F	5:40 AM-8:38 AM	62	74	0/0	1-3
		V	8:38 AM-11:00 AM	74	82	10/10	3-6
6B	June 22, 2022	F	5:35 AM-8:37 AM	65	77	60/40	2-4
		V	8:37 AM-10:52 AM	77	83	40/30	4-5
7A	July 1, 2022	F	5:32 AM-8:36 AM	58	68	100/0	1-3
		V	8:36 AM-11:00 AM	68	76	0/0	3-5
7B	July 4, 2022	F	5:50 AM-8:46 AM	53	62	20/0	2-3
		V	8:46 AM-11:00 AM	62	70	0/0	3-4
8A	July 13, 2022	F	5:52 AM-8:44 AM	55	62	15/0	2-3
		V	8:44 AM-11:00 AM	62	74	0/0	3-7
8B	July 14, 2022	F	6:14 AM-8:38 AM	59	66	10/0	3-6
		V	8:38 AM-10:49 AM	66	73	0/0	6-8
°F: degrees Fahrenheit; mph: miles per hour							

The results of the least Bell's vireo/southwestern willow flycatcher surveys are included in Appendix K.

2.3.9 Western Yellow-billed Cuckoo

The USFWS survey protocol for western yellow-billed cuckoo requires a minimum of four surveys be conducted in three time periods that span the peak of breeding activity for the western populations of this species: (1) one survey is required from June 15 to June 30 when migrating yellow-billed cuckoos are passing through but breeding birds are also arriving; (2) two surveys are required from July 1 to July 31 when individual cuckoos encountered are mostly breeders but are occasionally migrants, wandering individuals, or young of the year; and (3) one survey is required from August 1 to August 15 when most breeding yellow-billed cuckoos have finished breeding activities and are departing. Each survey needs to be conducted 12 to 15 days apart. Focused surveys were conducted by Lindsay Messett (TE-067064-5).

The survey area for the western yellow-billed cuckoo includes all suitable riparian habitats upstream of the dam. The Biologist reduced the survey area boundary where offsite areas were not accessible due to property boundaries (i.e., Santiago Landfill), topography (i.e., cliff), and where there was no suitable habitat (i.e., Irvine Lake).

Ms. Messett systematically surveyed the riparian habitats by walking slowly and methodically along the margins of riparian habitat and using meandering transects through the riparian habitat in the survey area. Per USFWS survey protocol for the species, Ms. Messett played recorded contact or "kowlp" calls of western yellow-billed cuckoo five times at one-minute intervals at each calling station (or point) established in the survey area. Compact speakers capable of broadcasting recorded bird calls in excess of 70 decibels were used during all surveys. Upon arriving at each calling point, Ms. Messett listened and watched for cuckoos for one minute prior to playing the broadcast contact calls. Calling points were established approximately every 328 feet in riparian habitat that provided potentially suitable or marginally suitable habitat for the western yellow-billed cuckoo. All surveys were conducted under optimal weather conditions (i.e., between 55 degrees Fahrenheit [°F] and 95°F with wind speeds between 0 and 15 miles per hour) and during the morning hours when bird activity is at a peak (Table 11). Additionally, per USFWS guidelines, all incidental observations of least Bell's vireo and willow flycatcher (*Empidonax traillii*) were recorded and mapped.

TABLE 11
SUMMARY OF SURVEY DATA AND CONDITIONS FOR
WESTERN YELLOW-BILLED CUCKOO SURVEYS

Survey No.	Survey Date	Surveyor	Time	Air Temperature (°F)		Cloud Cover (%) Start/End	Wind (mph)
				Start	End		
1A	June 23, 2022	Messett	6:00 AM–10:50 AM	67	83	50/30	1–3
1B	June 24, 2022	Messett	6:15 AM–10:45 AM	55	80	0/0	0–6
2A	July 12, 2022	Messett	5:50 AM–11:00 AM	64	73	100/0	2–4
2B	July 13, 2022	Messett	5:45 AM–10:55 AM	63	72	100/0	1–2
3A	July 28, 2022	Messett	6:00 AM–11:05 AM	66	76	100/50	0–1
3B	July 29, 2022	Messett	6:05 AM–10:45 AM	67	78	90/75	4–5
4A	August 11, 2022	Messett	6:00 AM–10:30 AM	63	87	25/0	0–1
4B	August 12, 2022	Messett	5:54 AM–11:00 AM	70	82	25/10	0–4

(°F): Fahrenheit; %: percent; mph: miles per hour

The results of the western yellow-billed cuckoo surveys are included in Appendix L.

2.3.10 Jurisdictional Delineation

Jurisdictional water resources considered for this report include waters of the United States (WOTUS) under the regulatory authority of the USACE; waters of the State under the regulatory authority of the RWQCB; and the bed, bank, and channel of all lakes, rivers, and/or streams (and associated riparian vegetation), under the regulatory authority of CDFW.

Psomas assessed the presence of WOTUS by determining connectivity or adjacency of on-site features to points of discharge at a Traditional Navigable Waterway. Non-wetland WOTUS are delineated based on the limits of the Ordinary High Water Mark (OHWM), which can be determined by a number of factors, including (1) the presence of a clear, natural line impressed on the bank; (2) shelving; (3) changes in the character of the soil; (3) destruction of terrestrial vegetation; and (4) the presence of litter and debris. The OHWM limits (i.e., active floodplain) occurring in the BSA were further verified using methods contained in *A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States, A Delineation Manual* (Lichvar and McColley 2008) and the *Updated Datasheet for the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States* (Curtis and Lichvar 2010).

In September 2008, the USACE issued the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (USACE 2008). This regional supplement is designed for use with the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987). Both the 1987 Wetlands Manual and the Arid West Supplement to the manual provide technical methods and guidelines for determining the presence of wetland WOTUS. Both documents prescribe using a three-parameter approach to identify wetlands. The three parameters needed to assign a site as a wetland include evidence of wetland hydrology, hydrophytic vegetation, and hydric soils. However, problem areas may periodically or permanently lack certain indicators due to seasonal or annual variability or

the nature of the soils or plant species on site. Atypical wetlands lack certain indicators due to recent human activities or natural events. Guidance for determining the presence of wetlands in these situations is presented in the regional supplement.

Psomas determined the limits of RWQCB jurisdiction in the field following the methods described for USACE jurisdiction, above. RWQCB shares USACE jurisdiction unless isolated conditions are present. If isolated waters are present, RWQCB takes jurisdiction using USACE's definition of the OHWM. In 2019, SWRCB adopted a new wetland definition, which includes areas with (1) continuous or recurrent saturation of the upper substrate of sufficient duration to cause anaerobic conditions and (2) vegetation dominated by hydrophytes or lacking vegetation (SWRCB 2019). This new definition went into effect on May 28, 2020.

CDFW's jurisdiction was determined by measuring the distance between the top of the bank to the top of the bank of the water features on site or, if present, to the outer limit of riparian vegetation located within or immediately adjacent to the feature. CDFW jurisdiction within Irvine Lake extended to the top of the existing dam embankment.

The jurisdictional delineation for the portion of the BSA downstream of the dam was conducted by Psomas on March 24, 2020. The jurisdictional delineation for the portion of the BSA upstream of the dam was conducted on October 14, 20, and 21, 2020. Psomas Senior Regulatory Specialist Allison Rudalevige performed all surveys with assistance from Psomas Senior Biologist Jonathan Aguayo on October 14 and 20 and Psomas Senior Biologist Lindsay Messett on October 21. Areas under USACE, RWQCB, and CDFW authority were delineated using an aerial photograph (scale of 1-inch equals 175 feet [$1'' = 175'$] downstream of the dam and scale $1'' = 275'$ upstream of the dam) overlaid with 5-foot topographic contour data loaded onto Avenza Maps application on an iPad. Large drainage features and waterbodies were delineated as polygons and narrow drainages were delineated as centerlines with corresponding width measurements. Soil test pits were dug in areas that exhibited potential hydrophytic vegetation and wetland hydrology.

The results of the jurisdictional delineation are included as Appendix M.

3.0 EXISTING BIOLOGICAL RESOURCES

3.1 PHYSICAL ENVIRONMENTAL SETTING

3.1.1 Regional Environment

The Project is generally located in the coastal foothills of eastern Orange County. Topographically, this region exhibits low-lying ridgelines and hills with interspersed relatively broad valley and canyon bottoms. Elevations in the BSA range from approximately 657 to 996 feet above msl.

Within the eastern Orange County area, there are numerous designated open space areas. The largest areas in proximity to the BSA include the following: the 1,000-acre NCCP Reserve, Limestone Canyon Regional Park, Whiting Ranch Wilderness Park, Santiago Oaks Regional Park, Irvine Regional Park, and Cleveland National Forest. In addition to designated open space, other non-designated open space areas within the region include other undeveloped land in the foothills of Santiago Canyon.

3.1.2 Climate

Southern California experiences a Mediterranean climate characterized by mild, rainy winters and hot, dry summers. The temperature is moderated by the coastal influence of the Pacific Ocean, which creates mild conditions throughout most of the year. The most distinguishing characteristic of a Mediterranean climate is its seasonal precipitation. In Southern California, precipitation is characterized by brief, intense storms between November and March. It is not unusual for the majority of the annual precipitation to fall during a few storms over a short span of time.

Rainfall patterns in the region are subject to extreme variations from year to year and longer-term wet and dry cycles. The region received approximately 17.7 inches of precipitation between August 2019 and July 2020 (data taken from Irvine – South Coast Valleys Station No. 75) (CIMIS 2020). The region received approximately 7.1 inches of precipitation between July 2021 and June 2022 and approximately 9.3 inches of precipitation between July 2021 and June 2022 (data taken from Irvine – South Coast Valleys Station No. 75) (CIMIS 2022). The average annual precipitation for this area is between 10 and 13 inches.

Climate change refers to any significant change in climate, such as the average temperature, precipitation, or wind patterns over a period of time. Significant changes in global climate patterns have been associated with an accumulation of greenhouse gas emissions in the atmosphere. Some greenhouse gases occur naturally and are emitted to the atmosphere through natural processes, while others are created and emitted solely through human activities; the majority of global warming is attributed to human activities. In addition to affecting temperature and precipitation patterns, climate change is believed to be contributing to more extreme weather events such as more frequent larger storms and extended periods of drought (USFS 2018, US EPA 2017).

In the Cleveland National Forest, climate change effects are changing fire patterns and disease outbreaks and affecting water supplies (USFS 2018). Fires are a natural part of the landscape, but each year the fire season is coming earlier and ending later. In addition, the fires themselves are burning hotter and have become more damaging and dangerous. Similarly, insects are a natural part of forested landscapes, but now the insects are spreading more rapidly because the winter is not cold enough to reduce their populations. Also, insect-caused disease epidemics are larger and last longer, killing more trees and increasing fire risk. The warmer winters are affecting water supplies because the snow packs are thinner and melt earlier in spring, so the water runs out from the forest earlier in summer. Extended droughts also make trees more vulnerable to both fire and insects (USFS 2018).

Two significant fires have recently burned in the vicinity of the BSA. The Silverado Fire began in October of 2020 and burned approximately 12,466 acres of open space south of the BSA. The 2020 Bond Fire is located north and east of the previous Silverado Fire. The Bond Fire burned approximately 6,686 acres (CalFire 2020). These fires were two of three significant fires that were burning concurrently in Southern California in the fall of 2020 during unusually powerful and long-lasting Santa Ana Wind conditions.

3.1.3 Local Environment

Irvine Lake (named Santiago Creek Reservoir on the USGS, Exhibit 3) was created by constructing a dam across Santiago Creek. Santiago Creek, a named blueline stream, enters Irvine Lake from the east and continues downstream of the dam flowing north and then west. It has a relatively broad floodplain both above and below the dam. The slopes around the western and northern portions of the lake are relatively steep while the areas to the southeast and east of the BSA include areas that are relatively flat. Three unnamed blueline streams enter the lake from the north and eight unnamed blueline streams enter the lake from the west, southeast, and south. One unnamed blueline stream enters the BSA in the northwest, downstream of the dam, while Fremont Canyon Creek merges with Santiago Creek downstream of the BSA. Elevations in the BSA range from approximately 657 to 996 feet above msl.

Soils mapped in the BSA include Alo variant clay, Anaheim loam, Anaheim clay loam, Balcom-rock outcrop complex, beaches, Bosanko clay, Botella loam, Botella clay loam, Calleguas clay loam, Capistrano sandy loam, Cieneba sandy loam, Cieneba-rock outcrop complex, Corralitos loamy sand, Myford sandy loam, pits, riverwash, rock outcrop-Cieneba complex, Soboba gravelly loamy sand, Soper loam, Soper gravelly loam, Soper cobbly loam, Soper-rock outcrop complex, and Sorrento loam (USDA NRCS 2020) (Exhibit 5).

3.2 VEGETATION TYPES AND OTHER AREAS

The following vegetation types occur in the BSA: sagebrush scrub, disturbed sagebrush scrub, sagebrush-coyote bush scrub, southern cactus scrub, disturbed southern cactus scrub, disturbed floodplain sage scrub, toyon-sumac chaparral, annual grassland, ruderal, riparian herb, southern willow scrub, mulefat scrub, disturbed mulefat scrub, southern sycamore-coast live oak riparian woodland, southern black willow forest, disturbed southern black willow forest, southern black willow forest/riparian herb, coast live oak woodland, and western sycamore, and vegetated fluctuating shoreline (Exhibit 6; Table 12). Other

landcover includes cliff, open water, fluctuating shoreline, perennial stream, ornamental, developed, and disturbed areas.

TABLE 12
VEGETATION TYPES AND OTHER AREAS IN THE BSA

Vegetation Type or Other Area	Gray and Bramlet (1992) Vegetation Code	Sensitive Vegetation Community (CDFW 2025b)	Total Vegetation in BSA (acres)
Coastal Sage Scrub			
Sagebrush Scrub	2.3.6	No	115.81
Disturbed Sagebrush Scrub	2.3.6	No	20.11
Sagebrush – Coyote Brush Scrub	2.3.12	No	10.59
Southern Cactus Scrub	2.4	Provisional ^a	17.48
Disturbed Southern Cactus Scrub	2.4	Yes	10.63
Disturbed Floodplain Sage Scrub	2.6	Yes	0.48
<i>Subtotal Coastal Sage Scrub</i>			<i>175.10</i>
Chaparral			
Toyon – Sumac Chaparral	3.12	No	30.35
<i>Subtotal Chaparral</i>			<i>30.35</i>
Grassland			
Annual Grassland	4.1	No	15.59
Ruderal	4.6	No	92.38
<i>Subtotal Grassland</i>			<i>107.97</i>
Riparian			
Riparian Herb	7.1	No	13.15
Southern Willow Scrub	7.2	Yes	0.43
Mulefat Scrub	7.3	No	1.50
Disturbed Mulefat Scrub	7.3	No	26.67
Southern Sycamore Riparian Woodland	7.4	Yes	20.48
Southern Sycamore Riparian Woodland/Southern Coast Live Oak Riparian Forest	7.4/7.5	Yes	5.46
Southern Black Willow Forest	7.7	Yes	83.61
Disturbed Southern Black Willow Forest	7.7	Yes	35.35
Southern Black Willow Forest/Riparian Herb	7.7/7.1	No ^b	26.01
<i>Subtotal Riparian</i>			<i>212.66</i>
Woodland			
Coast Live Oak Woodland	8.1	No	31.09
Western Sycamore	8.x	Yes	0.36
<i>Subtotal Woodland</i>			<i>31.45</i>
Cliff and Rock			
Cliff	10.0	No	1.63
<i>Subtotal Cliff and Rock</i>			<i>1.63</i>

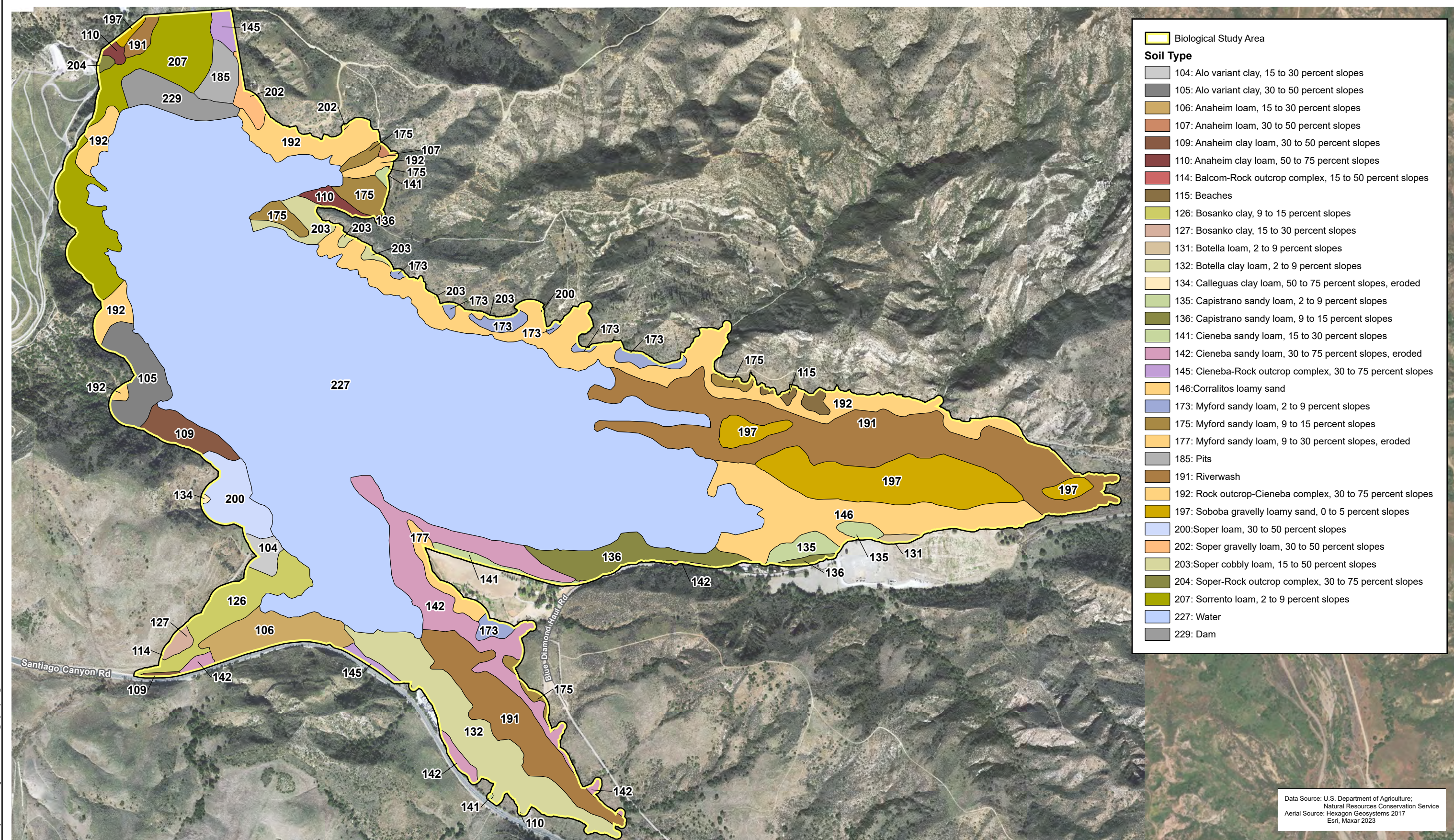
TABLE 12
VEGETATION TYPES AND OTHER AREAS IN THE BSA

Vegetation Type or Other Area	Gray and Bramlet (1992) Vegetation Code	Sensitive Vegetation Community (CDFW 2025b)	Total Vegetation in BSA (acres)
Lakes, Reservoirs, and Basins			
Open Water	12.1	No	312.11
Fluctuating Shoreline	12.2	No	26.31
Vegetated Fluctuating Shoreline	12.2	No	45.13
<i>Subtotal Lakes, Reservoirs, and Basins</i>			383.55
Watercourses			
Perennial Stream	13.1	No	6.97
<i>Subtotal Watercourses</i>			6.97
Developed Areas			
Ornamental	15.5	No	20.77
Developed	15.6	No	20.98
<i>Subtotal Developed Areas</i>			41.75
Disturbed Areas			
Disturbed	16.1	No	25.42
<i>Subtotal Disturbed Areas</i>			25.42
Total			1,016.85
^a Ranked as sensitive based on less than 10 stands sampled; may be more widespread (CDFW 2025b). ^b This blended community would be characterized more as riparian herb than southern black willow forest; therefore, it would not be considered a sensitive community.			
BSA: Biological Survey Area			

3.2.1 Sagebrush Scrub (2.3.6)

Sagebrush scrub is distributed throughout the BSA on the slopes surrounding Irvine Lake. This vegetation type is dominated by relatively dense California sagebrush (*Artemisia californica*). Other native shrubs are also scattered throughout these areas and include leafy California buckwheat (*Eriogonum fasciculatum* var. *foliolosum*), deerweed (*Acmispon glaber*), laurel sumac (*Malosma laurina*), lemonade berry (*Rhus integrifolia*), and toyon (*Heteromeles arbutifolia*). The density of these co-occurring species varies across the BSA. Where present, openings between shrubs have native herbs, such as erect plantain (*Plantago erecta*) and narrow-toothed pectocarya (*Pectocarya linearis* ssp. *ferocula*). Sparse amounts of scaly scale-broom (*Lepidospartum squamatum*) extend into this vegetation where it occurs along Santiago Creek downstream of the dam.

Sagebrush scrub is consistent with the *Artemisia californica* association in *A Manual of California Vegetation* (CNPS 2024). This association is not considered a sensitive natural community by CDFW (2025b). However, sagebrush scrub is protected by the NCCP/HCP.



- Biological Study Area**
- Soil Type**
- 104: Alo variant clay, 15 to 30 percent slopes
 - 105: Alo variant clay, 30 to 50 percent slopes
 - 106: Anaheim loam, 15 to 30 percent slopes
 - 107: Anaheim loam, 30 to 50 percent slopes
 - 109: Anaheim clay loam, 30 to 50 percent slopes
 - 110: Anaheim clay loam, 50 to 75 percent slopes
 - 114: Balcom-Rock outcrop complex, 15 to 50 percent slopes
 - 115: Beaches
 - 126: Bosanko clay, 9 to 15 percent slopes
 - 127: Bosanko clay, 15 to 30 percent slopes
 - 131: Botella loam, 2 to 9 percent slopes
 - 132: Botella clay loam, 2 to 9 percent slopes
 - 134: Calleguas clay loam, 50 to 75 percent slopes, eroded
 - 135: Capistrano sandy loam, 2 to 9 percent slopes
 - 136: Capistrano sandy loam, 9 to 15 percent slopes
 - 141: Cieneba sandy loam, 15 to 30 percent slopes
 - 142: Cieneba sandy loam, 30 to 75 percent slopes, eroded
 - 145: Cieneba-Rock outcrop complex, 30 to 75 percent slopes
 - 146: Corralitos loamy sand
 - 173: Myford sandy loam, 2 to 9 percent slopes
 - 175: Myford sandy loam, 9 to 15 percent slopes
 - 177: Myford sandy loam, 9 to 30 percent slopes, eroded
 - 185: Pits
 - 191: Riverwash
 - 192: Rock outcrop-Cieneba complex, 30 to 75 percent slopes
 - 197: Soboba gravelly loamy sand, 0 to 5 percent slopes
 - 200: Soper loam, 30 to 50 percent slopes
 - 202: Soper gravelly loam, 30 to 50 percent slopes
 - 203: Soper cobbly loam, 15 to 50 percent slopes
 - 204: Soper-Rock outcrop complex, 30 to 75 percent slopes
 - 207: Sorrento loam, 2 to 9 percent slopes
 - 227: Water
 - 229: Dam

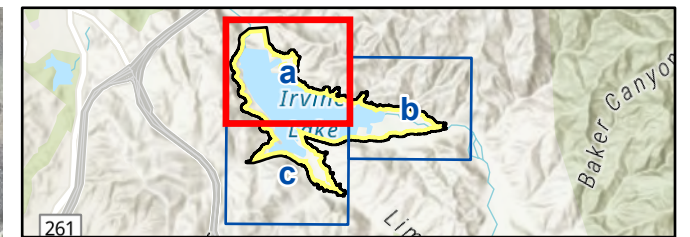
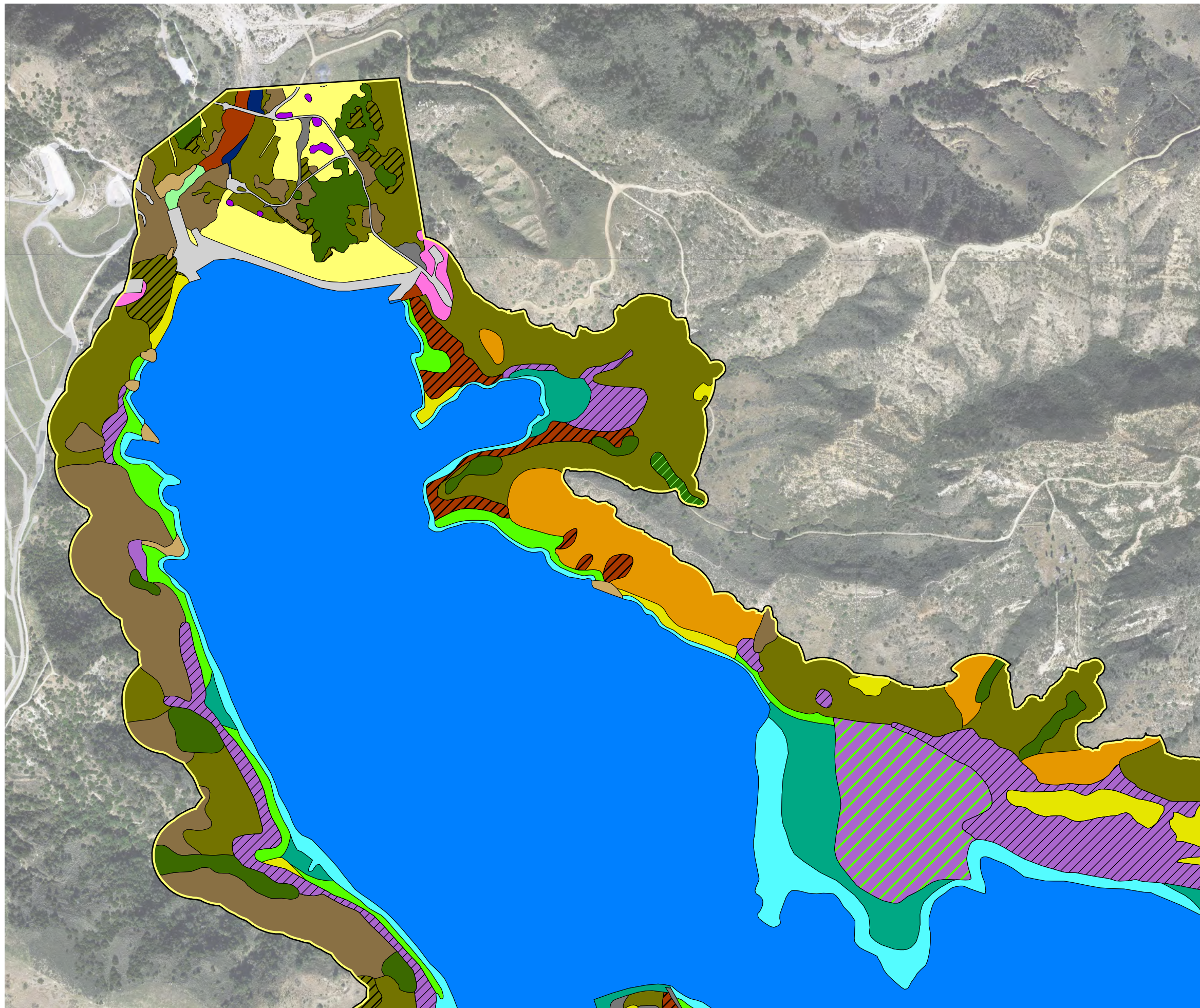
Data Source: U.S. Department of Agriculture;
Natural Resources Conservation Service
Aerial Source: Hexagon Geosystems 2017
Esri, Maxar 2023

Soil Types

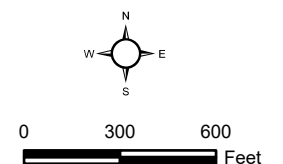
Santiago Creek Dam Improvement Project



D:\Projects\SRW\SantiagoCreek\PO\SCD\SCD_Project.aprx Biological_Resources



- Biological Study Area
- Vegetation Types and Other Areas**
- Sagebrush Scrub (2.3.6)
 - Disturbed Sagebrush Scrub (2.3.6)
 - Southern Cactus Scrub (2.4)
 - Disturbed Floodplain Sage Scrub (2.6)
 - Toyon - Sumac Chaparral (3.12)
 - Annual Grassland (4.1)
 - Ruderal (4.6)
 - Riparian Herb (7.1)
 - Southern Willow Scrub (7.2)
 - Mulefat Scrub (7.3)
 - Disturbed Mulefat Scrub (7.3)
 - Southern Sycamore Riparian Woodland/Southern Coast Live Oak Riparian Forest (7.4/7.5)
 - Southern Black Willow Forest (7.7)
 - Disturbed Southern Black Willow Forest (7.7)
 - Southern Black Willow Forest/Riparian Herb (7.7/7.1)
 - Coast Live Oak Woodland (8.1)
 - Western Sycamore (8.x)
 - Cliff (10)
 - Open Water (12.1)
 - Fluctuating Shoreline (12.2)
 - Vegetated Fluctuating Shoreline (12.2)
 - Ornamental (15.5)
 - Developed (15.6)
 - Disturbed (16.1)



Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

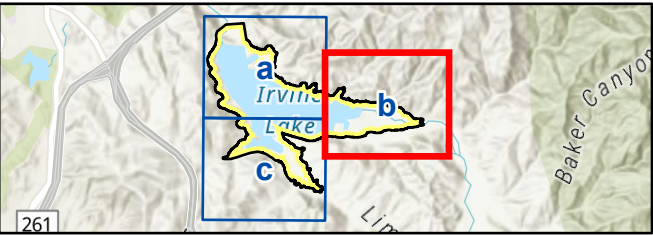
Biological Resources

Exhibit 6a

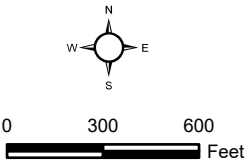
*Santiago Creek Dam
Improvement Project*



(Rev: 02/27/2025_JVR) R:\Projects\SRW_IRWD\3IRW010205\Graphics\BTR\BTR_BiologicalResources.pdf



- Biological Study Area
- Vegetation Types and Other Areas**
- Sagebrush Scrub (2.3.6)
- Sagebrush - Coyote Brush Scrub (2.3.12)
- Ruderal (4.6)
- Riparian Herb (7.1)
- Disturbed Mulefat Scrub (7.3)
- Southern Sycamore Riparian Woodland (7.4)
- Southern Black Willow Forest (7.7)
- Disturbed Southern Black Willow Forest (7.7)
- Coast Live Oak Woodland (8.1)
- Open Water (12.1)
- Fluctuating Shoreline (12.2)
- Vegetated Fluctuating Shoreline (12.2)
- Perennial Stream (13.1)
- Ornamental (15.5)
- Developed (15.6)
- Disturbed (16.1)



Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

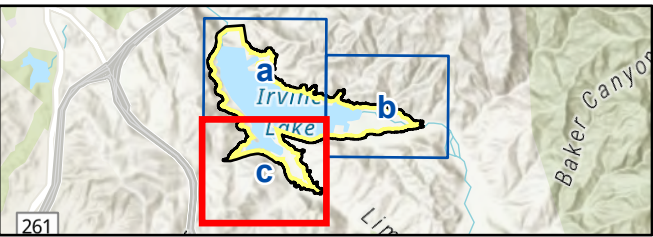
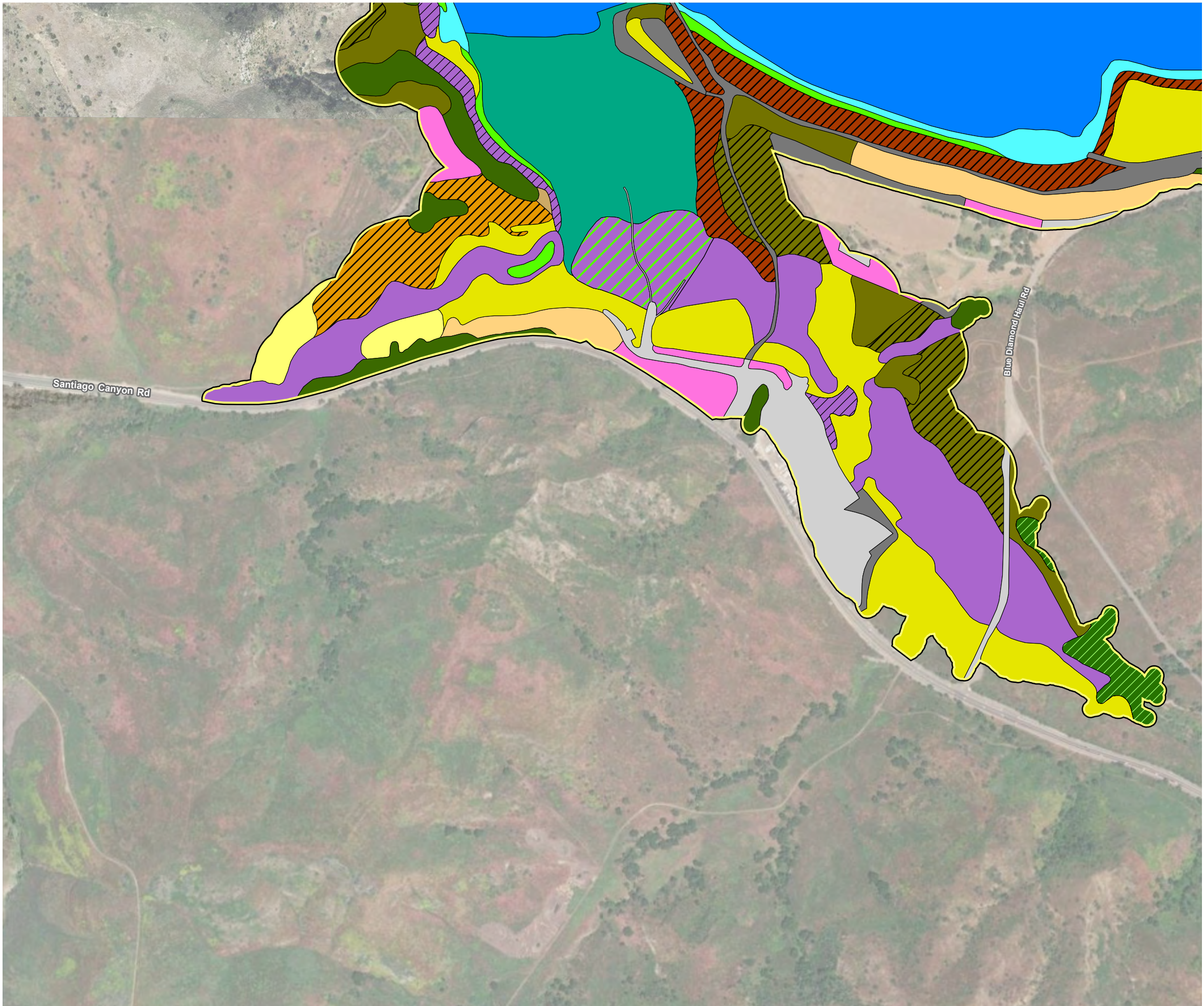
Biological Resources

Santiago Creek Dam Improvement Project

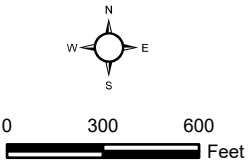
Exhibit 6b

(Rev: 02/27/2025_JVR) R:\Projects\IRW\IRWD\3IRW010205\Graphics\BTR\BTR_BiologicalResources.pdf

D:\Projects\IRW\SantiagoCreek\PO\SCDS\CD_P\Project.aprx\BTR_BiologicalResources



- Biological Study Area
- Vegetation Types and Other Areas**
- Sagebrush Scrub (2.3.6)
 - Disturbed Sagebrush Scrub (2.3.6)
 - Sagebrush - Coyote Brush Scrub (2.3.12)
 - Disturbed Southern Cactus Scrub (2.4)
 - Annual Grassland (4.1)
 - Ruderal (4.6)
 - Riparian Herb (7.1)
 - Disturbed Mulefat Scrub (7.3)
 - Southern Sycamore Riparian Woodland/Southern Coast Live Oak Riparian Forest (7.4/7.5)
 - Southern Black Willow Forest (7.7)
 - Disturbed Southern Black Willow Forest (7.7)
 - Southern Black Willow Forest/Riparian Herb (7.7/7.1)
 - Coast Live Oak Woodland (8.1)
 - Cliff (10)
 - Open Water (12.1)
 - Fluctuating Shoreline (12.2)
 - Vegetated Fluctuating Shoreline (12.2)
 - Ornamental (15.5)
 - Developed (15.6)
 - Disturbed (16.1)



Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Biological Resources
*Santiago Creek Dam
Improvement Project*

Exhibit 6c



(Rev: 02/27/2025_JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\BTR\Ex_BiologicalResources.pdf

3.2.2 Disturbed Sagebrush Scrub (2.3.6)

Disturbed sagebrush scrub is distributed downstream of the dam and along slopes in the southern portion of the BSA. It is similar in composition to sagebrush scrub but it has an open canopy and the spaces between the shrubs are degraded (disturbed) by the presence of non-native grasses and herbs such as bromes (*Bromus* spp.), oats (*Avena* spp.), grayish shortpod mustard (*Hirschfeldia incana*), and/or black mustard (*Brassica nigra*).

Disturbed sagebrush scrub is consistent with the *Artemisia californica* association mixed with one or more of the annual brome grasslands or the upland mustard associations in *A Manual of California Vegetation* (CNPS 2024). These associations are not considered sensitive natural communities by CDFW (2025b). However, disturbed sagebrush scrub is protected by the NCCP/HCP.

3.2.3 Sagebrush – Coyote Brush Scrub (2.3.12)

Sagebrush – coyote brush scrub is distributed on slopes in the southern portion of the BSA. This vegetation type is co-dominated by California sagebrush and coyote brush (*Baccharis pilularis* ssp. *consanguinea*) with lesser amounts of leafy California buckwheat, laurel sumac, lemonade berry, toyon, and white sage (*Salvia apiana*).

Sagebrush – coyote brush scrub is consistent with the *Baccharis pilularis* – *Artemisia californica* association in *A Manual of California Vegetation* (CNPS 2024). This association is not considered a sensitive natural community by CDFW (2025b). However, sagebrush – coyote brush scrub is protected by the NCCP/HCP.

3.2.4 Southern Cactus Scrub (2.4)

Southern cactus scrub is distributed on slopes on the northern side of Irvine Lake. This vegetation type is characterized by approximately 20 percent cover of prickly-pear (either *Opuntia littoralis* or *Opuntia x vaseyi*). These areas also contain California sagebrush, leafy California buckwheat, laurel sumac, and other sagebrush scrub species.

Southern cactus scrub is consistent with the *Artemisia californica* – *Opuntia littoralis* association in *A Manual of California Vegetation* (CNPS 2024). This association is considered a provisional¹⁰ sensitive natural community by CDFW (2025b). Southern cactus scrub is also protected by the NCCP/HCP.

3.2.5 Disturbed Southern Cactus Scrub (2.4)

Disturbed southern cactus scrub is located in the southwestern portion of the BSA. This vegetation type is characterized by the presence of prickly-pear with other native shrubs such as California sagebrush and leafy California buckwheat. However, it is degraded (disturbed) by the presence of non-native grayish shortpod mustard and pepper tree (*Schinus molle*).

¹⁰ Ranked as sensitive based on less than 10 stands sampled; may be more widespread (CDFW 2023a).

Disturbed southern cactus scrub is consistent with the *Artemisia californica* – *Opuntia littoralis* association mixed with one or more of the annual brome grasslands or the upland mustard associations in *A Manual of California Vegetation* (CNPS 2024). The *Artemisia californica* – *Opuntia littoralis* association is considered a provisional³ sensitive natural community by CDFW (2025b). Disturbed southern cactus scrub is also protected by the NCCP/HCP.

3.2.6 Disturbed Floodplain Sage Scrub (2.6)

Disturbed floodplain sage scrub occurs along the active floodplain/low terrace of Santiago Creek downstream of the dam. This vegetation type is characterized by the presence of scaly scale-broom along a rocky alluvial wash. As is typical of this vegetation type, shrub density is relatively low. Other species that co-occur include California sagebrush, California brickellbush (*Brickellia californica*), straw-colored cudweed (*Pseudognaphalium stramineum*), and chilicothe (*Marah macrocarpa*). This vegetation type is degraded (disturbed) by the presence of non-native fennel (*Foeniculum vulgare*) and non-native grasses.

Disturbed floodplain sage scrub is consistent with the *Lepidospartum squamatum* – *Artemisia californica* association mixed with the *Foeniculum vulgare* association in *A Manual of California Vegetation* (CNPS 2024). The *Lepidospartum squamatum* – *Artemisia californica* association is considered a sensitive natural community by CDFW (2025b). Disturbed floodplain sage scrub is also protected by the NCCP/HCP.

3.2.7 Toyon – Sumac Chaparral (3.12)

Toyon – sumac chaparral is distributed downstream of the dam and on the slopes in the western portion of the BSA. The dominant shrub is laurel sumac; however, lemonade berry, toyon, blue elderberry (*Sambucus mexicana*), and coast live oak (*Quercus agrifolia*) co-occur in some areas. The patch on the east side of Santiago Creek downstream of the dam also contains Coulter’s matilija poppy (*Romneya coulteri*), a special status plant species. This vegetation type intergrades with coastal sage scrub and annual brome grassland.

Toyon – sumac chaparral is consistent with the *Malosma laurina* association in *A Manual of California Vegetation* (CNPS 2024). This association is not considered a sensitive natural community by CDFW (2025b).

3.2.8 Annual Grassland (4.1)

Annual grassland is distributed primarily downstream of the dam but also occurs in small patches in the southwestern portion of the BSA. This vegetation type is dominated by non-native grasses, including red brome (*Bromus rubens*), ripgut grass (*Bromus diandrus*), slender wild oat (*Avena barbata*), wild oat (*Avena fatua*), and wall barley (*Hordeum murinum*). Other non-native species, such as grayish shortpod mustard, black mustard, and tocalote (*Centaurea melitensis*) are also present. Most areas contain scattered native species such as miner’s-lettuce (*Claytonia perfoliata*), fascicled tarplant (*Deinandra fasciculata*), telegraph weed (*Heterotheca grandiflora*), turkey-mullein (*Croton setiger*), and fiddleneck (*Amsinckia* spp.). The slope up to the dam contains a greater cover of native species,

including miniature lupine (*Lupinus bicolor*), common goldfields (*Lasthenia gracilis*), erect plantain, and valley popcorn flower (*Plagiobothrys canescens*). This slope may have been seeded with a native seed mix following a previous disturbance.

Annual grassland has characteristics of the *Bromus diandrus* – *Avena* spp., *Bromus diandrus* – mixed herbs, *Bromus rubens* – mixed herbs, *Brassica nigra* – *Bromus diandrus*, and *Hirschfeldia incana* associations in *A Manual of California Vegetation* (CNPS 2024). None of these associations are considered sensitive natural communities by CDFW (2025b).

3.2.9 Ruderal (4.6)

Ruderal (weedy) vegetation occurs in broad, flat areas and slopes in the eastern and southern portions of the BSA and along small portions of the shoreline around Irvine Lake. This vegetation type is dominated by grayish shortpod mustard. The area adjacent to the west of the dam is a monoculture of common castor bean (*Ricinus communis*), a non-native species.

Most of the ruderal vegetation in the BSA is consistent with the *Hirschfeldia incana* association in *A Manual of California Vegetation* (CNPS 2024). This association is not considered a sensitive natural community by CDFW (2025b).

3.2.10 Riparian Herb (7.1)

Riparian herb is distributed just above the shoreline around Irvine Lake throughout the BSA. This vegetation type is dominated by cocklebur (*Xanthium strumarium*) with lesser amounts of white sweetclover (*Melilotus albus*), alkali-mallow (*Malvella leprosa*), and grayish shortpod mustard.

Riparian herb is consistent with the *Xanthium strumarium* association in *A Manual of California Vegetation* (CNPS 2024). This association is not considered a sensitive natural community by CDFW (2025b).

3.2.11 Southern Willow Scrub (7.2)

Southern willow scrub occurs in one location along Santiago Creek downstream of the dam. This vegetation type is dominated by arroyo willow (*Salix lasiolepis*) with scattered white alder (*Alnus rhombifolia*), western sycamore (*Platanus racemosa*), and Fremont cottonwood (*Populus fremontii* ssp. *fremontii*). The understory contains scattered mule fat (*Baccharis salicifolia* ssp. *salicifolia*), California sagebrush, flatsedge (*Cyperus* sp.), and non-native grasses. A depression in the streambed holds standing water surrounded by broad-leaved cattail (*Typha latifolia*).

Southern willow scrub is consistent with the *Salix lasiolepis* association in *A Manual of California Vegetation* (CNPS 2024). This association is considered a sensitive natural community by CDFW (2025b).

3.2.12 Mulefat Scrub (7.3)

Mulefat scrub primarily occurs along the low flow channel of Santiago Creek downstream of the dam. It also occurs upstream of the dam in one patch adjacent to the east end of the dam structure. It is dominated by a varying cover of mule fat; scaly scale-broom also occurs. Downstream of the dam, this vegetation type includes some low cover of non-native fennel and mustards.

Mulefat scrub is consistent with the *Baccharis salicifolia* association in *A Manual of California Vegetation* (CNPS 2024). This association is not considered a sensitive natural community by CDFW (2025b).

3.2.13 Disturbed Mulefat Scrub (7.3)

Disturbed mulefat scrub is distributed above the shoreline of Irvine Lake and extending upstream of the lake along the low-flow channel of Santiago Creek. This vegetation type is dominated by scattered mule fat; however, it is degraded (disturbed) by the presence of saltcedar (*Tamarix ramosissima*), giant reed (*Arundo donax*), and grayish shortpod mustard.

Disturbed mulefat scrub is consistent with the *Baccharis salicifolia* – *Tamarix ramosissima* or *Baccharis salicifolia* – *Arundo donax* associations in *A Manual of California Vegetation* (CNPS 2024). These associations are not considered sensitive natural communities by CDFW (2025b).

3.2.14 Southern Sycamore Riparian Woodland (7.4)

Southern sycamore riparian woodland is located in one location at the upstream end of Santiago Creek in the eastern portion of the BSA. This vegetation type consists of a closed riparian canopy dominated by western sycamore. Other species in the tree canopy include Goodding's black willow, arroyo willow, Fremont cottonwood, and coast live oak; a few scattered gum trees (*Eucalyptus* spp.) are also present. The understory and margins contain mule fat.

Southern sycamore riparian woodland is consistent with the *Platanus racemosa*–*Populus fremontii*/*Salix lasiolepis* association in *A Manual of California Vegetation* (CNPS 2024). This association is considered a sensitive natural community by CDFW (2025b).

3.2.15 Southern Sycamore Riparian Woodland/Coast Live Oak Riparian Forest (7.4/7.5)

Southern sycamore riparian woodland/coast live oak riparian forest is distributed in a few patches in the southeastern portion of the BSA and in one location north of Irvine Lake. This vegetation type is co-dominated by western sycamore and coast live oak trees in a savannah-like setting. The understory and area between trees are dominated by grayish shortpod mustard and tree tobacco (*Nicotiana glauca*).

Southern sycamore riparian woodland/coast live oak riparian forest is consistent with the *Platanus racemosa*–*Quercus agrifolia* association in *A Manual of California Vegetation* (CNPS 2024). This association is considered a sensitive natural community by CDFW (2025b).

3.2.16 Southern Black Willow Forest (7.7)

Southern black willow forest occurs along tributary drainages in the southern portion of the BSA, upstream of the lake along Santiago Creek, and in a few patches above the shoreline of Irvine Lake. This vegetation type is dominated by a tree canopy of Goodding's black willow (*Salix gooddingii*); mule fat is abundant in the understory, along the margins, and between the tree canopy.

Southern black willow forest is consistent with the *Salix gooddingii*/*Baccharis salicifolia* association in *A Manual of California Vegetation* (CNPS 2024). This association is considered a sensitive natural community by CDFW (2025b).

3.2.17 Disturbed Southern Black Willow Forest (7.7)

Disturbed southern black willow forest is distributed above the shoreline of Irvine Lake and upstream of the lake along Santiago Creek. This vegetation type is characterized by the presence of Goodding's black willow and mule fat; however, it is degraded (disturbed) by the presence of non-native species such as saltcedar, giant reed, grayish shortpod mustard, and non-native grasses. In many areas, the tree canopy is sparse.

Disturbed southern black willow forest is consistent with the *Salix gooddingii*/*Baccharis salicifolia* association mixed with the *Tamarix* spp. association in *A Manual of California Vegetation* (CNPS 2024). The *Salix gooddingii*/*Baccharis salicifolia* association is considered a sensitive natural community by CDFW (2025b).

3.2.18 Southern Black Willow Forest/Riparian Herb (7.7/7.1)

Southern black willow forest/riparian herb is distributed in broad, flat areas near fluctuating shoreline and vegetated fluctuating shoreline near the upstream end of Irvine Lake and in the southern portion of the BSA. This vegetation type contains sparse Goodding's black willow scattered throughout an area dominated by cocklebur. Based on historic aerial images, these areas are inundated or partially inundated when the water level in the lake is higher.

Southern black willow forest/riparian herb is generally consistent with the *Xanthium strumarium* association mixed with the *Salix gooddingii* association in *A Manual of California Vegetation* (CNPS 2024). While the *Salix gooddingii* association is considered a sensitive natural community by CDFW (2025b), these areas would not be considered a sensitive natural community due to the extremely low tree cover.

3.2.19 Coast Live Oak Woodland (8.1)

Coast live oak woodland occurs scattered throughout the BSA. This vegetation type is dominated by coast live oak. In some areas, the understory consists of lemonade berry,

toyon, laurel sumac, and California sagebrush while in other areas understory is primarily non-native grasses, miner's-lettuce, and chilicothe. At its margins, coast live oak intergrades with sagebrush scrub, toyon – sumac chaparral, and annual grassland.

Coast live oak woodland is consistent with the *Quercus agrifolia* association in *A Manual of California Vegetation* (CNPS 2024). This association is not considered a sensitive natural community by CDFW (2025b).

3.2.20 Western Sycamore (8.x)

Western sycamore trees occur scattered throughout the central portion of the BSA downstream of the dam. Areas mapped as western sycamore consists of individual trees and small groups of western sycamore trees in a savannah-like setting. The understory consists of non-native grasses.

Western sycamore is similar to the *Platanus racemosa*/annual grass association in *A Manual of California Vegetation* (CNPS 2024). This association is considered a sensitive natural community by CDFW (2025b).

3.2.21 Cliff (10.0)

Cliffs occur on the western side of Santiago Creek downstream of the dam and along the slopes of Irvine Lake in the western portion of the BSA. This landcover consists of a steep, bare rock face with little to no vegetation.

3.2.22 Open Water (12.1)

Open water occurs in Irvine Lake. Areas mapped as open water were inundated at the time of the survey and unvegetated.

3.2.23 Fluctuating Shoreline (12.2)

Fluctuating shoreline is distributed along the margins of Irvine Lake above the waterline and where the water level has recently receded at the upstream end of the lake. These areas are submerged frequently enough that vegetation has not established. Based on historic aerial images, these areas are inundated or partially inundated when the water level in the lake is higher. These areas fluctuate between open water, unvegetated shoreline, and/or partially vegetated depending on water level.

3.2.24 Vegetated Fluctuating Shoreline (12.2)

Vegetated fluctuating shoreline is distributed along portions of Irvine Lake where the water level has receded long enough for vegetation to become established. These areas are dominated by the non-native swamp prickly grass (*Crypsis schoenoides*) with lesser amounts of flatsedge, seaside healiotrope (*Heliotropium curassavicum* var. *oculatum*), willow weed (*Persicaria lapathifolia*), alkali-mallow, and Bertero's burhead (*Echinodorus berteroi*). Based on historic aerial images, these areas are inundated or are partially inundated when the water level in the lake is higher.

Vegetated fluctuating shoreline is consistent with the *Crypsis* (*C. schoenoides*, *C. vaginiflora*) association in *A Manual of California Vegetation* (CNPS 2024). This association is not considered a sensitive natural community by CDFW (2025b).

3.2.25 Perennial Stream (13.1)

Perennial stream is located along Santiago Creek upstream of Irvine Lake. It includes a low flow channel and lower portions of the active floodplain; this area broadens as it discharges into Irvine Lake. The low flow channel was primarily unvegetated and flowing water was present at the time of the site visit. The upstream portion of the channel contains seedlings and low-growing vegetation, indicating that it is periodically scoured. Vegetation includes mule fat seedlings (approximately 6 inches high), marsh pulicaria (*Pulicaria paludosa*), white lamb cudweed (*Pseudognaphalium luteoalbum*), fringed willowherb (*Epilobium ciliatum*), willow weed, white sweetclover, annual beard grass (*Polypogon monspeliensis*), southern cattail (*Typha domingensis*), and broad-leaved cattail.

Because of the dynamic nature of this portion of Santiago Creek and the limited amount of vegetation, it does not represent a vegetation association in *A Manual of California Vegetation* (CNPS 2024).

3.2.26 Ornamental (15.5)

Ornamental vegetation is primarily located in association with development and consists of species planted for landscaping purposes. This vegetation type consists of non-native tree species (i.e., pepper tree [*Schinus* sp.], European olive (*Olea europaea*), and gum tree [*Eucalyptus* spp.]), sometimes intermixed with planted native trees such as coast live oak, western sycamore, and Fremont cottonwood. In some areas, the understory is dominated by turf grass.

Ornamental vegetation is consistent with the *Eucalyptus* (*globulus*, *camaldulensis*) association and the *Schinus molle* association in *A Manual of California Vegetation* (CNPS 2024). It is not considered a sensitive natural community by CDFW (2025b).

3.2.27 Developed (15.6)

Developed areas consist of an impermeable landcover and include the dam embankment, spillway channel, buildings, parking lots, and paved roads. These areas are unvegetated.

3.2.28 Disturbed (16.1)

Disturbed areas occur throughout the BSA and consist of bare ground (e.g., graded access roads). Note that graded areas overgrown with vegetation were mapped according to the vegetation. Smaller access roads were not mapped separately from the surrounding vegetation.

3.3 WILDLIFE POPULATIONS AND MOVEMENT PATTERNS

Vegetation in the BSA provides habitat for many wildlife species. Common wildlife species observed or expected to occur in the BSA are discussed below.

3.3.1 Fish

Irvine Lake is stocked with fish, including rainbow trout (*Oncorhynchus mykiss*), bass (*Morone* sp.), catfish (*Ictalurus* sp.), common carp (*Cyprinus carpio*), bluegill (*Lepomis macrochirus*), and crappie (*Pomoxis* sp.). Non-native fish are predators on native species; no native fish (with the exception of the stocked rainbow trout) are expected to occur in Irvine Lake.

3.3.2 Amphibians

Amphibians require moisture for at least a portion of their life cycle, and many require standing or flowing water for reproduction. Terrestrial species may or may not require standing water for reproduction; they survive in dry areas by aestivating (i.e., remaining beneath the soil in burrows or under logs and leaf litter and emerging only when temperatures are low and humidity is high). Many of these species' habitats are associated with water, and they emerge to breed once the rainy season begins. Soil moisture conditions can remain high throughout the year in some habitat types, depending on factors such as amount of vegetation cover, elevation, and slope/aspect.

Amphibian species observed in the BSA include western toad (*Anaxyrus boreas*), California treefrog (*Pseudacris cadaverina*), Baja California treefrog (*Pseudacris hypochondriaca*), and the non-native American bullfrog (*Lithobates catesbeianus*). Other amphibian species expected to occur include garden slender salamander (*Batrachoseps major major*), black-bellied salamander (*Batrachoseps nigriventris*), and arboreal salamander (*Aneides lugubris*).

3.3.3 Reptiles

Reptiles are well-adapted to life in arid habitats. They have several physiological adaptations that allow them to conserve water. Reptiles can also become dormant during weather extremes, allowing them to survive prolonged droughts and paucity of food (Ruben and Hillenius 2005). Reptilian diversity and abundance typically vary with vegetation type and character.

Common reptile species observed in the BSA include common side-blotched lizard (*Uta stansburiana*) and western fence lizard (*Sceloporus occidentalis*). Other reptile species expected to occur include southern alligator lizard (*Elgaria multicarinata*), western skink (*Plestiodon skiltonianus*), red racer (*Coluber flagellum piceus*), California striped racer (*Coluber lateralis lateralis*), California kingsnake (*Lampropeltis californiae*), gopher snake (*Pituophis catenifer*), northern three-lined boa [rosy boa] (*Lichanura orcutti*), and southern Pacific rattlesnake (*Crotalus oreganus helleri*).

3.3.4 **Birds**

A variety of bird species are expected to be residents in the BSA, using the habitats throughout the year. Other species are present only during certain seasons. For example, the white-crowned sparrow (*Zonotrichia leucophrys*) is expected to occur in the BSA during the winter and migrate to the northern forests for breeding in the spring.

The following resident bird species were observed in the BSA: mallard (*Anas platyrhynchos*), California quail (*Callipepla californica*), mourning dove (*Zenaida macroura*), Anna's hummingbird (*Calypte anna*), double-crested cormorant (*Phalacrocorax auritus*), snowy egret (*Egretta thula*), acorn woodpecker (*Melanerpes formicivorus*), northern flicker (*Colaptes auratus*), black phoebe (*Sayornis nigricans*), Say's phoebe (*Sayornis saya*), California scrub jay (*Aphelocoma californica*), American crow (*Corvus brachyrhynchos*), common raven (*Corvus corax*), oak titmouse (*Baeolophus inornatus*), Bewick's wren (*Thryomanes bewickii*), blue-gray gnatcatcher (*Polioptila caerulea*), northern mockingbird (*Mimus polyglottos*), European starling (*Sturnus vulgaris*), house finch (*Haemorhous mexicanus*), lesser goldfinch (*Spinus psaltria*), California towhee (*Melospiza crissalis*), song sparrow (*Melospiza melodia*), and common yellowthroat (*Geothlypis trichas*).

Migratory species observed in the BSA that are present during the nesting season include lesser nighthawk (*Chordeiles acutipennis*), barn swallow (*Hirundo rustica*), and black-headed grosbeak (*Pheucticus melanocephalus*). Other migratory species that would be expected to occur in the spring/summer include black-chinned hummingbird (*Archilochus alexandri*), Pacific-slope flycatcher (*Empidonax difficilis*), ash-throated flycatcher (*Myiarchus cinerascens*), phainopepla (*Phainopepla nitens*), hooded oriole (*Icterus cucullatus*), and Bullock's oriole (*Icterus bullockii*). Wintering species observed or expected to occur in the BSA include ruby-crowned kinglet (*Regulus calendula*), cedar waxwing (*Bombycilla cedrorum*), yellow-rumped warbler (*Setophaga coronata*), Townsend's warbler (*Setophaga townsendi*), and white-crowned sparrow.

Raptors (birds of prey) observed or expected to occur in the BSA include Cooper's hawk (*Accipiter cooperii*), red-tailed hawk (*Buteo jamaicensis*), red-shouldered hawk (*Buteo lineatus*), great-horned owl (*Bubo virginianus*), barn owl (*Tyto alba*), western screech owl (*Megascops kennicottii*), and American kestrel (*Falco sparverius*). The turkey vulture (*Cathartes aura*), a scavenger, was also observed. Each of these species also has potential to nest in the BSA.

3.3.5 **Mammals**

Small mammals observed in the BSA include Eastern fox squirrel (*Sciurus niger*), California ground squirrel (*Otospermophilus beecheyi*), Botta's pocket gopher (*Thomomys bottae*), mouse (*Peromyscus sp.*), and desert cottontail (*Sylvilagus audubonii*). Medium to large-sized mammals, or their sign, observed include mountain lion (*Puma concolor*), coyote (*Canis latrans*), northern raccoon (*Procyon lotor*), and southern mule deer (*Odocoileus hemionus*).

Bats occur throughout most of Southern California and may use any portion of the BSA as foraging habitat. Most of the bats that could potentially occur in the BSA are inactive during the winter and either hibernate or migrate, depending on the species. Bats may roost in cliffs

or rocky outcroppings, crevices of structures, or large oak or sycamore trees in the BSA. Bat species that may occur in the BSA for foraging and roosting include greater bonneted bat [western mastiff bat] (*Eumops perotis californicus*), Brazilian free-tailed bat (*Tadarida brasiliensis*), big brown bat (*Eptesicus fuscus*), canyon bat (*Parastrellus hesperus*), pallid bat (*Antrozous pallidus*), California myotis (*Myotis californicus*), and Yuma bat (*Myotis yumanensis*).

3.3.6 Wildlife Movement

Wildlife corridors link together areas of suitable wildlife habitat that are otherwise separated by rugged terrain, changes in vegetation, or human disturbance. The fragmentation of open space areas by urbanization creates isolated “islands” of wildlife habitat. In the absence of habitat linkages that allow movement to adjoining open space areas, various studies have concluded that some wildlife species, especially the larger and more mobile mammals, will not likely persist over time in fragmented or isolated habitat areas because they prohibit the infusion of new individuals and genetic information (MacArthur and Wilson 1967; Soule 1987; Harris and Gallagher 1989; Bennett 1990). Corridors mitigate the effects of this fragmentation by (1) allowing animals to move between remaining habitats, thereby permitting depleted populations to be replenished and promoting genetic exchange; (2) providing escape routes from fire, predators, and human disturbances, thus reducing the risk that catastrophic events (such as fire or disease) will result in population or local species extinction; and (3) serving as travel routes for individual animals as they move in their home ranges in search of food, water, mates, and other necessary resources (Noss 1983; Farhig and Merriam 1985; Simberloff and Cox 1987; Harris and Gallagher 1989).

Wildlife movement activities usually fall into one of three movement categories: (1) dispersal (e.g., juvenile animals from natal areas or individuals extending range distributions); (2) seasonal migration; and (3) movements related to home range activities (e.g., foraging for food or water; defending territories; or searching for mates, breeding areas, or cover). A number of terms such as “wildlife corridor,” “travel route,” “habitat linkage,” and “wildlife crossing” have been used in various wildlife movement studies to refer to areas in which wildlife move from one area to another. To clarify the meaning of these terms and to facilitate the discussion on wildlife movement in this analysis, these terms are defined as follows:

- A. **Travel route** – a landscape feature (such as a ridgeline, drainage, canyon, or riparian strip) within a larger natural habitat area that is used frequently by animals to facilitate movement and to provide access to necessary resources (e.g., water, food, cover, den sites). The travel route is generally preferred because it provides the least amount of topographic resistance in moving from one area to another. It contains adequate food, water, and/or cover while moving between habitat areas; and it provides a relatively direct link between target habitat areas.
- B. **Wildlife corridor** – a piece of habitat, usually linear in nature, that connects two or more habitat patches that would otherwise be fragmented or isolated from one another. Wildlife corridors are usually bound by urban land areas or other areas unsuitable for wildlife. The corridor generally contains suitable cover, food, and/or

water to support species and to facilitate their movement while in the corridor. Larger, landscape-level corridors (often referred to as “habitat linkages” or “landscape linkages”) can provide both transitory and resident habitat for a variety of species.

- C. **Wildlife crossing** – a small, narrow area, relatively short in length and generally constricted in nature that allows wildlife to pass under or through an obstacle or barrier that otherwise hinders or prevents movement. Crossings typically are man-made and include culverts, underpasses, drainage pipes, and tunnels to provide access across or under roads, highways, pipelines, or other physical obstacles. These often represent “choke points” along a movement corridor, which may impede wildlife movement and increase the risk of predation.

It is important to note that in a large, open space area with few or no man-made or naturally occurring physical constraints to wildlife movement, wildlife corridors (as defined above) may not yet exist. Given an open space area that is both large enough to maintain viable populations of species and to provide a variety of travel routes (e.g., canyons, ridgelines, trails, riverbeds, and others), wildlife will use these “local” routes while searching for food, water, shelter, and mates and will not need to cross into other large, open space areas. Based on their size, location, vegetative composition, and availability of food, some of these movement areas (e.g., large drainages and canyons) are used for longer lengths of time and serve as source areas for food, water, and cover, particularly for small- and medium-sized animals. This is especially true if the travel route is within a larger open space area. However, once open space areas become constrained and/or fragmented as a result of urban development or construction of physical obstacles (such as roads and highways), the remaining landscape features or travel routes that connect the larger open space areas become corridors as long as they provide adequate space, cover, food, and water and do not contain obstacles or distractions (e.g., man-made noise, lighting) that would generally hinder wildlife movement.

In general, wildlife corridor discussions typically focus on larger, more mobile mammal species such as southern mule deer, mountain lion, and coyote. Discussing the needs of larger mammal species typically also captures the needs of mid-sized mammals such as foxes (*Vulpes* sp.), northern raccoon, striped skunk (*Mephitis mephitis*), and American badger (*Taxidea taxus*). Most mammal species have relatively large home ranges through which they move to find adequate food, water, and breeding and wintering habitat. It is assumed that corridors that serve larger, more mobile mammal species also serve as corridors for many smaller, less mobile species, such as reptiles, amphibians, and rodents. Regional movement for these species facilitates gene flow and requires at least some local “stepping stone” movement of individuals between populations.

Discussions of wildlife corridors generally focus less on bird species because they are more mobile and can fly over inhospitable habitat. Long-distance migrants are able to move great distances over unsuitable habitat; however, they must have stopover sites to rest and forage in order to continue their migration. Many resident species are habitat-specific, moving only through their preferred habitat type(s), or similar adjacent habitat; wildlife corridors would be more important for these bird species.

Ideally, an open space corridor should encompass a heterogeneous mix of vegetation types to accommodate the ecological requirements of a wide variety of resident species in any particular region. Most species typically prefer adequate vegetation cover during movement, which can serve as both a food source and as protection from weather and predators. Drainages, riparian areas, and forested canyon bottoms typically serve as natural movement corridors because these features provide cover, food, and often water for a variety of species. Very few species will move across large expanses of open, uncovered habitat unless it is the only option available to them. Landscape linkages must also provide “live-in” habitat (food and cover) to support smaller and less mobile species, such as amphibians, reptiles, and rodents, that require longer periods to traverse a corridor.

The BSA is contiguous with large undeveloped open space areas in the NCCP Reserve, OC Regional Parks, and the Cleveland National Forest. Due to the undeveloped nature of the BSA, wildlife movement is generally unconstrained in and around the BSA. Santiago Creek likely functions as a regional movement corridor and connects with several canyons both upstream and downstream of the BSA. The existing dam structure and associated reservoir may be a barrier to movement for amphibians, reptiles, and small mammals moving along the drainage; however, like larger mammals, these small animals can move around the lake and dam over time using the adjacent drainages and ridgelines as travel routes. Santiago Canyon Road to the south of the BSA may be a barrier to wildlife movement for small animals; however, small animals could use drainage structures under the road as wildlife crossings. The roadway would not be expected to be a barrier to movement for medium and large-sized mammals due to the relatively low level of traffic on the road; the medium and large-sized mammals would be expected to cross over the roadway when traffic is low.

A NCCP “Special Linkage” area occurs in the southern portion of the BSA, extending southeast along Santiago Canyon Road (Exhibit 4). It connects Habitat Reserve areas to the west and north of Irvine Lake to Habitat Reserve areas south of Santiago Canyon Road (i.e., Limestone Canyon). Special Linkages include areas where proposed development or existing uses would provide either an opportunity to conserve habitat useful for biological connectivity or support target species while permitting compatible non-habitat uses. Special Linkages are not part of the Reserve System. Existing uses within the Special Linkage in the BSA include development associated with Irvine Lake and Santiago Canyon Road.

3.4 SPECIAL STATUS BIOLOGICAL RESOURCES

The following section addresses special status biological resources that were observed, reported, or have the potential to occur in the BSA. These resources include plant and wildlife species that have been afforded special status and/or recognition by federal and State resource agencies, as well as private conservation organizations. In general, the principal reason an individual taxon (i.e., species, subspecies, or variety) is given such recognition is the documented or perceived decline or limitations of its population size, geographic range, and/or distribution resulting in most cases from habitat loss. In addition to species, special status biological resources include vegetation types and habitats that are either unique; of relatively limited distribution in the region; or provide a high value for wildlife. These resources have been defined by federal, State, and local government conservation programs. Sources used to determine the special status of biological resources are listed below.

- **Habitats** – the CNDDDB (CDFW 2025a); *NatureServe Conservation Status Assessments: Methodology for Assigning Ranks* (Faber-Langendoen et al. 2012); and the *California Natural Communities List* (CDFW 2025b).
- **Plants** – the CNDDDB (CDFW 2025a); the Inventory of Rare and Endangered Plants (CNPS 2025); various USFWS *Federal Register* notices regarding listing status of plant species; and the *List of Special Vascular Plants, Bryophytes, and Lichens* (CDFW 2025c).
- **Wildlife** – the CNDDDB (CDFW 2025a); the California Wildlife Habitat Relationships Database System (CDFW 2014); various USFWS *Federal Register* notices regarding listing status of wildlife species; and the *List of Special Animals* (CDFW 2025d).

3.4.1 Definitions

A federally **Endangered** species is one facing extinction throughout all or a significant portion of its geographic range. A federally **Threatened** species is one likely to become Endangered within the foreseeable future throughout all or a significant portion of its range. The presence of any federally listed Threatened or Endangered species in a project impact area generally imposes constraints on development, particularly if development would result in “take” of the species or its habitat. The term “take” means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in such conduct. “Harm” in this sense can include any disturbance of species’ habitats during any portion of its life history.

Federally **Proposed** or **Candidate** species are those officially proposed by the USFWS to be added to the federal Threatened and Endangered species list. Because proposed species may soon be listed as Threatened or Endangered, these species could become listed prior to or during implementation of a proposed project. The presence of a Proposed or Candidate species within a project impact area may impose constraints on development if they are listed prior to issuance of project permits, particularly if a project would result in “take” of the species or its habitat.

The State of California considers an **Endangered** species to be one whose prospects of survival and reproduction are in immediate jeopardy, a **Threatened** species as one present in such small numbers throughout its range that it is likely to become an Endangered species in the near future in the absence of special protection or management, and a **Rare** species as one present in such small numbers throughout its range that it may become Endangered if its present environment worsens. “Rare species” only applies only to California native plants. State-listed Threatened and Endangered species are protected against take unless an Incidental Take Permit is obtained from the resource agencies. The presence of any State-listed Threatened or Endangered species in a project impact area generally imposes constraints on development, particularly if a project would result in “take” of the species or its habitat.

California **Species of Special Concern** is an informal designation used by CDFW for some declining wildlife species that are not State Candidates for listing. This designation does not provide legal protection but signifies that these species are recognized as special status by CDFW. A few years ago, CDFW down-listed several species from Species of Special Concern

to the **Watch List**. Although not considered special status, Watch List species are tracked by the CNDDDB.

Species that are California **Fully Protected** and **Protected** include those protected by special legislation for various reasons, such as the mountain lion and white-tailed kite (*Elanus leucurus*). Fully Protected species may not be taken or possessed at any time. California Protected species include those species that may not be taken or possessed at any time except under special permit from CDFW issued pursuant to Sections 650 and 670.7 of the *California Code of Regulations*, or Section 2081 of the *California Fish and Game Code*.

Species of **Local Concern** are those that have no official status with the resource agencies but are being watched because either the region has a unique population or the species is declining in the region.

Special Animal is a general term that refers to species that the CNDDDB is interested in tracking, regardless of legal or protective status. This term includes species designated as any of the above terms but also includes species that may be considered biologically rare; restricted in distribution; declining throughout their range; have a critical, vulnerable stage in their life cycle that warrants monitoring; are on the periphery of their range and are threatened with extirpation in California; are associated with special status habitats; or are considered by other State or federal agencies or private organizations to be sensitive or declining.

The **CRPR**, formerly known as CNPS List, is a ranking system by the Rare Plant Status Review group¹¹ and managed by the CNPS and CDFW (CDFW 2025). A CRPR summarizes information on the distribution, rarity, and endangerment of California's vascular plants. Plants with a CRPR of **1A** are presumed extirpated from the state because they have not been seen in the wild in California for many years and they are either rare or extinct elsewhere. Plants with a CRPR of **1B** are Rare, Threatened, or Endangered throughout their range. Plants with a CRPR of **2A** are presumed extirpated from California but are more common elsewhere. Plants with a CRPR of **2B** are considered Rare, Threatened, or Endangered in California, but are more common elsewhere. Plants with a CRPR of **3** require more information before they can be assigned to another rank or rejected; this is a "review" list. Plants with a CRPR of **4** are of limited distribution or are infrequent throughout a broader area in California; this is a "watch list". The Threat Rank is an extension that is added to the CRPR to designate the plant's endangerment level. An extension of **.1** is assigned to plants that are considered to be "seriously threatened" in California (i.e., over 80 percent of the occurrences are threatened or have a high degree and immediacy of threat). Extension **.2** indicates the plant is "fairly threatened" in California (i.e., between 20 and 80 percent of the occurrences are threatened or have a moderate degree and immediacy of threat). Extension **.3** is assigned to plants that are considered "not very threatened" in California (i.e., less than 20 percent of occurrences are threatened or have a low degree and immediacy of threat or no current threats are known). The absence of a threat code extension indicates that this information is lacking for the plant(s) in question.

¹¹ This group consists of over 300 botanical experts from the government, academia, non-governmental organizations, and the private sector.

In addition to providing an inventory of special status plant and wildlife species, CDFW also provides an inventory of vegetation types that are considered special status by the State and federal resource agencies, academic institutions, and various conservation groups (e.g., the CNPS). Special status natural communities are “of limited distribution statewide or within a county or region and are often vulnerable to environmental effects of projects”; they may or may not contain special status species (CDFG 2009). Determination of the level of imperilment (i.e., exposure to injury, loss, or destruction) is based on the NatureServe Heritage Program Status Ranks that rank both species and vegetation types on a global and statewide basis according to their rarity, trend in population size or area, and recognized threats (e.g., proposed developments, habitat degradation, and non-native species invasion) (Faber-Langendoen et al. 2012).

3.5 SPECIAL STATUS VEGETATION TYPES

Coastal sage scrub vegetation (i.e., sagebrush scrub, disturbed sagebrush scrub, sagebrush – coyote brush scrub, southern cactus scrub, disturbed southern cactus scrub and disturbed floodplain sage scrub) is considered a special status vegetation type in the Central–Coastal NCCP/HCP area because of its potential to support NCCP/HCP Covered Species. Additionally, southern cactus scrub and disturbed southern cactus scrub are considered sensitive natural communities by CDFW (2025b; Table 12).

Riparian vegetation types are often considered special status because they are often under the regulatory authority of the resource agencies (i.e., USACE, CDFW, and RWQCB); jurisdictional resources are discussed in the next section. Riparian vegetation types in the BSA include riparian herb, southern willow scrub, mulefat scrub, disturbed mulefat scrub, southern black willow forest, disturbed southern black willow forest, and southern black willow forest/riparian herb. Other mapped areas that may be considered riparian and jurisdictional resources include open water, fluctuating shoreline, vegetated fluctuating shoreline, and perennial stream. Of these riparian vegetation types, southern willow scrub, southern black willow forest, and disturbed southern black willow forest are considered sensitive natural communities by CDFW (2025b; Table 12).

Sycamore and oak woodlands provide high quality habitat for wildlife. These trees are large enough to provide cavities for shelter (e.g., roosting) and breeding (e.g., cavity-nesting) for wildlife species. Downed wood provides important cover for amphibians, reptiles, and small to medium-sized mammals; nest sites for cavity-nesting and ground-nesting birds; nutrients into the soil as they decompose; and favorable microhabitat for emerging seedlings (Tietje et al. 2005). Southern sycamore riparian woodland/coast live oak forest and western sycamore are considered sensitive natural communities by CDFW (2025b; Table 12). Coast live oak woodland is not considered a sensitive natural community but is generally considered of local concern because of the habitat value that it provides.

Toyon–sumac chaparral, annual grassland, ruderal, and ornamental are not considered sensitive natural communities by CDFW (2025b). Cliff, disturbed and developed are not given threat rankings because they are unvegetated landcovers.

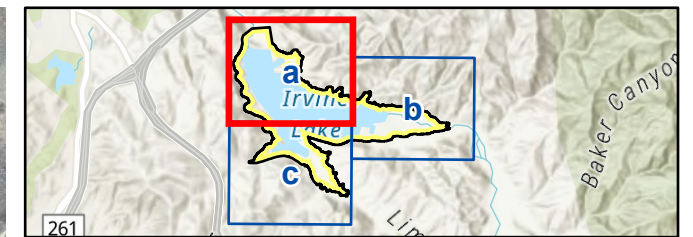
3.6 JURISDICTIONAL RESOURCES





Seventeen potential jurisdictional features were mapped in the BSA: Irvine Lake, Santiago Creek, and 15 smaller drainages that discharge into either Irvine Lake or Santiago Creek. Based on an assessment of jurisdictional waters, a total of 428.476 acres of WOTUS under the regulatory authority of the USACE, 435.205 acres of waters of the State under the regulatory authority of the RWQCB, and 669.630 acres of waters under the regulatory authority of CDFW occurs in the BSA (Table 13, Exhibits 7, 8, and 9).

TABLE 13
SUMMARY OF JURISDICTIONAL RESOURCES IN THE SURVEY AREA

Feature	Jurisdiction (acres)						
	USACE WOTUS			RWQCB Waters of the State			CDFW Jurisdictional Resources
	Wetland	Non- wetland	Total	Wetland	Non- wetland	Total	Total
Irvine Lake	94.582	312.959	407.541	94.582	312.959	407.541	614.135
Santiago Creek	7.124	13.803	20.927	7.124	13.803	20.927	36.024
Drainage 1	—	0.008	0.008	—	0.008	0.008	0.027
Drainage 2	—	—	—	—	0.025	0.025	0.074
Drainage 3	—	—	—	—	0.071	0.071	0.168
Drainage 4	—	—	—	—	0.048	0.048	0.094
Drainage 5	—	—	—	—	0.144	0.144	0.359
Drainage 6	—	—	—	—	0.369	0.369	0.149
Drainage 7	—	—	—	—	0.100	0.100	0.148
Drainage 8	—	—	—	—	0.024	0.024	0.042
Drainage 9	—	—	—	—	0.066	0.066	1.237
Drainage 10	—	—	—	—	0.167	0.167	0.245
Drainage 11	—	—	—	—	0.114	0.114	0.318
Drainage 12	—	—	—	—	4.894	4.894	13.517
Drainage 13	—	—	—	—	0.039	0.039	0.114
Drainage 14	—	—	—	—	0.235	0.235	0.416
Drainage 15	—	—	—	—	0.433	0.433	2.563
Total	101.706	326.770	428.476	101.706	333.499	435.205	669.630
USACE: U.S. Army Corps of Engineers; WOTUS: waters of the United States; RWQCB: Regional Water Quality Control Board; CDFW: California Department of Fish and Wildlife.							

D:\Projects\3\IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_ID_USACE



-  Survey Area
-  Sampling Point Location
- Waters of the United States**
-  Wetland
-  Non-Wetland



0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources –
USACE Waters of the United States

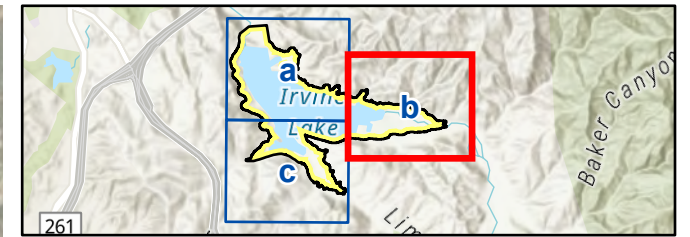
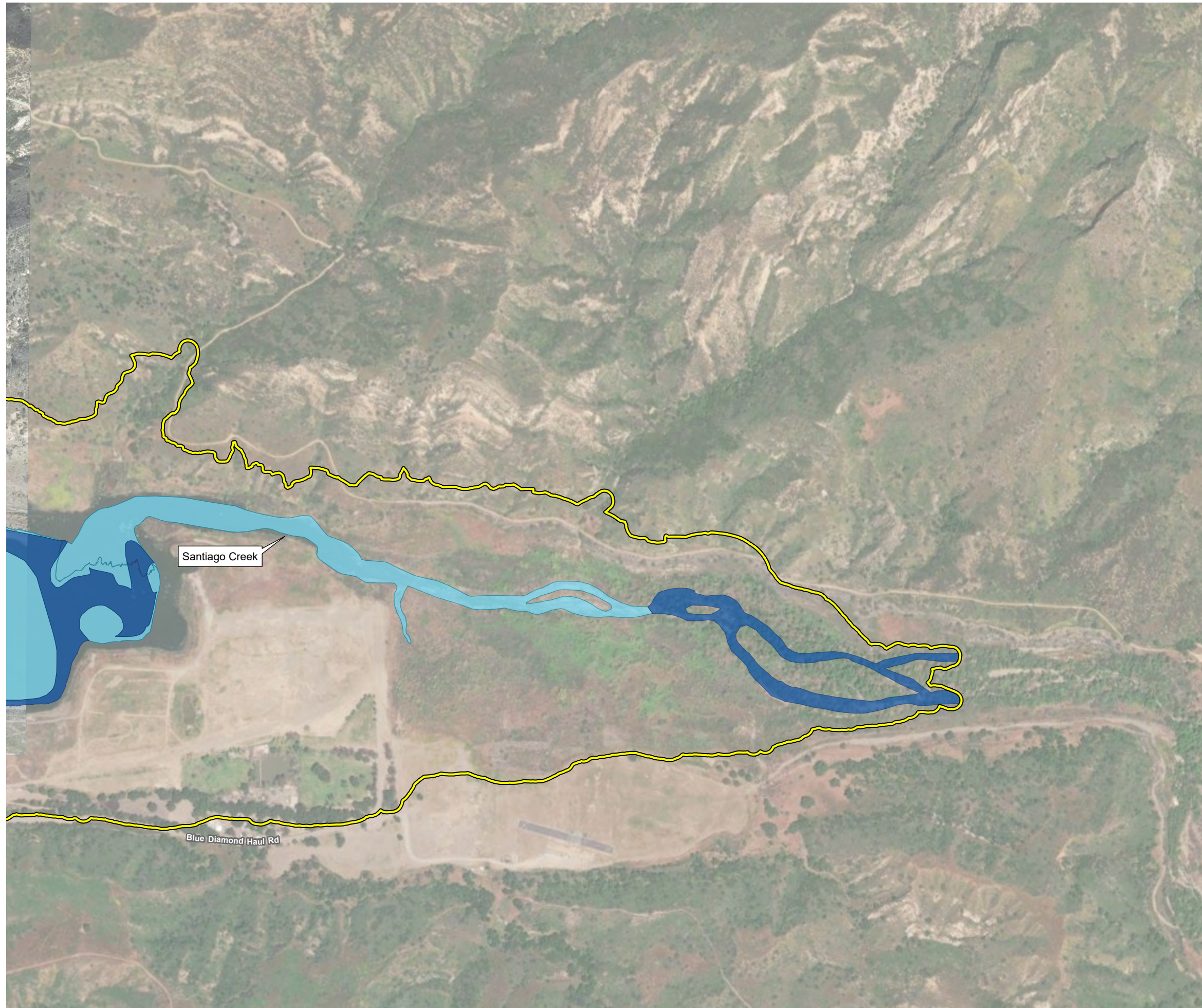
Exhibit 7a

*Santiago Creek Dam
Improvement Project*

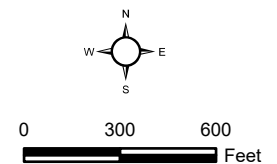


(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3\IRW010201\Graphics\BTR\ex_ID_USACE.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprxex_ID_USACE



- Survey Area
- Sampling Point Location
- Waters of the United States**
 - Wetland
 - Non-Wetland



Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources –
USACE Waters of the United States

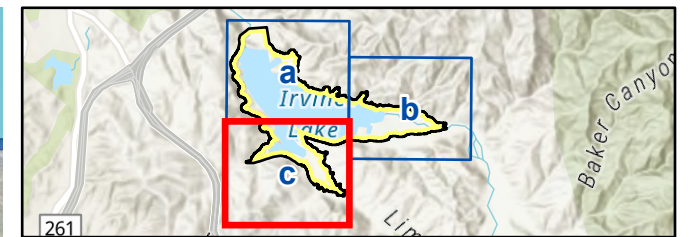
Exhibit 7b

*Santiago Creek Dam
Improvement Project*

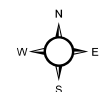


(Rev. 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW010201\Graphics\BTR\ex_ID_USACE.pdf

D:\Projects\3\IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx ID_USACE



- Survey Area
- Sampling Point Location
- Waters of the United States**
- Wetland
- Non-Wetland



0 300 600 Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources –
USACE Waters of the United States

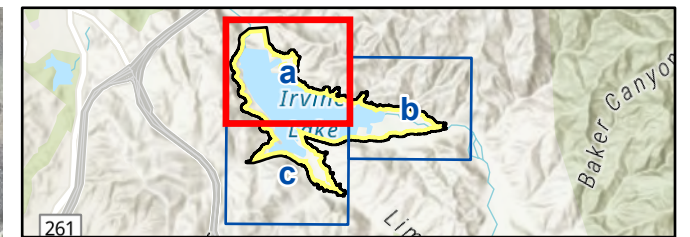
Exhibit 7c

*Santiago Creek Dam
Improvement Project*

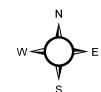


(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3\IRW010201\Graphics\BTR\ex_ID_USACE.pdf

D:\Projects\IRW\SantiagoCreek\PO\SCDS\CD_Project.aprx ID: RWQCB



- Survey Area
- Sampling Point Location
- Sheet Flow (non-jurisdictional)
- Waters of the State**
 - Wetland
 - Non-Wetland
 - Non-Wetland Drainage Centerline



0 300 600 Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources –
RWQCB Waters of the State

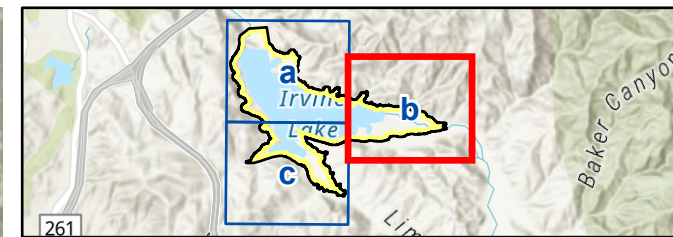
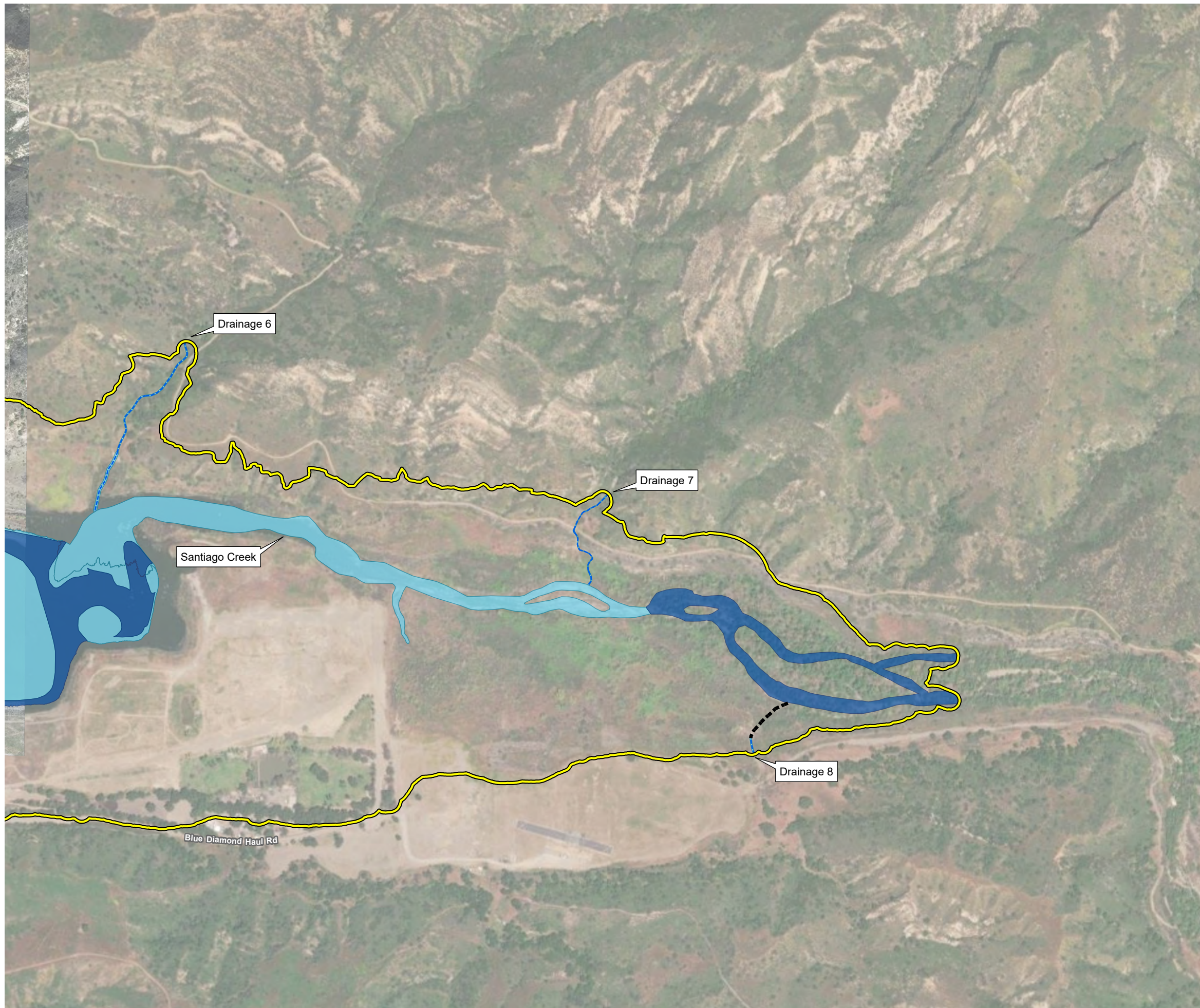
Exhibit 8a

*Santiago Creek Dam
Improvement Project*



(Rev: 02/27/2025 JVR) R:\Projects\IRW\IRWD\3IRW010205\Graphics\BTR\ex_ID_RWQCB.pdf

D:\Projects\IRW\SantiagoCreek\PO\SCDS\CD_Project.aprx ID: RWQCB



- Survey Area
- Sheet Flow (non-jurisdictional)
- Waters of the State**
 - Wetland
 - Non-Wetland
 - Non-Wetland Drainage Centerline



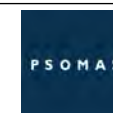
0 300 600 Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources –
RWQCB Waters of the State

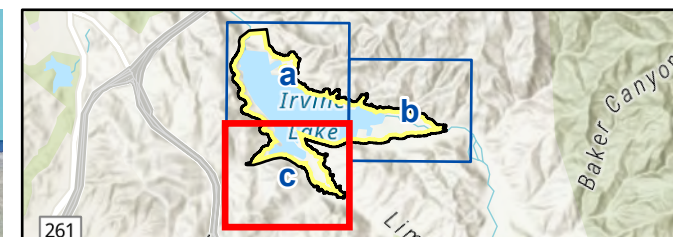
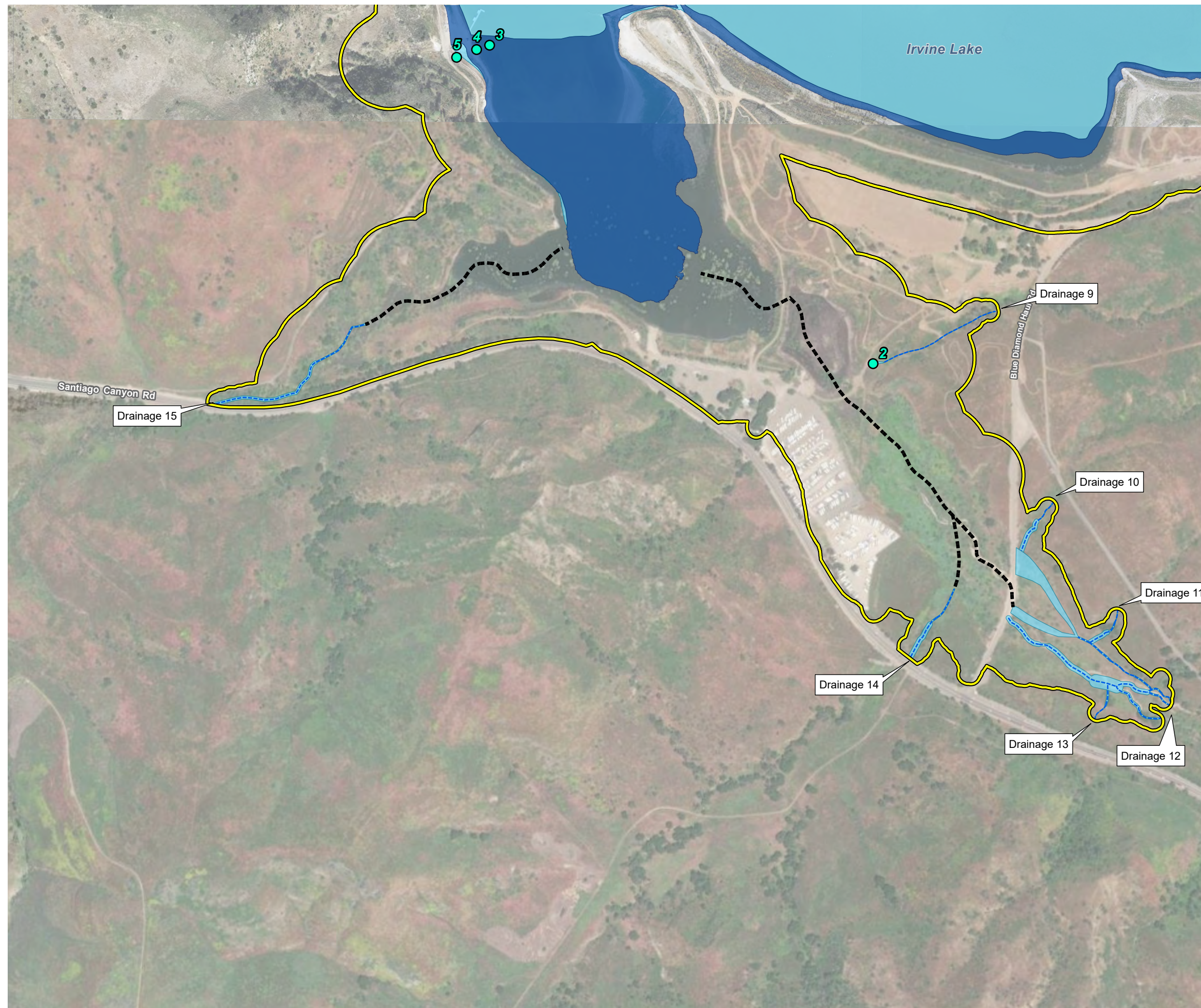
Exhibit 8b

*Santiago Creek Dam
Improvement Project*



(Rev: 02/27/2025 JVR) R:\Projects\IRW\IRWD\3IRW010205\Graphics\BTR\ex_ID_RWQCB.pdf

D:\Projects\IRW\SantiagoCreek\PO\SCDS\CD_Project.aprx ID_RWQCB



- Survey Area
- Sampling Point Location
- Sheet Flow (non-jurisdictional)
- Waters of the State**
- Wetland
- Non-Wetland
- Non-Wetland Drainage Centerline



0 300 600 Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources –
RWQCB Waters of the State

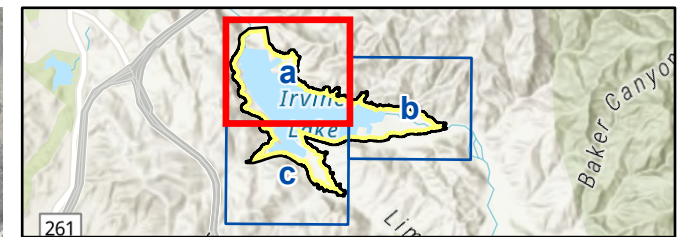
Exhibit 8c

*Santiago Creek Dam
Improvement Project*

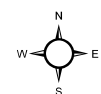


(Rev: 02/27/2025 JVR) R:\Projects\IRW\IRWD\3IRW010205\Graphics\BTR\ex_ID_RWQCB.pdf

D:\Projects\IRW_SantiagoCreek\PROJ\SCD\SCD_Project.aprx ID: CDFW



- Survey Area
- Sampling Point Location
- CDFW Jurisdictional Waters**
- CDFW
- Drainage Centerline



0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources –
CDFW Jurisdictional Waters

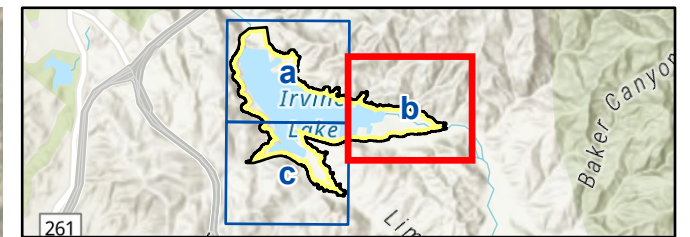
Exhibit 9a

*Santiago Creek Dam
Improvement Project*

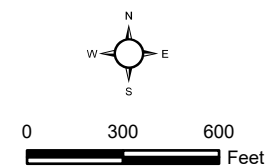


(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRWD10205\Graphics\BTR\ex_ID_CDFW.pdf

D:\Projects\IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx ID_CDFW



- Survey Area
- CDFW Jurisdictional Waters**
 - CDFW
 - Drainage Centerline



Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

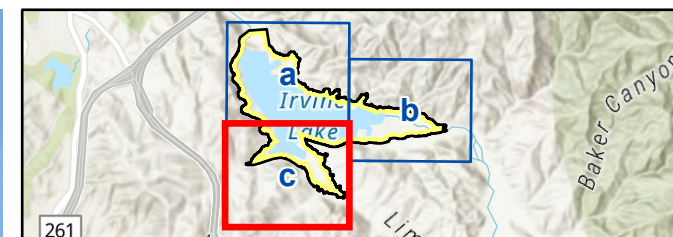
**Jurisdictional Resources –
CDFW Jurisdictional Waters**

*Santiago Creek Dam
Improvement Project*

(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRWD10205\Graphics\BTR\ex_ID_CDFW.pdf

Exhibit 9b

D:\Projects\3IRW\SantiagoCreek\PROJ\SCD\SCD_Project.aprx ID: CDFW



- Survey Area
- Sampling Point Location
- CDFW Jurisdictional Waters**
- CDFW
- Drainage Centerline



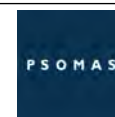
0 300 600 Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources –
CDFW Jurisdictional Waters

Exhibit 9c

Santiago Creek Dam
Improvement Project



(Rev: 02/27/2025 JVR) R:\Projects\3IRW_IRWD\3IRWD10205\Graphics\BTR\ex_ID_CDFW.pdf

3.7 SPECIAL STATUS PLANTS

Table 14 provides a summary of special status plant species reported to occur in the Project region (i.e., the USGS' Black Star Canyon, Orange, Tustin, and El Toro 7.5-minute quadrangles). This list includes species reported by the CNDDDB and the CNPS, supplemented with species from the Project Biologist's experience that either occur nearby or could occur based on the presence of suitable habitat. The table includes information on the status, NCCP/HCP coverage, species habitat, and potential for occurrence. Note that these species are listed alphabetically according to their scientific name.

Focused surveys for special status plants were conducted downstream of the dam in spring/summer 2020 and upstream of the dam in spring/summer 2022. The potential for occurrence in the area where additional inundation would occur is also shown in Table 14.

Focused surveys were conducted for all special status plant species with potential to occur in the BSA based on the presence of suitable habitat. Three special status plant species, intermediate mariposa lily (*Calochortus weedii* var. *intermedius*), many-stemmed dudleya (*Dudleya multicaulis*), and Coulter's matilija poppy, were observed downstream of the dam during the 2020 focused surveys (Appendix E). Four special status plant species, Braunton's milkvetch (*Astragalus brauntonii*), intermediate mariposa lily, mud nama (*Nama stenocarpa*), and Coulter's matilija poppy, were observed upstream of the dam during the 2022 focused surveys (Appendix E). The five special status species that were observed in the BSA are discussed in more detail following the table. The remaining species would not be expected to occur because the BSA lacks suitable habitat or because they were not observed during the focused surveys.

TABLE 14
SPECIAL STATUS PLANT SPECIES REPORTED FROM THE PROJECT REGION

Species	Common Name	Federal Status	State Status	CRPR	NCCP/ HCP Covered Species	Habitat*	Potential to Occur
<i>Abronia villosa</i> var. <i>aurita</i>	chaparral sand-verbena	—	—	1B.1	No	Sandy areas in chaparral, coastal scrub, desert dunes.	Not expected to occur; not observed during focused surveys; suitable habitat.
<i>Allium marvinii</i>	Yucaipa onion	—	—	1B.2	No	Dry slopes and ridges in chaparral.	Not expected to occur; outside current known range.
<i>Astragalus brauntonii</i>	Braunton's milk-vetch	FE	—	1B.1	No	Recent burns or disturbed areas, usually on sandstone with carbonate layers in chaparral, coastal scrub, valley and foothill grassland. Reported immediately north of the BSA in 2012 (CDFW 2025a).	Observed in the survey area
<i>Atriplex coulteri</i>	Coulter's saltbush	—	—	1B.2	No	Alkaline or clay soils in coastal bluff scrub, coastal dunes, coastal scrub, and valley and foothill grassland.	Not expected to occur; not observed during focused surveys; marginally suitable habitat.
<i>Atriplex pacifica</i>	south coast saltscale	—	—	1B.2	No	Alkaline soils in coastal scrub, coastal bluff scrub, playas, coastal dunes.	Not expected to occur; not observed during focused surveys; marginally suitable habitat.

TABLE 14
SPECIAL STATUS PLANT SPECIES REPORTED FROM THE PROJECT REGION

Species	Common Name	Federal Status	State Status	CRPR	NCCP/ HCP Covered Species	Habitat*	Potential to Occur
<i>Atriplex serenana</i> var. <i>davidsonii</i>	Davidson's saltscale	—	—	1B.2	No	Alkaline soils in coastal bluff scrub, coastal scrub.	Not expected to occur; not observed during focused surveys; marginally suitable habitat.
<i>Baccharis malibuensis</i>	Malibu baccharis	—	—	1B.1	No	In Conejo volcanic substrates in coastal scrub, chaparral, cismontane woodland, and riparian woodland. Reported immediately north of the BSA in 2000 (CCH 2020).	Not expected to occur; not observed during focused surveys; suitable habitat.
<i>Bahiopsis laciniata</i>	San Diego County viguiera	—	—	4.3	No	Chaparral and coastal scrub	Not expected to occur; not observed during focused surveys; suitable habitat.
<i>Brodiaea filifolia</i>	thread-leaved brodiaea	FT	SE	1B.1	No	Chaparral openings, cismontane woodland, coastal scrub, playas, valley and foothill grassland, vernal pools.	Not expected to occur; not observed during focused surveys; suitable habitat.

TABLE 14
SPECIAL STATUS PLANT SPECIES REPORTED FROM THE PROJECT REGION

Species	Common Name	Federal Status	State Status	CRPR	NCCP/ HCP Covered Species	Habitat*	Potential to Occur
<i>Calandrinia breweri</i>	Brewer's calandrinia	—	—	4.2	No	Sandy or loamy soils in disturbed sites and burns in chaparral and coastal sage scrub.	Not expected to occur; not observed during focused surveys; suitable habitat.
<i>Calochortus catalinae</i>	Catalina mariposa lily	—	—	4.2	Covered	Chaparral, cismontane woodland, coastal scrub, valley and foothill grassland.	Not expected to occur; not observed during focused surveys; suitable habitat. Incidentally observed on access road outside survey area.
<i>Calochortus plummerae</i>	Plummer's mariposa-lily	—	—	4.2	No	Rocky and sandy sites, usually of granitic or alluvial material, in coastal scrub, chaparral, valley and foothill grassland, cismontane woodland, lower montane coniferous forest.	Not expected to occur; not observed during focused surveys; suitable habitat.
<i>Calochortus weedii</i> var. <i>intermedius</i>	intermediate mariposa-lily	—	—	1B.2	Conditionally Covered	Dry, rocky calcareous slopes and rock outcrops in coastal scrub, chaparral, valley and foothill grassland.	Observed in the survey area.

TABLE 14
SPECIAL STATUS PLANT SPECIES REPORTED FROM THE PROJECT REGION

Species	Common Name	Federal Status	State Status	CRPR	NCCP/ HCP Covered Species	Habitat*	Potential to Occur
<i>Camissoniopsis lewisii</i>	Lewis' evening-primrose	—	—	3	No	Sand or clay substrate in coastal bluff scrub, cismontane woodland, coastal dunes, coastal scrub, valley and foothill grassland.	Not expected to occur; not observed during focused surveys; suitable habitat.
<i>Centromadia parryi</i> ssp. <i>australis</i>	southern tarplant	—	—	1B.1	No	Disturbed sites and alkaline soils in marshes and swamp margins, valley and foothill grassland, and vernal pools.	Not expected to occur; not observed during focused surveys; suitable habitat.
<i>Chorizanthe parryi</i> var. <i>fernandina</i>	San Fernando Valley spineflower	—	SE	1B.1	No	Sandy soils in coastal scrub, valley and foothill grasslands. Historic (1902) occurrence within 0.5 mile of the BSA, but the BSA is outside the current known range of the species (CDFW 2025a).	Not expected to occur; historic (1902) occurrence within 0.5 mile but outside current known range.

TABLE 14
SPECIAL STATUS PLANT SPECIES REPORTED FROM THE PROJECT REGION

Species	Common Name	Federal Status	State Status	CRPR	NCCP/ HCP Covered Species	Habitat*	Potential to Occur
<i>Chorizanthe polygonoides</i> var. <i>longispina</i>	long-spined spineflower	—	—	1B.2	No	Gabbroic clay or sandy soil in chaparral, coastal scrub, meadows and seeps, valley and foothill grassland, vernal pools. BSA is at the edge of the current known range.	Not expected to occur; not observed during focused surveys; suitable habitat.
<i>Convolvulus simulans</i>	small-flowered morning-glory	—	—	4.2	No	Clay, occasionally serpentine soils in chaparral openings, coastal scrub, valley and foothill grasslands. Reported just west of Irvine Lake in 2016 (CCH 2020).	Not expected to occur; not observed during focused surveys; suitable habitat.
<i>Deinandra paniculata</i>	paniculate tarplant	—	—	4.2	No	Usually vernal mesic, sometimes sandy substrate in coastal scrub, valley and foothill grassland, and vernal pools.	Not expected to occur; not observed during focused surveys; suitable habitat.

TABLE 14
SPECIAL STATUS PLANT SPECIES REPORTED FROM THE PROJECT REGION

Species	Common Name	Federal Status	State Status	CRPR	NCCP/ HCP Covered Species	Habitat*	Potential to Occur
<i>Diplacus clevelandii</i>	Cleveland's bush monkeyflower	—	—	4.2	No	Disturbed areas and open borders of chaparral, cismontane woodland, and lower montane coniferous forest.	Not expected to occur; outside current known elevational range.
<i>Dodecahema leptoceras</i>	slender-horned spineflower	FE	SE	1B.1	No	Sandy soil in chaparral, cismontane woodland, and alluvial fan coastal scrub.	Not expected to occur; outside current known range.
<i>Dudleya cymosa</i> ssp. <i>ovatifolia</i>	Santa Monica Mountains dudleya	FT	—	1B.1	Covered	Volcanic or sedimentary, rocky sediment in chaparral and coastal scrub.	Not expected to occur; not observed during focused surveys; suitable habitat.
<i>Dudleya multicaulis</i>	many-stemmed dudleya	—	—	1B.2	No	Heavy, often clayey soils or grassy slopes in chaparral, coastal scrub, valley and foothill grassland. Reported in immediate vicinity of the BSA in 2008 (CDFW 2025a).	Observed in the 2020 plant focused survey area.

TABLE 14
SPECIAL STATUS PLANT SPECIES REPORTED FROM THE PROJECT REGION

Species	Common Name	Federal Status	State Status	CRPR	NCCP/ HCP Covered Species	Habitat*	Potential to Occur
<i>Eriastrum densifolium</i> ssp. <i>sanctorum</i>	Santa Ana River woollystar	FE	SE	1B.1	No	Sandy soils on river floodplains or terraced fluvial deposits in coastal scrub and chaparral.	Not expected to occur; outside current known range (i.e., the Santa Ana River watershed).
<i>Harpagonella palmeri</i>	Palmer's grapplinghook	—	—	4.2	Covered	Clay soils in open grasses areas in chaparral, coastal scrub, and valley and foothill grassland.	Not expected to occur; not observed during focused surveys; suitable habitat.
<i>Helianthus nuttallii</i> ssp. <i>parishii</i>	Los Angeles sunflower	—	—	1A	No	Coastal and freshwater marshes and swamps.	Not expected to occur; not observed during focused surveys; presumed extinct; suitable habitat.
<i>Hesperocyparis forbesii</i>	Tecate cypress	—	—	1B.1	Covered	Clay or gabbro soils in closed-cone coniferous forest and chaparral.	Not expected to occur; perennial species not observed during general plant surveys or focused surveys.
<i>Hesperocyparis goveniana</i>	Gowen cypress	FT	—	1B.2	No	Closed-cone coniferous forest, mixed evergreen forest, chaparral, and coastal terraces. Perennial species observable year-round.	Not expected to occur; perennial species not observed during general plant surveys or focused surveys.

TABLE 14
SPECIAL STATUS PLANT SPECIES REPORTED FROM THE PROJECT REGION

Species	Common Name	Federal Status	State Status	CRPR	NCCP/ HCP Covered Species	Habitat*	Potential to Occur
<i>Hordeum intercedens</i>	vernal barley	—	—	3.2	No	Coastal dunes, coastal scrub, saline flats and depressions of valley and foothill grassland, vernal pools. Reported just south of Irvine Lake in 1998 (CCH 2020).	Not expected to occur; not observed during focused surveys; marginally suitable habitat.
<i>Horkelia cuneata</i> var. <i>puberula</i>	mesa horkelia	—	—	1B.1	No	Sandy or gravelly soils in chaparral, cismontane woodland, and coastal scrub.	Not expected to occur; not observed during focused surveys; suitable habitat.
<i>Juglans californica</i>	Southern California black walnut	—	—	4.2	No	Chaparral, cismontane woodland, coastal scrub, and riparian woodland. Perennial species observable year-round.	Not expected to occur; perennial species not observed during general plant surveys or focused surveys.
<i>Juncus acutus</i> ssp. <i>leopoldii</i>	southwestern spiny rush	—	—	4.2	No	Moist, saline places including coastal dunes, marshes and swamps, and meadows and seeps. Perennial species observable year-round.	Not expected to occur; perennial species not observed during focused surveys; marginally suitable habitat.

TABLE 14
SPECIAL STATUS PLANT SPECIES REPORTED FROM THE PROJECT REGION

Species	Common Name	Federal Status	State Status	CRPR	NCCP/ HCP Covered Species	Habitat*	Potential to Occur
<i>Lasthenia glabrata</i> ssp. <i>coulteri</i>	Coulter's goldfields	—	—	1B.1	No	Usually on alkaline soils in coastal salt marsh, playas, vernal pools. Reported from oak woodland in 2008 (CCH 2020).	Not expected to occur; not observed during focused surveys; no suitable habitat.
<i>Lepechinia cardiophylla</i>	heart-leaved pitcher sage	—	—	1B.2	Covered	Closed-cone coniferous forest, chaparral, cismontane woodland.	Not expected to occur; outside current known elevational range.
<i>Lepidium virginicum</i> var. <i>robinsonii</i>	Robinson's pepper-grass	—	—	4.3	No	Dry soils in chaparral and coastal scrub.	Not expected to occur; not observed during focused surveys; suitable habitat.
<i>Lilium humboldtii</i> ssp. <i>ocellatum</i>	ocellated Humboldt lily	—	—	4.2	No	Openings in chaparral, cismontane woodland, coastal scrub, lower montane coniferous forest, and riparian woodland.	Not expected to occur; not observed during focused surveys; suitable habitat.
<i>Lycium californicum</i>	California box-thorn	—	—	4.2	No	Coastal bluff scrub and coastal scrub. Perennial species observable year-round.	Not expected to occur; outside current known range.

TABLE 14
SPECIAL STATUS PLANT SPECIES REPORTED FROM THE PROJECT REGION

Species	Common Name	Federal Status	State Status	CRPR	NCCP/ HCP Covered Species	Habitat*	Potential to Occur
<i>Monardella hypoleuca</i> ssp. <i>intermedia</i>	intermediate monardella	—	—	1B.3	No	Chaparral, cismontane woodland, and sometimes lower montane coniferous forest.	Not expected to occur; not observed during focused surveys; marginally suitable habitat.
<i>Nama stenocarpa</i>	mud nama	—	—	2B.2	No	Lake shores, riverbanks, intermittently wet areas, marshes, and swamps. BSA is at the edge of the current known range.	Observed in the survey area.
<i>Nasturtium gambelii</i>	Gambel's water cress	FE	ST	1B.1	No	Freshwater and brackish marshes at the margins of lakes and along streams; in or just above the water level.	Not expected to occur; not observed during focused surveys; suitable habitat.
<i>Nolina cismontana</i>	chaparral nolina	—	—	1B.2	No	Primarily sandstone and shale substrates in chaparral and coastal scrub.	Not expected to occur; not observed during focused surveys; suitable habitat.

TABLE 14
SPECIAL STATUS PLANT SPECIES REPORTED FROM THE PROJECT REGION

Species	Common Name	Federal Status	State Status	CRPR	NCCP/ HCP Covered Species	Habitat*	Potential to Occur
<i>Penstemon californicus</i>	California beardtongue	—	—	1B.2	No	Sandy or granitic soils and stony slopes in chaparral, lower montane coniferous forest, pinyon and juniper woodland.	Not expected to occur; outside current known range.
<i>Pentachaeta aurea</i> ssp. <i>allenii</i>	Allen's pentachaeta	—	—	1B.1	No	Openings in coastal scrub and valley and foothill grasslands.	Not expected to occur; not observed during focused surveys; suitable habitat.
<i>Phacelia hubbyi</i>	Hubby's phacelia	—	—	4.2	No	Open gravelly or rocky slopes of chaparral, coastal scrub, and valley and foothill grassland.	Not expected to occur; not observed during focused surveys; suitable habitat.
<i>Pickeringia montana</i> var. <i>tomentosa</i>	woolly chaparral-pea	—	—	4.3	No	Gabbroic, granitic, or clay soil in chaparral.	Not expected to occur; no suitable habitat.
<i>Pseudognaphalium leucocephalum</i>	white rabbi-tobacco	—	—	2B.2	No	Sandy, gravelly areas of riparian woodland, cismontane woodland, coastal scrub, and chaparral.	Not expected to occur; not observed during focused surveys; suitable habitat.

TABLE 14
SPECIAL STATUS PLANT SPECIES REPORTED FROM THE PROJECT REGION

Species	Common Name	Federal Status	State Status	CRPR	NCCP/ HCP Covered Species	Habitat*	Potential to Occur
<i>Rhinotropis [Polygala] cornuta</i> var. <i>fishiae</i>	Fish's milkwort	—	—	4.3	No	Chaparral, cismontane woodland, riparian woodland.	Not expected to occur; not observed during focused surveys; suitable habitat.
<i>Romneya coulteri</i>	Coulter's matilija poppy	—	—	4.2	Covered	Chaparral and coastal scrub, often in burns.	Observed in the survey area.
<i>Senecio aphanactis</i>	chaparral ragwort	—	—	2B.2	No	Drying alkaline flats of chaparral, cismontane woodland, coastal scrub.	Not expected to occur; not observed during focused surveys; marginally suitable habitat.
<i>Sidalcea neomexicana</i>	salt spring checkerbloom	—	—	2B.2	No	Alkali springs and marshes in playas, chaparral, coastal scrub, lower montane coniferous forest, and Mojavean desert scrub.	Not expected to occur; not observed during focused surveys; marginally suitable habitat.
<i>Suaeda esteroa</i>	estuary seablite	—	—	1B.2	No	Coastal salt marshes in clay, silt, and sand substrates.	Not expected to occur; no suitable habitat.
<i>Suaeda taxifolia</i>	woolly seablite	—	—	4.2	No	Coastal bluff scrub, coastal dunes, and salt marshes.	Not expected to occur; outside current known range; no suitable habitat.

TABLE 14
SPECIAL STATUS PLANT SPECIES REPORTED FROM THE PROJECT REGION

Species	Common Name	Federal Status	State Status	CRPR	NCCP/ HCP Covered Species	Habitat*	Potential to Occur
<i>Symphyotrichum defoliatum</i>	San Bernardino aster	—	—	1B.2	No	Disturbed areas, vernal mesic grassland, or near ditches, streams, and springs in meadows and seeps, cismontane woodland, coastal scrub, lower montane coniferous forest, marshes and swamps, valley and foothill grassland.	Not expected to occur; not observed during focused surveys; suitable habitat.
<i>Viguiera laciniata</i>	San Diego County viguiera	—	—	4.3	No	Chaparral and coastal scrub.	Not expected to occur; not observed during focused surveys; suitable habitat.

CRPR: California Rare Plant Rank; NCCP/HCP: Natural Community Conservation Plan/Habitat Conservation Plan

LEGEND:

Federal Status

State Status

FE Endangered

SE Endangered

FT Threatened

ST Threatened

CRPR

1A Plants presumed extirpated in California and either rare or extinct elsewhere

1B Plants Rare, Threatened, or Endangered in California and elsewhere

2B Plants Rare, Threatened, or Endangered in California but more common elsewhere

3 Plants about which we need more information – A Review List

4 Plants of limited distribution – A Watch List

TABLE 14
SPECIAL STATUS PLANT SPECIES REPORTED FROM THE PROJECT REGION

Species	Common Name	Federal Status	State Status	CRPR	NCCP/ HCP Covered Species	Habitat*	Potential to Occur
CRPR Threat Code Extensions None Plants lacking any threat information .1 Seriously threatened in California (over 80% of occurrences threatened; high degree and immediacy of threat) .2 Fairly threatened in California (20–80% of occurrences threatened; moderate degree and immediacy of threat) .3 Not very threatened in California (<20% of occurrences threatened; low degree and immediacy of threat or no current threats known) Species that were observed on site are shown in boldface type . * Sources include CDFW 2025a, CNPS 2025, and Jepson Flora Project 2024.							

3.7.1 **Braunton's Milkvetch**

Braunton's milkvetch is a federally listed Endangered species and has a CRPR of 1B.1. It is not a Covered species in the Central Coastal NCCP/HCP. It typically blooms between January and August (CNPS 2025). This perennial herb occurs in chaparral, coastal scrub, and valley and foothill grassland at elevations between approximately 15 and 2,100 feet above msl (Jepson Flora Project 2024; CNPS 2025). It generally occurs after recent burns or in disturbed areas, usually in sandstone with carbonate layers (CNPS 2025). This species is known from the western portion of the Western Transverse Ranges, the San Gabriel Mountains, tentatively from the San Gabriel Mountains/South Coast, and the northern Peninsular Ranges (Jepson Flora Project 2024); it is known from a few canyons in Orange County (Allen and Roberts 2013).

One individual Braunton's milkvetch was observed in the 2022 survey area (Psomas 2022a; Exhibit 10). It was observed in the sandy channel of Santiago Creek, upstream of the lake. The species associated with the Braunton's milkvetch observed in the survey area include mule fat, cicuta-leaved phacelia (*Phacelia cicutaria*), and horseweed (*Erigeron canadensis*). A voucher specimen was not collected due to the limited population size.

3.7.2 **Intermediate Mariposa Lily**

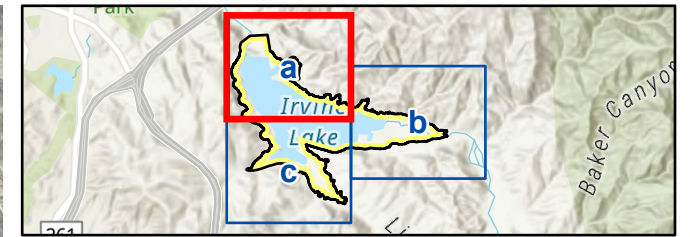
Intermediate mariposa lily has a CRPR of 1B.2. It is a Conditionally Covered species¹² in the Central-Coastal NCCP/HCP (i.e., populations less than 20 individuals are fully authorized). It typically blooms between May and July (Jepson Flora Project 2024; CNPS 2025). This perennial bulbiferous herb occurs on dry, rocky, open slopes in chaparral and coastal sage scrub at elevations between sea level and approximately 2,231 feet above msl (Roberts 2008; Jepson Flora Project 2024). It is sometimes locally common following fire (Roberts 2008). This species is known from the South Coast and northern Peninsular Ranges (Jepson Flora Project 2024).

One individual intermediate mariposa lily was observed in the 2020 focused survey area (Psomas 2020d, Exhibit 10). This individual was observed in the eastern portion of the 2020 focused survey area on a moderately steep, south facing slope in disturbed sagebrush scrub with Ceineba-rock outcrop complex soil. The species associated with the intermediate mariposa lily observed include California sagebrush, black mustard, coast morning glory (*Calystegia macrostegia*), and oats.

Four individual intermediate mariposa lilies were observed in the 2022 focused survey area and an additional individual was observed just outside the survey area (Psomas 2022a; Exhibit 10). The four individuals were observed in two populations in the northwestern portion of the 2022 survey area on moderately steep, southeast- to east-facing slopes in sagebrush scrub. The species associated with the intermediate mariposa lilies observed in the survey area include California sagebrush, black sage (*Salvia mellifera*), chilicothe, mule fat, California encelia (*Encelia californica*), and smilo grass (*Stipa miliacea* var. *miliacea*).

¹² The NCCP/HCP refers to this species by its former common name – foothill mariposa lily.

D:\Projects\IRW\SantiagoCreek\PO\SCDS\CD_Project.aprx SS_Species



- Biological Study Area
- Arroyo Toad Survey Area
- Special Status Plants**
 - Coulter's Matilija Poppy Population
 - Intermediate Mariposa Lily Population
 - Many-Stemmed Dudleya Population
 - Mud Nama Population (mapped polygon)
- Special Status Species**
 - American Peregrine Falcon
 - American White Pelican
 - Coastal Cactus Wren
 - Coastal California Gnatcatcher
 - Grasshopper Sparrow
 - Least Bell's Vireo
 - Southern California Rufous-Crowned Sparrow
 - White-Tailed Kite
 - Yellow-Breasted Chat
 - Two-Striped Gartersnake



0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Special Status Species Locations

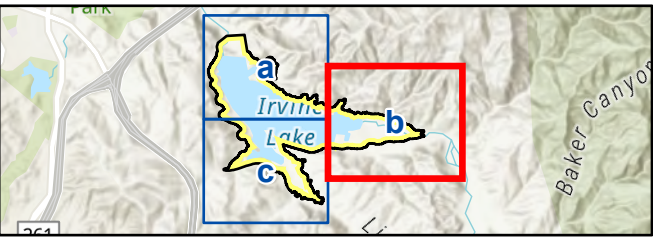
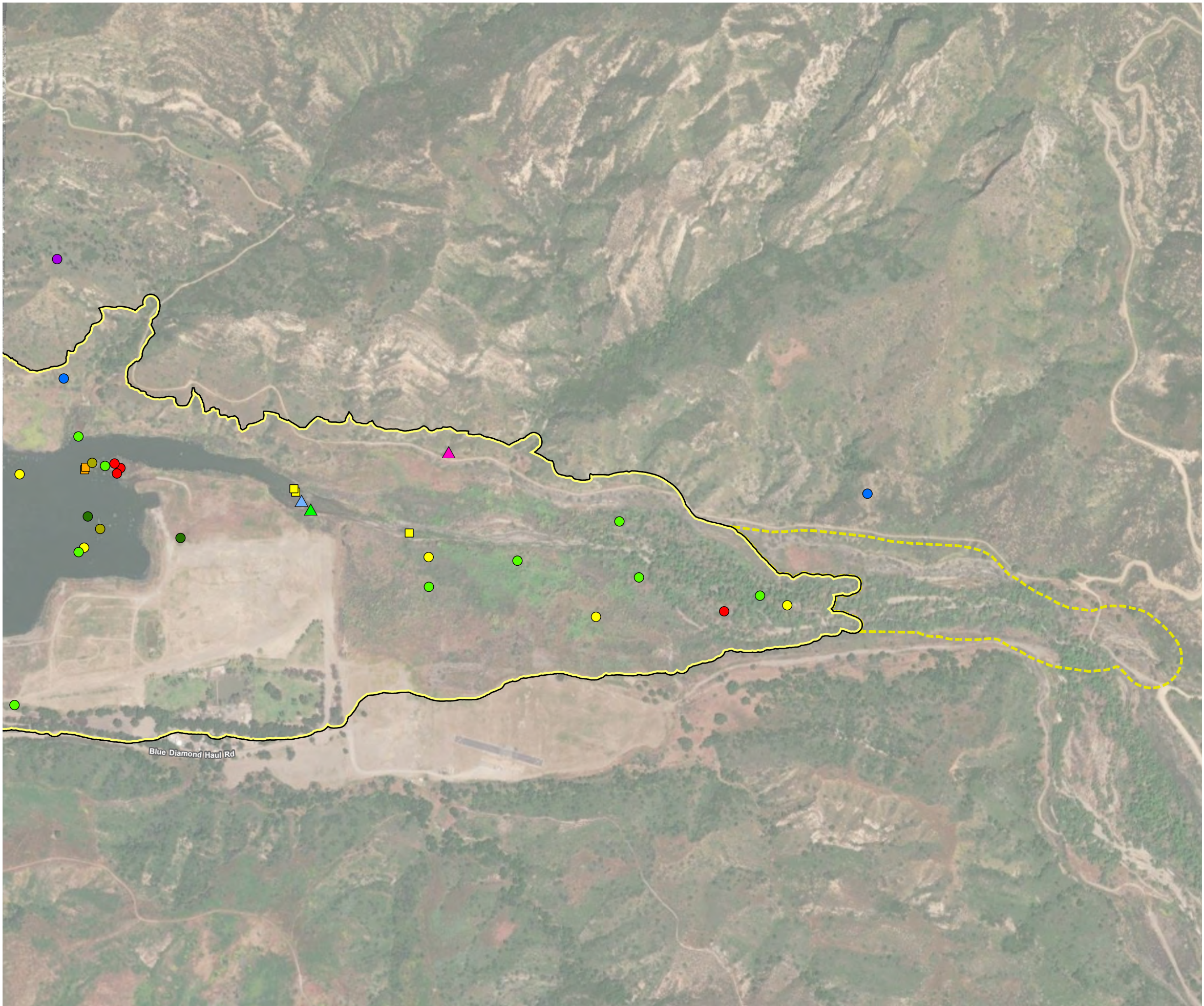
Exhibit 10a

*Santiago Creek Dam
Improvement Project*

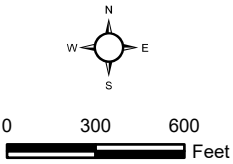


(Rev: 02/27/2025 JVR) R:\Projects\IRW\IRWD\3IRW010205\Graphics\BTR\ex_SS_Species.pdf

D:\Projects\IRW\SantiagoCreek\PO\SCD\SCD_P\Project.aprx SS_Species

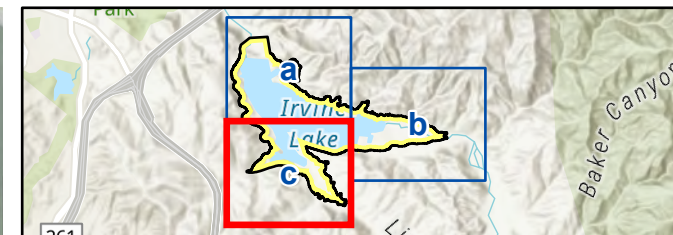
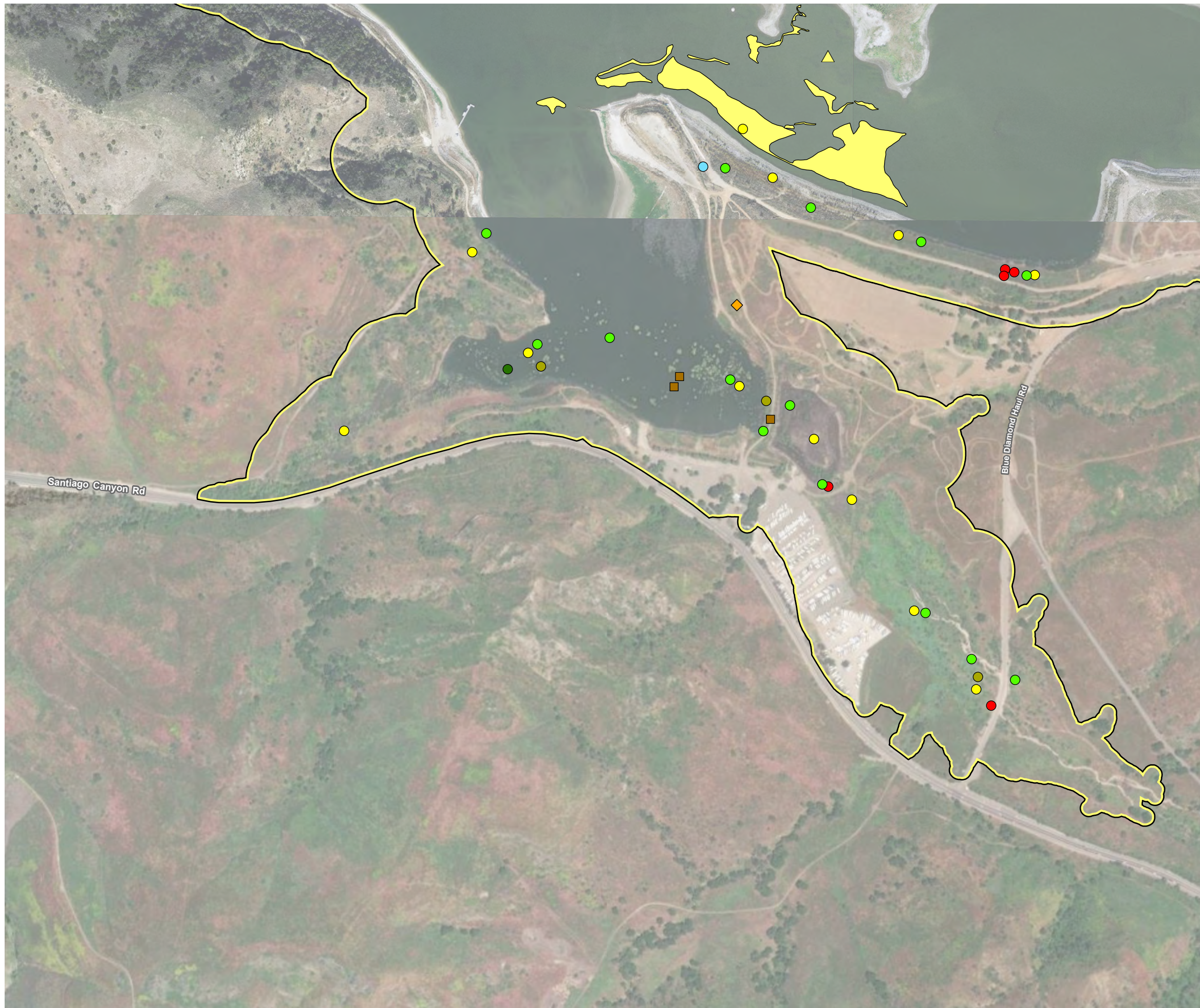













- Biological Study Area
- Arroyo Toad Survey Area
- Special Status Plants**
 - Coulter's Matilija Poppy Population
 - Intermediate Mariposa Lily Population
 - Braunton's Milkvetch Population
- Special Status Species**
 - Bald Eagle (Nest)
 - Coastal Cactus Wren
 - Grasshopper Sparrow
 - Least Bell's Vireo
 - Willow Flycatcher (migrant)
 - Yellow Warbler
 - Yellow-Breasted Chat
 - Belding's Orange-Throated Whiptail
 - Two-Striped Gartersnake



Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

D:\Projects\IRW\SantiagoCreek\PRO\SCDS\CD_Project.aprx\ex_SS_Species



-  Biological Study Area
- Special Status Plants**
-  Mud Nama Population (point location)
-  Mud Nama Population (mapped polygon)
- Special Status Species**
-  Crotch's Bumble Bee
-  Coastal California Gnatcatcher
-  Grasshopper Sparrow
-  Least Bell's Vireo
-  Willow Flycatcher (migrant)
-  Yellow Warbler
-  Yellow-Breasted Chat
-  Coastal Whiptail



0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

**Special Status
Species Locations**

Exhibit 10c

*Santiago Creek Dam
Improvement Project*



(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\BTR\ex_SS_Species.pdf

3.7.3 Many-stemmed Dudleya

Many-stemmed dudleya has a CRPR of 1B.2. It is not covered by the Central-Coastal NCCP/HCP. It typically blooms between April and June (Jepson Flora Project 2024; CNPS 2025). This perennial herb occurs on heavy, often clayey soils or grassy slopes in chaparral, coastal scrub, valley, and foothill grassland at elevations between approximately 5 and 2,975 feet above msl (Roberts 2008; Jepson Flora Project 2024). This species is known from the South Coast (Jepson Flora Project 2024).

Approximately 810 many-stemmed dudleya individuals were observed in 2 locations in the 2020 focused survey area (Psomas 2020d, Exhibit 10). Approximately 800 individuals were observed in the eastern portion of the 2020 focused survey area and 10 individuals were observed on a steep, east-facing cliff in the western portion of the 2020 focused survey area. The majority of individuals (eastern location) were observed in disturbed sagebrush scrub with Ceineba-rock outcrop complex and pits soil. The smaller population (western location) was observed in toyon-sumac chaparral with Sorrento loam soil. The species associated with the many-stemmed dudleya included California sagebrush, California buckwheat, daggerleaf cottonrose (*Filago gallica*), white sage, splendid mariposa lily (*Calochortus splendens*), common goldfields (*Lasthenia gracillis*), osmadenia (*Osmadenia tenella*), and little California melica (*Melica imperfecta*).

3.7.4 Mud Nama

Mud nama has a CRPR of 2B.2. It is not a Covered species in the Central Coastal NCCP/HCP. It typically blooms between January and October (Jepson Flora Project 2024; CNPS 2025). This annual herb occurs in intermittently wet areas of marshes and swamps, including lake margins and riverbanks at elevations between approximately 15 and 1,640 feet above msl (Jepson Flora Project 2024; CNPS 2025). This species is known from the San Joaquin Valley, South Coast, southern Channel Islands, western Peninsular Ranges, and southeastern Sonoran Desert (Jepson Flora Project 2024). The CNDDDB contains 22 records of this species in Imperial, Kings, Los Angeles, Orange, Riverside, and San Diego Counties. Of these, seven locations are reported from Orange County (i.e., Anaheim Marsh [historic occurrence, 1932], Laguna Lakes in Laguna Canyon, Emerald Canyon, Lambert Reservoir, Peters Canyon Channel, Fairview Park, and Ladera Ranch); all the records are over 25 years old. Of these records, the largest reported population was 30 individuals, most other records did not include a count or reported less than 10 individuals (CDFW 2025a).

Multiple populations of mud nama were observed in the southern portion of Irvine Lake in the 2022 focused survey area (Psomas 2022a; Exhibit 10). This area experiences periodic inundation and was mapped as open water during the 2020 vegetation mapping upstream of the dam. At the time of the special status plant survey, the substrate was exposed and consisted of riparian herb vegetation; the species was growing in more open areas, including along disturbed roads/trails. The species associated with the mud nama observed in the survey area were primarily annual beard grass, white sweetclover, and sourclover (*Melilotus indicus*) with scattered saltcedar, alkali heliotrope, mule fat, flatsedge, everlasting (*Pseudognaphalium* sp.), water cress (*Nasturtium officinale*), and willow weed.

Individuals covered a large area and the species is small in stature. To estimate the population sizes, ten quadrats one-square-foot in size were sampled in a relatively dense population of mud nama. This resulted in an average of 37.7 individuals per square foot. Therefore, a “high density” population was considered to have between 35 and 40 individuals per square foot. A “moderate density” population was considered to have between 20 and 25 individuals per square foot and a “low density” population was considered to have between 5 and 10 individuals per square foot. Based on these approximate population densities, the total number of individuals in the survey area was estimated using the square footage of each population. The total population was estimated to be between 3.5 and 5.5 million (Table 15). This is the largest population currently known for this species.

TABLE 15
MUD NAMA POPULATION INFORMATION

Population Number	Estimated Population Density	Population Area (square feet)	Estimated Population Size (Number of Individuals)
1	High density	25,023	875,805 – 1,000,920
2	Moderate density	15,709	314,180 – 392,725
3*	n/a	n/a	100
4*	n/a	n/a	1,000
5	Low density	284,500	1,422,500 – 2,845,000
6	Low density	12,647	63,235 – 126,470
7	Low density	1,121	5,605 – 11,210
8	High density	1,036	36,260 – 41,440
9	Low density	3,053	15,265 – 30,530
10	Low density	9,367	46,835 – 93,670
11	High density	17,305	605,675 – 692,200
12	Low density	8,335	41,675 – 83,350
Total			3,428,135 – 5,318,615
High Density: 35–40 individuals per square foot; Moderate Density: 20–25 individuals per square foot; Low Density: 5–10 individuals per square foot			
*Populations 3 and 4 were small and population sizes were estimated directly.			

3.7.5 Coulter's Matilija Poppy

Coulter's matilija poppy has a CRPR of 4.2. It is a Covered Species in the Central-Coastal NCCP/HCP. It typically blooms between March and July (Jepson Flora Project 2024; CNPS 2025). This perennial rhizomatous herb occurs in chaparral and coastal scrub, often in elevations between sea level and approximately 3,937 feet above msl (Roberts 2008; Jepson Flora Project 2024). This species grows as clones via rhizomes (Clarke et al. 2007; Jepson Flora Project 2024). This species is known from the South Coast, Western Transverse and Peninsular Ranges, and San Jacinto Mountains (Jepson Flora Project 2024).

Approximately 46 Coulter's matilija poppy clones were observed in 3 populations in the 2020 focused survey area (Psomas 2020d, Exhibit 10). Coulter's matilija poppy clones were observed in the northern and central portions of the 2020 focused survey area. The clones were observed in sagebrush scrub, coast live oak woodland, and toyon-sumac chaparral with Sorrento loam soil. The species associated with the Coulter's matilija poppy include laurel sumac, blue elderberry, California sagebrush, grayish shortpod mustard, chilicothe, black sage (*Salvia melifera*), California buckwheat, coast live oak, long-flowered monkey flower (*Diplicus longiflorus*), and slender wild oat. A voucher specimen was not collected and a CNDDDB form was not submitted because this species is not tracked by the CNDDDB (i.e., has a CRPR of 4.2).

One individual Coulter's matilija poppy was observed in the 2022 focused survey area (Psomas 2022a; Exhibit 10). It was observed in a sandy/cobbly low terrace of Santiago Creek upstream of the lake. The species associated with the Coulter's matilija poppy observed in the survey area include mule fat, leafy California buckwheat, fennel, and tocalote. A voucher specimen was not collected due to the limited population size and because it is known from the vicinity.

3.8 SPECIAL STATUS WILDLIFE

Table 16 provides a summary of special status wildlife species reported to occur in the Project region (i.e., the USGS' Black Star Canyon, Orange, Tustin, and El Toro 7.5-minute quadrangles). This list includes species reported by the CNDDDB, supplemented with species from the Project Biologist's experience that either occur nearby or could occur based on the presence of suitable habitat. This table includes information on the status, NCCP/HCP coverage, species habitat, and potential for occurrence. Note that these species are listed taxonomically. Species observed in the BSA are discussed further below. Exhibit 10 shows the locations of special status species.

Focused surveys for arroyo toad, coastal California gnatcatcher, and least Bell's vireo were conducted downstream of the dam in spring/summer 2020 (Appendices H, J, and K). Focused surveys for Quino checkerspot butterfly were conducted throughout the BSA in spring 2022 (Appendix F). Focused surveys for arroyo toad, coastal California gnatcatcher, least Bell's vireo, southwestern willow flycatcher, and western yellow-billed cuckoo were conducted upstream of the dam in spring/summer 2022 (Appendices H, J, K, and L). Focused surveys for Crotch's bumble bee and southwestern pond turtle were conducted throughout the BSA in summer 2024 (Appendices G and I).

Of the 60 species reported from the Project region, 40 species have potential to occur in the BSA based on the presence of suitable habitat and the results of focused surveys. The remaining species would not be expected to occur because the BSA lacks suitable habitat or because they were not observed during the focused surveys. Sixteen special status wildlife species were observed during the 2020, 2022, and 2024 focused surveys; these species are discussed in more detail following the table. Two federally-listed species (i.e., coastal California gnatcatcher and least Bell's vireo) and one federally Proposed Threatened species (i.e., monarch butterfly [*Danaus plexippus*; overwintering not expected]) are known to occur in the BSA. Two State listed species (i.e., bald eagle and least Bell's vireo) and four State Candidate species (i.e., Crotch's bumble bee, white sturgeon [*Acipenser transmontanus*; only sterile individuals], burrowing owl [*Athene cunicularia*], and mountain lion) are known or have potential to occur in the BSA. Special status species that were observed or those with moderate potential to occur are discussed in more detail following the table.

TABLE 16
SPECIAL STATUS WILDLIFE SPECIES REPORTED FROM THE PROJECT VICINITY

Species	Common Name	Federal Status	State Status	NCCP/HCP Covered Species	Habitat ^a	Potential to Occur
Invertebrates						
<i>Branchinecta sandiegonensis</i>	San Diego fairy shrimp	FE	—	Conditionally Covered	Inhabits vernal pools and ephemeral depressions.	Not expected to occur; no suitable habitat.
<i>Streptocephalus woottoni</i>	Riverside fairy shrimp	FE	—	Conditionally Covered	Inhabits vernal pools and ephemeral depressions.	Not expected to occur; no suitable habitat.
<i>Danaus plexippus</i> (overwintering populations)	monarch butterfly	FPT	—	No	Overwintering sites consist of forested areas that provide protection from the elements and moderate temperatures, as well as nectar and clean water sources located nearby. Overwintering sites are within 1.5 miles of the Pacific Ocean at elevations of 200-300 feet above msl. Reproduction is dependent on the presence of milkweed (<i>Asclepias</i> sp.).	Observed (individual foraging during spring); hostplant present; not expected for overwintering because BSA is too far inland and is outside the known elevational range for overwintering.
<i>Euphydryas editha quino</i>	quino checkerspot butterfly	FE	CE	Conditionally Covered	Inhabits openings in chaparral and sage scrub and grasslands; erect plantain is one of the specific host plants where females lay eggs.	Not expected to occur; not observed during focused surveys; suitable habitat.
<i>Bombus crotchii</i>	Crotch's bumble bee	—	CE	No	Inhabits areas with appropriate food sources (e.g., <i>Fabaceae</i> , <i>Apocynaceae</i> , <i>Asteraceae</i> , <i>Lamiaceae</i> , and <i>Boraginaceae</i>).	Observed; suitable habitat.

TABLE 16
SPECIAL STATUS WILDLIFE SPECIES REPORTED FROM THE PROJECT VICINITY

Species	Common Name	Federal Status	State Status	NCCP/HCP Covered Species	Habitat ^a	Potential to Occur
Fish						
<i>Acipenser transmontanus</i>	white sturgeon	—	CT	No	Inhabits large rivers with deep waters (>12 feet deep) and swift currents; brackish and estuarine environments.	Sterile individuals known to be stocked in Irvine Lake by OC Parks; no suitable habitat and outside current known range of natural populations.
<i>Oncorhynchus mykiss irideus</i> pop. 10	steelhead – southern California DPS	FE	CE	No	Inhabits streams; can tolerate warmer water and more variable conditions.	Not expected to occur; no suitable habitat; outside current known range.
<i>Rhinichthys gabrielino</i> [osculus ssp. 8]	Santa Ana speckled dace	FPT	SSC	No	Inhabits permanently flowing streams, usually in shallow cobble and gravel riffles.	Not expected to occur; outside current known range ^b .
<i>Catostomus santaanae</i>	Santa Ana sucker	FT	SSC	No	Inhabits coastal streams; prefer sand-rubble-boulder bottoms; cool, clear water; and algae.	Not expected to occur; outside current known range.
Amphibians						
<i>Taricha torosa</i>	Coast Range newt	—	SSC	No	Breeds in ponds, reservoirs, and slow-moving streams and lives in terrestrial habitats.	May occur; suitable habitat.
<i>Spea hammondi</i>	western spadefoot	FPT	SSC	Not Covered	Breeds in vernal pools in grassland habitats, but also hardwood woodlands.	May occur for foraging; not expected to occur for breeding because not observed during 2025 focused surveys; suitable foraging habitat; limited suitable breeding potential in pools or along slow-moving portions of Santiago Creek.

TABLE 16
SPECIAL STATUS WILDLIFE SPECIES REPORTED FROM THE PROJECT VICINITY

Species	Common Name	Federal Status	State Status	NCCP/HCP Covered Species	Habitat ^a	Potential to Occur
<i>Anaxyrus californicus</i>	arroyo toad	FE	SSC	Conditionally Covered	Inhabits rivers with sandy banks, willows, cottonwoods, and sycamores. Not observed during surveys for NCCP/HCP but area not thoroughly surveyed (County of Orange 1996).	Not expected to occur; not observed during focused surveys; suitable habitat.
Reptiles						
<i>Actinemys pallida</i> [<i>Emys marmorata</i>]	southwestern [western] pond turtle	FPT	SSC	No	Inhabits marshes, rivers, streams, and irrigation ditches, usually with aquatic vegetation and basking sites and suitable upland habitat.	Not expected to occur; not observed during focused surveys; suitable habitat.
<i>Phrynosoma blainvillii</i>	coast horned lizard	—	SSC	Covered	Inhabits a wide variety of habitats with open areas for sunning, bushes for cover, and patches of loose soil for burial.	Expected to occur; suitable habitat.
<i>Aspidoscelis hyperythra</i>	orange-throated whiptail	—	WL	Covered	Inhabits coastal scrub, chaparral, and hardwood woodlands; prefers washes and other sandy areas with patches of brush and rocks.	Observed in the survey area.
<i>Aspidoscelis tigris stejnegeri</i>	coastal whiptail	—	SSC	Covered	Inhabits deserts and semi-arid areas with sparse vegetation and open areas, woodland, and riparian areas.	Observed in the survey area.
<i>Anniella stebbinsi</i>	southern California legless lizard	—	SSC	No	Inhabits a variety of habitats, generally in moist, loose soil.	May occur; suitable habitat.
<i>Arizona elegans occidentalis</i>	California glossy snake	—	SSC	No	Inhabits a range of scrub and grassland habitats, often with loose or sandy soils.	May occur; suitable habitat.

TABLE 16
SPECIAL STATUS WILDLIFE SPECIES REPORTED FROM THE PROJECT VICINITY

Species	Common Name	Federal Status	State Status	NCCP/HCP Covered Species	Habitat ^a	Potential to Occur
<i>Salvadora hexalepis virgulata</i>	coast patch-nosed snake	—	SSC	No	Inhabits brushy or shrubby vegetation with small mammal burrows for refuge and overwintering sites.	May occur; suitable habitat.
<i>Thamnophis hammondi</i>	two-striped gartersnake	—	SSC	No	Found in or near permanent fresh water, often along streams with rocky beds and riparian growth.	Observed in the survey area.
<i>Crotalus ruber</i>	red-diamond rattlesnake	—	SSC	Covered	Inhabits rocky areas with dense vegetation in chaparral, woodland, grassland, and deserts.	Expected to occur; suitable habitat.
Birds						
<i>Accipiter cooperii</i>	Cooper's hawk	—	WL (nesting)	No	Forages in woodland. Nests in riparian growths of deciduous trees, such as canyon bottoms on river floodplains and in live oaks.	Expected to occur for foraging; may occur for nesting; suitable foraging and nesting habitat.
<i>Buteo regalis</i>	ferruginous hawk	—	WL (wintering)	No	Inhabits open grasslands, sagebrush flats, desert scrub, low foothills, and fringes of pinyon and juniper woodland.	May occur during migration and wintering; suitable habitat.
<i>Elanus leucurus</i>	white-tailed kite	—	FP (nesting)	No	Inhabits open grasslands, meadows, or marshes close to isolated, dense-topped trees for nesting and perching.	Observed in the survey area.
<i>Haliaeetus leucocephalus</i>	bald eagle	Delisted	SE/FP (nesting & wintering)	No	Nests in large, old-growth trees with open branches near water. Forages along ocean shore, lake margins, and rivers.	Observed (nesting) immediately adjacent to the survey area; observed foraging in the survey area.

TABLE 16
SPECIAL STATUS WILDLIFE SPECIES REPORTED FROM THE PROJECT VICINITY

Species	Common Name	Federal Status	State Status	NCCP/HCP Covered Species	Habitat ^a	Potential to Occur
<i>Aquila chrysaetos</i>	golden eagle	—	WL/FP (nesting & wintering)	Conditionally Covered	Variety of open habitats (desert, grassland, shrubland, agriculture, streams) especially near mountains, hills, and cliffs.	May occur for foraging; not expected to occur for nesting; suitable foraging habitat; no suitable nesting habitat but potentially suitable nesting habitat adjacent.
<i>Falco mexicanus</i>	prairie falcon	—	WL (nesting)	Conditionally Covered	Variety of open habitats (desert, grassland, shrubland, agriculture, streams) especially near bluffs and cliffs that are used for nesting.	May occur for foraging; not expected to occur for nesting; suitable foraging habitat; no suitable nesting habitat but potentially suitable nesting habitat adjacent.
<i>Falco peregrinus anatum</i>	American peregrine falcon	Delisted	Delisted	Covered	Nests in a scrape, depression, or ledge in an open site on cliffs, banks, dunes, and mounds near wetlands, lakes, rivers, or other water.	Observed in the survey area.
<i>Coturnicops noveboracensis</i>	yellow rail	—	SSC	No	Inhabits freshwater marshlands.	Not expected to occur; no suitable habitat.
<i>Laterallus jamaicensis coturniculus</i>	California black rail	—	ST/FP	No	Inhabits freshwater marshes, wet meadows, and shallow margins of saltwater marshes bordering larger bays.	Not expected to occur; no suitable habitat.
<i>Rallus obsoletus levipes</i>	light-footed Ridgway's rail	FE	SE/FP	No	Inhabits salt marshes with dense growth of pickleweed or cordgrass.	Not expected to occur; no suitable habitat.
<i>Sternula antillarum browni</i>	California least tern	FE (nesting colony)	SE/FP (nesting colony)	No	Colonial breeder on bare or sparsely vegetated, flat substrates such as sand beaches, alkali flats, landfills, or paved areas along the coast.	Not expected to occur; no suitable habitat.

TABLE 16
SPECIAL STATUS WILDLIFE SPECIES REPORTED FROM THE PROJECT VICINITY

Species	Common Name	Federal Status	State Status	NCCP/HCP Covered Species	Habitat ^a	Potential to Occur
<i>Coccyzus americanus occidentalis</i>	western yellow-billed cuckoo	FT (nesting)	SE (nesting)	No	Nests in riparian forests along broad, lower flood-bottoms of larger river systems with willows, often mixed with cottonwoods, with understory of blackberry, nettles, or wild grape.	Not expected to occur; not observed during focused surveys; suitable habitat.
<i>Asio otus</i>	long-eared owl	—	SSC (nesting)	No	Inhabits riparian bottomlands with tall willows and cottonwoods, also belts of live oak along stream courses.	May occur for foraging and nesting; suitable foraging and nesting habitat.
<i>Athene cunicularia</i>	burrowing owl	—	CE/SSC (burrow sites & some wintering sites)	No	Inhabits open, dry annual or perennial grasslands, deserts, and scrublands with low-growing vegetation; uses California ground squirrel burrows and similar openings for breeding.	Limited potential to occur; suitable habitat; limited numbers in the region.
<i>Empidonax traillii extimus</i>	southwestern willow flycatcher	FE (nesting)	SE (nesting)	Conditionally Covered	Inhabits riparian habitat along rivers, stream, and other wetlands with dense growths of willows, mule fat, etc., often with a scattered overstory of cottonwood.	Not expected to occur; not observed during focused surveys; suitable habitat.
<i>Lanius ludovicianus</i>	loggerhead shrike	—	SSC (nesting)	No	Inhabits grasslands and other dry, open habitats.	May occur; suitable habitat.
<i>Vireo bellii pusillus</i>	least Bell's vireo	FE (nesting)	SE (nesting)	Conditionally Covered	Inhabits riparian forest, riparian scrub, and riparian woodland, usually nesting in willows, mule fat, or mesquite.	Observed in the survey area.

TABLE 16
SPECIAL STATUS WILDLIFE SPECIES REPORTED FROM THE PROJECT VICINITY

Species	Common Name	Federal Status	State Status	NCCP/HCP Covered Species	Habitat ^a	Potential to Occur
<i>Eremophila alpestris actia</i>	California horned lark	—	WL	No	Inhabits short-grass prairie, “bald” hills, mountain meadows, open coastal plains, fallow agricultural fields, and alkali flats.	May occur; suitable habitat.
<i>Campylorhynchus brunneicapillus sandiegensis</i>	coastal cactus wren	—	SSC	Covered	Inhabits coastal sage scrub with tall prickly-pear cactus for nesting and roosting.	Observed in the survey area.
<i>Polioptila californica californica</i>	coastal California gnatcatcher	FT	SSC	Covered	Inhabits coastal sage scrub in arid washes, on mesas, and slopes.	Observed in the survey area.
<i>Aimophila ruficeps canescens</i>	southern California rufous-crowned sparrow	—	WL	Covered	Inhabits coastal sage scrub and sparse mixed chaparral, frequently on relative steep, rocky hillsides with grass and forb patches.	Observed in the survey area.
<i>Ammodramus savannarum</i>	grasshopper sparrow	—	SSC (nesting)	No	Inhabits dense grasslands on rolling hills, lowland plains, and valleys and on hillsides on lower mountain slopes.	Observed in the survey area.
<i>Passerculus sandwichensis beldingi</i>	Belding's savannah sparrow	—	SE	No	Inhabits coastal salt marshes, nesting in pickleweed on and about the margins of tidal flats.	Not expected to occur; no suitable habitat.
<i>Icteria virens</i>	yellow-breasted chat	—	SSC (nesting)	No	Inhabits riparian thickets of willow and other brushy tangles near watercourses; nests in low, dense riparian vegetation consisting of willows, blackberry, and wild grape.	Observed in the survey area.
<i>Agelaius tricolor</i>	tricolored blackbird	—	ST/SSC (nesting colony)	No	Inhabits freshwater marsh, swamps, and wetlands with open water and protected nesting substrate.	Not expected to occur; limited amount of suitable habitat.

TABLE 16
SPECIAL STATUS WILDLIFE SPECIES REPORTED FROM THE PROJECT VICINITY

Species	Common Name	Federal Status	State Status	NCCP/HCP Covered Species	Habitat ^a	Potential to Occur
<i>Setophaga petechia</i>	yellow warbler	—	SSC (nesting)	No	Inhabits riparian forest, riparian scrub, and riparian woodland, foraging and nesting in willow shrubs and thickets, cottonwoods, sycamores, ash, and alders.	Observed in the survey area.
Mammals						
<i>Sorex ornatus salicornicus</i>	southern California saltmarsh shrew	—	SSC	No	Inhabits coastal marshes with dense vegetation and woody debris for cover.	Not expected to occur; no suitable habitat.
<i>Choeronycteris mexicana</i>	Mexican long-tongued bat	—	SSC	No	Inhabits riparian scrub, pinyon and juniper woodland, and Sonoran thorn woodland; roosts in caves and in and around buildings.	Not expected to occur; outside current known range.
<i>Antrozous pallidus</i>	pallid bat	—	SSC	No	Inhabits deserts, grasslands, shrublands, woodlands, and forest, most commonly in open, dry habitats with rocky areas for roosting.	Limited potential to occur for foraging and roosting; suitable foraging and roosting habitat.
<i>Nyctinomops femorosaccus</i>	pocketed free-tailed bat	—	SSC	No	Inhabits pinyon-juniper woodlands, desert scrub, desert succulent shrub, desert riparian, desert wash, alkali desert scrub, Joshua tree, and palm oasis. Roosts in crevices of cliffs and rocky outcroppings.	May occur for foraging and roosting; suitable foraging and roosting habitat.
<i>Nyctinomops macrotis</i>	big free-tailed bat	—	SSC	No	Rugged and rocky terrain; roosts in buildings, caves, rock crevices in cliffs, and rocky outcroppings.	May occur for foraging and roosting; suitable foraging and roosting habitat.

TABLE 16
SPECIAL STATUS WILDLIFE SPECIES REPORTED FROM THE PROJECT VICINITY

Species	Common Name	Federal Status	State Status	NCCP/HCP Covered Species	Habitat ^a	Potential to Occur
<i>Lasiurus frantzii</i>	western red bat	—	SSC	No	Riparian habitat near water. Roosts exclusively in trees, particularly sycamore, cottonwood, ash, and elderberry (<i>Sambucus</i> sp.).	May occur for foraging and roosting; suitable foraging and roosting habitat.
<i>Lasiurus xanthinus</i>	western yellow bat	—	SSC	No	Inhabits valley foothill riparian, desert riparian, desert wash, and palm oasis habitats. Roosts in trees, particularly palms. Forages over water and among trees.	May occur for foraging and roosting; suitable foraging and roosting habitat.
<i>Eumops perotis californicus</i>	western mastiff bat	—	SSC	No	Inhabits many open, semi-arid to arid habitats including conifer and deciduous woodlands, coastal scrub, grasslands, and chaparral. Roosts in crevices in cliff faces, high buildings, trees, and tunnels.	May occur for foraging and roosting; suitable foraging and roosting habitat.
<i>Chaetodipus fallax fallax</i>	northwestern San Diego pocket mouse	—	—	No	Inhabits coastal scrub, chaparral, grasslands, and sagebrush, usually in association with rocks or coarse gravel.	May occur; suitable habitat.
<i>Perognathus longimembris pacificus</i>	Pacific pocket mouse	FE	SSC	Conditionally Covered	Inhabits coastal scrub with fine alluvial sands; only occurs within a few miles of the coast.	Not expected to occur; outside current known range.
<i>Neotoma bryanti [lepida] intermedia</i>	Bryant's San Diego desert woodrat	—	SSC	Covered	Inhabits coastal scrub with moderate to dense canopies, rock outcrops, rocky cliffs, and slopes.	May occur; suitable habitat.

TABLE 16
SPECIAL STATUS WILDLIFE SPECIES REPORTED FROM THE PROJECT VICINITY

Species	Common Name	Federal Status	State Status	NCCP/HCP Covered Species	Habitat ^a	Potential to Occur
<i>Onychomys torridus ramona</i>	southern grasshopper mouse	—	SSC	No	Inhabits desert areas, especially scrub habitats with friable soils for digging with low to moderate shrub cover.	Not expected to occur; outside current known range
<i>Puma concolor</i>	mountain lion–Southern California/Central Coast Evolutionary Significant Unit (ESU)	—	CE	No	Inhabits various habitats within foothill and mountain areas typically where deer can be found.	Observed (tracks) in the survey area.
NCCP/HCP: Natural Community Conservation Plan/Habitat Conservation Plan; BSA: Biological Study Area						
LEGEND:						
Federal (USFWS)		State (CDFW)				
FE	Endangered	SE	Endangered			
FT	Threatened	ST	Threatened			
FPT	Proposed Threatened	CE	Candidate Endangered			
FP	Fully Protected	CT	Candidate Threatened			
		CT/E	Candidate Threatened or Endangered			
		SSC	Species of Special Concern			
		WL	Watch List			
		SA	Special Animal			
^a Sources include CDFW 2025a and 2025d.						
^b CDFW is currently considering a translocation of Santa Ana speckled dace to Santiago Creek near its confluence with Black Star Canyon, about a mile upstream of Irvine Lake. Details are still being determined and are not yet available.						

3.8.1 Monarch Butterfly

The monarch butterfly is proposed as a federally Threatened species by the USFWS; California overwintering sites would be protected by this status. Monarch butterflies lay their eggs on the obligate milkweed (*Asclepias* sp.). Multiple generations of monarchs are produced through the breeding season, with most adult butterflies living two to five weeks. Overwintering adults enter reproductive diapause and live for six to nine months (USFWS 2023). Each spring, monarchs leave overwintering sites and disperse across California and eventually migrate to all western states, searching for milkweed plants on which to lay their eggs. Several generations are produced throughout the spring, summer, and fall, with each generation spreading further across the landscape. The last generation then migrates all the way back to the overwintering grounds on the Pacific coast in the fall. Monarchs return to the same groves of trees each year (Xeres Society 2023). In the western U.S., monarchs overwinter at groves of trees along the Pacific Coast with a large concentration overwintering in California. Currently, the most common overwintering groves consist of non-native blue gum (*Eucalyptus* sp.), but they also use native Monterey pine (*Pinus radiata*), Monterey cypress (*Hesperocyparis macrocarpa*), western sycamore, coast live oak, and redwood (*Sequoia sempervirens*) (USFWS 2024b). The majority of overwintering sites are found within 1.5 miles of the Pacific Ocean, which moderates temperatures, at lower elevations (i.e., 200 to 300 feet above msl) and situated on slopes oriented to the south, southwest, or west that provide the most solar radiation (Xeres Society 2016).

Along with the proposed listing, the USFWS is proposing 4,395 acres of Critical Habitat for this species to protect overwintering sites in Alameda, Marin, Monterey, San Luis Obispo, Santa Barbara, Santa Cruz, and Ventura Counties, California (USFWS 2024b). The BSA is not within proposed Critical Habitat for this species.

Monarch butterfly was recorded as an incidental observation during the Quino checkerspot butterfly surveys and its hostplant, milkweed, was noted during botanical surveys. Western sycamore and coast live oak woodlands are present in the BSA; however, the BSA is over 20 miles from the Pacific Ocean and the elevation of the BSA is too high (i.e., 657 to 996 feet above msl). Additionally, there are no known overwintering sites mapped in the BSA (Xeres Society 2023). Therefore, monarch butterfly is not expected to overwinter in the BSA.

3.8.2 Crotch's Bumble Bee

The Crotch's bumble bee (*Bombus crotchii*) is proposed as a Candidate¹³ to be State listed as Endangered. The Crotch's bumble bee is a ground nester and often makes its nest in abandoned mammal burrows and can be found in most native habitat types, although it prefers grassland and scrub habitats. It is primarily associated with plants from the following families: *Fabaceae*, *Apocynaceae*, *Asteraceae*, *Lamiaceae*, and *Boraginaceae* (Richardson 2017, Thorp et. al. 1983). Grassland and scrub habitat, as well as several plant species from these families are present; therefore, suitable habitat is present for this species. This species has been recently observed at multiple locations in the Project region. The most recent

¹³ The CDFW treats Candidate species as if they are listed while they determine if they will be formally listed.

observations of this species were in 2020 in the Irvine Ranch Open Space along Santiago Creek in 2016 and in Trabuco Canyon in 2020 (CDFW 2025a).

Focused surveys were conducted in summer 2024; one male Crotch's bumble bee was observed foraging in a small patch of leafy California buckwheat, in the southern portion of the survey area (Exhibit 10). At the time of the focused surveys in the summer months, most plants were no longer flowering; floral resources were likely higher in the spring and early summer. The estimated percent cover of floral resources during the focused surveys was approximately 20 to 30 percent of the survey area during the June visit. During the focused surveys, the species in bloom consisted primarily of leafy California buckwheat, deerweed, short-podded mustard, and black mustard. Potential bumble bee nest sites and overwintering habitat included small rodent burrows and leaf litter.

3.8.3 White Sturgeon

White sturgeon is a Candidate to be listed as State Threatened. This species occurs in deep rivers (more than 12 feet deep) with swift flows. White Sturgeon can live in excess of 100 years, and historically grew to sizes of approximately 20 feet and 1,300 pounds (Moyle 2002). White Sturgeon are an anadromous fish native to California, where they primarily occur in San Francisco Bay and the Delta and spawn in the Sacramento and San Joaquin rivers and associated tributaries (CDFW 2024c). White sturgeon are not expected to occur in southern California streams, and therefore, are not expected to occur naturally in the BSA as it is outside the species' known range and does not provide suitable habitat. However, sterile individuals of white sturgeon are stocked in Irvine Lake by OC Parks (Hayes, pers. comm. 2023).

3.8.4 Santa Ana Speckled Dace

Santa Ana speckled dace (*Rhinichthys gabrielino* [osculus ssp. 8]) is proposed as a federally Threatened species by the USFWS. The Santa Ana speckled dace is a small freshwater fish that occurs in perennial streams and rivers. The species was historically found throughout the upper and middle reaches of the Los Angeles, San Gabriel, Santa Ana, and San Jacinto Rivers. Currently, Santa Ana speckled dace is restricted to the headwaters of those river systems, with limited connectivity for populations in the Santa Ana River and San Jacinto River. Santa Ana speckled dace inhabit a variety of stream habitats, with a preference for cool, moving water and gravel substrate that have aquatic invertebrates as a food source (USFWS 2024a). This species was reported from Modjeska Canyon near its confluence with Santiago Creek in 1999 (CDFW 2025a). The BSA is outside the current known range of the Santa Ana speckled dace. However, CDFW is currently considering translocating this species to a site along Santiago Creek near its confluence with Black Star Canyon, approximately 1.25 mile upstream of Irvine Lake (Pareti, pers. comm. 2024). If this species is translocated, the translocation success will be monitored by CDFW. Therefore, while this species is not currently expected to occur in the BSA, it could occur along Santiago Creek upstream of the lake in the future.

3.8.5 Western Spadefoot

The western spadefoot has recently been proposed as a federally Threatened species by the USFWS; it is also a California Species of Special Concern. Western spadefoot are restricted to California and northwestern Baja California, Mexico between sea level and 4,500 feet above msl. Adult toads forage and burrow in open areas with sandy or gravelly soils, in a variety of habitats including mixed woodlands, grasslands, coastal sage scrub, chaparral, sandy washes, lowlands, river floodplains, alluvial fans, playas, and alkali flats in foothills and mountains. They feed primarily on insects, worms, and other invertebrates. Western spadefoot are rarely seen, spending most of their life underground in earthen burrows up to three feet deep. Adults emerge from dry season refuges during late winter or spring rains, typically in February and March, and proceed to nearby breeding pools. Breeding habitat consists primarily of shallow, temporary rain pools that should persist for a minimum of 30 days following egg-laying. The temporary nature of the breeding habitat ensures a lack of predators such as fish, American bullfrog (*Lithobates catesbeiana*), and red-swamp crayfish (*Procambarus larkia*) that would otherwise reduce the likelihood of tadpoles reaching metamorphosis and adulthood. In Southern California, over 80 percent of habitat once known to be occupied by western spadefoot has been lost through loss of breeding habitat and/or fragmentation of breeding and foraging/burrowing habitat by development. The Central Coastal Subregion of the NCCP/HCP proposed to include western spadefoot as a Covered Species; however, there were not enough breeding pools conserved in the Central Subregion. Therefore, western spadefoot was designated a Covered Species only in the Coastal Subregion; it is not covered in the Central Subregion, which is where the BSA occurs. Suitable foraging habitat is present in the BSA; limited suitable breeding pools were observed in the BSA and the species also has a limited potential to breed along slow-moving portions of Santiago Creek. The western spadefoot has potential to occur within the BSA for foraging but has only a limited potential to breed in the BSA because the presence of suitable pools is limited and variable from year to year. Areas that appeared suitable for pooling in 2024 did not pool in 2025; new pools were observed in 2025 that were not observed in prior years. Focused surveys were conducted throughout the BSA in spring 2025; no western spadefoot were observed. While this species may occur in the BSA for foraging, it is not expected to occur in the BSA for breeding because it was not observed during focused surveys.

3.8.6 Southwestern Pond Turtle

The southwestern pond turtle is proposed as a federally Threatened species by the USFWS; it is also a California Species of Special Concern. The western pond turtle is the only native turtle species in coastal California; the former northwestern and southwestern subspecies were recently split into separate species, with the southwestern pond turtle (*Actinemys pallida*) occurring in Southern California. It is found in ponds, lakes, marshes, reservoirs, seasonal standing or slow-moving streams, canals, sloughs, vernal pools, and occasionally in brackish water (Germano and Bury 2001). Sufficient cover (e.g., vegetation, undercut banks) and basking sites are important components of suitable habitat (Spinks et al. 2003). Suitable basking sites include partially submerged logs, rocks, floating vegetation, and open mud banks (CDFW 2000). Adults are often observed basking on logs or other objects protruding out of the water or floating in the warmer surface water. They have both good hearing and

eyesight and are easily disturbed; they are often heard splashing into the water to take cover before they are seen (USGS 2006a). Southwestern pond turtles are omnivorous; aquatic invertebrates are the mainstay of the adult diet; but carrion, small fish, frogs, and some plants are also consumed (USGS 2006a). Adult southwestern pond turtles in Southern California may remain active in the water year-round if conditions are suitable (enough water, warm temperatures) (USGS 2006a). However, during the coldest months (October to April), this species will often seek upland refugia (i.e., shelter with appropriate temperature and moisture conditions) and enter a period of aestivation. Western pond turtles can also hibernate underwater in bottom mud (CDFW 2000). Habitat destruction for urban (primarily flood control) and agricultural development has resulted in population declines throughout the western pond turtle's range (Spinks et al. 2003). Over 90 percent of the wetland habitats within the historic range of the western pond turtle throughout California have been lost (USFWS 1992). Additionally, invasion of non-native plant and wildlife species into habitats occupied by western pond turtles is another threat to the continued survival of the species. Suitable habitat for western pond turtle is present throughout the BSA. Focused visual surveys and a trapping program were conducted in the BSA, including 108 trap days (27 traps multiplied by 4 days of trapping for each), in summer 2024. No southwestern pond turtles were observed during the focused surveys. Therefore, southwestern pond turtle is not expected to occur in the BSA.

3.8.7 Orange-throated Whiptail

Orange-throated whiptail is a California Watch List Species. It is a Covered species in the Central-Coastal NCCP/HCP. This species occurs in coastal scrub, chamise-redshank chaparral, mixed chaparral, and valley-foothill hardwood habitats from sea level to 3,410 feet above msl (Jennings and Hayes 1994). It prefers washes and other sandy areas with patches of brush and rocks (Stebbins 2003). It occurs in Orange, Riverside, and San Diego counties west of the crest of the Peninsular Ranges, especially in areas with summer morning fog. It also occurs in southwestern San Bernardino County (Zeiner et al. 1990).

Two juvenile orange-throat whiptails were observed during the 2022 focused least Bell's vireo surveys upstream of Santiago Creek Dam (Exhibit 10). Suitable habitat for this species is present throughout the BSA.

3.8.8 Coastal Whiptail

Coastal whiptail is a California Species of Special Concern. It is a Covered species in the Central-Coastal NCCP/HCP. This species occurs in a variety of habitats including valley-foothill hardwood, valley-foothill hardwood conifer, valley-foothill riparian, mixed conifer, pine-juniper, chamise-redshank chaparral, mixed chaparral, desert scrub, desert wash, alkali scrub, and annual grassland from sea level to 7,500 feet above msl. It occurs throughout much of the state (Zeiner et al. 1990).

Three adult coastal whiptails were observed during the 2022 focused least Bell's vireo surveys upstream of Santiago Creek Dam (Exhibit 10). Suitable habitat for this species is present throughout the BSA.

3.8.9 Two-striped Garter Snake

Two-striped garter snake is a California Species of Special Concern. This highly aquatic species occurs primarily in or near perennial or intermittent freshwater streams with rocky beds bordered by willows or other dense vegetation (Jennings and Hayes 1994; Stebbins 2003). The two-striped garter snake feeds on tadpoles, newt larvae, toads, frogs, fish, fish eggs, and earthworms (Stebbins 2003). It occurs from Monterey County south to El Rosario in Baja California, Mexico at elevations between sea level and approximately 8,000 feet above msl (Stebbins 2003). It is considered locally rare in southwestern California. It is estimated that development and other human impacts have reduced the historic range of this species in California by 40 percent (Stebbins 2003).

An individual two-striped garter snake was observed during the 2020 focused arroyo toad survey downstream of Santiago Creek Dam (Exhibit 10). Three individual two-striped garter snakes were observed during the 2022 focused arroyo toad surveys upstream of Santiago Creek Dam (Exhibit 10). Suitable habitat for this species is present along Santiago Creek throughout the BSA.

3.8.10 White-tailed Kite

White-tailed kite is a California Fully Protected species; its nesting locations are protected. This species nests in oak and sycamore woodlands, mature willows with adjacent grasslands, agricultural fields, and other open areas. Kites prey on voles (*Microtus* sp.) and other small, diurnal mammals, occasionally on birds, insects, reptiles, and amphibians. Kites forage in undisturbed, open grasslands, meadows, farmlands and emergent wetlands. They soar, glide, and hover (i.e., “kite”) less than 100 feet above the ground in search of prey.

A pair of white-tailed kites was observed foraging during the 2022 focused least Bell’s vireo surveys upstream of Santiago Creek Dam (Exhibit 10). Suitable foraging habitat for this species is present throughout the BSA; woodlands in the BSA provide suitable nesting habitat.

3.8.11 Bald Eagle

The bald eagle is a State-listed Endangered species, a California Fully Protected species, and is also protected by the Federal Bald Eagle Act. Through protection under the Endangered Species Act, bald eagle populations recovered through captive breeding programs, reintroduction efforts, the banning of DDT, and public education (USDA 2023). This species was delisted by the USFWS in 2007 and will be monitored for 20 years as part of the Post-Delisting Monitoring Plan for the species. This species requires large bodies of water or free-flowing rivers with abundant fish and adjacent snags or perches, and nests in large, old-growth trees or snags in remote stands near water (Zeiner et al. 1990). Bald eagles are usually found close to water because their diet is primarily made up of fish and waterfowl. When waterfowl migrate south for the winter, bald eagles follow and winter in southern California from November to March (USDA 2023). Most breeding territories are in northern California, but the eagles also nest in scattered locations in the central and southern Sierra Nevada mountains and foothills, in several locations from the Central Coast Range to inland southern California, and on Santa Catalina Island (CDFW 2024a). Breeding populations of

bald eagles in southern California were extirpated in the 1950s until reintroduction efforts began on Catalina Island in the 1980s. Since 2003, several pairs of bald eagles have nested in southern California at Lake Hemet, Lake Skinner, Lake Matthews, and Big Bear Lake (USDA 2023). CDFW tracks information on occupied territories for bald eagles in California; the location at Irvine Lake has been mapped as the only bald eagle nesting location in Orange County (CDFW 2024a).

An individual bald eagle was incidentally observed during vegetation mapping upstream of Santiago Creek Dam in fall 2020 and a nesting pair was observed during focused surveys in spring/summer 2022 (Exhibit 10). The pair nested in a pine tree in a canyon adjacent to the BSA. Suitable foraging and wintering habitat for this species is present throughout the BSA. While the ornamental trees within the BSA are not suitable because they are not mostly gum trees or too small for eagle nesting, suitable nesting habitat is adjacent to the BSA.

3.8.12 American Peregrine Falcon

The American peregrine falcon is a Covered species in the Central-Coastal NCCP/HCP. This species was delisted from the federal list of Endangered species in 1999 (USFWS 1999), and from the California list of Endangered species in 2008. It was recently removed from the CDFW list of Fully Protected species (CDFW 2025d). Peregrine falcons prey almost exclusively on birds and use a variety of habitats, particularly wetlands and coastal areas. While this falcon is a rare summer resident in Southern California, it is more common during migration and the winter season. For nesting, this falcon prefers inaccessible areas such as those provided by cliffs, high building ledges, bridges, and other such structures.

A peregrine falcon was observed foraging during the 2020 focused arroyo toad survey downstream of Santiago Creek Dam (Exhibit 10). Suitable foraging habitat is present for this species throughout the BSA. While there are cliffs in the BSA, they are limited in extent and do not provide many ledges for nesting raptors; however, cliffs suitable for nesting are adjacent to the BSA.

3.8.13 Least Bell's Vireo

Least Bell's vireo is a federal and state Endangered species. The least Bell's vireo was formerly considered a common breeder in riparian habitats throughout the Central Valley and other low-elevation riverine systems throughout California and Baja California, Mexico (USFWS 1998). The decline of least Bell's vireo is attributed to the widespread loss of riparian woodlands coupled with the increase in brown-headed cowbirds (USFWS 1986). Cowbirds are nest parasites that lay their eggs in the nests of other birds and leave the host bird to raise their young, often to the detriment of the host's own young (USFWS 1998). With the implementation of intensive brown-headed cowbird management programs, the least Bell's vireo numbers have dramatically increased (USFWS 1998). The least Bell's vireo is an obligate riparian species (i.e., nests exclusively in riparian habitat) that generally nests in early-successional stages of riparian habitats. The most critical factor in habitat structure is the presence of a dense understory shrub layer from approximately three to six feet above ground, where nests are typically placed, and a dense stratified canopy for foraging (Goldwasser 1981; Gray and Greaves 1981; Salata 1981, 1983; RECON 1989).

A total of 29 least Bell's vireo locations were observed during the 2022 focused surveys upstream of the dam (Exhibit 10). A total of 27 locations consisted of territories occupied by breeding pairs, 1 location consisted of a territory occupied by an unpaired male, and 1 location consisted of a transient male. A territory is defined as a singing male observed or heard consistently in the same general location on multiple surveys (i.e., defending a territory). A transient male is one observed during only one survey. The territory points shown on Exhibit 10 represent either a nest location or the general area where least Bell's vireos were observed and/or detected most of the time. A total of 25 pairs were observed to have successfully nested; a total of 38 juveniles were observed during the 2022 focused surveys. The survey results include only the number of nestlings/fledglings that were visually or aurally confirmed; additional fledglings may have been undetected in the habitat. Least Bell's vireo was incidentally observed in the riparian habitat downstream of the dam during focused surveys conducted in summer 2024 (Psomas 2024a; Exhibit 10). Suitable riparian habitat for this species is present along Santiago Creek throughout the BSA.

On February 2, 1994, the USFWS published a final critical habitat for the least Bell's vireo, designating approximately 37,560 acres of land in Santa Barbara, Ventura, Los Angeles, San Bernardino, Riverside, and San Diego counties, California (USFWS 1994). The Project site is not located in designated critical habitat for this species.

3.8.14 Coastal Cactus Wren

Coastal cactus wren is a California Species of Special Concern; only individuals in San Diego and Orange Counties are special status. It is a Covered species in the Central-Coastal NCCP/HCP. The full species occurs in arid and semi-arid regions from California, Nevada, Utah, Arizona, New Mexico, and Texas south to Mexico and Baja California, Mexico (Shuford and Gardali 2008). The *sandiegensis* subspecies occurs from northwestern Baja California, Mexico through San Diego County and into southern Orange County, though the taxonomic status of cactus wrens and northern limits of this subspecies is uncertain (Shuford and Gardali 2008; Proudfoot et al. 2000). Coastal cactus wrens typically inhabit coastal sage scrub and alluvial sage scrub habitats that have sufficient amounts of prickly pear cactus and/or cholla (*Opuntia prolifera*) (Shuford and Gardali 2008). Nests are built almost exclusively in cholla or prickly pear cactus (Shuford and Gardali 2008).

Coastal cactus wrens were observed during both the 2020 focused surveys downstream of Santiago Creek Dam and the 2022 focused surveys upstream of Santiago Creek Dam (Exhibit 10). Suitable foraging and nesting habitat for this species is present throughout the BSA.

3.8.15 Coastal California Gnatcatcher

The coastal California gnatcatcher is a federally Threatened species and a California Species of Special Concern. It is a Covered species in the Central-Coastal NCCP/HCP. This species occurs in most of Baja California, Mexico's arid regions, but this subspecies is extremely localized in the United States, where it predominantly occurs in coastal regions of highly urbanized Los Angeles, Orange, Riverside, and San Diego Counties (Atwood 1992). In California, this subspecies is a resident of coastal sage scrub vegetation types. The breeding season for the coastal California gnatcatcher ranges from late February to August. Nests are

generally placed in a shrub about three feet above ground. Brood parasitism by brown-headed cowbirds and loss of habitat to urban development have been cited as causes of coastal California gnatcatcher population decline (Unitt 1984; Atwood 1990).

One California gnatcatcher territory was observed during the 2020 focused California gnatcatcher surveys downstream of Santiago Creek Dam (Exhibit 10). This territory included a breeding pair, which successfully fledged at least three chicks. No coastal California gnatcatchers were observed breeding upstream of the dam within the BSA during the 2022 focused surveys; however, one coastal California gnatcatcher was detected just outside the BSA (Exhibit 10). Additionally, four gnatcatcher locations were incidentally observed during vegetation mapping and the jurisdictional delineation upstream of Santiago Creek Dam (Exhibit 10). These four locations consisted of two individual juveniles, one male, and one unidentified individual. Coastal California gnatcatcher was also incidentally observed downstream of the dam during focused surveys conducted in summer 2024 (Psomas 2024a; Exhibit 10). Suitable habitat for this species is present throughout the BSA.

USFWS published a Revised Final Rule designating Critical Habitat for the coastal California gnatcatcher in 2007 (USFWS 2007). This Revised Critical Habitat designates 197,303 acres in San Diego, Orange, Riverside, San Bernardino, Los Angeles, and Ventura Counties. The Project is not located within the designated Revised Critical Habitat for the coastal California gnatcatcher.

3.8.16 Southern California Rufous-Crowned Sparrow

Southern California rufous-crowned sparrow is a Watch List species. In California, the subspecies occurs on moderate to steep, dry, rocky, south- or west-facing slopes in scrub vegetation interspersed with patches of grasses and forbs or rock outcrops (Collins 1999). It is present throughout the year in Southern California and is threatened by loss of habitat due to urban and agricultural development.

Southern California rufous-crowned sparrows were observed during the 2020 focused surveys downstream of Santiago Creek Dam (Exhibit 10). Suitable foraging and nesting habitat for this species is present throughout the BSA.

3.8.17 Grasshopper Sparrow

Grasshopper sparrow is a California Species of Special Concern; its nesting locations are protected. This species nests in short to medium-height moderately open grasslands with scattered shrubs, alkaline meadows, and sage scrub-grassland ecotones. Loss of habitat to urbanization is the primary threat to this species.

Four individual grasshopper sparrows were observed during the 2022 focused least Bell's vireo surveys upstream of Santiago Creek Dam (Exhibit 10). At least one pair was observed defending a territory and is presumed to have nested in ruderal habitat.

3.8.18 Yellow-breasted Chat

Yellow-breasted chat is a California Species of Special Concern; its nesting locations are protected. This species nests in early successional riparian habitats with a well-developed shrub layer and open canopy. The loss and degradation of riparian habitat, as well as nest parasitism by brown-headed cowbirds have contributed to this species' decline in California.

A total of 43 yellow-breasted chats (15 pairs, 6 individual adults, and 7 juveniles) were observed during the 2022 focused least Bell's vireo surveys upstream of Santiago Creek Dam (Exhibit 10). Suitable riparian habitat for this species is present along Santiago Creek throughout the BSA.

3.8.19 Yellow Warbler

Yellow warbler is a California Species of Special Concern; its nesting locations are protected. This species occurs in riparian vegetation in close proximity to water along streams and in wet meadows. The loss and degradation of riparian habitat, as well as nest parasitism by brown-headed cowbirds have contributed to this species' decline in California.

A total of 10 yellow warblers (5 pairs) were observed during the 2022 focused least Bell's vireo surveys upstream of Santiago Creek Dam (Exhibit 10). Suitable riparian habitat for this species is present along Santiago Creek throughout the BSA.

3.8.20 Mountain Lion

The mountain lion is currently a Candidate to be State listed as Threatened as an Evolutionary Significant Unit comprised of the following subpopulations: (1) Santa Ana Mountains; (2) Eastern Peninsular Ranges; (3) San Gabriel/San Bernardino Mountains; (4) Central Coast South (Santa Monica Mountains); (5) Central Coast North (Santa Cruz Mountains); and (6) Central Coast Central. CDFW is in the process of reviewing the petition for listing and evaluating available information (CDFW 2024b). CDFW status review report was expected in November 2021; as of June 2023, its status has not been updated (CDFW 2024b). The mountain lion occurs throughout most of California except for the Mojave and Colorado Deserts and the croplands of the Central Valley. Mountain lions occur in a variety of habitats, especially brushy habitats and riparian areas with interspersed irregular terrain, rocky outcrops, and tree/brush edges. Mountain lions use caves, natural cavities and thickets for cover. Mountain lions use habitat connections for movement among fragmented core habitat (Zeiner 1988). A major threat to this species is fragmentation of habitat by spread of human developments and associated roads. Estimates of effective population size highlight genetic isolation and raise significant concerns for viability in Southern California and the Central Coast (Center for Biological Diversity 2019).

Tracks of a mountain lion were observed during the 2020 focused arroyo toad survey downstream of Santiago Creek Dam and during the 2022 focused surveys upstream of Santiago Creek Dam. Suitable habitat for this species is present throughout the BSA.

4.0 PROJECT IMPACTS

The determination of impacts in this analysis is based on a comparison of maps depicting Project grading limits and maps of biological resources in the BSA. The Project would modify the existing dam embankment, spillway/outlet tower along with raising the spillway, which would lead to infrequent inundation of the area between the 795.9-foot elevation contour and the 797.9-foot elevation around the perimeter of Irvine Lake (referred to as “additional inundation area”) for an approximate maximum period of up to 45 days following large storms. Additionally, a SCE power line would need to be relocated around the Project (referred to as the “SCE Realignment”); impacts for the SCE Realignment are only shown where they are outside the permanent and temporary impact areas for the Project.

All permanent structural impacts are assumed to be contained within the permanent impact line identified on Exhibit 11. All construction activities, including equipment staging areas, borrow sites, and remedial grading are assumed to be contained within the temporary impact line identified on Exhibit 11. It should be noted that Irvine Lake will be partially or completely dewatered prior to construction of the access road along a dry portion of the lake bottom. Should these impact areas extend beyond the limits shown, additional analysis would be required.

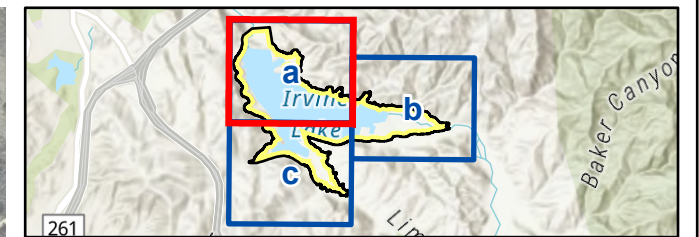
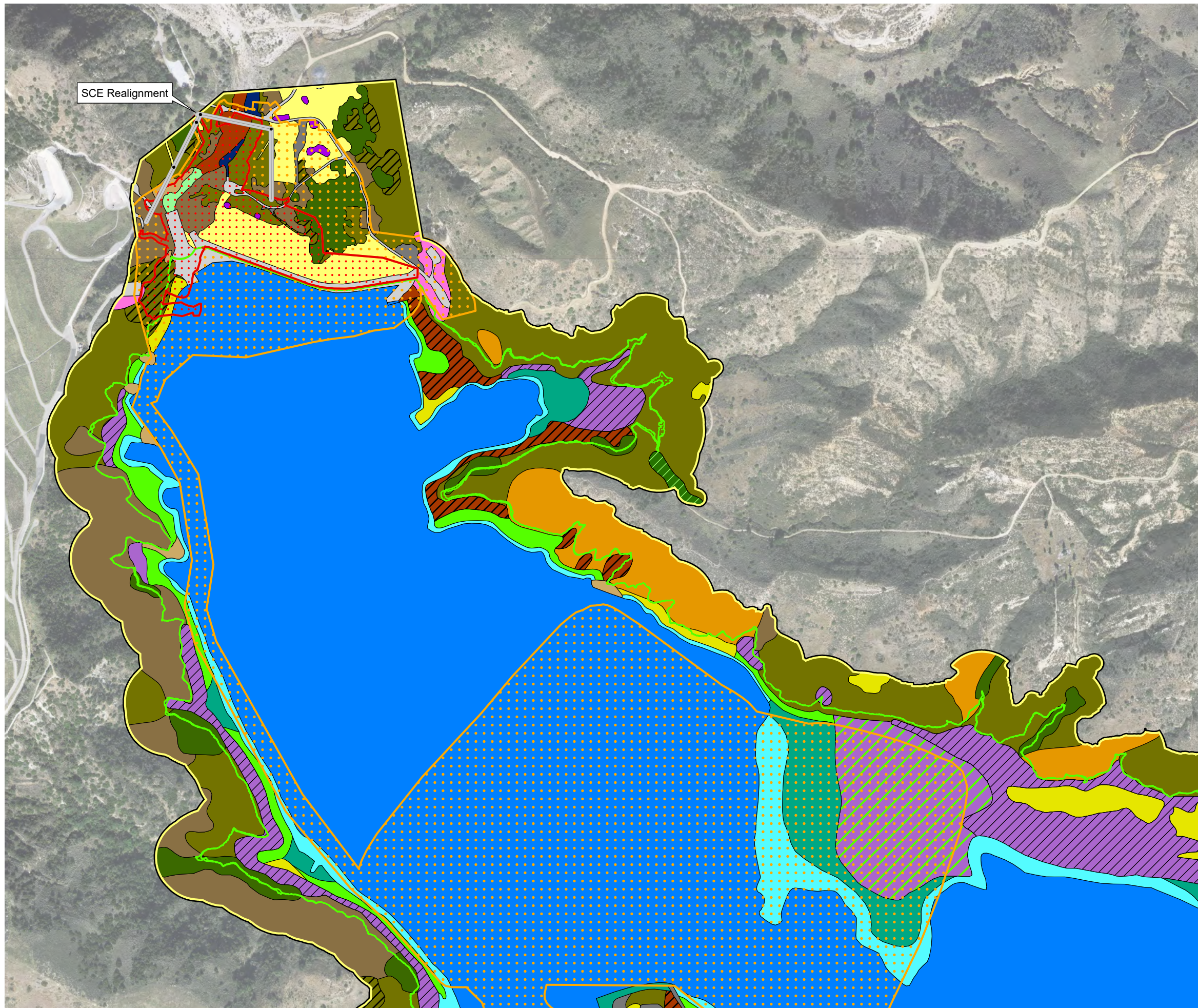
Both direct and indirect impacts on biological resources have been evaluated. Direct impacts are those that involve the initial loss of habitats due to grading, construction, and construction-related activities. Indirect impacts are those that would be related to temporary disturbance from construction activities (e.g., noise, dust) and the long-term use of the Project. Raising the spillway would have the indirect effect of infrequent additional inundation following larger storm events during operation of the Project.

Biological impacts associated with the Project were evaluated with respect to the following special status biological issues:

- Species listed under federal or State Endangered Species Acts;
- Species proposed for listing under federal or State Endangered Species Acts;
- Non-listed species that meet the criteria in the definition of “Rare” or “Endangered” in the CEQA Guidelines (i.e., 14 California Code of Regulations, Section 15380)¹⁴;
- Species designated as California Species of Special Concern, Fully Protected, or Watch List species;
- Vegetation types (synonymous with “habitat” and “community”) suitable to support a federally or State-listed Endangered or Threatened plant or wildlife species;
- Streambeds, waterbodies, wetlands, and their associated vegetation;

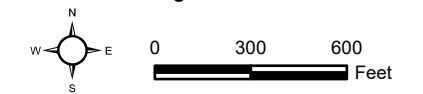
¹⁴ Section 15380 of the CEQA Guidelines indicates that a lead agency can consider a non-listed species (e.g., plant with a CRPR of 1B.1) to be Endangered, Rare, or Threatened if the species can be shown to meet the criteria in the definition of Rare or Endangered. For the purposes of this discussion, the current scientific knowledge on the population size and distribution for each special status species was considered in determining if a non-listed species meets the definitions for Rare and Endangered according to Section 15380 of the CEQA Guidelines.

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project\aprx_Veg_Impacts



- Biological Study Area**
- Project Impacts**
- Permanent Impacts
 - Temporary Impacts*
 - Additional Inundation Area
- SCE Realignment**
- Permanent Impacts
 - Temporary Impacts**
- Vegetation Types and Other Areas**
- Sagebrush Scrub (2.3.6)
 - Disturbed Sagebrush Scrub (2.3.6)
 - Southern Cactus Scrub (2.4)
 - Disturbed Floodplain Sage Scrub (2.6)
 - Toyon - Sumac Chaparral (3.12)
 - Annual Grassland (4.1)
 - Ruderal (4.6)
 - Riparian Herb (7.1)
 - Southern Willow Scrub (7.2)
 - Mulefat Scrub (7.3)
 - Disturbed Mulefat Scrub (7.3)
 - Southern Sycamore Riparian Woodland/Southern Coast Live Oak Riparian Forest (7.4/7.5)
 - Southern Black Willow Forest (7.7)
 - Disturbed Southern Black Willow Forest (7.7)
 - Southern Black Willow Forest/Riparian Herb (7.7/7.1)
 - Coast Live Oak Woodland (8.1)
 - Western Sycamore (8.x)
 - Cliff (10)
 - Open Water (12.1)
 - Fluctuating Shoreline (12.2)
 - Vegetated Fluctuating Shoreline (12.2)
 - Ornamental (15.5)
 - Developed (15.6)
 - Disturbed (16.1)

*Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.
**Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.



Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

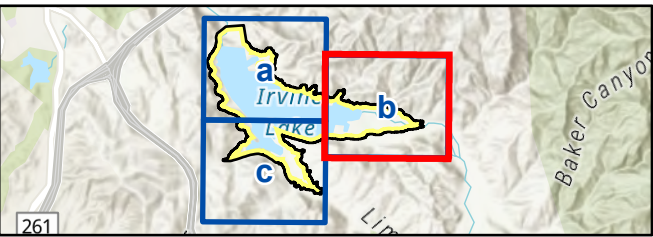
**Project Impacts
Vegetation Types**

Exhibit 11a

**Santiago Creek Dam
Improvement Project**

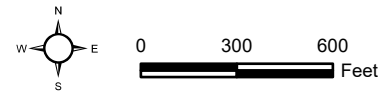
PSOMAS

(Rev: 04/11/2025 JVR) R:\Projects\3IRW\IRWD\3IRW010205\Graphics\BTR\Project_Impacts_Veg.pdf



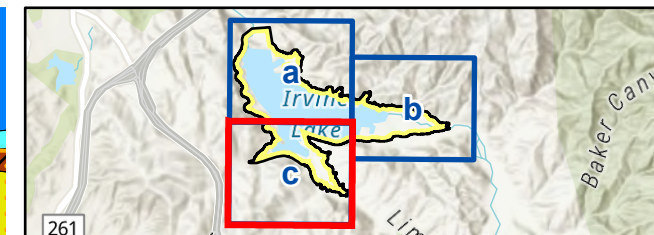
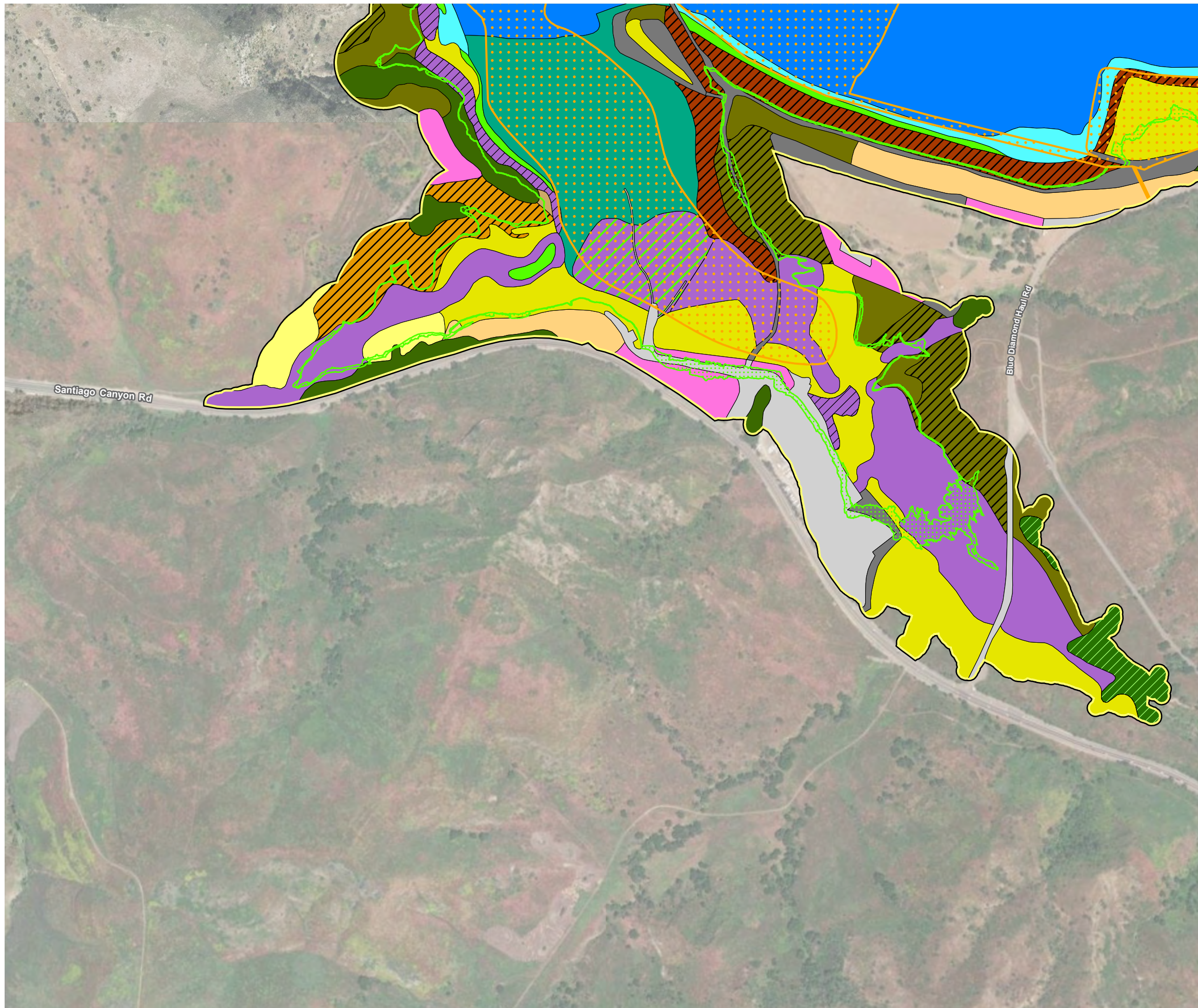
- Biological Study Area
- Project Impacts**
- Temporary Impacts*
- Additional Inundation Area
- SCE Realignment**
- Permanent Impacts
- Temporary Impacts**
- Vegetation Types and Other Areas**
- Sagebrush Scrub (2.3.6)
- Sagebrush - Coyote Brush Scrub (2.3.12)
- Ruderal (4.6)
- Riparian Herb (7.1)
- Disturbed Mulefat Scrub (7.3)
- Southern Sycamore Riparian Woodland (7.4)
- Southern Black Willow Forest (7.7)
- Disturbed Southern Black Willow Forest (7.7)
- Coast Live Oak Woodland (8.1)
- Open Water (12.1)
- Fluctuating Shoreline (12.2)
- Vegetated Fluctuating Shoreline (12.2)
- Perennial Stream (13.1)
- Ornamental (15.5)
- Developed (15.6)
- Disturbed (16.1)

*Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.
**Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.



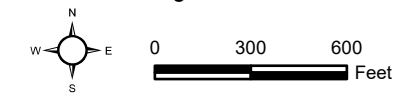
Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

D:\Projects\3\IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx_Veg_Impacts



- Biological Study Area
- Project Impacts**
- Temporary Impacts*
 - Additional Inundation Area
- SCE Realignment**
- Permanent Impacts
 - Temporary Impacts**
- Vegetation Types and Other Areas**
- Sagebrush Scrub (2.3.6)
 - Disturbed Sagebrush Scrub (2.3.6)
 - Sagebrush - Coyote Brush Scrub (2.3.12)
 - Disturbed Southern Cactus Scrub (2.4)
 - Annual Grassland (4.1)
 - Ruderal (4.6)
 - Riparian Herb (7.1)
 - Disturbed Mulefat Scrub (7.3)
 - Southern Sycamore Riparian Woodland/Southern Coast Live Oak Riparian Forest (7.4/7.5)
 - Southern Black Willow Forest (7.7)
 - Disturbed Southern Black Willow Forest (7.7)
 - Southern Black Willow Forest/Riparian Herb (7.7/7.1)
 - Coast Live Oak Woodland (8.1)
 - Cliff (10)
 - Open Water (12.1)
 - Fluctuating Shoreline (12.2)
 - Vegetated Fluctuating Shoreline (12.2)
 - Ornamental (15.5)
 - Developed (15.6)
 - Disturbed (16.1)

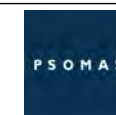
**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*
***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*



Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

**Project Impacts
Vegetation Types**
*Santiago Creek Dam
Improvement Project*

Exhibit 11c



(Rev: 04/11/2025 JVR) R:\Projects\IRW_IRWD\3\IRW010205\Graphics\BTR\ex_Project_Impacts_Veg.pdf

- Vegetation types, other than wetlands, considered special status by regulatory agencies (e.g., USFWS, CDFW) or resource conservation organizations;
- Other species or issues of concern to regulatory agencies or conservation organizations; and
- Central-Coastal Subregion NCCP/HCP and Implementation Agreement.

The actual and potential occurrence of these resources in the BSA was correlated with the following significance criteria to determine whether the impacts of the Project on these resources would be considered significant.

IRWD has prepared specifications related to construction of the Project. Standard Best Management Practices (BMPs) that would be implemented during construction of the Project; these BMPs are considered Project Design Features (PDF). Project impacts were evaluated assuming the following PDFs would be implemented:

PDF-1. Worker Environmental Awareness Program (WEAP) Training. Prior to the initiation of construction activities, IRWD will retain a qualified Biologist (i.e., Biological Monitor) to provide a WEAP training for construction personnel to review the mitigation measures and permit requirements applicable to the construction phase. The Biological Monitor will require trained personnel to sign the WEAP Log to document that they have been trained and understand the mitigation measures and permit conditions. The Biological Monitor will repeat the WEAP training as-needed for new construction personnel.

PDF-2. Project Limits. Prior to construction, the Project limits will be clearly staked by IRWD or IRWD's Contractor and verified by the Biological Monitor.

PDF-3. NCCP/HCP Construction Minimization Measures. As required by the NCCP/HCP, IRWD will follow standard construction-related minimization Measures. These include removal of coastal sage scrub outside the California gnatcatcher breeding season (i.e., February 15 to July 15); pre-construction surveys for coastal California gnatcatchers; identification of coastal sage scrub habitat areas for protection as Environmentally Sensitive Areas (ESAs); and biological monitoring during all clearing of coastal sage scrub.

PDF-4. Tree Protection. To protect western sycamore and coast live oak trees adjacent to Project's permanent and temporary impact areas (Exhibit 11), protective fencing will be placed around all western sycamore and coast live oak trees located within 50 feet of the Project's permanent and temporary impact areas. The tree protection area will be 1.5 times the dripline of the tree. No stockpiling of materials will occur within the tree protection areas. Limbs of western sycamore and coast live oak trees can be pruned to allow construction equipment access. If large branches need to be removed or if more than 10 percent of the total canopy would be affected, pruning will be supervised by a Certified Arborist retained by IRWD.

PDF-5: Nesting Bird Protection. To the extent practicable, IRWD or IRWD's Contractor will conduct vegetation clearing during the non-breeding season (i.e.,

September 16 to January 31). If vegetation clearing will be initiated during the breeding season for nesting birds/raptors (i.e., February 1–September 15), IRWD or IRWD’s Contractor will conduct the construction activity in compliance with the conditions set forth in the Migratory Bird Treaty Act. IRWD will retain a qualified Biologist to conduct a pre-construction survey for nesting birds and/or raptors within seven days prior to clearing of any vegetation or work near existing structures. The nesting bird survey area will include a buffer of 100 feet around the work area for nesting birds and a buffer of 500 feet around the work area for nesting raptors. If an active nest is found, the Biologist will determine the appropriate protective buffer depending on the sensitivity of the species and the nature of the construction activity. The protective buffer will be 25–100 feet for nesting birds; 300–500 feet for special status bird species or nesting raptors; and 0.5 mile for golden eagle or prairie falcon. No work will be conducted in the protective buffer until a qualified Biologist determines that the nest is no longer active. The Biologist will map any nests found during survey efforts and their protective buffers and will provide the map to IRWD and the Contractor.

PDF-6. Speed Limit During Construction. The speed limit on construction access roads will be no more than 20 miles per hour. Signage will be posted throughout the construction areas and at multiple locations along the access road between the dam and the staging area at the upstream end of the lake. “Wildlife crossing” signage will also be posted along the access road between the dam and the staging area at the upstream end of the lake. Signage will be verified by the Biological Monitor.

PDF-7. Night Lighting. Night lighting will be directed away from adjacent habitat areas to the extent practicable. Shielding of night lighting during construction will be incorporated to ensure that ambient lighting is directed away from sensitive habitat areas. Appropriate shielding of night lighting will be verified by the Biological Monitor.

PDF-8. Prevent Spread of Invasive Species. Weed seeds entering the construction area via vehicles will be minimized by requiring construction vehicles to be washed prior to delivery to the Project site. Track-clean or other methods of vehicle cleaning will be used by the construction contractor to prevent weed seeds from entering/exiting the Project site on vehicles. Wattles used for erosion control will be biodegradable and certified as weed-free. Seed mixes and/or hydroseed applied to temporarily disturbed areas will consist of native species local to the Project vicinity. IRWD will retain a qualified Biologist to review and approve the seed mix. Use of measures to prevent the spread of invasive species will be verified by the Biological Monitor.

PDF-9. Treatment of Invasive Species. During active construction, IRWD will retain a qualified Biologist to conduct surveys for non-native invasive plant species on the OC Parks target list on a monthly basis. If a target species is observed within 100 feet of the active construction area, IRWD will retain a qualified Contractor to remove and/or treat the non-native invasive plant species and to appropriately dispose of it. The target species will be removed/treated before they set seed.

For a period of two years following completion of construction, IRWD will retain a qualified Biologist to conduct surveys for non-native invasive plant species on the OC Parks target list on a quarterly basis. If a target species is observed within 100 feet of the previously disturbed areas, IRWD will retain a qualified Contractor to remove and/or treat the non-native invasive plant species and to appropriately dispose of it. The target species will be removed/treated before they set seed.

4.1 SIGNIFICANCE CRITERIA

The environmental impacts relative to biological resources are assessed using impact significance criteria that mirror the policy contained in CEQA, Section 21001(c) of the California Public Resources Code. Accordingly, the State Legislature has established it to be the policy of the state to:

“Prevent the elimination of fish or wildlife species due to man’s activities, ensure that fish and wildlife populations do not drop below self-perpetuating levels, and preserve for future generations representations of all plant and animal communities...”

Determining whether a project may have a significant effect, or impact plays a critical role in the CEQA process. According to CEQA, Section 15064.7, Thresholds of Significance, each public agency is encouraged to develop and adopt (by ordinance, resolution, rule, or regulation) thresholds of significance that the agency uses in the determination of the significance of environmental effects. A significant threshold is quantitative, qualitative, or performance level of a particular environmental effect, that would normally be determined to be significant by the agency if the threshold is exceeded.

In the development of thresholds of significance for impacts to biological resources CEQA provides guidance primarily in Section 15065, Mandatory Findings of Significance, and the CEQA Guidelines, Appendix G, Environmental Checklist Form. Section 15065(a) states that a project may have a significant effect where:

“The Project has the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or wildlife community, reduce the number or restrict the range of an endangered, rare, or threatened species...”

Appendix G of the CEQA Guidelines is more specific in addressing biological resources and encompasses a broader range of resources to be considered, including: candidate, sensitive, or special status species; riparian habitat or other sensitive natural communities; federally protected wetlands; fish and wildlife movement corridors; local policies or ordinances protecting biological resources; and, adopted HCPs. These factors are considered through the checklist of questions answered during the Initial Study process that is used to determine appropriate environmental documentation for a project (i.e., Negative Declaration, Mitigated Negative Declaration, or Environmental Impact Report). Because these questions are derived from standards in other laws, regulations, and other commonly used thresholds, it is reasonable to use these standards as a basis for defining significance thresholds for an environmental document. For each of the thresholds identified below, the section of CEQA

upon which the threshold was derived has been provided. For the purpose of this analysis, impacts to biological resources are considered significant (before considering offsetting mitigation measures) if one or more of the follow conditions would result from implementation of the Project:

1. *If the Project has the potential to substantially degrade the quality of the environment. (15065[a])*
2. *If the Project has the potential to substantially reduce the habitat of a fish or wildlife species. (15065[a])*
3. *If the Project will cause a fish or wildlife populations to drop below self-sustaining levels. (15065[a])*
4. *If the Project will threaten to eliminate a plant or animal community. (15065[a])*
5. *If the Project will reduce the number or restrict the range of an endangered, rare, or threatened species¹⁵. (15065[a])*
6. *If the Project has a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Game and Wildlife Service (CEQA Guidelines, Appendix G, IV. [a]).*
7. *If the Project has a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or U.S. Fish and Wildlife Service (CEQA Guidelines, Appendix G, IV. [b]).*
8. *If the Project has a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means (CEQA Guidelines, Appendix G, IV. [c]).*
9. *If the Project interferes substantially with the movement of any native or migratory fish or wildlife species or with established native resident or migratory wildlife corridors or impedes the use of native wildlife nursery sites (CEQA Guidelines, Appendix G, IV. [d]).*
10. *If the Project conflicts with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance CEQA Guidelines, Appendix G, IV. [e]).*
11. *If the Project conflicts with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan (CEQA Guidelines, Appendix G, IV. [f]).*

¹⁵ Endangered and threatened species as used in this threshold are those listed by USFWS and/or CDFW as Threatened or Endangered. Section 15380 of CEQA indicates that a lead agency can consider a non-listed species (e.g., CRPR 1B plants) to be Endangered, Rare, or Threatened for the purposes of CEQA if the species can be shown to meet the criteria in the definition of rare or endangered. For the purposes of this discussion, the current scientific knowledge on the population size and distribution for each special status species was considered in determining if a non-listed species met the definitions for rare and endangered according to Section 15380 of CEQA.

An evaluation of whether an impact on biological resources would result in a “substantial adverse effect” must consider both the resource itself and how that resource fits into a regional context. For the Project, the regional setting of the Project includes the Central-Coastal Subregion NCCP/HCP. This subregion is bound by the SR-55 and SR-91 freeways to the north, the County boundary to the east, El Toro Road and Interstate-5 to the south, and the Pacific Coast to the west.

For the purposes of the impact analysis, “substantial adverse effect” is defined as the loss or harm of a magnitude which, based on current scientific data and knowledge, would 1) substantially diminish population numbers of a species or distribution of a habitat type within the region, or 2) eliminate the functions and values of a biological resource in the region.

4.2 DIRECT IMPACTS

The actual and potential occurrence of biological resources in the BSA vicinity was correlated with the significance criteria described above to determine whether impacts from the Project on these resources would be significant. Potential direct impacts are described below.

4.2.1 Vegetation Types and Other Areas

Vegetation types and other areas that would be impacted by the Project, SCE Realignment, and Additional Inundation Area are shown in Table 17 and Exhibit 11. It should be noted that within the SCE Realignment outside of the permanent and temporary impact area, only trees and branches would be removed; other vegetation would not be temporarily removed but may be disturbed by access and movement of construction materials through the area. The vegetation types that would be impacted by the Project are discussed below.

TABLE 17
VEGETATION ACREAGE IMPACTS OF THE PROJECT^a

Vegetation Types and Other Areas	Gray and Bramlet Vegetation Code	Existing (acres)	Permanent Impact (acres)	Temporary Impact (acres)	SCE Realignment Temporary Impact ^b (acres)	Total Permanent/Temporary Impact (acres)	Additional Inundation Area (acres)
Coastal Sage Scrub							
Sagebrush Scrub	2.3.6	115.81	2.39	3.43	0.07	5.89	2.24
Disturbed Sagebrush Scrub	2.3.6	20.11	1.36	0.83	0.00	2.19	0.58
Sagebrush – Coyote Brush Scrub	2.3.12	10.59	0.00	0.03	0.00	0.03	0.06
Southern Cactus Scrub	2.4	17.48	0.00	0.00	0.00	0.00	0.19
Disturbed Southern Cactus Scrub	2.4	10.63	0.00	0.00	0.00	0.00	0.29
Disturbed Floodplain Sage Scrub	2.6	0.48	0.20	0.10	0.00	0.30	0.00
<i>Subtotal Coastal Sage Scrub</i>		<i>175.10</i>	<i>3.95</i>	<i>4.39</i>	<i>0.07</i>	<i>8.41</i>	<i>3.36</i>
Chaparral							
Toyon – Sumac Chaparral	3.12	30.35	2.52	2.18	0.00	4.70	0.18
<i>Subtotal Chaparral</i>		<i>30.35</i>	<i>2.52</i>	<i>2.18</i>	<i>0.00</i>	<i>4.70</i>	<i>0.18</i>
Grassland							
Annual Grassland	4.1	15.59	5.67	3.09	0.01	8.77	0.16
Ruderal	4.6	92.38	0.25	25.72	0.00	25.97	3.07
<i>Subtotal Grassland</i>		<i>107.97</i>	<i>5.92</i>	<i>28.81</i>	<i>0.01</i>	<i>34.74</i>	<i>3.23</i>
Riparian							
Riparian Herb	7.1	13.15	0.00	1.09	0.00	1.09	0.00
Southern Willow Scrub	7.2	0.43	0.43	0.00	0.00	0.43	0.00
Mulefat Scrub	7.3	1.50	1.02	0.33	0.00	1.35	0.00
Disturbed Mulefat Scrub	7.3	26.67	0.00	4.40	0.00	4.40	0.60
Southern Sycamore Riparian Woodland	7.4	20.48	0.00	0.00	0.00	0.00	0.96
Southern Sycamore Riparian Woodland/Coast Live Oak Riparian Forest	7.4/7.5	5.46	0.00	0.00	0.00	0.00	0.00
Southern Black Willow Forest	7.7	83.61	0.00	6.57	0.00	6.57	7.82
Disturbed Southern Black Willow Forest	7.7	35.34	0.00	0.73	0.00	0.73	0.28
Southern Black Willow Forest/Riparian Herb	7.7/7.1	26.01	0.00	22.16	0.00	22.16	0.00
<i>Subtotal Riparian</i>		<i>212.65</i>	<i>1.45</i>	<i>35.28</i>	<i>0.00</i>	<i>36.73</i>	<i>9.66</i>

TABLE 17
VEGETATION ACREAGE IMPACTS OF THE PROJECT^a

Vegetation Types and Other Areas	Gray and Bramlet Vegetation Code	Existing (acres)	Permanent Impact (acres)	Temporary Impact (acres)	SCE Realignment Temporary Impact ^b (acres)	Total Permanent/Temporary Impact (acres)	Additional Inundation Area (acres)
Woodland							
Coast Live Oak Woodland	8.1	31.09	0.48	2.78	0.05	3.31	0.50
Western Sycamore	8.x	0.36	0.05	0.21	0.00	0.26	0.00
<i>Subtotal Woodland</i>		<i>31.45</i>	<i>0.53</i>	<i>2.99</i>	<i>0.05</i>	<i>3.57</i>	<i>0.50</i>
Cliff and Rock							
Cliff	10.0	1.63	0.30	0.21	0.01	0.52	0.01
<i>Subtotal Cliff and Rock</i>		<i>1.63</i>	<i>0.30</i>	<i>0.21</i>	<i>0.01</i>	<i>0.52</i>	<i>0.01</i>
Lakes, Reservoirs, and Basins							
Open Water	12.1	312.11	0.33	139.08	0.00	139.41	0.00
Fluctuating Shoreline	12.2	26.31	0.00	13.04	0.00	13.04	0.00
Vegetated Fluctuating Shoreline	12.2	45.13	0.00	31.08	0.00	31.08	0.00
<i>Subtotal Lakes, Reservoirs, and Basins</i>		<i>383.55</i>	<i>0.33</i>	<i>183.20</i>	<i>0.00</i>	<i>183.53</i>	<i>0.00</i>
Watercourses							
Perennial Stream	13.1	6.97	0.00	0.00	0.00	0.00	0.00
<i>Subtotal Watercourses</i>		<i>6.97</i>	<i>0.00</i>	<i>0.00</i>	<i>0.00</i>	<i>0.00</i>	<i>0.00</i>
Developed Areas							
Ornamental	15.5	20.77	0.03	1.21	0.00	1.24	0.47
Developed	15.6	20.98	2.44	2.59	0.00	5.03	1.80
<i>Subtotal Developed Areas</i>		<i>41.75</i>	<i>2.47</i>	<i>3.80</i>	<i>0.00</i>	<i>6.27</i>	<i>2.27</i>
Disturbed Areas							
Disturbed	16.1	25.42	0.03	3.95	0.00	3.98	0.83
<i>Subtotal Disturbed Areas</i>		<i>25.42</i>	<i>0.03</i>	<i>3.95</i>	<i>0.00</i>	<i>3.98</i>	<i>0.83</i>
Total		1,016.85	17.50	264.81	0.14	282.45	20.04
^a The impact by landowner (i.e., IRWD or County of Orange) is included in Appendix N. ^b Within the SCE Realignment, only trees and branches would be removed; other vegetation would not be temporarily removed but may be disturbed by access and movement of construction materials through the area.							

Coastal Sage Scrub

A total of 8.41 acres (3.95 acres permanent; 4.39 acres temporary; 0.07 acre within the SCE realignment) of coastal sage scrub vegetation would be removed to construct the Project (Table 17). Coastal sage scrub vegetation types that would be impacted include sagebrush scrub, disturbed sagebrush scrub, sagebrush-coyote brush scrub, and disturbed floodplain sage scrub. The NCCP/HCP protects coastal sage scrub in the Central-Coastal Subregion because it provides habitat for Covered Species. Additionally, disturbed floodplain sage scrub is considered a sensitive natural community by CDFW.

The Project would also temporarily impact up to 3.36 acres of sage scrub vegetation types in the additional inundation area; inundation effects are discussed under Section 4.2.6 (Indirect Impacts). Coastal sage scrub in the additional inundation area includes sagebrush scrub, disturbed sagebrush scrub, sagebrush-coyote brush scrub, southern cactus scrub, and disturbed southern cactus scrub. The NCCP/HCP protects coastal sage scrub in the Central-Coastal Subregion because it provides habitat for Covered Species. Additionally, southern cactus scrub and disturbed southern cactus scrub are considered sensitive natural communities by CDFW.

Per Section 5.11 of the NCCP/HCP, infrastructure is an existing use that is allowed within the Reserve. Take of coastal sage scrub is fully covered by participation in the NCCP/HCP for IRWD. Additionally, the NCCP/HCP requires avoidance and minimization measures during removal of coastal sage scrub habitat to protect NCCP/HCP Covered Species. Implementation of Mitigation Measure #1 would ensure that IRWD's take is accounted for according to the NCCP/HCP. Standard NCCP/HCP construction minimization measures would also be implemented (PDF-3).

Chaparral

A total of 4.70 acres (2.52 acres permanent; 2.18 acres temporary) of toyon-sumac chaparral would be removed to construct the Project (Table 17). While the loss of chaparral would be considered adverse, the loss would be limited in relation to the total amount of chaparral vegetation available in the Project region. Toyon-sumac chaparral is not considered a sensitive natural community by CDFW. Impacts on toyon-sumac chaparral would be considered less than significant; therefore, no mitigation would be required.

The Project would also temporarily impact up to 0.18 acre of toyon-sumac chaparral in the additional inundation area; inundation effects are discussed under Section 4.2.6 (Indirect Impacts). As described above, impacts on toyon-sumac chaparral would be considered less than significant, and no mitigation would be required.

Grassland

A total of 34.74 acres (5.92 acres permanent; 28.81 acres temporary; 0.01 acre within the SCE realignment) of grassland vegetation would be removed to construct the Project (Table 17). Grassland vegetation types that would be impacted include annual grassland and ruderal. These vegetation types are generally considered of low biological value, are relatively common in the Project region, and are not considered sensitive natural

communities by CDFW. Impacts on grassland would be considered less than significant; therefore, no mitigation would be required.

The Project would also temporarily impact up to 3.23 acres of grassland vegetation types in the additional inundation area; inundation effects are discussed under Section 4.2.6 (Indirect Impacts). As described above, impacts on grassland would be considered less than significant; therefore, no mitigation would be required.

Riparian

A total of 36.73 acres (1.45 acre permanent; 35.28 acres temporary) of riparian vegetation would be removed to construct the Project (Table 17). Riparian vegetation types that would be impacted include riparian herb, southern willow scrub, mulefat scrub, disturbed mulefat scrub, southern black willow forest, disturbed southern black willow forest, and southern black willow forest/riparian herb. Impacts on riparian vegetation types are considered significant because federal and State resource agencies (i.e., USACE, CDFW, and RWQCB) have given these vegetation types special status due to their high biological value; jurisdictional areas are discussed below under Jurisdictional Resources (Section 4.2.2). Riparian vegetation types also provide potential habitat for federal and State-listed species. Additionally, southern willow scrub, southern black willow forest, disturbed southern black willow riparian forest, and southern black willow riparian forest/riparian herb are also considered sensitive natural communities by CDFW.

The Project would also temporarily impact up to 9.66 acres of riparian vegetation types in the additional inundation area; inundation effects are discussed under Section 4.2.6 (Indirect Impacts). Riparian vegetation types in the additional inundation area include disturbed mulefat scrub, southern sycamore riparian woodland, southern black willow forest, and disturbed southern black willow forest. As described above, these vegetation types have been given special status due to their high biological value and potential to support federal and State-listed species. Additionally, southern sycamore riparian woodland, southern black willow forest, and disturbed southern black willow forest are considered sensitive natural communities by CDFW.

Implementation of Mitigation Measure #2 would ensure that compensatory mitigation such as establishment of on-site or off-site riparian habitat, payment of in-lieu mitigation fees, and/or preservation of off-site riparian habitat at IRWD lands is implemented to mitigate for the loss of riparian vegetation types.

Woodland

A total of 3.57 acres (0.53 acre permanent; 2.99 acres temporary; 0.05 acre within the SCE realignment) of woodland vegetation would be removed to construct the Project (Table 17). This may include trimming of trees along access roads. Woodland vegetation types that would be impacted include coast live oak woodland and western sycamore. Western sycamore is considered a sensitive vegetation community by CDFW.

The Project would also temporarily impact up to 0.50 acre of woodland vegetation types in the additional inundation area; inundation effects are discussed under Section 4.2.6 (Indirect

Impacts). Woodland vegetation in the additional inundation area is coast live oak woodland. Coast live oak woodland is not considered a sensitive natural community by CDFW. Impacts on coast live oak woodland would be considered less than significant; therefore, no mitigation would be required for the vegetation community. However, portions of the woodland are within jurisdictional areas (discussed below in Jurisdictional Resources, Section 4.2.2).

Implementation of Mitigation Measure #2 would ensure that compensatory mitigation such as establishment of on-site or off-site riparian habitat, payment of in-lieu mitigation fees, and/or preservation of off-site riparian habitat at IRWD lands is implemented to mitigate for the loss of woodland vegetation types. Implementation of Mitigation Measure #3 would ensure that any western sycamores removed would be replaced. Standard tree protection measures to fence coast live oak and western sycamores within or near the work area would also be implemented (PDF-4).

Cliff

A total of 0.52 acre (0.30 acre permanent, 0.21 acre temporary; 0.01 acre within the SCE realignment) of cliff would be impacted to construct the Project (Table 17). The loss of cliff relative to the availability of this mapping unit in the Project region would be limited in relation to the total amount of cliff available in the Project region. Impacts on cliff would be considered less than significant; therefore, no mitigation would be required.

The Project would also temporarily impact up to 0.01 acre of cliff in the additional inundation area; inundation effects are discussed under Section 4.2.6 (Indirect Impacts). As discussed above, impacts on cliff would be considered less than significant; therefore, no mitigation would be required.

Lakes, Reservoirs, and Basins

A total of 183.53 acres (0.33 acre permanent; 183.20 acres temporary) of lakes, reservoirs, and basins would be impacted to construct the Project (Table 17). Mapping units and vegetation types that would be impacted include open water, fluctuating shoreline, and vegetated fluctuating shoreline. Impacts on these areas are considered significant because federal and State resource agencies (i.e., USACE, CDFW, and RWQCB) have given these areas special status due to their high biological value; jurisdictional areas are discussed below in Jurisdictional Resources (Section 4.2.2). These areas are not considered sensitive natural communities by CDFW.

The Project would not impact open water, fluctuating shoreline, or vegetated fluctuating shoreline in the additional inundation area (as they are mapped within the existing inundation area).

Implementation of Mitigation Measure #2 would ensure that compensatory mitigation such as establishment of on-site or off-site riparian habitat, payment of in-lieu mitigation fees, and/or preservation of off-site riparian habitat at IRWD lands is implemented to mitigate for impacts on these areas.

Watercourses

There would be no impact on watercourses (i.e., perennial stream) and no mitigation would be required.

Developed Areas

A total of 6.27 acres (2.47 acres permanent; 3.80 acres temporary) of developed areas would be impacted to construct the Project (Table 17). Mapping units and vegetation types that would be impacted include ornamental and developed. Developed and ornamental vegetation are generally considered of low biological value and are relatively common in the Project region. Impacts on developed areas would be considered less than significant; therefore, no mitigation would be required.

The Project would also temporarily impact up to 2.27 acres of developed areas in the additional inundation area; inundation effects are discussed under Section 4.2.6 (Indirect Impacts). As described above, impacts on developed areas would be considered less than significant; therefore, no mitigation would be required.

Disturbed

Approximately 3.98 acres (0.03 acre permanent; 3.95 acres temporary) of disturbed areas would be impacted to construct the Project (Table 17). These areas are considered of low biological value. Therefore, this impact is considered less than significant, and no mitigation would be required.

The Project would also temporarily impact up to 0.83 acre of disturbed areas in the additional inundation area; inundation effects are discussed under Section 4.2.6 (Indirect Impacts). As described above, impacts on disturbed areas would be considered less than significant; therefore, no mitigation would be required.

4.2.2 Jurisdictional Resources

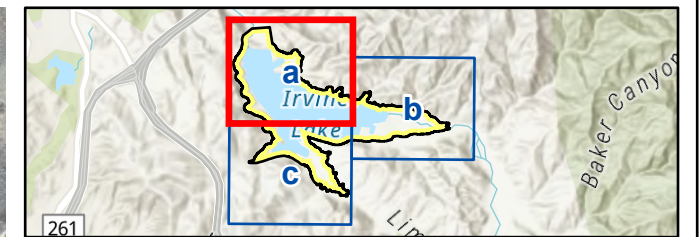
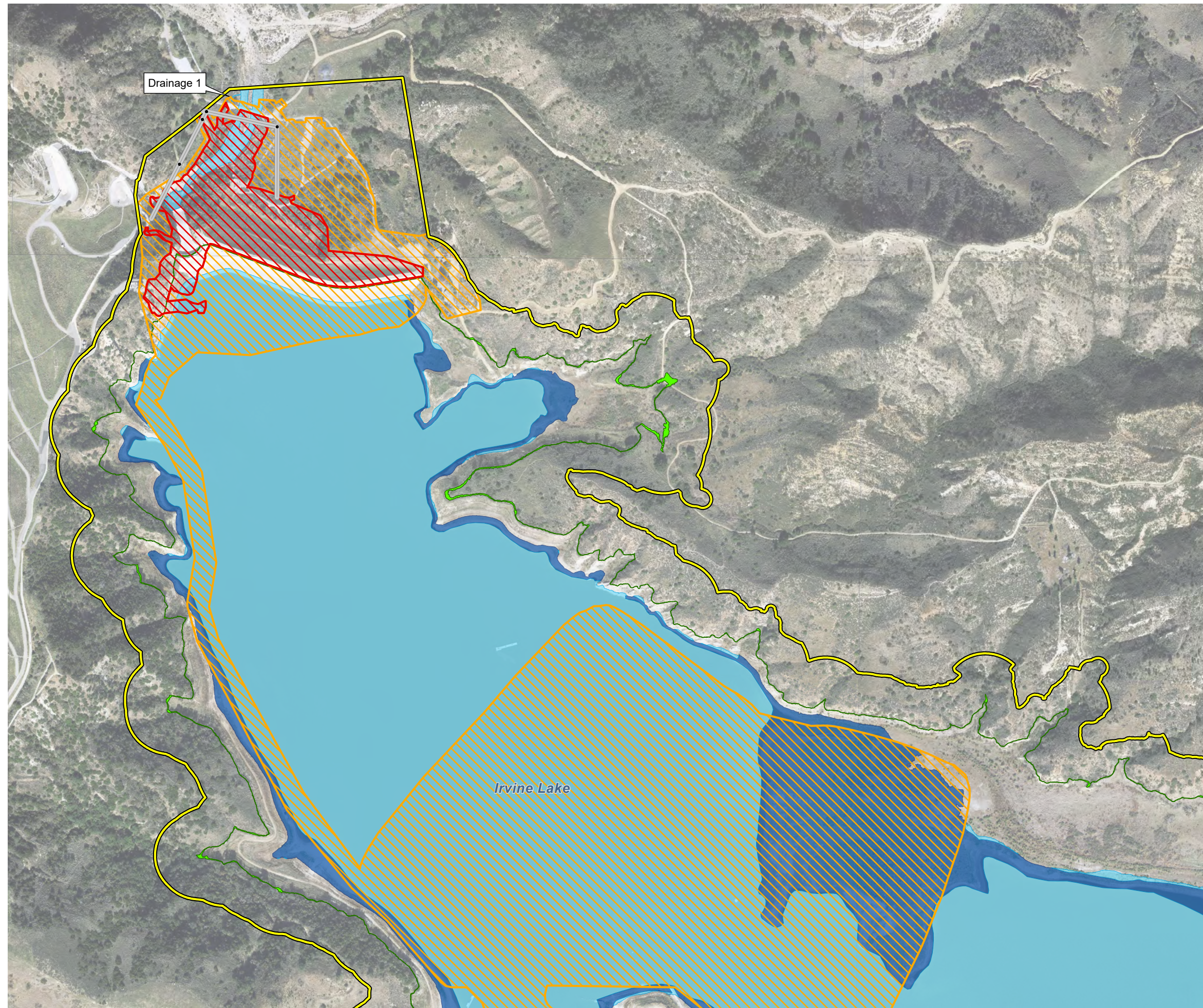
Jurisdictional resources that would be impacted by the Project, SCE Realignment, and Additional Inundation Area are discussed below.

USACE

A total of 203.570 acre of WOTUS under the regulatory authority of the USACE would be impacted to construct the Project (wetland: 0.000 acre permanent, 63.915 acres temporary; non-wetland: 1.798 acres permanent, 137.857 acres temporary) (Table 18; Exhibit 12). This represents impacts to WOTUS in Irvine Lake, Santiago Creek, and Drainage 1. There would be no impact on USACE jurisdiction for the SCE Realignment.

The Project would impact an additional 0.673 acre of WOTUS (0.673 acre wetland) with the additional inundation area (Table 18; Exhibit 12). The inundation of these areas would be infrequent and limited in duration. Additionally, these areas are already within the OHWM; additional inundation of areas under the jurisdiction of USACE would be considered less than significant.

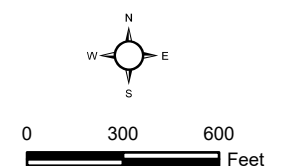
D:\Projects\3IRW_SantiagoCreek\PRO\SCD\SCD_Project.aprx ID_USACE_Impacts



- Survey Area
- Project Impacts**
 - Permanent Impacts
 - Temporary Impacts*
 - Additional Inundation Area
- SCE Realignment**
 - Permanent Impacts
 - Temporary Impacts**
- Waters of the United States**
 - Wetland
 - Non-Wetland

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*



Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

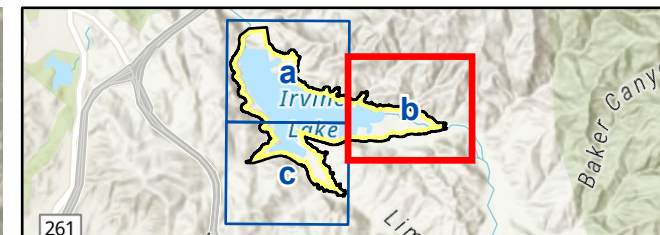
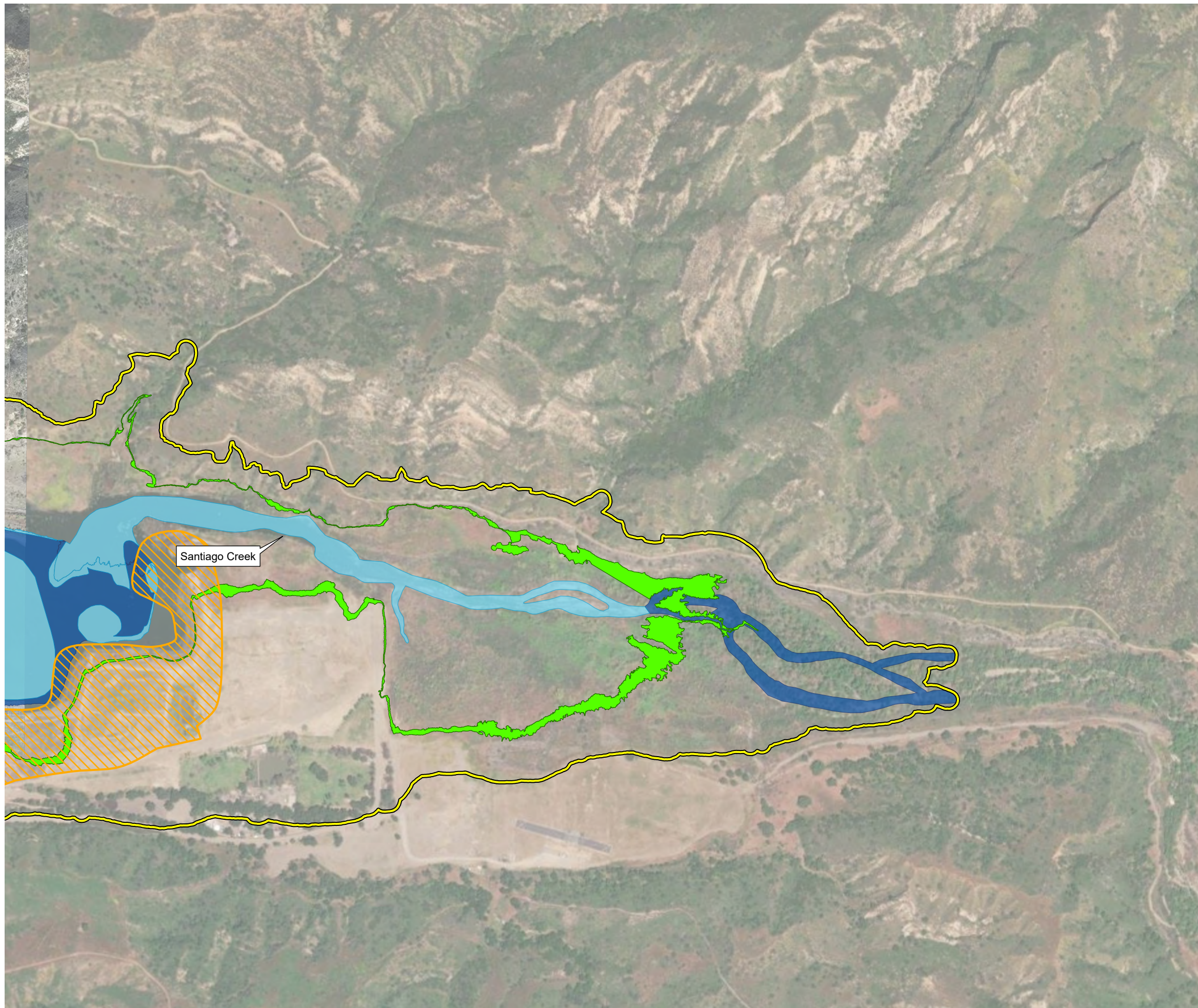
Project Impacts
USACE Waters of the United States
**Santiago Creek Dam
Improvement Project**

Exhibit 12a



(Rev: 04/11/2025 JVR) R:\Projects\3IRW_IRWD\3IRW010201\Graphics\BTR\ex_ID_USACE_Impacts.pdf

D:\Projects\IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx ID_USACE_Impacts



- Survey Area
- Project Impacts**
 - Permanent Impacts
 - Temporary Impacts*
 - Additional Inundation Area
- SCE Realignment**
 - Permanent Impacts
 - Temporary Impacts**
- Waters of the United States**
 - Wetland
 - Non-Wetland

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

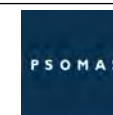


0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

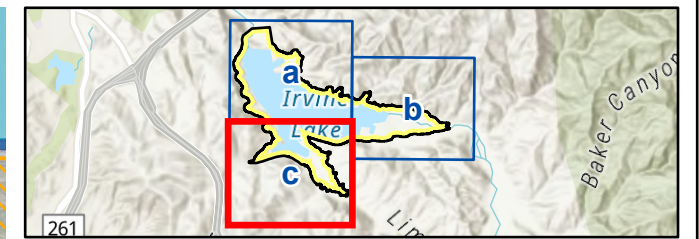
Project Impacts
USACE Waters of the United States
**Santiago Creek Dam
Improvement Project**

Exhibit 12b



(Rev. 04/11/2025 JVR) R:\Projects\IRW_IRWD\3IRW010201\Graphics\BTR\ex_ID_USACE_Impacts.pdf

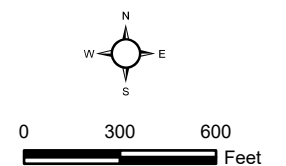
D:\Projects\IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx ID_USACE_Impacts



- Survey Area
- Project Impacts**
- Permanent Impacts
- Temporary Impacts*
- Additional Inundation Area
- SCE Realignment**
- Permanent Impacts
- Temporary Impacts**
- Waters of the United States**
- Wetland
- Non-Wetland

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*



Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Implementation of Mitigation Measure #2 would ensure that compensatory mitigation such as establishment of on-site or off-site riparian habitat, payment of in-lieu mitigation fees, and/or preservation of off-site riparian habitat at IRWD lands is implemented to mitigate for the loss of WOTUS under the jurisdiction of USACE.

RWQCB

A total of 203.641 acres of waters of the State under the regulatory authority of the RWQCB would be impacted to construct the Project (wetland: 0.000 acres permanent, 63.915 acres temporary; non-wetland: 1.861 acres permanent, 137.865 acres temporary) (Table 18; Exhibit 13). This represents impacts to waters of the State in Irvine Lake, Santiago Creek, Drainage 1, Drainage 2, and Drainage 3. There would be no impact on RWQCB jurisdiction for the SCE Realignment.

The Project would impact an additional 0.711 acre of waters of the State (0.673 acre wetland, 0.038 acre non-wetland) with the additional inundation area (Table 18; Exhibit 13). The inundation of these areas would be infrequent and limited in duration. Additionally, these areas are already within the OHWM, subject to existing water flow, and/or are riparian in nature; additional inundation of areas under the jurisdiction of RWQCB would be considered less than significant.

Implementation of Mitigation Measure #2 would ensure that compensatory mitigation such as establishment of on-site or off-site riparian habitat, payment of in-lieu mitigation fees, and/or preservation of off-site riparian habitat at IRWD lands is implemented to mitigate for the loss of waters of the State under the jurisdiction of RWQCB.

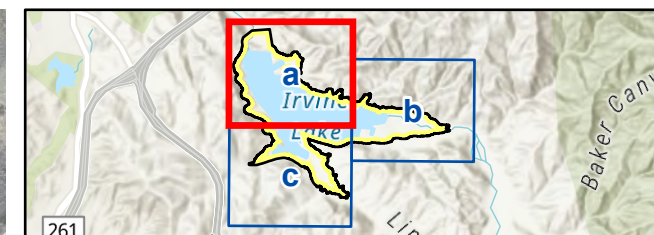
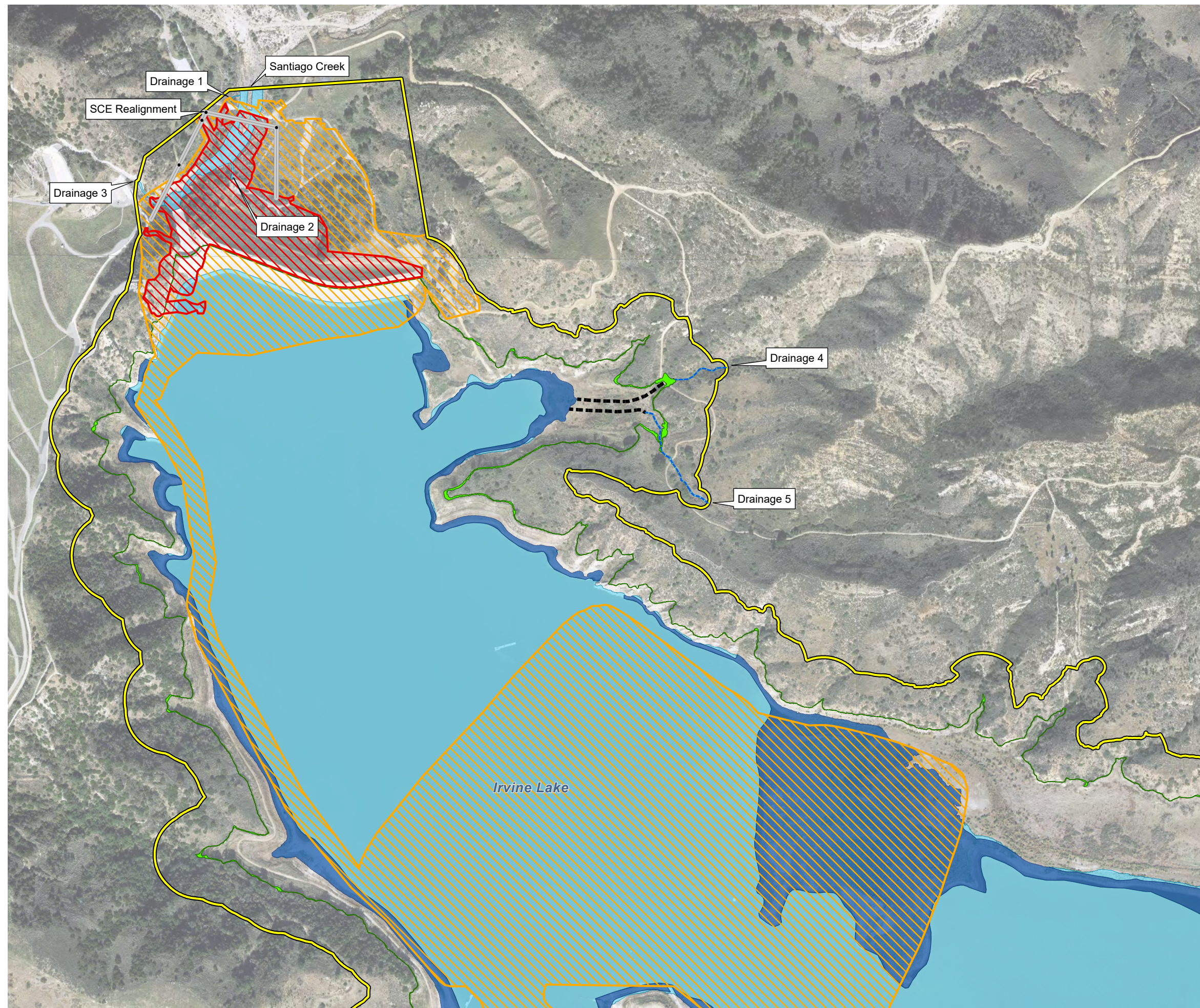
CDFW

A total of 233.774 acres of waters under the regulatory authority of CDFW would be impacted to construct the Project (3.924 acres permanent; 229.850 acres temporary) (Table 18; Exhibit 14). This represents impacts to waters under the authority of CDFW in Irvine Lake, Santiago Creek, Drainage 1, Drainage 2, and Drainage 3.

The Project would impact an additional 8.980 acres of waters under the authority of CDFW with the additional inundation area (Table 18; Exhibit 14). The inundation of these areas would be infrequent and limited in duration. Additionally, these areas are already within the existing bed and bank, subject to existing water flow, and/or are riparian in nature; additional inundation of areas under the jurisdiction of CDFW would be considered less than significant.

Implementation of Mitigation Measure #2 would ensure that compensatory mitigation such as establishment of on-site or off-site riparian habitat, payment of in-lieu mitigation fees, and/or preservation of off-site riparian habitat at IRWD lands is implemented to mitigate for the loss of waters of the State under the jurisdiction of CDFW.

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx ID: RWQCB_Impacts



- Survey Area
- Sheet Flow (non-jurisdictional)
- Impact Type**
- Permanent Impacts
- Temporary Impacts*
- Additional Inundation Area
- SCE Realignment**
- Permanent Impacts
- Temporary Impacts**
- Waters of the State**
- Wetland
- Non-Wetland
- Non-Wetland Drainage Centerline

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

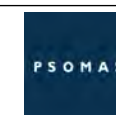


0 300 600
Feet

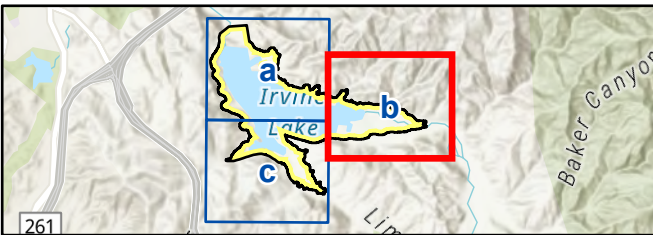
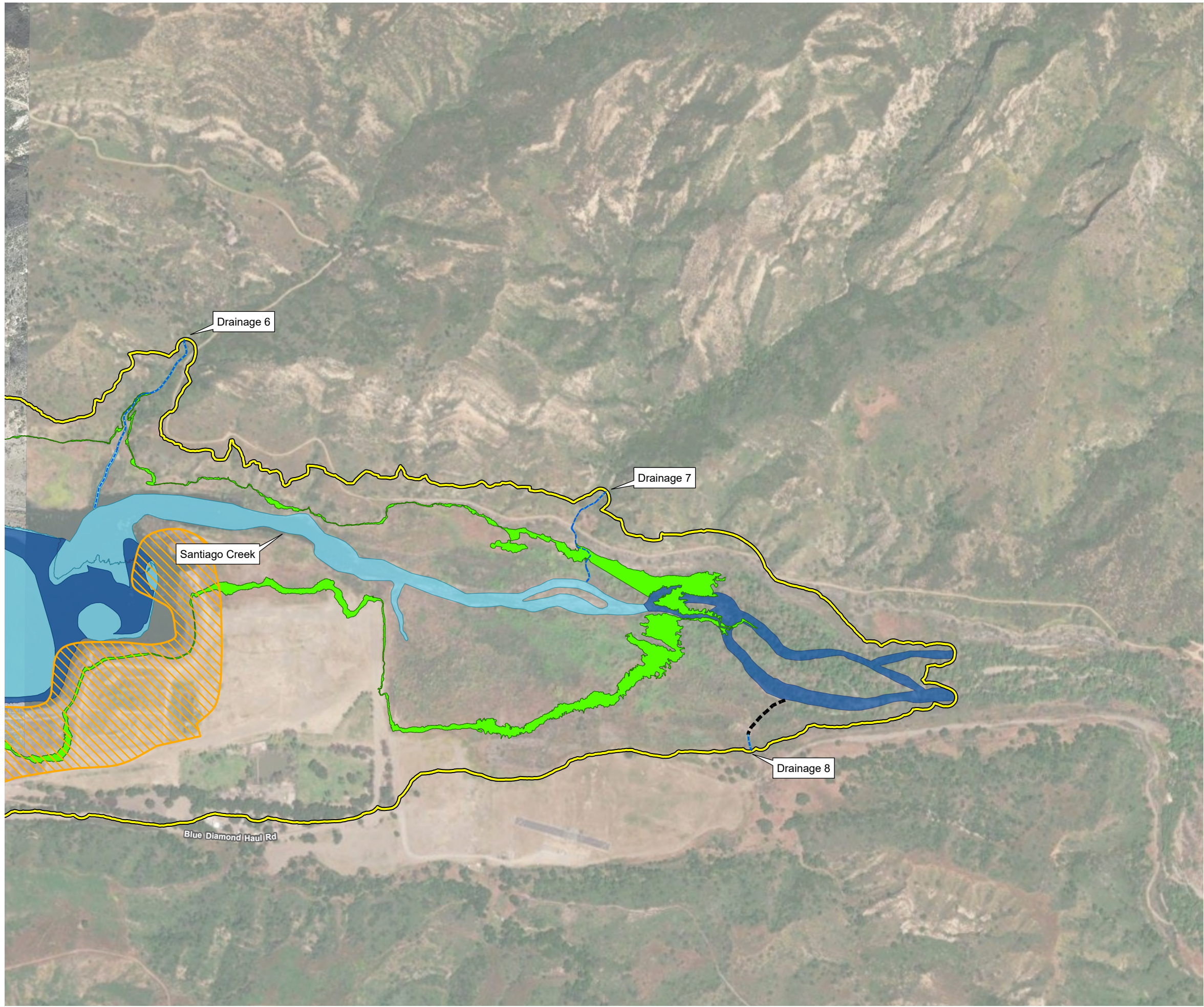
Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
RWQCB Waters of the State
Santiago Creek Dam
Improvement Project

Exhibit 13a



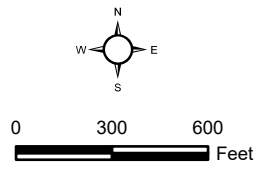
(Rev: 04/11/2025 JVR) R:\Projects\3IRW_IRWD\3IRW010205\Graphics\BTR\rev_ID.pdf



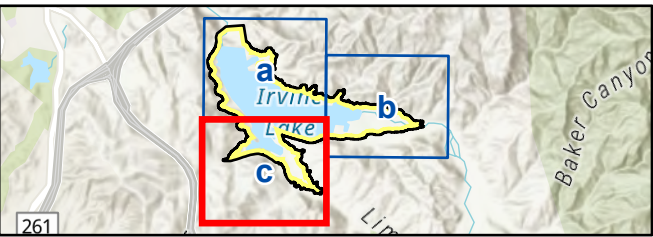
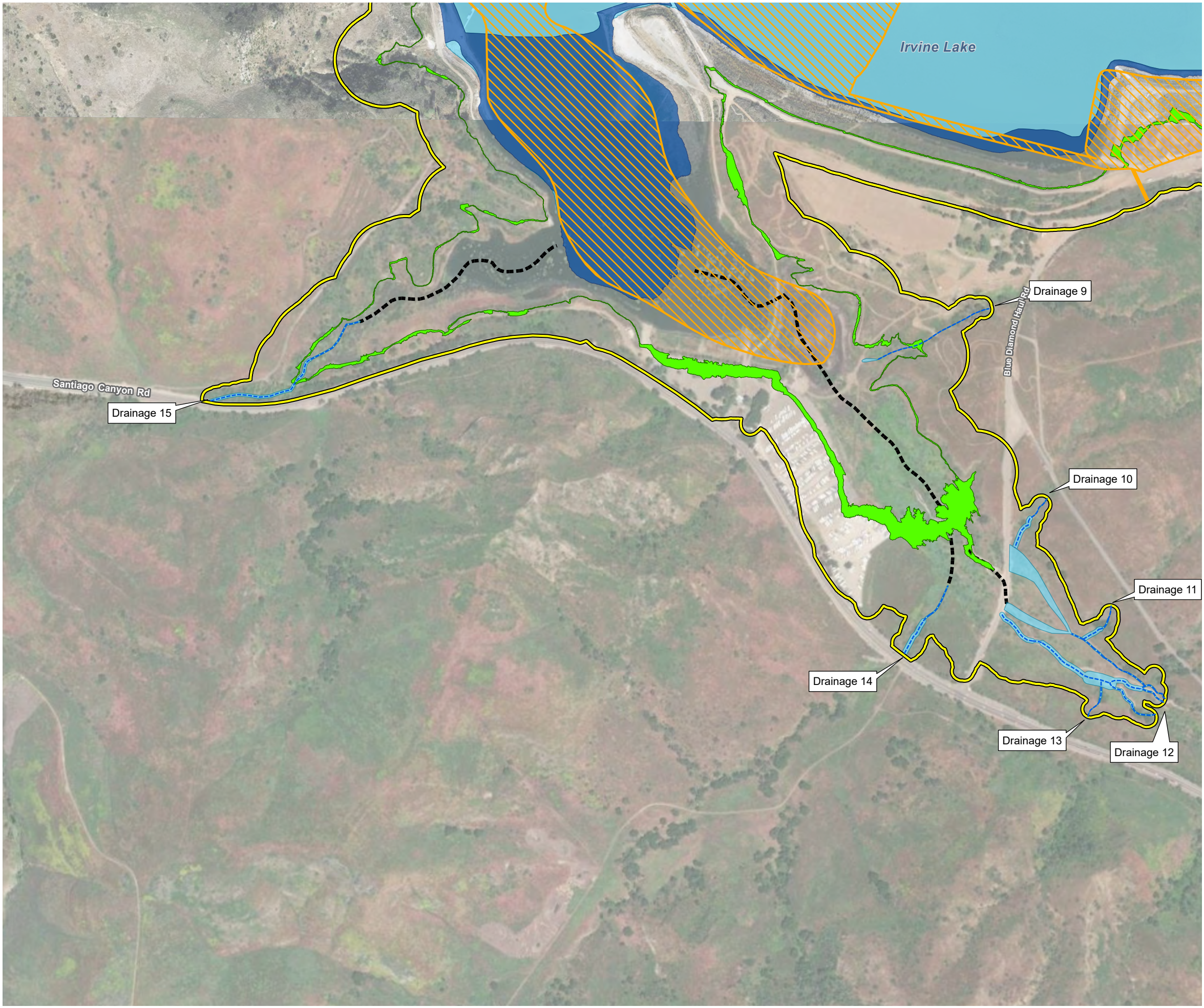
- Survey Area
- Sheet Flow (non-jurisdictional)
- Impact Type**
 - Permanent Impacts
 - Temporary Impacts*
 - Additional Inundation Area
- SCE Realignment**
 - Permanent Impacts
 - Temporary Impacts**
- Waters of the State**
 - Wetland
 - Non-Wetland
 - Non-Wetland Drainage Centerline

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*



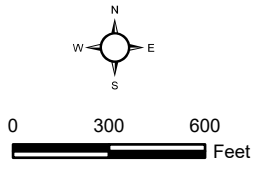
Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023



- Survey Area
- Sheet Flow (non-jurisdictional)
- Impact Type**
- Permanent Impacts
- Temporary Impacts*
- Additional Inundation Area
- SCE Realignment**
- Permanent Impacts
- Temporary Impacts**
- Waters of the State**
- Wetland
- Non-Wetland
- Non-Wetland Drainage Centerline

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*



Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

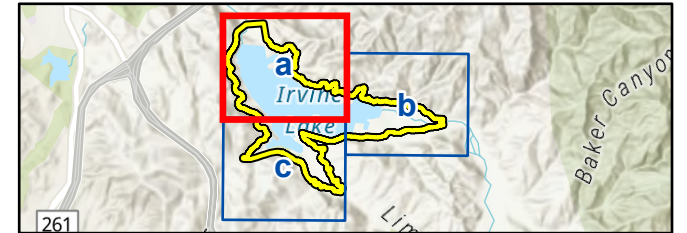
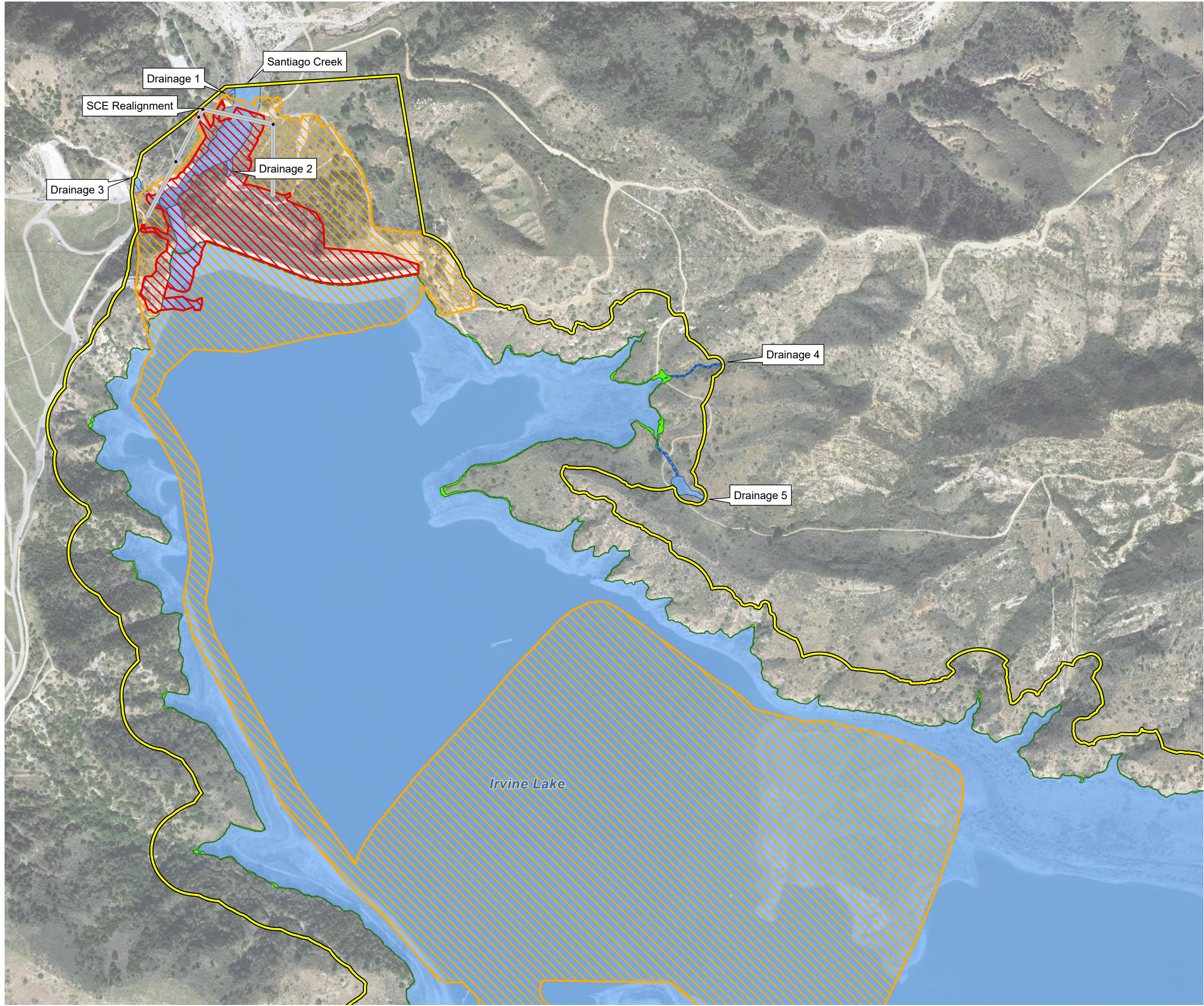
Project Impacts
RWQCB Waters of the State

Santiago Creek Dam Improvement Project

Exhibit 13c

(Rev. 04/11/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\BTR\ex_ID.pdf

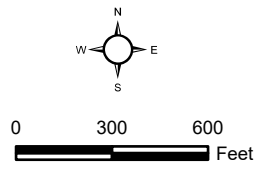
D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx ID_CDFW_Impacts



- Biological Study Area
- Impact Type**
 - Permanent Impacts
 - Temporary Impacts*
 - Additional Inundation Area
- SCE Realignment**
 - Permanent Impacts
 - Temporary Impacts**
- CDFW Jurisdictional Waters**
 - CDFW
 - Drainage Centerline

*Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.

**Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.




Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts

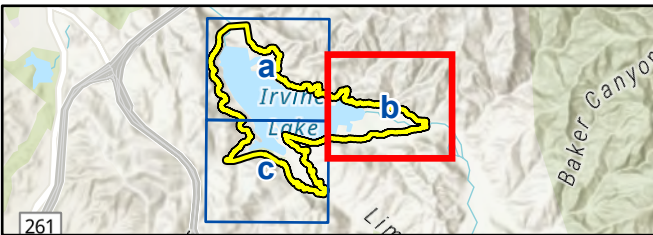
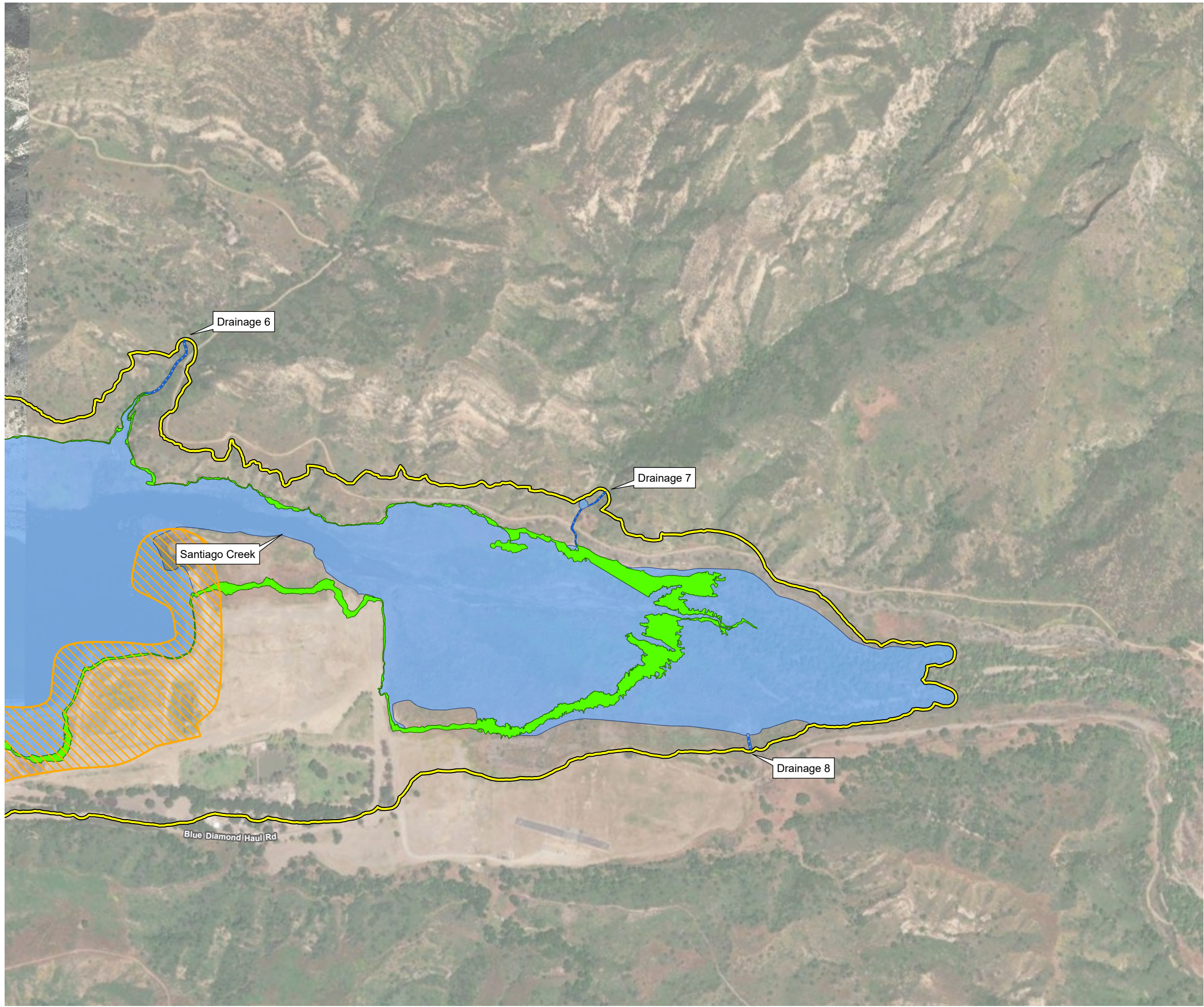
CDFW Jurisdictional Waters

Santiago Creek Dam Improvement Project

Exhibit 14a



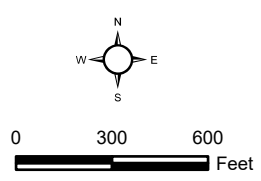
(Rev: 04/11/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\BTR\rev_ID.pdf



- Biological Study Area
- Impact Type**
 - Temporary Impacts*
 - Additional Inundation Area
- SCE Realignment**
 - Permanent Impacts
 - Temporary Impacts**
- CDFW Jurisdictional Waters**
 - CDFW
 - Drainage Centerline

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*




Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
CDFW Jurisdictional Waters

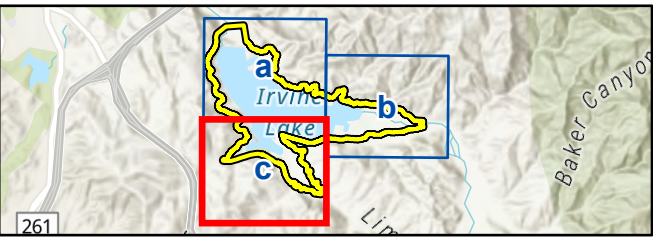
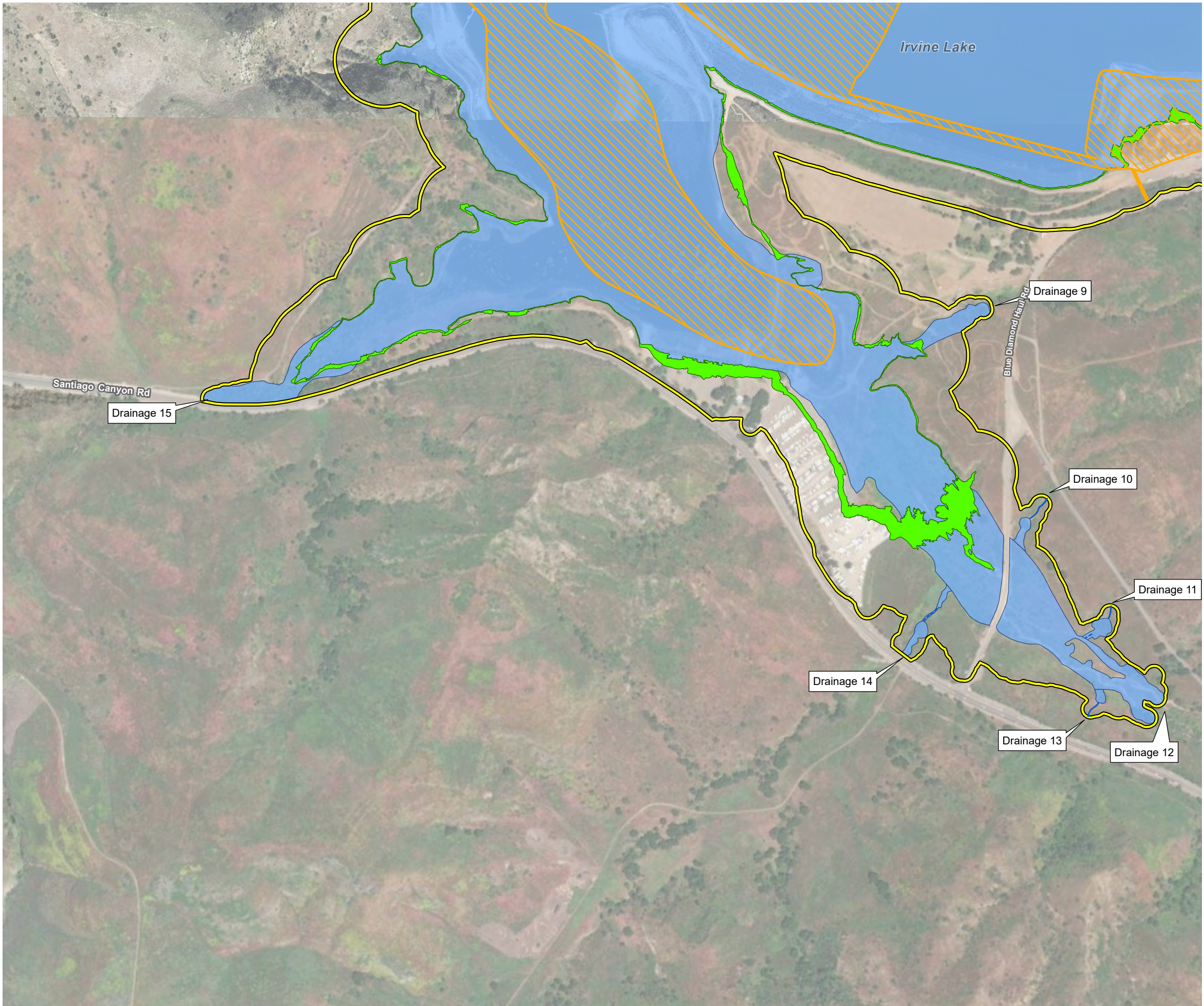
Santiago Creek Dam Improvement Project

Exhibit 14b



(Rev. 04/11/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\BTR\rev_ID.pdf

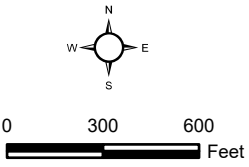
D:\Projects\IRW\SantiagoCreek\PRO\SCD\SCD_Project\aprx\rev_ID_CDFW_Impacts



- Biological Study Area
- Impact Type**
 - Temporary Impacts*
 - Additional Inundation Area
- SCE Realignment**
 - Permanent Impacts
 - Temporary Impacts**
- CDFW Jurisdictional Waters**
 - CDFW
 - Drainage Centerline

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*



Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
CDFW Jurisdictional Waters

Santiago Creek Dam Improvement Project

Exhibit 14c

(Rev. 04/11/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\BTR\rev_ID.pdf

TABLE 18
SUMMARY OF PROJECT IMPACTS ON JURISDICTIONAL RESOURCES

Jurisdiction	Amount of Jurisdictional Water Resource (acres)				
	Existing	Permanent	Temporary	Total Permanent/ Temporary Impact	Additional Inundation Area ^a
USACE WOTUS	Wetland: 101.706	Wetland: 0.000	Wetland: 63.915	Wetland: 63.915	Wetland: 0.673
	Non-wetland: 326.770	Non-wetland: 1.798	Non-wetland: 137.857	Non-wetland: 139.655	Non-wetland: 0.000
	Total: 428.476	Total: 1.798	Total: 201.772	Total: 203.570	Total: 0.673
RWCQB Waters of the State	Wetland: 101.706	Wetland: 0.000	Wetland: 63.915	Wetland: 63.915	Wetland: 0.673
	Non-wetland: 333.499	Non-wetland: 1.861	Non-wetland: 137.865	Non-wetland: 139.726	Non-wetland: 0.038
	Total: 435.20	Total: 1.861	Total: 201.780	Total: 203.641	Total: 0.711
CDFW Jurisdictional Resources	669.630	3.924	229.850	233.774	8.980
USACE: U.S. Army Corps of Engineers; WOTUS: waters of the United States; RWQCB: Regional Water Quality Control Board; CDFW: California Department of Fish and Wildlife					
^a Portions of the Permanent and Temporary impact boundaries overlap the "Additional Inundation Area". This overlap is not being excluded because the Additional Inundation Area represents a long-term, periodic change in maximum lake level as opposed to a permanent structural impact or temporary construction impact.					

4.2.3 Wildlife

Native and non-native vegetation provide valuable nesting, foraging, roosting, and denning opportunities for a variety of wildlife species. A total of 98.05 acres (8.75 acres permanent; 89.17 acres temporary; 0.13 acre within the SCE realignment) of native vegetation types (including coastal sage scrub, chaparral, riparian, woodland, cliff, fluctuating shoreline, and vegetated fluctuating shoreline) would be removed to construct the Project (Table 17). Additionally, a total of 39.96 acres (5.98 acres permanent; 33.97 acres temporary; 0.01 acre within the SCE realignment) of non-native vegetation (including grasslands, ornamental, and disturbed) would be removed to construct the Project (Table 17). Removing or altering habitats would likely result in the loss of small mammals, reptiles, amphibians, and other slow-moving wildlife that live in the Project's direct impact area. More mobile wildlife species that are now using these areas would be forced to move into adjacent areas of open space, which would increase competition for available resources in those areas. This situation would result in the loss of individuals that cannot successfully compete. The loss of wildlife habitat relative to the availability of habitat in the Project region would be considered adverse; however, the loss would be limited in relation to the total amount of wildlife habitat available in the Project region. Therefore, it would not be expected to reduce populations of common wildlife species below self-sustaining levels in the Project region. Therefore, this impact would be considered adverse but less than significant, and no mitigation would be required. Additionally, the NCCP/HCP mitigated for loss of native habitat through the creation of a Reserve System that provides habitat for common wildlife as well as the Covered Species.

Dewatering Irvine Lake during construction would temporarily reduce the amount of open water available for wildlife species to forage and drink during Project construction; however, drinking water would continue to be available upstream/downstream of the lake along Santiago Creek. Following completion of the Project, open water would again be available for foraging and drinking water.

Several common bird species have the potential to nest in the vegetation, on the ground, or in structures in the BSA. The loss of an active migratory bird nest, including nests of common species, would be considered a violation of the MBTA and Sections 3503, 3503.5, and 3513 of *California Fish and Game Code*. The MBTA and *California Fish and Game Code* prohibit the taking of migratory birds, nests, and eggs. Standard pre-construction surveys and nesting bird protection would be implemented to ensure consistency with the MBTA and *California Fish and Game Code* (PDF-5). Therefore, impacts on nesting birds would be less than significant assuming compliance with regulatory requirements.

The Project would also temporarily impact up to 13.71 acres of native vegetation types and 4.53 acres of non-native vegetation types in the additional inundation area; inundation effects are discussed under Section 4.2.6 (Indirect Impacts). If an area was inundated, it is assumed that wildlife would move to higher ground, and once the water subsided, the habitat would again be available to wildlife. Because the inundation would only affect a strip of habitat up to two feet in elevation, and there is a substantial amount of habitat available adjacent to the additional inundation area, the inundation would be considered a less than significant impact on wildlife and no mitigation would be required.

The additional inundation areas would be expected to be inundated during the storm season, which is generally outside the peak bird breeding season. The inundation would be associated with natural storm events, which could lead to a natural loss of nests early in the spring. The potential inundation of nests is expected to be extremely limited because (1) it would only affect species nesting within two feet in elevation above the current maximum water line; (2) it would only affect species nesting in February and March; and (3) it would only occur approximately once every several years. Therefore, the effect on nesting birds would be expected to be less than significant and no mitigation would be required.

4.2.4 Wildlife Movement

Santiago Creek Dam presents an existing barrier to wildlife movement for fish and amphibians along the Creek. As such, existing wildlife movement in the BSA is expected to be restricted to movement along the creek upstream of Irvine Lake and movement along the creek downstream of the dam. Although wildlife may avoid the dry lakebed during construction, the Project would not be expected to interfere with movement upstream or downstream of construction area. Wildlife species (e.g., mountain lion) would be expected to move through upland areas or along the edge of the Project through habitat not impacted by the Project. The Project would include night construction, which could temporarily decrease wildlife movement in the vicinity of construction at the dam embankment, spillway, near the staging area, and along access roads that are used by medium to large-sized mammals for movement at night. However, medium to large-sized mammals and other wildlife would still be able to use ridgelines that would not be affected by the Project. It is possible that wildlife may choose to move along the roads despite the construction, which

would increase the potential for wildlife strikes along the roadways at night. Speed limits and wildlife crossing signage would be posted along access roads (PDF-6). Therefore, the impact on wildlife movement would be less than significant.

The Project would permanently impact 14.73 acres of habitat downstream of the dam along Santiago Creek that wildlife currently moves through (Table 17); however, it would be in the same location as the existing dam structure; it would not create a new barrier to movement.

The additional inundation that would occur infrequently as a result of raising the spillway would be temporary and would occur near the existing waterline (i.e., within two feet); it would not create any new barriers to wildlife movement. Therefore, the effect of the additional inundation on wildlife movement would be less than significant and no mitigation would be required.

4.2.5 Special Status Biological Resource Impacts

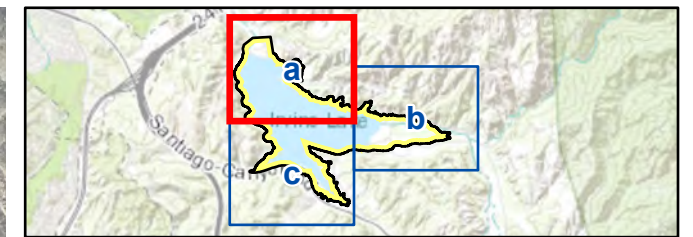
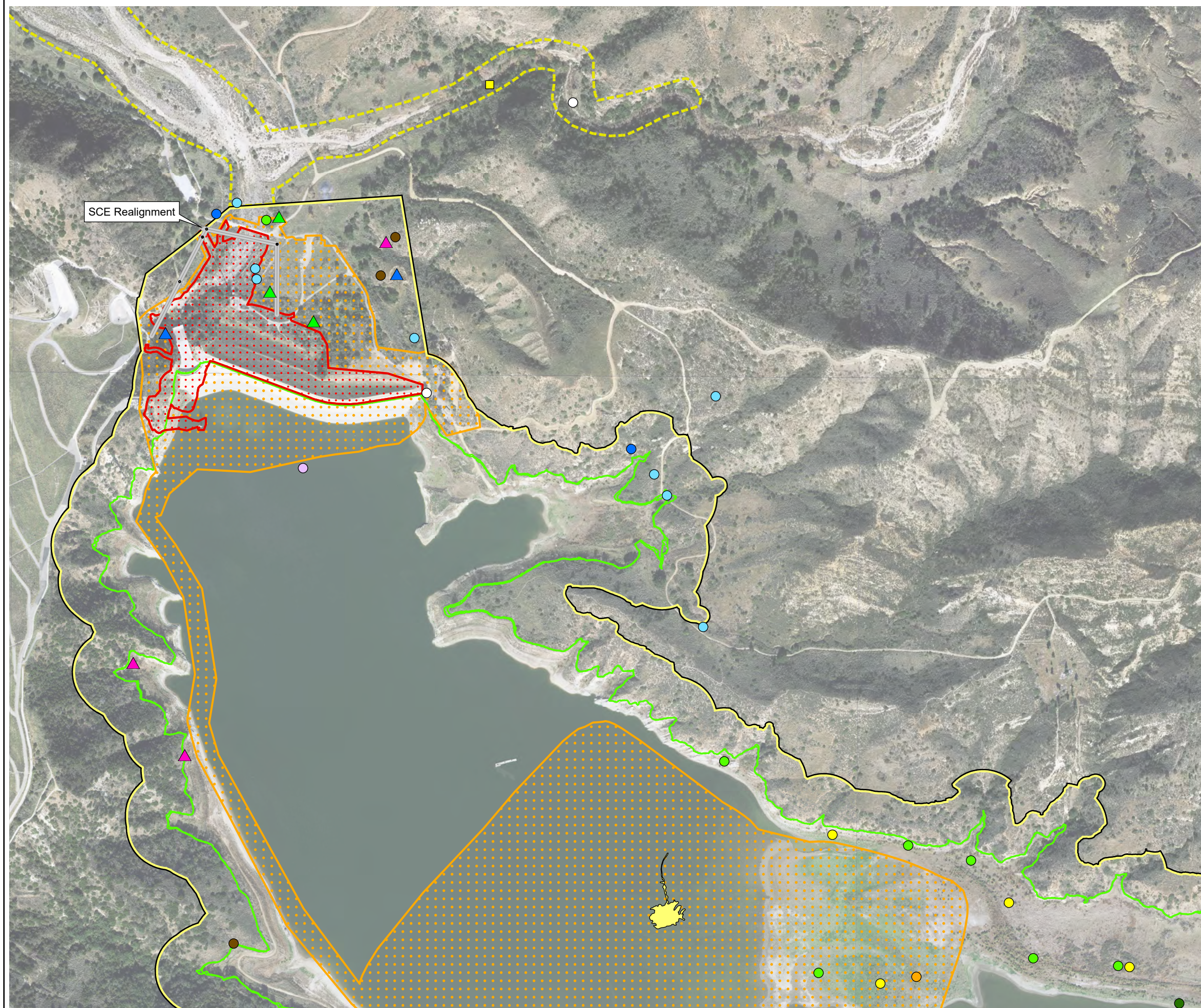
Special Status Plant Species



Focused plant surveys were conducted downstream of the dam in spring/summer 2020 and upstream of the dam in spring/summer 2022. Five species were observed: Braunton's milkvetch (federally Endangered, CRPR 1B.1), intermediate mariposa lily (CRPR 1B.2), many-stemmed dudleya (CRPR 1B.2), mud nama (CRPR 2B.2), and Coulter's matilija poppy (CRPR 4.2).

One individual Braunton's milkvetch was observed in the sandy channel of Santiago Creek, upstream of the lake. This location is outside of the impact footprint for the Project (Exhibit 15). Therefore, there would be no impact on this species and no mitigation would be required.




One individual intermediate mariposa lily was observed downstream of the dam; this individual would be impacted by the Project (Exhibit 15). Five individual intermediate mariposa lilies were observed in three locations upstream of the dam. All of the intermediate mariposa lily locations observed upstream of the dam are located outside of the impact footprint of the Project (Exhibit 15). Intermediate mariposa lily is a Covered Species under the NCCP/HCP; impacts up to 20 individuals are covered. Therefore, no mitigation would be required. To further minimize the impact, intermediate mariposa lily has been included with Mitigation Measure #4.

Approximately 810 many-stemmed dudleya individuals were observed in 2 locations downstream of the dam. Approximately 800 individuals were observed in the eastern portion of the plant survey area and 10 individuals were observed on a steep, east-facing cliff in the western portion of the plant survey area. The larger population of dudleya (800 individuals) is located outside of the impact footprint of the Project, but the smaller population (10 individuals) is located within the impact area (Exhibit 15). Although not formally listed under the federal or State Endangered Species Acts, many-stemmed dudleya is considered rare, threatened, or endangered within its range, and is fairly threatened in California (20–80 percent of its populations are threatened). However, the loss of 10 individuals of the 810 observed downstream of the dam represents 1.2 percent of the



-  Biological Study Area
 Arroyo Toad Survey Area

Project Impacts

-  Permanent Impacts
 Temporary Impacts*
 Additional Inundation Area

SCE Realignment

- ☐ Permanent Impacts
☐ Temporary Impacts**

Special Status Plants

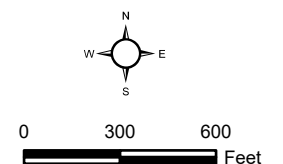
- ▲ Coulter's Matilija Poppy Population
- ▲ Intermediate Mariposa Lily Population
- ▲ Many-Stemmed Dudleya Population
- Mud Nama Population (mapped polygon)

Special Status Species

- ☐ American Peregrine Falcon
- ☐ American White Pelican
- ☐ Coastal Cactus Wren
- ☐ Coastal California Gnatcatcher
- ☐ Grasshopper Sparrow
- ☐ Least Bell's Vireo
- ☐ Southern California Rufous-Crowned Sparrow
- ☐ White-Tailed Kite
- ☐ Yellow-Breasted Chat
- ☐ Two-Striped Gartersnake

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*



Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts

Special Status Species

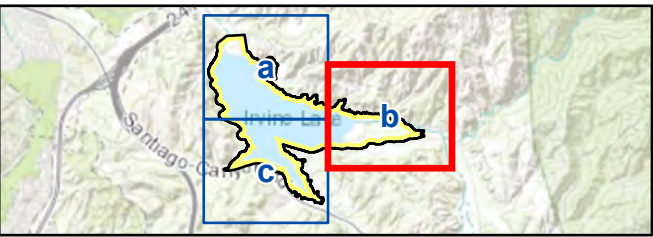
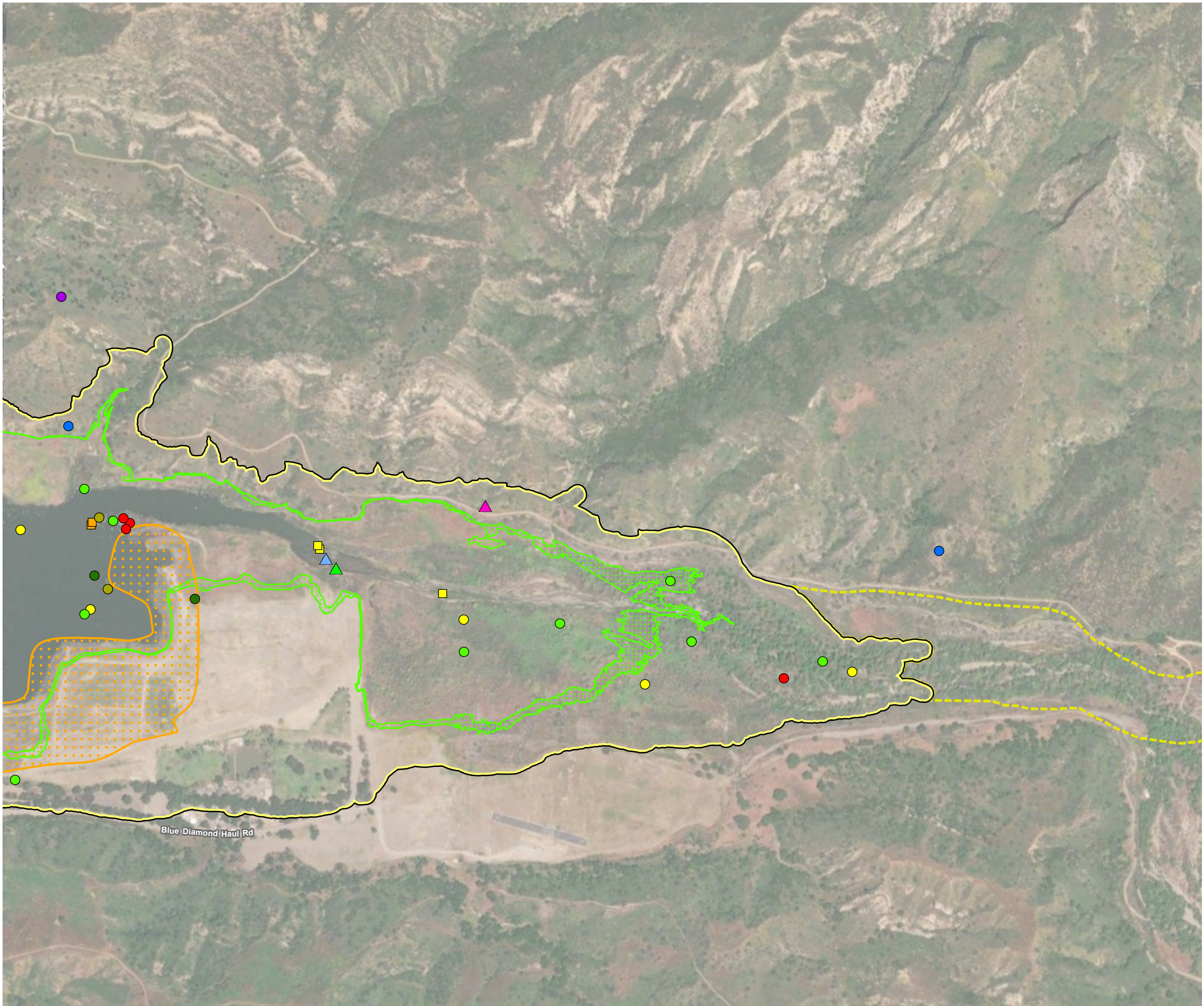
*Santiago Creek Dam
Improvement Project*

Exhibit 15a



(Rev: 04/11/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\BTR\ex_SS_Species_Impacts.pdf

D:\Projects\IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ss_SS_Species_Impacts



Biological Study Area

Arroyo Toad Survey Area

Project Impacts

Temporary Impacts*

Additional Inundation Area

SCE Realignment

Permanent Impacts

Temporary Impacts**

Special Status Plants

Coulter's Matilija Poppy Population

Intermediate Mariposa Lily Population

Braunton's Milkvetch Population

Special Status Species

Bald Eagle (Nest)

Coastal Cactus Wren

Grasshopper Sparrow

Least Bell's Vireo

Willow Flycatcher (migrant)

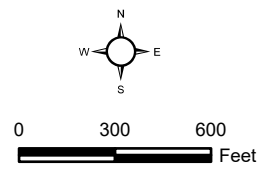
Yellow Warbler

Yellow-Breasted Chat

Belding's Orange-Throated Whiptail

Two-Striped Gartersnake

*Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.
**Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.



Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
Special Status Species

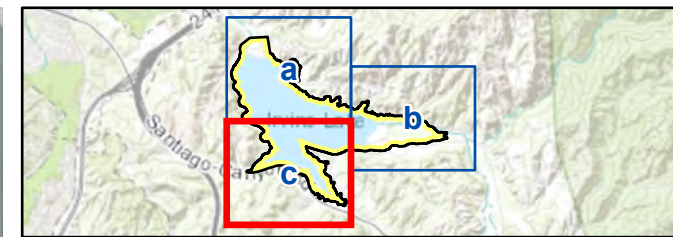
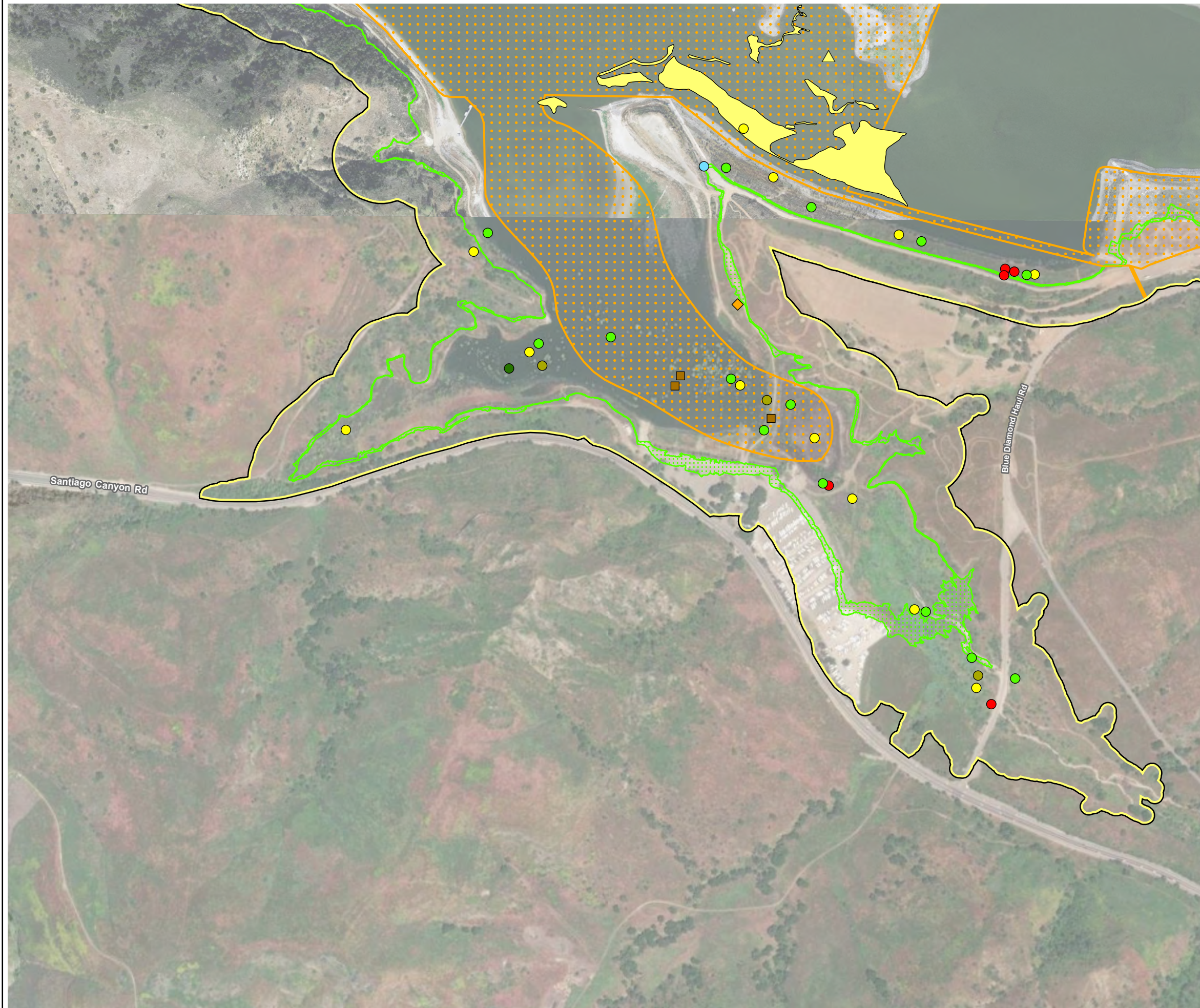
Exhibit 15b

Santiago Creek Dam
Improvement Project



(Rev: 04/11/2025 JVR) R:\Projects\IRW_IRWD\3\IRW010205\Graphics\BTR\ss_SS_Species_Impacts.pdf

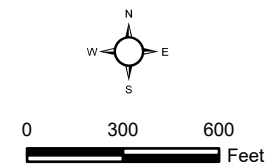
D:\Projects\IRW\SantiagoCreek\PRO\SCD\SCD_Project.apr\Map_SS_Species_Impacts



- Biological Study Area
- Project Impacts**
- Temporary Impacts*
 - Additional Inundation Area
- SCE Realignment**
- Permanent Impacts
 - Temporary Impacts**
- Special Status Plants**
- Mud Nama Population (point location)
 - Mud Nama Population (mapped polygon)
- Special Status Species**
- Crotch's Bumble Bee
 - Coastal California Gnatcatcher
 - Grasshopper Sparrow
 - Least Bell's Vireo
 - Willow Flycatcher (migrant)
 - Yellow Warbler
 - Yellow-Breasted Chat
 - Coastal Whiptail

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*



Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
Special Status Species
Santiago Creek Dam
Improvement Project

Exhibit 15c



(Rev: 04/11/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\BTRex_SS_Species_Impacts.pdf

individuals observed; therefore, the loss of 10 individuals of many-stemmed dudleya downstream of the dam would be considered adverse but less than significant. To further minimize the impact, many-stemmed dudleya has been included with Mitigation Measure #4.

Multiple populations of mud nama were observed in the southern portion of Irvine Lake (Exhibit 15). This area experiences periodic inundation and was mapped as open water during vegetation mapping in 2020. At the time of the special status plant survey, the substrate was exposed and consisted of riparian herb vegetation; the species was growing in more open areas, including along disturbed roads/trails. Because the individuals covered a large area and the species is small in stature, the population size was estimated based on density and square footage of each mapped polygon. The total population was estimated to be between 3.5 and 5.5 million. Current Project design shows that the borrow areas would impact 7.08 acres (308,405 square feet) of the mapped mud nama, which is estimated to be 86 to 89 percent of the mud nama present in the BSA (Table 19). This impact would be significant under CEQA Guidelines Section 15380. Once IRWD receives the results of the 2025 geotechnical investigations, Project Engineers would further refine the impact boundary to avoid and minimize impacts on mud nama to the extent feasible; IRWD is committed to avoiding at least 50 percent of the mud nama population (as mapped in 2022). Implementation of Mitigation Measure #4 would require pre-construction surveys by a qualified Botanist to flag the boundary of the population and to make recommendations for avoiding impacts to the extent feasible. With implementation of Mitigation Measure #4, which requires the avoidance of at least 50 percent of the mud nama populations (as mapped in 2022) and compensatory mitigation, impacts on mud nama would be considered less than significant.

TABLE 19
MUD NAMA POPULATION INFORMATION

Population Number	Estimated Population Density	Population Area (square feet)	Estimated Existing Population Size (Number of Individuals)	Extent of Impact
1	High density	25,023	875,805 – 1,000,920	100% Impacted
2	Moderate density	15,709	314,180 – 392,725	100% Impacted
3*	n/a	n/a	100	100% Impacted
4*	n/a	n/a	1,000	100% Impacted
5	Low density	284,500	1,422,500 – 2,845,000	77% Impacted; 219,499 sq. ft. (1,095,325–2,190,650 individuals)
6	Low density	12,647	63,235 – 126,470	100% Impacted
7	Low density	1,121	5,605 – 11,210	100% Impacted
8	High density	1,036	36,260 – 41,440	100% Impacted
9	Low density	3,053	15,265 – 30,530	100% Impacted
10	Low density	9,367	46,835 – 93,670	100% Impacted
11	High density	17,305	605,675 – 692,200	100% Impacted
12	Low density	8,335	41,675 – 83,350	10% Impacted; 871 sq. ft. (4,168–8,335 individuals)
Total			3,428,135 – 5,318,615	86 –89% Impacted 3,063,453–4,589,250
High Density: 35–40 individuals per square foot; Moderate Density: 20–25 individuals per square foot; Low Density: 5–10 individuals per square foot				
*Populations 3 and 4 were small and population sizes were estimated directly.				

Approximately 46 Coulter's matilija poppy clones were observed in 3 populations downstream of the dam and one individual was observed along Santiago Creek upstream of the lake. These populations are all located within the temporary impact footprint of the Project (Exhibit 15). Coulter's matilija poppy is a Covered Species in the NCCP/HCP; therefore, no mitigation would be required. To further minimize the impact, Coulter's matilija poppy has been included with Mitigation Measure #4.

The additional inundation that would occur infrequently as a result of raising the spillway would be temporary and would occur near the existing waterline (i.e., within two feet). The additional inundation may temporarily affect two of the intermediate mariposa lily locations on the northwestern side of Irvine Lake and the mud nama located within the lakebed (Exhibit 15). The intermediate mariposa lily populations are already located at the outer edge of the existing inundation footprint of the lake. The additional inundation would be expected to be similar in duration to the current inundation of the lake edges; therefore, the effect of the additional inundation would be expected to be less than significant for the few intermediate mariposa lily locations affected. Suitable habitat for mud nama consists of areas that are intermittently inundated; the mud nama locations are in areas that are regularly inundated. Additional inundation would either have no effect or would be considered a

beneficial impact for this species. Overall, impacts on special status plant species as a result of the additional inundation would be considered less than significant and no mitigation would be required.

Special Status Wildlife Species

Invertebrates

Focused surveys for Quino checkerspot were conducted throughout the BSA in spring/summer 2022; no Quino checkerspot were observed (Psomas 2022b). Therefore, there would be no impact on this species and no mitigation would be required.

Focused surveys for Crotch's bumble bee were conducted throughout the BSA in summer 2024; one Crotch's bumble bee individual was observed (Psomas 2024a). Suitable habitat for this species is present throughout the BSA. A total of 52.66 acres (12.95 acres permanent; 39.58 acres temporary; 0.13 acre within the SCE realignment) of suitable habitat (i.e., coastal sage scrub, chaparral, grassland, woodland, and ornamental) for the Crotch's bumble bee would be removed to construct the Project (Table 17). This species is a Candidate for State listing; impacts on this species would be considered significant. Mitigation Measure #5 would require pre-construction surveys for Crotch's bumble bee, avoidance of active nest burrows during construction, and consultation with CDFW to obtain an Incidental Take Permit.

Monarch butterfly, a federally proposed Threatened species, was recorded as an incidental observation during the spring 2022 Quino checkerspot butterfly surveys and its hostplant, milkweed, was noted during spring botanical surveys. Monarch butterfly is not expected to overwinter in the BSA because the BSA is too far inland; therefore, the Project is not expected to impact an overwintering site and no mitigation would be required.

The additional inundation that would occur infrequently as a result of raising the spillway would be temporary and would occur near the existing waterline (i.e., within two feet). The additional inundation area would temporarily impact 7.74 acres of suitable habitat for Crotch's bumble bee (i.e., coastal sage scrub, chaparral, grassland, woodland, and ornamental) (Table 17). If the area where Crotch's bumble bees forage was inundated, it is assumed that they would forage on higher ground, and once the water subsided, foraging habitat would again be available to them. Because the inundation would only affect a strip of habitat up to two feet in elevation, and there is a substantial amount of habitat available adjacent to the additional inundation area, the inundation would be considered a less than significant impact on foraging and no mitigation would be required.

Fish

White sturgeon is stocked in Irvine Lake by OC Parks. The Project would dewater the lake prior to construction for a period of up to four years. Dewatering the lake would result in the loss of all non-native fish, including the white sturgeon. White sturgeon stocked in the lake are sterile individuals and isolated from naturally occurring populations; therefore, the loss of these individuals would not affect the viability of the species since these individuals are

not reproducing and were intended to be taken by angling. Therefore, the impact on white sturgeon would be considered less than significant and no mitigation would be required.

Santa Ana speckled dace does not currently occur in Santiago Creek and/or Irvine Lake. Therefore, there would be no impact on this species and no mitigation would be required.

If CDFW implements a translocation of Santa Ana speckled dace to an area along Santiago Creek upstream of Irvine Lake, the translocated individuals may or may not be successful (i.e., survive and reproduce). Following the translocation, CDFW would monitor the translocated individuals to determine whether they become an established self-sustaining population. If the translocated individuals are successful in maintaining their population, they could move downstream along Santiago Creek to the upstream (eastern) end of the BSA prior to the initiation of the Project. Santa Ana speckled dace would not be expected to enter Irvine Lake as their preferred habitat is streams; they do not occur in lakes (except at the confluence with the stream). However, while the lake is dewatered, a portion of the flow could act as a stream, which the dace could then occupy temporarily until the lake is refilled. Project intake pipelines for dewatering and bypass pipelines around the work area would all include fish screens. The potential that the Project would impact translocated Santa Ana speckled dace is considered low because: (1) the translocated dace may not survive until the Project begins; (2) the translocated dace may not move downstream into the lake area where the Project construction would be occurring; (3) the Project bypass pipelines and dewatering pipelines would include fish screens; and (4) the area where active construction would be occurring would be dry. Therefore, the potential impact on translocated Santa Ana speckled dace is considered less than significant, and no mitigation would be required.

The additional inundation that would occur infrequently as a result of raising the spillway would be temporary and would occur near the existing waterline (i.e., within two feet). The additional inundation area would increase the amount of habitat available for fish species. Therefore, the additional inundation would be considered a beneficial effect, and no mitigation would be required.

Amphibians

Focused surveys for the arroyo toad were conducted downstream of the dam in spring 2020 and upstream of Irvine Lake in 2022; no arroyo toads were observed (Psomas 2020a, 2022c). Therefore, there would be no impact on this species and no mitigation would be required. Focused surveys for the western spadefoot toad were conducted throughout the BSA in spring 2025; no western spadefoot toads were observed (Psomas 2025 [in preparation]). Therefore, there would be no impact on this species and no mitigation would be required.

Coast Range newt has potential to occur in the BSA. The Project would not impact breeding habitat for this species (i.e., stream habitat with sufficient water). However, this species uses upland habitats for foraging and aestivation. A total of 88.67 acres (14.67 acres permanent; 73.86 acres temporary; 0.14 acre within the SCE realignment) of suitable habitat for this species (i.e., coastal sage scrub, chaparral, grassland, riparian, woodland, and cliff) would be removed to construct the Project (Table 17). Although not formally covered, Coast Range newt also benefits from habitats conserved in the Reserve System. Due to the limited amount

of habitat loss relative to the availability of habitat for Coast Range newt in the region, and because there would be no impact on breeding locations, impacts on this species would be considered adverse but less than significant; no mitigation would be required.

The additional inundation that would occur infrequently as a result of raising the spillway would be temporary and would occur near the existing waterline (i.e., within two feet). The additional inundation area would temporarily impact 16.94 acres of suitable habitat for special status amphibian species (i.e., coastal sage scrub, chaparral, grassland, riparian, woodland, and cliff) (Table 17). Amphibians can occur in aquatic or upland habitat; therefore, the additional inundation is not expected to affect them. Therefore, the additional inundation would be considered less than significant, and no mitigation would be required.

Reptiles

Focused surveys for southwestern pond turtle were conducted throughout the BSA in summer 2024; no southwestern pond turtles were observed (Psomas 2024b). Therefore, there would be no impact on this species and no mitigation would be required.

Two-striped garter snake is known to occur in riparian and open water habitats along Santiago Creek both upstream and downstream of the dam (Psomas 2020a, 2022c). A total of 220.26 acres (1.78 acres permanent; 218.48 acres temporary) of suitable riparian, fluctuating shoreline, vegetated fluctuating shoreline, and open water habitat for this species would be removed to construct the Project (Table 17). Although not formally covered by the NCCP/HCP, two-striped garter snake benefits from habitats conserved in the Reserve System. Due to the limited amount of habitat loss relative to the availability of habitat for these species in the region, impacts on this species would be considered adverse but less than significant, and no mitigation would be required.

Orange-throated whiptail and coastal whiptail were incidentally observed along Santiago Creek during focused surveys (Psomas 2022c). Additionally, coast horned lizard, southern California legless lizard, California glossy snake, coast patch-nosed snake, and red diamond rattlesnake have potential to occur in habitats throughout the BSA. A total of 88.67 acres (14.67 acres permanent; 73.86 acres temporary; 0.14 acre within the SCE realignment) of suitable habitat for these species (i.e., coastal sage scrub, chaparral, grassland, riparian, woodland, and cliff) would be removed to construct the Project (Table 17). Of these species, coast horned lizard, orange-throated whiptail, coastal whiptail, and red diamond rattlesnake are Covered Species in the NCCP/HCP; upland habitats have been conserved in the Reserve System. Although not formally covered, southern California legless lizard, California glossy snake, and coast patch-nosed snake also benefit from habitats conserved in the Reserve System. Due to the limited amount of habitat loss relative to the availability of habitat for these species in the region, impacts on these species would be considered adverse but less than significant, and no mitigation would be required.

The additional inundation that would occur infrequently as a result of raising the spillway would be temporary and would occur near the existing waterline (i.e., within two feet). The additional inundation would temporarily impact up to 16.94 acres of habitat for special status reptile species (i.e., coastal sage scrub, chaparral, grassland, riparian, woodland, and cliff) in the additional inundation area (Table 17). If the area were inundated, there would

be no effect on two-striped garter snake, which could use the open water habitat. It is assumed that the other special status reptiles would move to higher ground, and once the water subsided, the habitat would again be available to them. Because the inundation would only affect a strip of habitat up to two feet in elevation, and there is a substantial amount of habitat available adjacent to the additional inundation area, the inundation would be considered a less than significant impact on special status reptiles and no mitigation would be required.

Birds

Focused surveys for southwestern willow flycatcher and western yellow-billed cuckoo were conducted in spring/summer 2022; neither southwestern willow flycatcher nor western yellow-billed cuckoo were observed (Psomas 2022e, 2022f). Therefore, there would be no impact on these species and no mitigation would be required.

The federally Threatened coastal California gnatcatcher is known to occur throughout the coastal sage scrub habitats in the BSA. One pair of gnatcatchers successfully nested downstream of Santiago Creek Dam and multiple coastal California gnatcatchers were observed in habitat around Irvine Lake, upstream of the dam (Exhibit 15; Psomas 2020b, 2022d, 2024a). Therefore, coastal California gnatcatcher presence should be assumed throughout coastal sage scrub habitats in the BSA. A total of 8.41 acres (3.95 acres permanent; 4.39 acres temporary; 0.07 acre within the SCE realignment) of suitable habitat for this species (i.e., coastal sage scrub) would be removed to construct the Project (Table 17). Additionally, during construction, this species would be disturbed by construction noise for up to 20 hours per day (including night work) periodically during the breeding season for approximately four years. During construction, jackhammering and concrete crushing would occur during demolition of the existing spillway and drilling into bedrock would occur to construct the new spillway. In the absence of noise minimization measures, all coastal sage scrub within 500 feet of construction activities would be indirectly affected by construction noise¹⁶, with the most noise-intensive effects on coastal sage scrub occurring downstream of the dam. Any impact on coastal California gnatcatcher would be considered significant. This species is a Covered Species under the NCCP/HCP; therefore, take of coastal sage scrub is fully covered by participation in the NCCP/HCP for IRWD. Additionally, the NCCP/HCP requires standard construction minimization measures during removal of coastal sage scrub habitat to protect NCCP/HCP Covered Species (PDF-3). Implementation of Mitigation Measure #1 would ensure that IRWD's take is accounted for according to the NCCP/HCP.

The federally and state Endangered least Bell's vireo is known to occur in riparian habitats along Santiago Creek and the upstream edges of Irvine Lake (Exhibit 15; Psomas 2022e). Least Bell's vireo was absent downstream of the dam during the 2020 focused surveys (Psomas 2020c), but was incidentally observed downstream of the dam during the 2024 focused surveys for Crotch's bumble bee (Psomas 2024a); riparian habitat downstream of the dam is not as well-developed. Therefore, least Bell's vireo presence should be assumed throughout riparian habitats at the upper end of Irvine Lake and along Santiago Creek upstream of the lake; least Bell's vireo has potential to occur in riparian habitats downstream

¹⁶ A detailed analysis of noise impacts on these sensitive habitat areas will be included in the Noise section of the Environmental Impact Report.

of the dam. A total of 36.73 acres (1.45 acres permanent, 35.28 acre temporary) of suitable riparian habitat for the least Bell's vireo would be removed to construct the Project (Table 17). Additionally, during construction, this species would be disturbed by construction noise for up to 20 hours per day (including night work) periodically during the breeding season for approximately four years. During construction, concrete crushing would occur in the staging area at the upstream end of Irvine Lake. If least Bell's vireo occurred downstream of the dam, they would also be subject to jackhammering, concrete crushing, and drilling into bedrock to demolish/construct the new spillway, as described above for coastal California gnatcatcher. In the absence of noise minimization measures, all riparian habitat within 500 feet of construction would be indirectly affected by construction noise¹⁷. Any impact on least Bell's vireo would be considered significant. The least Bell's vireo is a Conditionally Covered Species under the NCCP/HCP. Mitigation Measures #2 would ensure that riparian habitat impacted by the Project would be replaced at no less than a 1:1 ratio. Mitigation Measure #6 would require removal of riparian habitat outside the nesting season, implementation of appropriate noise minimization measures, and consultation with USFWS and CDFW.

The coastal cactus wren and Southern California rufous-crowned sparrow were observed in coastal sage scrub habitats and grasshopper sparrow was observed in grassland habitats in the BSA (Exhibit 15; Psomas 2020b, 2022d, 2022e). Additionally, loggerhead shrike and California horned lark have potential to occur in upland habitats throughout the BSA. A total of 47.85 acres (12.39 acres permanent; 35.38 acres temporary; 0.08 acre within the SCE realignment) of suitable habitat for these species (i.e., coastal sage scrub, chaparral, and grassland) would be removed to construct the Project (Table 17). Of these species, coastal cactus wren and Southern California rufous-crowned sparrow are Covered Species in the NCCP/HCP; upland habitats have been conserved in the Reserve System. Although not formally covered, loggerhead shrike, California horned lark, and grasshopper sparrow also benefit from habitats conserved in the Reserve System. Due to the limited amount of habitat loss relative to the availability of habitat for these species in the region, impacts on these species would be considered adverse but less than significant, and no mitigation would be required.

The yellow-breasted chat and yellow warbler were observed in riparian habitats in the BSA (Exhibit 15; Psomas 2022d, 2022e). A total of 36.73 acres (1.45 acres permanent; 35.28 acre temporary) of suitable habitat for these species (i.e., riparian) would be removed to construct the Project (Table 17). Although not formally covered by the NCCP/HCP, these species also benefit from habitats conserved in the Reserve System. Due to the limited amount of habitat loss relative to the availability of habitat for these species in the region, impacts on these species would be considered adverse but less than significant, and no mitigation would be required.

A pair of bald eagles, State Endangered and Fully Protected, was incidentally observed nesting in a canyon adjacent to the BSA during focused surveys conducted around Irvine Lake in 2022 (Exhibit 15, Psomas 2022d, 2022e). CDFW included the location on a map of breeding territories (1990 to 2016); therefore, this location has been known since at least

¹⁷ A detailed analysis of noise impacts on these sensitive habitat areas will be included in the Noise section of the Environmental Impact Report.

2016. The 2022 nesting location was over 1,200 feet (0.22 mile) from the borrow site/staging area, which is the closest Project activity¹⁸ and approximately 1.25 miles from Santiago Creek Dam, where construction would be concentrated. Therefore, the nest would not be expected to be directly or indirectly impacted by the construction activities or noise. However, the entire lake would be temporarily dewatered (312.11 acres of open water) and construction would affect a total of 183.53 acres within the lake (0.33 acre permanent; 183.20 acres temporary) that provide suitable foraging habitat for this species (i.e., open water, fluctuating shoreline, and vegetated fluctuating shoreline) to construct the Project (Table 17). During construction, the lake would be dewatered and fish would no longer be an available food source for this breeding pair. Waterfowl may also be reduced in numbers once the lake is drained, although they may still be present upstream and downstream of the impact area. Throughout the winter storm season, when the lake is functioning for flood control, open water may be available for a limited time following storms but would be kept in a dewatered condition throughout the construction period and fish would not be stocked. When the lake holds limited water following storms, it could be used by waterfowl. The temporary loss of the lake habitat over four years of construction may cause the bald eagles to leave Irvine Lake for the duration of construction. However, they (or a new pair) would be expected to reoccupy the lake following completion of the Project once the lake is restocked with fish. This impact would be considered significant. Mitigation Measure #7 would require consultation with the USFWS and CDFW to determine the appropriate monitoring strategy during construction.

White-tailed kite and American peregrine falcon were observed in the BSA during surveys. In addition, Cooper's hawk, ferruginous hawk (during winter and migration), golden eagle, prairie falcon, long-eared owl, and burrowing owl have potential to occur in the BSA for foraging. A total of 137.98 acres (14.73 acres permanent; 123.11 acres temporary; 0.14 acre within the SCE realignment) of suitable foraging habitat for these species (i.e., coastal sage scrub, chaparral, grassland, riparian, woodland, cliff, fluctuating shoreline, vegetated fluctuating shoreline, ornamental, and disturbed) would be removed to construct the Project (Table 17). However, during construction, the lake would be dewatered and an additional 128.58 acres of lake bottom (areas currently mapped as open water outside of the impact areas) would be temporarily available as foraging habitat for these species, though these areas may provide limited prey since there would not be any vegetation cover. The permanent loss of 14.73 acres of foraging habitat for these raptors would cumulatively contribute to the ongoing regional loss of foraging habitat for these species. Of these species, American peregrine falcon is a Covered Species, while golden eagle and prairie falcon are Conditionally Covered, by the NCCP/HCP; upland habitats have been conserved in the Reserve System. Although not formally covered, Cooper's hawk, ferruginous hawk, white-tailed kite, long-eared owl, and burrowing owl also benefit from habitats conserved in the Reserve System. Therefore, this impact would be considered adverse but less than significant because a substantial amount of foraging habitat for these species is available immediately adjacent to the Project in the Reserve System.

The Cooper's hawk, white-tailed kite, golden eagle, prairie falcon, American peregrine falcon, long-eared owl, and burrowing owl also have potential to nest within or adjacent to the BSA.

¹⁸ The Federal Bald Eagle Act states that a permit to impact the nest would be needed if construction would be within 660 feet of an active nest.

Impacts on any active raptor nest (common or special status species) would be considered a violation of the MBTA and Sections 3503, 3503.5, and 3513 of the *California Fish and Game Code*. Additionally, these species could be disturbed by noise adjacent to construction areas. Standard pre-construction surveys and nesting bird protection would be implemented to ensure consistency with the MBTA and *California Fish and Game Code* (PDF-5). Therefore, impacts on nesting raptors would be less than significant assuming compliance with regulatory requirements.

The additional inundation that would occur infrequently as a result of raising the spillway would be temporary and would occur near the existing waterline (i.e., within two feet). The additional inundation would temporarily impact up to 17.41 acres of foraging and nesting habitat (i.e., coastal sage scrub, chaparral, grassland, woodland, cliff, and ornamental) for special status bird species in the additional inundation area (Table 17). If the area were inundated, it is assumed that special status birds would move to higher ground, and once the water subsided, the habitat would again be available to them. Because the inundation would only affect a strip of habitat up to two feet in elevation, and there is a substantial amount of habitat available adjacent to the additional inundation area, the inundation would be considered a less than significant impact on special status birds and no mitigation would be required.

The additional inundation areas would be expected to be inundated during the storm season, which is generally outside the peak bird breeding season (although there is some overlap in early spring). The inundation would be associated with natural storm events, which could lead to a natural loss of nests early in the spring. The potential inundation of nests is expected to be extremely limited because (1) it would only affect species nesting within two feet in elevation above the current maximum water line; (2) it would only affect species nesting in February and March; and (3) it would only occur approximately once every several years. Therefore, the effect on nesting birds would be expected to be less than significant and no mitigation would be required.

Mammals

Mountain lions are known to occur throughout the vicinity of the BSA and mountain lion sign (i.e., tracks) were observed downstream of Santiago Creek Dam during focused surveys. A total of 88.67 acres (14.67 acres permanent; 73.86 acres temporary; 0.14 acre within the SCE realignment) of suitable habitat for this species (i.e., coastal sage scrub, chaparral, grassland, riparian, woodland, and cliff) would be removed to construct the Project (Table 17). The mountain lion is proposed for State listing due to fragmentation of habitat that isolates populations. Although the Project would permanently impact 14.67 acres of habitat downstream of the dam along Santiago Creek, it would be in the same location as the existing dam structure; it would not create a new barrier to movement. Additionally, there is extensive habitat in the Reserve System immediately surrounding the Project site that would be available for use by mountain lion. Although mountain lion may avoid the dam area and borrow site/staging area during construction that occurs at night, it would be expected to move along the edge of the Project, using habitat not impacted by the Project, during construction. Therefore, the Project would not be expected to interfere with movement by mountain lions. It is possible that mountain lions may choose to move along the roads despite the construction, which would increase the potential for wildlife strikes along the roadways

at night. Speed limits and wildlife crossing signage would be posted along access roads (PDF-6). Therefore, the impact on wildlife movement would be less than significant.

Northwestern San Diego pocket mouse and San Diego desert woodrat may occur in the BSA. A total of 51.94 acres (13.22 acres permanent; 38.58 acres temporary; 0.14 acre within the SCE realignment) of suitable habitat for these species (i.e., coastal sage scrub, chaparral, grassland, woodland, and cliff) would be removed to construct the Project (Table 17). Additionally, vibration from construction could cause the collapse of pocket mouse burrows in the adjacent habitat as well as cause woodrats to flee their middens. Individuals could also potentially move through the construction area and be hit by construction vehicles. San Diego desert woodrat is a Covered Species in the NCCP/HCP; upland habitats have been conserved in the Reserve System. Although not formally covered, northwestern San Diego pocket mouse also benefits from habitats conserved in the Reserve System. Due to the limited amount of habitat loss relative to the availability of habitat for these species in the region, impacts on these species would be considered adverse but less than significant, and no mitigation would be required.

Six special status bat species have potential to forage in the BSA: pallid bat, pocketed free-tailed bat, big free-tailed bat, western red bat, western yellow bat, and western mastiff bat. A total of 137.98 acres (14.73 acres permanent; 123.11 acres temporary; 0.14 acre within the SCE realignment) of suitable foraging habitat for these species would be removed to construct the Project (Table 17). Many bat species prefer to forage over water. During construction, Irvine Lake (312.11 acres) would be dewatered and the creek would be routed around the construction area. Although this could create lower quality foraging habitat during construction, it is expected that open water (i.e., preferred foraging habitat) would be available upstream and/or downstream of the work areas during construction. These impacts would be considered adverse but less than significant because a substantial amount of foraging habitat for these species would continue to be available immediately adjacent to the Project in the Reserve System throughout the Project. Following completion of the Project, open water would again be available within Irvine Lake. Therefore, no mitigation would be required for the loss of bat foraging habitat.

Pallid bat, pocketed free-tailed bat, big free-tailed bat, western red bat, western yellow bat, and western mastiff bat also have potential to roost in the BSA. Bats may roost in the rocky outcroppings along Santiago Creek, in crevices of structures (e.g., dam structure, spillway and outlet tower, and dam keeper's house), or in large oak or sycamore trees in the BSA. A total of 3.57 acre (0.53 acre permanent; 2.99 acres temporary; 0.05 acre within the SCE realignment) of suitable tree roosting habitat would be removed to construct the Project (Table 17). This impact would be considered adverse but less than significant because a substantial amount of tree roosting habitat would continue to be available immediately adjacent to the Project in the Reserve System during the Project. A total of 0.52 acre (0.30 acre permanent; 0.21 acre temporary; 0.01 acre within the SCE realignment) of suitable cliff roosting habitat would be removed to construct the Project (Table 17). Additionally, during the project, a portion of the dam, spillway, outlet tower structure, and dam keeper's house that may be used by bats that roost in crevices would not be available for roosting. Construction activities could directly impact roosting individuals. Impacts on a maternal roost (i.e., where breeding occurs) or a communal roost would be considered to

meet the requirements of CEQA Guidelines Section 15380. Mitigation Measure #8 would require pre-construction surveys and bat exclusion.

The additional inundation that would occur infrequently as a result of raising the spillway would be temporary and would occur near the existing waterline (i.e., within two feet). The additional inundation would also temporarily impact up to 16.94 acres of habitat for special status mammals (i.e., coastal sage scrub, chaparral, grassland, riparian, woodland, and cliff) in the additional inundation area (Table 17). This may increase the amount of preferred foraging habitat (i.e., open water) for bat species. If the area were inundated, it is assumed that terrestrial mammals would move to higher ground, and once the water subsided, the habitat would again be available to them. Because the inundation would only affect a strip of habitat up to two feet in elevation, and there is a substantial amount of habitat available adjacent to the additional inundation area, the inundation would be considered a less than significant impact on special status mammals and no mitigation would be required.

4.2.6 INDIRECT IMPACTS

Increased Inundation

Lake level depends on rainfall of the season, intensity of storm events, and rate of releases. Following the Project, dam operations would not substantially change; the way that water would be held in the reservoir throughout the year would be expected to be the same as the existing conditions. The Project would raise the spillway height by six feet, which is two feet above the current maximum water storage elevation with flashboards installed. Thus, the area between the 795.9-foot elevation contour and the 797.9-foot elevation around the perimeter of Irvine Lake (referred to as “additional inundation area”) would be infrequently inundated for a period of up to approximately 45 days (Exhibit 11). In the last 20 years, Irvine Lake has been at the maximum capacity of 795.9-foot elevation four times. Approximately the same frequency would be expected following implementation of the Project, but it would depend on frequency and intensity of storms and operations of the lake.

When the lake is at the maximum elevation, a narrow strip of riparian vegetation would be inundated infrequently (9.66 acres of riparian; Exhibit 11; Table 17). These areas are dominated by mule fat and willows, which have a high to very high tolerance to inundation, assuming shoots (i.e., trunks, stems, leaves) are not fully submerged (Glentz et al. 2006, Tallent-Halsell and Walker 2002, Francis et al. 2005, Good et al. 1992). Glentz et al. (2006) found that willows can withstand a flooding duration for as much as 40% of the growing season (spring/summer); the BSA receives most rainfall outside the growing season in the winter and early spring when willows are dormant. Therefore, the infrequent additional inundation is not expected to affect the riparian vegetation that currently exists around the lake. While the OHWM may change after raising the spillway, creating some additional jurisdiction, riparian vegetation and hydric soils are not expected to be created where they do not currently occur based on the infrequency of the additional inundation. Jurisdictional areas within Irvine Lake, Santiago Creek, and Drainages 4, 5, 6, 7, 9, 12, and 15 fall within the additional inundation area (Exhibits 12, 13, and 14).

When the lake is at the maximum elevation, a narrow strip of upland vegetation would be inundated infrequently (3.36 acres coastal sage scrub, 0.18 acre chaparral, and 0.50 acre of

coast live oak woodland; Exhibit 11, Table 17). Species in these habitat types are not adapted to wet conditions and could be affected by extended inundation (i.e., longer than one week). Normally, shrub and tree roots get air from pore spaces in the soil, but when soils are inundated, air spaces are filled with water and roots experience anaerobic conditions. This can result in a delay in leafing out, branch dieback, smaller than normal leaves, or wilted leaves. Once the inundation has subsided, shrubs and trees should resume normal growth and their growth may catch up by spring or summer. However, if a flooded shrub/tree does not resume normal growth, the roots may have been damaged by the inundation (Cregg 2013). The infrequent additional inundation affects two feet in elevation, which may be several feet wide in flat areas, but less than a foot on steeper slopes. The upland habitat types within the additional inundation areas are mostly located on slopes, which means a narrower area of upland vegetation would be affected around most of the lake (Exhibit 11). Therefore, if a shrub/tree is affected, it would be expected to only affect a few shrubs or a small portion of the roots and associated canopy of trees. Potential effects on chaparral due to infrequent additional inundation would be considered adverse but less than significant in relation to the total amount of chaparral vegetation available in the Project region. Coastal sage scrub and oak woodlands are Covered Habitats under the NCCP/HCP; upland habitats have been conserved in the Reserve System. Take of coastal sage scrub is fully covered by participation in the NCCP/HCP for IRWD. Implementation of Mitigation Measure #1 would ensure that IRWD's take for its share of the impacts is accounted for according to the NCCP/HCP.

When the lake is at the maximum elevation, a narrow strip of nonnative vegetation would be inundated infrequently (3.23 acres grassland [annual grassland, ruderal] and 0.47 acres of ornamental; Exhibit 11, Table 17). Like the upland vegetation, these vegetation types may be adversely affected by the infrequent additional inundation, however, these vegetation types are considered of low biological value. Therefore, inundation effects on this vegetation would be considered less than significant and no mitigation would be required.

Although infrequent additional inundation would not directly remove vegetation from the BSA, habitat within the inundation area would be unavailable to most wildlife during the infrequent inundation. If infrequent additional inundation occurred during the breeding season, it could flood burrows and nests causing them to fail. However, it is anticipated that most inundation events would occur during the storm season (i.e., October 1 to April 15), which is outside the peak breeding season for most wildlife. Following each inundation event, the habitat would again be available for use with areas along the periphery becoming available most quickly. Although infrequent additional inundation effects would be considered adverse, they would affect a limited amount of habitat (17.41 acres) compared to the amount of habitat available in the Project region. Therefore, inundation effects would be considered adverse but less than significant.

Dewatering of the Lake

During the Project, the lake would be dewatered for a period of up to four years. When a lake is dewatered, water is not available to seep through the ground to recharge the underground aquifer and the water table under and around the edge of the lake may drop. If this occurs, it could affect the riparian vegetation around the edge of the lake. However, during the winter storm season, precipitation is expected to recharge or partially recharge the underground

aquifer/water table. The water table can also recharge through the areas surrounding the lake that are outside the dewatered area, including through several drainages flowing into the lake and sheet flow from the southeastern and eastern sides of the lake. The majority of riparian scrub/woodland vegetation occurs at the upstream end of the lake, upstream of the work area, where recharge would still be occurring naturally (since it is upstream of the area that would be dewatered). Considering both precipitation and recharge from surrounding areas, lowering of the water table is not expected to substantially affect riparian scrub/woodland vegetation around the edges of the lake. Therefore, this impact is considered adverse but less than significant, and no mitigation would be required.

Noise Impacts

The BSA includes some periodic noise events, including consistent low helicopter flights and landings and periodic special events in the adjacent park (e.g., concerts). Noise levels in the BSA would increase substantially over present levels during construction of the Project due to construction vehicles, demolition of the existing spillway, concrete crushing, and drilling into bedrock to secure the new spillway and dam embankment. A detailed noise analysis has been prepared for the Project. During construction, temporary noise impacts have the potential to disrupt foraging, nesting, roosting, and denning activities for a variety of wildlife species. These impacts are considered adverse, but not significant for most wildlife species, because the Project would not impact a substantial population of these species. Noise from construction activities may cause birds adjacent to the work area to abandon their territory or may discourage individuals from selecting habitat adjacent to the work area due to construction noise and human activity. Construction activities could increase noise in the immediate vicinity and could interfere with communication between a pair that could affect their nest success. Noise impacts would be considered significant for the coastal California gnatcatcher, least Bell's vireo, and other nesting raptors. With the implementation of standard NCCP/HCP construction minimization measures and Mitigation Measure #6, indirect noise impacts on the coastal California gnatcatcher and least Bell's vireo would be considered less than significant. Additionally, implementation of standard pre-construction surveys and nesting bird protection would ensure consistency with the MBTA and *California Fish and Game Code* (PDF-5). Therefore, indirect noise impacts on nesting birds and raptors would be less than significant.

Increased Dust and Urban Pollutants

Grading activities would disturb soils and result in the accumulation of dust on the surface of the leaves of trees, shrubs, and herbs. The respiratory function of the plants in the area would be impaired when dust accumulation is excessive. This indirect effect of construction of the Project on the native vegetation in the immediate vicinity of the construction area is considered adverse but less than significant because it would not substantially reduce plant populations in the region. Additionally, it is assumed that a water truck would be used to reduce dust during construction as required for air quality requirements. Therefore, no mitigation would be required.

During construction, excess silt, petroleum, or chemicals on the soil surface within the construction area could be washed into drainages (including Santiago Creek) and Irvine Lake during storms and may affect areas downstream of the Project. Adverse effects on water

quality could indirectly impact species that use riparian areas within the watershed by affecting the food web interactions (e.g., abundance of insects or other prey) or through biomagnification (i.e., the buildup of chemicals in body tissues to toxic levels in higher trophic levels). To be compliant with regulatory requirements, the Project will obtain a State Water Resources Control Board's General Permit for Storm Water Discharge Associated with Construction Activity (Construction Activities General NPDES Permit), which will include development of a Storm Water Pollution Prevention Plan and provisions for the implementation of Best Management Practices and erosion control measures to prevent the runoff of toxins, chemicals, petroleum products, or other elements that might degrade water quality. Assuming compliance with standard regulatory requirements, impacts on water quality would be less than significant and no mitigation would be required.

No dust or urban pollutants would be expected during operation of the Project. Therefore, there would be no long-term impact and no mitigation would be required.

Invasive Exotic Plant Species

No landscaping is anticipated as part of the Project. Therefore, there would be no effect on adjacent habitats due to the planting of non-native, invasive plant species.

Construction activities create disturbance, which in turn provides a place for non-native weedy species to spread. Additionally, construction equipment can introduce non-native weed seeds to the area if equipment is not properly cleaned. Weeds from the construction may then spread to adjacent habitat areas (including adjacent Reserve areas), which would degrade habitat quality for native species. In addition to the negative effects on habitat quality, non-native weeds can also increase the potential for large fires to spread. Specifications for the Project will use BMPs to prevent the spread of weed seeds and requires the use of a native seed mix for hydroseeding areas disturbed by construction activities. Invasive species observed during construction would be treated during and following construction (PDF-9). Therefore, impacts as a results of invasive exotic plant species would be considered less than significant.

Night Lighting

Night lighting may impact the behavioral patterns of nocturnal and crepuscular (i.e., active at dawn and dusk) wildlife adjacent to night lighting. Of greatest concern is the effect on small, ground-dwelling animals that use the darkness to hide from predators and bats, owls, and mountain lion, which are specialized night foragers. Following the Project, the spillway and outlet tower would not include night lighting; therefore, there would be no impact due to night lighting during operation of the Project. However, construction activities would include regular night work; therefore, night lighting during construction could negatively impact nocturnal and crepuscular wildlife species within the BSA as well as in the surrounding adjacent open space. Specifications for the Project will be used to minimize night lighting on sensitive habitat areas (PDF-7).

Human Activity

The Project is not expected to increase human activity during operation. Therefore, there would be no long-term impact and no mitigation would be required.

During construction, there would be an increase in human activity (i.e., vehicle and foot traffic), which would increase the disturbance of natural open space adjacent to construction areas. Human disturbance could disrupt normal foraging and breeding behavior of wildlife adjacent to construction areas, diminishing the value of the habitat. Standard pre-construction surveys and nesting bird protection would ensure nesting birds and raptors would be protected from disturbance (PDF-5). Additionally, all construction personnel would be trained on the environmental sensitivity of the area prior to construction (PDF-1) and the Project limits would be clearly delineated (PDF-2). With implementation of these measures, the increased human activity would be less than significant.

Increased Wildfire Risk

Fires are a natural part of the landscape in California; however, with the changing weather patterns brought by climate change, the fire season is coming earlier and ending later than in the past (USFS 2018). In the last five years (October 2019 – October 2023), there have been 6,884 wildfires that have burned 1,570,571 acres in California (CalFire 2023). Drought or extended periods of low rainfall can dry out fuel, increasing its risk of burning. Periods of high rainfall decrease fire risk because there is more moisture in the vegetation; however, years of high rainfall increase the fuel load with growth of vegetation and weeds. In the Project region, Santa Ana wind conditions also increase the risk of fire with dry, gusty winds (CalFire 2023). According to the National Park Service, approximately 85 percent of wildfires are caused by humans. Human-caused wildfires are due to campfires left unattended, the burning of debris, equipment use and malfunctions, negligently discarded cigarettes, and intentional acts of arson (NPS 2022). The location of the Project is an important factor in understanding the extent of wildfire risk and how much potential for damage there is if a fire starts. Risk is higher when there are hot temperatures, low humidity, and high winds (i.e., “red flag warning” weather conditions). Risk is also higher near dry, ignitable vegetation (e.g., coastal sage scrub, chaparral, grassland, and ruderal), and hills or mountainous topography (Lordson 2020). Public Resources Code Sections 4427, 4428, 4431, and 4442 prohibit the use of combustion engines near forest, brush, or grass at any time of year when ground litter or vegetation would sustain the spread of fire. A detailed wildfire analysis has been prepared for the Project. During construction, construction equipment or personal vehicles have potential to accidentally ignite vegetation, starting a wildfire. If not contained quickly, the fire could spread through adjacent habitat areas, damaging the NCCP/HCP Reserve. The loss of habitat may affect listed species (e.g., coastal California gnatcatcher). All construction personnel would be trained on the environmental sensitivity of the area prior to construction (PDF-1) and the Biological Monitor would be present during vegetation clearing (PDF-3). Therefore, the increased fire risk would be considered less than significant.

5.0 MITIGATION MEASURES

This section focuses on the development of mitigation measures for those impacts of the Project found to be significant or potentially significant. Strategies to mitigate each impact to a less than significant level are identified and described in the following section. Consistency with the NCCP is discussed in Section 6.0.

5.1 MITIGATION MEASURE #1: COASTAL SAGE SCRUB AND COASTAL CALIFORNIA GNATCATCHER

Potential direct and indirect impacts on coastal sage scrub and coastal California gnatcatcher are fully mitigated through IRWD's participation and contribution in the NCCP/HCP Mitigation Program. This participation not only provides mitigation for coastal sage scrub and the coastal California gnatcatcher, but also other Covered Species and Covered Habitats. IRWD will mitigate for impacts on coastal sage scrub and coastal California gnatcatcher through a combination of the following, as approved by USFWS and CDFW: (1) use of IRWD's NCCP/HCP take allocation at a 1:1 ratio for impacted coastal sage scrub; (2) restoration of coastal sage scrub habitat at a minimum 1:1 ratio in areas temporarily disturbed by construction including weeding and three years of restoration monitoring; and/or (3) restoration of coastal sage scrub habitat at an on-site or off-site location at a minimum 1:1 ratio, as described in a Habitat Mitigation and Monitoring Plan (HMMP) in order to preserve IRWD's remaining NCCP/HCP take allocation (if desired by IRWD).

If a coastal sage scrub habitat establishment program is selected to mitigate for all or a portion of the impacts, IRWD will prepare a Coastal Sage Scrub HMMP and submit it to the resource agencies for review and approval prior to the initiation of construction activities. The Coastal Sage Scrub HMMP will include the following items: (1) responsibilities and qualifications; (2) performance criteria and contingency planning; (3) site selection; (4) seed materials procurement; (5) wildlife surveys and protection; (6) site preparation and plant materials installation; (7) schedule; (8) maintenance program; (9) monitoring program; and (10) long-term preservation. IRWD will retain a qualified Restoration Ecology to prepare the Coastal Sage Scrub HMMP and will retain a qualified Restoration Contractor to implement the HMMP. IRWD will be responsible for implementing the Coastal Sage Scrub HMMP and ensuring that the mitigation program achieves the approved performance criteria.

5.2 MITIGATION MEASURE #2: RIPARIAN VEGETATION AND JURISDICTIONAL PERMITTING

Before the start of construction, IRWD will obtain all necessary permits for impacts to USACE, CDFW, and/or RWQCB jurisdictional areas and will determine the compensatory mitigation needed for the loss of jurisdictional waters and wetlands. Potential compensatory mitigation options will include one or a combination of the following, as determined through consultation with the above-listed resource agencies: (1) establishment of riparian habitat (on site or off site) at a minimum 1:1 ratio for impacted jurisdictional areas; (2) payment to a resource agency-approved mitigation bank or regional riparian enhancement program (e.g., invasive species removal) at a minimum 1:1 ratio for impacted jurisdictional areas;

and/or (3) preservation of off-site riparian habitat on IRWD lands at a minimum 1:1 ratio for impacted jurisdictional areas.

If in-lieu mitigation fees are required, IRWD will pay the in-lieu mitigation fee before the start of construction to a mitigation bank/enhancement program for the replacement of impacted jurisdictional resources.

If a riparian habitat establishment program is selected to mitigate for all or a portion of the impacts, IRWD will retain a qualified Restoration Ecologist to prepare a Riparian HMMP and submit it to the resource agencies for review and approval prior to the initiation of construction activities. The Riparian HMMP will include the following items: (1) responsibilities and qualifications; (2) performance criteria and contingency planning; (3) site selection; (4) seed materials procurement; (5) wildlife surveys and protection; (6) site preparation and plant materials installation; (7) schedule; (8) maintenance program; (9) monitoring program; and (10) long-term preservation. IRWD will retain a qualified Restoration Contractor to implement the HMMP. IRWD will be responsible for implementing the Riparian HMMP and ensuring that the mitigation program achieves the approved performance criteria.

5.3 MITIGATION MEASURE #3: TREE SURVEY/REPLACEMENT

Before the start of construction, IRWD will retain a qualified Biologist or Certified Arborist to conduct a tree survey to identify the location and health of western sycamore trees within 100 feet of the Project impact area. To the extent practicable, temporary impact areas will be revised to avoid and minimize effects on western sycamore trees. Standard tree protection measures to fence western sycamores will be recommended for trees within or near the work area (PDF BIO-4).

Any western sycamores greater than four inches diameter at breast height that are removed by construction will be replaced at no less than a 1:1 ratio. Trees with a diameter at breast height (dbh) of greater than 4 up to 8 inches will be replaced at a 1:1 ratio with a minimum container size of 15 gallons. Trees with a dbh of greater than 8 inches up to 16 inches will be replaced at a 1:1 ratio with a minimum container size of 25 gallons (i.e., 24-inch box). Trees with a dbh of greater than 16 inches up to 24 inches will be replaced at a 3:1 ratio with a minimum container size of 25 gallons (i.e., 24-inch box). Trees with a dbh of greater than 24 inches up to 36 inches will be replaced at a 5:1 ratio with a minimum container size of 25 gallons (i.e., 24-inch box). Trees with a dbh of greater than 36 inches will be replaced at a 10:1 ratio with a minimum container size of 25 gallons (i.e., 24-inch box). The replacement trees will be replaced either on-site or off-site in a location with appropriate microclimate conditions. The replacement trees will be incorporated into the Coastal Sage Scrub HMMP or Riparian HMMP (described above).

5.4 MITIGATION MEASURE #4: SPECIAL STATUS PLANT SPECIES

A. Pre-construction Surveys

During the peak blooming season prior to the initiation of construction (within the same year or the spring/summer prior), IRWD will retain a qualified Botanist to conduct a pre-construction focused survey for mud nama. Although not required, the pre-construction survey will also include intermediate mariposa lily, many-stemmed dudleya, and Coulter's matilija poppy to minimize impacts on these species. The pre-construction survey will focus on these species in the general locations where they were previously observed within the impact area, including a 100-foot survey buffer. The Botanist will record special status plant locations within the impact area and within 100 feet of the impact area using GPS and will clearly mark locations with pin flags or lathe and flagging. The Botanist will meet in the field with IRWD to discuss whether avoidance of these locations would be feasible (e.g., whether they could be protected within the temporary impact areas).

No compensatory mitigation will be required if the locations of intermediate mariposa lily,¹⁹ many-stemmed dudleya, and Coulter's matilija poppy cannot be avoided. However, IRWD will notify the Natural Communities Coalition (NCC) and allow the NCC to collect seed and/or salvage special status plants that will be impacted by the Project. Seed collection/salvage will be coordinated so that it does not delay the construction schedule.

Compensatory mitigation will be required if more than 10 percent of the mud nama locations mapped in 2022 will be impacted, as described below under Mitigation Measure #4B.

Following the pre-construction survey and field meeting with IRWD, the Botanist will prepare a Pre-construction Special Status Plant Survey Report to document the results of the pre-construction surveys and will document the special status plant locations that will be avoided during construction. The Botanist will calculate the percent of the mud nama population that will be impacted by comparing the amount of mud nama within the construction impact area to the mud nama locations mapped in 2022. The report will also document that the final engineering plans, coupled with construction avoidance areas, will impact less than 50 percent of the mud nama population mapped in 2022.

After the field meeting with IRWD, the Botanist will work with IRWD/Contractor to clearly mark the locations that will be avoided during construction with lathe and flagging, orange snow fencing, stakes and rope, or other suitable fencing until the initiation of construction. During construction, the Biological Monitor will ensure that these areas are protected during construction as described below under Mitigation Measure #4C.

¹⁹ The NCCP/HCP covers impacts on this species up to 20 individuals; if more than 20 individuals would be impacted, additional consultation with the resource agencies would be required. However, this is not anticipated to be necessary because only six individuals have been observed in the BSA during focused surveys and only one individual is located in the impact area.

B. Compensatory Mitigation for Mud Nama

As described under Mitigation Measure #4A, if compensatory mitigation is required for mud nama (i.e., more than 10 percent of the mud nama locations mapped in 2022 will be impacted by the Project), IRWD will retain a qualified Restoration Biologist to prepare a detailed Mud Nama Mitigation Plan. The Plan will describe collection of seed, salvage of individuals, salvage of soils (i.e., seed bank), and establishment of a new on-site location that will replace the area of mud nama impacted at a minimum 1:1 ratio (i.e., 1 acre impacted to 1 acre replaced). The on-site mitigation areas will provide similar microhabitat, including similar soils and elevation, to provide similar inundation frequency to current conditions. The Mud Nama Mitigation Plan will include the following topics: (1) responsibilities and qualifications of the personnel to implement and supervise the plan; (2) mitigation site selection criteria; (3) site preparation and planting implementation, including pilot studies (if needed); (4) implementation schedule; (5) maintenance plan/guidelines; (6) monitoring plan; (7) performance criteria and contingency planning; and (8) long-term preservation. IRWD will implement the Plan.

IRWD will retain a qualified Restoration Biologist/Seed Collector to collect seed, salvage individuals, and salvage soils (i.e., seed bank) from the mud nama during the spring/summer prior to impacts upon this plant. IRWD will ensure that the seed/salvaged individuals/soil will be stored by a qualified Seed Collector in appropriate conditions to maintain the viability of the seed to be used in the implementation of the Mud Nama Mitigation Plan.

C. Biological Monitoring

Before the start of construction, IRWD will retain a qualified Biological Monitor to confirm that the special status plant locations to be avoided are clearly marked with lathe and flagging, orange snow fencing, stakes and rope, or other suitable fencing. The Biological Monitor will post signs to indicate each location as an “Environmentally Sensitive Area” and that no work activities may occur within the fencing. The Biological Monitor will conduct a WEAP training regarding the importance of Environmentally Sensitive Areas. Once Project activities begin, the Biological Monitor will check the fencing/signage weekly to ensure that it stays in place throughout construction activities and will notify IRWD and the construction contractor immediately if the fencing/signage needs to be repaired.

5.5 MITIGATION MEASURE #5: CROTCH’S BUMBLE BEE

If CDFW determines that listing of the Crotch’s bumble bee as threatened or endangered under the California Endangered Species Act is not warranted prior to or during implementation of the Project, this measure will not be required.

Until CDFW makes a determination, or if CDFW determines that listing of the Crotch’s bumble bee as threatened or endangered under the California Endangered Species Act is warranted, the following measures will be required.

A. Incidental Take Permit/Compensatory Mitigation

IRWD will obtain an Incidental Take Permit (2081) prior to removal of suitable habitat for Crotch's bumble bee. IRWD will consult with CDFW to determine the appropriate mitigation to compensate for loss of floral resources associated with the species at a minimum 1:1 ratio of suitable habitat impacted (i.e., 1 acre impacted to 1 acre compensated). Potential compensatory mitigation options include on-site revegetation of temporarily disturbed areas using a seed mix of species preferred by Crotch's bumble bee at a minimum 1:1 ratio of temporarily impacted areas; payment of an in-lieu mitigation fee to an approved mitigation bank at a minimum 1:1 ratio of permanently impacted areas; long-term preservation of on-site or off-site habitat at a minimum 1:1 ratio of permanently impacted areas; or another strategy as approved by CDFW. Mitigation provided for under Mitigation Measure #1 (Coastal Sage Scrub) may be used towards mitigation for Crotch's bumble bee.

B. Pre-construction Survey

Prior to vegetation clearing or other ground-disturbance during each year of Project construction, IRWD will retain a qualified Biologist to conduct pre-construction focused surveys for active nests of Crotch's bumble bee following the most current CDFW guidelines²⁰ within 100 feet of Project impact areas with suitable habitat for Crotch's bumble bee. According to current guidelines (CDFW 2023), the Biologist will conduct three visual surveys during the species' active period (i.e., April to August). The timing between each visual survey may be reduced to accommodate the construction schedule, as long as the first and last survey are conducted at least one week apart during the active period.

If no active nests of Crotch's bumble bee are observed, vegetation clearing, grading, and ground-disturbance may proceed.

If a ground nest is observed, it will be protected in place until it is no longer active as determined by the qualified Biologist retained by IRWD. IRWD will implement applicable protective measures from the Incidental Take Permit for the species (see Mitigation Measure 5A). Potential protective measures may include protective buffers coupled with biological monitoring to avoid take of an active ground nest. The protective buffer will be determined by the Biologist conducting the pre-construction survey, or as designated in conditions in the Incidental Take Permit.

IRWD will ensure that a Letter Report is prepared to document the results of the pre-construction survey and will provide the letter to CDFW within 30 days of the completion of the survey.

²⁰ The current guidelines for this species are CDFW 2023; guidelines may be updated as more is learned about this species' biology.

C. Biological Monitor

Biological monitoring for Crotch's bumble bee will follow the most current CDFW guidelines²¹ at the time of construction. According to current guidelines (CDFW 2023), IRWD will retain a Biological Monitor to be present onsite during vegetation clearing and/or ground-disturbing activities that take place during the Crotch's bumble bee queen flight period (i.e., February to March), colony active period (i.e., April to August), or gyne flight period (i.e., September to October). No biological monitoring will be required for vegetation clearing or ground-disturbance that occurs from November to January.

If a ground nest of Crotch's bumble bee is observed during the monitoring, it will be protected in place until it is no longer active, as determined by the qualified Biologist retained by IRWD. IRWD will also implement applicable protective measures from the Incidental Take Permit for the species (see Mitigation Measure 5A). If establishment of a protective and/or avoidance of the nest is not feasible, IRWD and its qualified Biologist will consult with CDFW regarding potential encroachment into the protective buffer that may result in take of Crotch's bumble bee pursuant to Mitigation Measure #5A.

5.6 MITIGATION MEASURE #6: LEAST BELL'S VIREO

IRWD will consult with USFWS and CDFW under Section 7 of FESA and Section 2080.1 of the California Fish and Game Code to approve the mitigation approach and whether NCCP/HCP Conditional Coverage would be extended to least Bell's vireo based on the measures below.

- A. IRWD will obtain concurrence from USFWS and CDFW that the riparian mitigation described in Mitigation Measure #2 will provide appropriate compensatory mitigation for the loss of riparian habitat.
- B. To the extent feasible, removal of riparian habitat will be conducted during the non-breeding season (i.e., September 16 to March 14) in order to minimize direct impacts on nests of least Bell's vireo. IRWD will retain a qualified Biologist to monitor vegetation clearing of riparian habitat.
- C. Before starting construction each spring, IRWD will retain qualified Biologist to survey all habitat within 500 feet of the construction limits for the presence of least Bell's vireo. The Biologist will map any active nests/territories as Environmentally Sensitive Areas on an aerial photograph. IRWD will also ensure that the Biologist prepares a Letter Report and that it is submitted to USFWS and CDFW to document the results of the pre-construction survey within 30 days of completion of the survey.
- D. IRWD will retain a qualified Biologist to conduct weekly focused surveys during construction to update the location of active least Bell's vireo territories. The Biologist will map new territories as Environmentally Sensitive Areas and will remove inactive Environmentally Sensitive Areas from the map. Once construction is in progress, IRWD will provide Weekly Reports to USFWS and CDFW.

²¹ The current guidelines for this species are CDFW 2023; guidelines may be updated as more is learned about this species' biology.

- E. IRWD will retain a qualified Biologist to establish a 500-foot protective buffer is around each least Bell's vireo territory identified during pre-construction or weekly surveys. The Biologist will verify that occupied riparian habitat is be protected with lathe and rope, orange snow fencing, or other suitable fencing to provide an adequate buffer from construction work. The Biologist will post signs to indicate that the area is an "Environmentally Sensitive Area" and that no work activities may occur within the fencing. The Biologist will conduct training to educate workers on the importance of Environmentally Sensitive Areas.
- F. If construction activities need to occur within 500 feet of an active least Bell's vireo territory, IRWD will consult with USFWS and CDFW to determine an appropriate noise reduction strategy. Appropriate noise reduction measures may include, but are not limited to, specifications for equipment type, siting of equipment, and temporary noise barriers. IRWD will retain a qualified Biologist to monitor the installation of any noise reduction measures.
- G. IRWD will retain a qualified Biologist to conduct daily monitoring when construction activities are conducted within 500 feet of an active least Bell's vireo territory or until the Biologist determines that the individuals are not being impacted by the noise (i.e., the noise measures are established and birds are acclimated to the activities).

5.7 MITIGATION MEASURE #7: BALD EAGLE

IRWD will consult with USFWS and CDFW with regard to bald eagle to determine whether any regulatory approval is necessary to comply with the California Endangered Species Act and the federal Bald Eagle Act. Because there would be no direct take of a nest, an informal consultation may be sufficient, but this approach will be confirmed by USFWS and CDFW.

USFWS and CDFW will review and approve the monitoring strategy to be used during construction. IRWD will retain a qualified Biologist to visit the bald eagle nest multiple times over the course of the breeding season to determine whether the nest is active and/or to determine the stage of nesting. The Biologist will conduct the first visit in early March to determine whether the nest is active. The Biologist will conduct the second visit in late March or April to confirm the nesting stage (i.e., eggs/young), or to confirm that the nest is still inactive. If the nest is not active during the first two visits, no additional surveys will be needed. However, if the nest is active, the Biologist will conduct weekly surveys from five weeks post-hatching continuing weekly until the young fledge or until May 15, whichever comes last. The Biologist conducting the surveys will complete the California Bald Eagle Nesting Territory Survey Form to document the survey results each year. IRWD will ensure that the form is submitted to USFWS and CDFW by September 1 of each year.

5.8 MITIGATION MEASURE #8: PRE-CONSTRUCTION BAT SURVEYS

IRWD will retain a qualified Biologist to conduct a pre-construction roosting bat survey (including both day and evening efforts) before construction begins. The day survey will involve inspection of the structures within the impact area to look for signs of bat roosting. The evening survey will involve monitoring each potential roost site for evening emergence, conducting exit counts, and acoustic monitoring (from a half an hour before sunset to no greater than three hours after sunset) near potential roosts within the impact area. If the

Biologist determines that bats are actively roosting onsite, IRWD will retain a qualified Biologist to prepare a Project-specific Bat Roost Minimization Plan (BRMP) and will implement the plan. The BRMP will include relevant avoidance and minimization measures based on survey results. If tree roosting bat species are found to be both foraging and potentially roosting onsite, IRWD will conduct tree removal only during the non-maternity season (September 1 through March 31). When potentially-occupied roost trees are removed, IRWD will implement a phased tree removal method (i.e., leaving the felled tree on the ground for 24-48 hours after the felling to allow any tree-roosting bats to leave). IRWD will avoid all Project structures proposed for demolition that support an active day-roost until either the roost is no longer active, as determined by a qualified Biologist, or until the occupants can be humanely evicted as described in the BRMP. IRWD will retain a qualified Biologist to implement bat eviction during the fall months outside of the bat maternity season (i.e., September 1 through November 30).

6.0 CONSISTENCY WITH THE NCCP/HCP

6.1 CONSISTENCY WITH NON-RESERVE OPEN SPACE POLICIES

The Project site is in a Non-Reserve Open Space area as defined by the NCCP/HCP Implementation Agreement, which includes development of infrastructure within the Reserve System in accordance with the provisions of Chapter 5.3, 5.9, and 5.11 of the NCCP/HCP and 5.3.3 of the Implementation Agreement.

Santiago Creek Dam is a permitted existing use under the NCCP/HCP. No amendments to the NCCP/HCP will be required for constructing infrastructure facilities so long as amended infrastructure plans do not result in incidental take beyond that described and permitted by the NCCP/HCP.

Recommended Action

See Mitigation Measure #1.

6.2 CONSISTENCY WITH COASTAL SAGE SCRUB TAKE AUTHORIZATION

Under the NCCP/HCP, IRWD is allotted up to 87 acres of take (60 within the Reserve System and 27 outside the Reserve System); this Project may use credits from within the Reserve System. IRWD merged with the Santiago County Water District, which was allotted 9 acres within the Reserve System, bringing the total allotted for IRWD to 96 acres (69 acres within the Reserve System and 27 acres outside the Reserve System). As of March 2025, IRWD has approximately 44 acres within the Reserve remaining in their allocation.

Per Section 5.11 of the NCCP/HCP, infrastructure is an existing use that is allowed within the Reserve. The Project would remove 8.41 acres of coastal sage scrub habitat (3.95 acres permanent; 4.39 acres temporary; 0.07 acre within the SCE realignment). Coastal sage scrub vegetation types that would be impacted include sagebrush scrub, disturbed sagebrush scrub, sagebrush-coyote brush scrub, and disturbed floodplain sage scrub. Raising the spillway would also temporarily impact 3.36 acres within the additional inundation area. Coastal sage scrub in the additional inundation area includes sagebrush scrub, disturbed sagebrush scrub, sagebrush-coyote brush scrub, southern cactus scrub, and disturbed southern cactus scrub. Take of coastal sage scrub is fully covered by IRWD's participation in the NCCP/HCP.

The NCCP/HCP requires avoidance and minimization measures during removal of coastal sage scrub habitat to protect NCCP/HCP Covered Species.

Recommended Action

See Mitigation Measure #1 and standard NCCP/HCP construction minimization measures (PDF-3).

6.3 COVERED SPECIES

The following is a list of species that are covered by the Central Subarea of the Central/Coastal Subregion NCCP/HCP:

Arboreal salamander (*Aneides lugubris*)
 Black-bellied slender salamander (*Batrachoseps nigriventris*)
 California gnatcatcher (*Poliophtila californica californica*)
 Catalina mariposa lily (*Calochortus catalinae*)
 Coast [San Diego] horned lizard (*Phrynosoma coronatum*)
 Coastal cactus wren (*Camplorhynchus brunneicapillus*)
 Coastal rosy boa (*Lichanura trivirgata rosafusca*)
 Coastal western whiptail lizard (*Aspidoscelis* [*Cnemidophorus*] *tigris multicutatus*)
 Coronado skink (*Eumeces skiltonianus interparietalis*)
 Coulter matilija poppy (*Romneya coulteri*)
 Coyote (*Canis latrans*)
 Gray fox (*Urocyon cinereoargenteus*)
 Heart-leaved pitcher sage (*Lepichinia cardiophylla*)
 Northern harrier (*Circus cyaneus*)
 Orange-throated whiptail lizard (*Cnemidophorus hyperythrus beldingi*)
 Peregrine falcon (*Falco peregrinus*)
 Red diamondback rattlesnake (*Crotalis ruber ruber*)
 Red-shouldered hawk (*Buteo lineatus*)
 Rough-legged hawk (*Buteo lagopus*)
 San Bernardino ringneck snake (*Diadophis punctatus modestus*)
 Bryant's [San Diego desert] woodrat (*Neotoma bryanti* [*lepida*] *intermedia*)
 Santa Monica Mountains dudleya (*Dudleya dudleyi* spp. *ovatifolia*)
 Sharp-shinned hawk (*Accipiter striatus*)
 Small-flowered mountain mahogany (*Cercocarpus minutifolius*)
 Southern California rufous-crowned sparrow (*Aimophila ruficeps canescens*)
 Southwestern arroyo toad (*Bufo microscaphus californicus*)
 Tecate cypress (*Cupressus forbesii*)

The Catalina mariposa lily, heart-leaved pitcher sage, Santa Monica mountains dudleya, small-flowered mountain mahogany, and Tecate cypress are not expected to occur in the BSA. The remaining species have either been observed or may occur in the BSA and could be impacted by the Project. However, the NCCP mitigates for all impacts on these species.

Recommended Action

See Mitigation Measure #1 and standard construction minimization measures (PDF-3). No additional mitigation measures would be required.

6.4 CONDITIONALLY COVERED SPECIES

The following is a list of species that are conditionally covered species with a brief explanation of the status of this species in the BSA:

Pacific Pocket Mouse (*Perognathus longimembris pacificus*)

The Pacific pocket mouse is not expected to occur in the BSA because it is outside of its current known range.

[Southwestern] Arroyo Toad (*Bufo microscaphus californicus*)

Potential habitat for the arroyo toad is present in the BSA. Focused surveys for this species were conducted downstream of Santiago Creek Dam in 2020 and upstream of Irvine Lake in 2022; no arroyo toad were observed. Therefore, this species is not expected to occur.

Least Bell's Vireo (*Vireo bellii pusillus*)

Potential habitat for the least Bell's vireo is present in the BSA. Focused surveys for this species were conducted downstream of Santiago Creek Dam in 2020; no vireo were observed. Focused surveys for this species were conducted upstream of Santiago Creek Dam in 2022; least Bell's vireo were observed throughout riparian scrub/woodland habitat at the upper end of Irvine Lake, along Santiago Creek, and in the southern portion of Irvine Lake. Least Bell's vireo was incidentally observed in the riparian habitat downstream of the dam during focused surveys conducted in summer 2024.

Recommended Action

See Mitigation Measure #6.

Southwestern Willow Flycatcher (*Empidonax trailii extimus*)

Potential habitat for the southwestern willow flycatcher is present in the BSA upstream of Santiago Creek Dam. Focused surveys for this species were conducted in 2022; no southwestern willow flycatchers were observed. Therefore, this species is not expected to occur in the BSA.

Quino Checkerspot Butterfly (*Euphydryx netha quino*)

Potential habitat for the quino checkerspot butterfly is present in the BSA. Focused surveys were conducted for this species in 2022; no quino checkerspot were conducted. Therefore, this species is not expected occur in the BSA.

Riverside Fairy Shrimp (*Streptocephalus woottoni*)

This species is not expected to occur in the BSA due to lack of suitable habitat.

San Diego Fairy Shrimp (*Branchinecta sandeigonsis*)

This species is not expected to occur in the BSA due to lack of suitable habitat.

Golden Eagle (*Aquila chrysaetos*)

This species may forage and nest in the BSA due to the presence of suitable foraging habitat and nesting habitat adjacent to the BSA.

Recommended Action

With implementation of standard pre-construction surveys and nesting bird protection (PDF-5), no mitigation would be required.

Prairie Falcon (*Falco mexicanus*)

This species may forage and nest in the BSA due to the presence of suitable foraging habitat and nesting habitat adjacent to the BSA.

Recommended Action

With implementation of standard pre-construction surveys and nesting bird protection (PDF-5), no mitigation would be required.

Intermediate [Foothill] Mariposa Lily (*Calochortus weedii* var. *intermedius*)

Potential habitat for the Intermediate mariposa lily is present in the BSA. Focused surveys for this species were conducted downstream of Santiago Creek Dam in 2020, and one individual mariposa lily was observed. Focused surveys for this species were conducted upstream of Santiago Creek Dam in 2022, and five individual intermediate mariposa lilies were observed in three locations. The intermediate mariposa lily location downstream of the dam is within the temporary impact area and would be impacted if it cannot be avoided during construction. The remaining intermediate mariposa lily locations observed are outside the permanent and temporary impact areas for the Project. Two of the intermediate mariposa lily locations (consisting of four individuals) are located within the additional inundation area; however, they are already located at the edge of the existing inundation area and would not be expected to be significantly impacted. Additionally, the NCCP/HCP covers the loss of up to 20 intermediate mariposa lily individuals; therefore, the loss of one individual within the temporary impact area plus the potential loss of four individuals within the additional inundation area would be covered by the NCCP/HCP.

Recommended Action

See Mitigation Measure # 4. No mitigation would be required.

6.5 COVERED HABITATS

The following is a list of habitats that are covered by the Central Subarea of the Central/Coastal Subregion NCCP/HCP:

- Oak woodlands
- Tecate cypress forest
- Cliff and Rock

Tecate cypress forest does not occur in the BSA.

Oak woodland occurs in the BSA as coast live oak woodland. The Project would impact 3.31 acres of coast live oak woodland habitat (0.48 acre permanent; 2.78 acres temporary; and 0.05 acre within the SCE realignment). Raising the spillway would also temporarily impact 0.50 acre of coast live oak woodland within the additional inundation area.

Cliff and rock occur in the BSA as cliff. A total of 0.52 acre (0.30 acre permanent, 0.21 acre temporary; 0.01 acre within the SCE realignment) of cliff would be impacted to construct the Project. Raising the spillway would also temporarily impact 0.01 acre of cliff within the additional inundation area.

The NCCP/HCP fully mitigates for all impacts on these habitat types.

Recommended Action

See Mitigation Measure #3 regarding replacement of coast live oak trees. No mitigation measures would be required for the loss of oak woodland habitat.

6.6 MIGRATORY BIRD TREATY ACT

The original Migratory Bird Treaty Act of 1918 implemented the 1916 Convention between the United States and Great Britain (for Canada) for the protection of migratory birds. Specific provisions of the statute include the establishment of a Federal prohibition, unless permitted, to “pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess, offer for sale, sell, offer to purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird, included in the terms of the Convention ... for the protection of migratory birds ... or any part, nest, or egg of any such bird.”

Bird species protected under the provisions of the Migratory Bird Treaty Act are identified by the List of Migratory Birds (Title 50 of the Code of Federal Regulations, Section 10.13 as updated by 1983 AOU Check-list and published supplements through 1995, U.S. Fish and Wildlife Service).

Section 8.3.7 of the NCCP/HCP Implementation Agreement authorizes the participating landowners who possess a 10(a) permit under this program to take species covered by the permit in the amount and/or number and subject to the same terms and conditions as

specified in the permit. Any such take will not be in violation of the Migratory Bird Treaty Act of 1918 as amended (16 U.S.C. §§ 703-12).

Recommended Action

With implementation of standard pre-construction surveys and nesting bird protection (PDF-5), no mitigation would be required.

7.0 LEVEL OF SIGNIFICANCE AFTER MITIGATION

Assuming impacts to mud nama can be reduced to less than 50 percent of the population mapped in 2022 through refinement of Project design, the impact will be reduced to less than significant with the incorporation of recommended mitigation. For all other impacts, implementation of the recommended mitigation measures will mitigate biological impacts to a level that is considered less than significant.

8.0 REFERENCES

- American Ornithological Society (AOS). 2024 (July). *Check-list of North and Middle American Birds (7th ed., as revised through 65th Supplement)*. *Ornithology* 141(ukae019). Washington, D.C.: AOU. <https://checklist.americanornithology.org/taxa/>
- Atwood, J.L. 1992. *Rare, Local, Little-Known, and Declining North American Breeders – A Closer Look*. *Birding* 25: 228-233.
- Atwood, J.L. 1990. Status Review of the California Gnatcatcher (*Poliophtila californica*). Manomet Bird Observatory, Manomet, MA.
- Baldwin, B.G., D.J. Keil, R. Patterson, T.J. Rosatti, and D.H. Wilken (Eds.). 2012. *The Jepson Manual: Vascular Plants of California* (Second ed.). Berkeley, CA: University of California Press.
- Bennett, A.F. 1990. Habitat Corridors and the Conservation of Small Mammals in the Fragmented Forest Environment. *Landscape Ecology* 4(2-3):109–122. New York, NY: International Association for Landscape Ecology.
- California Department of Fish and Wildlife (CDFW). 2025a (March 12, date accessed). California Natural Diversity Database. Records of Occurrence for the USGS Black Star Canyon, Orange, Tustin, and El Toro 7.5-minute quadrangles. Sacramento, CA: CDFW, Natural Heritage Division.
- . 2025b (February 27). *California Natural Communities List*. Natural Communities List Arranged Alphabetically by Life Form (PDF). Sacramento, CA: CDFW Biogeographic Data Branch. <https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=153398&inline>.
- . 2025c (January). *Special Vascular Plants, Bryophytes, and Lichens List*. Sacramento, CA: CDFW, Natural Heritage Division. <https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=109383&inline>.
- . 2025d (January). *Special Animals List*. Sacramento, CA: CDFW, Natural Heritage Division. <https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=109406&inline>.
- . 2024a (January 19, date accessed). *Bald Eagles in California*. California Department of Fish and Wildlife. <http://wildlife.ca.gov/Conservation/Birds/Bald-Eagle>
- . 2024b (December 18, date accessed). *Petitions to List Species Under the California Endangered Species Act, Petitions, Notices and Documents, Mountain Lion*. California Fish and Game Commission. <https://fgc.ca.gov/cesa#ml>.
- . 2024c (March). *Report to the Fish and Game Commission. Evaluation of the petition from San Francisco Baykeeper, The Bay Institute, Restore the Delta, and California Sportfishing Protection Alliance to list White Sturgeon (Acipenser transmontanus) as threatened under the California Endangered Species Act*. California Department of Fish and Wildlife.

- . 2023. (June 6). *Survey Considerations for California Endangered Species Act (CESA) Candidate Bumble Bee Species*. Sacramento, CA: CDFW.
- . 2021 (May 18). Office of Administrative Law's Notice ID #Z2019-0716-03 and Z2020-0421-01 Petition to List Mountain Lion (*Puma concolor*) as a Threatened or Endangered Species. <https://fgc.ca.gov/CESA#ml>.
- . 2018 (March 20). *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities*. Sacramento, CA: CDFW.
- . 2014. California Wildlife Habitat Relationships System (version 9.0 personal computer program). Life History Accounts for Species in Table 8. Sacramento, CA: CDFW, California Interagency Wildlife Task Group. <https://www.wildlife.ca.gov/Data/CWHR>.
- . 2000. Biogeographic Data Branch (CDFW BDB). California Wildlife Habitat Relationships System (CWHR). Western Pond Turtle (*Actinemys marmorata*). By: S. Morey. California Interagency Wildlife Task Group. Sacramento, CA: CDFW BDB. <https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=2657&inline=1>.
- California Department of Forestry and Fire Protection (CAL FIRE). 2020 (December 17, Accessed March 26, 2021). Incident information: Bond Fire. <https://www.fire.ca.gov/incidents/2020/12/2/bond-fire/>.
- CalFire. 2023 (October 23). Statistics. <https://www.fire.ca.gov/our-impact/statistics>.
- California Native Plant Society (CNPS). 2025 (March 12, date accessed). Inventory of Rare and Endangered Plants (online edition, v-9.5). Records of Occurrence for the USGS Black Star Canyon, Orange, Tustin, and El Toro 7.5-minute quadrangles. Sacramento, CA: CNPS. <http://www.rareplants.cnps.org/>.
- . 2024 (January 19, date accessed). A Manual of California Vegetation, Online Edition. Sacramento, CA: CNPS. <https://vegetation.cnps.org>.
- California Irrigation Management Information System (CIMIS). 2020. CIMIS Monthly Report for Irvine – South Coast Valleys Station #75. Sacramento, CA: California Department of Water Resources, CIMIS. <http://www.cimis.water.ca.gov>.
- Center for Biological Diversity. 2019 (June 25). A Petition to List the Southern California/Central Coast Evolutionarily Significant Unit (ESU) of Mountain Lions as Threatened under the California Endangered Species Act (CESA). Oakland, CA: Center for Biological Diversity. <https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=171208&inline>.
- Clarke, O.F., D. Svehla, G. Ballmer, and A. Montalvo. 2007. *Flora of the Santa Ana River and Environs with References to World Botany*. Berkeley, CA: Heyday Books.

- Collins, Paul W. 1999b. Rufous-crowned Sparrow (*Aimophila ruficeps*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/472>.
- Consortium of California Herbaria (CCH). 2023. Consortium of California Herbaria. Data provided by the participants of the Consortium of California Herbaria for plants listed in Table 2. Berkeley, CA: University of California. <http://ucjeps.berkeley.edu/consortium/>.
- Cregg, Bert. 2013 (April 25). *Trees and flooding FAQs*. East Lansing, Michigan: Michigan State University Extension, Department of Horticulture and Department of Forestry. https://www.canr.msu.edu/news/trees_and_flooding_faqs.
- Crother, B.I. (Ed.). 2017 (September). Scientific and Standard English Names of Amphibians and Reptiles of North America North of Mexico, with Comments Regarding Confidence in Our Understanding. *Society for the Study of Amphibians and Reptiles Herpetological Circular* 43:1–102. <https://ssarherps.org/wp-content/uploads/2017/10/8th-Ed-2017-Scientific-and-Standard-English-Names.pdf>
- Curtis, K.E. and R.W. Lichvar. 2010 (July). *Updated Datasheet for the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States*. Hanover, NH: USACE, Engineer Research and Development Center, Cold Regions
- Environmental Laboratory. 1987. *Corps of Engineers Wetlands Delineation Manual* (Technical Report Y-87-1). Vicksburg, MS: U.S. Army Engineer Waterways Experiment Station.
- Faber-Langendoen, D., L. Master, J. Nichols, K. Snow, A. Tomaino, R. Bittman, G. Hammerson, B. Heidel, L. Ramsay, and B. Young. 2012 (June). *NatureServe Conservation Status Assessments: Methodology for Assigning Ranks* (Revised Edition). Arlington, VA: NatureServe. http://www.natureserve.org/sites/default/files/publications/files/natureserve_conservationstatusmethodology_jun12_0.pdf.
- Fahrig, L. and G. Merriam. 1985. Habitat Patch Connectivity and Population Survival. *Ecology* 66(6): 1762–1768. Tempe, AZ: Ecological Society of America.
- Francis, Robert A. et al. 2005. Survival and Growth Responses of *Populus nigra*, *Salix elaeagnos* and *Alnus incana* cuttings to varying levels of hydric stress. *Forest Ecology and Management* 210:291–301. Cambridge, MA: Elsevier.
- Goodman, R.H. 1999. *Relocation Project of the Southwestern Pond Turtle (*Clemmys marmorata pallida*) from the San Gabriel Dam to the Upper West Fork of the San Gabriel River*. Irvine, CA: Chambers Group, Inc.
- Germano, D.J., and R.B. Bury. 2001. Western Pond Turtles (*Clemmys marmorata*) in the Central Valley of California: Status and Population Structure. *2001 Transactions of the*

- Western Section of the Wildlife Society*. 37:22–36. Rancho Cordova, CA: The Wildlife Society, Western Section.
- Glenz, C. et al. 2006. Flooding Tolerance of Central European Tree and Scrub Species. *Forest Ecology and Management* 235:1–13. Cambridge, MA: Elsevier.
- Good, J.E.G. et al. 1992. Species and Clonal Variation in Growth Responses to Waterlogging and Submersion in the Genus *Salix*. *Proceedings of the Royal Society of Edinburgh* 98:21–48. Cambridge, England: Cambridge University Press.
- Gray, J. and D. Bramlet. 1992. *Habitat Classification System Natural Resources Geographic Information System (GIS) Project* (Prepared for the County of Orange Environmental Management Agency). Santa Ana, CA: Gray and Bramlet.
- Harris, L.D. and P.B. Gallagher. 1989. New Initiatives for Wildlife Conservation: The Need for Movement Corridors (pp. 11–34). *Preserving Communities and Corridors* (G. Mackintosh, Ed.). Washington, D.C.: Defenders of Wildlife.
- Hayes, Erin. 2023 (May 4). Personal communication. Email between Erin Hayes (OC Parks) and Jacob Moeder (IRWD) regarding the type and amount of fish that are stocked in Irvine Lake by OC Parks.
- Hickman, J.C., Ed. 1993. *The Jepson Manual of Higher Plants of California*. Berkeley, CA: University of California Press.
- Irvine Ranch Water District (IRWD). 2020 (April 16, date accessed). About Irvine Lake. Irvine, CA: IRWD. <https://www.irwd.com/construction/irvine-lake>.
- Jennings, M.R., and M.P. Hayes. 1994. Amphibian and reptile species of special concern in California. Report to the California Department of Fish and Game, Inland Fisheries Division, Rancho Cordova, California. 255 pp.
- Jepson Flora Project. 2024 (January 19). Jepson eFlora (Records for common species in the Plant Compendium and all species descriptions). Berkeley, CA: The Jepson Herbarium. <http://ucjeps.berkeley.edu/eflora/>.
- Lichvar, R.W. and S.M. McColley. 2008 (August). *A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States, A Delineation Manual*. Hanover, NH: USACE, Engineer Research and Development Center, Cold Regions Research and Engineering Laboratory.
- Lordson, Brian. 2020 (February 25). Sounding the alarm: Wildfire exposure and prevention in construction. https://axaxl.com/fast-fast-forward/articles/sounding-the-alarm_wildfire-exposure-and-prevention-in-construction.
- MacArthur, R.H. and E.O. Wilson. 1967. *The Theory of Island Biogeography*. Princeton, NJ: Princeton University Press.
- Munz, P.A. 1974. *A Flora of Southern California*. Berkeley, CA: University of California Press.

- National Park Service. 2022 (March). Wildfire Causes and Evaluations. <https://www.nps.gov/articles/wildfire-causes-and-evaluation.htm>.
- Noss, R.F. 1983. A Regional Landscape Approach to Maintain Diversity. *BioScience*. 33(11): 700–706. Washington, D.C.: American Institute of Biological Sciences.
- Orange, County of. 1996a (July). *Natural Community Conservation Plan and Habitat Conservation Plan, County of Orange, Central and Coastal Subregion*. Santa Ana, CA.
- . 1996b (July). *Implementation Agreement Regarding the Natural Community Conservation Plan for the Central/coastal Orange County Subregion of the Coastal Sage Scrub Natural Community Conservation Program*. Santa Ana, CA.
- Pareti, Jennifer. 2024 (October 23). Personal communication. Email between Jennifer Pareti (CDFW) and Amber Heredia (Psomas) and Andy Uk (IRWD) regarding the release site for the possible translocation of Santa Ana speckled dace by CDFW.
- Proudfoot, G.A., Sherry, D.A., and Johnson, S. 2000. Cactus Wren (*Campylorhynchus brunneicapillus*) in the Birds of North America (A. Poole and F. Gill, eds.) no. 558. Birds of North America. Philadelphia.
- Psomas. 2024a (September 19) *Results of a Focused Presence/Absence Surveys for Crotch's Bumble Bee for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California*. Santa Ana, CA: Psomas.
- . 2024b (October 21) *Results of Visual Survey and Trapping Program for Southwestern Pond Turtle for the Santiago Creek Dam Outlet Tower and Spillway Improvements Project, Orange County, California*. Santa Ana, CA: Psomas.
- . 2022a (September 27). *Results of Special Status Plant Surveys for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California*. Santa Ana, CA: Psomas.
- . 2022b (May 2). *Results of Focused Presence/Absence Surveys for the Quino Checkerspot Butterfly for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California*. Santa Ana, CA: Psomas.
- . 2022c (August 23). *Results of Focused Presence/Absence Surveys for Arroyo Toad for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California*. Santa Ana, CA: Psomas.
- . 2022d (July 25). *Results of the Coastal California Gnatcatcher Survey for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California*. Santa Ana, CA: Psomas.
- . 2022e (September 27). *Results of Focused Presence/Absence Surveys for the Least Bell's Vireo and Southwestern Willow Flycatcher for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California*. Santa Ana, CA: Psomas.

- . 2022f (September 27). *Results of Focused Presence/Absence Surveys for the Western Yellow-billed Cuckoo for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California*. Santa Ana, CA: Psomas.
- . 2020a (August 18). *Results of Focused Presence/Absence Surveys for Arroyo Toad for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California*. Santa Ana, CA: Psomas.
- . 2020b (August 24). *Results of the Coastal California Gnatcatcher Survey for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California*. Santa Ana, CA: Psomas.
- . 2020c (August 26). *Results of Focused Presence/Absence Surveys for the Least Bell's Vireo for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California*. Santa Ana, CA: Psomas.
- . 2020d (September 3). *Results of Special Status Plant Surveys for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California*. Santa Ana, CA: Psomas.
- Roberts, F.M. 2008. *The Vascular Plants of Orange County, California: An Annotated Checklist*. San Luis Rey, CA: F.M. Roberts Publications.
- Ruben, J.A. and W.J. Hillenius. 2005 (May). Cold Blooded. *Natural History*. New York, NY: American Museum of Natural History.
- Shuford, W.D. and T. Gardali (Eds.). 2008. California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California. *Studies of Western Birds 1*. Camarillo, CA and Sacramento, CA: Western Field Ornithologists and CDFG (respectively).
- Simberloff, D. and J. Cox. 1987. Consequences and Costs of Conservation Corridors. *Conservation Biology* 1(1): 63–71. Boston, MA: Blackwell Scientific Publications.
- Smithsonian National Museum of Natural History (SNMNH). 2011. Mammal Species of the World (3rd ed.) (a database based on Wilson, D.E., and D.M. Reeder's 2005 publication entitled Mammal Species of the World, A Taxonomic and Geographic Reference, 3rd ed.). Washington, D.C.: SNMNH.
<https://www.departments.bucknell.edu/biology/resources/msw3/>.
- Soule, M.E. 1987. *Viable Populations for Conservation*. New York, NY: Cambridge University Press.
- Spinks, P.Q., G.B. Pauly, J.J. Crayon, and H.B. Shaffer. 2003. "Survival of the western pond turtle (*Emys marmorata*) in an urban California environment." US Geological Survey Staff— -- Published Research. University of Nebraska: USGS. 526.
<http://digitalcommons.unl.edu/usgsstaffpub/526>.

- State Water Resources Control Board (SWRCB). 2019 (April 2). *State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State*. https://www.waterboards.ca.gov/water_issues/programs/cwa401/docs/procedures_conformed.pdf.
- Stebbins, R.C. 2003. *A Field Guide to Western Reptiles and Amphibians* (3rd ed.). Boston, MA: Houghton-Mifflin Company.
- Tallent-Halsell, N.G. and L.R. Walker. 2002 (December). Responses of *Salix Goodingii* and *Tamarix Ramosissima* to Flooding. *Wetlands* 22(4):776–785. Fargo, ND: The Society of Wetland Scientists.
- Tietje et al. 2005. Oak Woodlands as Wildlife Habitat. *A Planner's Guide for Oak Woodlands, Second Edition*. Davis, CA: University of California. <https://anrcatalog.ucanr.edu/pdf/3491E.pdf>.
- Unitt, P. 1984. *The Birds of San Diego County*. San Diego Society of Natural History, Memoir 13, San Diego, CA.
- URS Corporation (URS). 2015 (July). *Santiago Creek Dam Outlet Tower Seismic Evaluation Structural Engineering Services*. Oakland, CA: URS.
- U.S. Army Corps of Engineers (USACE). 2008. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (Version 2.0). (J.S. Wakeley, R.W. Lichvar, and C.V. Noble, Eds.). Vicksburg, MS: U.S. Army Engineer Research and Development Center.
- U.S. Department of Agriculture, Natural Resources Conservation Service (USDA NRCS). 2020 (April 16, date accessed). State Soil Data Access Hydric Soils List. Washington, D.C.: USDA, NRCS. <http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/use/hydric/>.
- U.S. Department of Agriculture, U.S. Forest Service (USDA USFS). 2023 (June 17, date accessed). Put on Your Eagle Eyes! It's Time to Count Eagles! San Bernardino National Forest. San Bernardino, CA. <https://www.fs.usda.gov/detail/sbnf/news-events/?cid=STELPRDB5408473>.
- U.S. Environmental Protection Agency (USEPA). 2017 (January 17, last update). Climate Change. Washington, D.C.: USEPA. https://19january2017snapshot.epa.gov/climatechange/climate-change-basic-information_.html.
- U.S. Fish and Wildlife Service. 2024a (August 13). Endangered and Threatened Wildlife and Plants; Threatened Species Status With Section 4(d) Rule for the Santa Ana Speckled Dace. Federal Register Vol. 89, No. 156.
- . 2024b (December 12). Endangered and Threatened Wildlife and Plants; Threatened Species Status With Section 4(d) Rule for Monarch Butterfly and Designation of Critical Habitat. Federal Register Vol. 89, No. 239.

- . 2023 (June 17, date accessed). Monarch butterfly (*Danaus plexippus*). Environmental Conservation Online System. <https://ecos.fws.gov/ecp/species/9743#lifeHistory>.
- . 2007 (December 19). Endangered and Threatened Wildlife and Plants; Revised Designation of Critical Habitat for the Coastal California Gnatcatcher (*Polioptila californica californica*); Final Rule. *Federal Register* 72(243): 72009–72213. Washington, D.C.: USFWS.
- . 2001 (January 19). Least Bell's Vireo Survey Guidelines. Carlsbad, CA: USFWS.
- . 1999. Arroyo southwestern toad (*Bufo microscaphus californicus*) recovery plan. Portland, Oregon. 119 pp. <http://www.amphibians.org/wp-content/uploads/2013/07/Arroyo-Southwestern-Toad-Recovery-Plan.pdf>.
- . 1997a (February 28). *Coastal California Gnatcatcher (Polioptila californica californica) Presence/Absence Survey Guidelines*. Washington, D.C.: USFWS.
- . 1997b (July 28). *Coastal California Gnatcatcher (Polioptila californica californica) Presence/Absence Survey Protocol*. Washington, D.C.: USFWS.
- . 1992. Endangered and threatened wildlife and plants; 90-day finding and commencement of status reviews for a petition to list the western pond turtle and California red-legged frog. *Federal Register*. 57:45761–45762. Washington, D.C.: USFWS.
- United States Forest Service. 2018. Pacific Southwest Region, Climate Change. <https://www.fs.usda.gov/main/r5/climatechange>
- U.S. Department of the Interior, U.S. Geological Survey (USGS). 2006a. Draft USGS Western Pond Turtle (*Emys marmorata*) Visual Survey Protocol for the Southcoast Ecoregion. Sacramento, CA: USGS.
- . 2006b. Draft USGS Western Pond Turtle (*Emys marmorata*) Trapping Survey Protocol for the Southcoast Ecoregion. Sacramento, CA: USGS.
- Williams, P.H., Thorp, R.W., Richardson, L.L. and Colla, S.R. 2014. *The Bumble bees of North America: An Identification guide*. Princeton University Press, Princeton.
- Xeres Society. 2023 (June 12, date accessed). Western Monarch Count. Xeres Society for Invertebrate Conservation. <https://www.westernmonarchcount.org>.
- . 2016 (June). State of the Monarch Butterfly Overwintering Sites in California. Prepared for the U.S. Fish and Wildlife Service by the Xeres Society for Invertebrate Conservation. https://www.xerces.org/sites/default/files/2018-05/16-015_01_XercesSoc_State-of-Monarch-Overwintering-Sites-in-California_web.pdf.
- Zeiner, D.C., W.F. Laudenslayer Jr., K.E. Mayer, M. White (Eds). 1990. *California's Wildlife Vol. 3: Mammals*. Sacramento, CA: CDFG, The Resources Agency.

- . 1988-1990. California's Wildlife. Vol. I-III. California Depart. of Fish and Game, Sacramento, California.

APPENDIX A

GEOTECHNICAL INVESTIGATION MEMORANDUMS

SANTIAGO DAM GEOTECHNICAL INVESTIGATIONS BIOLOGICAL RESOURCES MEMORANDUM

December 14, 2023

To: Andy Uk
IRWD

From: Amber Heredia
Psomas

As part of a larger Santiago Creek Dam Outlet Tower and Spillway Improvements Project (Project), Irvine Ranch Water District (IRWD) and Serrano Water District (SWD) propose to conduct additional geotechnical investigations (hereinafter referred to as the “geotechnical investigations”) to provide necessary geologic and geotechnical data to inform the Project’s design engineering of a new spillway. The geotechnical investigations include geotechnical exploratory test pits and geophysical seismic refraction lines. The geotechnical investigation would be entirely within the Project’s permanent or temporary impact footprint. The purpose of this Memorandum is to evaluate the proposed impact of the geotechnical investigation program on Biological and Jurisdictional Resources.

No cultural resources are known to occur within the limits of the proposed geotechnical investigation.

Project Background

IRWD and SWD jointly own and operate Irvine Lake and the Santiago Creek Dam that serves as a critical water supply for both districts. Santiago Creek Dam is a compacted earthfill embankment completed in 1933 and certified by the State of California, Department of Water Resources (DWR), Division of Safety of Dams (DSOD). Santiago Creek Dam impounds water for Irvine Lake on Santiago Creek, a tributary to the Santa Ana River. A seismic assessment requested by the DSOD found that the spillway is nearing the end of its useful life, and the design does not meet current standards. To meet current DSOD regulatory requirements and improve water supply reliability, IRWD and SWD propose to rehabilitate and replace the Santiago Creek Dam outlet tower and spillway structure by implementing the Project. The area of the proposed new spillway is critical to the overall design of the Project, however there is limited historical subsurface information of the area. There is the potential for significant cost implications without reliable soil characterizations in advance of finalizing the design.

In 2020, the DSOD downgraded the condition of the dam to the second to the lowest possible rating due to the two known deficiencies (issues with the spillway and outlet tower). DSOD further restricted the operating levels of the reservoir, which limits the ability to store local runoff water supplies for the benefit of the region. DSOD, IRWD, and SWD agreed to repair the known deficiencies by 2029. Because the existing dam must remain in place and operational throughout the course of construction of the spillway structure, the bulk of the construction must occur in the summer dry seasons. Milestones at the end of each dry season have been established so that the contractor will be able to winterize the Project and be ready for the next dry season. The Project is scheduled to begin construction in the first dry season of 2025 and to be completed by 2029. The proposed geotechnical investigations are needed to inform the final design so that the project construction can start in the dry season of 2025.

Project Location

The Project is located at Santiago Creek Dam at the northwest end of Irvine Lake in unincorporated Orange County, California. It is south of State Route (SR) 261 and east of SR-241 and Santiago Canyon Road. Surrounding land use primarily consists of undeveloped open space. Irvine Regional Park is located northwest of SR-241; Limestone Canyon Regional Park is located south of Santiago Canyon

Andy Uk
 December 14, 2023
 Page 2

Road; and Oak Canyon Park is located at the southeast end of Irvine Lake. The closed Santiago Canyon Landfill is located adjacent to the west of Irvine Lake. Residential development is located east of SR-241.

The Project is located on the U.S. Geological Survey's (USGS') Black Star Canyon 7.5-minute quadrangle. Irvine Lake (named Santiago Creek Reservoir on the USGS) was created by constructing a dam across Santiago Creek. Santiago Creek, a named blueline stream, enters Irvine Lake from the east and continues downstream of the dam flowing north and then west, ultimately reaching the Santa Ana River. Elevations on the Project site range from approximately 657 to 996 feet above mean sea level.

The Project is located in the Central/Coastal Subregion of the Natural Communities Conservation Plan/Habitat Conservation Plan (NCCP/HCP). Santiago Dam and its associated structures are located within designated "Non-Reserve Open Space". IRWD is a participating jurisdiction; Santiago Dam is a permitted existing use under the NCCP/HCP.

The geotechnical investigation sites are on the downstream side of the dam within the disturbance footprint of the proposed new spillway, which runs partly along Santiago Creek and partly in the adjacent uplands. The area is along the chute of the new spillway structure at the stilling basin (Exhibit 1).

Description of Geotechnical Investigation Work:

To inform the design of the spillway structure, the proposed geotechnical investigations are needed to provide necessary geologic and geotechnical information to fully characterize the existing soil and subsurface conditions at the site of the new spillway structure.

IRWD/SWD propose to conduct 10 geotechnical exploratory test pits and 4 geophysical survey transects downstream of the existing dam where the new spillway would be constructed. Each geotechnical test pit would be approximately 10 feet deep and would be 3 feet in diameter; the work area around each test pit is assumed to be 20 feet by 20 feet. At the test pit locations, contractors will utilize a small rubber-tracked mounted excavator with an excavation bucket for digging and tracking over brush. This work is expected to require six to seven days to complete. Test pit locations as shown on Exhibit 1 were selected based on the location of the proposed spillway and information needed. These locations may be modified by IRWD and SWD as needed in the field to avoid trees, sensitive vegetation, or jurisdictional areas, if needed. Samples of subsurface materials would be collected from the test pits for examination and laboratory testing. Following the completion of the test pit, each hole would be backfilled using the dirt spoils that came from the hole.

The four geophysical seismic refraction lines would be conducted at the site of the new spillway structure to evaluate bedrock and seismic conditions. The geophysical refraction lines would not require digging/trenching, but may require removal of minimal vegetation if it cannot be avoided to allow the laying of the cable. A minimum 10-inch width area is needed for the cable. The cable can be snaked around shrubs as needed. If any vegetation removal is needed, it would be performed using hand tools (e.g., loppers, pruners, shovels, and picks). Although only 10 inches would be needed in some locations, this analysis assumes an average disturbance width of 3 feet because some areas may require removal of a limited amount of shrubs. Removal of trees would be avoided. No surface soil would be removed. This work is expected to require six to seven days to complete.

The geotechnical investigations will be accessed using existing dirt roads adjacent to existing downstream control structure and storage shed. One test pit will be accessed from the dam crest and spillway overlook. Temporary access routes from the existing dirt roads to each test pit would be needed. Where feasible,

Andy Uk
December 14, 2023
Page 3

temporary access would be established by the “drive and crush” method to limit vegetation disturbance. The drive and crush method involves substantially less disturbance than blading of the surface material; some vegetation would be crushed, but would not be cut or removed, allowing it to retain the root structure and resprout in place.

Each individual geotechnical investigation activity is anticipated to be completed within one working day and would not result in open pits beyond working hours. A limited number of workers (typically about five) would be required to perform the work. Workers would commute individually and would park in a designated existing staging area (e.g., along established dirt roads). There would be no nighttime work conducted as part of the geotechnical investigations.

Access roads in Santiago Creek and within native vegetation would be needed to access all the geotechnical testing sites. The access roads in jurisdictional waters and coastal sage scrub would be limited to a width of 8 feet 6 inches, which is the width of the proposed backhoe (i.e., CASE CX-1450 backhoe with rubber treads). Some minor grading may be needed along the temporary access roads, but wherever possible, the backhoe would be walked up to each test pit site to minimize disturbance to the streambed and sensitive vegetation. The backhoe would be walked in following a Biological Monitor who would help to find a path to minimize impacts to native vegetation to the extent possible.

Prior to the geotechnical work, the Biological Monitor will conduct a Worker Environmental Awareness Program (WEAP) training with the contractor to inform the workers of the environmental sensitivity of the area. The Biological Monitor will walk the proposed work areas and access routes with the Geotechnical Contractor. The Biological Monitor will make suggestions by slightly shifting or narrowing the access road and/or proposed work areas to site the geotechnical disturbance in previously disturbed areas and to avoid or minimize impacts to sensitive shrubs (i.e., coastal sage scrub or riparian) and jurisdictional resources. The Biological Monitor will flag the shrubs to be avoided along the access route prior to work activities and will monitor the work to ensure that impacts are minimized to the extent practicable. In addition, to reduce the potential for the spread of weed seeds, all heavy equipment will be cleaned (including wheels, tracks, undercarriages, and bumpers as applicable) before delivery to the site.

If needed, depending on project timing, a pre-construction nesting bird survey will be conducted by the Biological Monitor prior to any work activities. The Biological Monitor will establish a protective buffer around any active nests, and work may be redirected, as needed, to avoid these areas. The geotechnical work is currently proposed to occur during the non-breeding season (i.e., September 1 to February 14) of the federally Threatened coastal California gnatcatcher (*Poliopitila californica californica*).

Because the geotechnical investigations would impact the same areas as the future Project, IRWD and SWD propose to use mitigation proposed for the Project to offset impacts associated with the geotechnical investigations.

Methods

In support of the Project and its Environmental Impact Report (EIR) (Psomas [in preparation]), Psomas conducted a literature review that included the following: (1) a database search of the California Natural Diversity Database (California Department of Fish and Wildlife [CDFW] 2023); (2) a database search of the Electronic Inventory of the California Native Plant Society (CNPS 2023); (3) the Information for Planning and Consultation Database (U.S. Fish and Wildlife Service [USFWS] 2023); and (4) Central-Coastal NCCP/HCP (County of Orange 1996) requirements applicable to the Project.

Andy Uk
December 14, 2023
Page 4

Psomas Senior Biologist Allison Rudalevige conducted vegetation mapping and general plant and wildlife surveys downstream of the dam on February 25, 2020. Ms. Rudalevige conducted a jurisdictional delineation downstream of the dam on March 24, 2020. Psomas Senior Biologist Jonathan Aguayo conducted focused surveys for arroyo toad downstream of the dam in spring/summer 2020. Psomas Senior Biologist Lindsay Messett conducted focused surveys for coastal California gnatcatcher and least Bell's vireo (*Vireo bellii pusillus*) downstream of the dam in spring/summer 2020. Ms. Rudalevige conducted focused surveys for special status plants in spring/summer 2020. Ms. Messett conducted focused surveys for Quino checkerspot (*Euphydryas editha quino*) in spring 2022. Detailed methods for these biological surveys are provided in the Biological Technical Report and Jurisdictional Delineation Report (Psomas 2023a, 2023b).

Existing Conditions

Vegetation Types

Existing conditions are described in detail in the Biological Technical Report for the Project (Psomas 2023a). The following vegetation types and other areas occur within or adjacent to the geotechnical investigations area downstream of the dam: sagebrush scrub (2.3.6)¹, disturbed sagebrush scrub (2.3.6), disturbed floodplain sage scrub (2.6), toyon–sumac chaparral (3.12), annual grassland (4.1), southern willow scrub (7.2), mulefat scrub (7.3), coast live oak woodland (8.1), western sycamore (8.x²), cliff (10.0), open water (12.1), developed (15.6), and disturbed (16.1).

Wildlife

No fish are expected to occur in the geotechnical investigations area because Santiago Creek is ephemeral downstream of the dam.

Amphibian species that may occur in the geotechnical investigations area include western toad (*Anaxyrus boreas*), California treefrog (*Pseudacris cadaverina*), Baja California treefrog (*Pseudacris hypochondriaca*), garden slender salamander (*Batrachoseps major major*), black-bellied salamander (*Batrachoseps nigriventris*), and arboreal salamander (*Aneides lugubris*).

Common reptile species that may occur in the geotechnical investigations area include common side-blotched lizard (*Uta stansburiana*), western fence lizard (*Sceloporus occidentalis*), southern alligator lizard (*Elgaria multicarinata*), western skink (*Plestiodon skiltonianus*), red racer (*Coluber flagellum piceus*), California striped racer (*Coluber lateralis lateralis*), California kingsnake (*Lampropeltis californiae*), gopher snake (*Pituophis catenifer*), and southern Pacific rattlesnake (*Crotalus oreganus helleri*).

The following resident bird species may occur in the geotechnical investigations area: California quail (*Callipepla californica*), mourning dove (*Zenaida macroura*), Anna's hummingbird (*Calypte anna*), acorn woodpecker (*Melanerpes formicivorus*), northern flicker (*Colaptes auratus*), black phoebe (*Sayornis nigricans*), Say's phoebe (*Sayornis saya*), California scrub jay (*Aphelocoma californica*), American crow (*Corvus brachyrhynchos*), common raven (*Corvus corax*), oak titmouse (*Baeolophus inornatus*), Bewick's wren (*Thryomanes bewickii*), blue-gray gnatcatcher (*Poliophtila caerulea*), northern

¹ Number codes for each vegetation type correspond to Gray and Bramlet (1992).

² 8.x indicates that this vegetation type is within the woodland category; however, there is no specific number code for western sycamore woodland.

Andy Uk
December 14, 2023
Page 5

mockingbird (*Mimus polyglottos*), house finch (*Haemorhous mexicanus*), lesser goldfinch (*Spinus psaltria*), California towhee (*Melospiza crissalis*), song sparrow (*Melospiza melodia*), and common yellowthroat (*Geothlypis trichas*). Migratory bird species that may occur in the geotechnical investigations area include black-chinned hummingbird (*Archilochus alexandri*), Pacific-slope flycatcher (*Empidonax difficilis*), ash-throated flycatcher (*Myiarchus cinerascens*), phainopepla (*Phainopepla nitens*), hooded oriole (*Icterus cucullatus*), and Bullock's oriole (*Icterus bullockii*). Wintering bird species that may occur in the geotechnical investigations area include ruby-crowned kinglet (*Regulus calendula*), cedar waxwing (*Bombycilla cedrorum*), yellow-rumped warbler (*Setophaga coronata*), and white-crowned sparrow (*Zonotrichia leucophrys*).

Raptors (birds of prey) that may occur in the geotechnical investigations area include Cooper's hawk (*Accipiter cooperii*), red-tailed hawk (*Buteo jamaicensis*), red-shouldered hawk (*Buteo lineatus*), great-horned owl (*Bubo virginianus*), barn owl (*Tyto alba*), western screech owl (*Megascops kennicottii*), and American kestrel (*Falco sparverius*). The turkey vulture (*Cathartes aura*), a scavenger, was observed.

Small mammals that may occur in the geotechnical investigations area include California ground squirrel (*Otospermophilus beecheyi*) and desert cottontail (*Sylvilagus audubonii*). Medium to large-sized mammals that may occur in the geotechnical investigations area include mountain lion (*Puma concolor*), coyote (*Canis latrans*), northern raccoon (*Procyon lotor*), and southern mule deer (*Odocoileus hemionus*). Bat species that may occur in the geotechnical investigations area for foraging and roosting include greater bonneted bat [western mastiff bat] (*Eumops perotis*), Brazilian free-tailed bat (*Tadarida brasiliensis*), big brown bat (*Eptesicus fuscus*), canyon bat (*Parastrellus hesperus*), pallid bat (*Antrozous pallidus*), California myotis (*Myotis californicus*), and Yuma bat (*Myotis yumanensis*).

Wildlife Movement

Wildlife movement in the geotechnical investigations area would primarily occur along Santiago Creek or along surrounding ridgelines; local wildlife movement could occur through all habitat types. The geotechnical investigations area is contiguous with large undeveloped open space areas in the NCCP Reserve, OC Regional Parks, and the Cleveland National Forest. Due to the undeveloped nature of the area, wildlife movement is generally unconstrained in and around the geotechnical investigations area. Santiago Creek likely functions as a regional movement corridor and connects with several canyons both upstream and downstream. The existing dam structure and associated reservoir (i.e., Irvine Lake) may be a barrier to movement for amphibians, reptiles, and small mammals moving upstream along the drainage; however, like larger mammals, these small animals can move around the lake and dam over time using the adjacent drainages and ridgelines as travel routes.

Geotechnical Investigation Impacts

Vegetation Types

The proposed geotechnical activities would temporarily impact native vegetation types. The geotechnical investigations are located almost entirely within the Project's permanent impact footprint for the new spillway; the remainder are located within the Project's temporary impact footprint for construction of the new spillway. No restoration is currently planned following the geotechnical investigations because the work activities are within the footprint of the Project. Project impacts would be fully mitigated as described in the Project EIR (Psomas [in preparation]). Applicable mitigation measures from the Project EIR are included below. Following completion of the geotechnical investigations, there would be no

Andy Uk
December 14, 2023
Page 6

paved roads or permanent structures. Though not expected, if the Project does not occur, the area could be restored to natural conditions.

The following vegetation types and other areas would be temporarily impacted by proposed geotechnical investigations: sagebrush scrub, disturbed floodplain sage scrub, toyon–sumac chaparral, annual grassland, mulefat scrub, and developed (Table 1, Exhibit 1).

TABLE 1
GEOTECHNICAL INVESTIGATION VEGETATION IMPACTS

Vegetation Types (Gray and Bramlet Code)	Temporary Impact (acre)
Sagebrush Scrub (2.3.6)	0.132
Disturbed Sagebrush Scrub (2.3.6)	0.001
Disturbed Floodplain Sage Scrub (2.6)	0.017
Toyon–Sumac Chaparral (3.12).	0.154
Annual Grassland (4.1)	0.053
Southern Willow Scrub (7.2)	0.004
Mulefat Scrub (7.3)	0.068
Coast Live Oak Woodland (8.1)	—
Sycamore Woodland (8.x)	—
Cliff (10.0)	—
Open Water (12.1)	—
Developed (15.6)	0.012
Disturbed (16.1)	—
Total	0.441

A total of 0.338 acre of coastal sage scrub (0.132 acre of sagebrush scrub, 0.001 acre of disturbed sagebrush scrub, and 0.017 acre of floodplain sage scrub) would be impacted by the proposed geotechnical investigations. Impacts on these vegetation types would be considered significant as these vegetation types provide habitat for the coastal California gnatcatcher, which is known to occur in the geotechnical investigations area. Additionally, disturbed floodplain sage scrub is considered a sensitive natural community by CDFW. Take of coastal sage scrub is fully covered by participation in the NCCP/HCP for IRWD. SWD is not a participating jurisdiction in the NCCP/HCP; however, the NCCP/HCP coverage could still be used with payment of the per-acre mitigation fee or alternative mitigation for the loss of coastal sage scrub. IRWD's take for its share of the impacts will be accounted for according to the NCCP/HCP and that SWD will provide compensatory mitigation for its loss of coastal sage scrub as part of the Project's mitigation.

A total of 0.154 acre of toyon–sumac chaparral would be impacted by the proposed geotechnical investigations. While the loss of chaparral would be considered adverse, the loss would be limited in relation to the total amount of chaparral vegetation available in the Project region. Toyon–sumac chaparral is not considered a sensitive natural community by CDFW. Impacts on toyon–sumac chaparral would be considered less than significant; therefore, no mitigation would be required.

A total of 0.053 acre of annual grassland would be impacted by the proposed geotechnical investigations. This vegetation type is generally considered of low biological value, is relatively common in the Project

Andy Uk
December 14, 2023
Page 7

region, and is not considered a sensitive natural community by CDFW. Impacts on grassland would be considered less than significant; therefore, no mitigation would be required.

A total of 0.072 acre of riparian vegetation (0.004 southern willow scrub and 0.068 acre mulefat scrub) would be impacted by the proposed geotechnical investigations. Impacts on riparian vegetation types are considered significant because federal and State resource agencies (i.e., U.S. Army Corps of Engineers [USACE], CDFW, and Regional Water Quality Control Board [RWQCB]) have given these vegetation types special status due to their high biological value; jurisdictional areas are discussed below under Jurisdictional Resources. IRWD and SWD will provide compensatory mitigation for the loss of mule fat scrub as part of the Project's mitigation.

A total of 0.012 acre of developed areas (i.e., existing road) would be impacted by the proposed geotechnical investigations. Developed areas are considered of low biological value. Impacts on developed areas would be considered less than significant; therefore, no mitigation would be required.

Jurisdictional Resources

A detailed description of each drainage is provided in the Project's Jurisdictional Delineation Report (Psomas 2023b).

USACE

A total of 0.077 acre of waters of the U.S. (WOTUS) under the regulatory authority of the USACE would be impacted by the proposed geotechnical investigations (Table 2; Exhibit 2). This represents impacts to WOTUS along Santiago Creek downstream of the dam. Nationwide Permit (NWP) 6 allows for the loss of less than 0.10 acre of WOTUS for the purpose of geotechnical investigations. IRWD/SWD will obtain a NWP 6 prior to initiating geotechnical investigations.

RWQCB

A total of 0.078 acre of waters of the State under the regulatory authority of the RWQCB would be impacted by the proposed geotechnical investigations (Table 2, Exhibit 3). This represents impacts to waters of the State along Santiago Creek and Drainage 2. IRWD/SWD will obtain a Section 401 Water Quality Certification, consistent with NWP 6, prior to initiating geotechnical investigations.

CDFW

A total of 0.107 acre of waters under the regulatory authority of CDFW would be impacted by the proposed geotechnical investigations (Table 2, Exhibit 4). This represents impacts to waters under the authority of CDFW along Santiago Creek and Drainage 2. A Streambed Alteration Agreement will be obtained to allow for the loss of CDFW jurisdiction prior to initiating geotechnical investigations.

TABLE 2
GEOTECHNICAL IMPACTS ON
JURISDICTIONAL RESOURCES

Jurisdiction	Amount of Jurisdictional Water Resource (acres)
	Temporary
USACE WOTUS	Wetland: 0.000
	Non-wetland: 0.077
	Total: 0.077
RWCQB Waters of the State	Wetland: 0.000
	Non-wetland: 0.078
	Total: 0.078
CDFW Jurisdictional Resources	0.107
USACE: U.S. Army Corps of Engineers; WOTUS: waters of the United States; RWQCB: Regional Water Quality Control Board; CDFW: California Department of Fish and Wildlife.	

Wildlife Habitat

Geotechnical investigations would result in a limited loss of native vegetation types. While these vegetation types provide potential nesting, roosting, foraging, and denning opportunities for wildlife species, there would be a limited amount of habitat loss (0.429 acre) and many acres of similar habitats would remain immediately adjacent to the areas that would be disturbed (over 1,015 acres of habitat remaining in the Project's Biological Study Area [BSA]). Any wildlife disturbed by the proposed activities could move to areas of habitat immediately adjacent to the areas disturbed. The work would be temporary in nature (approximately two weeks total, with work at each location occurring for one or two days). Wildlife may move away from the disturbance and human activity temporarily but would be expected to return following completion of the geotechnical investigations. Therefore, the impact of the proposed geotechnical investigations would be considered adverse but less than significant on wildlife because they would not reduce wildlife populations in the region.

Work would occur only during daylight hours; wildlife would be expected to continue to use all areas of the Project site for wildlife movement at night, including areas within the proposed geotechnical investigation area.

It is expected that work at each test pit would be completed within one day. If the work extended over multiple days, the test pits would be covered at the completion of work each day. This would ensure that no wildlife fall into the trench and become entrapped when work is not occurring. While the loss of a few individuals of common wildlife species (e.g., western fence lizard) would not be considered significant, the loss of individuals would be avoided and minimized during the geotechnical investigation activities.

Nesting Birds

The Migratory Bird Treaty Act (MBTA) protects the taking of migratory birds and their nests and eggs. Bird species protected under the provisions of the MBTA are identified by the List of Migratory Birds

Andy Uk
December 14, 2023
Page 9

(*Code of Federal Regulations*, Title 50, §10.13). Section 3503 of the *California Fish and Game Code* makes it unlawful to take, possess, or destroy any bird's nest or any bird's eggs. Section 3513 of the *California Fish and Game Code* prohibits the take and possession of any migratory nongame bird, as designated in the MBTA. Birds have potential to nest throughout geotechnical investigations area in vegetation and on bare ground. Geotechnical activities are planned to occur prior to the nesting season (i.e., February 15 to August 31); therefore, no impact on nesting birds is expected. As discussed previously, the Biological Monitor will conduct a pre-construction nesting bird/raptor survey prior to the initiation of geotechnical activities to ensure that no nests are present within the proposed impact area. If an active nest is present, activities would be restricted as needed in the immediate vicinity of the nest until nesting is complete.

Trees in the BSA have potential to be used for nesting by raptors such as the American kestrel, red-tailed hawk, and Cooper's hawk. The raptor nesting season is generally from February 1 to June 30. Regulations prohibit activities that "take, possess, or destroy" any raptor nest or egg (*California Fish and Game Code* §3503, 3503.5, and 3513). Additionally, the noise and disturbance associated with construction may disturb a nesting raptor adjacent to the proposed geotechnical activities. Geotechnical activities may be conducted during the raptor nesting season (i.e., February 1 to June 30). As discussed previously, the Biological Monitor will conduct a pre-construction nesting bird/raptor survey prior to the initiation of geotechnical activities to ensure that no nests are present within the proposed impact area. If an active nest is present, activities would be restricted as needed in the immediate vicinity of the nest until nesting is complete.

Special Status Plant Species

Focused surveys were conducted for special status plant species; details of the results are included in the Biological Technical Report (Psomas 2023a). No special status plant species are located in the geotechnical investigations area. Therefore, there would be no impact on these species, and no mitigation would be required.

Special Status Wildlife Species

Focused surveys for the following special status wildlife were conducted downstream of the dam: Quino checkerspot, arroyo toad, coastal California gnatcatcher, and least Bell's vireo. Details on the methods and results of the focused surveys are included in the Biological Technical Report for the Project (Psomas 2023a). This section focuses on high status species (i.e., Threatened, Endangered, or Candidate species) because those species would be the ones that could trigger a significant impact.

Quino checkerspot and arroyo toad would not be expected to occur in the geotechnical investigations area because they were not observed during focused surveys.

Crotch bumble bee (*Bombus crotchii*) has potential to occur in the geotechnical investigations area. While there would be a limited amount of foraging habitat loss (0.429 acre), many acres of similar habitats would remain immediately adjacent to the areas that would be disturbed (over 1,015 acres of habitat remaining in the BSA). The proposed geotechnical activities would occur outside the breeding season of the Crotch bumble bee (i.e., March to July); therefore, if there are bees present, the geotechnical activities would not affect nesting.

Coastal California gnatcatcher is known to occur in coastal sage scrub habitats in the geotechnical investigations area. As discussed above, geotechnical activities would impact 0.338 acre of sagebrush

Andy Uk
 December 14, 2023
 Page 10

scrub and floodplain sage scrub occupied by the coastal California gnatcatcher. Take of coastal sage scrub is fully covered by participation in the NCCP/HCP for IRWD. SWD is not a participating jurisdiction in the NCCP/HCP; however, the NCCP/HCP coverage could still be used with payment of the per-acre mitigation fee or alternative mitigation for the loss of coastal sage scrub. NCCP/HCP avoidance and minimization measures require that a biological monitor be present during clearing of coastal sage scrub.

Least Bell's vireo would not be expected within the area of proposed geotechnical investigations because it was not observed during focused surveys in spring/summer 2020. Additionally, geotechnical investigations would occur outside the breeding season for this species (i.e., March 15 to September 15) when it would be on its wintering grounds. Therefore, the noise from geotechnical investigations would not affect least Bell's vireo since it would not be present when the geotechnical investigations are planned to occur and because riparian habitat downstream of the dam was not occupied during previous surveys.

The bald eagle may occur as a flyover occurrence; it is expected to forage over Irvine Lake. The bald eagle is not expected to nest within the area of proposed geotechnical investigations due to lack of suitable nesting habitat (large trees). Geotechnical activities may be conducted during the raptor nesting season (i.e., February 1 to June 30). As discussed previously, the Biological Monitor will conduct a pre-construction nesting bird/raptor survey prior to the initiation of geotechnical activities to ensure that no nests are present within the proposed impact area. If an active nest is present, activities would be restricted as needed in the immediate vicinity of the nest until nesting is complete.

Mountain lion may occur in the BSA and may forage in the area where geotechnical activities would occur. As mentioned above under wildlife movement, the proposed geotechnical activities would occur during daylight hours and would not interfere with foraging by this nocturnal species. The mountain lion would be expected to continue to use the proposed work area for foraging and wildlife movement at night throughout the duration of the proposed geotechnical activities.

Several other special status amphibians, reptiles, birds, and mammals have potential to occur within the impact area for the geotechnical investigations. No roosting habitat for bat species is present in the geotechnical investigations area (e.g., structures, large trees); roosting habitat is present in the vicinity and special status bats may forage in the geotechnical investigations area. The geotechnical investigations would be located entirely within the Project's impact footprint for the new spillway. While there would be a limited temporary loss of habitat (0.429 acre) following the geotechnical investigations, many acres of similar habitats would remain immediately adjacent to the areas that would be disturbed (over 1,015 acres of habitat remaining in the BSA). Therefore, the impact on other special status amphibians, reptiles, birds, and mammals would be less than significant and no mitigation would be required.

Indirect Impacts

Noise Impacts

The BSA includes some periodic noise events, including consistent low helicopter flights and landings and periodic special events in the adjacent park (e.g., concerts). Noise levels in the BSA would increase over present levels during geotechnical investigations due to construction vehicles. Temporary noise impacts have the potential to disrupt foraging, nesting, roosting, and denning activities for a variety of wildlife species. Temporary noise from geotechnical activities may cause birds adjacent to the work area to temporarily leave the area or may discourage individuals from selecting habitat adjacent to the work area due to construction vehicle noise and human activity. These impacts are considered adverse, but not

Andy Uk
December 14, 2023
Page 11

significant for most wildlife species, because the Project would not impact a substantial population of these species and because work is planned to occur outside the breeding season for most species.

Geotechnical activities would create noise and human activity adjacent to areas of coastal sage scrub occupied by the coastal California gnatcatcher; however, work is planned to occur outside the breeding season for this species (i.e., September 1 to February 14). Coastal California gnatcatchers may move away from the disturbance and human activity temporarily but would be expected to return following completion of the geotechnical investigations. Therefore, indirect impacts would be considered adverse, but less than significant, for work conducted outside the breeding season. If work were to be conducted during the breeding season (i.e., February 15 to August 31), it could affect nesting activities (e.g., vocalizations between the pair, or flushing birds from their nests, leaving the eggs exposed to predation). This indirect impact would be considered potentially significant. If geotechnical activities were to occur during the breeding season, the pre-construction nesting bird survey will ensure that no work would occur in the immediate vicinity of the nest.

Increased Dust

Geotechnical activities would disturb soils and result in the accumulation of dust on the surface of the leaves of trees, shrubs, and herbs. The respiratory function of the plants in the area would be impaired when dust accumulation is excessive. This indirect effect of dust as a result of geotechnical activities is considered less than significant because it would only affect a limited area and would not substantially reduce plant populations in the region. Therefore, no mitigation would be required.

Water Quality

During geotechnical activities, excess silt, petroleum, or chemicals on the soil surface within the geotechnical investigations area could be washed into drainages (including Santiago Creek) and may affect areas downstream of the geotechnical activities. Adverse effects on water quality could indirectly impact species that use riparian areas within the watershed by affecting the food web interactions (e.g., abundance of insects or other prey) or through biomagnification (i.e., the buildup of chemicals in body tissues to toxic levels in higher trophic levels). To be compliant with regulatory requirements, the geotechnical investigations would implement Best Management Practices and erosion control measures to prevent the runoff of toxins, chemicals, petroleum products, or other elements that might degrade water quality. Assuming compliance with standard regulatory requirements, impacts on water quality would be less than significant, and no mitigation would be required.

Invasive Exotic Plant Species

Geotechnical activities create disturbance, which in turn provides a place for non-native weedy species to spread. As discussed previously, construction equipment would be washed prior to arrival on the site to ensure equipment would not introduce non-native weed seeds to the area. The use of Best Management Practices associated with prevention of the spread of weed seeds would result in an impact that is less than significant. Additionally, a native seed mix will be used for hydroseeding areas temporarily disturbed by construction activities (following the Project's construction).

Night Lighting

Geotechnical activities would occur during the day. Therefore, there would be no impact due to night lighting, and no mitigation would be required.

Andy Uk
December 14, 2023
Page 12

Human Activity

During geotechnical investigations, there would be a small increase in human activity (i.e., vehicle and foot traffic), which would increase the disturbance of natural open space adjacent to the geotechnical investigations area. Human disturbance could disrupt normal foraging and breeding behavior of wildlife adjacent to the geotechnical investigation area. As described above for noise, this disturbance would be considered potentially significant. As discussed previously, a WEAP training would be conducted by the Biological Monitor to ensure that geotechnical personnel are trained on the environmental sensitivity of the area.

Increased Wildfire Risk

During geotechnical investigations, construction equipment or personal vehicles have potential to accidentally ignite vegetation, starting a wildfire. Additionally, construction personnel may dispose of cigarettes inappropriately in the geotechnical investigations area and could ignite dry vegetation. If not contained quickly, the fire could spread through adjacent habitat areas. As discussed previously, a WEAP training will be conducted by the Biological Monitor to ensure that geotechnical personnel are trained on the environmental sensitivity of the area.

Mitigation

The Project Draft EIR (Psomas [in preparation]) includes compensatory mitigation for the loss of coastal sage scrub and riparian vegetation, and jurisdictional resources. These habitats would be mitigated at a minimum 1:1 ratio through use of one of the following options: (1) NCCP take credits (for coastal sage scrub); (2) preservation, restoration, and/or enhancement of on-site habitats; or (3) preservation, restoration, or enhancement of off-site habitats. IRWD/SWD have initiated consultation with the resource agencies to negotiate appropriate mitigation for the loss of these resources as a result of the Project, as consistent with the Clean Water Act, California Fish and Game Code, and the federal and State Endangered Species Acts.

Attachments – Exhibits 1–5

R:\Projects\IRW_IRWD\3IRW010201\Documentation\Geotech_Memo\SantiagoDam-Geotech-Bio Memo-121423.docx

Andy Uk
December 14, 2023
Page 13

REFERENCES:

California Department of Fish and Wildlife (CDFW). 2023a (June 12, date accessed). California Natural Diversity Database. Records of Occurrence for the USGS Black Star Canyon, Orange, Tustin, and El Toro 7.5-minute quadrangles. Sacramento, CA: CDFW, Natural Heritage Division.

California Native Plant Society (CNPS). 2023 (June 12, date accessed). Inventory of Rare and Endangered Plants (online edition, v-9.5). Records of Occurrence for the USGS Black Star Canyon, Orange, Tustin, and El Toro 7.5-minute quadrangles. Sacramento, CA: CNPS. <http://www.rareplants.cnps.org/>.

Gray, J. and D. Bramlet. 1992. *Habitat Classification System Natural Resources Geographic Information System (GIS) Project* (Prepared for the County of Orange Environmental Management Agency). Santa Ana, CA: Gray and Bramlet.

Orange, County of. 1996 (July). *Natural Community Conservation Plan and Habitat Conservation Plan, County of Orange, Central and Coastal Subregion*. Santa Ana, CA.

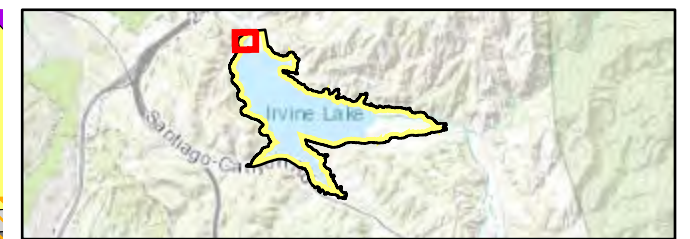
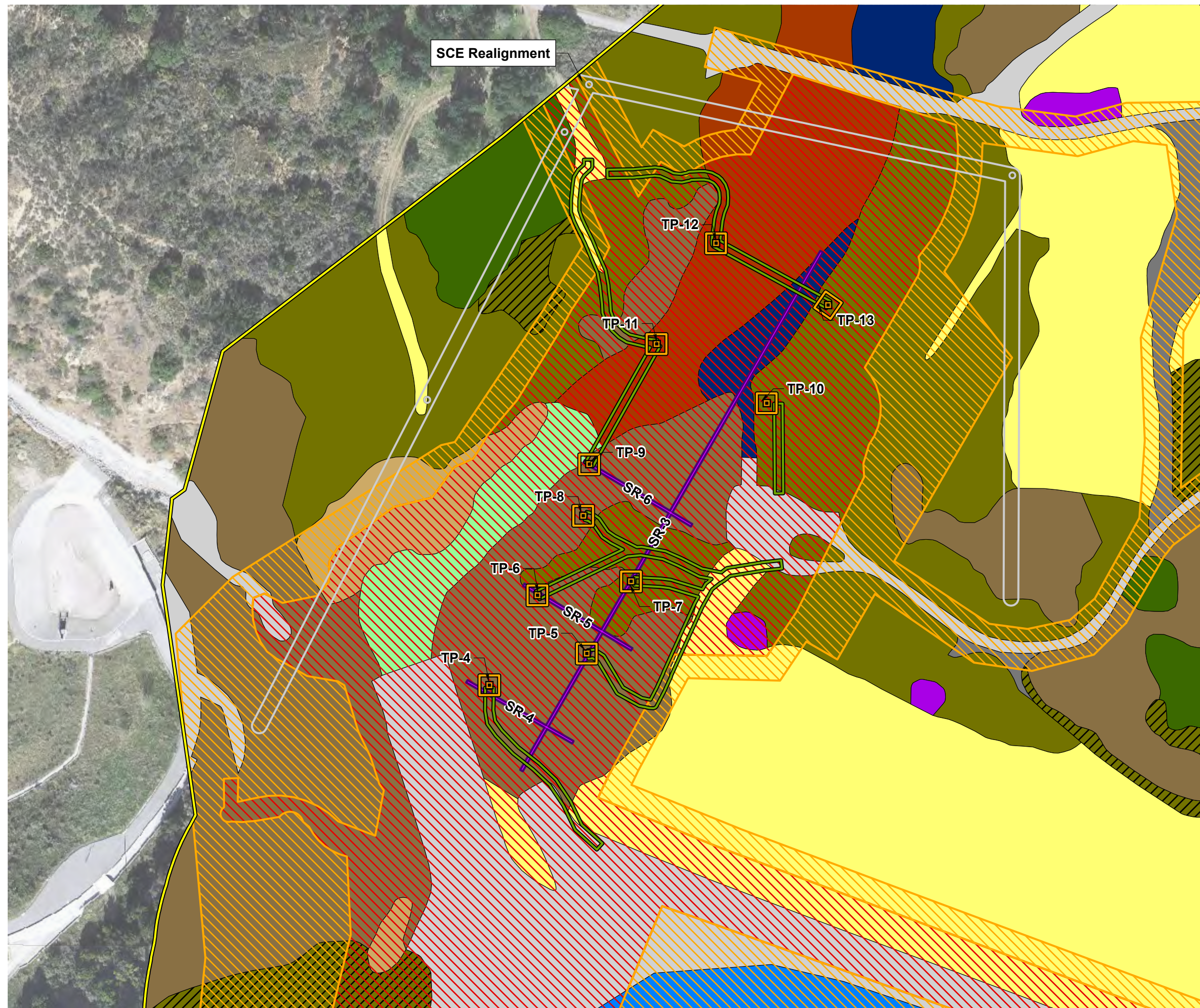
Psomas. 2023a (November 3). *Biological Technical Report for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California*. Santa Ana, CA: Psomas.

_____. 2023b (November 2). *Jurisdictional Delineation Report for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California*. Santa Ana, CA: Psomas.

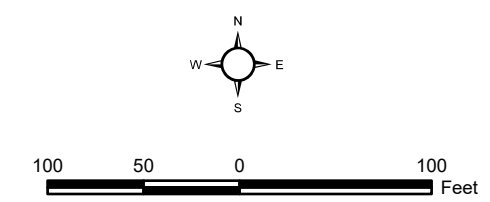
_____. [in preparation]. *Draft Environmental Impact Report for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California*. Santa Ana, CA: Psomas.

U.S. Fish and Wildlife Service (USFWS). 2023. (October 11). List of Threatened and Endangered Species That May Occur in Your Proposed Project Location or May Be Affected By Your Proposed Project; Santiago Creek Dam Outlet Tower and Spillway Improvements Project; 2023-0055398. Carlsbad, CA: USFWS.

D:\Projects\IRW\SantiagoCreek\PROSCDS\CD_Project.aprx\ex_GeoTech_VegImpacts



- Survey Area
- Test Pit
- Test Pit 20ft x 20ft Work Area
- Access Road
- Geophysical Survey
- Geophysical Survey Work Area
- Project Impacts**
 - Permanent Impacts
 - Temporary Impacts
- SCE Realignment**
 - Permanent Impacts
 - Temporary Impacts
- Vegetation Types and Other Areas**
 - Sagebrush Scrub (2.3.6)
 - Disturbed Sagebrush Scrub (2.3.6)
 - Disturbed Floodplain Sage Scrub (2.6)
 - Toyon - Sumac Chaparral (3.12)
 - Annual Grassland (4.1)
 - Southern Willow Scrub (7.2)
 - Mulefat Scrub (7.3)
 - Coast Live Oak Woodland (8.1)
 - Western Sycamore (8.x)
 - Cliff (10)
 - Open Water (12.1)
 - Developed (15.6)
 - Disturbed (16.1)



Aerial Source: Hexagon Geosystems 2017
Esri, Maxar 2019

**Geotechnical Impacts –
Vegetation Types**

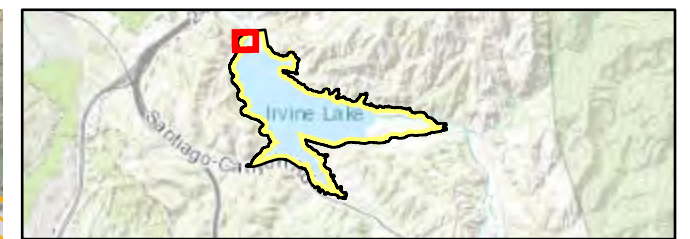
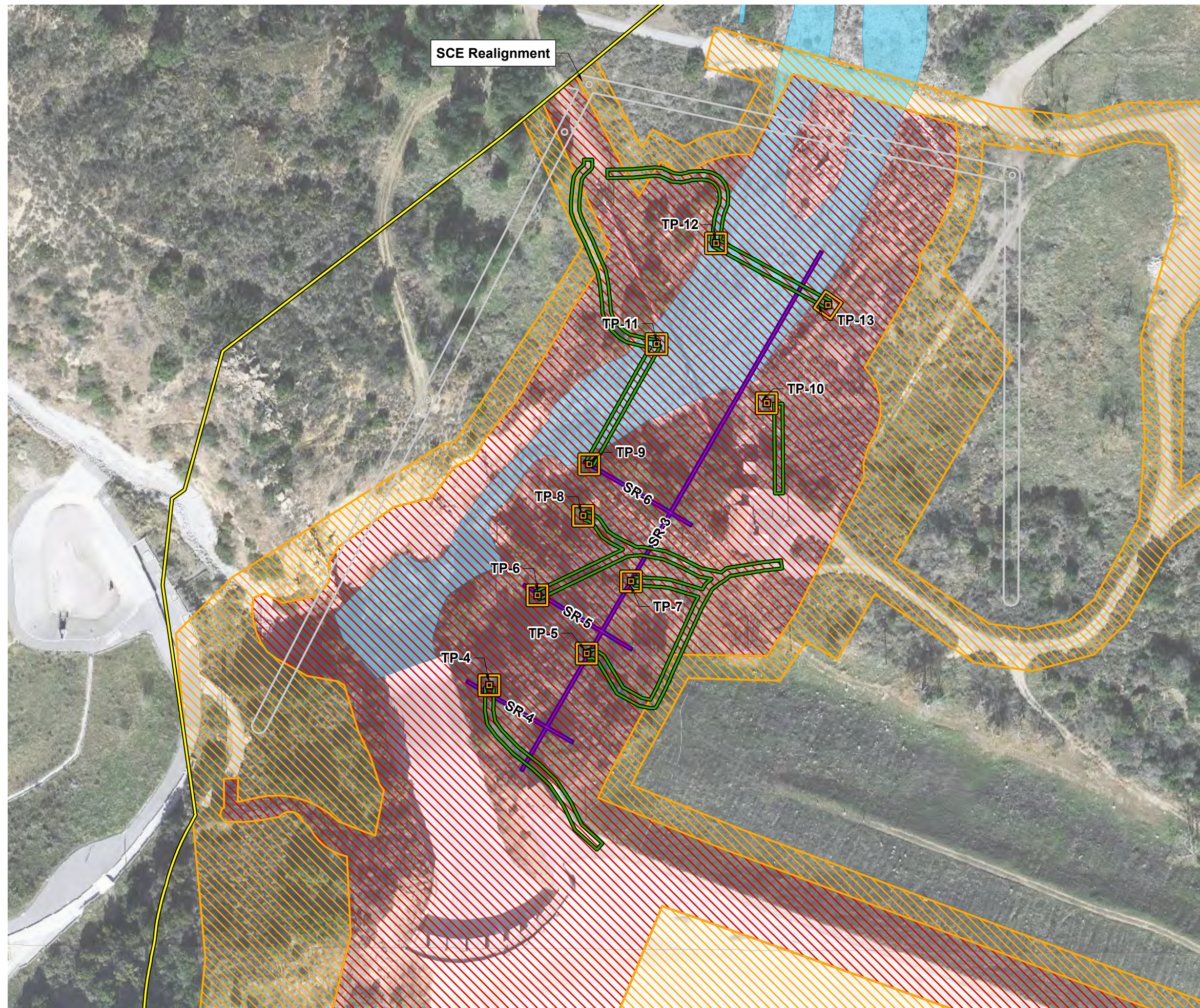
*Santiago Creek Dam Outlet Tower
and Spillway Improvements Project*

(Rev. 12/13/2023 JVR) R:\Projects\IRW_IRWD\3\IRW010201\Graphics\Geotech_Memo\ex_GeoTech_VegImpacts.pdf

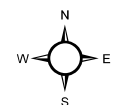
Exhibit 1

PSOMAS

D:\Projects\3IRW\SantiagoCreek\PROSCDS\CD_SCD_Project.aprx\ex_GeoTech_USACE_Impacts



- Survey Area
- Test Pit
- Test Pit 20ft x 20ft Work Area
- Access Road
- Geophysical Survey
- Geophysical Survey Work Area
- Project Impacts**
 - Permanent Impacts
 - Temporary Impacts
- SCE Realignment**
 - Permanent Impacts
 - Temporary Impacts
- Waters of the United States**
 - Non-Wetland



100 50 0 100 Feet

Aerial Source: Hexagon Geosystems 2017
Esri, Maxar 2019

Geotechnical Impacts –
USACE Jurisdiction

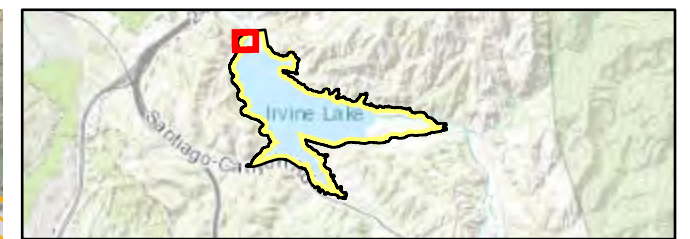
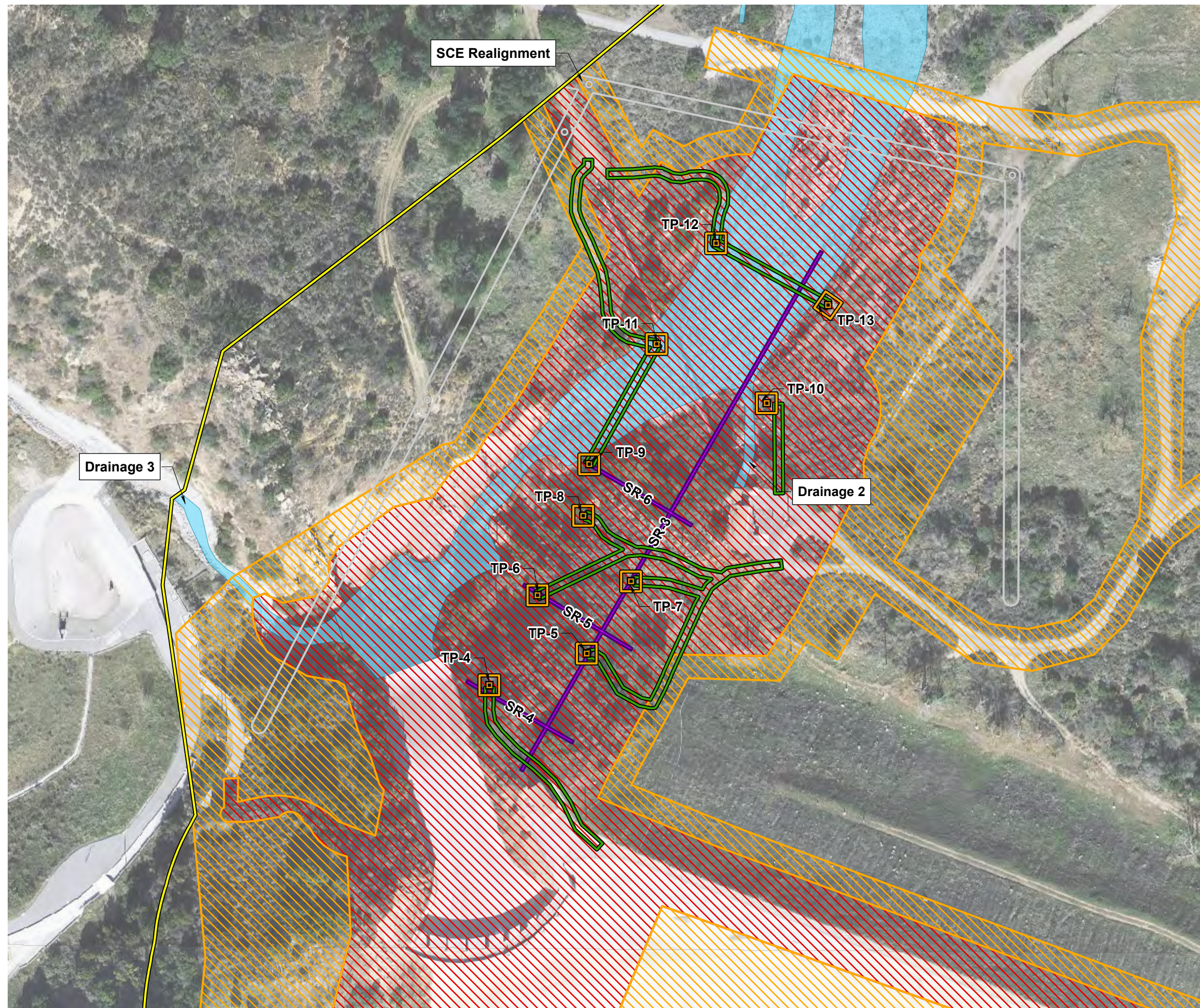
Exhibit 2

*Santiago Creek Dam Outlet Tower
and Spillway Improvements Project*

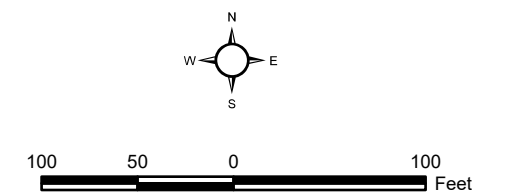


(Rev. 12/13/2023 JVR) R:\Projects\3IRW\IRWD\3IRW010201\Graphics\Geotech_Memo\ex_GeoTech_VegImpacts.pdf

D:\Projects\3\IRW\SantiagoCreek\PROJ\SCDSCD_P\Project.aprx\ex_GeoTech_RWQCB_Impacts



- Survey Area
- Test Pit
- Test Pit 20ft x 20ft Work Area
- Access Road
- Geophysical Survey
- Geophysical Survey Work Area
- Project Impacts**
 - Permanent Impacts
 - Temporary Impacts
- SCE Realignment**
 - Permanent Impacts
 - Temporary Impacts
- Waters of the State**
 - Non-Wetland



Aerial Source: Hexagon Geosystems 2017
Esri, Maxar 2019

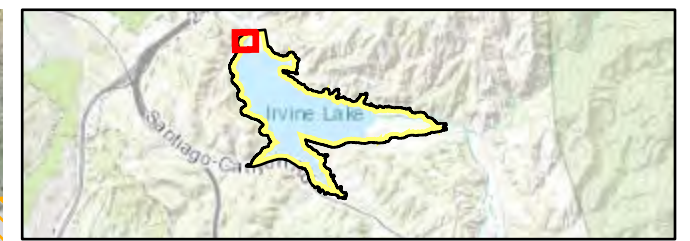
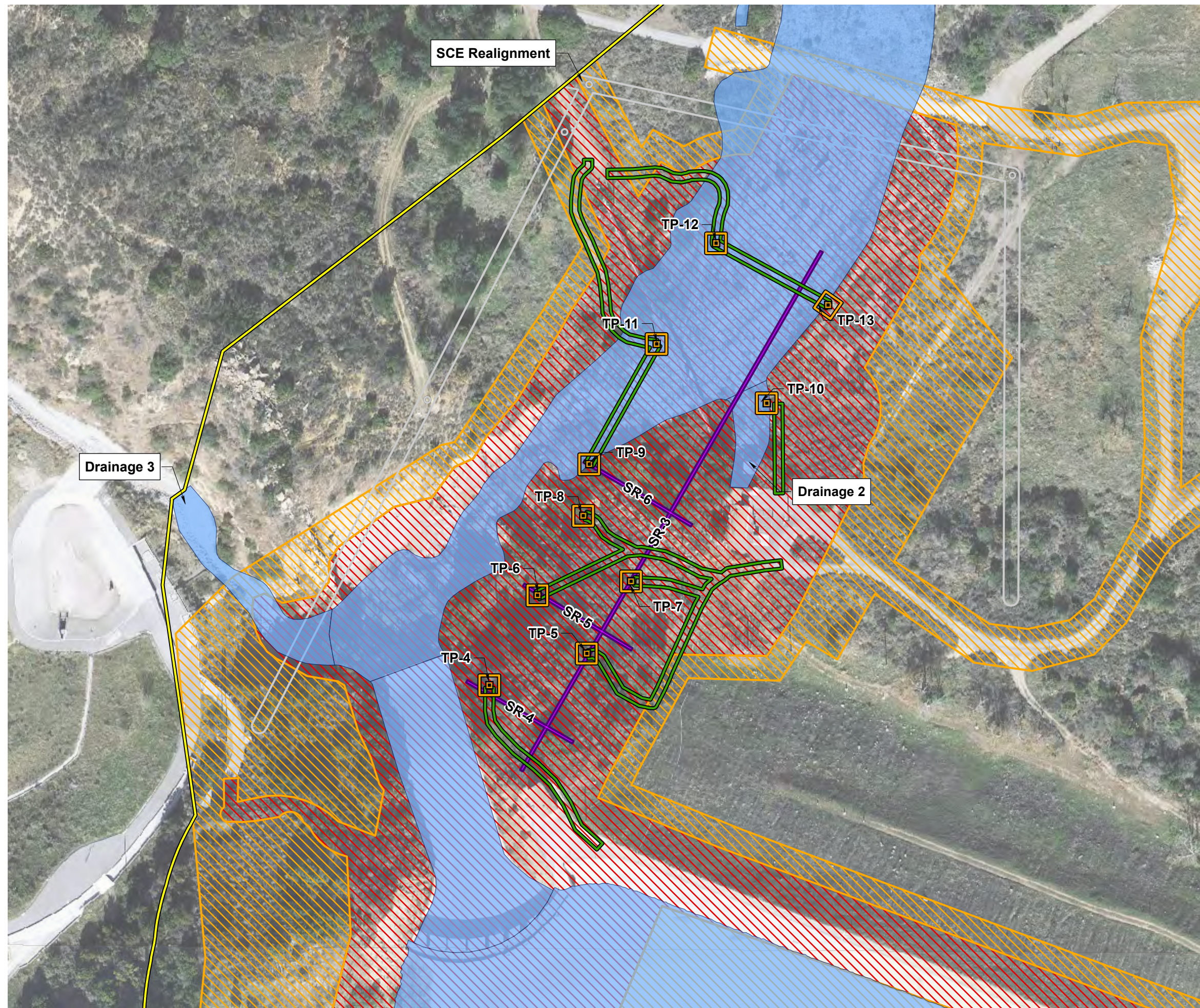
Geotechnical Impacts –
RWQCB Jurisdiction
*Santiago Creek Dam Outlet Tower
and Spillway Improvements Project*

Exhibit 3

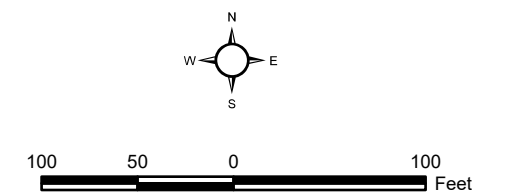


(Rev. 12/13/2023 JVR) R:\Projects\IRW_IRWD\3\IRW010201\Graphics\Geotech_Memo\ex_GeoTech_VegImpacts.pdf

D:\Projects\3IRW\SantiagoCreek\PROJ\SCDSCD_Project.aprx\ex_GeoTech_CDFW_Impacts



- Survey Area
- Test Pit
- Test Pit 20ft x 20ft Work Area
- Access Road
- Geophysical Survey
- Geophysical Survey Work Area
- Project Impacts**
 - Permanent Impacts
 - Temporary Impacts
- SCE Realignment**
 - Permanent Impacts
 - Temporary Impacts
- CDFW Jurisdictional Waters**
 - CDFW



Aerial Source: Hexagon Geosystems 2017
Esri, Maxar 2019

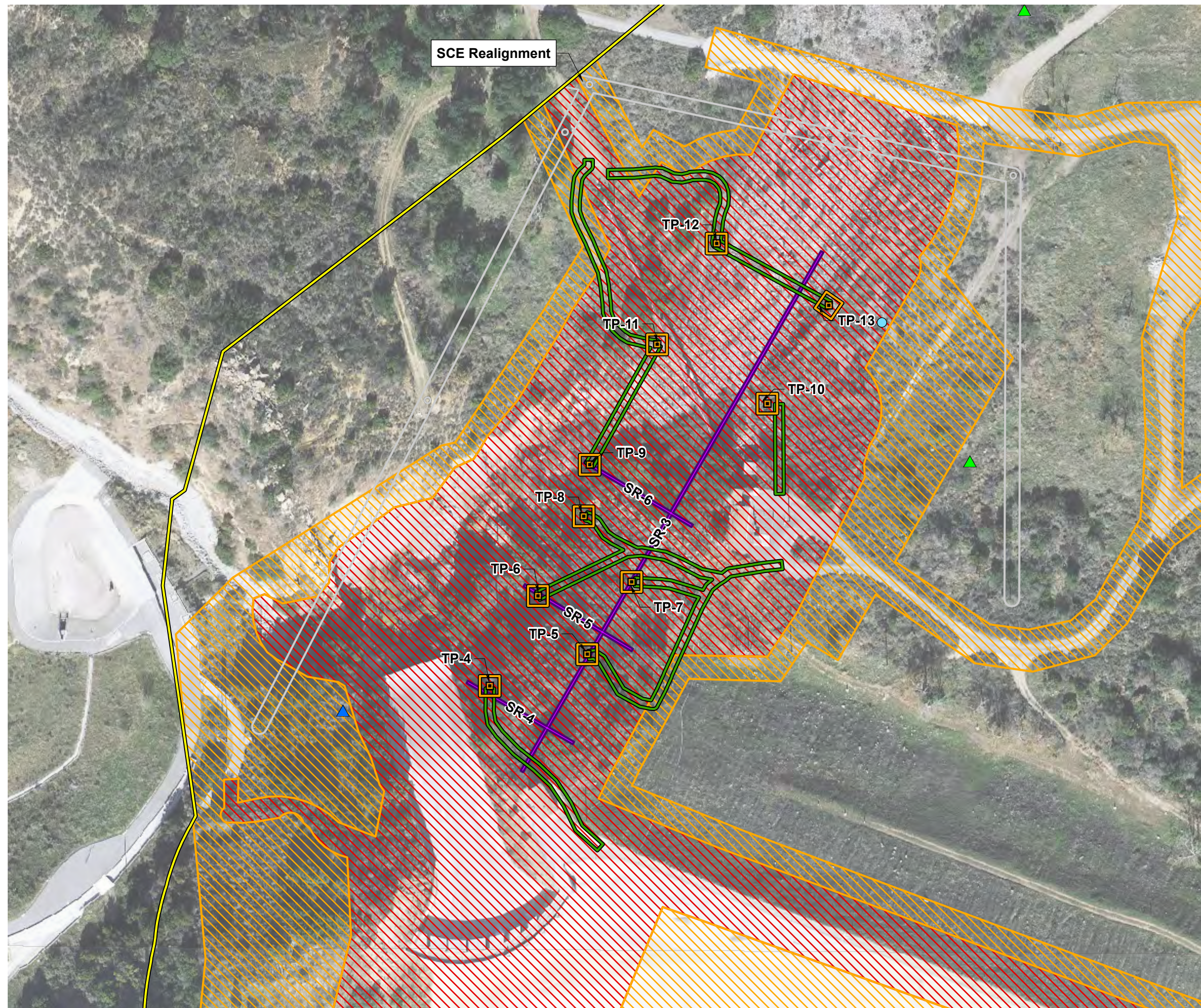
Geotechnical Impacts –
CDFW Jurisdiction
*Santiago Creek Dam Outlet Tower
and Spillway Improvements Project*

Exhibit 4

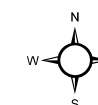


(Rev. 12/13/2023 JVR) R:\Projects\3IRW\IRWD\3IRW010201\Graphics\Geotech_Memo\ex_GeoTech_VegImpacts.pdf

D:\Projects\3IRW\SantiagoCreek\PROJ\SCDSCD_P\Project.aprx\ex_GeoTech_SS\Species_Impacts



- Survey Area
- Test Pit
- Test Pit 20ft x 20ft Work Area
- Access Road
- Geophysical Survey
- Geophysical Survey Work Area
- SCE Realignment**
- Permanent Impacts
- Temporary Impacts
- Project Impacts**
- Permanent Impacts
- Temporary Impacts
- Special Status Plants**
- Coulter's Matilija Poppy Population
- Many-Stemmed Dudleya Population
- Special Status Species**
- Coastal California Gnatcatcher



100 50 0 100 Feet

Aerial Source: Hexagon Geosystems 2017
Esri, Maxar 2019

Geotechnical Impacts –
Special Status Species

*Santiago Creek Dam Outlet Tower
and Spillway Improvements Project*

(Rev. 12/13/2023 JVR) R:\Projects\3IRW\IRWD\3IRW010201\Graphics\Geotech_Memo\ex_GeoTech_VegImpacts.pdf

Exhibit 5

PSOMAS

**SANTIAGO DAM GEOTECHNICAL INVESTIGATIONS
BIOLOGICAL RESOURCES MEMORANDUM**

September 5, 2024

To: Andy Uk
IRWD

From: Amber Heredia
Psomas

As part of a larger Santiago Creek Dam Outlet Tower and Spillway Improvements Project (Project), Irvine Ranch Water District (IRWD) proposes to conduct an additional round of geotechnical investigations (hereinafter referred to as the “geotechnical investigations”) to provide necessary geologic and geotechnical data to inform the Project’s design engineering. The current geotechnical investigations include subsurface investigations of Irvine Lake to characterize soil material for use as borrow material to construct an earthen diversion berm adjacent to Santiago Creek Dam and a potential dam embankment improvement. The proposed geotechnical investigations include vibracores, geotechnical exploratory test pits, and hollow stem auger borings. The purpose of this Memorandum is to evaluate the proposed impact of the geotechnical investigation program on Biological and Jurisdictional Resources.

No cultural resources are known to occur within the limits of the proposed geotechnical investigation.

Project Background

IRWD owns and operates Irvine Lake and the Santiago Creek Dam that serves as a critical water supply for both IRWD and Serrano Water District. Santiago Creek Dam is a compacted earthfill embankment completed in 1933 and certified by the State of California, Department of Water Resources, Division of Safety of Dams (DSOD). Santiago Creek Dam impounds water for Irvine Lake on Santiago Creek, a tributary to the Santa Ana River. A seismic assessment requested by the DSOD found that the spillway is nearing the end of its useful life, and the design does not meet current standards. To meet current DSOD regulatory requirements and improve water supply reliability, IRWD proposes to rehabilitate and replace the Santiago Creek Dam outlet tower and spillway structure by implementing the Project. The area of the proposed boring location is important to the overall design of the Project; however, there is limited historical subsurface information of the area. There is potential for significant cost implications without reliable soil characterizations in advance of finalizing the design.

In 2020, the DSOD downgraded the condition of the dam to the second to the lowest possible rating due to the two known deficiencies (issues with the spillway and outlet tower). DSOD further restricted the operating levels of the reservoir, which limits the ability to store local runoff water supplies for the benefit of the region. DSOD and IRWD agreed to repair the known deficiencies by 2029. Because the existing dam must remain in place and operational throughout the course of construction of the spillway structure, the bulk of the construction must occur in the summer dry seasons. Milestones at the end of each dry season have been established so that the contractor will be able to winterize the Project and be ready for the next dry season. The Project is scheduled to begin construction in the first dry season of 2025 and to be completed by 2029. The proposed geotechnical investigations are needed to inform the final design so that the Project construction can start in the dry season of 2025.

Andy Uk
September 5, 2024
Page 2

Project Location

The Project is located at Santiago Creek Dam at the northwest end of Irvine Lake in unincorporated Orange County, California. It is south of State Route (SR) 261 and east of SR-241 and Santiago Canyon Road. Surrounding land use primarily consists of undeveloped open space. Irvine Regional Park is located northwest of SR-241; Limestone Canyon Regional Park is located south of Santiago Canyon Road; and Oak Canyon Park is located at the southeast end of Irvine Lake. The closed Santiago Canyon Landfill is located adjacent to the west of Irvine Lake. Residential development is located east of SR-241.

The Project is located on the U.S. Geological Survey's (USGS') Black Star Canyon 7.5-minute quadrangle. Irvine Lake (named Santiago Creek Reservoir on the USGS) was created by constructing a dam across Santiago Creek. Santiago Creek, a named blue-line stream, enters Irvine Lake from the east and continues downstream of the dam flowing north and then west, ultimately reaching the Santa Ana River. Elevations on the Project site range from approximately 657 to 996 feet above mean sea level.

The Project is located in the Central/Coastal Subregion of the Natural Communities Conservation Plan/Habitat Conservation Plan (NCCP/HCP). Santiago Dam and its associated structures are located within designated "Non-Reserve Open Space". IRWD is a participating jurisdiction; Santiago Dam is a permitted existing use under the NCCP/HCP.

The geotechnical investigation sites are located on the upstream side of the dam on the southeastern side of the lake where Santiago Creek enters the lake. Many of the geotechnical investigation sites are located in the lakebed or on the fluctuating shoreline (Exhibit 1).

Description of Geotechnical Investigation Work

To inform the location of the borrow site, the proposed geotechnical investigations are needed to provide necessary geologic and geotechnical information to fully characterize the existing soil and subsurface conditions of the potential borrow site material that would be used to construct an earthen berm and to reinforce the dam structure.

IRWD proposes to conduct 14 geotechnical vibracores, 7–9 exploratory test pits, and 2 hollow stem auger borings on the southeast side of the lake (Exhibit 1). Geotechnical locations were selected based on the location of the proposed borrow sites. These locations may be modified by IRWD as needed in the field to avoid trees, sensitive vegetation, or jurisdictional areas, to the extent possible. This work is expected to require 7 to 10 workdays to complete.

Vibracore samples would be taken from a barge; each vibracore sample would be approximately 4 inches in diameter and 15 feet deep. The vibracore samples are expected to take two to three workdays, with one additional day to mobilize and demobilize the barge from the boat ramp.

At the test pit locations, contractors will use a small rubber-tracked mounted excavator with an excavation bucket for digging and tracking over brush. Each geotechnical test pit would be approximately 3 feet wide, 10 feet long, and 10 feet deep; the work area around each test pit is assumed to be approximately 20 feet by 20 feet. Approximately 300 to 500 cubic yards of soil will be excavated from, and temporarily stockpiled adjacent to, the test pit. Samples of

Andy Uk
September 5, 2024
Page 3

subsurface materials would be collected from the test pits for examination and laboratory testing. Following the completion of the test pit, each hole would be backfilled using the dirt spoils that came from the hole. Two alternative test pits are included (i.e., TP-2a, TP-3a) and will be used if lake levels are low enough to allow them; the impact analysis assumes a worst-case scenario that both sites will be sampled, but in implementation, the field crew will select one set of sites to conduct sampling of soils. The test pits are expected to take three to four workdays.

At the hollow stem auger locations, a truck mounted drill rig will be used. Each geotechnical hollow stem auger would be approximately 8 inches wide and 30 feet deep; the work area around the hollow stem auger is assumed to be approximately 20 feet by 20 feet. Each hollow stem auger will generate one to three 55-gallon drums of soil cuttings; these drums filled with soil cuttings will be disposed of at an appropriate landfill. A two-inch polyvinyl chloride (PVC) standpipe piezometer will be installed in each boring to allow for the monitoring of ground water elevations in proposed borrow areas BA-3 and BA-4. The drilling of the hollow stem augers and installation of the piezometers is expected to take two to three workdays.

The geotechnical investigations will be accessed using existing dirt roads around the southeast portion of the lake. Temporary access routes from the existing dirt roads to each test pit and hollow stem auger would be needed. Where feasible, temporary access would be established by the “drive and crush” method to limit vegetation disturbance. The drive and crush method involves substantially less disturbance than blading of the surface material; some vegetation would be crushed, but would not be cut or removed, allowing it to retain the root structure and resprout in place.

Each individual geotechnical investigation activity is anticipated to be completed within one working day and would not result in open pits beyond working hours. A limited number of workers (typically about five) would be required to perform the work. Workers would commute individually and would park along established dirt roads. There would be no nighttime work conducted as part of the geotechnical investigations.

Access roads in jurisdictional waters and native vegetation would be limited to a width of approximately 8 feet 6 inches, which is the width of the proposed backhoe (i.e., CASE CX-1450 backhoe with rubber treads). Some minor grading may be needed along the temporary access roads, but wherever possible, the backhoe would be walked up to each test pit site to minimize disturbance to the streambed and sensitive vegetation. The backhoe would be walked in following a Biological Monitor who would help to find a path to minimize impacts to native vegetation to the extent possible.

Prior to the geotechnical work, the Biological Monitor will conduct a Worker Environmental Awareness Program (WEAP) training with the contractor to inform the workers of the environmental sensitivity of the area. The Biological Monitor will walk the proposed work areas and access routes with the Geotechnical Contractor. The Biological Monitor will make suggestions by slightly shifting or narrowing the access road and/or proposed work areas to site the geotechnical disturbance in previously disturbed areas and to avoid or minimize impacts to sensitive shrubs/trees (i.e., riparian) and jurisdictional resources. The Biological Monitor will flag the shrubs/trees to be avoided along the access route prior to work activities and will monitor the work to ensure that impacts are minimized to the extent practicable. In addition, to reduce

Andy Uk
September 5, 2024
Page 4

the potential for the spread of weed seeds, all heavy equipment will be cleaned (including wheels, tracks, undercarriages, and bumpers as applicable) before delivery to the site.

Work would be conducted outside the nesting bird season (i.e., September 16 to February 14). Therefore, no pre-construction nesting bird survey will be needed.

Geotechnical investigations within the selected borrow site would impact the same areas as the future Project. Geotechnical investigations within the borrow sites that are not selected would be minimal. IRWD proposes to use mitigation proposed for the Project to offset impacts associated with the geotechnical investigations.

Methods

In support of the Project and its Environmental Impact Report (EIR) (Psomas [in preparation]), Psomas conducted a literature review that included the following: (1) a database search of the California Natural Diversity Database (California Department of Fish and Wildlife [CDFW] 2024); (2) a database search of the Electronic Inventory of the California Native Plant Society (CNPS 2024); (3) the Information for Planning and Consultation Database (U.S. Fish and Wildlife Service [USFWS] 2024); and (4) Central-Coastal NCCP/HCP (County of Orange 1996) requirements applicable to the Project.

Psomas Senior Biologists Allison Rudalevige and Lindsay Messett conducted vegetation mapping and general plant and wildlife surveys upstream of the dam on September 16 and 17, 2020. Ms. Rudalevige conducted a jurisdictional delineation upstream of the dam on October 14, 20, and 21, 2020; she was accompanied by Psomas Senior Biologist Jonathan Aguayo or Ms. Messett. Protocol focused surveys were conducted upstream of the dam in spring/summer 2022. Ms. Rudalevige conducted focused surveys for special status plants. Mr. Aguayo conducted focused surveys for arroyo toad (*Anaxyrus californicus*), least Bell's vireo (*Vireo bellii pusillus*), and southwestern willow flycatcher (*Empidonax traillii extimus*). Ms. Messett conducted focused surveys for Quino checkerspot (*Euphydryas editha quino*), coastal California gnatcatcher (*Poliophtila californica californica*), and western yellow-billed cuckoo (*Coccyzus americanus occidentalis*). In summer 2024, Ms. Messett conducted protocol focused surveys for Crotch's bumble bee (*Bombus crotchii*) and Mr. Aguayo and Ms. Messett conducted protocol focused trapping and visual surveys for southwestern [western] pond turtle (*Actinemys pallida* [*Emys marmorata*]) [in progress]. Detailed methods for these biological surveys are included in the respective focused survey reports, which are summarized in the Biological Technical Report and Jurisdictional Delineation Report (Psomas 2024a, 2024b).

Existing Conditions

Vegetation Types

Existing conditions are described in detail in the Biological Technical Report for the Project (Psomas 2024a). The following vegetation types and other areas occur within or adjacent to the geotechnical investigations area downstream of the dam: sagebrush scrub (2.3.6)¹, disturbed sagebrush scrub (2.3.6), sagebrush-coyote bush scrub (2.3.12), southern cactus scrub (2.4), disturbed southern cactus scrub (2.4), toyon-sumac chaparral (3.12), annual grassland (4.1),

¹ Number codes for each vegetation type correspond to Gray and Bramlet (1992).

Andy UK
September 5, 2024
Page 5

ruderal (4.6), riparian herb (7.1), disturbed mulefat scrub (7.3), southern black willow forest (7.7), disturbed southern black willow forest (7.7), southern black willow forest/riparian herb (7.7/7.1), coast live oak woodland (8.1), and vegetated fluctuating shoreline (12.2). Other landcover includes cliff (10.0), open water (12.1), fluctuating shoreline (12.2), perennial stream (13.1), ornamental (15.5), developed (15.6), and disturbed areas (16.1) (Exhibit 1).

Wildlife

Irvine Lake is stocked with fish, including rainbow trout (*Oncorhynchus mykiss*), bass (*Morone* sp.), catfish (*Ictalurus* sp.), common carp (*Cyprinus carpio*), bluegill (*Lepomis macrochirus*), and crappie (*Pomoxis* sp.). Non-native fish are predators on native species; no native fish (with the exception of the stocked rainbow trout) are expected to occur in Irvine Lake.

Amphibian species that may occur in the geotechnical investigations area include western toad (*Anaxyrus boreas*), California treefrog (*Pseudacris cadaverina*), Baja California treefrog (*Pseudacris hypochondriaca*), garden slender salamander (*Batrachoseps major major*), black-bellied salamander (*Batrachoseps nigriventris*), and arboreal salamander (*Aneides lugubris*).

Common reptile species that may occur in the geotechnical investigations area include common side-blotched lizard (*Uta stansburiana*), western fence lizard (*Sceloporus occidentalis*), southern alligator lizard (*Elgaria multicarinata*), western skink (*Plestiodon skiltonianus*), red racer (*Coluber flagellum piceus*), California striped racer (*Coluber lateralis lateralis*), California kingsnake (*Lampropeltis californiae*), gopher snake (*Pituophis catenifer*), and southern Pacific rattlesnake (*Crotalus oreganus helleri*).

The following resident bird species may occur in the geotechnical investigations area: California quail (*Callipepla californica*), mourning dove (*Zenaida macroura*), Anna's hummingbird (*Calypte anna*), acorn woodpecker (*Melanerpes formicivorus*), northern flicker (*Colaptes auratus*), black phoebe (*Sayornis nigricans*), American crow (*Corvus brachyrhynchos*), common raven (*Corvus corax*), Bewick's wren (*Thryomanes bewickii*), northern mockingbird (*Mimus polyglottos*), house finch (*Haemorhous mexicanus*), lesser goldfinch (*Spinus psaltria*), California towhee (*Melospiza crissalis*), song sparrow (*Melospiza melodia*), and common yellowthroat (*Geothlypis trichas*). Wintering bird species that may occur in the geotechnical investigations area include ruby-crowned kinglet (*Regulus calendula*), cedar waxwing (*Bombycilla cedrorum*), yellow-rumped warbler (*Setophaga coronata*), and white-crowned sparrow (*Zonotrichia leucophrys*). Migratory species that occur during the breeding season would not be expected during the geotechnical investigations since they would occur during the non-breeding season.

Raptors (birds of prey) that may occur in the geotechnical investigations area include Cooper's hawk (*Accipiter cooperii*), red-tailed hawk (*Buteo jamaicensis*), red-shouldered hawk (*Buteo lineatus*), great-horned owl (*Bubo virginianus*), barn owl (*Tyto alba*), western screech owl (*Megascops kennicottii*), American kestrel (*Falco sparverius*), and turkey vulture (*Cathartes aura*).

Small mammals that may occur in the geotechnical investigations area include California ground squirrel (*Otospermophilus beecheyi*), desert cottontail (*Sylvilagus audubonii*), North American deer mouse (*Peromyscus maniculatus*), and Bryant's woodrat (*Neotoma bryanti*). Medium to large-sized mammals that may occur in the geotechnical investigations area include mountain lion (*Puma concolor*), coyote (*Canis latrans*), northern raccoon (*Procyon lotor*), and southern

Andy Uk
September 5, 2024
Page 6

mule deer (*Odocoileus hemionus*). Bat species that may occur in the geotechnical investigations area for foraging and roosting include greater bonneted bat [western mastiff bat] (*Eumops perotis*), Brazilian free-tailed bat (*Tadarida brasiliensis*), big brown bat (*Eptesicus fuscus*), canyon bat (*Parastrellus hesperus*), pallid bat (*Antrozous pallidus*), California myotis (*Myotis californicus*), and Yuma bat (*Myotis yumanensis*).

Wildlife Movement

Wildlife movement in the geotechnical investigations area would primarily occur along Santiago Creek or along surrounding ridgelines; local wildlife movement could occur through all habitat types. The geotechnical investigations area is contiguous with large undeveloped open space areas in the NCCP Reserve, OC Regional Parks, and the Cleveland National Forest. Due to the undeveloped nature of the area, wildlife movement is generally unconstrained in and around the lake and geotechnical investigations area. Santiago Creek likely functions as a regional movement corridor and connects with several canyons both upstream and downstream. The existing dam structure and associated reservoir (i.e., Irvine Lake) may be a barrier to movement for amphibians, reptiles, and small mammals; however, like larger mammals, these small animals can move around the lake and dam over time using the adjacent drainages and ridgelines as travel routes.

Geotechnical Investigation Impacts

Vegetation Types

The proposed geotechnical activities would temporarily impact native vegetation types. No restoration is currently planned following the geotechnical investigations because the work activities are primarily in ruderal areas and/or within the impact footprint of the Project's permanent or temporary impacts. Project impacts would be fully mitigated as described in the Project EIR (Psomas [in preparation]). Following completion of the geotechnical investigations, there would be no paved roads or permanent structures; although there would be two new piezometers. Though not expected, if the Project does not occur, the area could be restored to natural conditions.

The following vegetation types and other areas would be temporarily impacted by proposed geotechnical investigations: (Table 1, Exhibit 1).

TABLE 1
GEOTECHNICAL INVESTIGATION VEGETATION IMPACTS

Vegetation Types (Gray and Bramlet Code)	Temporary Impact (acre)
Sagebrush Scrub (2.3.6)	—
Disturbed Sagebrush Scrub (2.3.6)	—
Sagebrush-Coyote Bush Scrub (2.3.12)	—
Southern Cactus Scrub (2.4)	—
Disturbed Southern Cactus Scrub (2.4)	—
Toyon–Sumac Chaparral (3.12)	—
Annual Grassland (4.1)	—
Ruderal (4.6)	0.50
Riparian Herb (7.1)	—
Disturbed Mulefat Scrub (7.3)	—
Southern Black Willow Forest (7.7)	—
Disturbed Southern Black Willow Forest (7.7)	—
Southern Black Willow Forest/Riparian Herb (7.7/7.1)	—
Coast Live Oak Woodland (8.1)	—
Cliff (10.0)	—
Open Water (12.1)	—
Vegetated Fluctuating Shoreline (12.2)	0.50
Perennial Stream (12.3)	—
Ornamental (15.5)	—
Developed (15.6)	0.20
Disturbed (16.1)	1.29
Total	2.49

No native vegetation types would be impacted by the proposed geotechnical investigations. However, the geotechnical investigations would be adjacent to several native vegetation types.

A total of 0.50 acre of ruderal would be impacted by the proposed geotechnical investigations. This vegetation type is generally considered of low biological value, is relatively common in the Project region, and is not considered a sensitive natural community by CDFW. Impacts on ruderal would be considered less than significant; therefore, no mitigation would be required.

A total of 0.50 acre of vegetated fluctuating shoreline would be impacted by the proposed geotechnical investigations. This vegetation type is not considered a sensitive natural community by CDFW. However, it is within the jurisdiction of the regulatory agencies discussed below under Jurisdictional Resources. Impacts to jurisdictional resources would be mitigated as part of the Project.

A total of 0.20 acre of developed areas and 1.29 acre of disturbed areas (i.e., existing roads) would be impacted by the proposed geotechnical investigations. Developed and disturbed areas are considered of low biological value. Impacts on developed areas would be considered less than significant; therefore, no mitigation would be required.

Andy Uk
September 5, 2024
Page 8

Jurisdictional Resources

A detailed description of each drainage is provided in the Project's Jurisdictional Delineation Report (Psomas 2024b).

U.S. Army Corps of Engineers (USACE)

A total of 0.149 acre of wetland waters of the U.S. (WOTUS), including 742 linear feet (717 feet along access roads and 25 feet total for all geotechnical locations), under the regulatory authority of the USACE would be impacted by the proposed geotechnical investigations (Table 2; Exhibit 2). This represents impacts to WOTUS within Irvine Lake. One test pit (i.e., TP-3a) and all 14 vibracore samples are located within Irvine Lake; this totals 15 locations within USACE jurisdiction. Nationwide Permit (NWP) 6 allows for the loss² of less than 0.10 acre of WOTUS for the purpose of geotechnical investigations. IRWD will obtain a NWP 6 prior to initiating geotechnical investigations.

Regional Water Quality Control Board (RWQCB)

A total of 0.149 acre of wetland waters of the State, including 742 linear feet (717 feet along access roads and 25 feet total for all geotechnical locations), under the regulatory authority of the RWQCB would be impacted by the proposed geotechnical investigations (Table 2, Exhibit 3). This represents impacts to waters of the State within Irvine Lake. One test pit (i.e., TP-3a) and all 14 vibracore samples are located within Irvine Lake; this totals 15 locations within RWQCB jurisdiction. IRWD will obtain a Section 401 Water Quality Certification, consistent with NWP 6, prior to initiating geotechnical investigations.

CDFW

A total of 0.635 acre of waters, including 3,048 linear feet (2,883 feet along access roads and 165 feet total for all geotechnical locations), under the regulatory authority of CDFW would be impacted by the proposed geotechnical investigations (Table 2, Exhibit 4). This represents impacts to waters under the authority of CDFW within and adjacent to Irvine Lake. Both hollow stem augers (i.e., HSA-1, HAS-2), 6 test pits (i.e., TP-1, TP-2, TP-2a, TP-3, TP-3a, and TP-4), and all 14 vibracore samples are located within Irvine Lake; this totals 22 locations within CDFW jurisdiction. A Streambed Alteration Agreement will be obtained to allow for the loss of CDFW jurisdiction prior to initiating geotechnical investigations.

² Refers to permanent impacts.

**TABLE 2
GEOTECHNICAL IMPACTS ON
JURISDICTIONAL RESOURCES**

Jurisdiction	Amount of Jurisdictional Water Resource (acres)	Length of Jurisdictional Resource Impacted (linear feet)
	Temporary	Temporary
USACE WOTUS	Wetland: 0.149	Access Road: 717
	Non-wetland: 0.000	Geotech Locations: 25
	Total: 0.149	Total: 742
RWCQB Waters of the State	Wetland: 0.149	Access Road: 717
	Non-wetland: 0.000	Geotech Locations: 25
	Total: 0.149	Total: 742
CDFW Jurisdictional Resources	0.635	Access Road: 2,883
		Geotech Locations: 165
		Total: 3,048
USACE: U.S. Army Corps of Engineers; WOTUS: waters of the United States; RWQCB: Regional Water Quality Control Board; CDFW: California Department of Fish and Wildlife.		

Wildlife Habitat

The geotechnical investigations locations were adjusted to avoid native vegetation types; they would only impact ruderal vegetation and vegetated fluctuating shoreline. There would be limited disturbance to these habitat types while many acres of native habitats would remain immediately adjacent to the areas that would be disturbed (over 1,015 acres of habitat remaining in the Project's Biological Study Area [BSA]). Any wildlife disturbed by the proposed activities could move to areas of habitat immediately adjacent to the areas of disturbance. The work would be temporary in nature (approximately two weeks total, with work at each location occurring for one or two days). Wildlife may move away from the disturbance and human activity temporarily but would be expected to return following completion of the geotechnical investigations. Therefore, the impact of the proposed geotechnical investigations would be considered less than significant on wildlife.

Work would occur only during daylight hours; wildlife would be expected to continue to use all areas of the Project site for wildlife movement at night, including areas within the proposed geotechnical investigation area.

It is expected that work at each test pit would be completed within one day. If the work extended over multiple days, the test pits would be covered at the completion of work each day. This would ensure that no wildlife fall into the trench and become entrapped when work is not occurring. While the loss of a few individuals of common wildlife species (e.g., western fence lizard) would not be considered significant, the loss of individuals would be avoided and minimized during the geotechnical investigation activities.

Andy Uk
September 5, 2024
Page 10

Nesting Birds

The geotechnical investigations would occur outside the nesting season (i.e., September 16 to February 14); therefore, there would be no impact on nesting birds.

Special Status Plant Species

Focused surveys were conducted for special status plant species; details of the results are included in the Biological Technical Report (Psomas 2024a). Mud nama (*Nama stenocarpa*) was observed in the southern portion of the lake during the 2022 focused surveys. Mud nama has a California Rare Plant Rank of 2B.2; it is not a Covered species in the Central Coastal NCCP/HCP. The area where mud nama was observed experiences periodic inundation and was mapped as open water during the 2020 vegetation mapping upstream of the dam. At the time of the special status plant survey, the substrate was exposed and consisted of riparian herb vegetation; the species was growing in more open areas, including along disturbed roads/trails. Individuals covered a large area, and the species is small in stature. To estimate the population sizes, ten quadrats one-square-foot in size were sampled in a relatively dense population of mud nama. This resulted in an average of 37.7 individuals per square foot and the total population was estimated to be between 3.5 and 5.5 million (Psomas 2024a). The proposed geotechnical investigations would impact only 0.09 square foot of mud nama, which equates to 3 individuals. Given the amount of mud nama present in the BSA, the loss of three individuals would be considered less than significant. Therefore, no mitigation would be required.

Special Status Wildlife Species

Focused surveys for the following special status wildlife were conducted upstream of the dam: Quino checkerspot, Crotch's bumble bee, arroyo toad, southwestern pond turtle, coastal California gnatcatcher, least Bell's vireo, southwestern willow flycatcher, and western yellow-billed cuckoo. Details on the methods and results of the focused surveys are included in the Biological Technical Report for the Project (Psomas 2024a). This section focuses on high status species (i.e., Threatened, Endangered, or Candidate species) because those species would be the ones that could trigger a significant impact.

Quino checkerspot, arroyo toad, southwestern willow flycatcher, and western yellow-billed cuckoo would not be expected to occur in the geotechnical investigation areas because they were not observed during focused surveys.

Crotch bumble bee was observed foraging in coastal sage scrub habitat on the southern side of the lake and has potential to occur in the geotechnical investigation areas. While there would be a limited amount of foraging habitat loss (0.50 acre of ruderal), many acres of similar habitats would remain immediately adjacent to the areas that would be disturbed (over 1,015 acres of habitat remaining in the BSA). The proposed geotechnical activities would occur outside the breeding season of the Crotch bumble bee; therefore, if there are bees present in the immediate area, the geotechnical activities would not affect nesting.

Coastal California gnatcatcher is known to occur in coastal sage scrub habitats in the BSA and could occur adjacent to the geotechnical investigation areas. No coastal sage scrub would be

Andy Uk
September 5, 2024
Page 11

directly impacted by the geotechnical investigations. As an avoidance and minimization measure, a Biological Monitor will be present throughout the geotechnical work.

Least Bell's vireo is known to occur in riparian habitats in the BSA adjacent to the geotechnical investigations area. No riparian habitat would be directly impacted by the geotechnical investigations. Additionally, the geotechnical investigations would occur outside the breeding season (i.e., September 16 to February 14) when least Bell's vireo would be on its wintering grounds. Therefore, the noise from geotechnical investigations would not affect least Bell's vireo since it would not be present when the geotechnical investigations are planned to occur.

Mountain lion may occur in the BSA and may forage in the area where geotechnical activities would occur. As mentioned above under wildlife movement, the proposed geotechnical activities would occur during daylight hours and would not interfere with foraging by this nocturnal species. The mountain lion would be expected to continue to use the proposed work area for foraging and wildlife movement at night throughout the duration of the proposed geotechnical activities.

Several other special status amphibians, reptiles, birds, and mammals have potential to occur within the impact area for the geotechnical investigations. No roosting habitat for bat species is present in the geotechnical investigations area (e.g., structures, large trees); roosting habitat is present in the vicinity and special status bats may forage in the geotechnical investigations area. While there would be a limited temporary loss of low-quality habitat (0.50 acre ruderal and 0.50 acre vegetated fluctuating shoreline) following the geotechnical investigations, many acres of similar or higher-quality habitats would remain immediately adjacent to the areas that would be disturbed (over 1,015 acres of habitat remaining in the BSA). Therefore, the impact on other special status amphibians, reptiles, birds, and mammals would be less than significant, and no mitigation would be required.

Indirect Impacts

Noise Impacts

The BSA includes some periodic noise events, including consistent low helicopter flights and landings and periodic special events in the adjacent park (e.g., concerts). Noise levels in the BSA would increase over present levels during geotechnical investigations due to construction vehicles. Temporary noise impacts have the potential to disrupt foraging, nesting, roosting, and denning activities for a variety of wildlife species. Temporary noise from geotechnical activities may cause birds adjacent to the work area to temporarily leave the area or may discourage individuals from selecting habitat adjacent to the work area due to construction vehicle noise and human activity. These impacts are considered adverse, but not significant for most wildlife species, because the Project would not impact a substantial population of these species and because work is planned to occur outside the breeding season.

Geotechnical activities would create noise and human activity adjacent to areas of coastal sage scrub occupied by the coastal California gnatcatcher and open water used for foraging by the bald eagle; however, work is planned to occur outside the breeding season (i.e., September 16 to February 14). Coastal California gnatcatchers and bald eagles may move away from the disturbance and human activity temporarily but would be expected to return following

Andy Uk
September 5, 2024
Page 12

completion of the geotechnical investigations. Therefore, indirect impacts would be considered adverse, but less than significant, for work conducted outside the breeding season.

Increased Dust

Geotechnical activities would disturb soils and result in the accumulation of dust on the surface of the leaves of trees, shrubs, and herbs. The respiratory function of the plants in the area would be impaired when dust accumulation is excessive. This indirect effect of dust as a result of geotechnical activities is considered less than significant because it would only affect a limited area and would not substantially reduce plant populations in the region. Therefore, no mitigation would be required.

Water Quality

During geotechnical activities, excess silt, petroleum, or chemicals on the soil surface within the geotechnical investigations area could be washed into drainages and may affect areas downstream of the geotechnical activities (i.e., Irvine Lake). Adverse effects on water quality could indirectly impact species that use riparian areas within the watershed by affecting the food web interactions (e.g., abundance of insects or other prey) or through biomagnification (i.e., the buildup of chemicals in body tissues to toxic levels in higher trophic levels). To be compliant with regulatory requirements, the geotechnical investigations would implement Best Management Practices and erosion control measures to prevent the runoff of toxins, chemicals, petroleum products, or other elements that might degrade water quality. Assuming compliance with standard regulatory requirements, impacts on water quality would be less than significant, and no mitigation would be required.

Invasive Exotic Plant Species

Geotechnical activities create disturbance, which in turn provides a place for non-native weedy species to spread. As discussed previously, construction equipment would be washed prior to arrival on the site to ensure equipment would not introduce non-native weed seeds to the area. The use of Best Management Practices associated with prevention of the spread of weed seeds would result in an impact that is less than significant. Additionally, a native seed mix will be used for hydroseeding areas temporarily disturbed by construction activities (following the Project's construction).

Night Lighting

Geotechnical activities would occur during the day. Therefore, there would be no impact due to night lighting, and no mitigation would be required.

Human Activity

During geotechnical investigations, there would be a small increase in human activity (i.e., vehicle and foot traffic), which would increase the disturbance of natural open space adjacent to the geotechnical investigations area. Human disturbance could disrupt normal foraging behavior of wildlife adjacent to the geotechnical investigation area. However, as discussed above, wildlife may move away from the disturbance and human activity temporarily but would be expected to return following completion of the geotechnical investigations. A WEAP training would be

Andy Uk
September 5, 2024
Page 13

conducted by the Biological Monitor to ensure that geotechnical personnel are trained on the environmental sensitivity of the area.

Increased Wildfire Risk

During geotechnical investigations, construction equipment or personal vehicles have potential to accidentally ignite vegetation, starting a wildfire. Additionally, construction personnel may dispose of cigarettes inappropriately in the geotechnical investigations area and could ignite dry vegetation. If not contained quickly, the fire could spread through adjacent habitat areas. As discussed previously, a WEAP training will be conducted by the Biological Monitor to ensure that geotechnical personnel are trained on the environmental sensitivity of the area.

Mitigation

The Project Draft EIR (Psomas [in preparation]) includes compensatory mitigation for the loss of jurisdictional resources. These habitats would be mitigated at a minimum 1:1 ratio through use of one of the following options: (1) preservation, restoration, and/or enhancement of on-site habitats; or (2) preservation, restoration, or enhancement of off-site habitats. IRWD have initiated consultation with the resource agencies to negotiate appropriate mitigation for the loss of these resources as a result of the Project, as consistent with the Clean Water Act, California Fish and Game Code, and the federal and State Endangered Species Acts.

Attachments – Exhibits 1–5

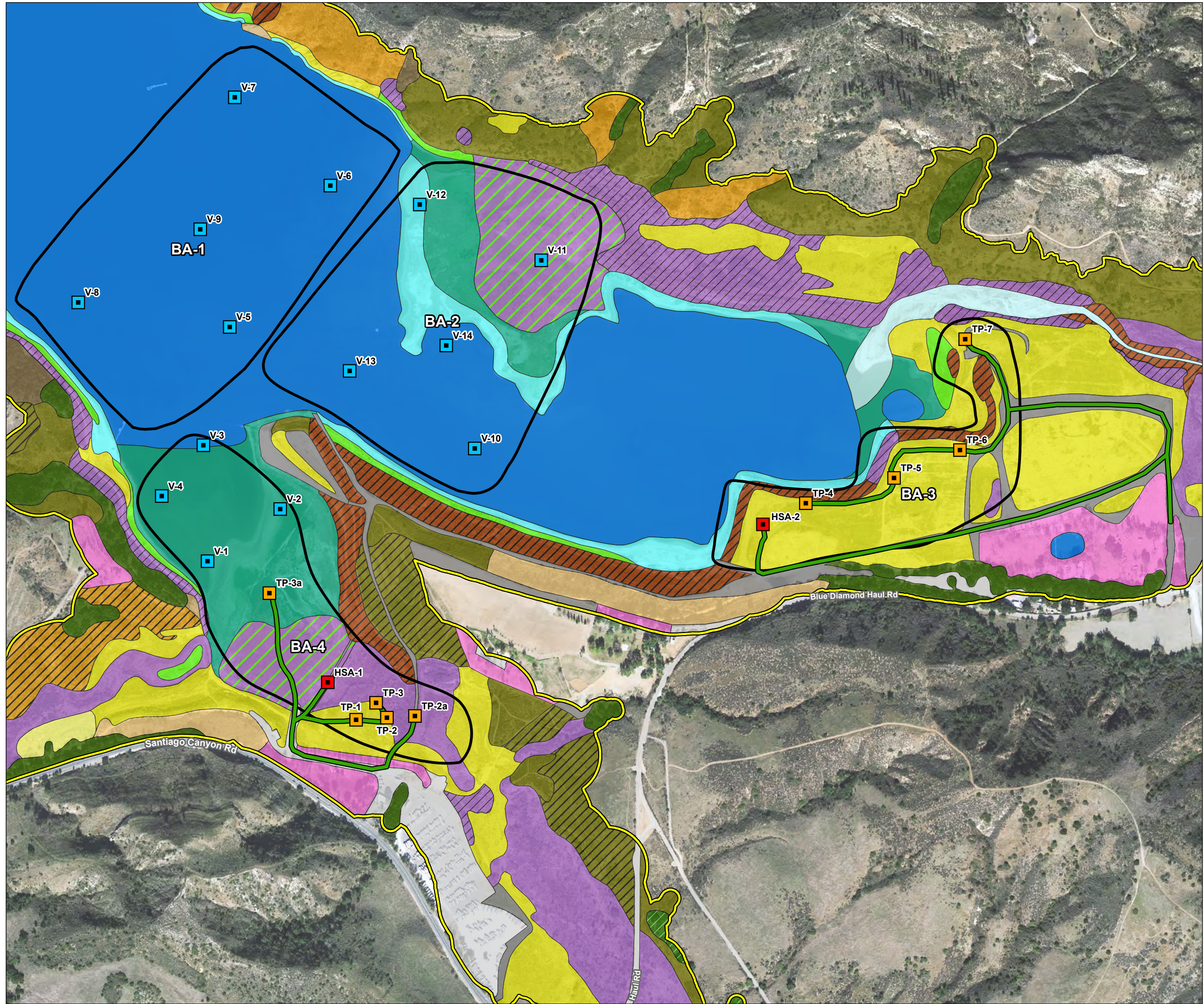
R:\Projects\IRW_IRWD\3IRW010205\Documentation\Geotech 2 Memo\SantiagoDam-Geotech2-Bio Memo-090524.docx

Andy Uk
September 5, 2024
Page 14

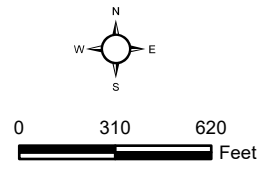
REFERENCES:

- California Department of Fish and Wildlife (CDFW). 2024 (August 26, date accessed). California Natural Diversity Database. Records of Occurrence for the USGS Black Star Canyon, Orange, Tustin, and El Toro 7.5-minute quadrangles. Sacramento, CA: CDFW, Natural Heritage Division.
- California Native Plant Society (CNPS). 2024 (August 26, date accessed). Inventory of Rare and Endangered Plants (online edition, v-9.5). Records of Occurrence for the USGS Black Star Canyon, Orange, Tustin, and El Toro 7.5-minute quadrangles. Sacramento, CA: CNPS. <http://www.rareplants.cnps.org/>.
- Gray, J. and D. Bramlet. 1992. *Habitat Classification System Natural Resources Geographic Information System (GIS) Project* (Prepared for the County of Orange Environmental Management Agency). Santa Ana, CA: Gray and Bramlet.
- Orange, County of. 1996 (July). *Natural Community Conservation Plan and Habitat Conservation Plan, County of Orange, Central and Coastal Subregion*. Santa Ana, CA.
- Psomas. 2024a (March 4). *Biological Technical Report for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California*. Santa Ana, CA: Psomas.
- . 2024b (March 4). *Jurisdictional Delineation Report for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California*. Santa Ana, CA: Psomas.
- . [in preparation]. *Draft Environmental Impact Report for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California*. Santa Ana, CA: Psomas.
- U.S. Fish and Wildlife Service (USFWS). 2024. (August 26). List of Threatened and Endangered Species That May Occur in Your Proposed Project Location or May Be Affected By Your Proposed Project; Santiago Creek Dam Outlet Tower and Spillway Improvements Project; 2023-0055398. Carlsbad, CA: USFWS.

D:\Projects\3IRW\SantiagoCreek\FRC\SCD_Geotech_Memo2.aprx Geotech_Vegetation_Impacts



- Survey Area
- Borrow Areas
- Access Routes
- Borrow Sites**
- Hollow Stem Auger Boring
- Test Pit
- Vibracore
- Vegetation Types and Other Areas**
- Sagebrush Scrub (2.3.6)
- Disturbed Sagebrush Scrub (2.3.6)
- Sagebrush - Coyote Brush Scrub (2.3.12)
- Southern Cactus Scrub (2.4)
- Disturbed Southern Cactus Scrub (2.4)
- Toyon - Sumac Chaparral (3.12)
- Annual Grassland (4.1)
- Ruderal (4.6)
- Riparian Herb (7.1)
- Disturbed Mulefat Scrub (7.3)
- Southern Sycamore Riparian Woodland/Southern Coast Live Oak Riparian Forest (7.4/7.5)
- Southern Black Willow Forest (7.7)
- Disturbed Southern Black Willow Forest (7.7)
- Southern Black Willow Forest/Riparian Herb (7.7/7.1)
- Coast Live Oak Woodland (8.1)
- Cliff (10)
- Open Water (12.1)
- Fluctuating Shoreline (12.2)
- Vegetated Fluctuating Shoreline (12.2)
- Perennial Stream (13.1)
- Ornamental (15.5)
- Developed (15.6)
- Disturbed (16.1)



Aerial Source: Esri, Maxar 2022

Geotechnical Impacts - Vegetation Types

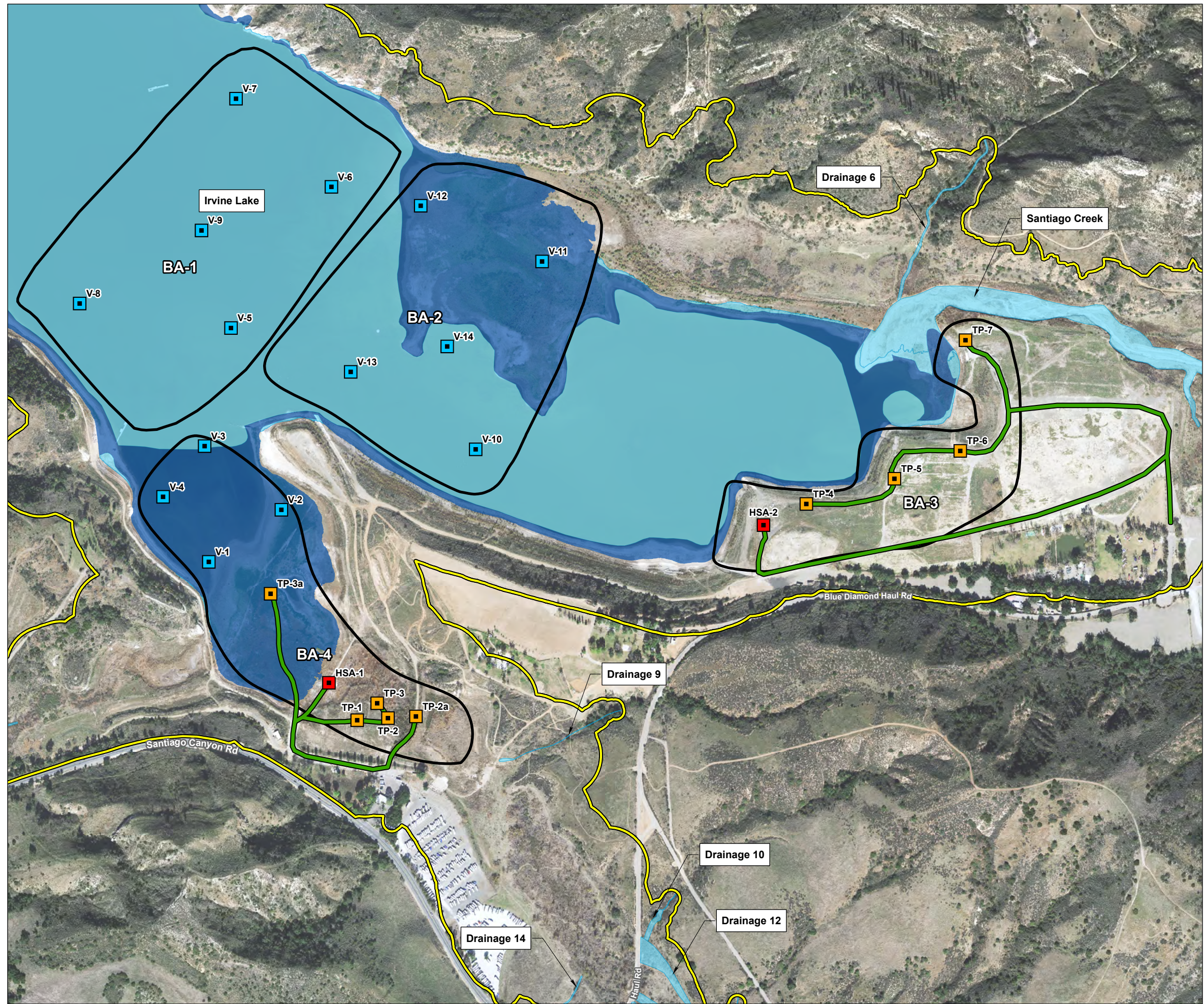
Santiago Creek Dam Outlet Tower and Spillway Improvements Project

Exhibit 1



(Rev: 9-05-2024 PLO) R:\Projects\IRW_IRWD\3IRW010205\Graphics\Geotech_Memo2\ex_Geotech_Vegetation_Impacts.pdf

D:\Projects\3IRW\SantiagoCreek\FRC\SCD_Geotech_Memo2\SCD_Geotech_Memo2.aprx Geotech_USACE_Impacts



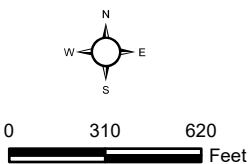
- Survey Area
- Borrow Areas
- Access Routes

Borrow Sites

- Hollow Stem Auger Boring
- Test Pit
- Vibracore

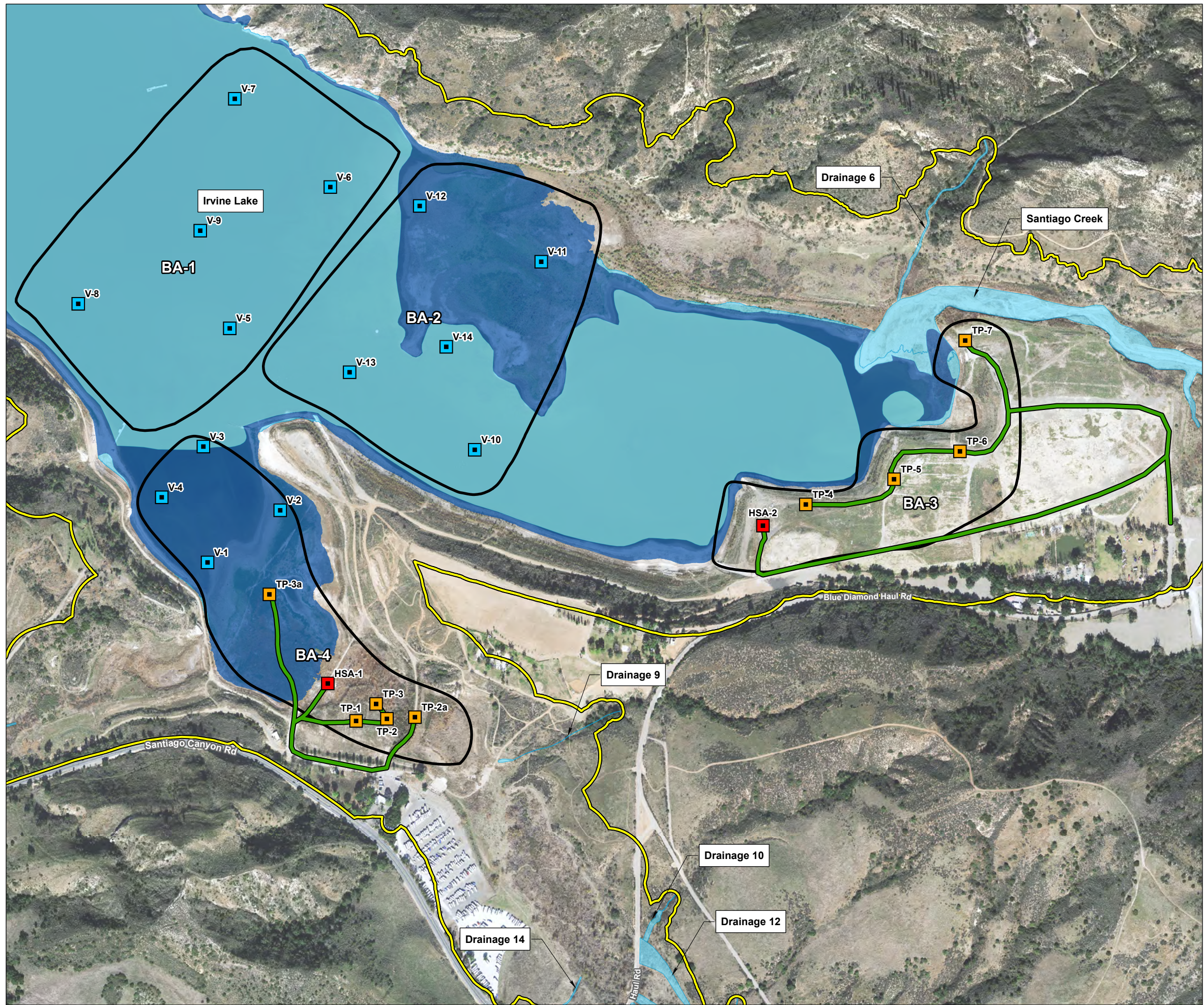
Waters of the United States

- Non-Wetland
- Wetland



Aerial Source: Hexagon Geosystems 2017

D:\Projects\31RW\SantiagoCreek\FRC\SCD_Geotech_Memo2\SCD_Geotech_Memo2.aprx Geotech_RWQCB_Impacts



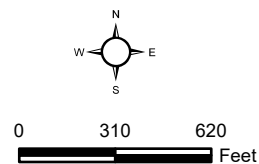
- Survey Area
- Borrow Areas
- Access Routes

Borrow Sites

- Hollow Stem Auger Boring
- Test Pit
- Vibracore

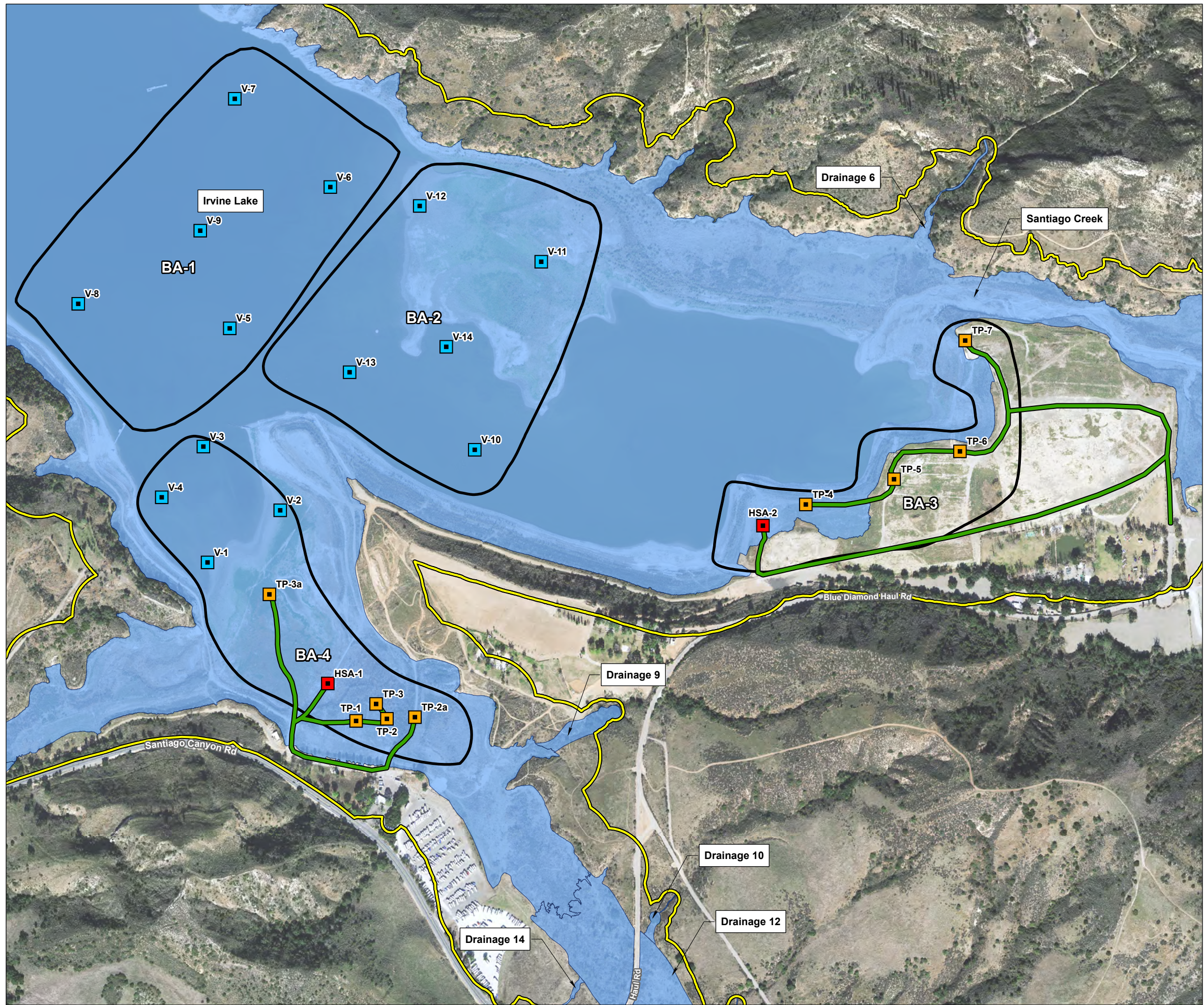
Waters of the State

- Non-Wetland
- Wetland

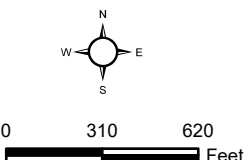


Aerial Source: Hexagon Geosystems 2017

D:\Projects\3IRW\SantiagoCreek\FRC\SCD_Geotech_Memo2\SCD_Geotech_Memo2.aprx Geotech_CDFW_Impacts

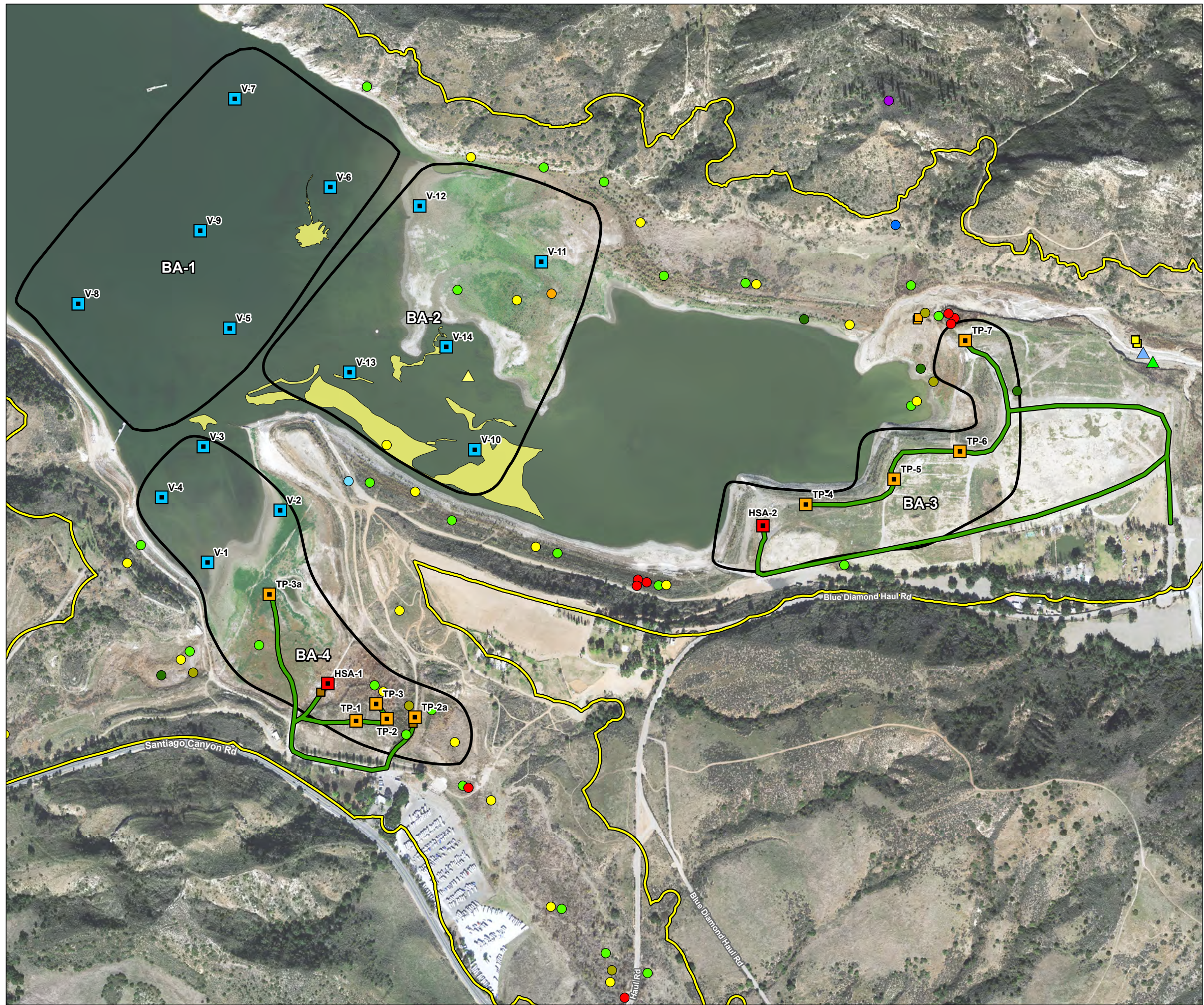


- Survey Area
- Borrow Areas
- Access Routes
- Borrow Sites**
 - Hollow Stem Auger Boring
 - Test Pit
 - Vibracore
- CDFW Jurisdictional Waters**
 - CDFW

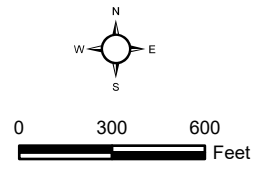


Aerial Source: Hexagon Geosystems 2017

D:\Projects\31RW\SantiagoCreek\FRC\SCD_Geotech_Memo2\approx_Geotech_SS_Species_Impacts



- Survey Area
- Borrow Areas
- Access Routes
- Borrow Sites**
 - Hollow Stem Auger Boring
 - Test Pit
 - Vibracore
- Special Status Plants**
 - Braunton's Milkvetch Population
 - Coulter's Matilija Poppy Population
 - Mud Nama Population (point location)
 - Mud Nama Population (mapped polygon)
- Special Status Species**
 - Bald Eagle (Nest)
 - Belding's Orange-Throated Whiptail
 - Coastal Cactus Wren
 - Coastal California Gnatcatcher
 - Coastal Whiptail
 - Grasshopper Sparrow
 - Least Bell's Vireo
 - Two-Striped Gartersnake
 - White-Tailed Kite
 - Willow Flycatcher (migrant)
 - Yellow Warbler
 - Yellow-Breasted Chat



Aerial Source: Hexagon Geosystems 2017

APPENDIX B

USFWS OFFICIAL SPECIES LIST



United States Department of the Interior

FISH AND WILDLIFE SERVICE

Carlsbad Fish And Wildlife Office

2177 Salk Avenue - Suite 250

Carlsbad, CA 92008-7385

Phone: (760) 431-9440 Fax: (760) 431-5901



In Reply Refer To:

03/19/2025 20:30:17 UTC

Project Code: 2023-0055398

Project Name: Santiago Creek Dam Improvements Project

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A biological assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2) (c)). For projects other than major construction activities, the Service suggests that a biological

evaluation similar to a biological assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a biological assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found at the Fish and Wildlife Service's Endangered Species Consultation website at:

<https://www.fws.gov/service/esa-section-7-consultation>

Migratory Birds: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts, see <https://www.fws.gov/program/migratory-bird-permit/what-we-do>.

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures, see <https://www.fws.gov/library/collections/threats-birds>.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit <https://www.fws.gov/partner/council-conservation-migratory-birds>.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Code in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Carlsbad Fish And Wildlife Office

2177 Salk Avenue - Suite 250

Carlsbad, CA 92008-7385

(760) 431-9440

PROJECT SUMMARY

Project Code: 2023-0055398

Project Name: Santiago Creek Dam Improvements Project

Project Type: Dam - Maintenance/Modification

Project Description: The Project is located at Santiago Creek Dam at the northwest end of Irvine Lake in unincorporated Orange County. Irvine Ranch Water District (IRWD) operates Irvine Lake (and the Santiago Creek Dam) to serve as a critical water supply reservoir. Santiago Creek Dam is a compacted earthfill embankment completed in 1933 and certified by the State of California, Department of Water Resources (DWR), Division of Safety of Dams (DSOD).

The primary objective of the Project is the rehabilitation and replacement of the Santiago Creek Dam outlet tower and spillway facilities, as well as to modify the dam embankment to permit operation of the facilities for a long-term water resource benefit. The Project would also raise the spillway two feet, which would result in a small increase in maximum inundation area of the reservoir. In implementing the Project, the Districts would: (1) create new facilities and dam embankment modifications that will meet or exceed the current seismic, safety and design requirements; (2) satisfy IRWD's operational requirements in the present and future; (3) extend the useful life of the facilities; (4) improve water supply reliability; and (5) minimize impacts to local environmental resources and surrounding property owners.

Project Location:

The approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/@33.775968,-117.7096687758396,14z>



Counties: Orange County, California

ENDANGERED SPECIES ACT SPECIES

There is a total of 12 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries¹, as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

-
1. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

BIRDS

NAME	STATUS
Coastal California Gnatcatcher <i>Polioptila californica californica</i> There is final critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/8178	Threatened
Least Bell's Vireo <i>Vireo bellii pusillus</i> There is final critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/5945	Endangered
Southwestern Willow Flycatcher <i>Empidonax traillii extimus</i> There is final critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/6749	Endangered

REPTILES

NAME	STATUS
Southwestern Pond Turtle <i>Actinemys pallida</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/4768	Proposed Threatened

AMPHIBIANS

NAME	STATUS
Arroyo (=arroyo Southwestern) Toad <i>Anaxyrus californicus</i> There is final critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/3762	Endangered
Western Spadefoot <i>Spea hammondi</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/5425	Proposed Threatened

INSECTS

NAME	STATUS
Monarch Butterfly <i>Danaus plexippus</i> There is proposed critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/9743	Proposed Threatened
Quino Checkerspot Butterfly <i>Euphydryas editha quino</i> (= <i>E. e. wrighti</i>) There is final critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/5900	Endangered

CRUSTACEANS

NAME	STATUS
San Diego Fairy Shrimp <i>Branchinecta sandiegonensis</i>	Endangered

NAME	STATUS
There is final critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/6945	

FLOWERING PLANTS

NAME	STATUS
Braunton's Milk-vetch <i>Astragalus brauntonii</i> There is final critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/5674	Endangered
Nevin's Barberry <i>Berberis nevinii</i> There is final critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/8025	Endangered
Santa Monica Mountains Dudleyea <i>Dudleya cymosa ssp. ovatifolia</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/2538	Threatened

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

IPAC USER CONTACT INFORMATION

Agency: Irvine Ranch Water District
Name: Amber Heredia
Address: 5 Hutton Centre Drive
Address Line 2: Suite 300
City: Santa Ana
State: CA
Zip: 92707
Email: amber.heredia@psomas.com
Phone: 7144818049

LEAD AGENCY CONTACT INFORMATION

Lead Agency: U.S. Fish and Wildlife Service
Name: Eric Sweeney
Email: Eric.R.Sweeney@usace.army.mil
Phone: 7606024837

APPENDIX C
REPRESENTATIVE PHOTOGRAPHS



View of the spillway from Irvine Lake, looking north.



Overview of the northern portion of the survey area, looking south.

Representative Photographs

Santiago Creek Dam Improvement Project

Attachment C-1





From the waterline to the upland, the following vegetation types are visible: fluctuating shoreline, vegetated fluctuating shoreline, disturbed mulefat scrub, and sagebrush scrub. Northern portion of the survey area, looking south.



Ruderal vegetation is in the foreground with southern black willow forest along the lake edge in the eastern portion of the survey area, looking south.

Representative Photographs

Santiago Creek Dam Improvement Project

Attachment C-2





Disturbed mulefat scrub and riparian herb along Santiago Creek in the eastern portion of the survey area, looking west.



Ruderal vegetation and disturbed areas in the foreground with southern black willow forest in the distant background in the eastern portion of the survey area, looking east.

Representative Photographs

Santiago Creek Dam Improvement Project

Attachment C-3





Disturbed sagebrush scrub in the southern portion of the survey area, looking northwest.



Sagebrush scrub where a coastal California gnatcatcher was observed in the southern portion of the survey area.

Representative Photographs

Santiago Creek Dam Improvement Project

Attachment C-4





Vegetated fluctuating shoreline in the foreground and southern black willow forest/riparian herb in the background in the southern portion of the survey area.



Overview of the southern portion of the survey area, looking north. From the foreground to the background, the following vegetation types are visible: sagebrush-coyote brush scrub (green in lower right), ruderal (brown), southern black willow forest (green), and disturbed southern cactus scrub (on hill in background).

Representative Photographs

Santiago Creek Dam Improvement Project

Attachment C-5





Overview of the western portion of the survey area.



Toyon – sumac chaparral on slope with riparian herb and fluctuating shoreline in the foreground along the waterline in the northern portion of the survey area.

Representative Photographs

Santiago Creek Dam Improvement Project

Attachment C-6



APPENDIX D

PLANT AND WILDLIFE COMPENDIA

PLANT SPECIES OBSERVED IN THE BIOLOGICAL STUDY AREA

Species	
Scientific Name	Common Name
FERNS	
POLYPODIACEAE – POLYPODY FAMILY	
<i>Polypodium californicum</i>	California polypody
PTERIDACEAE – BRAKE FAMILY	
<i>Pellaea andromedifolia</i>	coffee fern
<i>Pentagramma triangularis</i>	goldback fern
SELAGINELLACEAE – SPIKE-MOSS FAMILY	
<i>Selaginella bigelovii</i>	Bigelow's spike-moss
GYMNOSPERMS	
PINACEAE – PINE FAMILY	
<i>Pinus sp.*</i>	pine
EUDICOTS	
ADOXACEAE – MUSKROOT FAMILY	
<i>Sambucus mexicana</i>	blue elderberry
AIZOACEAE – FIG-MARIGOLD FAMILY	
<i>Carpobrotus edulis*</i>	freeway iceplant
AMARANTHACEAE – AMARANTH FAMILY	
<i>Amaranthus albus*</i>	tumbleweed
ANACARDIACEAE – SUMAC FAMILY	
<i>Malosma laurina</i>	laurel sumac
<i>Rhus integrifolia</i>	lemonade berry
<i>Rhus ovata</i>	sugar bush
<i>Schinus molle*</i>	pepper tree
<i>Toxicodendron diversilobum</i>	western poison oak
APIACEAE – CARROT FAMILY	
<i>Daucus pusillus</i>	small daucus
<i>Foeniculum vulgare*</i>	fennel
<i>Torilis nodosa*</i>	short sock-destroyer
APOCYNACEAE – DOGBANE FAMILY	
<i>Asclepias fascicularis</i>	narrow-leaf milkweed
ASTERACEAE – SUNFLOWER FAMILY	
<i>Acourtia microcephala</i>	small-headed acourtia
<i>Ambrosia acanthicarpa</i>	annual bur-sage
<i>Ambrosia psilostachya</i>	western ragweed
<i>Artemisia californica</i>	California sagebrush
<i>Baccharis pilularis ssp. consanguinea</i>	coyote brush
<i>Baccharis salicifolia ssp. salicifolia</i>	mule fat
<i>Baccharis sarothroides</i>	broom baccharis
<i>Bebbia juncea var. aspera</i>	rough rush-like sweetbush
<i>Brickellia californica</i>	California brickellbush

PLANT SPECIES OBSERVED IN THE BIOLOGICAL STUDY AREA

Species	
Scientific Name	Common Name
<i>Carduus pycnocephalus</i> ssp. <i>pycnocephalus</i> *	Italian thistle
<i>Centaurea melitensis</i> *	toçalote
<i>Chaenactis artemisiifolia</i>	white pincushion
<i>Chaenactis glabriuscula</i>	yellow pincushion
<i>Cirsium occidentale</i>	cobwebby thistle
<i>Cirsium vulgare</i> *	bull thistle
<i>Corethrogyne filaginifolia</i>	filago-leaved sand-aster
<i>Cotula australis</i> *	Australian cotula
<i>Cynara cardunculus</i> ssp. <i>cardunculus</i> *	artichoke
<i>Deinandra fasciculata</i>	fascicled tarplant
<i>Eclipta prostrata</i>	false daisy
<i>Encelia californica</i>	California encelia
<i>Encelia farinosa</i>	brittlebush
<i>Ericameria palmeri</i> var. <i>pachylepis</i>	thickbracted goldenbush
<i>Erigeron bonariensis</i> *	flax-leaved horseweed
<i>Erigeron canadensis</i>	horseweed
<i>Erigeron foliosus</i>	leafy fleabane
<i>Eriophyllum confertiflorum</i> var. <i>confertiflorum</i>	golden-yarrow
<i>Filago gallica</i>	Daggerleaf cottonrose
<i>Gazania linearis</i> *	parallel-sided treasure flower
<i>Grindelia camporum</i>	field gumplant
<i>Hazardia squarrosa</i>	saw-toothed goldenbush
<i>Hedypnois rhagadioloides</i> *	Crete weed
<i>Helianthus annuus</i>	annual sunflower
<i>Helianthus gracilentus</i>	slender sunflower
<i>Helminthotheca echioides</i> *	bristly ox-tongue
<i>Heterotheca grandiflora</i>	telegraph weed
<i>Heterotheca sessiliflora</i> ssp. <i>echioides</i>	Viper's sessileflower goldenaster
<i>Hypochaeris glabra</i> *	smooth cat's-ear
<i>Isocoma menziesii</i>	coastal goldenbush
<i>Lactuca serriola</i> *	prickly lettuce
<i>Lasthenia gracilis</i>	common goldfields
<i>Lepidospartum squamatum</i>	scaly scale-broom
<i>Logfia filaginoides</i>	California cottonrose
<i>Logfia gallica</i> *	daggerleaf cottonrose
<i>Madia exigua</i>	small tarweed
<i>Madia gracilis</i>	gumweed
<i>Malacothrix saxatilis</i>	rocky malacothrix
<i>Matricaria discoidea</i> *	pineapple weed
<i>Oncosiphon piluliferum</i> *	stinknet

PLANT SPECIES OBSERVED IN THE BIOLOGICAL STUDY AREA

Species	
Scientific Name	Common Name
<i>Osmadenia tenella</i>	osmadenia
<i>Pluchea sericea</i>	arrow-weed
<i>Pseudognaphalium biolettii</i>	Bioletti's cudweed
<i>Pseudognaphalium californicum</i>	California cudweed
<i>Pseudognaphalium canescens</i>	hairy everlasting
<i>Pseudognaphalium luteoalbum*</i>	white lamb cudweed
<i>Pseudognaphalium stramineum</i>	straw-colored cudweed
<i>Psilocarphus brevissimus</i> var. <i>brevissimus</i>	dwarf woollyheads
<i>Pulicaria paludosa*</i>	marsh pulicaria
<i>Rafinesquia californica</i>	California chicory
<i>Senecio vulgaris*</i>	common groundsel
<i>Silybum marianum*</i>	milk thistle
<i>Sonchus asper</i> ssp. <i>asper*</i>	prickly sow thistle
<i>Sonchus oleraceus*</i>	common sow thistle
<i>Stephanomeria diegensis</i>	San Diego stephanomeria
<i>Stephanomeria virgata</i>	wand-like stephanomeria
<i>Stylocline gnaphaloides</i>	everlasting neststraw
<i>Taraxacum officinale*</i>	common dandelion
<i>Uropappus lindleyi</i>	Lindley's silverpuffs
<i>Xanthium strumarium</i>	cocklebur
BETULACEAE – BIRCH FAMILY	
<i>Alnus rhombifolia</i>	white alder
BORAGINACEAE – BORAGE FAMILY	
<i>Amsinckia intermedia</i>	common fiddleneck
<i>Amsinckia menziesii</i>	common fiddleneck
<i>Cryptantha intermedia</i>	intermediate cryptantha
<i>Cryptantha</i> sp.	cryptantha
<i>Emmenanthe penduliflora</i>	whispering bells
<i>Eriodictyon crassifolium</i> var. <i>crassifolium</i>	thick-leaved yerba santa
<i>Eucrypta chrysanthemifolia</i>	chrysanthemum-leaved eucrypta
<i>Heliotropium curassavicum</i> var. <i>oculatum</i>	seaside heliotrope
<i>Nama stenocarpa</i>	mud nama
<i>Pectocarya linearis</i> ssp. <i>ferocula</i>	narrow-toothed pectocarya
<i>Phacelia cicutaria</i>	cicuta-leaved phacelia
<i>Phacelia parryi</i>	Parry's phacelia
<i>Pholistoma auritum</i> var. <i>auritum</i>	fiesta flower
<i>Plagiobothrys canescens</i>	valley popcornflower
BRASSICACEAE – MUSTARD FAMILY	
<i>Brassica nigra*</i>	black mustard
<i>Hirschfeldia incana*</i>	grayish shortpod mustard

PLANT SPECIES OBSERVED IN THE BIOLOGICAL STUDY AREA

Species	
Scientific Name	Common Name
<i>Lepidium didymum</i> *	lesser swine grass
<i>Lepidium latifolium</i> *	perennial pepperweed
<i>Nasturtium officinale</i>	water cress
<i>Raphanus sativus</i> *	radish
<i>Rorippa sp.</i>	yellow cress
<i>Sisymbrium irio</i> *	London rocket
<i>Sisymbrium orientale</i> *	eastern sisymbrium
CACTACEAE – CACTUS FAMILY	
<i>Opuntia littoralis</i>	seaside prickly-pear
<i>Opuntia ×vaseyi</i>	Vasey's prickly-pear
CARYOPHYLLACEAE – PINK FAMILY	
<i>Silene gallica</i> *	small-flower catchfly
<i>Silene laciniata</i>	torn catchfly
<i>Stellaria media</i> *	common chickweed
CHENOPODIACEAE – GOOSEFOOT FAMILY	
<i>Chenopodium californicum</i>	California goosefoot
<i>Salsola tragus</i> *	Russian thistle
CONVOLVULACEAE – MORNING-GLORY FAMILY	
<i>Calystegia macrostegia</i>	large-bracted morning-glory
<i>Cuscuta californica</i>	chaparral dodder
CRASSULACEAE – STONECROP FAMILY	
<i>Crassula connata</i>	pygmy-weed
<i>Dudleya lanceolata</i>	lance-leaved dudleya
<i>Dudleya multicaulis</i>	many-stemmed dudleya
<i>Dudleya pulverulenta</i>	chalk dudleya
CUCURBITACEAE – GOURD FAMILY	
<i>Cucurbita foetidissima</i>	buffalo gourd
<i>Marah macrocarpa</i>	chilicothe
EUPHORBIACEAE – SPURGE FAMILY	
<i>Croton californicus</i>	California croton
<i>Croton setiger</i>	turkey-mullein
<i>Euphorbia albomarginata</i>	rattlesnake sandmat
<i>Euphorbia peplus</i> *	petty spurge
<i>Ricinus communis</i> *	common castor bean
FABACEAE – LEGUME FAMILY	
<i>Acmispon americanus var. americanus</i>	American deervetch
<i>Acmispon glaber</i>	deerweed
<i>Acmispon maritimus</i>	coastal deervetch
<i>Acmispon micranthus</i>	small-flowered deervetch
<i>Astragalus brauntonii</i>	Braunton's milkvetch

PLANT SPECIES OBSERVED IN THE BIOLOGICAL STUDY AREA

Species	
Scientific Name	Common Name
<i>Astragalus pomonensis</i>	Pomona milkvetch
<i>Cytisus multiflorus</i> *	Spanish broom
<i>Lupinus bicolor</i>	miniature lupine
<i>Lupinus hirsutissimus</i>	stinging lupine
<i>Lupinus sparsiflorus</i>	Coulter's lupine
<i>Lupinus succulentus</i>	arroyo lupine
<i>Lupinus truncatus</i>	cut leaf lupine
<i>Medicago polymorpha</i> *	variable burclover
<i>Melilotus albus</i> *	white sweetclover
<i>Melilotus indicus</i> *	sourclover
<i>Robinia pseudoacacia</i> *	black locust
<i>Trifolium willdenovii</i>	tomcat clover
<i>Vicia sp.</i>	vetch
FAGACEAE – OAK FAMILY	
<i>Quercus agrifolia</i>	coast live oak
GERANIACEAE – GERANIUM FAMILY	
<i>Erodium botrys</i> *	long-beaked filaree
<i>Erodium cicutarium</i> *	redstem filaree
<i>Geranium carolinianum</i>	Carolina geranium
GROSSULARIACEAE – GOOSEBERRY FAMILY	
<i>Ribes speciosum</i>	fuchsia-flowered gooseberry
LAMIACEAE – MINT FAMILY	
<i>Marrubium vulgare</i> *	common horehound
<i>Salvia apiana</i>	white sage
<i>Salvia columbariae</i>	chia
<i>Salvia mellifera</i>	black sage
<i>Trichostema lanceolatum</i>	vinegar weed
LOASACEAE – BLAZING STAR FAMILY	
<i>Mentzelia micrantha</i>	small-flowered blazing star
MALVACEAE – MALLOW FAMILY	
<i>Malacothamnus fasciculatus</i> var. <i>fasciculatus</i>	chaparral mallow
<i>Malva parviflora</i> *	cheeseweed
<i>Malvella leprosa</i>	alkali-mallow
MELIACEAE – MAHOGANY FAMILY	
<i>Melia azedarach</i> *	china berry
MONTIACEAE – MINER'S-LETTUCE FAMILY	
<i>Calandrinia menziesii</i>	red maids
<i>Claytonia perfoliata</i>	miner's lettuce
MYRSINACEAE – MYRSINE FAMILY	
<i>Lysimachia arvensis</i> *	scarlet pimpernel

PLANT SPECIES OBSERVED IN THE BIOLOGICAL STUDY AREA

Species	
Scientific Name	Common Name
MYRTACEAE – MYRTLE FAMILY	
<i>Eucalyptus</i> spp.*	gum tree
NYCTAGINACEAE – FOUR O'CLOCK FAMILY	
<i>Mirabilis laevis</i> var. <i>crassifolia</i>	wishbone bush
OLEACEAE – OLIVE FAMILY	
<i>Olea europaea</i> *	European olive
ONAGRACEAE – EVENING PRIMROSE FAMILY	
<i>Camissoniopsis micrantha</i>	small-flowered camissoniopsis
<i>Clarkia epilobioides</i>	epilobium-like clarkia
<i>Clarkia purpurea</i>	purple clarkia
<i>Clarkia purpurea</i> ssp. <i>quadrivulnera</i>	four-spot
<i>Epilobium ciliatum</i>	fringed willowherb
<i>Gayophytum</i> sp.	gayophytum
OROBANCHACEAE – BROOM-RAPE FAMILY	
<i>Castilleja exserta</i>	purple owl's-clover
<i>Cordylanthus rigidus</i> ssp. <i>setiger</i>	bristly rigid bird's-beak
OXALIDACEAE – OXALIS FAMILY	
<i>Oxalis pes-caprae</i> *	Bermuda buttercup
PAEONIACEAE – PEONY FAMILY	
<i>Paeonia californica</i>	California peony
PAPAVERACEAE – POPPY FAMILY	
<i>Eschscholzia californica</i>	California poppy
<i>Romneya coulteri</i>	Coulter's matilija poppy
PHRYMACEAE – LOPSEED FAMILY	
<i>Diplacus australis</i>	southern monkeyflower
<i>Diplacus longiflorus</i>	long-flowered monkeyflower
<i>Erythranthe cardinalis</i>	scarlet monkeyflower
<i>Erythranthe guttata</i>	common monkeyflower
PINACEAE – PINE FAMILY	
<i>Pinus</i> sp.*	pine
PLANTAGINACEAE – PLANTAIN FAMILY	
<i>Antirrhinum nuttallianum</i>	Nuttall's snapdragon
<i>Keckiella antirrhinoides</i>	antirrhinum-like bush penstemon
<i>Keckiella cordifolia</i>	heart-leaved bush penstemon
<i>Plantago erecta</i>	erect plantain
<i>Veronica anagallis-aquatica</i> *	water speedwell
PLATANACEAE – SYCAMORE FAMILY	
<i>Platanus racemosa</i>	western sycamore

PLANT SPECIES OBSERVED IN THE BIOLOGICAL STUDY AREA

Species	
Scientific Name	Common Name
POLEMONIACEAE – PHLOX FAMILY	
<i>Gilia angelensis</i>	chaparral gilia
<i>Linanthus dianthiflorus</i>	carnation-like linanthus
POLYGONACEAE – BUCKWHEAT FAMILY	
<i>Eriogonum fasciculatum</i>	California buckwheat
<i>Persicaria lapathifolia</i>	willow weed
<i>Polygonum aviculare</i> *	knotweed
<i>Pterostegia drymarioides</i>	fairy mist
<i>Rumex crispus</i> *	curly dock
RANUNCULACEAE – BUTTERCUP FAMILY	
<i>Delphinium parryi</i> ssp. <i>parryi</i>	Parry's larkspur
RHAMNACEAE – BUCKTHORN FAMILY	
<i>Rhamnus ilicifolia</i>	hollyleaf redberry
ROSACEAE – ROSE FAMILY	
<i>Adenostoma fasciculatum</i>	chamise
<i>Heteromeles arbutifolia</i>	toyon
RUBIACEAE – COFFEE FAMILY	
<i>Galium angustifolium</i> ssp. <i>angustifolium</i>	narrow-leaved bedstraw
<i>Galium aparine</i>	goose grass
SALICACEAE – WILLOW FAMILY	
<i>Populus fremontii</i> ssp. <i>fremontii</i>	Fremont cottonwood
<i>Salix exigua</i>	narrow-leaved willow
<i>Salix gooddingii</i>	Goodding's black willow
<i>Salix laevigata</i>	red willow
<i>Salix lasiolepis</i>	arroyo willow
SCROPHULARIACEAE – FIGWORT FAMILY	
<i>Scrophularia californica</i>	California figwort
<i>Verbascum</i> sp.*	mullein
SOLANACEAE – NIGHTSHADE FAMILY	
<i>Datura wrightii</i>	Wright's jimsonweed
<i>Nicotiana glauca</i> *	tree tobacco
<i>Solanum americanum</i>	American nightshade
<i>Solanum douglasii</i>	Douglas' nightshade
<i>Solanum umbelliferum</i>	umbelled nightshade
<i>Solanum xanti</i>	Xantus' nightshade
TAMARICACEAE – TAMARISK FAMILY	
<i>Tamarix ramosissima</i> *	saltcedar
URTICACEAE – NETTLE FAMILY	
<i>Urtica urens</i> *	dwarf nettle

PLANT SPECIES OBSERVED IN THE BIOLOGICAL STUDY AREA

Species	
Scientific Name	Common Name
VERBENACEAE – VERVAIN FAMILY	
<i>Phyla nodiflora</i>	node-flowered phyla
<i>Verbena bracteata</i>	bracted vervain
<i>Verbena lasiostachys</i>	woolly-flowered vervain
VIOLACEAE – VIOLET FAMILY	
<i>Viola pedunculata</i>	Johnny-jump-up
VISCACEAE – MISTLETOE FAMILY	
<i>Phoradendron leucarpum</i>	American mistletoe
MONOCOTS	
AGAVACEAE – AGAVE FAMILY	
<i>Chlorogalum</i> sp.	soap plant
<i>Hesperoyucca whipplei</i>	Whipple's chaparral yucca
ALISMATACEAE – WATER-PLANTAIN FAMILY	
<i>Echinodorus berteroi</i>	Bertero's burhead
ARECACEAE – PALM FAMILY	
<i>Washingtonia robusta</i> *	Mexican fan palm
CYPERACEAE – SEDGE FAMILY	
<i>Cyperus</i> sp.	flatsedge
<i>Eleocharis</i> sp.	spikerush
IRIDACEAE – IRIS FAMILY	
<i>Sisyrinchium bellum</i>	western blue-eyed-grass
JUNCACEAE – RUSH FAMILY	
<i>Juncus bufonius</i>	toad rush
<i>Juncus mexicanus</i>	Mexican rush
<i>Juncus xiphioides</i>	iris-leaved rush
LILIACEAE – LILY FAMILY	
<i>Calochortus splendens</i>	splendid mariposa lily
<i>Calochortus weedii</i> var. <i>intermedius</i>	intermediate mariposa-lily
POACEAE – GRASS FAMILY	
<i>Arundo donax</i> *	giant reed
<i>Avena barbata</i> *	slender wild oat
<i>Avena fatua</i> *	wild oat
<i>Bothriochloa barbinodis</i>	cane bluestem
<i>Brachypodium distachyon</i> *	two-corn false brome
<i>Bromus diandrus</i> *	ripgut grass
<i>Bromus hordeaceus</i> *	soft chess
<i>Bromus rubens</i> *	red brome
<i>Cortaderia selloana</i> *	pampas grass
<i>Crypsis schoenoides</i> *	swamp prickly grass
<i>Cynodon dactylon</i> *	Bermuda grass

PLANT SPECIES OBSERVED IN THE BIOLOGICAL STUDY AREA

Species	
Scientific Name	Common Name
<i>Elymus condensatus</i>	giant wild-rye
<i>Elymus triticoides</i>	beardless wild rye
<i>Festuca myuros</i> *	rattail sixweeks grass
<i>Festuca perennis</i> *	rye grass
<i>Gastridium phleoides</i> *	nit grass
<i>Hordeum murinum</i> *	wall barley
<i>Lamarckia aurea</i> *	goldentop
<i>Melica imperfecta</i>	little California melica
<i>Muhlenbergia microsperma</i>	littleseed muhly
<i>Pennisetum setaceum</i> *	crimson fountain grass
<i>Polypogon monspeliensis</i> *	annual beard grass
<i>Polypogon viridis</i> *	water beard grass
<i>Schismus barbatus</i> *	barbed Mediterranean grass
<i>Stipa lepida</i>	foothill needle grass
<i>Stipa miliacea</i> var. <i>miliacea</i> *	smilo grass
<i>Stipa pulchra</i>	purple needle grass
THEMIDACEAE – BRODIAEA FAMILY	
<i>Bloomeria crocea</i>	common goldenstar
<i>Dipterostemon capitatus</i>	blue dicks
TYPHACEAE – CATTAIL FAMILY	
<i>Typha domingensis</i>	southern cattail
<i>Typha latifolia</i>	broad-leaved cattail
CRPR: California Rare Plant Rank * Non-native or invasive species Species Status: CRPR 1B Plants Rare, Threatened, or Endangered in California and elsewhere 4 Plants of limited distribution – watch list Threat Code Extensions .2 Moderately threatened in California (20–80% of occurrences threatened; moderate degree and immediacy of threat)	

WILDLIFE SPECIES OBSERVED IN THE BIOLOGICAL STUDY AREA

Species	
Scientific Name	Common Name
INVERTEBRATES	
PAPILIONIDAE - SWALLOWTAIL BUTTERFLIES	
<i>Papilio eurymedon</i>	pale swallowtail
<i>Papilio rutulus</i>	western tiger swallowtail
<i>Papilio zelicaon</i>	anise swallowtail
PIERIDAE - WHITES, SULFURS AND ORANGETIPS	
<i>Anthocharis sara</i>	Sara's orangetip
<i>Pieris rapae</i>	cabbage white
<i>Pontia protodice</i>	common (checkered) white
<i>Colias harfordii</i>	Harford's sulfer
NYMPHALIDAE - BRUSH-FOOTED BUTTERFLIES	
<i>Vanessa cardui</i>	painted lady
DANAIIDAE - MILKWEED BUTTERFLIES	
<i>Danaus plexippus</i>	monarch
HESPERIDAE - SKIPPERS	
<i>Pyrgus albescens</i>	white checkered-skipper
<i>Erynnis funeralis</i>	funereal duskywing
RIODINIDAE - METALMARKS	
<i>Apodemia mormo</i>	Behr's (Mormon) metalmark
LYCAENIDAE - BLUES, HAIRSTREAKS AND COPPERS	
<i>Plebejus acmon</i>	acmon blue
<i>Brephidium exilis</i>	western pygmy-blue
<i>Leptotes marina</i>	marine blue
FISH	
CYPRINIDAE – MINNOW FAMILY	
<i>Cyprinus carpio</i> *	common carp
ICTALURIDAE – BULLHEAD CATFISH FAMILY	
<i>Ictalurus sp.*</i>	catfish
SALMONIDAE – SALMON AND TROUT FAMILY	
<i>Oncorhynchus mykiss</i>	rainbow trout
CENTRARCHIDAE – SUNFISH FAMILY	
<i>Lepomis macrochirus</i> *	bluegill
<i>Pomoxis sp.*</i>	crappie
<i>Micropterus sp.*</i>	bass
AMPHIBIANS	
BUFONIDAE – TRUE TOAD FAMILY	
<i>Anaxyrus boreas</i>	western toad
RANIDAE – TRUE FROG FAMILY	
<i>Lithobates catesbeianus</i> *	American bullfrog

WILDLIFE SPECIES OBSERVED IN THE BIOLOGICAL STUDY AREA

Species	
Scientific Name	Common Name
HYLIDAE – TREEFROG FAMILY	
<i>Pseudacris cadaverina</i>	California treefrog
<i>Pseudacris hypochondriaca</i>	Baja California treefrog
LIZARDS	
PHRYNOSOMATIDAE – SPINY LIZARD FAMILY	
<i>Sceloporus occidentalis</i>	western fence lizard
<i>Uta stansburiana</i>	common side-blotched lizard
TEIIDAE – WHIPTAIL LIZARD FAMILY	
<i>Aspidoscelis hyperythra beldingi</i>	Belding's orange-throated whiptail
<i>Aspidoscelis tigris stejnegeri</i>	coastal whiptail
SNAKES	
COLUBRIDAE - COLUBRID SNAKE FAMILY	
<i>Coluber flagellum piceus</i>	red racer
<i>Pituophis catenifer</i>	gopher snake
NATRICIDAE – HARMLESS LIVE-BEARING SNAKE FAMILY	
<i>Thamnophis hammondi</i>	two-striped garter snake
BIRDS	
ANATIDAE – SWAN, GOOSE, AND DUCK FAMILY	
<i>Branta canadensis</i>	Canada goose
<i>Mareca americana</i>	American wigeon
<i>Spatula cyanoptera</i>	cinnamon teal
<i>Spatula clypeata</i>	northern shoveler
<i>Anas platyrhynchos</i>	mallard
<i>Aythya affinis</i>	lesser scaup
<i>Bucephala albeola</i>	bufflehead
<i>Oxyura jamaicensis</i>	ruddy duck
ODONTOPHORIDAE – NEW WORLD QUAIL FAMILY	
<i>Callipepla californica</i>	California quail
PODICIPEDIDAE – GREBE FAMILY	
<i>Podilymbus podiceps</i>	pied-billed grebe
<i>Aechmophorus occidentalis</i>	western grebe
<i>Aechmophorus clarkii</i>	Clark's grebe
COLUMBIDAE – PIGEON AND DOVE FAMILY	
<i>Columba livia*</i>	rock pigeon
<i>Streptopelia decaocto*</i>	Eurasian collared-dove
<i>Zenaida macroura</i>	mourning dove
CUCULIDAE – CUCKOO AND ROADRUNNER FAMILY	
<i>Geococcyx californianus</i>	greater roadrunner
CAPRIMULGIDAE – NIGHTJAR FAMILY	
<i>Chordeiles acutipennis</i>	lesser nighthawk

WILDLIFE SPECIES OBSERVED IN THE BIOLOGICAL STUDY AREA

Species	
Scientific Name	Common Name
<i>Phalaenoptilus nuttallii</i>	common poorwill
APODIDAE – SWIFT FAMILY	
<i>Aeronautes saxatalis</i>	white-throated swift
TROCHILIDAE – HUMMINGBIRD FAMILY	
<i>Archilochus alexandri</i>	black-chinned hummingbird
<i>Calypte anna</i>	Anna's hummingbird
<i>Calypte costae</i>	Costa's hummingbird
<i>Selasphorus rufus</i>	rufous hummingbird
<i>Selasphorus sasin</i>	Allen's hummingbird
RALLIDAE – RAIL AND COOT FAMILY	
<i>Fulica americana</i>	American coot
CHARADRIIDAE – PLOVER FAMILY	
<i>Charadrius vociferus</i>	killdeer
SCOLOPACIDAE – SANDPIPER FAMILY	
<i>Calidris minutilla</i>	least sandpiper
<i>Calidris mauri</i>	western sandpiper
<i>Actitis macularius</i>	spotted sandpiper
<i>Gallinago delicata</i>	Wilson's snipe
LARIDAE – GULL AND TERN FAMILY	
<i>Larus delawarensis</i>	ring-billed gull
<i>Larus occidentalis</i>	western gull
<i>Hydroprogne caspia</i>	Caspian tern
<i>Sterna forsteri</i>	Forster's tern
<i>Thalasseus elegans</i>	elegant tern
PHALACROCORACIDAE – CORMORANT FAMILY	
<i>Phalacrocorax auritus</i>	double-crested cormorant
PELECANIDAE – PELICAN FAMILY	
<i>Pelecanus erythrorhynchos</i>	American white pelican
ARDEIDAE – HERON FAMILY	
<i>Ardea herodias</i>	great blue heron
<i>Ardea alba</i>	great egret
<i>Egretta thula</i>	snowy egret
CATHARTIDAE – NEW WORLD VULTURE FAMILY	
<i>Cathartes aura</i>	turkey vulture
PANDIONIDAE – OSPREY FAMILY	
<i>Pandion haliaetus</i>	osprey
ACCIPITRIDAE – HAWK FAMILY	
<i>Elanus leucurus</i>	white-tailed kite
<i>Haliaeetus leucocephalus</i>	bald eagle
<i>Accipiter striatus</i>	sharp-shinned hawk

WILDLIFE SPECIES OBSERVED IN THE BIOLOGICAL STUDY AREA

Species	
Scientific Name	Common Name
<i>Accipiter cooperii</i>	Cooper's hawk
<i>Buteo lineatus</i>	red-shouldered hawk
<i>Buteo jamaicensis</i>	red-tailed hawk
TYTONIDAE – BARN OWL FAMILY	
<i>Tyto alba</i>	barn owl
STRIGIDAE – TYPICAL OWL FAMILY	
<i>Megascops kennicottii</i>	western screech-owl
<i>Bubo virginianus</i>	great horned owl
PICIDAE – WOODPECKER FAMILY	
<i>Melanerpes formicivorus</i>	acorn woodpecker
<i>Picoides nuttallii</i>	Nuttall's woodpecker
<i>Colaptes auratus</i>	northern flicker
FALCONIDAE – FALCON FAMILY	
<i>Falco sparverius</i>	American kestrel
<i>Falco peregrinus</i>	peregrine falcon
PSITTACIDAE – PARROT FAMILY	
<i>Amazona viridigenalis</i> *	red-crowned parrot*
TYRANNIDAE – TYRANT FLYCATCHER FAMILY	
<i>Empidonax difficilis</i>	Pacific-slope flycatcher
<i>Sayornis nigricans</i>	black phoebe
<i>Sayornis saya</i>	Say's phoebe
<i>Myiarchus cinerascens</i>	ash-throated flycatcher
<i>Tyrannus vociferans</i>	Cassin's kingbird
VIREONIDAE – VIREO FAMILY	
<i>Vireo bellii pusillus</i>	least Bell's vireo
<i>Vireo gilvus</i>	warbling vireo
CORVIDAE – JAY AND CROW FAMILY	
<i>Aphelocoma californica</i>	California scrub-jay
<i>Corvus brachyrhynchos</i>	American crow
<i>Corvus corax</i>	common raven
ALAUDIDAE – LARK FAMILY	
<i>Eremophila alpestris actia</i>	California horned lark
HIRUNDINIDAE – SWALLOW FAMILY	
<i>Tachycineta bicolor</i>	tree swallow
<i>Stelgidopteryx serripennis</i>	northern rough-winged swallow
<i>Petrochelidon pyrrhonota</i>	cliff swallow
<i>Hirundo rustica</i>	barn swallow
PARIDAE – TITMOUSE FAMILY	
<i>Baeolophus inornatus</i>	oak titmouse

WILDLIFE SPECIES OBSERVED IN THE BIOLOGICAL STUDY AREA

Species	
Scientific Name	Common Name
AEGITHALIDAE – BUSHTIT FAMILY	
<i>Psaltiriparus minimus</i>	bushtit
TROGLODYTIDAE – WREN FAMILY	
<i>Troglodytes aedon</i>	house wren
<i>Thryomanes bewickii</i>	Bewick's wren
<i>Campylorhynchus brunneicapillus sandiegensis</i>	coastal cactus wren
POLIOPTILIDAE – GNATCATCHER FAMILY	
<i>Poliophtila caerulea</i>	blue-gray gnatcatcher
<i>Poliophtila californica</i>	California gnatcatcher
SYLVIIDAE – SILVIID WARBLERS FAMILY	
<i>Chamaea fasciata</i>	wren
TURDIDAE – THRUSH FAMILY	
<i>Turdus migratorius</i>	American robin
<i>Sialia mexicana</i>	western bluebird
MIMIDAE – MOCKINGBIRD AND THRASHER FAMILY	
<i>Toxostoma redivivum</i>	California thrasher
<i>Mimus polyglottos</i>	northern mockingbird
STURNIDAE – STARLING FAMILY	
<i>Sturnus vulgaris</i> *	European starling*
BOMBYCILLIDAE – WAXWING FAMILY	
<i>Bombycilla cedrorum</i>	cedar waxwing
PTILOGONATIDAE – SILKY-FLYCATCHER FAMILY	
<i>Phainopepla nitens</i>	phainopepla
FRINGILLIDAE – FINCH FAMILY	
<i>Haemorhous mexicanus</i>	house finch
<i>Spinus psaltria</i>	lesser goldfinch
<i>Spinus tristis</i>	American goldfinch
<i>Spinus lawrencei</i>	Lawrence's goldfinch
PASSERELLIDAE – NEW WORLD SPARROW FAMILY	
<i>Ammodramus savannarum</i>	grasshopper sparrow
<i>Zonotrichia leucophrys</i>	white-crowned sparrow
<i>Chondestes grammacus</i>	lark sparrow
<i>Pipilo maculatus</i>	spotted towhee
<i>Aimophila ruficeps canescens</i>	Southern California rufous-crowned sparrow
<i>Melospiza crissalis</i>	California towhee
<i>Melospiza melodia</i>	song sparrow
<i>Melospiza lincolni</i>	Lincoln's sparrow
ICTERIIDAE – YELLOW-BREASTED CHAT FAMILY	
<i>Icteria virens</i>	yellow-breasted chat

WILDLIFE SPECIES OBSERVED IN THE BIOLOGICAL STUDY AREA

Species	
Scientific Name	Common Name
ICTERIDAE – BLACKBIRDS AND ORIOLES	
<i>Sturnella neglecta</i>	western meadowlark
<i>Icterus cucullatus</i>	hooded oriole
<i>Icterus bullockii</i>	Bullock's oriole
<i>Agelaius phoeniceus</i>	red-winged blackbird
<i>Molothrus ater</i>	brown-headed cowbird
<i>Quiscalus mexicanus</i>	great-tailed grackle
PARULIDAE – WOOD-WARBLER FAMILY	
<i>Geothlypis trichas</i>	common yellowthroat
<i>Setophaga petechia</i>	yellow warbler
<i>Setophaga coronata</i>	yellow-rumped warbler
<i>Cardellina pusilla</i>	Wilson's warbler
CARDINALIDAE – CARDINALS AND ALLIES	
<i>Piranga ludoviciana</i>	western tanager
<i>Pheucticus melanocephalus</i>	black-headed grosbeak
<i>Passerina caerulea</i>	blue grosbeak
<i>Passerina amoena</i>	lazuli bunting
MAMMALS	
SCIURIDAE – SQUIRREL FAMILY	
<i>Sciurus niger</i> *	eastern fox squirrel
<i>Otospermophilus beecheyi</i>	California ground squirrel
GEOMYIDAE – POCKET GOPHER FAMILY	
<i>Thomomys bottae</i>	Botta's pocket gopher
CRICETIDAE – NEW WORLD RATS AND MICE FAMILY	
<i>Neotoma bryanti</i>	Bryant's woodrat
<i>Peromyscus sp.</i>	mouse
LEPORIDAE – HARE AND RABBIT FAMILY	
<i>Sylvilagus audubonii</i>	desert cottontail
VESPERTILIONIDAE – VESPERTILIONID BAT FAMILY	
Order Chiroptera	bat
FELIDAE – CAT FAMILY	
<i>Lynx rufus</i>	bobcat (tracks)
<i>Puma concolor</i>	mountain lion (tracks)
CANIDAE – CANID FAMILY	
<i>Canis latrans</i>	coyote (tracks)
<i>Urocyon cinereoargenteus</i>	common gray fox
MEPHITIDAE – SKUNK FAMILY	
<i>Mephitis mephitis</i>	striped skunk
PROCYONIDAE – PROCYONID FAMILY	
<i>Procyon lotor</i>	northern raccoon (tracks)

WILDLIFE SPECIES OBSERVED IN THE BIOLOGICAL STUDY AREA

Species									
Scientific Name	Common Name								
CERVIDAE – CERVID FAMILY									
<i>Odocoileus hemionus</i>	southern mule deer								
<p>* Non-native species</p> <p>USFWS: U.S. Fish and Wildlife Service; CDFW: California Department of Fish and Wildlife</p> <p>Species Status:</p> <table> <tr> <td>Federal (USFWS)</td><td>State (CDFW)</td></tr> <tr> <td>FT Threatened</td><td>SE Endangered</td></tr> <tr> <td></td><td>PST Proposed State Threatened FP Fully Protected</td></tr> <tr> <td></td><td>SSC Species of Special Concern</td></tr> </table>		Federal (USFWS)	State (CDFW)	FT Threatened	SE Endangered		PST Proposed State Threatened FP Fully Protected		SSC Species of Special Concern
Federal (USFWS)	State (CDFW)								
FT Threatened	SE Endangered								
	PST Proposed State Threatened FP Fully Protected								
	SSC Species of Special Concern								

APPENDIX E
SPECIAL STATUS PLANT SURVEYS

September 3, 2020

Ms. Jo Ann Corey
Irvine Ranch Water District
15600 Sand Canyon Avenue
Irvine, California 92618

VIA EMAIL
corey@irwd.com

Subject: Results of Special Status Plant Surveys for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California

Dear Ms. Corey:

This Letter Report presents the findings of special status plant surveys conducted in 2020 for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project (hereinafter referred to as “the project site”) located in Orange County, California. The purpose of the surveys was to determine the presence or absence of special status plant species on the project site.

PROJECT LOCATION AND DESCRIPTION

The Irvine Ranch Water District (IRWD) and Serrano Water District are jointly proposing to abandon the existing Santiago Creek Dam outlet tower and construct a new inclined outlet structure to be located on the left abutment of the existing dam. Additionally, based on feedback from the Department of Safety of Dams, the dam spillway requires structural improvements. Existing structures include the dam crest, the intake tower in Irvine Lake, the spillway channel, the control houses, the energy dissipater structure, the aboveground outlet pipe, and the dam crest access road. The project is currently in the early design phase but would be located within the project site provided by IRWD.

Santiago Creek Dam is located at the north end of Irvine Lake in unincorporated Orange County, California (Exhibit 1). It is south of State Route (SR) 261 and east of SR-241 and Santiago Canyon Road. The project site is depicted on the U.S. Geological Survey’s Black Star Canyon 7.5-minute quadrangle (Exhibit 2). Topography in the center of the project site is relatively flat, with rolling hills to the east and a steep cliff to the west. Elevations range from approximately 657 to 898 feet above mean sea level (msl). Santiago Creek, a blue line stream, occurs on the project site. Surrounding land uses primarily consist of undeveloped open space. Irvine Regional Park is located northwest of SR-241; Limestone Canyon Regional Park is located south of Santiago Canyon Road; and Oak Canyon Park is located at the southeast end of Irvine Lake. Residential development is located west of SR-241.

The project site is located in the Central/Coastal Subregion of the Natural Communities Conservation Plan/Habitat Conservation Plan (NCCP/HCP). The purpose of this plan is to provide regional protection and recovery of multiple species and habitat while allowing compatible land use and appropriate development. IRWD is a participating jurisdiction and, as such, will comply with the terms of the NCCP/HCP Implementation Agreement.

5 Hutton Centre Drive
Suite 300
Santa Ana, CA 92707

Tel 714.751.7373
Fax 714.545.8883
www.Psomas.com

Ms. Jo Ann Corey
 September 3, 2020
 Page 2

The following vegetation types and other areas occur on the project site: sagebrush scrub, disturbed sagebrush scrub, disturbed floodplain sage scrub, toyon – sumac chaparral, annual grassland, ruderal, southern willow scrub, mulefat scrub, coast live oak woodland, western sycamore, cliff, open water, ornamental, developed, and disturbed (Exhibit 3). Soils on the project site include Anaheim clay loam, Cienega-rock outcrop complex, pits, riverwash, rock-outcrop-Cienega complex, Soboba gravelly loamy sand, Soper gravelly loam, Soper-rock outcrop complex, and Sorrento loam (Exhibit 4).

METHODS

Botanical surveys were floristic in nature and consistent with the protocols created by the California Department of Fish and Wildlife (CDFW 2018). Prior to the 2020 field surveys, a literature search was conducted to identify special status plant species reported from the vicinity of the project site. Sources reviewed include the United States Geological Survey's Black Star Canyon, Orange, Tustin, and El Toro 7.5-minute quadrangles in the California Native Plant Society's Inventory of Rare and Endangered Plants (CNPS 2020) and the CDFW's California Natural Diversity Database (CNDDB) (CDFW 2020a).

Rainfall received in the winter and spring determines the germination of many annual and perennial herb species. The region received approximately 17.7 inches of precipitation between August 2019 and July 2020 (data taken from Irvine – South Coast Valleys Station No. 75) (CIMIS 2020). The average annual precipitation for this area is between 10 and 13 inches.

Reference populations were monitored for annual and difficult-to-detect target species to ensure that the surveys were comprehensive (Table 1). This is especially relevant during periods of unusual rainfall patterns or below average rainfall. If conditions at a nearby reference population are suitable for germination and growth, then it can be inferred that conditions would also be suitable on the project site. Reference populations were not monitored for species with a California Rare Plant Rank (CRPR) of 3 or 4, large perennials (e.g., Tecate cypress [*Hesperocyparis forbesii*] and chaparral nolina [*Nolina cismontana*]) which would be identifiable throughout the year, or for species lacking a publicly accessible reference population.

TABLE 1
REFERENCE POPULATIONS MONITORED IN THE PROJECT REGION

Species	Date Observed	Location	Phenology
<i>Brodiaea filifolia</i> thread-leaved brodiaea	May 15, 2020	San Clemente	in bloom
<i>Calochortus weedii</i> var. <i>intermedius</i> intermediate mariposa lily	June 1, 2020	Peters Canyon	in bloom
<i>Dudleya multicaulis</i> many-stemmed dudleya	April 12, 2017	City of Orange	vegetative

Ms. Jo Ann Corey
September 3, 2020
Page 3

Surveys were conducted on April 30, May 21 and June 4, 2020, by Psomas Senior Biologist Allison Rudalevige. The total number of person-hours spent surveying was approximately 15.75 hours. The plant survey area included the entire project site boundary. A systematic survey was conducted in all areas of suitable special status plant habitat in the survey area. All plant species observed were recorded in field notes. Plant species were identified in the field or collected for future identification. Plants were identified to the taxonomic level necessary to determine whether they were a special status species. Plants were identified using taxonomic keys, descriptions, and illustrations in Jepson Flora Project (2020), Baldwin et al. (2012), Hickman (1993), and Munz (1974). Nomenclature of plant taxa conform to the *Special Vascular Plants, Bryophytes, and Lichens List* (CDFW 2020b) for special status species and the Jepson eFlora (Jepson Flora Project 2020) for all other taxa.

Any special status plant species observed in the survey area were mapped on an iPad loaded with Avenza Maps software and data were collected on the number and phenology of individuals (estimated for large populations) and microsite characteristics (e.g., slope, aspect, soil texture, surrounding habitat, and associated species). Representative photographs are included as Attachment A.

SURVEY RESULTS

Table 2 identifies the special status plants reported from the literature review with their status, their potential to occur in the survey area, and the survey results. Intermediate mariposa lily (*Calochortus weedii* var. *intermedius*), many-stemmed dudleya (*Dudleya multicaulis*) and Coulter's matilija poppy (*Romneya coulteri*) were observed during the surveys and are discussed further below. A list of all plants observed in the survey area during special status plant surveys is included in Attachment B.

Ms. Jo Ann Corey
September 3, 2020
Page 4

TABLE 2
SPECIAL STATUS PLANT SPECIES REPORTED
FROM THE SURVEY AREA VICINITY

Species	Federal Status	State Status	CRPR	Habitat*	Potential to Occur in the Survey Area; Results of the Surveys
chaparral sand-verbena <i>Abronia villosa</i> var. <i>aurita</i>	—	—	1B.1	Sandy areas in chaparral, coastal scrub, desert dunes.	Not expected to occur; no suitable sandy soils.
Braunton's milk-vetch <i>Astragalus brauntonii</i>	FE	—	1B.1	Recent burns or disturbed areas, usually on sandstone with carbonate layers in chaparral, coastal scrub, valley and foothill grassland.	Unknown; can only be observed for a few years following a fire; marginally suitable habitat; reported immediately north of the survey area in 2012 (CDFW 2020a).
Coulter's saltbush <i>Atriplex coulteri</i>	—	—	1B.2	Alkaline or clay soils in coastal bluff scrub, coastal dunes, coastal scrub, and valley and foothill grassland.	Not expected to occur; no suitable soils.
south coast saltscale <i>Atriplex pacifica</i>	—	—	1B.2	Alkaline soils in coastal scrub, coastal bluff scrub, playas, coastal dunes.	Not expected to occur; no suitable soils.
Davidson's saltscale <i>Atriplex serenana</i> var. <i>davidsonii</i>	—	—	1B.2	Alkaline soils in coastal bluff scrub, coastal scrub.	Not expected to occur; no suitable soils.
Malibu baccharis <i>Baccharis malibuensis</i>	—	—	1B.1	In Conejo volcanic substrates in coastal scrub, chaparral, cismontane woodland, and riparian woodland.	Not expected to occur because not observed during focused surveys; suitable habitat and reported immediately north of the survey area in 2000 (CCH 2020).
thread-leaved brodiaea <i>Brodiaea filifolia</i>	FT	SE	1B.1	Chaparral openings, cismontane woodland, coastal scrub, playas, valley and foothill grassland, vernal pools.	Not expected to occur because not observed during focused surveys; suitable habitat.
Brewer's calandrinia <i>Calandrinia breweri</i>	—	—	4.2	Sandy or loamy soils in disturbed sites and burns in chaparral and coastal sage scrub.	Not expected to occur because not observed during focused surveys; suitable habitat.
Catalina mariposa lily <i>Calochortus catalinae</i>	—	—	4.2	Chaparral, cismontane woodland, coastal scrub, valley and foothill grassland.	Not expected to occur because not observed during focused surveys; suitable habitat.

Ms. Jo Ann Corey
September 3, 2020
Page 5

TABLE 2
SPECIAL STATUS PLANT SPECIES REPORTED
FROM THE SURVEY AREA VICINITY

Species	Federal Status	State Status	CRPR	Habitat*	Potential to Occur in the Survey Area; Results of the Surveys
Plummer's mariposa-lily <i>Calochortus plummerae</i>	—	—	4.2	Rocky and sandy sites, usually of granitic or alluvial material, in coastal scrub, chaparral, valley and foothill grassland, cismontane woodland, lower montane coniferous forest.	Not expected to occur because not observed during focused surveys; suitable habitat.
intermediate mariposa-lily <i>Calochortus weedii</i> var. <i>intermedius</i>	—	—	1B.2	Dry, rocky calcareous slopes and rock outcrops in coastal scrub, chaparral, valley and foothill grassland.	Observed in the survey area.
Lewis' evening-primrose <i>Camissoniopsis lewisii</i>	—	—	3	Sand or clay substrate in coastal bluff scrub, cismontane woodland, coastal dunes, coastal scrub, valley and foothill grassland.	Not expected to occur because not observed during focused surveys; suitable habitat.
southern tarplant <i>Centromadia parryi</i> ssp. <i>australis</i>	—	—	1B.1	Disturbed sites and alkaline soils in marshes and swamp margins, valley and foothill grassland, and vernal pools.	Not expected to occur; no suitable soils.
San Fernando Valley spineflower <i>Chorizanthe parryi</i> var. <i>fernandina</i>	PT	SE	1B.1	Sandy soils in coastal scrub, valley and foothill grasslands.	Not expected to occur; historic (1902) occurrence within 0.5 mile but outside the current known range of the species (CDFW 2020a).
long-spined spineflower <i>Chorizanthe polygonoides</i> var. <i>longispina</i>	—	—	1B.2	Gabbroic clay or sandy soil in chaparral, coastal scrub, meadows and seeps, valley and foothill grassland, vernal pools.	Not expected to occur because not observed during focused surveys; suitable habitat but at edge of current known range.
small-flowered morning-glory <i>Convolvulus simulans</i>	—	—	4.2	Clay, occasionally serpentine soils in chaparral openings, coastal scrub, valley and foothill grasslands.	Not expected to occur because not observed during focused surveys; suitable habitat and reported just west of Irvine Lake in 2016 (CCH 2020).

Ms. Jo Ann Corey
September 3, 2020
Page 6

TABLE 2
SPECIAL STATUS PLANT SPECIES REPORTED
FROM THE SURVEY AREA VICINITY

Species	Federal Status	State Status	CRPR	Habitat*	Potential to Occur in the Survey Area; Results of the Surveys
paniculate tarplant <i>Deinandra paniculata</i>	—	—	4.2	Usually vernal mesic, sometimes sandy substrate in coastal scrub, valley and foothill grassland, and vernal pools.	Not expected to occur because not observed during focused surveys; suitable habitat.
slender-horned spineflower <i>Dodecahema leptoceras</i>	FE	SE	1B.1	Sandy soil in chaparral, cismontane woodland, and alluvial fan coastal scrub.	Not expected to occur; outside current known range.
Santa Monica Mountains dudleya <i>Dudleya cymosa</i> ssp. <i>ovatifolia</i>	FT	—	1B.1	Volcanic or sedimentary, rocky sediment in chaparral and coastal scrub.	Not expected to occur because not observed during focused surveys; suitable habitat.
many-stemmed dudleya <i>Dudleya multicaulis</i>	—	—	1B.2	Heavy, often clayey soils or grassy slopes in chaparral, coastal scrub, valley and foothill grassland.	Observed in the survey area.
Santa Ana River woollystar <i>Eriastrum densifolium</i> ssp. <i>sanctorum</i>	FE	SE	1B.1	Sandy soils on river floodplains or terraced fluvial deposits in coastal scrub and chaparral.	Not expected to occur; outside current known range (i.e., the Santa Ana River watershed).
Palmer's grapplinghook <i>Harpagonella palmeri</i>	—	—	4.2	Clay soils in open grasses areas in chaparral, coastal scrub, and valley and foothill grassland.	Not expected to occur because not observed during focused surveys; suitable habitat.
Los Angeles sunflower <i>Helianthus nuttallii</i> ssp. <i>parishii</i>	—	—	1A	Coastal and freshwater marshes and swamps.	Not expected to occur; no suitable habitat and presumed extinct.
Tecate cypress <i>Hesperocyparis forbesii</i>	—	—	1B.1	Clay or gabbro soils in closed-cone coniferous forest and chaparral.	Not expected to occur; perennial species not observed during survey
vernal barley <i>Hordeum intercedens</i>	—	—	3.2	Coastal dunes, coastal scrub, saline flats and depressions of valley and foothill grassland, vernal pools.	Not expected to occur because not observed during focused surveys; marginally suitable habitat but reported just south of Irvine Lake in 1998 (CCH 2020)

Ms. Jo Ann Corey
September 3, 2020
Page 7

TABLE 2
SPECIAL STATUS PLANT SPECIES REPORTED
FROM THE SURVEY AREA VICINITY

Species	Federal Status	State Status	CRPR	Habitat*	Potential to Occur in the Survey Area; Results of the Surveys
mesa horkelia <i>Horkelia cuneata</i> var. <i>puberula</i>	—	—	1B.1	Sandy or gravelly soils in chaparral, cismontane woodland, and coastal scrub.	Not expected to occur because not observed during focused surveys; suitable habitat.
Coulter's goldfields <i>Lasthenia glabrata</i> ssp. <i>coulteri</i>	—	—	1B.1	Usually on alkaline soils in coastal salt marsh, playas, vernal pools.	Not expected to occur because not observed during focused surveys; no suitable habitat but reported from oak woodland in 2008 (CCH 2020).
heart-leaved pitcher sage <i>Lepechinia cardiophylla</i>	—	—	1B.2	Closed-cone coniferous forest, chaparral, cismontane woodland.	Not expected to occur; no suitable habitat and outside the current known elevational range.
Robinson's pepper-grass <i>Lepidium virginicum</i> var. <i>robinsonii</i>	—	—	4.3	Dry soils in chaparral and coastal scrub.	Not expected to occur because not observed during focused surveys; suitable habitat.
ocellated Humboldt lily <i>Lilium humboldtii</i> ssp. <i>ocellatum</i>	—	—	4.2	Openings in chaparral, cismontane woodland, coastal scrub, lower montane coniferous forest, and riparian woodland.	Not expected to occur because not observed during focused surveys; suitable habitat.
intermediate monardella <i>Monardella hypoleuca</i> ssp. <i>intermedia</i>	—	—	1B.3	Chaparral, cismontane woodland, and sometimes lower montane coniferous forest.	Not expected to occur because not observed during focused surveys; suitable habitat.
mud nama <i>Nama stenocarpa</i>	—	—	2B.2	Lake shores, riverbanks, intermittently wet areas, marshes, and swamps.	Not expected to occur because not observed during focused surveys; suitable habitat but at edge of current known range.
Gambel's water cress <i>Nasturtium gambelii</i>	FE	ST	1B.1	Freshwater and brackish marshes at the margins of lakes and along streams; in or just above the water level.	Not expected to occur because not observed during focused surveys; suitable habitat.
chaparral nolina <i>Nolina cismontana</i>	—	—	1B.2	Primarily sandstone and shale substrates in chaparral and coastal scrub	Not expected to occur because not observed during focused surveys; suitable habitat.

Ms. Jo Ann Corey
September 3, 2020
Page 8

TABLE 2
SPECIAL STATUS PLANT SPECIES REPORTED
FROM THE SURVEY AREA VICINITY

Species	Federal Status	State Status	CRPR	Habitat*	Potential to Occur in the Survey Area; Results of the Surveys
California beardtongue <i>Penstemon californicus</i>	—	—	1B.2	Sandy or granitic soils and stony slopes in chaparral, lower montane coniferous forest, pinyon and juniper woodland.	Not expected to occur; no suitable habitat and outside current known range.
Allen's pentachaeta <i>Pentachaeta aurea</i> ssp. <i>allenii</i>	—	—	1B.1	Openings in coastal scrub and valley and foothill grasslands.	Not expected to occur because not observed during focused surveys; suitable habitat.
woolly chaparral-pea <i>Pickeringia montana</i> var. <i>tomentosa</i>	—	—	4.3	Gabbroic, granitic, or clay soil in chaparral.	Not expected to occur; no suitable habitat.
Fish's milkwort <i>Polygala cornuta</i> var. <i>fishiae</i>	—	—	4.3	Chaparral, cismontane woodland, riparian woodland.	Not expected to occur because not observed during focused surveys; suitable habitat.
white rabbit-tobacco <i>Pseudognaphalium leucocephalum</i>	—	—	2B.2	Sandy, gravelly areas of riparian woodland, cismontane woodland, coastal scrub, and chaparral.	Not expected to occur because not observed during focused surveys; suitable habitat.
Coulter's matilija poppy <i>Romneya coulteri</i>	—	—	4.2	Chaparral and coastal scrub, often in burns.	Observed in the survey area.
chaparral ragwort <i>Senecio aphanactis</i>	—	—	2B.2	Drying alkaline flats of chaparral, cismontane woodland, coastal scrub.	Not expected to occur; no suitable soils.
salt spring checkerbloom <i>Sidalcea neomexicana</i>	—	—	2B.2	Alkali springs and marshes in playas, chaparral, coastal scrub, lower montane coniferous forest, and Mojavean desert scrub.	Not expected to occur; no suitable soils.
estuary seablite <i>Suaeda esteroa</i>	—	—	1B.2	Coastal salt marshes in clay, silt, and sand substrates.	Not expected to occur; no suitable habitat.

Ms. Jo Ann Corey
September 3, 2020
Page 9

TABLE 2
SPECIAL STATUS PLANT SPECIES REPORTED
FROM THE SURVEY AREA VICINITY

Species	Federal Status	State Status	CRPR	Habitat*	Potential to Occur in the Survey Area; Results of the Surveys
San Bernardino aster <i>Symphyotrichum defoliatum</i>	—	—	1B.2	Disturbed areas, vernal mesic grassland, or near ditches, streams, and springs in meadows and seeps, cismontane woodland, coastal scrub, lower montane coniferous forest, marshes and swamps, valley and foothill grassland.	Not expected to occur because not observed during focused surveys; suitable habitat.
CRPR: California Rare Plant Rank; NCCP/HCP: Natural Community Conservation Plan/Habitat Conservation Plan					
LEGEND:					
Federal Status State Status					
FE Endangered SE Endangered					
FT Threatened ST Threatened					
PT Proposed Threatened					
CRPR					
1A Plants presumed extirpated in California and either rare or extinct elsewhere					
1B Plants Rare, Threatened, or Endangered in California and elsewhere					
2B Plants Rare, Threatened, or Endangered in California but more common elsewhere					
3 Plants about which we need more information – A Review List					
4 Plants of limited distribution – A Watch List					
CRPR Threat Code Extensions					
None Plants lacking any threat information					
.1 Seriously threatened in California (over 80% of occurrences threatened; high degree and immediacy of threat)					
.2 Fairly threatened in California (20–80% of occurrences threatened; moderate degree and immediacy of threat)					
.3 Not very threatened in California (<20% of occurrences threatened; low degree and immediacy of threat or no current threats known)					
Species that were observed on site are shown in boldface type .					
* Sources include CDFW 2020a, CNPS 2020, and Jepson Flora Project 2020.					

Ms. Jo Ann Corey
 September 3, 2020
 Page 10

Intermediate Mariposa Lily

Intermediate mariposa lily has a CRPR of 1B.2. It is a Conditionally Covered species¹ in the Central Coastal NCCP/HCP (i.e., populations less than 20 individuals are fully authorized). It typically blooms between May and July (Jepson Flora Project 2020; CNPS 2020). This perennial bulbiferous herb occurs on dry, rocky, open slopes in chaparral and coastal sage scrub at elevations between sea level and approximately 2,231 feet above msl (Roberts 2008; Jepson Flora Project 2020). It is sometimes locally common following fire (Roberts 2008). This species is known from the South Coast and northern Peninsular Ranges (Jepson Flora Project 2020).

One individual intermediate mariposa lily was observed in the survey area (Exhibit 5). This individual was observed in the eastern portion of the survey area on a moderately steep, south facing slope in disturbed sagebrush scrub with Ceineba-rock outcrop complex soil. The species associated with the intermediate mariposa lily observed in the survey area include California sagebrush (*Artemisia californica*), black mustard (*Brassica nigra*), coast morning glory (*Calystegia macrostegia*) and oats (*Avena* spp.). A voucher specimen was not collected because there was only one individual. A CNDDDB form for this species will be submitted online by Ms. Rudalevige and is included in Attachment C.

Many-Stemmed Dudleya

Many-stemmed dudleya has a CRPR of 1B.2. It is not covered by the Central Coastal NCCP/HCP. It typically blooms between April and June (Jepson Flora Project 2020; CNPS 2020). This perennial herb occurs on heavy, often clayey soils or grassy slopes in chaparral, coastal scrub, valley and foothill grassland at elevations between approximately 5 and 2,975 feet above msl (Roberts 2008; Jepson Flora Project 2020). This species is known from the South Coast (Jepson Flora Project 2020).

Approximately 810 many-stemmed dudleya individuals were observed in 2 locations in the survey area (Exhibit 5). Approximately 800 individuals were observed in the eastern portion of the survey area and 10 individuals were observed on a steep, east-facing cliff in the western portion of the survey area. The majority of individuals (eastern location) were observed in disturbed sagebrush scrub with Ceineba-rock outcrop complex and pits soil. The smaller population (western location) was observed in toyon-sumac chaparral with Sorrento loam soil. The species associated with the many-stemmed dudleya in the survey area included California sagebrush, California buckwheat (*Eriogonum fasciculatum*), daggerleaf cottonrose (*Filago gallica*), white sage (*Salvia apiana*), splendid mariposa lily (*Calochortus splendens*), common goldfields (*Lasthenia gracillis*), osmadenia (*Osmadenia tenella*), and little California melica (*Melica imperfecta*). A total of two voucher specimens were collected for this species. A CNDDDB form for this species will be submitted online by Ms. Rudalevige and is included in Attachment C.

Coulter's Matilija Poppy

Coulter's matilija poppy has a CRPR of 4.2. It is a Covered species in the Central Coastal NCCP/HCP. It typically blooms between March and July (Jepson Flora Project 2020; CNPS 2020). This perennial rhizomatous herb occurs in chaparral and coastal scrub, often in elevations between sea level and approximately 3,937 feet above msl (Roberts 2008; Jepson Flora Project 2020). This species grows as clones via rhizomes (Clarke et al. 2007; Jepson Flora Project 2020). This species is known from the South Coast, Western Transverse and Peninsular Ranges, and San Jacinto Mountains (Jepson Flora Project 2020).

¹ The NCCP/HCP refers to this species by its former common name – foothill mariposa lily.

Ms. Jo Ann Corey
September 3, 2020
Page 11

Approximately 46 Coulter's matilija poppy clones were observed in 3 populations in the survey area (Exhibit 5). Coulter's matilija poppy clones were observed in the northern and central portions of the survey area. The clones were observed in sagebrush scrub, coast live oak woodland, and toyon-sumac chaparral with Sorrento loam soil. The species associated with the Coulter's matilija poppy in the survey area include laurel sumac (*Melosma laurina*), blue elderberry (*Sambucus nigra*), California sagebrush, grayish shortpod mustard (*Hirschfeldia incana*), chilicothe (*Marah macrocarpa*), black sage (*Salvia melifera*), California buckwheat, coast live oak (*Quercus agrifolia*), long-flowered monkey flower (*Diplicus longiflorus*), and slender wild oat (*Avena barbata*). A voucher specimen was not collected and a CNDDDB form will not be submitted because this species is a lower status species that is not tracked by the CNDDDB (i.e., has a CRPR of 4.2).

CONCLUSIONS

The project is early in the preliminary design phase. Final project design will determine whether any special status plant populations will be impacted. Any impacts to intermediate mariposa lily (because there was only one individual) and Coulter's matilija poppy would be covered by the NCCP/HCP. Impacts to many-stemmed dudleya would require mitigation as this species is considered Threatened and Endangered in the project region (i.e., CRPR 1B.2). Impacts will be analyzed and mitigation will be determined in the Biological Technical Report for the project.

Although reference populations and regional rainfall amounts were monitored to ensure the scientific adequacy of these focused surveys, there is always a minimal potential for false negative survey results as species could possibly be present on a site but may not be detectable at the time of the surveys.

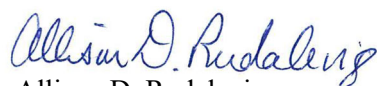
Psomas appreciates the opportunity to assist on this project. If you have any comments or questions, please contact Amber Heredia (Amber.Heredia@psomas.com) or Allison Rudalevige (Allison.Rudalevige@psomas.com).

Sincerely,

P S O M A S



Amber O. Heredia
Senior Project Manager



Allison D. Rudalevige
Senior Biologist

Enclosures: Exhibit 1 – Project Location
 Exhibit 2 – U.S. Geological Survey 7.5-Minute Digital Quadrangle
 Exhibit 3 – Vegetation Types and Other Areas
 Exhibit 4 – Soil Types
 Exhibit 5 – Special Status Plant Species
 Attachment A – Site Photographs
 Attachment B – Plant Compendium
 Attachment C – CNDDDB Forms

Ms. Jo Ann Corey
September 3, 2020
Page 12

REFERENCES

- Baldwin, B.G., D.J. Keil, R. Patterson, T.J. Rosatti, and D.H. Wilken (Eds.). 2012. *The Jepson Manual: Vascular Plants of California* (Second ed.). Berkeley, CA: University of California Press.
- California Department of Fish and Wildlife (CDFW). 2020a. California Natural Diversity Database. Records of Occurrence for the Black Star Canyon, Orange, Tustin, and El Toro USGS quadrangles. Sacramento, CA: CDFW, Natural Heritage Division.
- . 2020b (April). *Special Vascular Plants, Bryophytes, and Lichens List*. Sacramento, CA: CDFW, Natural Heritage Division.
- . 2018 (March 20). *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities*. Sacramento, CA: CDFW.
- California Irrigation Management Information System (CIMIS). 2020. CIMIS Monthly Report for Irvine – South Coast Valleys Station #75. Sacramento, CA: California Department of Water Resources, CIMIS. <http://www.cimis.water.ca.gov>.
- California Native Plant Society (CNPS). 2020. Inventory of Rare and Endangered Plants. Records of Occurrence for the Black Star Canyon, Orange, Tustin, and El Toro USGS quadrangles. Sacramento, CA: CNPS. <http://www.cnps.org/inventory>.
- Clarke, O.F., D. Svehla, G. Ballmer, and A. Montalvo. 2007. *Flora of the Santa Ana River and Environs with References to World Botany*. Berkeley, CA: Heyday Books.
- Consortium of California Herbaria (CCH). 2020 (February 24, date accessed). Consortium of California Herbaria. Data provided by the participants of the Consortium of California Herbaria for plants listed in Table 2. Berkeley, CA: University of California. <http://ucjeps.berkeley.edu/consortium/>.
- Hickman, J.C., Ed. 1993. *The Jepson Manual of Higher Plants of California*. Berkeley, CA: University of California Press.
- Jepson Flora Project. 2020 (December 23, Revision 4). Jepson eFlora (Records for common species in the Plant Compendium and all species descriptions). Berkeley, CA: The Jepson Herbarium. <http://ucjeps.berkeley.edu/eflora/>.
- Munz, P.A. 1974. *A Flora of Southern California*. Berkeley, CA: University of California Press.
- Roberts, F.M. 2008. *The Vascular Plants of Orange County, California: An Annotated Checklist*. San Luis Rey, CA: F.M. Roberts Publications.

D:\Projects\3IRW000905\MXD\Plants\ex_LV_RL_20200831.mxd



Aerial Source: Hexagon Geosystems, 2018

Project Location

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

Exhibit 1

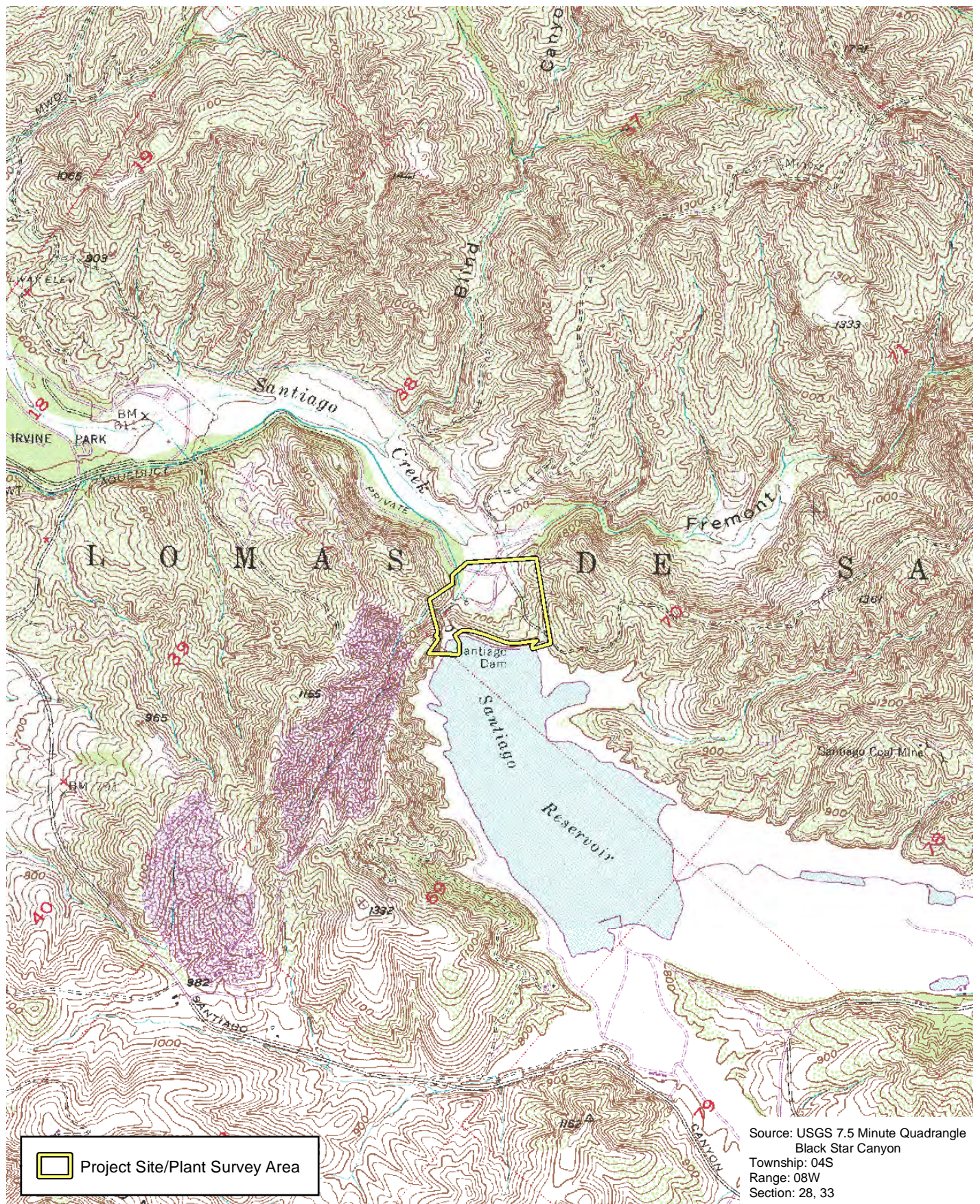


1,100 550 0 1,100
Feet



(Rev: 9-01-2020 RMB) R:\Projects\IRW_IRWD\3IRW000905\Graphics\Plants\ex_LV_RL.pdf

D:\Projects\3IRW000905\MXD\Plants\ex_USGS_20200831.mxd



U.S. Geological Survey 7.5-minute Digital Quadrangle

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

Exhibit 2

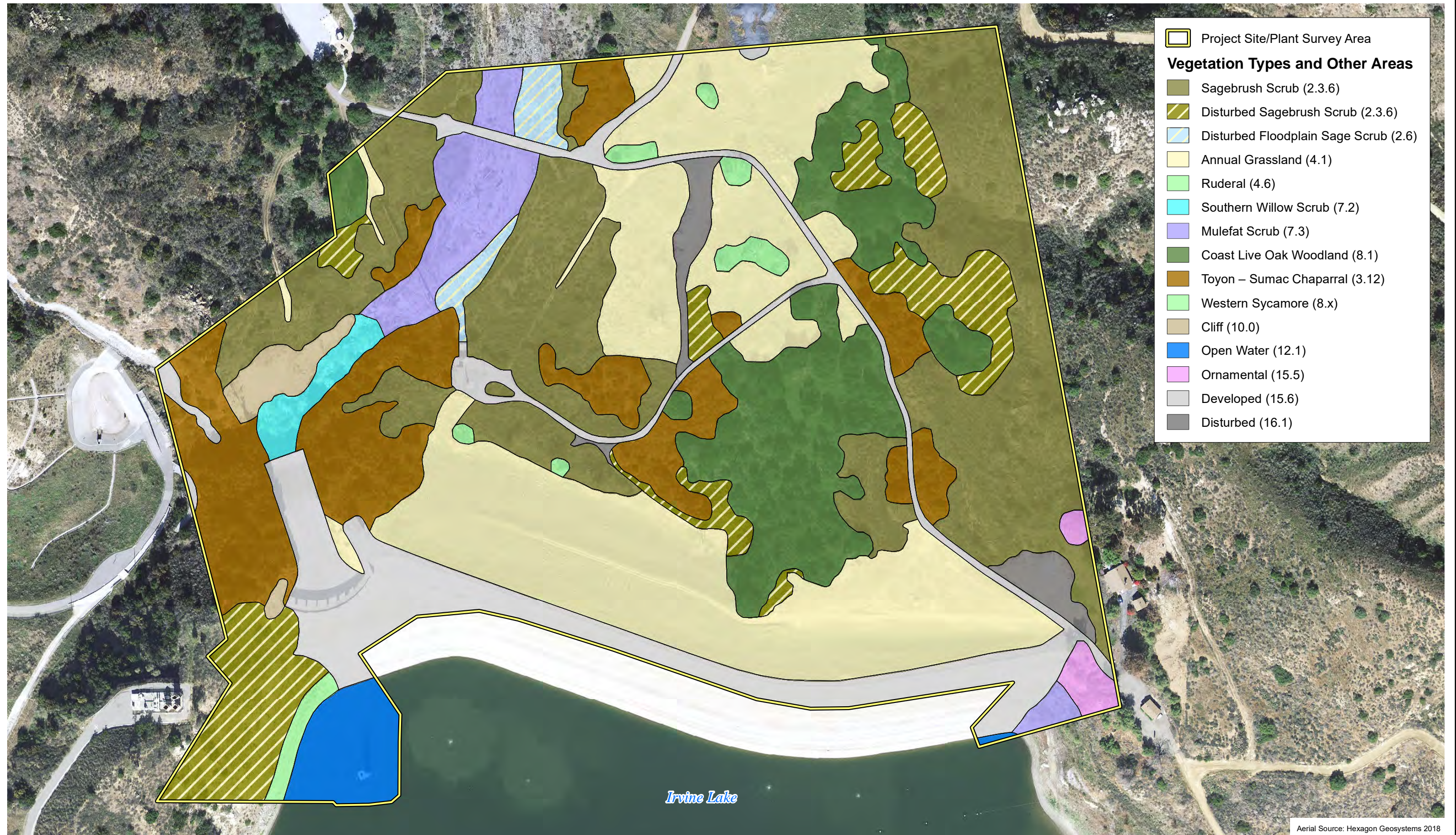


2,000 1,000 0 2,000
Feet



(Rev: 9-01-2020 RMB) R:\Projects\IRW_IRWD\3IRW000905\Graphics\Plants\ex_USGS.pdf

D:\Projects\3\IRW00905\MXD\Plants\lex_Vegetation_20200901.mxd



Vegetation Types and Other Areas

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

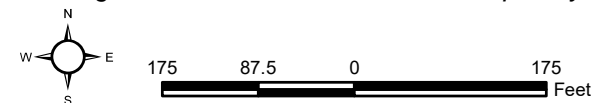
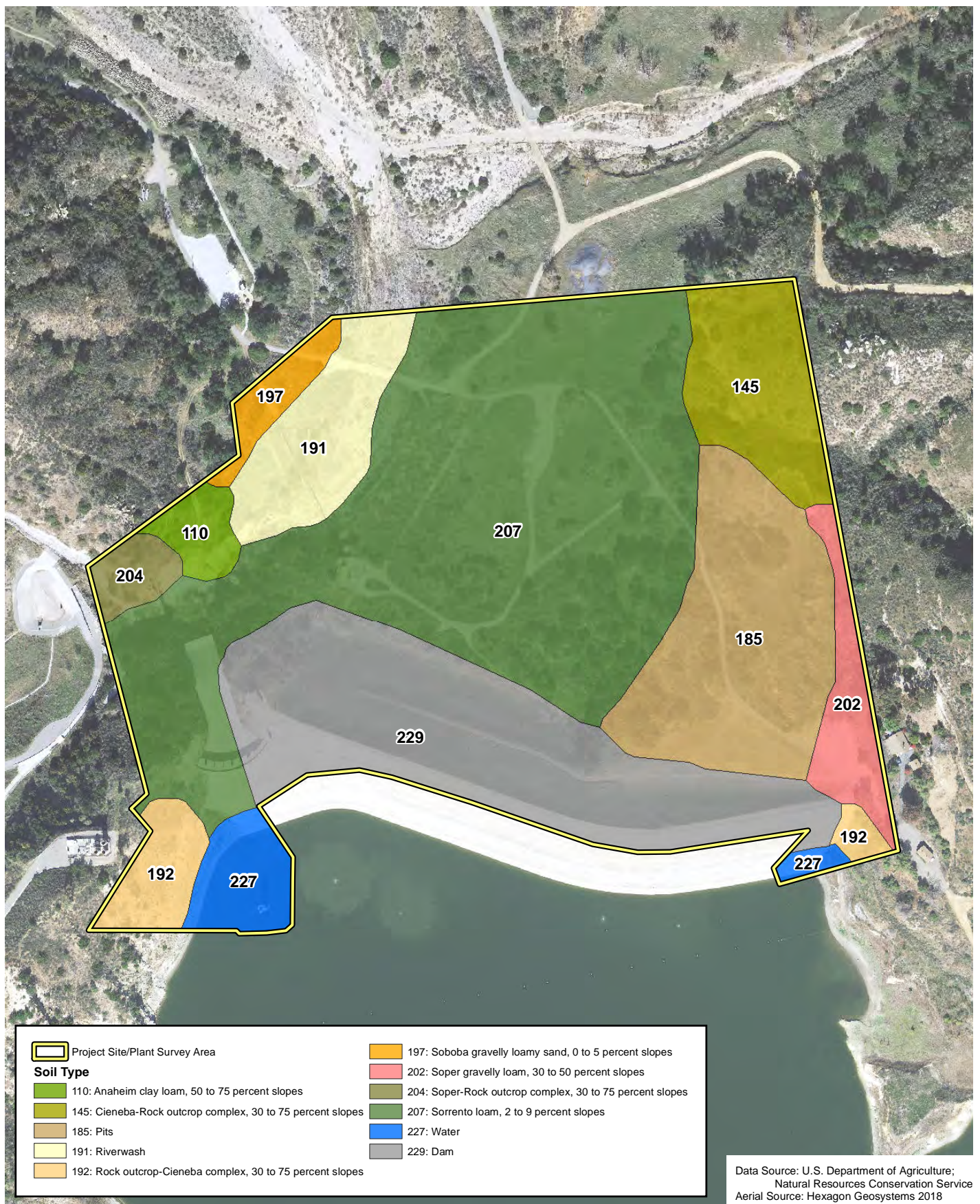


Exhibit 3



(Rev: 09/02/2020 RMB) R:\Projects\IRW_IRWD\3\IRW000905\Graphics\Plants\lex_Vegetation.pdf

D:\Projects\3IRW000905\MXD\Plants\ex_Soils_20200831.mxd



Soil Types

Santiago Creek Dam Outlet Tower and Spillway Improvement Project



300 150 0 300
Feet

Exhibit 4



(Rev: 9-01-2020 RMB) R:\Projects\IRW_IRWD\3IRW000905\Graphics\Plants\ex_SoilTypes.pdf

D:\Projects\3\RW00905\MXD\Plants\ex_SS_Plant_Species_20200831.mxd



Aerial Source: Hexagon Geosystems 2018

Special Status Plant Species

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

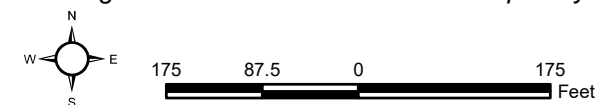


Exhibit 5



(Rev: 09/02/2020 RMB) R:\Projects\RW\IRWD\3\RW00905\Graphics\Plants\ex_SS_Plant_Species.pdf

ATTACHMENT A
SITE PHOTOGRAPHS



Intermediate mariposa lily observed in the survey area.



Intermediate mariposa lily habitat in the survey area.

Site Photographs

Santiago Creek Dam Tower and Spillway Improvement Project

Attachment A-1





Many-stemmed dudleya observed in the survey area.



Many-stemmed dudleya habitat in the survey area.

D:\Projects\3IRW00905\GRAPHICS\Plants\AttA-2_SitePhotographs.ai

Site Photographs

Santiago Creek Dam Tower and Spillway Improvement Project

Attachment A-2





Coulter's matilija poppy observed in the survey area.



Coulter's matilija poppy habitat in the survey area.

Site Photographs

Santiago Creek Dam Tower and Spillway Improvement Project

Attachment A-3



ATTACHMENT B
PLANT COMPENDIUM

**PLANTS OBSERVED IN THE SURVEY AREA
DURING SPECIAL STATUS PLANT SURVEYS**

Species		Special Status
Scientific Name	Common Name	
FERNS		
POLYPODIACEAE – POLYPODY FAMILY		
<i>Polypodium californicum</i>	California polypody	
PTERIDACEAE – BRAKE FAMILY		
<i>Pellaea andromedifolia</i>	coffee fern	
<i>Pentagramma triangularis</i>	goldback fern	
EUDICOTS		
ADOXACEAE – MUSKROOT FAMILY		
<i>Sambucus nigra ssp. caerulea</i>	blue elderberry	
AIZOACEAE – FIG–MARIGOLD FAMILY		
<i>Carpobrotus edulis*</i>	freeway iceplant	
AMARANTHACEAE – AMARANTH FAMILY		
<i>Amaranthus albus*</i>	tumbleweed	
ANACARDIACEAE – SUMAC FAMILY		
<i>Malosma laurina</i>	laurel sumac	
<i>Rhus integrifolia</i>	lemonade berry	
<i>Schinus molle*</i>	pepper tree	
<i>Toxicodendron diversilobum</i>	western poison oak	
APIACEAE – CARROT FAMILY		
<i>Daucus pusillus</i>	small daucus	
<i>Foeniculum vulgare*</i>	fennel	
ASTERACEAE – SUNFLOWER FAMILY		
<i>Acourtia microcephala</i>	small-headed acourtia	
<i>Ambrosia psilostachya</i>	western ragweed	
<i>Artemisia californica</i>	California sagebrush	
<i>Baccharis pilularis ssp. consanguinea</i>	coyote brush	
<i>Baccharis salicifolia ssp. salicifolia</i>	mule fat	
<i>Brickellia californica</i>	California brickellbush	
<i>Carduus pycnocephalus ssp. pycnocephalus*</i>	Italian thistle	
<i>Centaurea melitensis*</i>	totalote	
<i>Chaenactis glabriuscula</i>	yellow pincushion	
<i>Cirsium vulgare*</i>	bull thistle	
<i>Corethrogyne filaginifolia</i>	filago-leaved sand-aster	
<i>Cotula australis*</i>	Australian cotula	
<i>Cynara cardunculus ssp. cardunculus*</i>	artichoke	
<i>Deinandra fasciculata</i>	fascicled tarplant	
<i>Encelia californica</i>	California encelia	
<i>Erigeron canadensis</i>	horseweed	
<i>Erigeron foliosus</i>	leafy fleabane	
<i>Gazania linearis*</i>	parallel-sided treasure flower	
<i>Grindelia camporum</i>	field gumplant	
<i>Hedypnois rhagadioloides*</i>	Crete weed	

PLANTS OBSERVED IN THE SURVEY AREA DURING SPECIAL STATUS PLANT SURVEYS

Species		Special Status
Scientific Name	Common Name	
<i>Helminthotheca echioides</i> *	bristly ox-tongue	
<i>Heterotheca grandiflora</i>	telegraph weed	
<i>Heterotheca sessiliflora</i> ssp. <i>echioides</i>	viper's sessileflower goldenaster	
<i>Hypochaeris glabra</i> *	smooth cat's-ear	
<i>Isocoma menziesii</i>	coastal goldenbush	
<i>Lactuca serriola</i> *	prickly lettuce	
<i>Lasthenia gracilis</i>	common goldfields	
<i>Lepidospartum squamatum</i>	scaly scale-broom	
<i>Logfia filaginoides</i>	California cottonrose	
<i>Logfia gallica</i> *	daggerleaf cottonrose	
<i>Madia exigua</i>	small tarweed	
<i>Osmadenia tenella</i>	osmadenia	
<i>Pseudognaphalium biolettii</i>	Bioletti's cudweed	
<i>Pseudognaphalium californicum</i>	California cudweed	
<i>Pseudognaphalium luteoalbum</i> *	white lamb cudweed	
<i>Pseudognaphalium stramineum</i>	straw-colored cudweed	
<i>Pulicaria paludosa</i> *	marsh pulicaria	
<i>Rafinesquia californica</i>	California chicory	
<i>Senecio vulgaris</i> *	common groundsel	
<i>Silybum marianum</i> *	milk thistle	
<i>Sonchus asper</i> ssp. <i>asper</i> *	prickly sow thistle	
<i>Sonchus oleraceus</i> *	common sow thistle	
<i>Uropappus lindleyi</i>	Lindley's silverpuffs	
<i>Xanthium strumarium</i>	cocklebur	
BETULACEAE – BIRCH FAMILY		
<i>Alnus rhombifolia</i>	white alder	
BORAGINACEAE – BORAGE FAMILY		
<i>Amsinckia intermedia</i>	common fiddleneck	
<i>Amsinckia menziesii</i>	common fiddleneck	
<i>Cryptantha</i> sp.	cryptantha	
<i>Eriodictyon crassifolium</i> var. <i>crassifolium</i>	thick-leaved yerba santa	
<i>Eucrypta chrysanthemifolia</i>	chrysanthemum-leaved eucrypta	
<i>Heliotropium curassavicum</i> var. <i>oculatum</i>	seaside heliotrope	
<i>Pectocarya linearis</i> ssp. <i>ferocula</i>	narrow-toothed pectocarya	
<i>Phacelia cicutaria</i>	cicuta-leaved phacelia	
<i>Phacelia parryi</i>	Parry's phacelia	
<i>Pholistoma auritum</i> var. <i>auritum</i>	fiesta flower	
<i>Plagiobothrys canescens</i>	valley popcornflower	
BRASSICACEAE – MUSTARD FAMILY		
<i>Brassica nigra</i> *	black mustard	
<i>Hirschfeldia incana</i> *	grayish shortpod mustard	
<i>Lepidium latifolium</i> *	perennial pepperweed	

PLANTS OBSERVED IN THE SURVEY AREA DURING SPECIAL STATUS PLANT SURVEYS

Species		Special Status
Scientific Name	Common Name	
<i>Sisymbrium irio</i> *	London rocket	
CACTACEAE – CACTUS FAMILY		
<i>Opuntia littoralis</i>	seaside prickly-pear	
<i>Opuntia ×vaseyi</i>	Vasey's prickly-pear	
CARYOPHYLLACEAE – PINK FAMILY		
<i>Silene gallica</i> *	small-flower catchfly	
<i>Silene laciniata</i>	torn catchfly	
<i>Stellaria media</i> *	common chickweed	
CHENOPODIACEAE – GOOSEFOOT FAMILY		
<i>Chenopodium californicum</i>	California goosefoot	
<i>Salsola tragus</i> *	Russian thistle	
CONVOLVULACEAE – MORNING-GLORY FAMILY		
<i>Calystegia macrostegia</i>	large-bracted morning-glory	
<i>Cuscuta californica</i>	chaparral dodder	
CRASSULACEAE – STONECROP FAMILY		
<i>Crassula connata</i>	pygmy-weed	
<i>Dudleya lanceolata</i>	lance-leaved dudleya	
<i>Dudleya multicaulis</i>	many-stemmed dudleya	CRPR 1B.2
<i>Dudleya pulverulenta</i>	chalk dudleya	
CUCURBITACEAE – GOURD FAMILY		
<i>Cucurbita foetidissima</i>	buffalo gourd	
<i>Marah macrocarpa</i>	chilicothe	
EUPHORBIACEAE – SPURGE FAMILY		
<i>Croton californicus</i>	California croton	
<i>Croton setiger</i>	turkey-mullein	
<i>Euphorbia albomarginata</i>	rattlesnake sandmat	
<i>Euphorbia peplus</i> *	petty spurge	
<i>Ricinus communis</i> *	common castor bean	
FABACEAE – LEGUME FAMILY		
<i>Acmispon glaber</i>	deerweed	
<i>Acmispon micranthus</i>	small-flowered deervetch	
<i>Lupinus bicolor</i>	miniature lupine	
<i>Lupinus sparsiflorus</i>	Coulter's lupine	
<i>Medicago polymorpha</i> *	variable burclover	
<i>Melilotus indicus</i> *	sourclover	
<i>Trifolium willdenovii</i>	tomcat clover	
FAGACEAE – OAK FAMILY		
<i>Quercus agrifolia</i>	coast live oak	
GERANIACEAE – GERANIUM FAMILY		
<i>Erodium botrys</i> *	long-beaked filaree	
<i>Erodium cicutarium</i> *	redstem filaree	

**PLANTS OBSERVED IN THE SURVEY AREA
DURING SPECIAL STATUS PLANT SURVEYS**

Species		Special Status
Scientific Name	Common Name	
GROSSULARIACEAE – GOOSEBERRY FAMILY		
<i>Ribes speciosum</i>	fuchsia-flowered gooseberry	
LAMIACEAE – MINT FAMILY		
<i>Marrubium vulgare</i> *	common horehound	
<i>Salvia apiana</i>	white sage	
<i>Salvia mellifera</i>	black sage	
<i>Trichostema lanceolatum</i>	vinegar weed	
MALVACEAE – MALLOW FAMILY		
<i>Malacothamnus fasciculatus</i> var. <i>fasciculatus</i>	chaparral mallow	
<i>Malva parviflora</i> *	cheeseweed	
MELIACEAE – MAHOGANY FAMILY		
<i>Melia azedarach</i> *	china berry	
MONTIACEAE – MINER'S-LETTUCE FAMILY		
<i>Calandrinia menziesii</i>	red maids	
<i>Claytonia perfoliata</i>	miner's lettuce	
MYRSINACEAE – MYRSINE FAMILY		
<i>Lysimachia arvensis</i> *	scarlet pimpernel	
NYCTAGINACEAE – FOUR O'CLOCK FAMILY		
<i>Mirabilis laevis</i> var. <i>crassifolia</i>	wishbone bush	
ONAGRACEAE – EVENING PRIMROSE FAMILY		
<i>Camissoniopsis micrantha</i>	small-flowered camissoniopsis	
<i>Clarkia epilobioides</i>	epilobium-like clarkia	
<i>Clarkia purpurea</i> ssp. <i>quadrivulnera</i>	four-spot	
OROBANCHACEAE – BROOM-RAPE FAMILY		
<i>Castilleja exserta</i>	purple owl's-clover	
OXALIDACEAE – OXALIS FAMILY		
<i>Oxalis pes-caprae</i> *	Bermuda buttercup	
PAPAVERACEAE – POPPY FAMILY		
<i>Eschscholzia californica</i>	California poppy	
<i>Romneya coulteri</i>	Coulter's matilija poppy	CRPR 4.2
PHRYMACEAE – LOPSEED FAMILY		
<i>Diplacus longiflorus</i>	long-flowered monkeyflower	
PLANTAGINACEAE – PLANTAIN FAMILY		
<i>Antirrhinum nuttallianum</i>	Nuttall's snapdragon	
<i>Plantago erecta</i>	erect plantain	
PLATANACEAE – SYCAMORE FAMILY		
<i>Platanus racemosa</i>	western sycamore	
POLEMONIACEAE – PHLOX FAMILY		
<i>Gilia angelensis</i>	chaparral gilia	
<i>Linanthus dianthiflorus</i>	carnation-like linanthus	
POLYGONACEAE – BUCKWHEAT FAMILY		
<i>Eriogonum fasciculatum</i>	California buckwheat	

**PLANTS OBSERVED IN THE SURVEY AREA
DURING SPECIAL STATUS PLANT SURVEYS**

Species		Special Status
Scientific Name	Common Name	
<i>Rumex crispus</i> *	curly dock	
RANUNCULACEAE – BUTTERCUP FAMILY		
<i>Delphinium parryi</i> ssp. <i>parryi</i>	Parry's larkspur	
RHAMNACEAE – BUCKTHORN FAMILY		
<i>Rhamnus ilicifolia</i>	hollyleaf redberry	
ROSACEAE – ROSE FAMILY		
<i>Heteromeles arbutifolia</i>	toyon	
RUBIACEAE – COFFEE FAMILY		
<i>Galium angustifolium</i> ssp. <i>angustifolium</i>	narrow-leaved bedstraw	
<i>Galium aparine</i>	goose grass	
SALICACEAE – WILLOW FAMILY		
<i>Populus fremontii</i> ssp. <i>fremontii</i>	Fremont cottonwood	
<i>Salix gooddingii</i>	Goodding's black willow	
<i>Salix lasiolepis</i>	arroyo willow	
SCROPHULARIACEAE – FIGWORT FAMILY		
<i>Scrophularia californica</i>	California figwort	
SOLANACEAE – NIGHTSHADE FAMILY		
<i>Datura wrightii</i>	Wright's jimsonweed	
<i>Nicotiana glauca</i> *	tree tobacco	
<i>Solanum douglasii</i>	Douglas' nightshade	
<i>Solanum xanti</i>	Xantus' nightshade	
TAMARICACEAE – TAMARISK FAMILY		
<i>Tamarix ramosissima</i> *	saltcedar	
VERBENACEAE – VERVAIN FAMILY		
<i>Phyla nodiflora</i>	node-flowered phyla	
VISCACEAE – MISTLETOE FAMILY		
<i>Phoradendron leucarpum</i>	American mistletoe	
MONOCOTS		
AGAVACEAE – AGAVE FAMILY		
<i>Chlorogalum</i> sp.	soap plant	
<i>Hesperoyucca whipplei</i>	Whipple's chaparral yucca	
CYPERACEAE – SEDGE FAMILY		
<i>Cyperus</i> sp.	flatsedge	
IRIDACEAE – IRIS FAMILY		
<i>Sisyrinchium bellum</i>	western blue-eyed-grass	
LILIACEAE – LILY FAMILY		
<i>Calochortus splendens</i>	splendid mariposa lily	
<i>Calochortus weedii</i> var. <i>intermedius</i>	intermediate mariposa-lily	CRPR 1B.2
POACEAE – GRASS FAMILY		
<i>Arundo donax</i> *	giant reed	
<i>Avena barbata</i> *	slender wild oat	
<i>Bothriochloa barbinodis</i>	cane bluestem	

PLANTS OBSERVED IN THE SURVEY AREA DURING SPECIAL STATUS PLANT SURVEYS

Species		Special Status
Scientific Name	Common Name	
<i>Bromus diandrus</i> *	ripgut grass	
<i>Bromus hordeaceus</i> *	soft chess	
<i>Bromus rubens</i> *	red brome	
<i>Cortaderia selloana</i> *	pampas grass	
<i>Cynodon dactylon</i> *	Bermuda grass	
<i>Elymus condensatus</i>	giant wild-rye	
<i>Elymus triticoides</i>	beardless wild rye	
<i>Festuca myuros</i> *	rattail sixweeks grass	
<i>Festuca perennis</i> *	rye grass	
<i>Hordeum murinum</i> *	wall barley	
<i>Lamarckia aurea</i> *	goldentop	
<i>Melica imperfecta</i>	little California melica	
<i>Muhlenbergia microsperma</i>	littleseed muhly	
<i>Pennisetum setaceum</i> *	crimson fountain grass	
<i>Polypogon monspeliensis</i> *	annual beard grass	
<i>Schismus barbatus</i> *	barbed Mediterranean grass	
<i>Stipa lepida</i>	foothill needle grass	
<i>Stipa miliacea</i> var. <i>miliacea</i> *	smilo grass	
<i>Stipa pulchra</i>	purple needle grass	
THEMIDACEAE – BRODIAEA FAMILY		
<i>Bloomeria crocea</i>	common goldenstar	
<i>Dipterostemon capitatus</i>	blue dicks	
TYPHACEAE – CATTAIL FAMILY		
<i>Typha latifolia</i>	broad-leaved cattail	
CRPR: California Rare Plant Rank * Non-native or invasive species CRPR 1B Plants Rare, Threatened, or Endangered in California and elsewhere 4 Plants of limited distribution - watch list Threat Code Extensions .2 Moderately threatened in California (20–80% of occurrences threatened; moderate degree and immediacy of threat)		

ATTACHMENT C

CNDBB FORMS

CNDDDB Online Field Survey Form Report



California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/



Source code RUD20F0002
Quad code 3311776
Occ. no. _____
EO index no. _____
Map index no. _____

This data has been reported to the CNDDDB, but may not have been evaluated by the CNDDDB staff

Scientific name: *Calochortus weedii* var. *intermedius*

Common name: *intermediate mariposa-lily*

Date of field work (mm-dd-yyyy): *06-04-2020*

Comment about field work date(s):

OBSERVER INFORMATION

Observer: *Allison D. Rudalevige*

Affiliation: *Psomas*

Address: *5 Hutton Centre Drive, Suite 300, Santa Ana, CA 92707*

Email: *allison.rudalevige@psomas.com*

Phone: *(714) 481-8024*

Other observers:

DETERMINATION

Keyed in: *Jepson Flora Project 2020*

Compared w/ specimen at:

Compared w/ image in:

By another person:

Other:

Identification explanation:

Identification confidence: *Very confident*

Species found: *Yes* If not found, why not?

Level of survey effort: *Survey followed CDFW 2018 protocol.*

Total number of individuals: *1*

Collection? *No*

Collection number:

Museum/Herbarium:

PLANT INFORMATION

Phenology:	<i>0 %</i>	<i>100 %</i>	<i>0 %</i>
	vegetative	flowering	fruiting

SITE INFORMATION

Habitat description: *Disturbed sagebrush scrub associated with Artemisia California, Brassica nigra, Calystegia macrostegia, and Avena sp.*

Slope: *moderate*

Land owner/manager: *Irvine Ranch Water District*

Aspect: *s-facing*

Site condition + population viability: *Good*

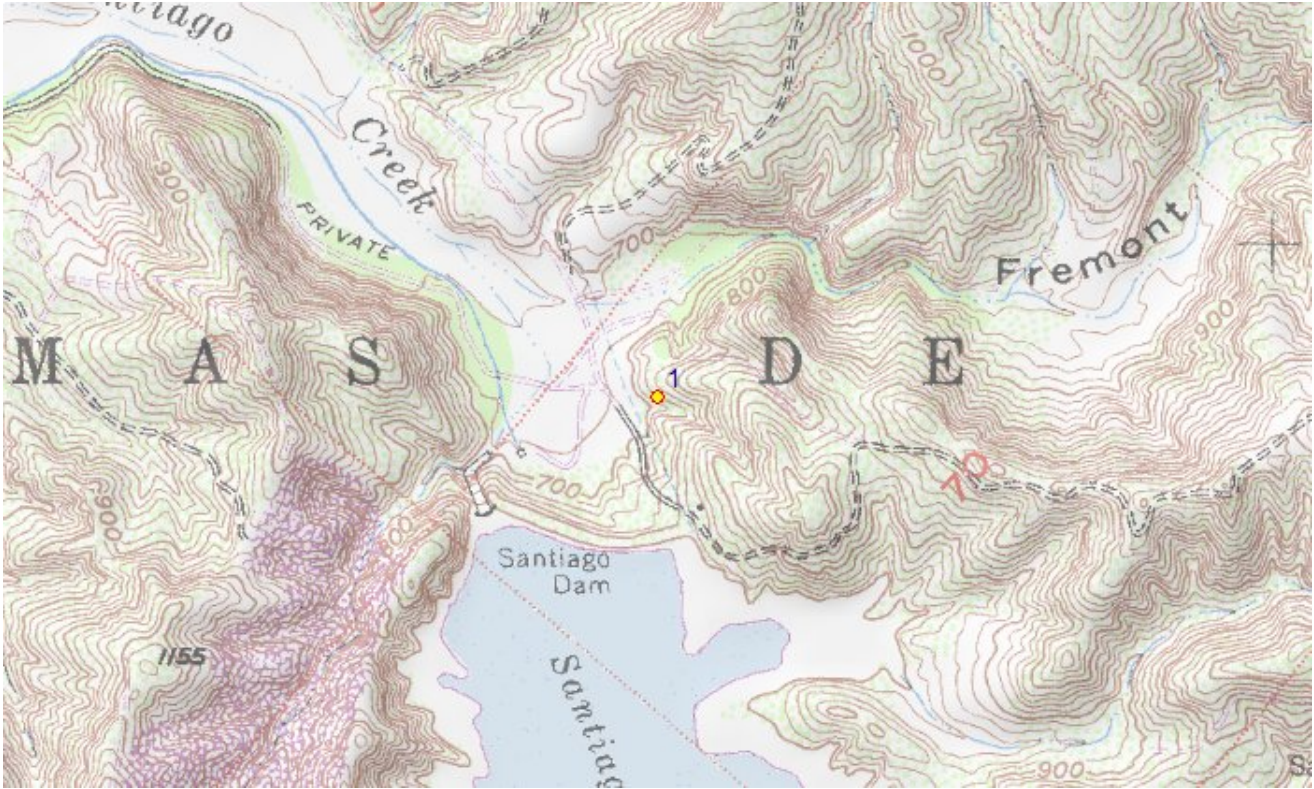
Immediate & surrounding land use: [Open space in Irvine Regional Park, Limestone Canyon Regional Park, and Oak Canyon Park.](#)

Visible disturbances: [invasive weeds](#)

Threats: [nearby dam operations](#)

General comments: [Other special status species observed in vicinity include Dudleya multicaulis and Romneya coulteri.](#)

MAP INFORMATION



ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTM E NAD83	UTM N NAD83	UTM Zone
	Orange	Black Star Canyon	744	33.78880	-117.72334	433035	3738974	11
1	Public Land Survey	Feature Comment						
	S T04S R08W 28	One individual						

The mapped feature is accurate within: [5 m](#)

Source of mapped feature: [iPad with Avenza Maps application](#)

Mapping notes:

Location/directions comments:

Attachment(s): [IMG_7150.JPG, Photo of individual](#)

CNDDDB Online Field Survey Form Report



California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/



Source code RUD20F0003
Quad code 3311776
Occ. no. _____
EO index no. _____
Map index no. _____

This data has been reported to the CNDDDB, but may not have been evaluated by the CNDDDB staff

Scientific name: *Dudleya multicaulis*

Common name: many-stemmed dudleya

Date of field work (mm-dd-yyyy): 06-04-2020

Comment about field work date(s): Species observed on Apr 30, May 21, and Jun 4, 2020

OBSERVER INFORMATION

Observer: Allison D. Rudalevige

Affiliation: Psomas

Address: 5 Hutton Centre Drive, Suite 300, Santa Ana, CA 92707

Email: allison.rudalevige@psomas.com

Phone: (714) 481-8024

Other observers:

DETERMINATION

Keyed in: Jepson Flora Project 2020

Compared w/ specimen at:

Compared w/ image in:

By another person:

Other:

Identification explanation:

Identification confidence: Very confident

Species found: Yes If not found, why not?

Level of survey effort: Survey followed CDFW 2018 protocol.

Total number of individuals: 810

Collection? Yes Collection number: Allison Rudalevige

Museum/Herbarium: California Botanic Garden

PLANT INFORMATION

Phenology:	10 %	90 %	0 %
	vegetative	flowering	fruiting

SITE INFORMATION

Habitat description: Pop 1 (800 individuals) in disturbed sagebrush scrub associated with *Eriogonum fasciculatum*, *Logfia gallica*, *Artemisia californica*, *Festuca perennis*, *Calochortus splendens*, *Lasthenia gracilis*, and *Osmadenia tenella*. Growing under *Eriogonum fasciculatum* canopy. Pop 2 (10 individuals) on vertical cliff face associated with *Eriogonum fasciculatum*, *Salvia apiana*, *Artemisia californica*, and *Melica imperfecta*.

Slope: P1-flat; P2-vertical

Land owner/manager: Irvine Ranch Water District

Aspect: P1-n/a; P2- E-facing

Site condition + population viability: Good

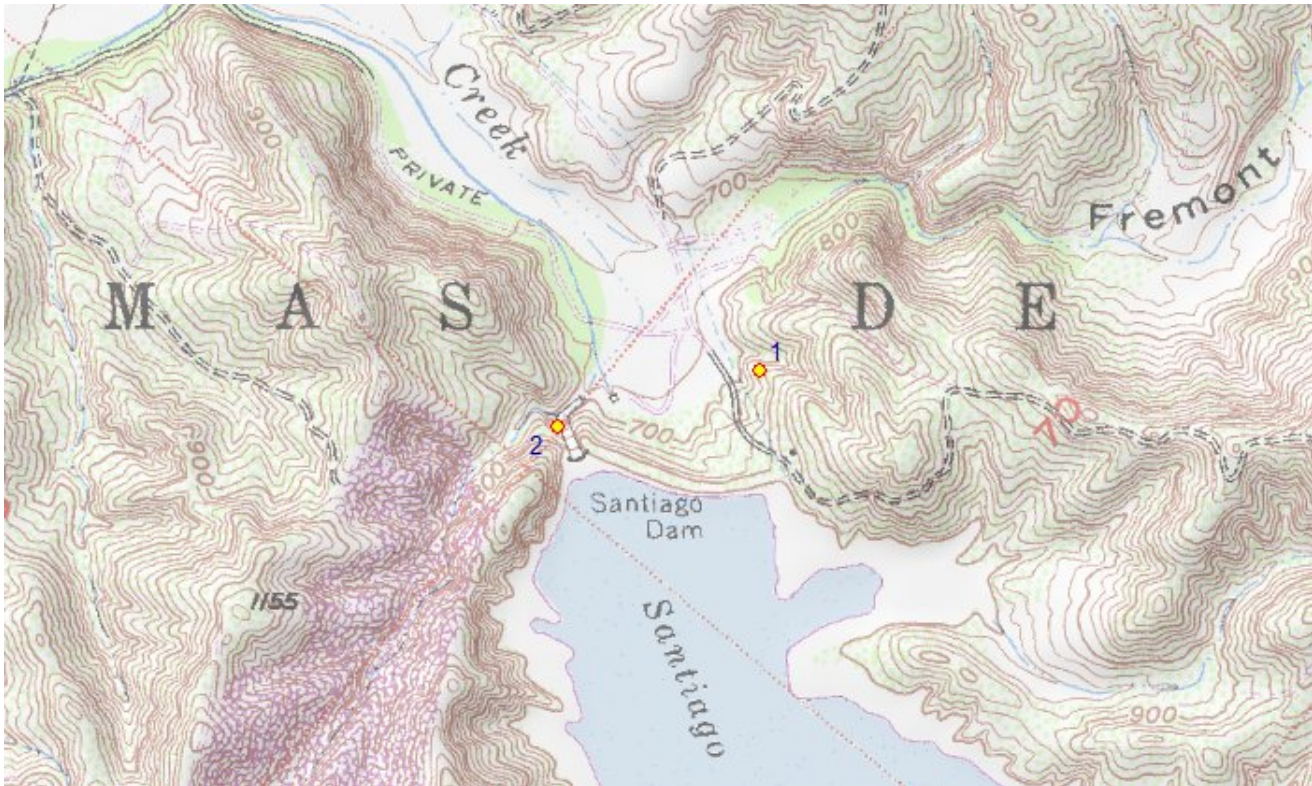
Immediate & surrounding land use: Open space in Irvine Regional Park, Limestone Canyon Regional Park, and Oak Canyon Park.

Visible disturbances: invasive weeds

Threats: nearby dam operations

General comments: Other special status species observed in vicinity include *Calochortus weedii* var. *intermedius* and *Romneya coulteri*.

MAP INFORMATION



ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTM E NAD83	UTM N NAD83	UTM Zone
	Orange	Black Star Canyon	761	33.78827	-117.72313	433054	3738916	11
1	Public Land Survey	Feature Comment						
	S T04S R08W 28	800 individuals						
ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTM E NAD83	UTM N NAD83	UTM Zone
	Orange	Black Star Canyon	767	33.78717	-117.72774	432626	3738797	11
2	Public Land Survey	Feature Comment						
	S T04S R08W 33	10 individuals						

The mapped feature is accurate within: 5 m

Source of mapped feature: iPad with Avenza Maps application

Mapping notes: Population 1: 800 individuals; Population 2: 10 individuals

Location/directions comments:

Attachment(s): IMG_6711.JPG, Photo of individuals

September 27, 2022

Ms. Kellie Welch
Irvine Ranch Water District
15600 Sand Canyon Avenue
Irvine, California 92618

VIA EMAIL
Welch@irwd.com

Subject: Results of Special Status Plant Surveys for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California

Dear Ms. Welch:

This Letter Report presents the results of focused surveys for special status plant species for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project (hereinafter referred to as the “project site”) located in Orange County, California. The purpose of the surveys was to determine the presence or absence of special status plant species upstream of Santiago Dam. Focused surveys for special status plants were conducted downstream of Santiago Dam in spring/summer 2020 (Psomas 2020).

PROJECT LOCATON AND DESCRIPTION

The project site is located at Santiago Creek Dam at the northwest end of Irvine Lake in unincorporated Orange County, California (Exhibit 1). The Biological Study Area includes Santiago Creek Dam, downstream areas along Santiago Creek, areas around Irvine Lake, and upstream areas along Santiago Creek. The Biological Study Area is south of State Route (SR) 261 and east of SR-241 and Santiago Canyon Road. Surrounding land use primarily consists of undeveloped open space. Irvine Regional Park is located northwest of SR-241; Limestone Canyon Regional Park is located south of Santiago Canyon Road; and Oak Canyon Park is located at the southeast end of Irvine Lake. The closed Santiago Canyon Landfill is located adjacent to the west of Irvine Lake.

The Biological Study Area is located on the U.S. Geological Survey’s (USGS’) Black Star Canyon 7.5-minute quadrangle (Exhibit 2). Irvine Lake (named Santiago Creek Reservoir on the USGS) was created by constructing a dam across Santiago Creek. Santiago Creek, a named blueline stream, enters Irvine Lake from the east and continues downstream of the dam flowing north and then west. It has a relatively broad floodplain both above and below the dam. The slopes around the western and northern portions of the lake are relatively steep while the areas to the southeast and east include areas that are relatively flat. Three unnamed blueline streams enter the lake from the north and eight unnamed blueline streams enter the lake from the west, southeast, and south. One unnamed blueline stream enters the Biological Study Area in the northwest, downstream of the Dam, while Fremont Canyon Creek merges with Santiago Creek downstream of the Biological Study Area. Elevations in the Biological Study Area range from approximately 657 to 996 feet above mean sea level (msl).

The Biological Study Area is located in the Central/Coastal Subregion of the Natural Communities Conservation Plan/Habitat Conservation Plan (NCCP/HCP). Santiago Dam and its associated structures are located within designated “Non-Reserve Open Space”, while

5 Hutton Centre Drive
Suite 300
Santa Ana, CA 92707

Tel 714.751.7373
Fax 714.545.8883
www.Psomas.com

Kellie Welch
September 27, 2022
Page 2

Habitat Reserve and Conservation Easements surround the lake; a Special Linkage is located southeast of the lake. The purpose of this plan is to provide regional protection and recovery of multiple species and habitat while allowing compatible land use and appropriate development. Irvine Ranch Water District (IRWD)¹ is a participating jurisdiction and, as such, will comply with the terms of the NCCP/HCP Implementation Agreement.

The IRWD and Serrano Water District are jointly proposing to abandon the existing Santiago Creek Dam outlet tower and construct a new inclined outlet structure to be located on the left abutment of the existing dam. Additionally, based on feedback from the Division of Safety of Dams, the dam spillway requires structural improvements. Existing structures include the dam crest, the intake tower in Irvine Lake, the spillway channel, the control houses, the energy dissipater structure, the aboveground outlet pipe, and the dam crest access road. The project is currently in the design phase. Staging areas are currently planned to be placed in disturbed areas on the east side of Irvine Lake, adjacent to where Santiago Creek flows into the lake.

EXISTING CONDITIONS

The special status plant survey area included all project impact areas (i.e., permanent, temporary, and additional inundation areas) plus a 50-foot buffer. A variety of vegetation types occur in the survey area, including sagebrush scrub, disturbed sagebrush scrub, sagebrush-coyote bush scrub, southern cactus scrub, disturbed southern cactus scrub, toyon-sumac chaparral, annual grassland, ruderal, riparian herb, mulefat scrub, disturbed mulefat scrub, southern sycamore riparian woodland/southern coast live oak riparian forest, southern black willow forest, disturbed southern black willow forest, southern black willow forest/riparian herb, coast live oak woodland, and vegetated fluctuating shoreline (Exhibit 3). Other landcover includes cliff, open water, fluctuating shoreline, perennial stream, ornamental, developed, and disturbed areas.

Soils mapped in the survey area include Alo variant clay, Anaheim loam, Anaheim clay loam, beaches, Bosanko clay, Botella clay loam, Capistrano sandy loam, Cieneba sandy loam, Cieneba-rock outcrop complex, Corralitos loamy sand, Myford sandy loam, riverwash, rock outcrop-Cieneba complex, Soboba gravelly loamy sand, Soper loam, Soper gravelly loam, Soper cobbly loam, and Sorrento loam (Exhibit 4).

SURVEY METHODS

Botanical surveys were floristic in nature and consistent with the protocols created by the California Department of Fish and Wildlife (CDFW; CDFW 2018). Prior to the 2022 field surveys, a literature search was conducted to identify special status plant species reported from the vicinity of the project site. Sources reviewed include the USGS Black Star Canyon, Orange, Tustin, and El Toro 7.5-minute quadrangles in the California Native Plant Society's Inventory of Rare and Endangered Plants (CNPS 2022) and the CDFW's California Natural Diversity Database (CNDDB) (CDFW 2022a).

Rainfall received in the winter and spring determines the germination of many annual and perennial herb species. The region received approximately 9.3 inches of precipitation between July 2021 and June 2022 (data taken from Irvine – South Coast Valleys Station No. 75) (CIMIS 2022). The average annual precipitation for this area is between 10 and 13 inches.

¹ The Santiago County Water District (SCWD) was also a participating jurisdiction in the NCCP/HCP. The SCWD consolidated with IRWD in 2006.

Kellie Welch
 September 27, 2022
 Page 3

Reference populations were monitored for annual and difficult-to-detect target species to ensure that the surveys were comprehensive (Table 1). This is especially relevant during periods of unusual rainfall patterns or below average rainfall. If conditions at a nearby reference population are suitable for germination and growth, then it can be inferred that conditions would also be suitable on the survey area. Reference populations were not monitored for species with a California Rare Plant Rank (CRPR) of 3 or 4, large perennials (e.g., Tecate cypress [*Hesperocyparis forbesii*] and chaparral nolina [*Nolina cismontana*]) which would be identifiable throughout the year, or for species lacking a publicly accessible reference population.

TABLE 1
REFERENCE POPULATIONS MONITORED IN THE PROJECT REGION

Species	Date Observed	Location	Phenology
<i>Calochortus weedii</i> var. <i>intermedius</i> intermediate mariposa lily	May 12, 2022	Santiago Canyon vicinity	early bloom
<i>Dudleya multicaulis</i> many-stemmed dudleya	April 27, 2022	Santiago Canyon vicinity	in bloom
<i>Pseudognaphalium</i> <i>leucocephalum</i> white rabbit-tobacco	September 8, 2022	San Juan Capistrano	in bloom

Surveys were conducted on March 24, 2022, by Psomas Senior Biologist Allison Rudalevige; on April 25, 26, and 28, 2022, by Ms. Rudalevige and Consulting Botanist Sandra Leatherman; on May 23 and 26 by Ms. Rudalevige and Psomas Biologist Erin Ruckman; and on September 13, 2022, by Ms. Rudalevige and Psomas Biologist Sarah Thomas. The total number of person-hours spent surveying was approximately 87.75 hours. The special status plant survey area included all project impact areas (i.e., permanent, temporary, and additional inundation areas) plus a 50-foot buffer. A systematic survey was conducted in all areas of suitable special status plant habitat in the survey area. Inaccessible areas (e.g., steep cliffs), were observed remotely with binoculars. All plant species observed were recorded in field notes. Plant species were identified in the field or collected for future identification. Plants were identified to the taxonomic level necessary to determine whether they were a special status species. Plants were identified using taxonomic keys, descriptions, and illustrations in Jepson Flora Project (2022), Baldwin et al. (2012), and Hickman (1993). Nomenclature of plant taxa conform to the *Special Vascular Plants, Bryophytes, and Lichens List* (CDFW 2022b) for special status species and the *Jepson eFlora* (Jepson Flora Project 2022) for all other taxa.

Any special status plant species observed in the survey area were mapped on an iPad loaded with Avenza Maps software or with a handheld Garmin Global Positioning System (GPS) unit. Data were collected on the number and phenology of individuals (estimated for large populations) and microsite characteristics (e.g., slope, aspect, soil texture, surrounding habitat, and associated species). Representative photographs are included as Attachment A.

SURVEY RESULTS

Table 2 identifies the special status plants reported from the literature review with their status, their potential to occur in the survey area, and the survey results. Braunton's milkvetch (*Astragalus brauntonii*), intermediate mariposa lily (*Calochortus weedii* var. *intermedius*), mud nama (*Nama stenocarpa*), and Coulter's matilija poppy (*Romneya coulteri*) were observed during the surveys and are discussed further below. A list of all plants observed in the survey area during 2022 special status plant surveys is included in Attachment B.

Kellie Welch
September 27, 2022
Page 1

TABLE 2
SPECIAL STATUS PLANT SPECIES REPORTED
FROM THE SURVEY AREA VICINITY

Species	Federal Status	State Status	CRPR	Habitat*	Potential to Occur in the Survey Area; Results of the Surveys
chaparral sand-verbena <i>Abronia villosa</i> var. <i>aurita</i>	—	—	1B.1	Sandy areas in chaparral, coastal scrub, desert dunes. Blooms: (January) March – September.	Not expected to occur because not observed during focused surveys; suitable habitat.
Yucaipa onion <i>Allium marvinii</i>	—	—	1B.2	Dry slopes and ridges in chaparral. Blooms: April – May.	Not expected to occur; outside current known range.
Braunton's milk-vetch <i>Astragalus brauntonii</i>	FE	—	1B.1	Recent burns or disturbed areas, usually on sandstone with carbonate layers in chaparral, coastal scrub, valley and foothill grassland. Reported immediately north of the survey area in 2012 (CDFW 2022a). Blooms: January – August.	Observed in the survey area.
Coulter's saltbush <i>Atriplex coulteri</i>	—	—	1B.2	Alkaline or clay soils in coastal bluff scrub, coastal dunes, coastal scrub, and valley and foothill grassland. Blooms: March – October.	Not expected to occur because not observed during focused surveys; marginally suitable habitat.
south coast saltscale <i>Atriplex pacifica</i>	—	—	1B.2	Alkaline soils in coastal scrub, coastal bluff scrub, playas, coastal dunes. Blooms: March – October.	Not expected to occur because not observed during focused surveys; marginally suitable habitat.
Davidson's saltscale <i>Atriplex serenana</i> var. <i>davidsonii</i>	—	—	1B.2	Alkaline soils in coastal bluff scrub, coastal scrub. Blooms: April – October.	Not expected to occur because not observed during focused surveys; marginally suitable habitat.
Malibu baccharis <i>Baccharis malibuensis</i>	—	—	1B.1	In Conejo volcanic substrates in coastal scrub, chaparral, cismontane woodland, and riparian woodland. Reported northeast of the survey area in 2000 (CCH 2022). Blooms: August.	Not expected to occur because not observed during focused surveys; suitable habitat.
thread-leaved brodiaea <i>Brodiaea filifolia</i>	FT	SE	1B.1	Chaparral openings, cismontane woodland, coastal scrub, playas, valley and foothill grassland, vernal pools. Blooms: March – June.	Not expected to occur because not observed during focused surveys; suitable habitat.

Kellie Welch
September 27, 2022
Page 2

TABLE 2
SPECIAL STATUS PLANT SPECIES REPORTED
FROM THE SURVEY AREA VICINITY

Species	Federal Status	State Status	CRPR	Habitat*	Potential to Occur in the Survey Area; Results of the Surveys
Brewer's calandrinia <i>Calandrinia breweri</i>	—	—	4.2	Sandy or loamy soils in disturbed sites and burns in chaparral and coastal sage scrub. Blooms: (January) March – June.	Not expected to occur because not observed during focused surveys; suitable habitat.
Catalina mariposa lily <i>Calochortus catalinae</i>	—	—	4.2	Chaparral, cismontane woodland, coastal scrub, valley and foothill grassland. Blooms: (February) March – June.	Not expected to occur because not observed during focused surveys; suitable habitat. Incidentally observed on access road outside survey area.
Plummer's mariposa-lily <i>Calochortus plummerae</i>	—	—	4.2	Rocky and sandy sites, usually of granitic or alluvial material, in coastal scrub, chaparral, valley and foothill grassland, cismontane woodland, lower montane coniferous forest. Blooms: May – July.	Not expected to occur because not observed during focused surveys; suitable habitat.
intermediate mariposa-lily <i>Calochortus weedii</i> var. <i>intermedius</i>	—	—	1B.2	Dry, rocky calcareous slopes and rock outcrops in coastal scrub, chaparral, valley and foothill grassland. Blooms: May – July.	Observed in the survey area.
Lewis' evening-primrose <i>Camissoniopsis lewisii</i>	—	—	3	Sand or clay substrate in coastal bluff scrub, cismontane woodland, coastal dunes, coastal scrub, valley and foothill grassland. Blooms: March – May (June).	Not expected to occur because not observed during focused surveys; suitable habitat.
southern tarplant <i>Centromadia parryi</i> ssp. <i>australis</i>	—	—	1B.1	Disturbed sites and alkaline soils in marshes and swamp margins, valley and foothill grassland, and vernal pools. Blooms: May – November.	Not expected to occur because not observed during focused surveys; suitable habitat.
San Fernando Valley spineflower <i>Chorizanthe parryi</i> var. <i>fernandina</i>	—	SE	1B.1	Sandy soils in coastal scrub, valley and foothill grasslands. Blooms: April – July.	Not expected to occur; historic (1902) occurrence within 0.5 mile but outside the current known range of the species (CDFW 2022a).
long-spined spineflower	—	—	1B.2	Gabbroic clay or sandy soil in chaparral, coastal scrub, meadows and	Not expected to occur because not observed during focused surveys;

Kellie Welch
September 27, 2022
Page 3

TABLE 2
SPECIAL STATUS PLANT SPECIES REPORTED
FROM THE SURVEY AREA VICINITY

Species	Federal Status	State Status	CRPR	Habitat*	Potential to Occur in the Survey Area; Results of the Surveys
<i>Chorizanthe polygonoides</i> var. <i>longispina</i>				seeps, valley and foothill grassland, vernal pools. Blooms: April – July.	suitable habitat but at edge of current known range.
small-flowered morning-glory <i>Convolvulus simulans</i>	—	—	4.2	Clay, occasionally serpentine soils in chaparral openings, coastal scrub, valley and foothill grasslands. Reported just west of Irvine Lake in 2016 (CCH 2022). Blooms: March – July.	Not expected to occur because not observed during focused surveys; suitable habitat.
paniculate tarplant <i>Deinandra paniculata</i>	—	—	4.2	Usually vernal mesic, sometimes sandy substrate in coastal scrub, valley and foothill grassland, and vernal pools. Blooms: (March) April – November.	Not expected to occur because not observed during focused surveys; suitable habitat.
Cleveland's bush monkeyflower <i>Diplacus clevelandii</i>	—	—	4.2	Disturbed areas and open borders of chaparral, cismontane woodland, and lower montane coniferous forest. Blooms: April – July.	Not expected to occur; outside current known elevational range.
slender-horned spineflower <i>Dodecahema leptoceras</i>	FE	SE	1B.1	Sandy soil in chaparral, cismontane woodland, and alluvial fan coastal scrub. Blooms: April – June.	Not expected to occur; outside current known range.
Santa Monica Mountains dudleya <i>Dudleya cymosa</i> ssp. <i>ovatifolia</i>	FT	—	1B.1	Volcanic or sedimentary, rocky sediment in chaparral and coastal scrub. Blooms: March – June.	Not expected to occur because not observed during focused surveys; suitable habitat.
many-stemmed dudleya <i>Dudleya multicaulis</i>	—	—	1B.2	Heavy, often clayey soils or grassy slopes in chaparral, coastal scrub, valley and foothill grassland. Blooms: April – July.	Not expected to occur because not observed during focused surveys; suitable habitat. Known to occur just outside the survey area; observed during previous focused surveys downstream of the dam.

TABLE 2
SPECIAL STATUS PLANT SPECIES REPORTED
FROM THE SURVEY AREA VICINITY

Species	Federal Status	State Status	CRPR	Habitat*	Potential to Occur in the Survey Area; Results of the Surveys
Santa Ana River woollystar <i>Eriastrum densifolium</i> ssp. <i>sanctorum</i>	FE	SE	1B.1	Sandy soils on river floodplains or terraced fluvial deposits in coastal scrub and chaparral. Blooms: April – September.	Not expected to occur; outside current known range (i.e., the Santa Ana River watershed).
Palmer's grapplinghook <i>Harpagonella palmeri</i>	—	—	4.2	Clay soils in open grasses areas in chaparral, coastal scrub, and valley and foothill grassland. Blooms: March – May.	Not expected to occur because not observed during focused surveys; suitable habitat.
Los Angeles sunflower <i>Helianthus nuttallii</i> ssp. <i>parishii</i>	—	—	1A	Coastal and freshwater marshes and swamps. Blooms: August – October.	Not expected to occur because not observed during focused surveys and because species is presumed extinct; suitable habitat.
Tecate cypress <i>Hesperocyparis forbesii</i>	—	—	1B.1	Clay or gabbro soils in closed-cone coniferous forest and chaparral. Perennial species observable year-round.	Not expected to occur; no suitable habitat.
Gowen cypress <i>Hesperocyparis goveniana</i>	FT	—	1B.2	Closed-cone coniferous forest, mixed evergreen forest, chaparral, and coastal terraces. Perennial species observable year-round.	Not expected to occur; outside current known range; no suitable habitat.
vernal barley <i>Hordeum intercedens</i>	—	—	3.2	Coastal dunes, coastal scrub, saline flats and depressions of valley and foothill grassland, vernal pools. Reported just south of Irvine Lake in 1998 (CCH 2020). Blooms: March – June.	Not expected to occur because not observed during focused surveys; marginally suitable habitat.
mesa horkelia <i>Horkelia cuneata</i> var. <i>puberula</i>	—	—	1B.1	Sandy or gravelly soils in chaparral, cismontane woodland, and coastal scrub. Blooms: February – July (September).	Not expected to occur because not observed during focused surveys; suitable habitat.

TABLE 2
SPECIAL STATUS PLANT SPECIES REPORTED
FROM THE SURVEY AREA VICINITY

Species	Federal Status	State Status	CRPR	Habitat*	Potential to Occur in the Survey Area; Results of the Surveys
Southern California black walnut <i>Juglans californica</i>	—	—	4.2	Chaparral, cismontane woodland, coastal scrub, and riparian woodland. Perennial species observable year-round. Blooms: March – August.	Not expected to occur because not observed during focused surveys.
southwestern spiny rush <i>Juncus acutus</i> ssp. <i>leopoldii</i>	—	—	4.2	Moist, saline places including coastal dunes, marshes and swamps, and meadows and seeps. Perennial species observable year-round. Blooms: (March) May – June.	Not expected to occur because not observed during focused surveys; marginally suitable habitat.
Coulter's goldfields <i>Lasthenia glabrata</i> ssp. <i>coulteri</i>	—	—	1B.1	Usually alkaline soils in coastal salt marsh, playas, vernal pools. Blooms: February – June.	Not expected to occur because not observed during focused surveys; no suitable habitat.
heart-leaved pitcher sage <i>Lepechinia cardiophylla</i>	—	—	1B.2	Closed-cone coniferous forest, chaparral, cismontane woodland. Blooms: April – July.	Not expected to occur; outside the current known elevational range; no suitable habitat.
Robinson's pepper-grass <i>Lepidium virginicum</i> var. <i>robinsonii</i>	—	—	4.3	Dry soils in chaparral and coastal scrub. Blooms: January – July.	Not expected to occur because not observed during focused surveys; suitable habitat.
Ocellated Humboldt lily <i>Lilium humboldtii</i> ssp. <i>ocellatum</i>	—	—	4.2	Openings in chaparral, cismontane woodland, coastal scrub, lower montane coniferous forest, and riparian woodland. Blooms: March – July (August).	Not expected to occur because not observed during focused surveys; suitable habitat.
California box-thorn <i>Lycium californicum</i>	—	—	4.2	Coastal bluff scrub and coastal scrub. Perennial species observable year-round. Blooms: March – August (December).	Not expected to occur; outside current known range.

TABLE 2
SPECIAL STATUS PLANT SPECIES REPORTED
FROM THE SURVEY AREA VICINITY

Species	Federal Status	State Status	CRPR	Habitat*	Potential to Occur in the Survey Area; Results of the Surveys
intermediate monardella <i>Monardella hypoleuca</i> ssp. <i>intermedia</i>	—	—	1B.3	Chaparral, cismontane woodland, and sometimes lower montane coniferous forest. Blooms: April – September.	Not expected to occur because not observed during focused surveys; marginally suitable habitat.
mud nama <i>Nama stenocarpa</i>	—	—	2B.2	Lake shores, riverbanks, intermittently wet areas, marshes, and swamps. Blooms: January – July.	Observed in the survey area.
Gambel's water cress <i>Nasturtium gambelii</i>	FE	ST	1B.1	Freshwater and brackish marshes at the margins of lakes and along streams; in or just above the water level. Blooms: April – October.	Not expected to occur because not observed during focused surveys; suitable habitat.
chaparral nolina <i>Nolina cismontana</i>	—	—	1B.2	Primarily sandstone and shale substrates in chaparral and coastal scrub. Perennial species observable year-round. Blooms: (March) May – July.	Not expected to occur because not observed during focused surveys; suitable habitat.
California beardtongue <i>Penstemon californicus</i>	—	—	1B.2	Sandy or granitic soils and stony slopes in chaparral, lower montane coniferous forest, pinyon and juniper woodland. Blooms: May – June (August).	Not expected to occur; outside current known range; no suitable habitat.
Allen's pentachaeta <i>Pentachaeta aurea</i> ssp. <i>allenii</i>	—	—	1B.1	Openings in coastal scrub and valley and foothill grasslands. Blooms: March – June.	Not expected to occur because not observed during focused surveys; suitable habitat.
Hubby's phacelia <i>Phacelia hubbyi</i>	—	—	4.2	Open gravelly or rocky slopes of chaparral, coastal scrub, and valley and foothill grassland. Blooms: April – July.	Not expected to occur because not observed during focused surveys; suitable habitat.
woolly chaparral-pea <i>Pickeringia montana</i> var. <i>tomentosa</i>	—	—	4.3	Gabbroic, granitic, or clay soil in chaparral. Blooms: May – August.	Not expected to occur; no suitable habitat.

TABLE 2
SPECIAL STATUS PLANT SPECIES REPORTED
FROM THE SURVEY AREA VICINITY

Species	Federal Status	State Status	CRPR	Habitat*	Potential to Occur in the Survey Area; Results of the Surveys
Fish's milkwort <i>Polygala cornuta</i> var. <i>fishiae</i>	—	—	4.3	Chaparral, cismontane woodland, riparian woodland. Blooms: May – August.	Not expected to occur because not observed during focused surveys; suitable habitat.
white rabbit-tobacco <i>Pseudognaphalium leucocephalum</i>	—	—	2B.2	Sandy, gravelly areas of riparian woodland, cismontane woodland, coastal scrub, and chaparral. Blooms: (July) August – November (December).	Not expected to occur because not observed during focused surveys; suitable habitat.
Coulter's matilija poppy <i>Romneya coulteri</i>	—	—	4.2	Chaparral and coastal scrub, often in burns. Blooms: March – July (August).	Observed in the survey area.
chaparral ragwort <i>Senecio aphanactis</i>	—	—	2B.2	Drying alkaline flats of chaparral, cismontane woodland, coastal scrub. Blooms: January – April (May).	Not expected to occur because not observed during focused surveys; marginally suitable habitat.
salt spring checkerbloom <i>Sidalcea neomexicana</i>	—	—	2B.2	Alkali springs and marshes in playas, chaparral, coastal scrub, lower montane coniferous forest, and Mojavean desert scrub. Blooms: March – June.	Not expected to occur because not observed during focused surveys; marginally suitable habitat.
estuary seablite <i>Suaeda esteroa</i>	—	—	1B.2	Coastal salt marshes in clay, silt, and sand substrates. Blooms: (January – May) July – October.	Not expected to occur; no suitable habitat.
woolly seablite <i>Suaeda taxifolia</i>	—	—	4.2	Coastal bluff scrub, coastal dunes, and salt marshes. Blooms: January – December.	Not expected to occur; outside current known range; no suitable habitat.

Kellie Welch
September 27, 2022
Page 8

TABLE 2
SPECIAL STATUS PLANT SPECIES REPORTED
FROM THE SURVEY AREA VICINITY

Species	Federal Status	State Status	CRPR	Habitat*	Potential to Occur in the Survey Area; Results of the Surveys
San Bernardino aster <i>Symphyotrichum defoliatum</i>	—	—	1B.2	Disturbed areas, vernal mesic grassland, or near ditches, streams, and springs in meadows and seeps, cismontane woodland, coastal scrub, lower montane coniferous forest, marshes and swamps, valley and foothill grassland. Blooms: July – November.	Not expected to occur because not observed during focused surveys; suitable habitat.
San Diego County viguiera <i>Viguiera laciniata</i>	—	—	4.3	Chaparral and coastal scrub. Blooms: February – June (August).	Not expected to occur because not observed during focused surveys; suitable habitat.

CRPR: California Rare Plant Rank

LEGEND:

Federal Status		State Status	
FE	Endangered	SE	Endangered
FT	Threatened	ST	Threatened

CRPR

1A Plants presumed extirpated in California and either rare or extinct elsewhere

1B Plants Rare, Threatened, or Endangered in California and elsewhere

2B Plants Rare, Threatened, or Endangered in California but more common elsewhere

3 Plants about which we need more information – A Review List

4 Plants of limited distribution – A Watch List

CRPR Threat Code Extensions

None Plants lacking any threat information

.1 Seriously threatened in California (over 80% of occurrences threatened; high degree and immediacy of threat)

.2 Fairly threatened in California (20–80% of occurrences threatened; moderate degree and immediacy of threat)

.3 Not very threatened in California (<20% of occurrences threatened; low degree and immediacy of threat or no current threats known)

Species that were observed on site are shown in **boldface type**. For blooming period, months included in parentheses are uncommon.

* Sources include CDFW 2022a, CNPS 2022, and Jepson Flora Project 2022.

Kellie Welch
September 27, 2022
Page 1

Braunton's Milkvetch

Braunton's milkvetch is a federally listed Endangered species and has a CRPR of 1B.1. It is not a Covered species in the Central Coastal NCCP/HCP. It typically blooms between January and August (CNPS 2022). This perennial herb occurs in chaparral, coastal scrub, and valley and foothill grassland at elevations between approximately 15 and 2,100 feet above msl (Jepson Flora Project 2022; CNPS 2022). It generally occurs after recent burns or in disturbed areas, usually in sandstone with carbonate layers (CNPS 2022). This species is known from the western portion of the Western Transverse Ranges, the San Gabriel Mountains, tentatively from the San Gabriel Mountains/South Coast, and the northern Peninsular Ranges (Jepson Flora Project 2022); it is known from a few canyons in Orange County (Allen and Roberts 2013).

One individual Braunton's milkvetch was observed in the survey area (Exhibit 5). It was observed in the sandy channel of Santiago Creek, upstream of the lake. The species associated with the Braunton's milkvetch observed in the survey area include mule fat, cicuta-leaved phacelia (*Phacelia cicutaria*), and horseweed (*Erigeron canadensis*). A voucher specimen was not collected due to the limited population size (i.e., a single, small individual). A CNDDDB form for this species will be submitted online by Ms. Rudalevige and is included in Attachment C.

Intermediate Mariposa Lily

Intermediate mariposa lily has a CRPR of 1B.2. It is a Conditionally Covered species² in the Central Coastal NCCP/HCP (i.e., populations less than 20 individuals are fully authorized). It typically blooms between May and July (Jepson Flora Project 2022; CNPS 2022). This perennial bulbiferous herb occurs on dry, rocky, open slopes in chaparral and coastal sage scrub at elevations between sea level and approximately 2,231 feet above msl (Roberts 2008; Jepson Flora Project 2022). It is sometimes locally common following fire (Roberts 2008). This species is known from the South Coast and northern Peninsular Ranges (Jepson Flora Project 2022).

Four individual intermediate mariposa lilies were observed in the survey area and an additional individual was observed just outside the survey area (Exhibit 5). The four individuals were observed in two populations in the northwestern portion of the survey area on moderately steep, southeast- to east-facing slopes in sagebrush scrub. The species associated with the intermediate mariposa lilies observed in the survey area include California sagebrush (*Artemisia californica*), black sage (*Salvia mellifera*), chilicothe (*Marah macrocarpa*), mule fat (*Baccharis salicifolia* ssp. *salicifolia*), California encelia (*Encelia californica*), and smilo grass (*Stipa miliacea* var. *miliacea*). A voucher specimen was not collected due to the limited population size. A CNDDDB form for this species will be submitted online by Ms. Rudalevige and is included in Attachment C.

Mud Nama

Mud nama has a CRPR of 2B.2. It is not a Covered species in the Central Coastal NCCP/HCP. It typically blooms between January and October (Jepson Flora Project 2022; CNPS 2022). This generally annual herb occurs in intermittently wet areas of marshes and swamps, including lake margins and riverbanks at elevations between approximately 15 and 1,640 feet above msl (Jepson Flora Project 2022; CNPS 2022). This species is known from the San Joaquin Valley, South Coast, southern Channel Islands, western Peninsular Ranges, and southeastern Sonoran Desert (Jepson Flora Project 2022).

Multiple populations were observed in the southern portion of Irvine Lake (Exhibit 5). This area experiences periodic inundation and was mapped as open water during the 2020 vegetation mapping

² The NCCP/HCP refers to this species by its former common name – foothill mariposa lily.

Kellie Welch
September 27, 2022
Page 2

upstream of the dam. At the time of the special status plant survey, the substrate was exposed and consisted of riparian herb vegetation; the species was growing in more open areas, including along disturbed roads/trails. The species associated with the mud nama observed in the survey area were primarily rabbitfoot grass (*Polypogon monspeliensis*), white sweetclover (*Melilotus albus*), and sourclover (*Melilotus indicus*) with scattered saltcedar (*Tamarix ramosissima*), alkali heliotrope (*Heliotropium curassavicum* var. *oculatum*), mule fat, flatsedge (*Cyperus* sp.), everlasting (*Pseudognaphalium* sp.), water cress (*Nasturtium officinale*), and willow weed (*Persicaria lapathifolia*). Approximately 98 percent of the populations were vegetative, and 2 percent were flowering.

Individuals covered a large area and the species is small in stature. To estimate the population sizes, ten quadrats one-square-foot in size were sampled in a relatively dense population of mud nama (i.e., Population 1). This resulted in an average of 37.7 individuals per square foot. Therefore, a “high density” population was considered to have between 35 and 40 individuals per square foot. A “moderate density” population was considered to have between 20 and 25 individuals per square foot and a “low density” population was considered to have between 5 and 10 individuals per square foot. Based on these approximate population densities, the total number of individuals in the survey area was estimated using the square footage of each population. The total population was estimated to be between 3.5 and 5.5 million. Information on individual mud nama populations is provided in Table 3. A voucher specimen was collected and will be deposited in a herbarium. A CNDDDB form for this species will be submitted online by Ms. Rudalevige and is included in Attachment C.

TABLE 3
MUD NAMA POPULATION INFORMATION

Population Number	Estimated Population Density	Population Area (square feet)	Estimated Population Size (Number of Individuals)
1	High density	25,023	875,805 – 1,000,920
2	Moderate density	15,709	314,180 – 392,725
3*	n/a	n/a	100
4*	n/a	n/a	1,000
5	Low density	284,500	1,422,500 – 2,845,000
6	Low density	12,647	63,235 – 126,470
7	Low density	1,121	5,605 – 11,210
8	High density	1,036	36,260 – 41,440
9	Low density	3,053	15,265 – 30,530
10	Low density	9,367	46,835 – 93,670
11	High density	17,305	605,675 – 692,200
12	Low density	8,335	41,675 – 83,350
Total			3,428,135 – 5,318,615
High Density: 35–40 individuals per square foot; Moderate Density: 20–25 individuals per square foot; Low Density: 5–10 individuals per square foot			
*Populations 3 and 4 were small and population sizes were estimated directly.			

Coulter’s Matilija Poppy

Coulter’s matilija poppy has a CRPR of 4.2. It is a Covered species in the Central Coastal NCCP/HCP. It typically blooms between March and July (Jepson Flora Project 2020; CNPS 2020). This perennial rhizomatous herb occurs in chaparral and coastal scrub, often in elevations between sea level and

Kellie Welch
September 27, 2022
Page 3

approximately 3,937 feet above msl (Roberts 2008; Jepson Flora Project 2020). This species grows as clones via rhizomes (Clarke et al. 2007; Jepson Flora Project 2020). This species is known from the South Coast, Western Transverse and Peninsular Ranges, and San Jacinto Mountains (Jepson Flora Project 2020).

One individual Coulter's matilija poppy was observed in the survey area (Exhibit 5). It was observed in a sandy/cobbly low terrace of Santiago Creek upstream of the lake. The species associated with the Coulter's matilija poppy observed in the survey area include mule fat, California buckwheat (*Eriogonum fasciculatum*), fennel (*Foeniculum vulgare*), and tocalote (*Centaurea melitensis*). A voucher specimen was not collected due to the limited population size (i.e., a single individual) and because it is known from the vicinity. A CNDDB form was not prepared for the species because it has a CRPR of 4.2.

OTHER OBSERVATIONS

One other special status species was observed in the survey area during the surveys: bald eagle (*Haliaeetus leucocephalus*, State Endangered, California Fully Protected). The bald eagle was observed flying over the survey area on the east side of Irvine Lake; a CNDDB form for bald eagle is attached to the coastal California gnatcatcher report for the project (Psomas 2022).

CONCLUSIONS

Based on the current project impact footprint, no Branton's milkvetch, intermediate mariposa lily, mud nama, or Coulter's matilija poppy populations would be impacted by the project. The access road is less than 100 feet from mud nama Population 12. Therefore, it is recommended that a qualified botanist survey the impact area for mud nama during each year of construction following dewatering and prior to grading of the access road to flag the boundaries of mud nama population(s) adjacent to this impact area. The botanist will recommend minor re-routing of the access road to avoid impacts on this species to the extent possible. As the current footprint avoids all impacts to mud nama, it is assumed that potential future impacts due to routing of the access road would be entirely avoided or minimal (e.g., clipping the edge of one population, representing impacts to less than five percent of the population onsite).

Kellie Welch
September 27, 2022
Page 4

Psomas appreciates the opportunity to assist on this project. If you have any comments or questions, please contact Amber Heredia (Amber.Heredia@psomas.com) or Allison Rudalevige (Allison.Rudalevige@psomas.com).

Sincerely,

P S O M A S



Amber O. Heredia
Senior Project Manager, Resource Management



Allison D. Rudalevige
Senior Biologist

Attachments: Exhibits 1–5
A – Site Photographs
B – Plant Compendium
C – CNDDDB Forms

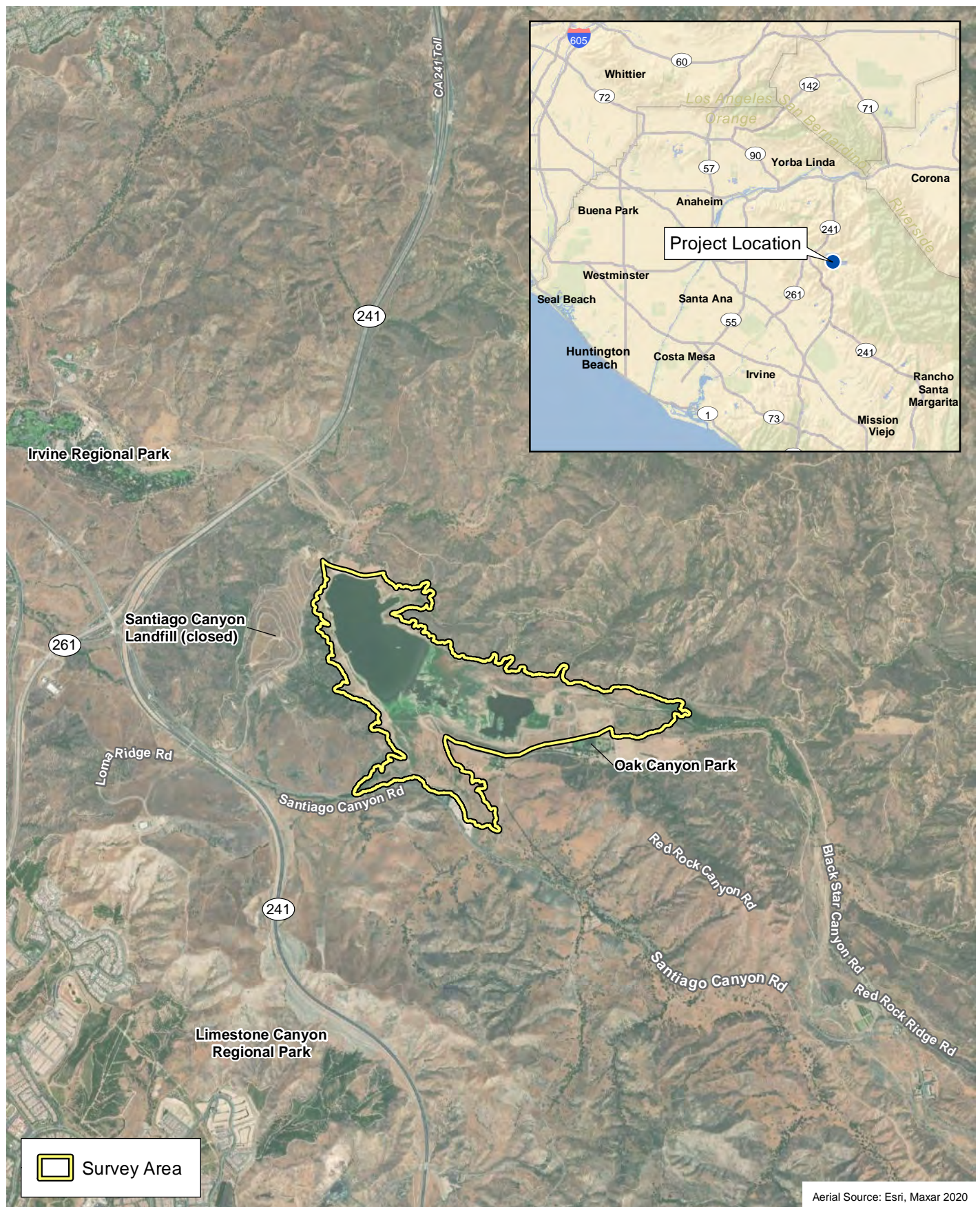
cc: Jacob Moeder, Moeder@irwd.com

Kellie Welch
September 27, 2022
Page 5

REFERENCES

- Allen, R.L., and F.M. Roberts. 2013. *Wildflowers of Orange County and the Santa Ana Mountains*. Laguna Beach, CA: Laguna Wilderness Press.
- Baldwin, B.G., D.J. Keil, R. Patterson, T.J. Rosatti, and D.H. Wilken (Eds.). 2012. *The Jepson Manual: Vascular Plants of California* (Second ed.). Berkeley, CA: University of California Press.
- California Department of Fish and Wildlife (CDFW). 2022a. California Natural Diversity Database. Records of Occurrence for the Black Star Canyon, Orange, Tustin, and El Toro USGS quadrangles. Sacramento, CA: CDFW, Natural Heritage Division.
- . 2022b (July). *Special Vascular Plants, Bryophytes, and Lichens List*. Sacramento, CA: CDFW, Natural Heritage Division.
- . 2018 (March 20). *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities*. Sacramento, CA: CDFW.
- California Irrigation Management Information System (CIMIS). 2022. CIMIS Monthly Report for Irvine – South Coast Valleys Station #75. Sacramento, CA: California Department of Water Resources, CIMIS. <http://www.cimis.water.ca.gov>.
- California Native Plant Society (CNPS). 2022. Inventory of Rare and Endangered Plants. Records of Occurrence for the Black Star Canyon, Orange, Tustin, and El Toro USGS quadrangles. Sacramento, CA: CNPS. <http://www.cnps.org/inventory>.
- Clarke, O.F., D. Svehla, G. Ballmer, and A. Montalvo. 2007. *Flora of the Santa Ana River and Environs with References to World Botany*. Berkeley, CA: Heyday Books.
- Consortium of California Herbaria (CCH). 2022. Consortium of California Herbaria. Data provided by the participants of the Consortium of California Herbaria for plants listed in Table 2. Berkeley, CA: University of California. <http://ucjeps.berkeley.edu/consortium/>.
- Hickman, J.C., Ed. 1993. *The Jepson Manual of Higher Plants of California*. Berkeley, CA: University of California Press.
- Jepson Flora Project. 2022 (May 31, Revision 10). Jepson eFlora (Records for common species in the Plant Compendium and all species descriptions). Berkeley, CA: The Jepson Herbarium. <http://ucjeps.berkeley.edu/eflora/>.
- Psomas. 2020 (September 3). Results of Special Status Plant Surveys for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California. Santa Ana, CA: Psomas.
- Psomas. 2022 (August 24). Results of Focused Presence/Absence Surveys for the Coastal California Gnatcatcher for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California. Santa Ana, CA: Psomas.
- Roberts, F.M. 2008. *The Vascular Plants of Orange County, California: An Annotated Checklist*. San Luis Rey, CA: F.M. Roberts Publications.

D:\Projects\3IRW\010200MXDSS_Plants\ex_RL_LV_20220726.mxd



Regional Location and Local Vicinity

Exhibit 1

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

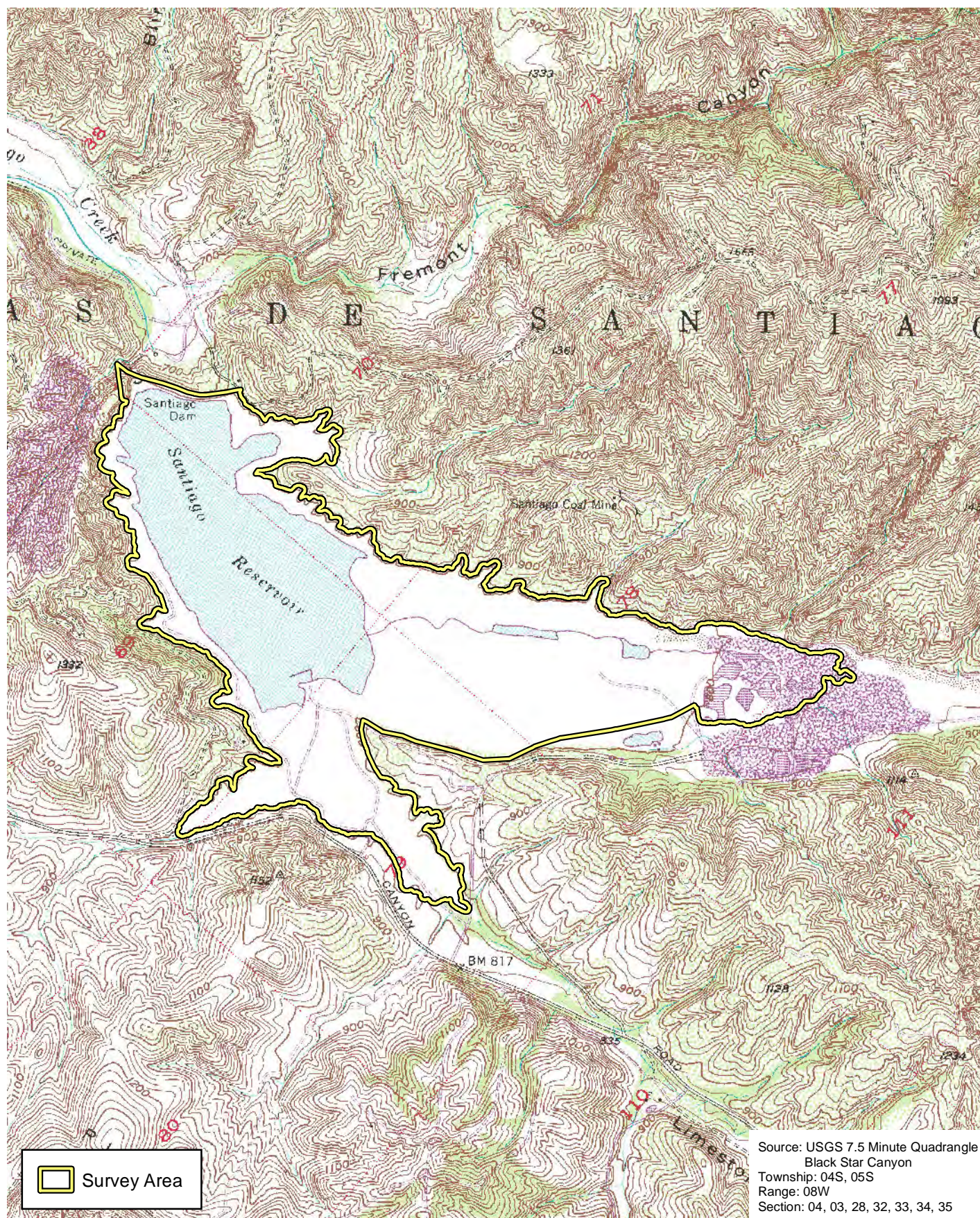


4,000 2,000 0 4,000
Feet



(Rev: 08/15/2022 MMD) R:\Projects\IRW_IRWD\3IRW010200\Graphics\SS_Plants\ex_RL_LV.pdf

D:\Projects\3RW\010200\MXDSS_Plants\ex_SurveyArea_USGS_20220726.mxd



Special Status Plant Species Survey Area

Exhibit 2

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

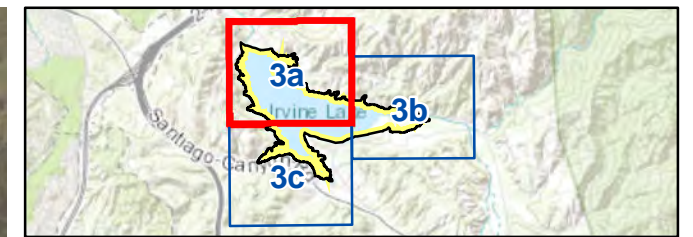
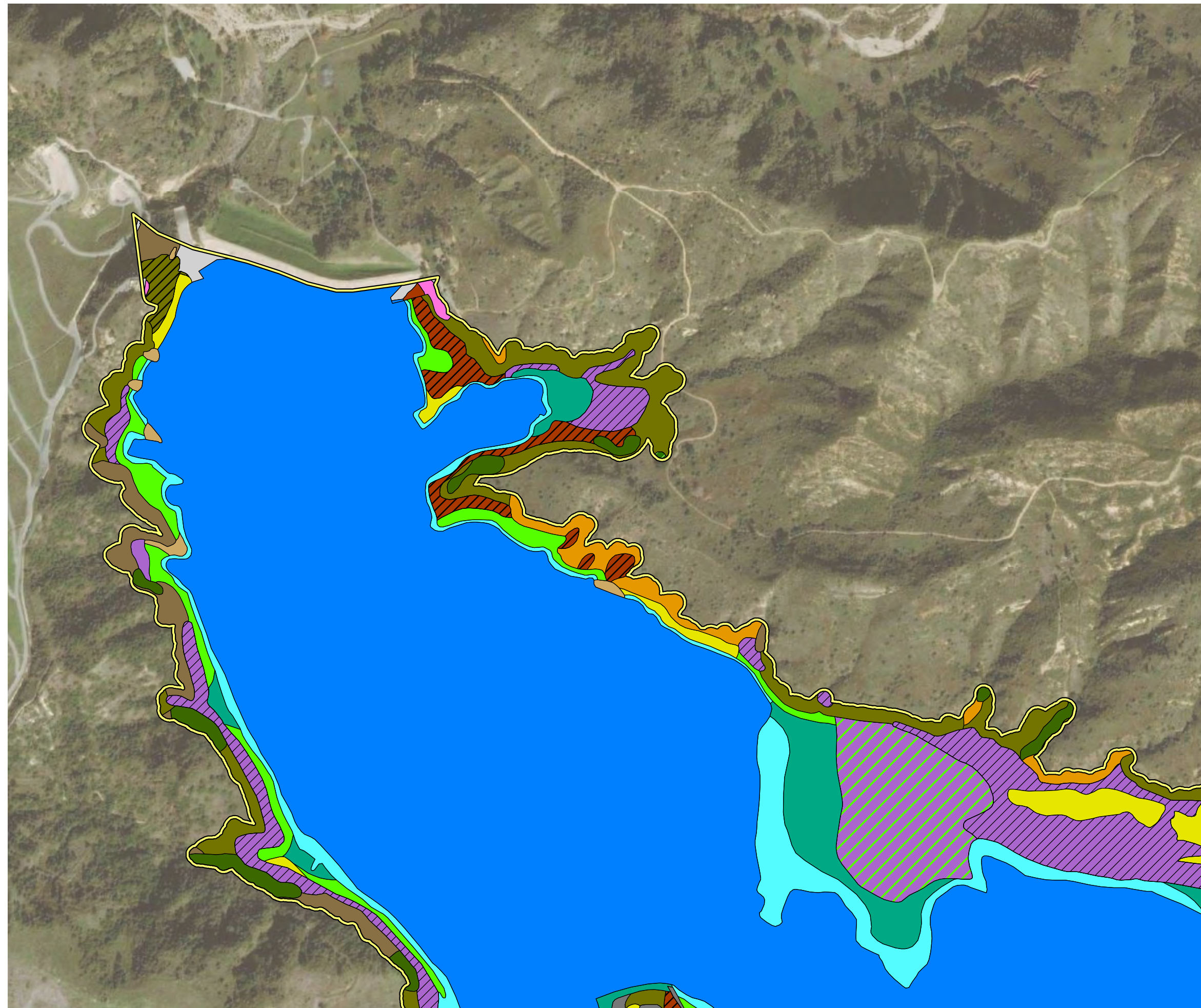


2,000 1,000 0 2,000
Feet

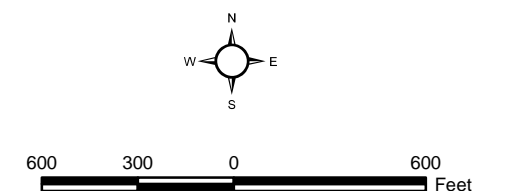


(Rev: 8-15-2022 MMD) R:\Projects\IRW_IRWD\3RW010200\Graphics\SS_Plants\ex_SurveyArea_USGS.pdf

D:\Projects\3IRW010200\MXD\SS_Plants\ex_Vegetation_2020726.mxd



- Survey Area
- Vegetation Types and Other Areas**
- Sagebrush Scrub (2.3.6)
 - Disturbed Sagebrush Scrub (2.3.6)
 - Southern Cactus Scrub (2.4)
 - Toyon - Sumac Chaparral (3.12)
 - Ruderal (4.6)
 - Riparian Herb (7.1)
 - Mulefat Scrub (7.3)
 - Disturbed Mulefat Scrub (7.3)
 - Southern Sycamore Riparian Woodland/Southern Coast Live Oak Riparian Forest (7.4/7.5)
 - Southern Black Willow Forest (7.7)
 - Disturbed Southern Black Willow Forest (7.7)
 - Southern Black Willow Forest/Riparian Herb (7.7/7.1)
 - Coast Live Oak Woodland (8.1)
 - Cliff (10)
 - Open Water (12.1)
 - Fluctuating Shoreline (12.2)
 - Vegetated Fluctuating Shoreline (12.2)
 - Ornamental (15.5)
 - Developed (15.6)
 - Disturbed (16.1)



Aerial Source: Esri, Maxar 2020

Vegetation Types and Other Areas

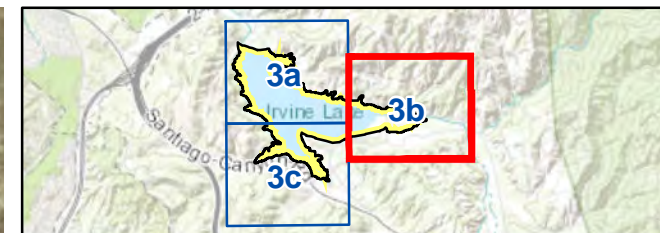
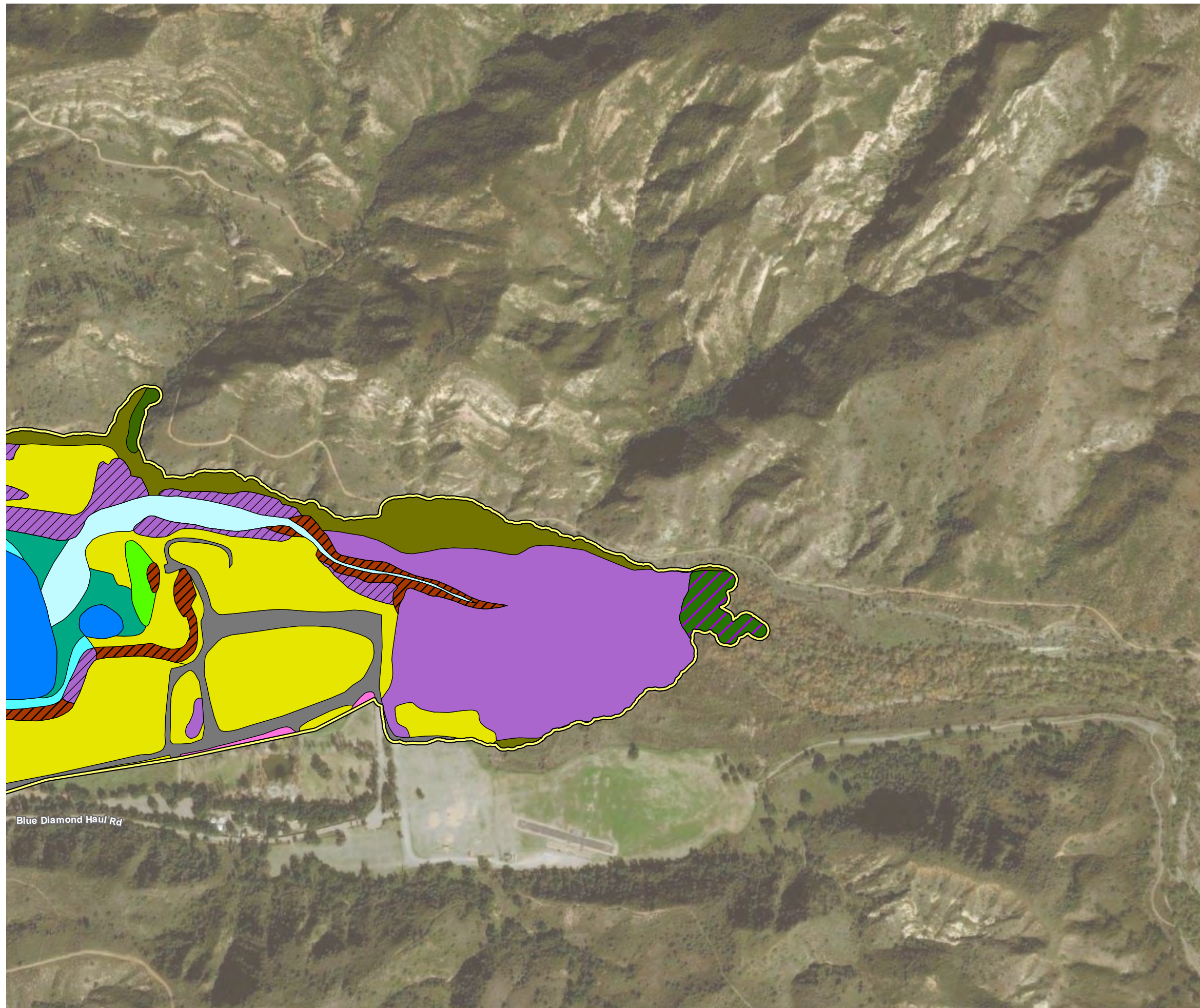
Exhibit 3a

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

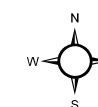
PSOMAS

(Rev: 08/15/2022 MMD) R:\Projects\IRW_IRWD\3IRW010200\Graphics\SS_Plants\ex_Vegetation.pdf

D:\Projects\3IRW010200MMD\SS_Plants\ex_Vegetation_20220726.mxd



- Survey Area
- Vegetation Types and Other Areas**
- Sagebrush Scrub (2.3.6)
 - Ruderal (4.6)
 - Riparian Herb (7.1)
 - Disturbed Mulefat Scrub (7.3)
 - Southern Sycamore Riparian Woodland (7.4)
 - Southern Black Willow Forest (7.7)
 - Disturbed Southern Black Willow Forest (7.7)
 - Coast Live Oak Woodland (8.1)
 - Open Water (12.1)
 - Fluctuating Shoreline (12.2)
 - Vegetated Fluctuating Shoreline (12.2)
 - Perennial Stream (13.1)
 - Ornamental (15.5)
 - Disturbed (16.1)



600 300 0 600 Feet

Aerial Source: Esri, Maxar 2020

Vegetation Types and Other Areas

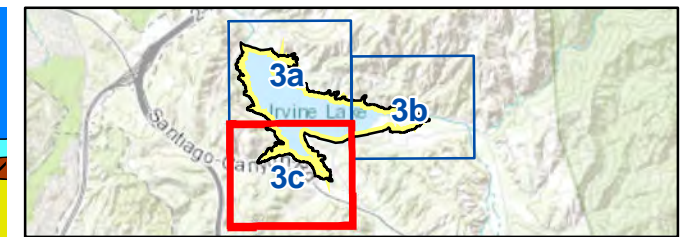
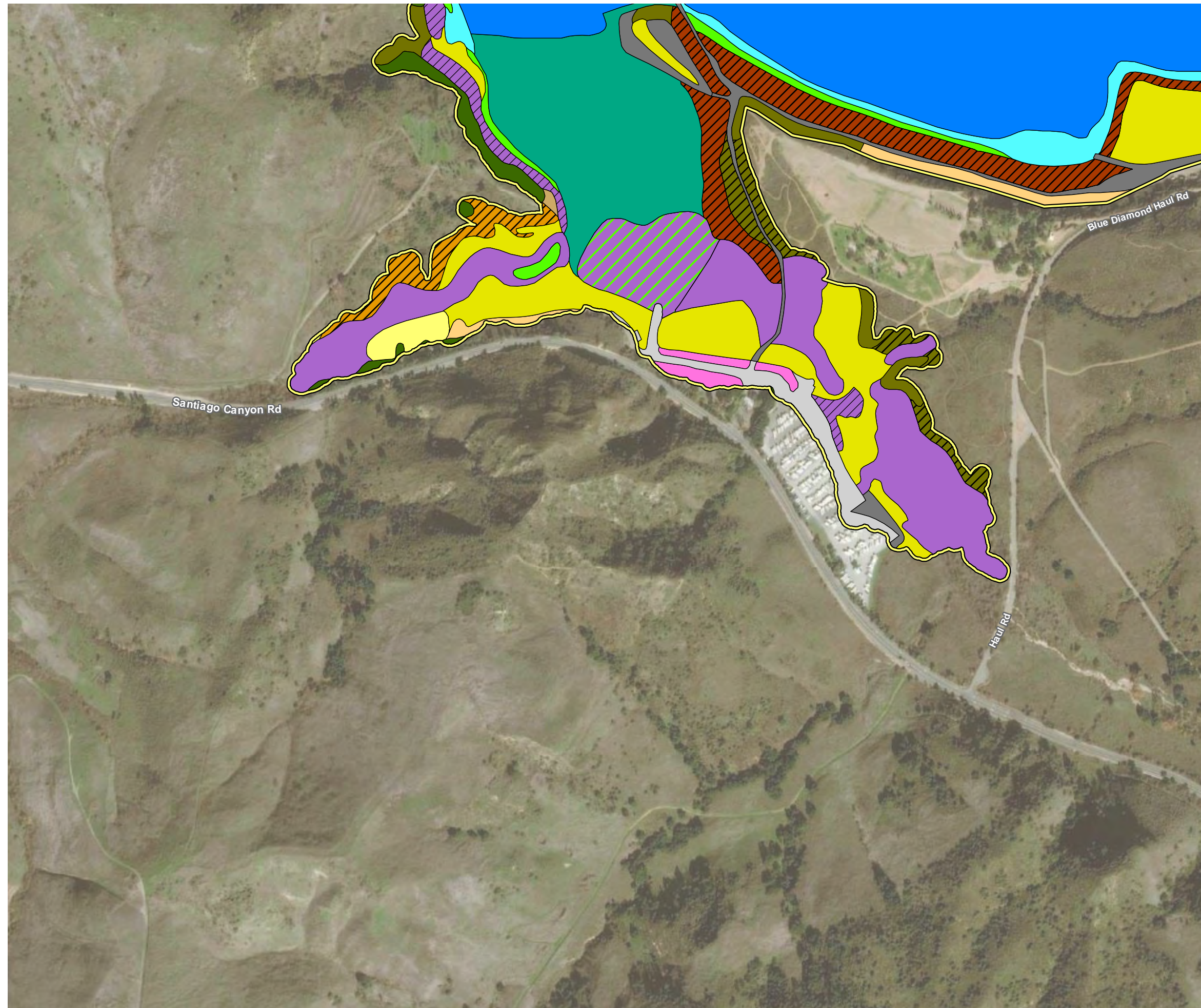
Exhibit 3b

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

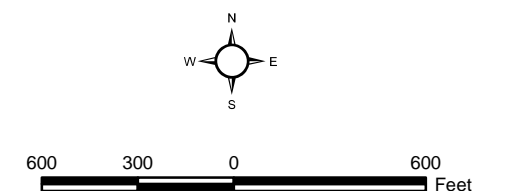


(Rev: 08/15/2022 MMD) R:\Projects\IRW_IRWD\3IRW010200\Graphics\SS_Plants\ex_Vegetation.pdf

D:\Projects\3IRW010200MXD\SS_Plants\ex_Vegetation_20220726.mxd



- Survey Area
- Vegetation Types and Other Areas**
- Sagebrush Scrub (2.3.6)
 - Disturbed Sagebrush Scrub (2.3.6)
 - Sagebrush - Coyote Brush Scrub (2.3.12)
 - Disturbed Southern Cactus Scrub (2.4)
 - Annual Grassland (4.1)
 - Ruderal (4.6)
 - Riparian Herb (7.1)
 - Disturbed Mulefat Scrub (7.3)
 - Southern Black Willow Forest (7.7)
 - Disturbed Southern Black Willow Forest (7.7)
 - Southern Black Willow Forest/Riparian Herb (7.7/7.1)
 - Coast Live Oak Woodland (8.1)
 - Cliff (10)
 - Open Water (12.1)
 - Fluctuating Shoreline (12.2)
 - Vegetated Fluctuating Shoreline (12.2)
 - Ornamental (15.5)
 - Developed (15.6)
 - Disturbed (16.1)



Aerial Source: Esri, Maxar 2020

**Vegetation Types
and Other Areas**

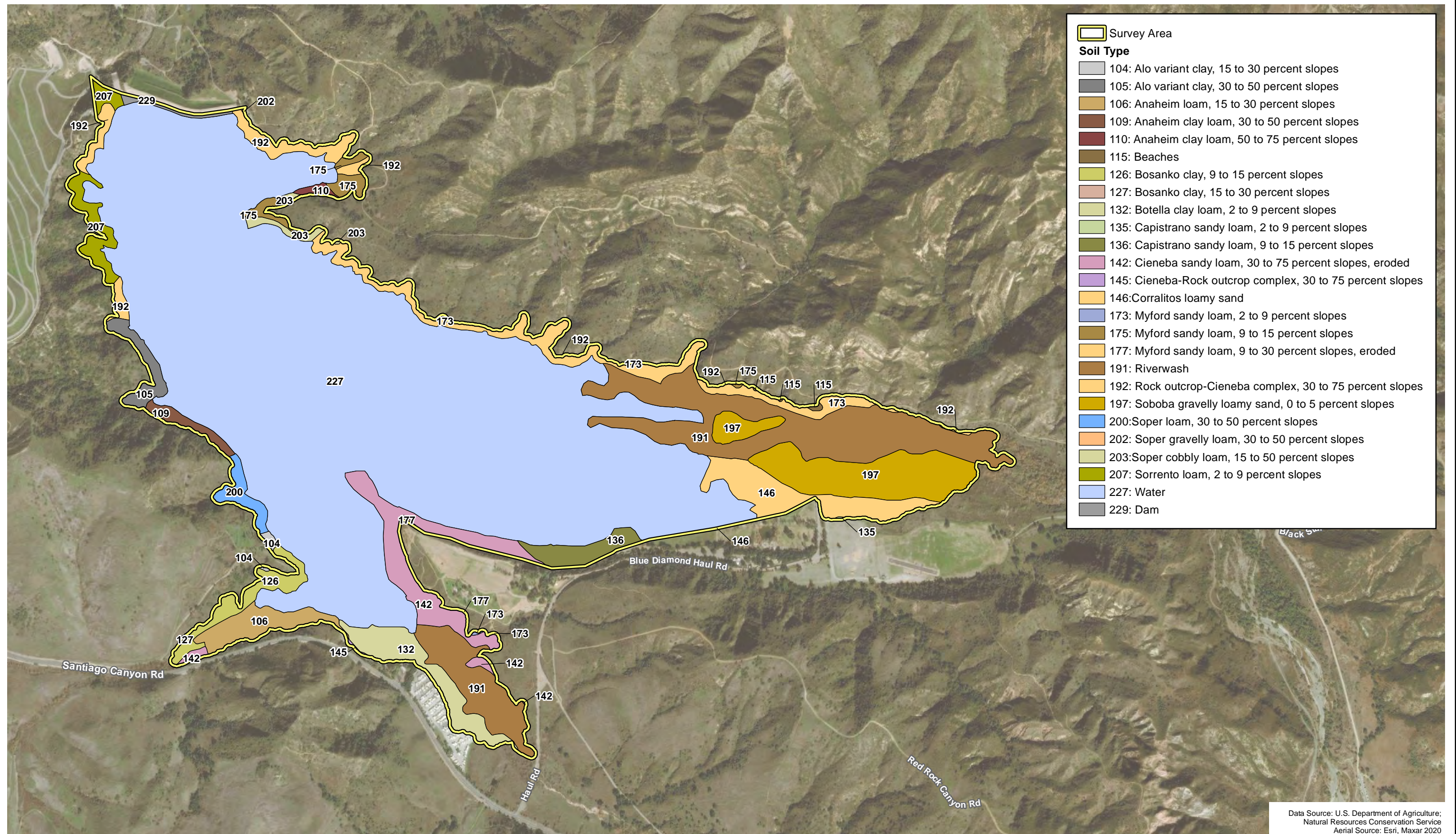
*Santiago Creek Dam Outlet Tower
and Spillway Improvement Project*

(Rev: 08/15/2022 MMD) R:\Projects\IRW_IRWD\3IRW010200\Graphics\SS_Plants\ex_Vegetation.pdf

Exhibit 3c

PSOMAS

D:\Projects\3IRW010200\MXD\SS_Plants\lex_Soils_20220726.mxd



Soil Types

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

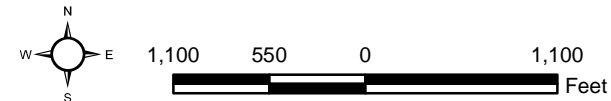
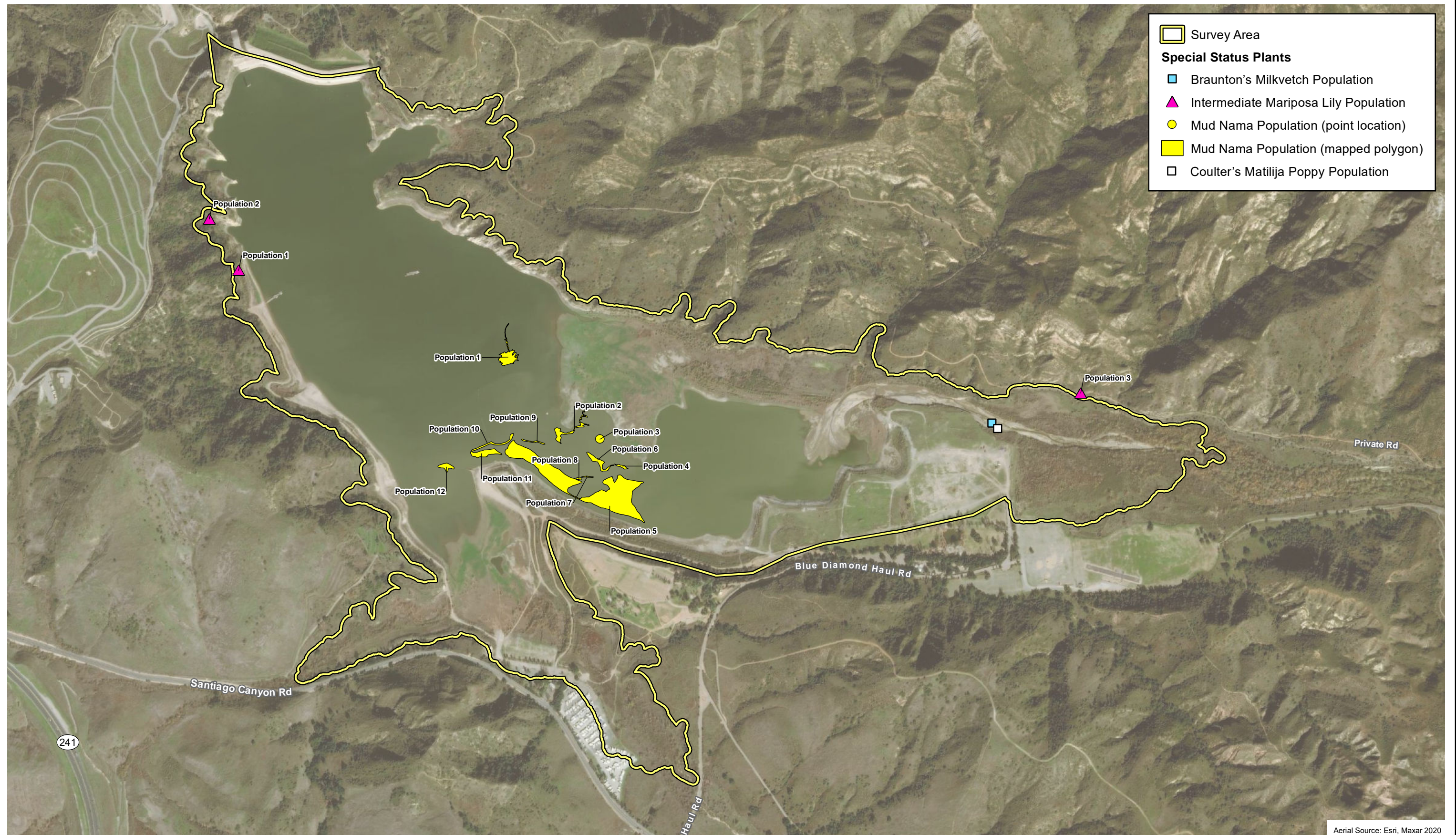


Exhibit 4



(Rev: 08/15/2022 MMD) R:\Projects\IRW_IRWD\3IRW010200\Graphics\SS_Plants\lex_Soils.pdf

D:\Projects\3\IRW010200\MXD\SS_Plants\ex_SS_Species_20220815.mxd



Survey Results

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

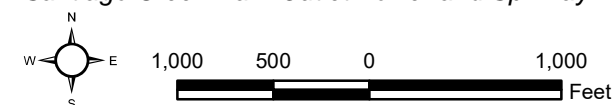


Exhibit 5



(Rev: 09/26/2022 MMD) R:\Projects\IRW_IRWD\3\IRW010200\Graphics\SS_Plants\ex_SurveyResults.pdf

ATTACHMENT A
SITE PHOTOGRAPHS



Branton's milkvetch observed in the survey area. September 13, 2022.



Intermediate mariposa lily observed in the survey area. May 23, 2022.



Mud nama habitat in the survey area. April 26, 2022.



Mud nama observed in the survey area. April 26, 2022.

Site Photographs

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

Attachment A



ATTACHMENT B
PLANT COMPENDIUM

**PLANTS OBSERVED IN THE SURVEY AREA
DURING 2022 SPECIAL STATUS PLANT SURVEYS**

Species	
Scientific Name	Common Name
LYCOPHYTES	
SELAGINELLACEAE – SPIKE-MOSS FAMILY	
<i>Selaginella bigelovii</i>	Bigelow's spike-moss
EUDICOTS	
ADOXACEAE – MUSKROOT FAMILY	
<i>Sambucus mexicana</i>	blue elderberry
AMARANTHACEAE – AMARANTH FAMILY	
<i>Amaranthus albus</i> *	tumbleweed
ANACARDIACEAE – SUMAC FAMILY	
<i>Malosma laurina</i>	laurel sumac
<i>Rhus integrifolia</i>	lemonade berry
<i>Rhus ovata</i>	sugar bush
<i>Schinus molle</i> *	pepper tree
<i>Toxicodendron diversilobum</i>	western poison oak
APIACEAE – CARROT FAMILY	
<i>Foeniculum vulgare</i> *	fennel
<i>Torilis nodosa</i> *	short sock-destroyer
APOCYNACEAE – DOGBANE FAMILY	
<i>Asclepias fascicularis</i>	narrow-leaf milkweed
ARECACEAE – PALM FAMILY	
<i>Washingtonia robusta</i> *	Mexican fan palm
ASTERACEAE – SUNFLOWER FAMILY	
<i>Acourtia microcephala</i>	small-headed acourtia
<i>Ambrosia acanthicarpa</i>	annual bur-sage
<i>Ambrosia psilostachya</i>	western ragweed
<i>Artemisia californica</i>	California sagebrush
<i>Baccharis pilularis</i> ssp. <i>consanguinea</i>	coyote brush
<i>Baccharis salicifolia</i> ssp. <i>salicifolia</i>	mule fat
<i>Baccharis sarothroides</i>	broom baccharis
<i>Bebbia juncea</i> var. <i>aspera</i>	rough rush-like sweetbush
<i>Brickellia californica</i>	California brickellbush
<i>Carduus pycnocephalus</i> ssp. <i>pycnocephalus</i> *	Italian thistle
<i>Centaurea melitensis</i> *	toocalote
<i>Chaenactis artemisiifolia</i>	white pincushion
<i>Cirsium occidentale</i>	cobwebby thistle
<i>Cirsium vulgare</i> *	bull thistle
<i>Cotula australis</i> *	Australian cotula
<i>Cynara cardunculus</i> ssp. <i>cardunculus</i> *	artichoke
<i>Deinandra fasciculata</i>	fascicled tarplant
<i>Eclipta prostrata</i>	false daisy
<i>Encelia californica</i>	California encelia
<i>Encelia farinosa</i>	brittlebush
<i>Ericameria palmeri</i> var. <i>pachylepis</i>	thickbracted goldenbush

**PLANTS OBSERVED IN THE SURVEY AREA
DURING 2022 SPECIAL STATUS PLANT SURVEYS**

Species	
Scientific Name	Common Name
<i>Erigeron bonariensis</i> *	flax-leaved horseweed
<i>Erigeron canadensis</i>	horseweed
<i>Eriophyllum confertiflorum</i> var. <i>confertiflorum</i>	golden-yarrow
<i>Hazardia squarrosa</i>	saw-toothed goldenbush
<i>Hedypnois rhagadioloides</i> *	Crete weed
<i>Helianthus annuus</i>	annual sunflower
<i>Helianthus gracilentus</i>	slender sunflower
<i>Helminthotheca echioides</i> *	bristly ox-tongue
<i>Heterotheca grandiflora</i>	telegraph weed
<i>Hypochaeris glabra</i> *	smooth cat's-ear
<i>Isocoma menziesii</i>	coastal goldenbush
<i>Lactuca serriola</i> *	prickly lettuce
<i>Logfia filaginoides</i>	California cottonrose
<i>Logfia gallica</i> *	daggerleaf cottonrose
<i>Madia gracilis</i>	gumweed
<i>Malacothrix saxatilis</i>	rocky malacothrix
<i>Matricaria discoidea</i> *	pineapple weed
<i>Oncosiphon piluliferum</i> *	stinknet
<i>Pluchea sericea</i>	arrow-weed
<i>Pseudognaphalium biolettii</i>	Bioletti's everlasting
<i>Pseudognaphalium californicum</i>	California everlasting
<i>Pseudognaphalium canescens</i>	hairy everlasting
<i>Pseudognaphalium luteoalbum</i> *	white lamb everlasting
<i>Psilocarphus brevissimus</i> var. <i>brevissimus</i>	dwarf woollyheads
<i>Pulicaria paludosa</i> *	marsh pulicaria
<i>Senecio vulgaris</i> *	common groundsel
<i>Silybum marianum</i> *	milk thistle
<i>Sonchus oleraceus</i> *	common sow thistle
<i>Stephanomeria diegensis</i>	San Diego stephanomeria
<i>Stylocline gnaphaloides</i>	everlasting neststraw
<i>Taraxacum officinale</i> *	common dandelion
<i>Uropappus lindleyi</i>	Lindley's silverpuffs
<i>Xanthium strumarium</i>	cocklebur
BORAGINACEAE – BORAGE FAMILY	
<i>Amsinckia intermedia</i>	common fiddleneck
<i>Amsinckia menziesii</i>	common fiddleneck
<i>Cryptantha intermedia</i>	intermediate cryptantha
<i>Emmenanthe penduliflora</i>	whispering bells
<i>Eriodictyon crassifolium</i> var. <i>crassifolium</i>	thick-leaved yerba santa
<i>Eucrypta chrysanthemifolia</i>	chrysanthemum-leaved eucrypta
<i>Heliotropium curassavicum</i> var. <i>oculatum</i>	seaside heliotrope
<i>Nama stenocarpa</i>	mud nama
<i>Pectocarya linearis</i> ssp. <i>ferocula</i>	narrow-toothed pectocarya

**PLANTS OBSERVED IN THE SURVEY AREA
DURING 2022 SPECIAL STATUS PLANT SURVEYS**

Species	
Scientific Name	Common Name
<i>Phacelia cicutaria</i>	cicuta-leaved phacelia
<i>Phacelia parryi</i>	Parry's phacelia
<i>Pholistoma auritum</i> var. <i>auritum</i>	fiesta flower
BRASSICACEAE – MUSTARD FAMILY	
<i>Brassica nigra</i> *	black mustard
<i>Hirschfeldia incana</i> *	grayish shortpod mustard
<i>Lepidium didymum</i> *	lesser swine grass
<i>Nasturtium officinale</i>	water cress
<i>Raphanus sativus</i> *	radish
<i>Rorippa</i> sp.	yellow cress
<i>Sisymbrium irio</i> *	London rocket
<i>Sisymbrium orientale</i> *	eastern sisymbrium
CACTACEAE – CACTUS FAMILY	
<i>Opuntia littoralis</i>	seaside prickly-pear
<i>Opuntia vaseyi</i>	Vasey's prickly-pear
CARYOPHYLLACEAE – PINK FAMILY	
<i>Silene gallica</i> *	small-flower catchfly
<i>Silene laciniata</i>	torn catchfly
CHENOPODIACEAE – GOOSEFOOT FAMILY	
<i>Atriplex semibaccata</i> *	Australian saltbush
<i>Chenopodium album</i> *	lamb's quarters
<i>Salsola tragus</i> *	Russian thistle
CONVOLVULACEAE – MORNING-GLORY FAMILY	
<i>Calystegia macrostegia</i>	large-bracted morning-glory
<i>Cuscuta californica</i>	chaparral dodder
CRASSULACEAE – STONECROP FAMILY	
<i>Crassula connata</i>	pygmy-weed
<i>Dudleya lanceolata</i>	lance-leaved dudleya
<i>Dudleya pulverulenta</i>	chalk dudleya
CUCURBITACEAE – GOURD FAMILY	
<i>Cucurbita foetidissima</i>	buffalo gourd
<i>Marah macrocarpa</i>	chilicothe
EUPHORBIACEAE – SPURGE FAMILY	
<i>Croton setiger</i>	turkey-mullein
<i>Euphorbia albomarginata</i>	rattlesnake sandmat
<i>Ricinus communis</i> *	common castor bean
FABACEAE – LEGUME FAMILY	
<i>Acmispon americanus</i> var. <i>americanus</i>	American deervetch
<i>Acmispon glaber</i>	deerweed
<i>Acmispon maritimus</i>	coastal deervetch
<i>Astragalus brauntonii</i>	Braunton's milkvetch
<i>Astragalus pomonensis</i>	Pomona milkvetch
<i>Cytisus multiflorus</i> *	Spanish broom

**PLANTS OBSERVED IN THE SURVEY AREA
DURING 2022 SPECIAL STATUS PLANT SURVEYS**

Species	
Scientific Name	Common Name
<i>Lupinus bicolor</i>	miniature lupine
<i>Lupinus hirsutissimus</i>	stinging lupine
<i>Lupinus succulentus</i>	arroyo lupine
<i>Lupinus truncatus</i>	cut leaf lupine
<i>Medicago polymorpha</i> *	variable burclover
<i>Melilotus albus</i> *	white sweetclover
<i>Melilotus indicus</i> *	sourclover
<i>Robinia pseudoacacia</i> *	black locust
<i>Trifolium willdenovii</i>	tomcat clover
<i>Vicia sp.</i>	vetch
FAGACEAE – OAK FAMILY	
<i>Quercus agrifolia</i>	coast live oak
GERANIACEAE – GERANIUM FAMILY	
<i>Erodium botrys</i> *	long-beaked filaree
<i>Erodium cicutarium</i> *	redstem filaree
<i>Geranium carolinianum</i>	Carolina geranium
GROSSULARIACEAE – GOOSEBERRY FAMILY	
<i>Ribes speciosum</i>	fuchsia-flowered gooseberry
LAMIACEAE – MINT FAMILY	
<i>Marrubium vulgare</i> *	common horehound
<i>Salvia apiana</i>	white sage
<i>Salvia columbariae</i>	chia
<i>Salvia mellifera</i>	black sage
<i>Trichostema lanceolatum</i>	vinegar weed
LOASACEAE – BLAZING STAR FAMILY	
<i>Mentzelia micrantha</i>	small-flowered blazing star
MALVACEAE – MALLOW FAMILY	
<i>Malacothamnus fasciculatus var.</i>	chaparral mallow
<i>Malva parviflora</i> *	cheeseweed
<i>Malvella leprosa</i>	alkali-mallow
MONTIACEAE – MINER'S-LETTUCE FAMILY	
<i>Claytonia perfoliata</i>	miner's lettuce
MYRSINACEAE – MYRSINE FAMILY	
<i>Lysimachia arvensis</i> *	scarlet pimpernel
MYRTACEAE – MYRTLE FAMILY	
<i>Eucalyptus sp.</i> *	gum tree
NYCTAGINACEAE – FOUR O'CLOCK FAMILY	
<i>Mirabilis laevis var. crassifolia</i>	wishbone bush
ONAGRACEAE – EVENING PRIMROSE FAMILY	
<i>Camissoniopsis micrantha</i>	small-flowered camissoniopsis
<i>Clarkia purpurea</i>	purple clarkia
<i>Epilobium ciliatum</i>	fringed willowherb
<i>Gayophytum sp.</i>	gayophytum

**PLANTS OBSERVED IN THE SURVEY AREA
DURING 2022 SPECIAL STATUS PLANT SURVEYS**

Species	
Scientific Name	Common Name
OROBANCHACEAE – BROOM-RAPE FAMILY	
<i>Castilleja exserta</i>	purple owl's-clover
<i>Cordylanthus rigidus</i> ssp. <i>setiger</i>	bristly rigid bird's-beak
PAEONIACEAE – PEONY FAMILY	
<i>Paeonia californica</i>	California peony
PAPAVERACEAE – POPPY FAMILY	
<i>Eschscholzia californica</i>	California poppy
<i>Romneya coulteri</i>	Coulter's matilija poppy
PHRYMACEAE – LOPSEED FAMILY	
<i>Diplacus australis</i>	southern monkeyflower
<i>Erythranthe cardinalis</i>	scarlet monkeyflower
<i>Erythranthe guttata</i>	common monkeyflower
PINACEAE – PINE FAMILY	
<i>Pinus</i> sp.*	pine
PLANTAGINACEAE – PLANTAIN FAMILY	
<i>Keckiella antirrhinoides</i>	antirrhinum-like bush penstemon
<i>Keckiella cordifolia</i>	heart-leaved bush penstemon
<i>Plantago erecta</i>	erect plantain
<i>Veronica anagallis-aquatica</i> *	water speedwell
PLATANACEAE – SYCAMORE FAMILY	
<i>Platanus racemosa</i>	western sycamore
POLYGONACEAE – BUCKWHEAT FAMILY	
<i>Eriogonum fasciculatum</i>	California buckwheat
<i>Persicaria lapathifolia</i>	willow weed
<i>Polygonum aviculare</i> *	knotweed
<i>Pterostegia drymarioides</i>	fairy mist
<i>Rumex crispus</i> *	curly dock
ROSACEAE – ROSE FAMILY	
<i>Adenostoma fasciculatum</i>	chamise
<i>Heteromeles arbutifolia</i>	toyon
RUBIACEAE – COFFEE FAMILY	
<i>Galium angustifolium</i> ssp. <i>angustifolium</i>	narrow-leaved bedstraw
<i>Galium aparine</i>	goose grass
SALICACEAE – WILLOW FAMILY	
<i>Populus fremontii</i> ssp. <i>fremontii</i>	Fremont cottonwood
<i>Salix exigua</i>	narrow-leaved willow
<i>Salix gooddingii</i>	Goodding's black willow
<i>Salix laevigata</i>	red willow
<i>Salix lasiolepis</i>	arroyo willow
SCROPHULARIACEAE – FIGWORT FAMILY	
<i>Scrophularia californica</i>	California figwort
<i>Verbascum</i> sp.*	mullein

**PLANTS OBSERVED IN THE SURVEY AREA
DURING 2022 SPECIAL STATUS PLANT SURVEYS**

Species	
Scientific Name	Common Name
SOLANACEAE – NIGHTSHADE FAMILY	
<i>Datura wrightii</i>	Wright's jimsonweed
<i>Nicotiana glauca</i> *	tree tobacco
<i>Solanum americanum</i>	American nightshade
<i>Solanum umbelliferum</i>	umbelled nightshade
TAMARICACEAE – TAMARISK FAMILY	
<i>Tamarix ramosissima</i> *	saltcedar
URTICACEAE – NETTLE FAMILY	
<i>Urtica urens</i> *	dwarf nettle
VERBENACEAE – VERVAIN FAMILY	
<i>Phyla nodiflora</i>	node-flowered phyla
<i>Verbena bracteata</i>	bracted vervain
<i>Verbena lasiostachys</i>	woolly-flowered vervain
VIOLACEAE – VIOLET FAMILY	
<i>Viola pedunculata</i>	Johnny-jump-up
MONOCOTS	
AGAVACEAE – AGAVE FAMILY	
<i>Chlorogalum sp.</i>	soap plant
<i>Hesperoyucca whipplei</i>	Whipple's chaparral yucca
CYPERACEAE – SEDGE FAMILY	
<i>Cyperus sp.</i>	flatsedge
<i>Eleocharis sp.</i>	spikerush
IRIDACEAE – IRIS FAMILY	
<i>Sisyrinchium bellum</i>	western blue-eyed-grass
JUNCACEAE – RUSH FAMILY	
<i>Juncus bufonius</i>	toad rush
<i>Juncus mexicanus</i>	Mexican rush
<i>Juncus xiphioides</i>	iris-leaved rush
LILIACEAE – LILY FAMILY	
<i>Calochortus splendens</i>	splendid mariposa lily
<i>Calochortus weedii var. intermedius</i>	intermediate mariposa-lily
POACEAE – GRASS FAMILY	
<i>Arundo donax</i> *	giant reed
<i>Avena barbata</i> *	slender wild oat
<i>Avena fatua</i> *	wild oat
<i>Bothriochloa barbinodis</i>	cane bluestem
<i>Brachypodium distachyon</i> *	two-corn false brome
<i>Bromus diandrus</i> *	ripgut grass
<i>Bromus hordeaceus</i> *	soft chess
<i>Bromus rubens</i> *	red brome
<i>Cortaderia selloana</i> *	pampas grass
<i>Crypsis schoenoides</i> *	swamp prickly grass
<i>Cynodon dactylon</i> *	Bermuda grass

**PLANTS OBSERVED IN THE SURVEY AREA
DURING 2022 SPECIAL STATUS PLANT SURVEYS**

Species	
Scientific Name	Common Name
<i>Elymus condensatus</i>	giant wild-rye
<i>Festuca myuros</i> *	rattail sixweeks grass
<i>Festuca perennis</i> *	rye grass
<i>Gastridium phleoides</i> *	nit grass
<i>Hordeum murinum ssp. leporinum</i> *	hare barley
<i>Lamarckia aurea</i> *	goldentop
<i>Melica imperfecta</i>	little California melica
<i>Pennisetum setaceum</i> *	crimson fountain grass
<i>Polypogon monspeliensis</i> *	annual beard grass
<i>Polypogon viridis</i> *	water beard grass
<i>Schismus barbatus</i> *	barbed Mediterranean grass
<i>Stipa lepida</i>	foothill needle grass
<i>Stipa miliacea var. miliacea</i> *	smilo grass
<i>Stipa pulchra</i>	purple needle grass
THEMIDACEAE – BRODIAEA FAMILY	
<i>Bloomeria crocea</i>	common goldenstar
<i>Dipterostemon capitatus</i>	blue dicks
TYPHACEAE – CATTAIL FAMILY	
<i>Typha sp.</i>	Cattail
* Non-native or invasive species	

ATTACHMENT C

CNDDB FORMS

CNDDDB Online Field Survey Form Report



California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/



Source code RUD22F0004
Quad code 3311776
Occ. no. _____
EO index no. _____
Map index no. _____

This data has been reported to the CNDDDB, but may not have been evaluated by the CNDDDB staff

Scientific name: *Astragalus brauntonii*

Common name: Braunton's milk-vetch

Date of field work (mm-dd-yyyy): 09-13-2022

Comment about field work date(s): _____

OBSERVER INFORMATION

Observer: Allison D. Rudalevige

Affiliation: Psomas

Address: 5 Hutton Centre Drive, Suite 300, Santa Ana, CA 92707

Email: allison.rudalevige@psomas.com

Phone: (714) 325-0129

Other observers: Sarah Thomas

DETERMINATION

Keyed in:

Compared w/ specimen at:

Compared w/ image in: CalPhotos

By another person: Sandra Leatherman, Andrew Sanders

Other:

Identification explanation: images reviewed by Sandra Leatherman and Andrew Sanders

Identification confidence: Confident

Species found: Yes If not found, why not?

Level of survey effort: Used CDFW. 2018. Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities.

Total number of individuals: 1

Collection?

Collection number:

Museum/Herbarium:

PLANT INFORMATION

Phenology: 100 %

vegetative

flowering

fruiting

SITE INFORMATION

Habitat description: Observed in sandy channel of Santiago Creek upstream of reservoir in an opening of mule fat scrub. Associated species include Baccharis salicifolia ssp. salicifolia, Phacelia cicutaria, and Erigeron canadensis.

Slope: flat

Land owner/manager: County of Orange

Aspect: n/a

Site condition + population viability: Good

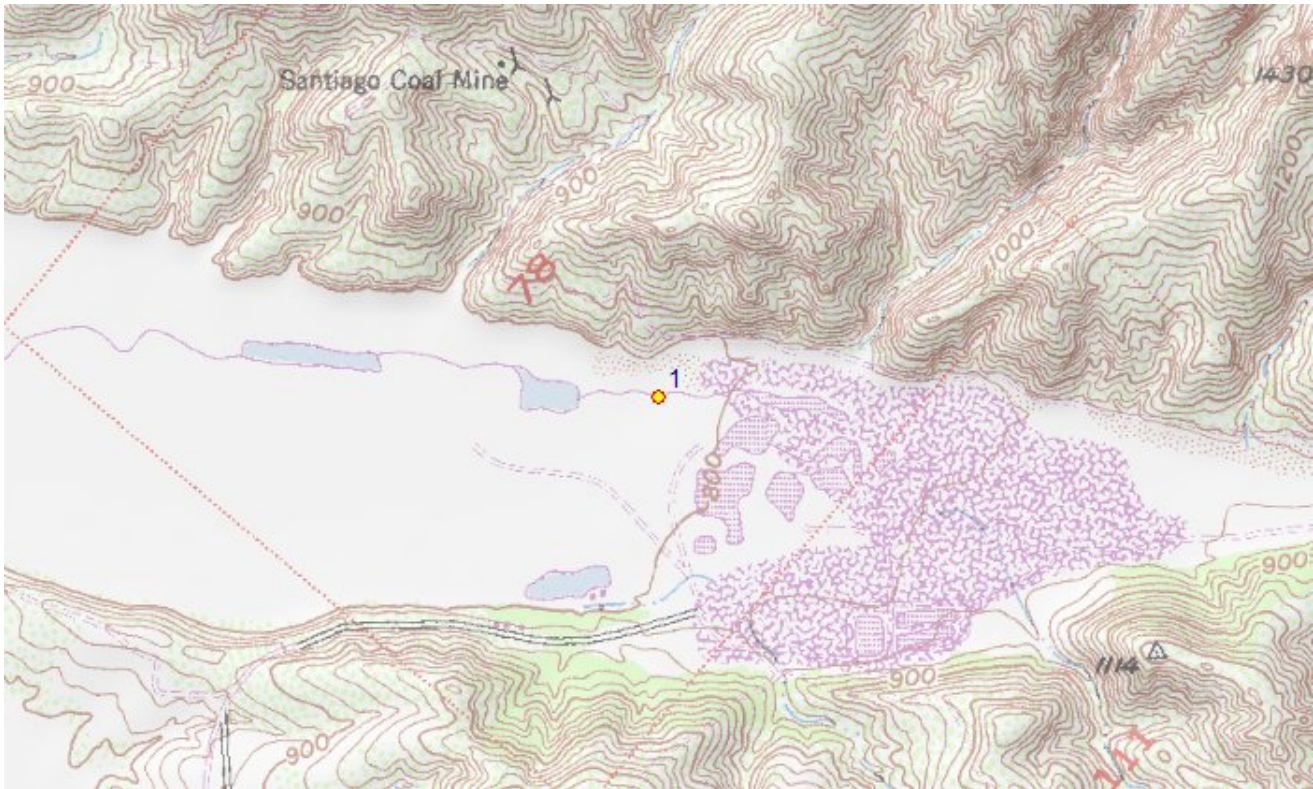
Immediate & surrounding land use: Open space at Santiago Reservoir, Irvine Regional Park, NCCP Reserve, and Santiago Canyon Road

Visible disturbances: non-native species

Threats:

General comments:

MAP INFORMATION



ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTM E NAD83	UTM N NAD83	UTM Zone
	Orange	Black Star Canyon	786	33.77572	-117.70013	435174	3737509	11
1	Public Land Survey	Feature Comment						
	S T04S R08W 34							

The mapped feature is accurate within: 10 m

Source of mapped feature: Olympus T-5 camera with internal GPS

Mapping notes:

Location/directions comments:

Attachment(s): 3IRW010200_091322 (28).JPG

CNDDDB Online Field Survey Form Report



California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/



Source code RUD22F0001
Quad code 3311776
Occ. no. _____
EO index no. _____
Map index no. _____

This data has been reported to the CNDDDB, but may not have been evaluated by the CNDDDB staff

Scientific name: *Calochortus weedii* var. *intermedius*

Common name: *intermediate mariposa-lily*

Date of field work (mm-dd-yyyy): *05-26-2022*

Comment about field work date(s): *Species observed on 05/23/2022*

OBSERVER INFORMATION

Observer: *Allison D. Rudalevige*

Affiliation: *Psomas*

Address: *5 Hutton Centre Drive, Suite 300, Santa Ana, CA 92707*

Email: *allison.rudalevige@psomas.com*

Phone: *(714) 325-0129*

Other observers: *Erin Ruckman*

DETERMINATION

Keyed in: *Jepson eFlora. 2022.*

Compared w/ specimen at:

Compared w/ image in:

By another person:

Other:

Identification explanation:

Identification confidence: *Very confident*

Species found: *Yes* If not found, why not?

Level of survey effort: *Followed CDFW. 2018. Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities.*

Total number of individuals: *4*

Collection? *No*

Collection number:

Museum/Herbarium:

PLANT INFORMATION

Phenology:

100 %

vegetative

flowering

fruiting

SITE INFORMATION

Habitat description: *In rocky soil of sagebrush scrub vegetation. Associated species include Artemisia californica, Salvia mellifera, Marah macrocarpa, Baccharis salicifolia ssp. salicifolia, Encelia californica, and Stipa miliacea var. miliacea.*

Slope: *moderately steep*

Land owner/manager: *County of Orange*

Aspect: *southeast to east*

Site condition + population viability: *Good*

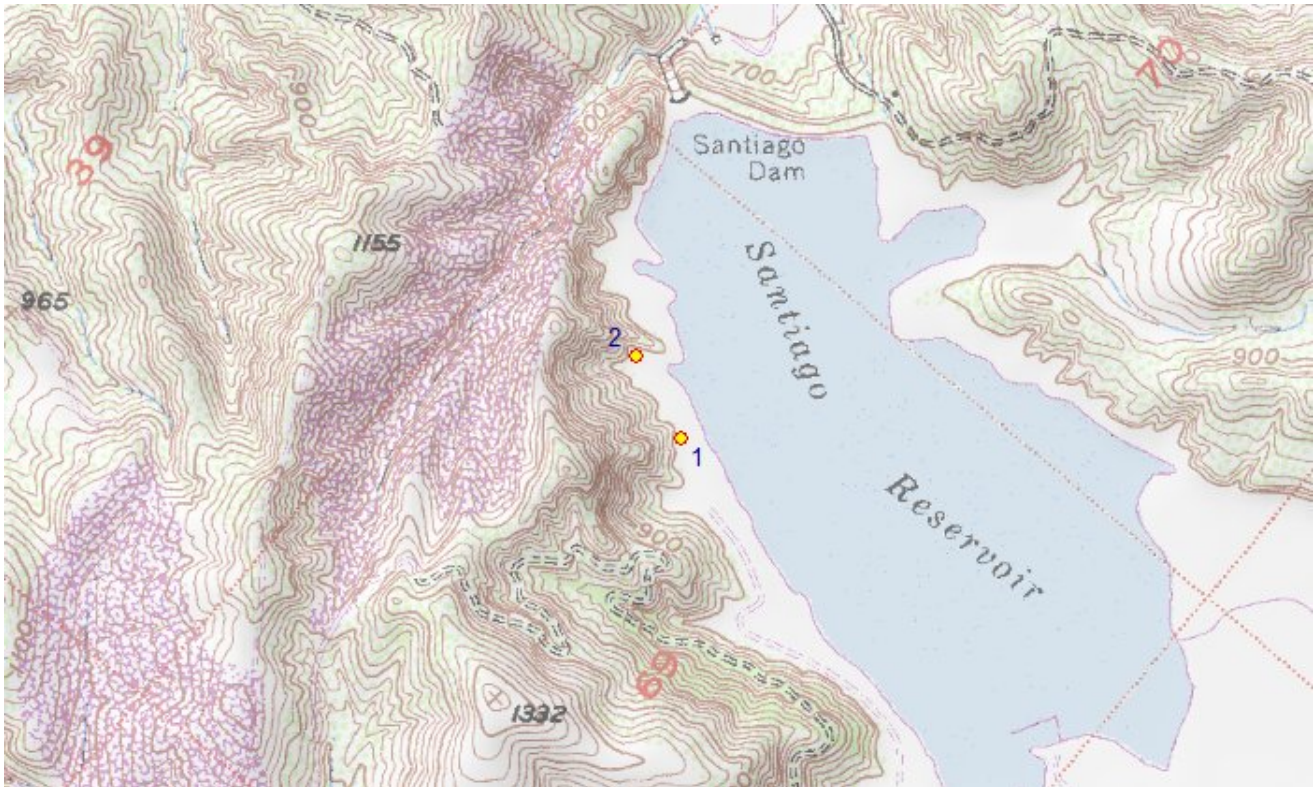
Immediate & surrounding land use: Open space at Santiago Reservoir, Irvine Regional Park, NCCP Reserve, and Santiago Canyon Road.

Visible disturbances:

Threats:

General comments:

MAP INFORMATION



ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTM E NAD83	UTM N NAD83	UTM Zone
	Orange	Black Star Canyon	794	33.78014	-117.72724	432667	3738017	11
1	Public Land Survey	Feature Comment						
	S T04S R08W 33	Population 1; 2 individuals blooming.						
ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTM E NAD83	UTM N NAD83	UTM Zone
	Orange	Black Star Canyon	782	33.78168	-117.72830	432570	3738188	11
2	Public Land Survey	Feature Comment						
	S T04S R08W 33	Population 2; 2 individuals blooming.						

The mapped feature is accurate within: 10 m

Source of mapped feature: Garmin handheld GPS, accuracy 20 feet

Mapping notes:

Location/directions comments:

Attachment(s): 3IRW010200_052322 (28).JPG; 3IRW010200_052322 (32).JPG; 3IRW010200_052322 (30).JPG

CNDDDB Online Field Survey Form Report



California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/



Source code RUD22F0002
Quad code 3311776
Occ. no. _____
EO index no. _____
Map index no. _____

This data has been reported to the CNDDDB, but may not have been evaluated by the CNDDDB staff

Scientific name: *Calochortus weedii* var. *intermedius*

Common name: *intermediate mariposa-lily*

Date of field work (mm-dd-yyyy): *05-26-2022*

Comment about field work date(s): *Species observed on 05/23/2022*

OBSERVER INFORMATION

Observer: *Allison D. Rudalevige*

Affiliation: *Psomas*

Address: *5 Hutton Centre Drive, Suite 300 , Santa Ana, CA 92707*

Email: *allison.rudalevige@psomas.com*

Phone: *(714) 325-0129*

Other observers: *Erin Ruckman*

DETERMINATION

Keyed in: *Jepson eFlora*

Compared w/ specimen at:

Compared w/ image in:

By another person:

Other:

Identification explanation:

Identification confidence: *Very confident*

Species found: *Yes* If not found, why not?

Level of survey effort: *Followed CDFW. 2018. Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities.*

Total number of individuals: *1*

Collection? *No*

Collection number:

Museum/Herbarium:

PLANT INFORMATION

Phenology:

100 %

vegetative

flowering

fruiting

SITE INFORMATION

Habitat description: *On east-west running ridgeline in sagebrush scrub vegetation. Associated species include Artemisia californica, Adenostoma fasciculatum, Bromus rubens, and Hirschfeldia incana.*

Slope: *gentle*

Land owner/manager: *County of Orange*

Aspect: *southwest*

Site condition + population viability: *Good*

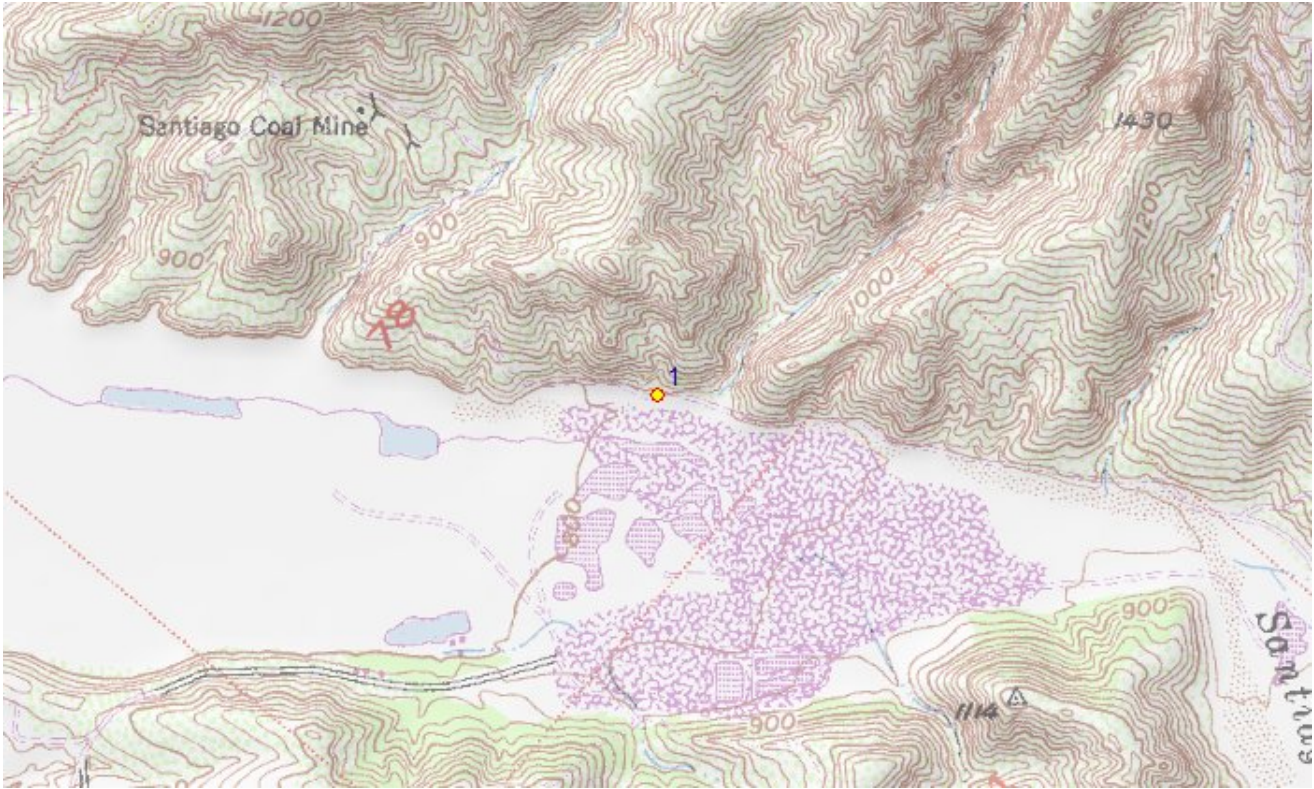
Immediate & surrounding land use: [Open space at Santiago Reservoir, Irvine Regional Park, NCCP Reserve, and Santiago Canyon Road.](#)

Visible disturbances:

Threats:

General comments:

MAP INFORMATION



ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTM E NAD83	UTM N NAD83	UTM Zone
	Orange	Black Star Canyon	820	33.77664	-117.69693	435471	3737609	11
1	Public Land Survey	Feature Comment						
	S T04S R08W 34	1 individual blooming						

The mapped feature is accurate within: 10 m

Source of mapped feature: [Garmin handheld GPS; accuracy 20 feet](#)

Mapping notes:

Location/directions comments:

Attachment(s):

CNDDDB Online Field Survey Form Report



California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/



Source code RUD22F0003
Quad code 3311776
Occ. no. _____
EO index no. _____
Map index no. _____

This data has been reported to the CNDDDB, but may not have been evaluated by the CNDDDB staff

Scientific name: *Nama stenocarpa*

Common name: mud nama

Date of field work (mm-dd-yyyy): 05-26-2022

Comment about field work date(s): Species observed on 4/26/2022 and 4/28/2022

OBSERVER INFORMATION

Observer: Allison D. Rudalevige

Affiliation: Psomas

Address: 5 Hutton Centre Drive, Suite 300, Santa Ana, CA 92707

Email: allison.rudalevige@psomas.com

Phone: (714) 325-0129

Other observers: Sandra Leatherman

DETERMINATION

Keyed in: Jepson eFlora

Compared w/ specimen at:

Compared w/ image in:

By another person: Sandra Leatherman

Other:

Identification explanation:

Identification confidence: Very confident

Species found: Yes If not found, why not?

Level of survey effort: Used CDFW. 2018. Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities. Estimated population density based on counts in 10 1-square-foot quadrats for low, medium, and high density areas

Total number of individuals: 3,500,000-5,500,000

Collection? Yes

Collection number: Sandra Leatherman

Museum/Herbarium: University of California, Riverside

PLANT INFORMATION

Phenology: 98 % 2 %
vegetative flowering fruiting

SITE INFORMATION

Habitat description: Observed along lakeshore in open areas of riparian herb vegetation. Area is periodically inundated. Associated species include Polypogon monspeliensis, Melilotus albus, Melilotus indicus, Tamarix ramosissima, Heliotropium curassavicum var oculatum, Baccharis salicifolia ssp salicifolia, Cyperus sp., Pseudognaphalium sp., Nasturtium officinale, and Persicaria lapathifolia.

Slope: flat

Aspect: n/a

Land owner/manager: County of Orange

Site condition + population viability: Good

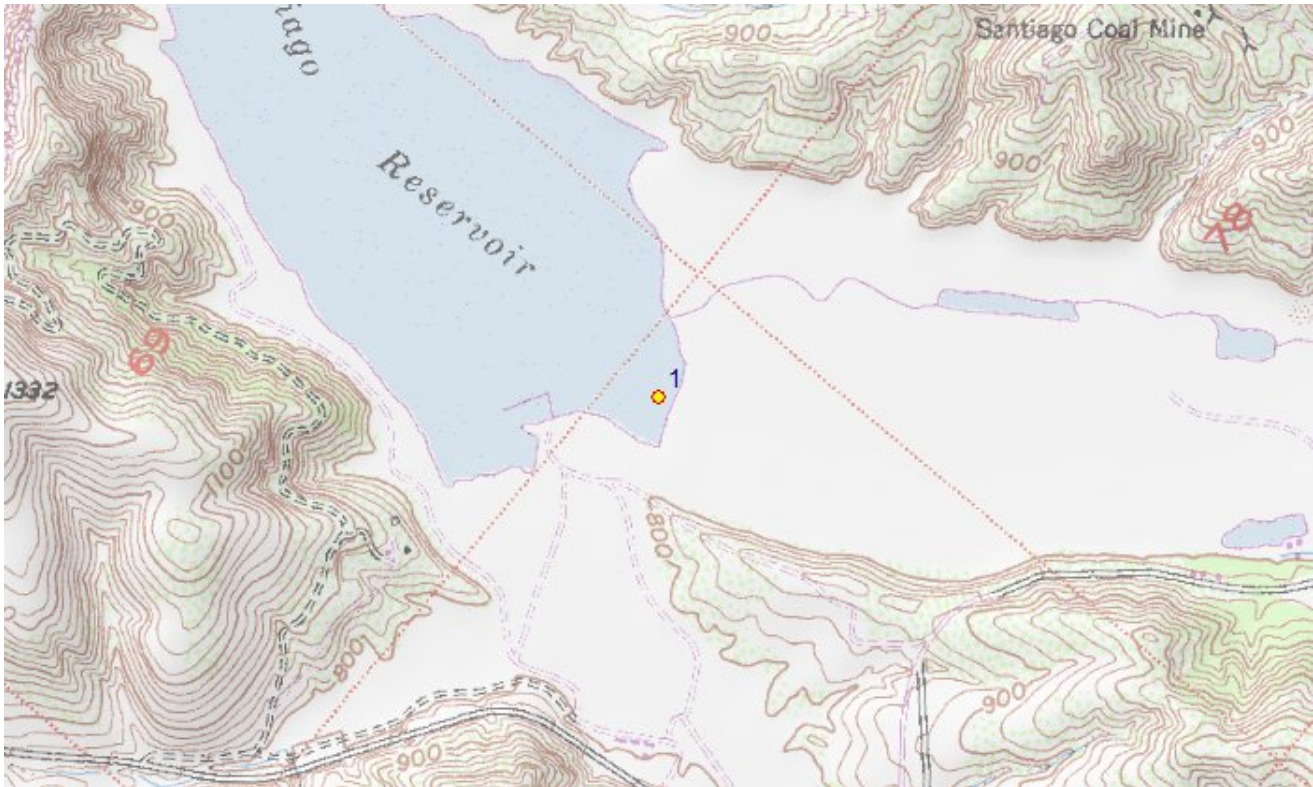
Immediate & surrounding land use: Open space at Santiago Reservoir, Irvine Regional Park, NCCP Reserve, and Santiago Canyon Road

Visible disturbances: dirt roads, non-native species

Threats: Periodically used dirt access roads

General comments:

MAP INFORMATION



ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTM E NAD83	UTM N NAD83	UTM Zone
	Orange	Black Star Canyon	782	33.77474	-117.71611	433693	3737411	11
1	Public Land Survey	Feature Comment						
	S T04S R08W 33	Approximate center of populations						

The mapped feature is accurate within: 500 m

Source of mapped feature: Garmin handheld GPS

Mapping notes: Mapped population extent and estimated population density. See attached kmz for individual populations.

Location/directions comments:

Attachment(s): 3IRW010200_042622 (35).JPG, Representative habitat; 3IRW010200_042622 (45).JPG; 3IRW010200_042622 (47).JPG; Mud Nama Data_2022.kmz

APPENDIX F

QUINO CHECKERSPOT SURVEY

May 2, 2022

Stacey Love
Recovery Permit Coordinator
U.S. Fish and Wildlife Service
2177 Salk Avenue, Suite 250
Carlsbad, California 92008

VIA EMAIL
Stacey_Love@fws.gov

Subject: Results of Focused Presence/Absence Surveys for the Quino Checkerspot Butterfly for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California

Dear Ms. Love:

This Letter Report presents the results of focused surveys for the Quino checkerspot butterfly (*Euphydras editha quino*) for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project (hereinafter referred to as the “project site”) located in Orange County, California. The purpose of the surveys was to determine the presence or absence of the Quino checkerspot butterfly on or immediately adjacent to the project site. Surveys were conducted by a Biologist who holds the necessary Federal Endangered Species Act survey permit and were completed according to the guidelines established by the U.S. Fish and Wildlife Service (USFWS 2014). Notification of the intent to conduct protocol-level surveys was submitted to the USFWS on February 3, 2022.

PROJECT LOCATON AND DESCRIPTION

The project site is located at Santiago Creek Dam at the northwest end of Irvine Lake in unincorporated Orange County, California (Exhibit 1). It is south of State Route (SR) 261 and east of SR-241 and Santiago Canyon Road. Surrounding land use primarily consists of undeveloped open space. Irvine Regional Park is located northwest of SR-241; Limestone Canyon Regional Park is located south of Santiago Canyon Road; and Oak Canyon Park is located at the southeast end of Irvine Lake. The closed Santiago Canyon Landfill is located adjacent to the west of Irvine Lake.

The project site is located on the U.S. Geological Survey’s (USGS’) Black Star Canyon 7.5-minute quadrangle (Exhibit 2). Irvine Lake (named Santiago Creek Reservoir on the USGS) was created by constructing a dam across Santiago Creek. Santiago Creek, a named blueline stream, enters Irvine Lake from the east and continues downstream of the dam flowing north and then west. It has a relatively broad floodplain both above and below the dam. The slopes around the western and northern portions of the lake are relatively steep while the areas to the southeast and east include areas that are relatively flat. Three unnamed blueline streams enter the lake from the north and eight unnamed blueline streams enter the lake from the west, southeast, and south. One unnamed blueline stream enters the project site in the northwest, downstream of the Dam, while Fremont Canyon Creek merges with Santiago Creek downstream of the project site. Elevations in the project site range from approximately 657 to 996 feet above mean sea level.

5 Hutton Centre Drive
Suite 300
Santa Ana, CA 92707

Tel 714.751.7373
Fax 714.545.8883
www.Psomas.com

Stacey Love
May 2, 2022
Page 2

The project site is located in the Central/Coastal Subregion of the Natural Communities Conservation Plan/Habitat Conservation Plan (NCCP/HCP). Santiago Dam and its associated structures are located within designated “Non-Reserve Open Space”, while Habitat Reserve and Conservation Easements surround the lake; a Special Linkage is located southeast of the lake. The purpose of this plan is to provide regional protection and recovery of multiple species and habitat while allowing compatible land use and appropriate development. Irvine Ranch Water District (IRWD)¹ is a participating jurisdiction and, as such, will comply with the terms of the NCCP/HCP Implementation Agreement.

The IRWD and Serrano Water District are jointly proposing to abandon the existing Santiago Creek Dam outlet tower and construct a new inclined outlet structure to be located on the left abutment of the existing dam. Additionally, based on feedback from the Department of Safety of Dams, the dam spillway requires structural improvements. Existing structures include the dam crest, the intake tower in Irvine Lake, the spillway channel, the control houses, the energy dissipater structure, the aboveground outlet pipe, and the dam crest access road. The project is currently in the design phase but would be located within the survey area provided by IRWD.

SURVEY AREA

A variety of vegetation types occur on the project site, including sagebrush scrub, disturbed sagebrush scrub, sagebrush-coyote bush scrub, southern cactus scrub, disturbed southern cactus scrub, disturbed floodplain sage scrub, toyon-sumac chaparral, annual grassland, ruderal, riparian herb, southern willow scrub, mulefat scrub, disturbed mulefat scrub, southern sycamore riparian woodland/southern coast live oak riparian forest, southern black willow forest, disturbed southern black willow forest, southern black willow forest/riparian herb, coast live oak woodland, western sycamore, and vegetated fluctuating shoreline. Other landcover includes cliff, open water, fluctuating shoreline, perennial stream, ornamental, developed, and disturbed areas.

Focused surveys for the Quino checkerspot butterfly were conducted within all suitable habitat (i.e., sagebrush scrub, disturbed sagebrush scrub, disturbed floodplain sagebrush scrub, annual grassland, ruderal and disturbed areas) including a 50-foot buffer around the tentative impact footprint. All other vegetation types on the project site were excluded from focused surveys (Exhibit 3).

The Quino survey areas contained suitable habitat, open ground, clay soils, host plants, and/or nectar sources. These habitat types were generally dominated by California sagebrush (*Artemisia californica*), leafy California buckwheat (*Eriogonum fasciculatum* var. *foliolosum*), deerweed (*Acmispon glaber*), laurel sumac (*Malosma laurina*), lemonade berry (*Rhus integrifolia*), scaly scale-broom (*Lepidospartum squamatum*), toyon (*Heteromeles arbutifolia*), and California brickellbush (*Brickellia californica*). Openings between shrubs have native herbs, such as erect plantain (*Plantago erecta*), purple owl’s-clover (*Castilleja exserta*), and narrow-toothed pectocarya (*Pectocarya linearis* ssp. *ferocula*), as well as non-native fennel (*Foeniculum vulgare*) and non-native grasses (*Avena* sp. and *Bromus* spp.). Concentrations of host plants were mapped (Exhibit 4). Site photographs of representative habitat in the survey area are provided in Attachment A.

¹ The Santiago County Water District (SCWD) was also a participating jurisdiction in the NCCP/HCP. The SCWD consolidated with IRWD in 2006.

Stacey Love
May 2, 2022
Page 3

BACKGROUND

The Quino checkerspot butterfly is a federally listed Endangered species. This species is known to occur in San Diego and Riverside Counties, as well as Baja California Norte, Mexico. The historic range of this species included much of coastal California south of Ventura County and inland valleys south of the Tehachapi Mountains. The distribution and abundance of the Quino checkerspot butterfly has been dramatically reduced during the past century as a result of agricultural and urban development and other land-use changes in Southern California (USFWS 2003).

According to the Recovery Plan, more than 75 percent of the Quino checkerspot butterfly's historic range has been lost, including more than 90 percent of its coastal mesa and bluff distribution. The Recovery Plan also states that Quino checkerspot butterfly populations appear to have been reduced in number and size by more than 95 percent range-wide, due to direct and indirect human impacts, including habitat loss and fragmentation, infestation of non-native plant species, and disrupted fire regimes (USFWS 2003).

The life cycle of the Quino checkerspot butterfly typically includes one generation of adults per year, with a four- to six-week flight period. The flight season begins from late January to early March and may continue as late as early May, depending on weather conditions (Emmel and Emmel 1973; USFWS 2003). If a sufficient amount of rain falls in late summer or early fall, a rare second generation of Quino checkerspot butterfly may occur in reduced numbers (Mattoni et al. 1997). Females usually mate on the day they emerge from pupae and lay one or two egg clusters per day for most of their adult life. Adults live from 10 to 14 days; however, adult emergence from pupae is staggered, resulting in a 1-to-2-month flight season. As with most brush-footed butterflies, peak emergence for Quino checkerspot butterfly is expected to occur in the second week of the flight season (USFWS 2003).

Eggs deposited by adults hatch in 10 to 14 days. As many as seven larval molts (instars) may occur prior to pupation. During larval development, the host plants age, eventually dry out and become inedible (senescence). At the time of host plant senescence, if larvae are old enough and have accumulated sufficient reserves, they are able to enter diapause, a resting state that enables larvae to maintain a low metabolic rate and survive harsh environmental conditions that could not typically be tolerated. Like many other related butterflies, Quino checkerspot butterfly larvae can live for several years. One mechanism that generates longevity is repeated diapause (Singer and Ehrlich 1979), which occurs when larvae emerge from diapause, feed, and then re-enter diapause, postponing development until the next year. It has been suggested that Quino checkerspot butterfly larvae may also be able to survive without "breaking" diapause to feed in extremely dry years (USFWS 2003). It is unknown whether Quino checkerspot butterfly larvae can store enough energy reserves to prolong diapause without feeding at all for more than a year (USFWS 2003).

The Quino checkerspot butterfly is a member of the brush-footed butterfly family *Nymphalidae*. The dorsal (top) sides of the wings have a red, black, and cream-colored checkered pattern, with a distinctively larger orange subterminal band on the lower hind wings. The ventral (bottom) sides are dominated by a checkered red and cream pattern with heavy black lines separating the colors. The abdomen of the Quino checkerspot butterfly has three red bands, which makes it distinct from the three checkerspot species that could co-occur with the Quino: Chalcedon/Variable checkerspot (*E. chalcedona*) have red bands with white dots; Gabb's checkerspot (*Chlosyne gabbii gabbii*) have orange bands and no dots; and Leanira checkerspots (*Chlosyne leanira*) have cream bands and no dots (USFWS 2003).

The larva (caterpillar of the Quino checkerspot butterfly) can be distinguished after their second molt by the characteristic dark-black coloration and row of eight to nine orange tubercles on their back. Larvae feed on specific plants (host plants), primarily two types of plantain, erect plantain and Patagonian plantain (*Plantago patagonica*) when developing. Secondary host plants that may be utilized when

Stacey Love
May 2, 2022
Page 4

plantain is not available include Coulter's snapdragon (*Antirrhinum coulterianum*), rigid bird's beak (*Cordlyanthus rigidus*), purple owl's-clover, Chinese houses (*Collinsia* spp.), and possibly related Indian paintbrush (*Castilleja affinis* ssp. *affinis*). The USFWS published a Revised Critical Habitat for Quino checkerspot butterfly on June 17, 2009. The designation covers 62,125 acres of land in San Diego and Riverside Counties (USFWS 2009). The project site is not located in the Revised Critical Habitat for the Quino checkerspot butterfly.

SURVEY METHODOLOGY

All Quino checkerspot butterfly surveys were conducted following guidelines from USFWS Survey Protocol (USFWS 2014) to maximize detection of adults during the flight season. Protocol surveys consist of an initial site assessment to determine if the project site contains areas recommended for Quino checkerspot butterfly surveys. If the project site is determined to be comprised solely of excluded areas (described below), Quino checkerspot butterfly surveys are not recommended. If a project site has areas suitable for butterfly surveys (non-excluded areas), then surveys should be conducted in those portions of the project site. Per USFWS protocol, five weekly focused surveys were conducted beginning the third week of February.

Site Assessment

All areas within 50-feet of the proposed impact footprint (including additional inundation areas) were included in the site assessment. The site assessment was conducted prior to the first focused butterfly survey to identify which portions of the project site provide suitable habitat for Quino checkerspot butterfly. The assessment was conducted by Psomas Senior Biologist Lindsay Messett (USFWS Permit No. TE 067064-5) on February 15 and 16, 2022.

Orchards, developed areas, or small in-fill parcels (plots smaller than one acre that are completely surrounded by urban development) largely dominated by non-native vegetation, active/in-use agricultural fields, closed-canopy forests or riparian areas, dense chaparral, and small openings (less than one acre) completely enclosed within dense chaparral, were considered unsuitable and designated as "excluded areas". Areas outside of excluded areas, regardless of the presence/absence of host plants and nectar sources, were considered potential habitat areas.

Quino Survey Area

All areas that were not excluded were surveyed for Quino checkerspot butterfly, regardless of host plant presence, absence, and/or density. The Quino checkerspot butterfly is generally associated with sage scrub, open chaparral, grasslands, and vernal pools. Within these communities, they are usually observed in open or sparsely vegetated areas (including trails and dirt roads), on hilltops, and on ridgelines. All wildlife species observed were recorded (Attachment B).

Vegetation types in the survey area were previously mapped by Psomas Senior Biologist Allison Rudalevige downstream of the dam in February 2020. Ms. Rudalevige and Ms. Messett mapped vegetation mapping upstream of the dam in September 2020. Nomenclature of vegetation types generally follows that of Gray and Bramlet (1992) but was cross-referenced to A Manual of California Vegetation (CNPS 2020), which is the most current vegetation classification system used by the California Department of Fish and Wildlife (CDFW) for assessing sensitive natural communities (CDFW 2020).

Stacey Love
May 2, 2022
Page 5

Focused Surveys

The survey area contained approximately 308 acres of suitable habitats that could not be excluded per USFWS protocol (Exhibit 3); two days were required to complete each survey visit. The survey visits were divided into two areas (i.e., upstream of Santiago Dam and downstream of Santiago Dam). Ms. Messett conducted five rounds of focused survey visits in the survey areas during the 2022 flight season. Surveys were conducted once per week (weather permitting) on non-consecutive days during the peak of the flight season on February 18, 19, 25, 27; March 3, 4, 10, 11, 17, and 18, 2022. Table 1 below summarizes the survey conditions during each of the ten surveys.

TABLE 1
SUMMARY OF QUINO CHECKERSPOT BUTTERFLY SURVEYS

Survey Number	Survey Location	Date	Time (Start/End)	Surveyor	Weather Conditions		
					Temperature (°F) (Start/End)	Wind (mph) (Start/End)	Cloud Cover (%) (Start/End)
1	Downstream of Santiago Dam	February 18, 2022	0900/1500	Messett	62/70	0–1/2–5	Clear/Clear
1	Upstream of Santiago Dam	February 19, 2022	0930/1530	Messett	60/70	0–1/4–6	25/20
2	Downstream of Santiago Dam	February 25, 2022	1000/1600	Messett	60/63	2–3/5–7	Clear/Clear
2	Upstream of Santiago Dam	February 27, 2022	1000/1545	Messett	61/70	0–1/5–6	10/10
3	Upstream of Santiago Dam	March 3, 2022	0930/1555	Messett	62/67	1–2/8–10	50/30
3	Downstream of Santiago Dam	March 4, 2022	0915/1530	Messett	63/65	0–1/2–5	50/50
4	Upstream of Santiago Dam	March 10, 2022	0845/1550	Messett	63/71	2–3/4–6	30/Clear
4	Downstream of Santiago Dam	March 11, 2022	0815/1530	Messett	68/74	3–4/6–8	Clear/Clear
5	Upstream of Santiago Dam	March 17, 2022	0930/1600	Messett	65/80	0–1/2–5	25/30
5	Downstream of Santiago Dam	March 18, 2022	0900/1515	Messett	68/74	1–2/4–6	Clear/Clear

Surveys focused on likely breeding areas (host plant patches), feeding areas (nectaring plant patches), and topographical features conducive to detecting the Quino checkerspot butterfly (ridgelines, hilltops, rock outcrops, dirt roads, and open ground with clay soils). Survey areas were walked at an average rate of 10 to 15 acres per hour. Binoculars were used to identify the majority of butterfly species that could not be seen at close range. General survey forms were filled out for each survey, noting weather conditions, survey date, start and end times, and nectaring sources in bloom (Attachment C).

Stacey Love
May 2, 2022
Page 6

SURVEY RESULTS

Two host plant species: erect plantain and purple owl's-clover were observed in the survey area. Plantain was located throughout the survey area with the most abundant patches located downstream of Santiago Dam (in the northern portion of the survey area) and in the central-southern portion of the survey area, south of Irvine Lake. A few individual purple owl's-clover were observed on the project site in this same general location (Exhibit 4).

Several nectar sources occur throughout the survey area, including valley popcornflower (*Plagiobothrys canescens*), common fiddleneck (*Amsinckia intermedia*) and (*Amsinckia menziesii*), red maids (*Calandrinia menziesii*), blue dicks (*Dipterostemon capitatus*), common goldfields (*Lasthenia gracilis*), western blue-eyed grass (*Sisyrinchium bellum*), and California buckwheat (*Eriogonum fasciculatum*).

Several topographic features (i.e., rock outcrops, dirt roads) known to attract Quino checkerspot butterfly and other butterfly species were present in the survey area.

No Quino checkerspot butterfly larvae or adults were observed during the surveys.

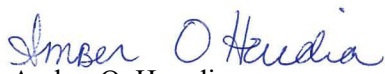
OTHER OBSERVATIONS

Four special status species were observed and/or detected in the survey area during the surveys: bald eagle (*Haliaeetus leucocephalus*, State Endangered, California Fully Protected), American peregrine falcon (*Falco peregrinus anatum*, California Fully Protected), coastal California gnatcatcher (*Polioptila californica californica*, federally Threatened, California Species of Special Concern), and southern California rufous-crowned sparrow (*Aimophila ruficeps canescens*, CDFW Watch List) (Exhibit 4). These species are all tracked by the California Natural Diversity Database (CNDDDB). The bald eagles were observed at their nest during a focused survey for coastal California gnatcatcher for the same project; the CNDDDB form for bald eagle will be attached to that report (Psomas 2022 [in preparation]). CNDDDB forms for the other three species are included in Attachment D and will be submitted online by Ms. Messett.

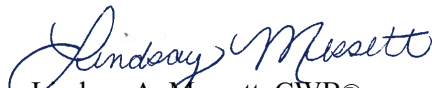
Psomas appreciates the opportunity to assist on this project. If you have any comments or questions, please contact Amber Heredia (Amber.Heredia@psomas.com) or Lindsay Messett (Lindsay.Messett@psomas.com).

Sincerely,

PSOMAS




Amber O. Heredia
Senior Project Manager, Resource Management



Lindsay A. Messett, CWB®
Senior Biologist

Stacey Love
May 2, 2022
Page 7

I certify that the information in this survey report and enclosed exhibits fully and accurately present my work.


Lindsay A. Messett, CWB®
Senior Biologist
(TE067064-5)

Attachments: Exhibits 1–4
A – Site Photographs
B – Plant and Wildlife Compendium
C – Data Sheets
D – CNDDDB Forms

cc: Kellie Welch, Welch@irwd.com
Jacob Moeder, Moeder@irwd.com
David Mayer, David.Mayer@wildlife.ca.gov
AskR5@wildlife.ca.gov

Stacey Love
May 2, 2022
Page 8

REFERENCES

- California Department of Fish and Wildlife (CDFW). 2020 (September 9). *California Natural Communities List*. Natural Communities List Arranged Alphabetically by Life Form (PDF). Sacramento, CA: CDFW Biogeographic Data Branch.
<https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=153398&inline>.
- California Native Plant Society (CNPS). 2020 (February 24 and September 21, dates accessed). A Manual of California Vegetation, Online Edition. Sacramento, CA: CNPS.
<http://www.cnps.org/cnps/vegetation/>.
- Emmel, T.C. and J.F. Emmel. 1973 (November 30). The Butterflies of Southern California. *Natural History Museum of Los Angeles County, Science Series* 26. Los Angeles, CA: Natural History Museum of Los Angeles County.
- Gray, J. and D. Bramlet. 1992. *Habitat Classification System Natural Resources Geographic Information System (GIS) Project* (Prepared for the County of Orange Environmental Management Agency). Santa Ana, CA: Gray and Bramlet.
- Mattoni, R., G.F. Pratt, T.R. Longcore, J.F. Emmel, and J.N. George. 1997. The Endangered Quino Checkerspot Butterfly, *Euphydryas editha quino* (Lepidoptera: Nymphalidae). *Journal of Research on the Lepidoptera* 34:99–118. Arcadia, CA: Lepidoptera Research Foundation.
- Psomas. 2022 [in preparation]. Results of Focused Presence/Absence Surveys for the Coastal California Gnatcatcher for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California. Santa Ana, CA.
- Singer, M.C. and P.R. Elrich. 1979. Population dynamics of the checkerspot butterfly *Euphydryas editha*. *Fortschritte der Zoologie* 25:53–60.
- U.S. Fish and Wildlife Service (USFWS). 2014 (December). *Quino Checkerspot Butterfly Survey Guidelines*. Carlsbad, CA: USFWS.
- . 2009 (June 17). Endangered and Threatened Wildlife and Plants; Revised Designation of Critical Habitat for the Quino Checkerspot Butterfly (*Euphydryas editha quino*); Final Rule. *Federal Register* 74(115): 28776–28862. Washington, D.C.: USFWS.
- . 2003 (September). *List of California Terrestrial Natural Communities Recognized by the Natural Diversity Data Base*. Sacramento, CA: CDFG, Natural Heritage Division.

D:\Projects\3IRW010200\MXD\Quinolox_LV_RL_20220425.mxd



Aerial Source: Esri, Maxar 2020

Regional Location and Local Vicinity

Exhibit 1

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

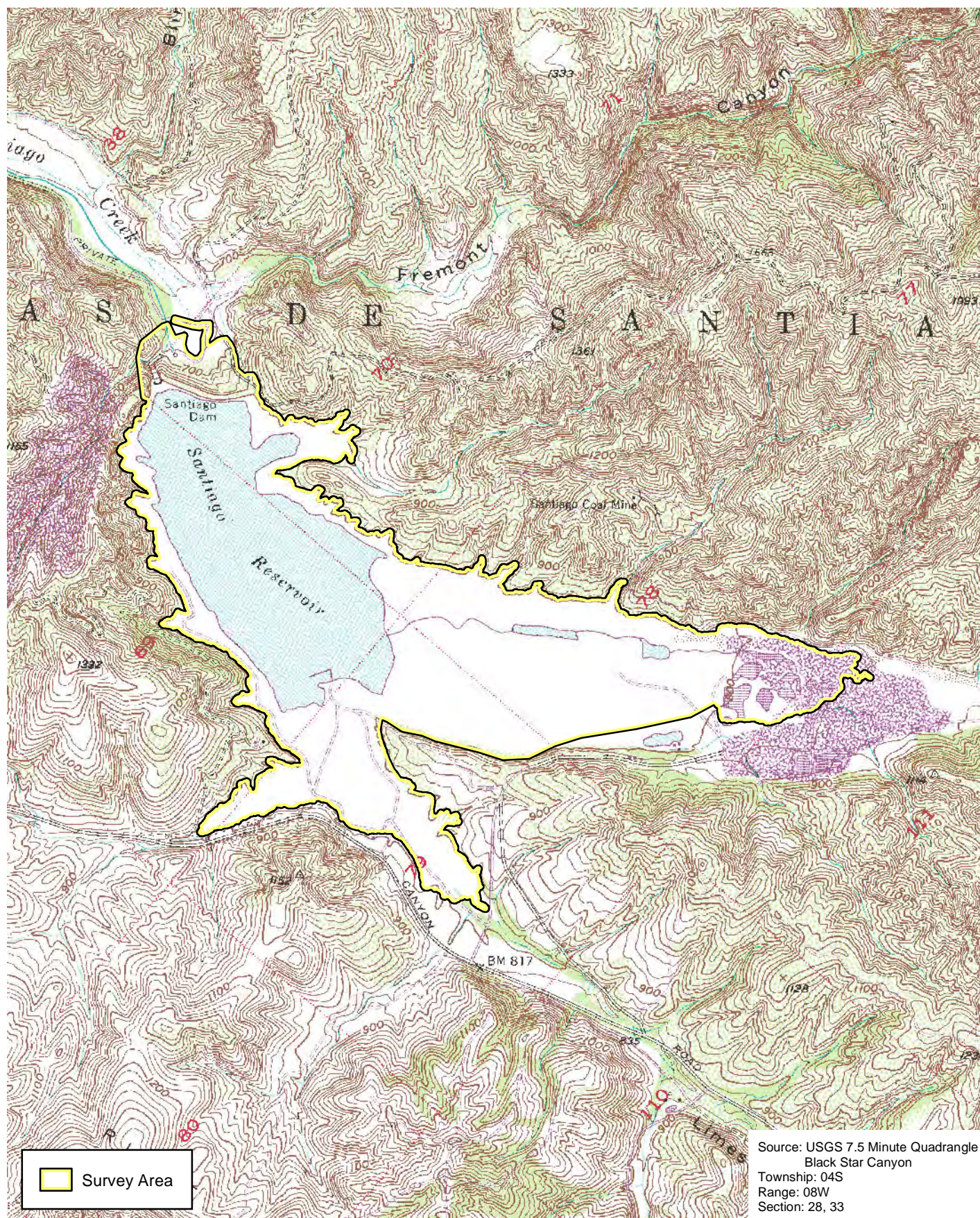


4,000 2,000 0 4,000
Feet



(Rev: 05/02/2022 JVR) R:\Projects\IRW_IRWD\3IRW010200\Graphics\Quinolox_LV_RL.pdf

D:\Projects\3IRW010200\MXD\Quinolex_Quino_SurveyArea_20220425.mxd



Quino Checkerspot Survey Area

Exhibit 2

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

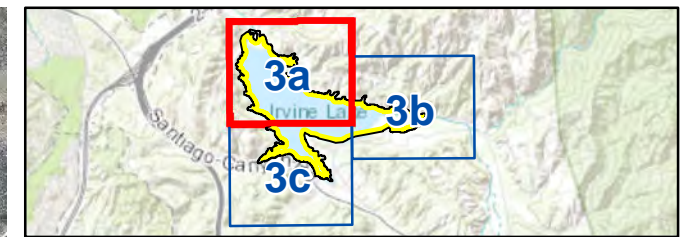
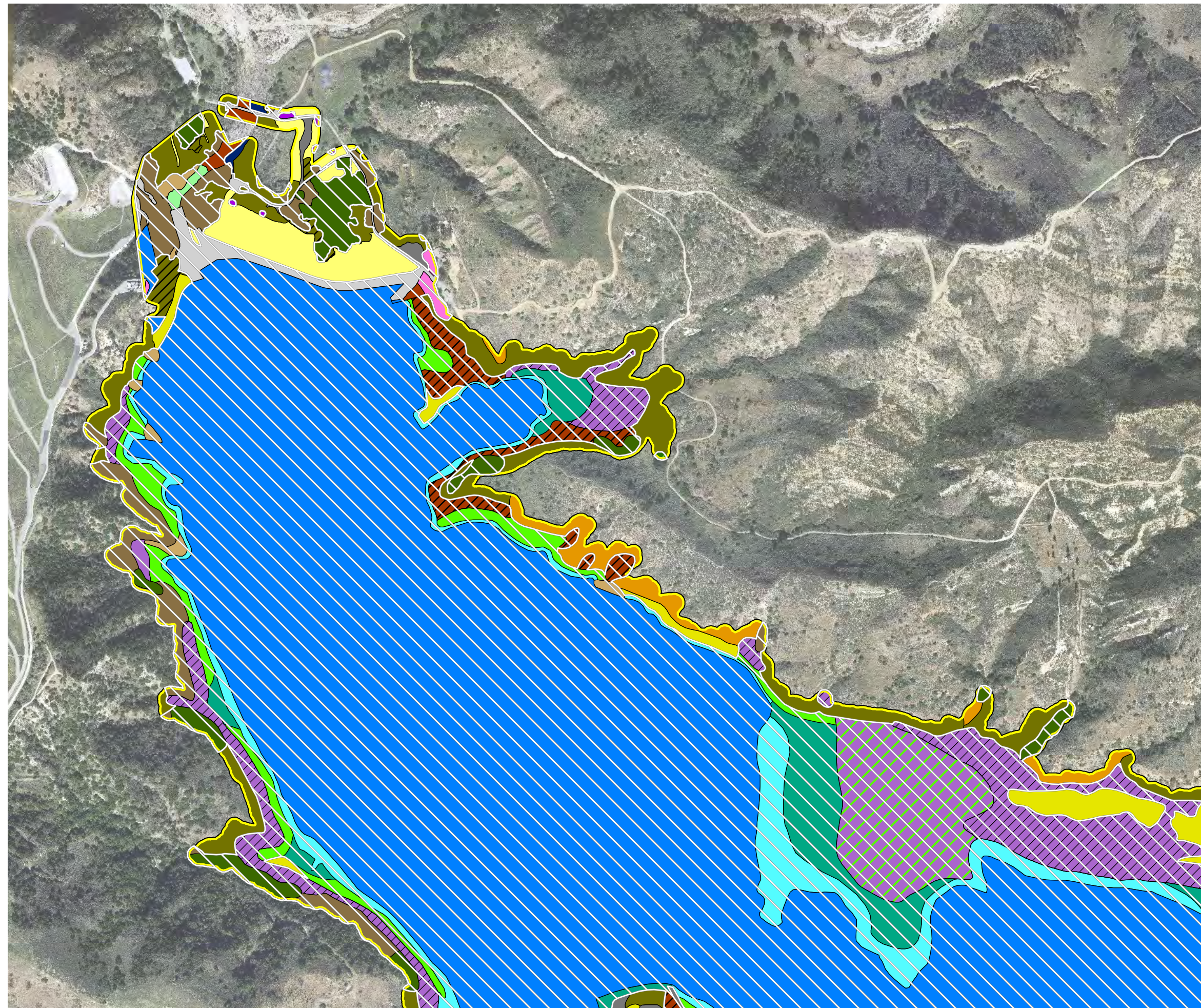


2,000 1,000 0 2,000
Feet

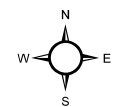


(Rev: 5-02-2022 JVR) R:\Projects\IRW_IRWD\3IRW010200\Graphics\Quinolex_Quino_SurveyArea.pdf

D:\Projects\3\IRW010200MXD\Quinolox_ ExcludedAreas_ 2022\425.mxd



- Survey Area
- Excluded Areas
- Vegetation Types and Other Areas**
- Sagebrush Scrub (2.3.6)
 - Disturbed Sagebrush Scrub (2.3.6)
 - Southern Cactus Scrub (2.4)
 - Disturbed Floodplain Sage Scrub (2.6)
 - Toyon - Sumac Chaparral (3.12)
 - Annual Grassland (4.1)
 - Ruderal (4.6)
 - Riparian Herb (7.1)
 - Southern Willow Scrub (7.2)
 - Mulefat Scrub (7.3)
 - Disturbed Mulefat Scrub (7.3)
 - Southern Sycamore Riparian Woodland/Southern Coast Live Oak Riparian Forest (7.4/7.5)
 - Southern Black Willow Forest (7.7)
 - Disturbed Southern Black Willow Forest (7.7)
 - Southern Black Willow Forest/Riparian Herb (7.7/7.1)
 - Coast Live Oak Woodland (8.1)
 - Western Sycamore (8.x)
 - Cliff (10)
 - Open Water (12.1)
 - Fluctuating Shoreline (12.2)
 - Vegetated Fluctuating Shoreline (12.2)
 - Ornamental (15.5)
 - Developed (15.6)
 - Disturbed (16.1)



600 300 0 600 Feet

Aerial Source: Hexagon Geosystems 2017
Esri, Maxar 2020

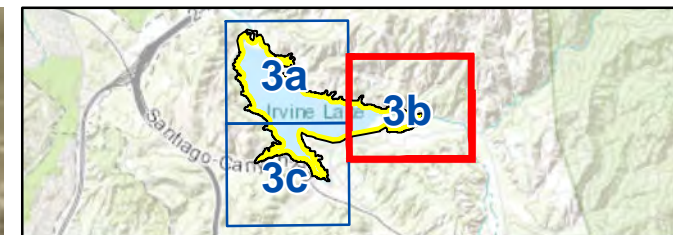
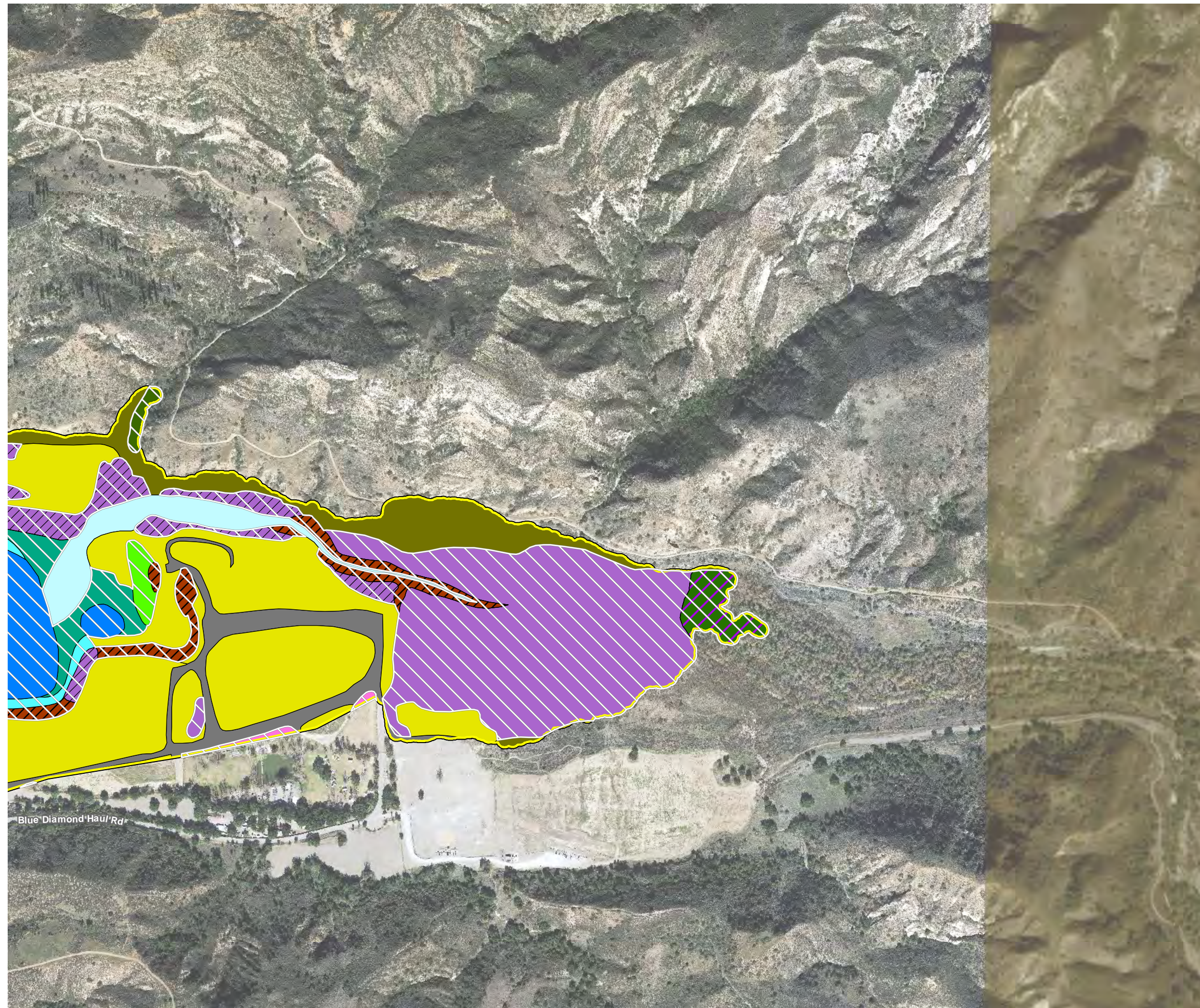
Excluded Areas Exhibit 3a

*Santiago Creek Dam Outlet Tower
and Spillway Improvement Project*

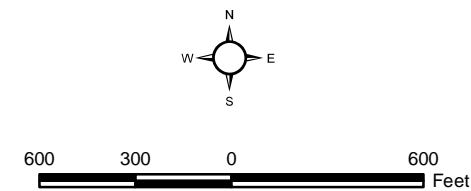


(Rev: 05/02/2022 JVR) R:\Projects\IRW_IRWD\3\IRW010200\Graphics\Quinolox_ Excluded.pdf

D:\Projects\3\IRW010200MXD\Quinolox_ ExcludedAreas_ 2022\425.mxd



- Survey Area
- Excluded Areas
- Vegetation Types and Other Areas**
- Sagebrush Scrub (2.3.6)
 - Ruderal (4.6)
 - Riparian Herb (7.1)
 - Disturbed Mulefat Scrub (7.3)
 - Southern Sycamore Riparian Woodland (7.4)
 - Southern Black Willow Forest (7.7)
 - Disturbed Southern Black Willow Forest (7.7)
 - Coast Live Oak Woodland (8.1)
 - Open Water (12.1)
 - Fluctuating Shoreline (12.2)
 - Vegetated Fluctuating Shoreline (12.2)
 - Perennial Stream (13.1)
 - Ornamental (15.5)
 - Disturbed (16.1)



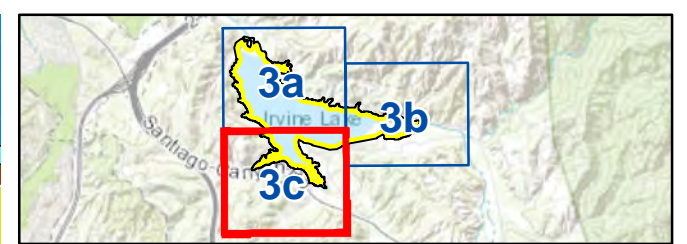
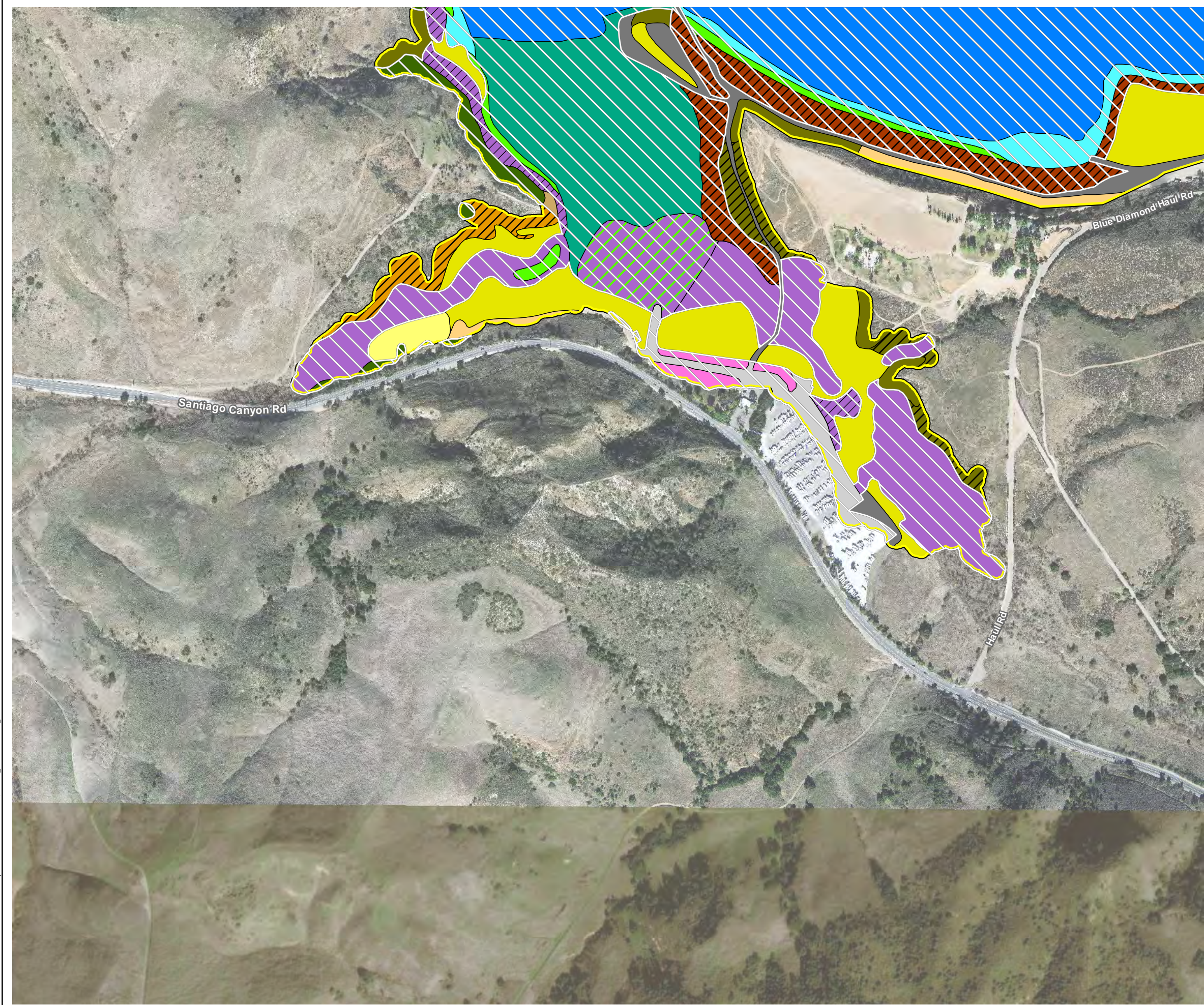
Aerial Source: Hexagon Geosystems 2017
Esri, Maxar 2020

Excluded Areas Exhibit 3b

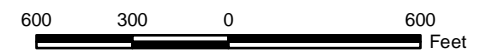
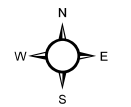
*Santiago Creek Dam Outlet Tower
and Spillway Improvement Project*



(Rev: 05/02/2022 JVR) R:\Projects\IRW_IRWD\3\IRW010200\Graphics\Quinolox_ Excluded.pdf



- Survey Area
- Excluded Areas
- Vegetation Types and Other Areas**
- Sagebrush Scrub (2.3.6)
- Disturbed Sagebrush Scrub (2.3.6)
- Sagebrush - Coyote Brush Scrub (2.3.12)
- Disturbed Southern Cactus Scrub (2.4)
- Annual Grassland (4.1)
- Ruderal (4.6)
- Riparian Herb (7.1)
- Disturbed Mulefat Scrub (7.3)
- Southern Black Willow Forest (7.7)
- Disturbed Southern Black Willow Forest (7.7)
- Southern Black Willow Forest/Riparian Herb (7.7/7.1)
- Coast Live Oak Woodland (8.1)
- Cliff (10)
- Open Water (12.1)
- Fluctuating Shoreline (12.2)
- Vegetated Fluctuating Shoreline (12.2)
- Ornamental (15.5)
- Developed (15.6)
- Disturbed (16.1)



Aerial Source: Hexagon Geosystems 2017
Esri, Maxar 2020

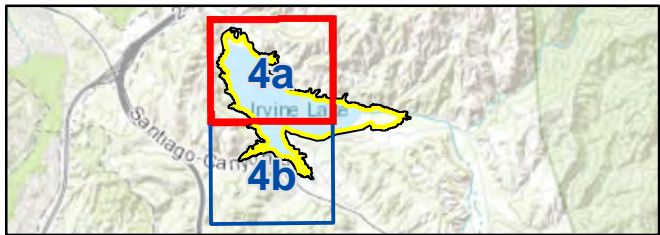
Excluded Areas
*Santiago Creek Dam Outlet Tower
and Spillway Improvement Project*


Exhibit 3c


(Rev: 05/02/2022 JVR) R:\Projects\IRW\IRWD\3\IRW010200\Graphics\Quinolox_Excluded.pdf


D:\Projects\IRW010200\MXD\Quinolox_ ExcludedAreas_ 20220425.mxd


D:\Projects\3IRW010200\MXD\Quinolox_SurveyResults_20220427.mxd



 Survey Area


Host Plant Locations

 Erect Plantain

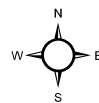
 Erect Plantain and Purple Owl's Clover

Special Status Species Observed

 American Peregrine Falcon

 Coastal California Gnatcatcher Pair

 Southern California Rufous-Crowned Sparrow



600 300 0 600
Feet

Aerial Source: Hexagon Geosystems 2017
Esri, Maxar 2020

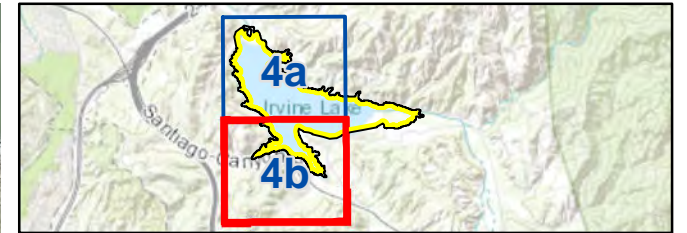
Survey Results

Exhibit 4a

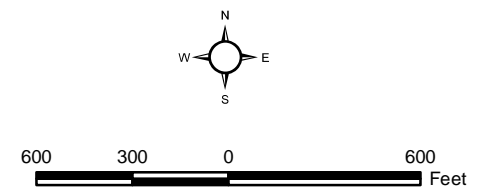
*Santiago Creek Dam Outlet Tower
and Spillway Improvement Project*



(Rev: 05/05/2022 JVR) R:\Projects\IRW_IRWD\3IRW010200\Graphics\Quinolox_SurveyResults.pdf



- Survey Area
- Host Plant Locations
 - Erect Plantain and Purple Owl's Clover
- Special Status Species Observed
 - Bald Eagle




Aerial Source: Hexagon Geosystems 2017
Esri, Maxar 2020

Survey Results

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

(Rev: 05/05/2022 JVR) R:\Projects\IRW_IRWD\3\IRW010200\Graphics\Quinolox_SurveyResults.pdf

Exhibit 4b



D:\Projects\3\IRW010200\MXD\Quinolox_SurveyResults_20220427.mxd

ATTACHMENT A
SITE PHOTOGRAPHS



Photo 1 – View of northern polygon containing erect plantain, located in the downstream portion of the survey area, looking west.



Photo 2 – View of southern polygon containing erect plantain, located in the downstream portion of the survey area, looking north.

D:\Projects\3IRW010200\GRAPHICS\Quino\Att_SP_1_20220427.ai

Site Photographs

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

Attachment A-1





Photo 3 – View of eastern polygon containing erect plantain, located in the downstream portion of the survey area, looking north.



Photo 4 – View of polygon containing erect plantain and purple owl's clover, located in the upstream portion of the survey area, looking northwest.

Site Photographs

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

Attachment A-2





Photo 5 – Close-up view of erect plantain located in the downstream portion of the survey area.



Photo 6 – Close-up view of erect plantain located in the downstream portion of the survey area.

Site Photographs

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

Attachment A-3





Photo 7 – Close-up view of purple owl's clover located in the upstream portion of the survey area.

D:\Projects\3IRW010200\GRAPHICS\Quino\Att_SP_4_20220427.ai

Site Photographs

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

Attachment A-4



(05/02/2022 JVR) R:\Projects\IRW_IRWD\3IRW010200\Graphics\Quino\Att_SP.pdf

ATTACHMENT B
WILDLIFE COMPENDIUM

WILDLIFE SPECIES OBSERVED

Species		Special Status
Scientific Name	Common Name	
INVERTEBRATES		
PAPILIONIDAE - SWALLOWTAIL BUTTERFLIES		
<i>Papilio eurymedon</i>	pale swallowtail	
<i>Papilio rutulus</i>	western tiger swallowtail	
<i>Papilio zelicaon</i>	anise swallowtail	
PIERIDAE - WHITES, SULFURS AND ORANGETIPS		
<i>Anthocharis sara</i>	Sara's orangetip	
<i>Pieris rapae</i>	cabbage white	
<i>Pontia protodice</i>	common (checkered) white	
<i>Colias harfordii</i>	Harford's sulfur	
NYMPHALIDAE - BRUSH-FOOTED BUTTERFLIES		
<i>Vanessa cardui</i>	painted lady	
DANAIDAE - MILKWEED BUTTERFLIES		
<i>Danaus plexippus</i>	monarch	
HESPERIDAE - SKIPPERS		
<i>Pyrgus albescens</i>	white checkered-skipper	
<i>Erynnis funeralis</i>	funereal duskywing	
RIODINIDAE - METALMARKS		
<i>Apodemia mormo</i>	Behr's (Mormon) metalmark	
LYCAENIDAE - BLUES, HAIRSTREAKS AND COPPERS		
<i>Plebejus acmon</i>	acmon blue	
<i>Brephidium exilis</i>	western pygmy-blue	
<i>Leptotes marina</i>	marine blue	
AMPHIBIANS		
HYLIDAE - TREEFROG FAMILY		
<i>Pseudacris cadaverina</i>	California treefrog	
<i>Pseudacris hypochondriaca</i>	Baja California treefrog	
LIZARDS		
PHRYNOSOMATIDAE - SPINY LIZARD FAMILY		
<i>Sceloporus occidentalis</i>	western fence lizard	
SNAKES		
COLUBRIDAE - COLUBRID SNAKE FAMILY		
<i>Pituophis catenifer</i>	gopher snake	
BIRDS		
ANATIDAE - SWAN, GOOSE, AND DUCK FAMILY		
<i>Branta canadensis</i>	Canada goose	
<i>Mareca americana</i>	American wigeon	
<i>Anas platyrhynchos</i>	mallard	
<i>Aythya affinis</i>	lesser scaup	
<i>Oxyura jamaicensis</i>	ruddy duck	
ODONTOPHORIDAE - NEW WORLD QUAIL FAMILY		
<i>Callipepla californica</i>	California quail	

WILDLIFE SPECIES OBSERVED

Species		Special Status
Scientific Name	Common Name	
PODICIPEDIDAE - GREBE FAMILY		
<i>Aechmophorus occidentalis</i>	western grebe	
COLUMBIDAE - PIGEON AND DOVE FAMILY		
<i>Columba livia</i> *	rock pigeon	
<i>Zenaida macroura</i>	mourning dove	
CUCULIDAE - CUCKOO AND ROADRUNNER FAMILY		
<i>Geococcyx californianus</i>	greater roadrunner	
CAPRIMULGIDAE - NIGHTJAR FAMILY		
<i>Chordeiles acutipennis</i>	lesser nighthawk	
TROCHILIDAE - HUMMINGBIRD FAMILY		
<i>Calypte anna</i>	Anna's hummingbird	
<i>Selasphorus sasin</i>	Allen's hummingbird	
CHARADRIIDAE - PLOVER FAMILY		
<i>Charadrius vociferus</i>	killdeer	
LARIDAE - GULL AND TERN FAMILY		
<i>Larus occidentalis</i>	western gull	
PHALACROCORACIDAE - CORMORANT FAMILY		
<i>Phalacrocorax auritus</i>	double-crested cormorant	
ARDEIDAE - HERON FAMILY		
<i>Ardea alba</i>	great egret	
<i>Egretta thula</i>	snowy egret	
<i>Nycticorax nycticorax</i>	black-crowned night-heron	
CATHARTIDAE - NEW WORLD VULTURE FAMILY		
<i>Cathartes aura</i>	turkey vulture	
PANDIONIDAE - OSPREY FAMILY		
<i>Pandion haliaetus</i>	osprey	
ACCIPITRIDAE - HAWK FAMILY		
<i>Haliaeetus leucocephalus</i>	bald eagle	SE, FP
<i>Buteo jamaicensis</i>	red-tailed hawk	
STRIGIDAE - TYPICAL OWL FAMILY		
<i>Megascops kennicottii</i>	western screech-owl	
<i>Bubo virginianus</i>	great horned owl	
PICIDAE - WOODPECKER FAMILY		
<i>Melanerpes formicivorus</i>	acorn woodpecker	
<i>Picoides nuttallii</i>	Nuttall's woodpecker	
<i>Colaptes auratus</i>	northern flicker	
FALCONIDAE - FALCON FAMILY		
<i>Falco sparverius</i>	American kestrel	
<i>Falco peregrinus</i>	peregrine falcon	FP
TYRANNIDAE - TYRANT FLYCATCHER FAMILY		
<i>Sayornis nigricans</i>	black phoebe	
<i>Tyrannus vociferans</i>	Cassin's kingbird	

WILDLIFE SPECIES OBSERVED

Species		Special Status
Scientific Name	Common Name	
CORVIDAE - JAY AND CROW FAMILY		
<i>Aphelocoma californica</i>	California scrub-jay	
<i>Corvus brachyrhynchos</i>	American crow	
<i>Corvus corax</i>	common raven	
ALAUDIDAE - LARK FAMILY		
<i>Eremophila alpestris actia</i>	California horned lark	
HIRUNDINIDAE - SWALLOW FAMILY		
<i>Stelgidopteryx serripennis</i>	northern rough-winged swallow	
<i>Petrochelidon pyrrhonota</i>	cliff swallow	
AEGITHALIDAE - BUSHTIT FAMILY		
<i>Psaltirparus minimus</i>	bushtit	
TROGLODYTIDAE - WREN FAMILY		
<i>Troglodytes aedon</i>	house wren	
<i>Thryomanes bewickii</i>	Bewick's wren	
<i>Campylorhynchus brunneicapillus sandiegensis</i>	coastal cactus wren	SSC
POLIOPTILIDAE - GNATCATCHER FAMILY		
<i>Poliopitila caerulea</i>	blue-gray gnatcatcher	
<i>Poliopitila californica</i>	California gnatcatcher	FT, SSC (subsp. californica)
SYLVIIDAE - SILVIID WARBLERS FAMILY		
<i>Chamaea fasciata</i>	wrentit	
MIMIDAE - MOCKINGBIRD AND THRASHER FAMILY		
<i>Toxostoma redivivum</i>	California thrasher	
<i>Mimus polyglottos</i>	northern mockingbird	
STURNIDAE - STARLING FAMILY		
<i>Sturnus vulgaris*</i>	European starling*	
FRINGILLIDAE - FINCH FAMILY		
<i>Haemorhous mexicanus</i>	house finch	
<i>Spinus psaltria</i>	lesser goldfinch	
PASSERELLIDAE - NEW WORLD SPARROW FAMILY		
<i>Pipilo maculatus</i>	spotted towhee	
<i>Aimophila ruficeps</i>	rufous-crowned sparrow	
<i>Melospiza crissalis</i>	California towhee	
<i>Melospiza melodia</i>	song sparrow	
ICTERIDAE - BLACKBIRDS AND ORIOLES		
<i>Sturnella neglecta</i>	western meadowlark	
<i>Icterus cucullatus</i>	hooded oriole	
<i>Agelaius phoeniceus</i>	red-winged blackbird	
PARULIDAE - WOOD-WARBLER FAMILY		
<i>Geothlypis trichas</i>	common yellowthroat	
<i>Setophaga coronata</i>	yellow-rumped warbler	

WILDLIFE SPECIES OBSERVED

Species		Special Status
Scientific Name	Common Name	
MAMMALS		
SCIURIDAE - SQUIRREL FAMILY		
<i>Otospermophilus beecheyi</i>	California ground squirrel	
GEOMYIDAE - POCKET GOPHER FAMILY		
<i>Thomomys bottae</i>	Botta's pocket gopher	
CRICETIDAE - NEW WORLD RATS AND MICE FAMILY		
<i>Neotoma bryanti</i>	Bryant's woodrat	
LEPORIDAE - HARE AND RABBIT FAMILY		
<i>Sylvilagus audubonii</i>	desert cottontail	
CANIDAE - CANID FAMILY		
<i>Canis latrans</i>	coyote	
MEPHITIDAE - SKUNK FAMILY		
<i>Mephitis mephitis</i>	striped skunk	
PROCYONIDAE - PROCYONID FAMILY		
<i>Procyon lotor</i>	northern raccoon	
CERVIDAE - CERVID FAMILY		
<i>Odocoileus hemionus</i>	southern mule deer	

ATTACHMENT C

DATA SHEETS

Quino Checkerspot General Form

Adult Survey

Location Santiago Creek Dam
 Surveyor Lindsay Messert Date 2/18/22 Survey Week Number 1
 Survey Partner(s) n/a
 Total Acres: 307 Portion Surveyed: Downstream Elevation: Max 657 Min 996

Time (24 hr)	% Cloud	Sky	Wind (range)	Temp (F)
Start 0900	0	<input checked="" type="checkbox"/> clear <input type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower	0-1 mph	62
		<input type="checkbox"/> clear <input type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower		
1100	0	<input checked="" type="checkbox"/> clear <input type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower	0-1 mph	64
		<input type="checkbox"/> clear <input type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower		
1300	0	<input checked="" type="checkbox"/> clear <input type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower	3-4 mph	69
		<input type="checkbox"/> clear <input type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower		
Stop 1500	0	<input checked="" type="checkbox"/> clear <input type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower	2-5 mph	70

Habitat onsite (circle as applicable): hilltops, ridges, rock outcrops, open soils, soil crusts, clay soils, old roads, Plantago, Castilleja, Cordylanthus, Antirrhinum, nectar sources.

Butterfly Species	Count (Total)	Hill-topping	Butterfly Species	Count (Total)	Hill-topping
Nymphalidae (Brush Footed Butterflies)			<i>Leptotes marina</i> (Marine Blue)		
<i>Euphydryas editha quino</i> (Quino Checkerspot)			<i>Philotes sonorensis</i> (Sonoran Blue)		
<i>Euphydryas chalcedona</i> (Chalcedon Checkerspot)			<i>Lycaeides melissa</i> (Melissa Blue)		
<i>Chlosyne gabbii gabbii</i> (Gabb's Checkerspot)			<i>Cupido amyntula</i> (Western Tailed-Blue)		
<i>Phycoides mylitta</i> (Mylitta Crescent)			<i>Brephidium exilis</i> (Western Pygmy-Blue)		
<i>Chlosyne leanira</i> (Leanira Checkerspot)			Riodinidae (Metalmarks)		
<i>Nymphalis antiopa</i> (Mourning Cloak)	1		<i>Apodemia mormo</i> (Mormon Metalmark)	11	
<i>Limenitis lorquini</i> (Lorquin's Admiral)			Papilionidae (Swallowtails)		
<i>Junonia coenia</i> (Common Buckeye)			<i>Papilio eurymedon</i> (Pale Swallowtail)	1	
<i>Vanessa annabella</i> (West Coast Lady)			<i>Papilio rutulus</i> (Western Tiger Swallowtail)	1	
<i>Vanessa atalanta</i> (Red Admiral)			<i>Papilio zelicaon</i> (Anise Swallowtail)		
<i>Vanessa cardui</i> (Painted Lady)			Pieridae (Whites and Orangetips)		
<i>Vanessa virginiensis</i> (American Lady)			<i>Anthocharis cethura</i> (Desert Orangetip)		
Danaidae			<i>Anthocharis sara</i> (Sara's Orangetip)	11	1
<i>Danaus gilippus</i> (Queen)			<i>Pieris rapae</i> (Cabbage White)		
<i>Danaus plexippus</i> (Monarch)	1		<i>Pontia protodice</i> (Checkered White)		
Hesperiidae			<i>Colias eurytheme</i> (Orange Sulphur)		
<i>Heliopetes ericetorum</i> (Northern White-Skipper)			<i>Colias harfordii</i> (Harford's Sulphur)	1	
<i>Hylephila phyleus</i> (Fiery Skipper)			<i>Eurema nicippe</i> (Sleepy Orange)		
<i>Pyrgus albescens</i> (White Checkered-Skipper)			Satyridae (Satyrids)		
<i>Erynnis funeralis</i> (Funereal Duskywing)			<i>Coenonympha tullia californica</i> (California Ringlet)		
<i>Erynnis tristis</i> (Mournful Duskywing)			OTHERS:		
<i>Erynnis propertius</i> (Propertius Duskywing)					
<i>Ochlodes agricola</i> (Rural Skipper)					
Lycaenidae (Hairstreaks)					
<i>Atlides halesus</i> (Great Purple Hairstreak)					
<i>Callophrys augustinus</i> (Brown Elfin)					
<i>Callophrys perplexa</i> (Perplexing/Green Hairstreak)					
<i>Strymon melinus</i> (Gray Hairstreak)					
<i>Glaucopsyche hydamus</i> (Silvery Blue)					
<i>Plebejus acmon</i> (Acmon Blue)					
<i>Celastrina ladon</i> (Spring Azure)					

Surveyor Lindsay Messett

Date: 2/18/22

Comments:

Several Polygons containing Plantago. The Plantago is very small and patchy but flowering. Most nectar sources aren't flowering yet but are present and should be flowering soon.

Plant Communities and Habitat Information:

Surveys were conducted in sagebrush scrub, disturbed sagebrush scrub, disturbed floodplain sagebrush scrub, annual grassland, ruderal and disturbed areas (dirt roads).

Host Plants Present:

Plantago erecta
Castilleja exserta

Nectar Plants Present:

Popcorn Flower, Fiddleneck, redmaids, buckwheat, blue dicks, goldfields, mustard, erodium.

☐ Quino Sighting n/a Date: n/a GPS Location: n/a

Photographs Taken: n/a

1.	2.	3.
4.	5.	6.
7.	8.	9.
10.	11.	12.

Quino Checkerspot General Form

Adult Survey

Location Santiago Creek Dam
 Surveyor Kindsay Messett Date 2/19/22 Survey Week Number 1
 Survey Partner(s) n/a
 Total Acres: 307 Portion Surveyed: Upstream Elevation: Max 657 Min 996

Time (24 hr)	% Cloud	Sky	Wind (range)	Temp (F)
Start <u>0930</u>	<u>25</u>	<input type="checkbox"/> clear <input checked="" type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower	<u>0-1 mph</u>	<u>60</u>
		<input type="checkbox"/> clear <input type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower		
<u>1135</u>	<u>25</u>	<input type="checkbox"/> clear <input checked="" type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower	<u>1-2 mph</u>	<u>60</u>
		<input type="checkbox"/> clear <input type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower		
<u>1400</u>	<u>25</u>	<input type="checkbox"/> clear <input checked="" type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower	<u>3-5 mph</u>	<u>68</u>
		<input type="checkbox"/> clear <input type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower		
Stop <u>1530</u>	<u>20</u>	<input type="checkbox"/> clear <input checked="" type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower	<u>4-6 mph</u>	<u>70</u>

Habitat onsite (circle as applicable): hilltops, ridges, rock outcrops, open soils, soil crusts, clay soils, old roads, Plantago, Castilleja, Cordylanthus, Antirrhinum, nectar sources.

Butterfly Species	Count (Total)	Hill-topping	Butterfly Species	Count (Total)	Hill-topping
Nymphalidae (Brush Footed Butterflies)			<i>Leptotes marina</i> (Marine Blue)		
<i>Euphydryas editha quino</i> (Quino Checkerspot)			<i>Philotes sonorensis</i> (Sonoran Blue)		
<i>Euphydryas chalcedona</i> (Chalcedon Checkerspot)			<i>Lycaeides melissa</i> (Melissa Blue)		
<i>Chlosyne gabbii gabbii</i> (Gabb's Checkerspot)			<i>Cupido amyntula</i> (Western Tailed-Blue)		
<i>Phycoides mylitta</i> (Mylitta Crescent)			<i>Brephidium exilis</i> (Western Pygmy-Blue)		
<i>Chlosyne leanira</i> (Leanira Checkerspot)			Riodinidae (Metalmarks)		
<i>Nymphalis antiopa</i> (Mourning Cloak)			<i>Apodemia mormo</i> (Mormon Metalmark)	<u>111</u>	
<i>Limenitis lorquini</i> (Lorquin's Admiral)			Papilionidae (Swallowtails)		
<i>Junonia coenia</i> (Common Buckeye)			<i>Papilio eurymedon</i> (Pale Swallowtail)		
<i>Vanessa annabella</i> (West Coast Lady)			<i>Papilio rutulus</i> (Western Tiger Swallowtail)	<u>1</u>	
<i>Vanessa atalanta</i> (Red Admiral)			<i>Papilio zelicaon</i> (Anise Swallowtail)		
<i>Vanessa cardui</i> (Painted Lady)			Pieridae (Whites and Orangetips)		
<i>Vanessa virginiensis</i> (American Lady)			<i>Anthocharis cethura</i> (Desert Orangetip)		
Danaidae			<i>Anthocharis sara</i> (Sara's Orangetip)	<u>44</u>	<u>11</u>
<i>Danaus gilippus</i> (Queen)			<i>Pieris rapae</i> (Cabbage White)		
<i>Danaus plexippus</i> (Monarch)	<u>11</u>		<i>Pontia protodice</i> (Checkered White)		
Hesperiidae			<i>Colias eurytheme</i> (Orange Sulphur)		
<i>Heliopetes ericetorum</i> (Northern White-Skipper)			<i>Colias harfordii</i> (Harford's Sulphur)	<u>111</u>	
<i>Hylephila phyleus</i> (Fiery Skipper)			<i>Eurema nicippe</i> (Sleepy Orange)		
<i>Pyrgus albescens</i> (White Checkered-Skipper)			Satyridae (Satyrids)		
<i>Erynnis funeralis</i> (Funereal Duskywing)	<u>1</u>		<i>Coenonympha tullia californica</i> (California Ringlet)		
<i>Erynnis tristis</i> (Mournful Duskywing)			OTHERS:		
<i>Erynnis propertius</i> (Propertius Duskywing)					
<i>Ochlodes agricola</i> (Rural Skipper)					
Lycaenidae (Hairstreaks)					
<i>Atilides halesus</i> (Great Purple Hairstreak)					
<i>Callophrys augustinus</i> (Brown Elf)					
<i>Callophrys perplexa</i> (Perplexing/Green Hairstreak)					
<i>Strymon melinus</i> (Gray Hairstreak)					
<i>Glaucopsyche lygdamus</i> (Silvery Blue)					
<i>Plebejus acmon</i> (Acmon Blue)					
<i>Celastrina ladon</i> (Spring Azure)					

Surveyor Lindsay Nessett

Date: 2/19/22

Comments:

Most of the survey area is lower quality w/ ruderal and disturbed areas; however there is one large area that contains *Plantago* and nectar sources. There is also good quality habitat immediately adjacent to this polygon.

Plant Communities and Habitat Information:

Sagebrush scrub, disturbed sagebrush scrub, disturbed floodplain sagebrush scrub, annual grassland, ruderal and disturbed areas.

Host Plants Present:

Plantago erecta
Castilleja exserta

Nectar Plants Present:

Blue dicks, buckwheat, fiddleneck, erodium, mustard, lupine, red voads, gold fields

☐ Quino Sighting na Date: na GPS Location: na

Photographs Taken: na

1.	2.	3.
4.	5.	6.
7.	8.	9.
10.	11.	12.

Quino Checkerspot General Form

Adult Survey

Location Santiago Creek Dam
 Surveyor Lindsay Messett Date 2/25/22 Survey Week Number 2
 Survey Partner(s) na
 Total Acres: 357 Portion Surveyed: Downstream Elevation: Max 1057 Min 996

Time (24 hr)	% Cloud	Sky	Wind (range)	Temp (F)
Start 1000	0	<input checked="" type="checkbox"/> clear <input type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower	2-3 mph	60
		<input type="checkbox"/> clear <input type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower		
1200	0	<input checked="" type="checkbox"/> clear <input type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower	1-2 mph	62
		<input type="checkbox"/> clear <input type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower		
1430	0	<input checked="" type="checkbox"/> clear <input type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower	4-6 mph	62
		<input type="checkbox"/> clear <input type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower		
Stop 1600	0	<input checked="" type="checkbox"/> clear <input type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower	5-7 mph	63

Habitat onsite (circle as applicable): hilltops, ridges, rock outcrops, open soils, soil crusts, clay soils, old roads, Plantago, Castilleja, Cordylanthus, Antirrhinum, nectar sources.

Butterfly Species	Count (Total)	Hill-topping	Butterfly Species	Count (Total)	Hill-topping
Nymphalidae (Brush Footed Butterflies)			<i>Leptotes marina</i> (Marine Blue)		
<i>Euphydryas editha quino</i> (Quino Checkerspot)			<i>Philotes sonorensis</i> (Sonoran Blue)		
<i>Euphydryas chalcedona</i> (Chalcedon Checkerspot)			<i>Lycaeides melissa</i> (Melissa Blue)		
<i>Chlosyne gabbii gabbii</i> (Gabb's Checkerspot)			<i>Cupido amyntula</i> (Western Tailed-Blue)		
<i>Phycoides mylitta</i> (Mylitta Crescent)			<i>Brephidium exilis</i> (Western Pygmy-Blue)		
<i>Chlosyne leanira</i> (Leanira Checkerspot)			Riodinidae (Metalmarks)		
<i>Nymphalis antiopa</i> (Mourning Cloak)			<i>Apodemia mormo</i> (Mormon Metalmark)		
<i>Limenitis lorquini</i> (Lorquin's Admiral)			Papilionidae (Swallowtails)		
<i>Junonia coenia</i> (Common Buckeye)			<i>Papilio eurymedon</i> (Pale Swallowtail)	1	
<i>Vanessa annabella</i> (West Coast Lady)			<i>Papilio rutulus</i> (Western Tiger Swallowtail)		
<i>Vanessa atalanta</i> (Red Admiral)			<i>Papilio zelicaon</i> (Anise Swallowtail)	1	
<i>Vanessa cardui</i> (Painted Lady)			Pieridae (Whites and Orangetips)		
<i>Vanessa virginiensis</i> (American Lady)			<i>Anthocharis cethura</i> (Desert Orangetip)		
Danaidae			<i>Anthocharis sara</i> (Sara's Orangetip)	111	
<i>Danaus gilippus</i> (Queen)			<i>Pieris rapae</i> (Cabbage White)		
<i>Danaus plexippus</i> (Monarch)	1		<i>Pontia protodice</i> (Checkered White)		
Hesperiidae			<i>Colias eurytheme</i> (Orange Sulphur)		
<i>Heliopetes ericetorum</i> (Northern White-Skipper)			<i>Colias harfordii</i> (Harford's Sulphur)	1	
<i>Hylephila phyleus</i> (Fiery Skipper)			<i>Eurema nicippe</i> (Sleepy Orange)		
<i>Pyrgus albescens</i> (White Checkered-Skipper)	1		Satyridae (Satyrids)		
<i>Erynnis funeralis</i> (Funereal Duskywing)	111		<i>Coenonympha tullia californica</i> (California Ringlet)		
<i>Erynnis tristis</i> (Mournful Duskywing)			OTHERS:		
<i>Erynnis propertius</i> (Propertius Duskywing)					
<i>Ochlodes agricola</i> (Rural Skipper)					
Lycaenidae (Hairstreaks)					
<i>Atlides halesus</i> (Great Purple Hairstreak)					
<i>Callophrys augustinus</i> (Brown Elfin)					
<i>Callophrys perplexa</i> (Perplexing/Green Hairstreak)					
<i>Strymon melinus</i> (Gray Hairstreak)					
<i>Glaucopsyche lygdamus</i> (Silvery Blue)					
<i>Plebejus acmon</i> (Acmon Blue)	11				
<i>Celastrina ladon</i> (Spring Azure)					

Surveyor Lindsay Messett

Date: 2/25/22

Comments:

Plantago is still small in most flygones but larger in a few too. Nectar sources are flowering more.

→ a crew was weeding a large area on the back slope of the dam. The area contained mostly non-natives (grasses) but did also contain scattered CSS shrubs and nectar sources (primarily fiddleneck w/ some blue dicks). The crew parked trucks on Plantago. I asked them to move and keep all equipment on the other side of the road.

Plant Communities and Habitat Information:

Sagebrush / disturbed Sagebrush scrub, disturbed floodplain sagebrush scrub, annual grassland, ruderal, disturbed areas.

Host Plants Present:

Plantago erecta
Castilleja exserta

Nectar Plants Present:

fiddleneck, blue dicks, popcorn flower, buckwheat, goldfields, mustard, erodium, red maids

☐ Quino Sighting —

Date: —

GPS Location: —

Photographs Taken: —

1.	2.	3.
4.	5.	6.
7.	8.	9.
10.	11.	12.

Quino Checkerspot General Form

Adult Survey

Location Santiago Creek Dan
 Surveyor Lindsay Messett Date 2/27/22 Survey Week Number 2
 Survey Partner(s) _____
 Total Acres: 357 Portion Surveyed: Upstream Elevation: Max 457 Min 996

Time (24 hr)	% Cloud	Sky	Wind (range)	Temp (F)
Start 1000	10	<input type="checkbox"/> clear <input checked="" type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower	0-1 mph	61
		<input type="checkbox"/> clear <input type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower		
1230	5	<input type="checkbox"/> clear <input checked="" type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower	0-1 mph	65
		<input type="checkbox"/> clear <input type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower		
1405	0	<input checked="" type="checkbox"/> clear <input type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower	4-5 mph	66
		<input type="checkbox"/> clear <input type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower		
Stop 1545	10	<input type="checkbox"/> clear <input checked="" type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower	5-6 mph	70

Habitat onsite (circle as applicable): hilltops, ridges, rock outcrops, open soils, soil crusts, clay soils, old roads, Plantago, Castilleja, Cordylanthus, Antirrhinum, nectar sources.

Butterfly Species	Count (Total)	Hill-topping	Butterfly Species	Count (Total)	Hill-topping
Nymphalidae (Brush Footed Butterflies)			<i>Leptotes marina</i> (Marine Blue)		
<i>Euphydryas editha quino</i> (Quino Checkerspot)			<i>Philotes sonorensis</i> (Sonoran Blue)		
<i>Euphydryas chalcedona</i> (Chalcedon Checkerspot)			<i>Lycaeides melissa</i> (Melissa Blue)		
<i>Chlosyne gabbii gabbii</i> (Gabb's Checkerspot)			<i>Cupido amyntula</i> (Western Tailed-Blue)		
<i>Phycoides mylitta</i> (Mylitta Crescent)			<i>Brephidium exilis</i> (Western Pygmy-Blue)		
<i>Chlosyne leanira</i> (Leanira Checkerspot)			Riodinidae (Metalmarks)		
<i>Nymphalis antiopa</i> (Mourning Cloak)	1		<i>Apodemia mormo</i> (Mormon Metalmark)	11	
<i>Limenitis lorquini</i> (Lorquin's Admiral)			Papilionidae (Swallowtails)		
<i>Junonia coenia</i> (Common Buckeye)			<i>Papilio eurymedon</i> (Pale Swallowtail)		
<i>Vanessa annabella</i> (West Coast Lady)			<i>Papilio rutulus</i> (Western Tiger Swallowtail)	1	
<i>Vanessa atalanta</i> (Red Admiral)			<i>Papilio zelicaon</i> (Anise Swallowtail)		
<i>Vanessa cardui</i> (Painted Lady)	1		Pieridae (Whites and Orangetips)		
<i>Vanessa virginiensis</i> (American Lady)			<i>Anthocharis cethura</i> (Desert Orangetip)		
Danaidae			<i>Anthocharis sara</i> (Sara's Orangetip)	44	
<i>Danaus gilippus</i> (Queen)			<i>Pieris rapae</i> (Cabbage White)	111	
<i>Danaus plexippus</i> (Monarch)			<i>Pontia protodice</i> (Checkered White)	11	
Hesperiidae			<i>Colias eurytheme</i> (Orange Sulphur)		
<i>Heliopetes ericetorum</i> (Northern White-Skipper)			<i>Colias harfordii</i> (Harford's Sulphur)	1	
<i>Hylephila phyleus</i> (Fiery Skipper)			<i>Eurema nicippe</i> (Sleepy Orange)		
<i>Pyrgus albescens</i> (White Checkered-Skipper)	1		Satyridae (Satyrids)		
<i>Erynnis funeralis</i> (Funereal Duskywing)	11		<i>Coenonympha tullia californica</i> (California Ringlet)		
<i>Erynnis tristis</i> (Mournful Duskywing)			OTHERS:		
<i>Erynnis propertius</i> (Propertius Duskywing)					
<i>Ochlodes agricola</i> (Rural Skipper)					
Lycaenidae (Hairstreaks)					
<i>Atlides halesus</i> (Great Purple Hairstreak)					
<i>Callophrys augustinus</i> (Brown Elf)					
<i>Callophrys perplexa</i> (Perplexing/Green Hairstreak)					
<i>Strymon melinus</i> (Gray Hairstreak)					
<i>Glaucopsyche lygdamus</i> (Silvery Blue)					
<i>Plebejus acmon</i> (Acmon Blue)	111				
<i>Celastrina ladon</i> (Spring Azure)					

Surveyor Lindsay Messett

Date: 2/27/22

Comments:

Plantago is larger, nectar sources flowering more as well. Only 1 large polygon of good quality habitat. Other portions of the survey area are really low quality w/ very few nectar sources.

Plant Communities and Habitat Information:

Sagebrush / disturbed sagebrush scrub, disturbed floodplain sagebrush scrub, annual grassland, ruderal, disturbed areas.

Host Plants Present:

Plantago erecta
Castilleja exserta

Nectar Plants Present:

fiddle neck, erodium, mustard, lupine, goldfields, blue dicks, popcorn flower, gold fields.

☐ Quino Sighting

Date:

GPS Location:

Photographs Taken:

1.	2.	3.
4.	5.	6.
7.	8.	9.
10.	11.	12.

Quino Checkerspot General Form

Adult Survey

Location Santiago Creek Dam
 Surveyor Lindsay Messett Date 3/31/22 Survey Week Number 3
 Survey Partner(s) _____
 Total Acres: 307 Portion Surveyed: upstream Elevation: Max 1057 Min 996

Time (24 hr)	% Cloud	Sky	Wind (range)	Temp (F)
Start <u>0930</u>	<u>50</u>	<input type="checkbox"/> clear <input checked="" type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower	<u>1-2 mph</u>	<u>62</u>
		<input type="checkbox"/> clear <input type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower		
<u>1100</u>	<u>40</u>	<input type="checkbox"/> clear <input checked="" type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower	<u>3-4 mph</u>	<u>64</u>
		<input type="checkbox"/> clear <input type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower		
<u>1330</u>	<u>30</u>	<input type="checkbox"/> clear <input checked="" type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower	<u>5-6 mph</u>	<u>66</u>
		<input type="checkbox"/> clear <input type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower		
Stop <u>1555</u>	<u>30</u>	<input type="checkbox"/> clear <input checked="" type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower	<u>8-10 mph</u>	<u>67</u>

Habitat onsite (circle as applicable): hilltops, ridges, rock outcrops, open soils, soil crusts, clay soils, old roads, Plantago, Castilleja, Cordylanthus, Antirrhinum, nectar sources.

Butterfly Species	Count (Total)	Hill-topping	Butterfly Species	Count (Total)	Hill-topping
Nymphalidae (Brush Footed Butterflies)			<i>Leptotes marina</i> (Marine Blue)		
<i>Euphydryas editha quino</i> (Quino Checkerspot)			<i>Philotes sonorensis</i> (Sonoran Blue)		
<i>Euphydryas chalcedona</i> (Chalcedon Checkerspot)			<i>Lycaeides melissa</i> (Melissa Blue)		
<i>Chlosyne gabbii gabbii</i> (Gabb's Checkerspot)			<i>Cupido amyntula</i> (Western Tailed-Blue)		
<i>Phycoides mylitta</i> (Mylitta Crescent)			<i>Brephidium exilis</i> (Western Pygmy-Blue)		
<i>Chlosyne leanira</i> (Leanira Checkerspot)			Riodinidae (Metalmarks)		
<i>Nymphalis antiopa</i> (Mourning Cloak)			<i>Apodemia mormo</i> (Mormon Metalmark)		
<i>Limenitis lorquini</i> (Lorquin's Admiral)			Papilionidae (Swallowtails)		
<i>Junonia coenia</i> (Common Buckeye)			<i>Papilio eurymedon</i> (Pale Swallowtail)	<u>1</u>	
<i>Vanessa annabella</i> (West Coast Lady)			<i>Papilio rutulus</i> (Western Tiger Swallowtail)	<u>1</u>	
<i>Vanessa atalanta</i> (Red Admiral)			<i>Papilio zelicaon</i> (Anise Swallowtail)		
<i>Vanessa cardui</i> (Painted Lady)			Pieridae (Whites and Orangetips)		
<i>Vanessa virginiensis</i> (American Lady)			<i>Anthocharis cethura</i> (Desert Orangetip)		
Danaidae			<i>Anthocharis sara</i> (Sara's Orangetip)	<u>1</u>	
<i>Danaus gilippus</i> (Queen)			<i>Pieris rapae</i> (Cabbage White)		
<i>Danaus plexippus</i> (Monarch)			<i>Pontia protodice</i> (Checkered White)		
Hesperiidae			<i>Colias eurytheme</i> (Orange Sulphur)		
<i>Heliopetes ericetorum</i> (Northern White-Skipper)			<i>Colias harfordii</i> (Harford's Sulphur)		
<i>Hylephila phyleus</i> (Fiery Skipper)			<i>Eurema nicippe</i> (Sleepy Orange)		
<i>Pyrgus albescent</i> (White Checkered-Skipper)	<u>1111</u>		Satyridae (Satyrids)		
<i>Erynnis funeralis</i> (Funereal Duskywing)			<i>Coenonympha tullia californica</i> (California Ringlet)		
<i>Erynnis tristis</i> (Mournful Duskywing)			OTHERS:		
<i>Erynnis propertius</i> (Propertius Duskywing)					
<i>Ochlodes agricola</i> (Rural Skipper)					
Lycaenidae (Hairstreaks)					
<i>Atlides halesus</i> (Great Purple Hairstreak)					
<i>Callophrys augustinus</i> (Brown Elfin)					
<i>Callophrys perplexa</i> (Perplexing/Green Hairstreak)					
<i>Strymon melinus</i> (Gray Hairstreak)					
<i>Glaucopsyche lygdamus</i> (Silvery Blue)					
<i>Plebejus acmon</i> (Acmon Blue)	<u>11</u>				
<i>Celastrina ladon</i> (Spring Azure)					

Surveyor Lindsay Messett

Date: 3/3/22

Comments:

Plantago and Castilleja in full bloom along w/
other nectar sources.

Plant Communities and Habitat Information:

Sagebrush / disturbed Sagebrush scrub, disturbed flood plain
sagebrush scrub, annual grassland, ruderal, and
disturbed areas.

Host Plants Present:

Plantago erecta
Castilleja exserta

Nectar Plants Present:

erodium, mustard, blue dicks, gold Redds, popcorn flower,
fiddleneck, lupine

☐ Quino Sighting

Date: —

GPS Location: —

Photographs Taken: —

1.	2.	3.
4.	5.	6.
7.	8.	9.
10.	11.	12.

Quino Checkerspot General Form

Adult Survey

Location Santiago Creek Dam
 Surveyor Kindsay Meszett Date 3/4/22 Survey Week Number 3
 Survey Partner(s) _____
 Total Acres: 307 Portion Surveyed: Downstream Elevation: Max 657 Min 990

Time (24 hr)	% Cloud	Sky	Wind (range)	Temp (F)
Start <u>0915</u>	<u>50</u>	<input type="checkbox"/> clear <input checked="" type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower	<u>0-1 mph</u>	<u>63</u>
		<input type="checkbox"/> clear <input type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower		
<u>1115</u>	<u>50</u>	<input type="checkbox"/> clear <input checked="" type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower	<u>0-1 mph</u>	<u>63</u>
		<input type="checkbox"/> clear <input type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower		
<u>1330</u>	<u>50</u>	<input type="checkbox"/> clear <input checked="" type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower	<u>1-2 mph</u>	<u>65</u>
		<input type="checkbox"/> clear <input type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower		
Stop <u>1530</u>	<u>50</u>	<input type="checkbox"/> clear <input checked="" type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower	<u>2-5 mph</u>	<u>65</u>

Habitat onsite (circle as applicable): hilltops, ridges, rock outcrops, open soils, soil crusts, clay soils, old roads, Plantago, Castilleja, Cordylanthus, Antirrhinum, nectar sources.

Butterfly Species	Count (Total)	Hill-topping	Butterfly Species	Count (Total)	Hill-topping
Nymphalidae (Brush Footed Butterflies)			<i>Leptotes marina</i> (Marine Blue)		
<i>Euphydryas editha quino</i> (Quino Checkerspot)			<i>Philotes sonorensis</i> (Sonoran Blue)		
<i>Euphydryas chalcedona</i> (Chalcedon Checkerspot)			<i>Lycaeides melissa</i> (Melissa Blue)		
<i>Chlosyne gabbii gabbii</i> (Gabb's Checkerspot)			<i>Cupido amyntula</i> (Western Tailed-Blue)		
<i>Phycoides mylitta</i> (Mylitta Crescent)			<i>Brephidium exilis</i> (Western Pygmy-Blue)		
<i>Chlosyne leanira</i> (Leanira Checkerspot)			Riodinidae (Metalmarks)		
<i>Nymphalis antiopa</i> (Mourning Cloak)			<i>Apodemia mormo</i> (Mormon Metalmark)	<u>111</u>	
<i>Limenitis lorquini</i> (Lorquin's Admiral)			Papilionidae (Swallowtails)		
<i>Junonia coenia</i> (Common Buckeye)			<i>Papilio eurymedon</i> (Pale Swallowtail)	<u>1</u>	
<i>Vanessa annabella</i> (West Coast Lady)			<i>Papilio rutulus</i> (Western Tiger Swallowtail)		
<i>Vanessa atalanta</i> (Red Admiral)			<i>Papilio zelicaon</i> (Anise Swallowtail)	<u>1</u>	
<i>Vanessa cardui</i> (Painted Lady)			Pieridae (Whites and Orangetips)		
<i>Vanessa virginiensis</i> (American Lady)			<i>Anthocharis cethura</i> (Desert Orangetip)		
Danaidae			<i>Anthocharis sara</i> (Sara's Orangetip)	<u>1111</u>	
<i>Danaus gilippus</i> (Queen)			<i>Pieris rapae</i> (Cabbage White)	<u>11</u>	
<i>Danaus plexippus</i> (Monarch)	<u>11</u>		<i>Pontia protodice</i> (Checkered White)	<u>111</u>	
Hesperiidae			<i>Colias eurytheme</i> (Orange Sulphur)		
<i>Heliopterus ericetorum</i> (Northern White-Skipper)			<i>Colias harfordii</i> (Harford's Sulphur)		
<i>Hylephila phyleus</i> (Fiery Skipper)			<i>Eurema nicippe</i> (Sleepy Orange)		
<i>Pyrgus albescens</i> (White Checkered-Skipper)	<u>111</u>		Satyridae (Satyrids)		
<i>Erynnis funeralis</i> (Funereal Duskywing)			<i>Coenonympha tullia californica</i> (California Ringlet)		
<i>Erynnis tristis</i> (Mournful Duskywing)	<u>11</u>		OTHERS:		
<i>Erynnis propertius</i> (Propertius Duskywing)					
<i>Ochlodes agricola</i> (Rural Skipper)					
Lycaenidae (Hairstreaks)					
<i>Atlides halesus</i> (Great Purple Hairstreak)					
<i>Callophrys augustinus</i> (Brown Elf)					
<i>Callophrys perplexa</i> (Perplexing/Green Hairstreak)					
<i>Strymon melinus</i> (Gray Hairstreak)					
<i>Glaucopsyche lygdamus</i> (Silvery Blue)					
<i>Plebejus acmon</i> (Acmon Blue)	<u>11</u>				
<i>Celastrina ladon</i> (Spring Azure)					

Surveyor Lindsay Messett

Date: 3/4/22

Comments:

Plantago is much larger and blooming in all polygons. Nectar sources occur throughout the song area.

Plant Communities and Habitat Information:

Sagebrush / disturbed sagebrush scrub, disturbed floodplain sagebrush scrub, annual grassland, ruderal, disturbed areas.

Host Plants Present:

Plantago erecta
Castilleja exserta

Nectar Plants Present:

goldfields, blue dicks, mustard, erodium, popcorn flower
buckwheat, fiddle neck.

☐ Quino Sighting

Date: —

GPS Location: —

Photographs Taken: —

1.	2.	3.
4.	5.	6.
7.	8.	9.
10.	11.	12.

Quino Checkerspot General Form

Adult Survey

Location Santiago Creek Dam
 Surveyor Lindsay Messett Date 3/10/22 Survey Week Number 4
 Survey Partner(s) _____
 Total Acres: 307 Portion Surveyed: Upstream Elevation: Max 1057 Min 996

Time (24 hr)	% Cloud	Sky	Wind (range)	Temp (F)
Start <u>0845</u>	<u>30</u>	<input type="checkbox"/> clear <input checked="" type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower	<u>2-3 mph</u>	<u>63</u>
		<input type="checkbox"/> clear <input type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower		
<u>1030</u>	<u>25</u>	<input type="checkbox"/> clear <input checked="" type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower	<u>23 mph</u>	<u>66</u>
		<input type="checkbox"/> clear <input type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower		
<u>1330</u>	<u>0</u>	<input checked="" type="checkbox"/> clear <input type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower	<u>1-2 mph</u>	<u>70</u>
		<input type="checkbox"/> clear <input type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower		
Stop <u>1550</u>	<u>0</u>	<input checked="" type="checkbox"/> clear <input type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower	<u>4-6 mph</u>	<u>71</u>

Habitat onsite (circle as applicable): hilltops, ridges, rock outcrops, open soils, soil crusts, clay soils, old roads, Plantago, Castilleja, Cordylanthus, Antirrhinum, nectar sources.

Butterfly Species	Count (Total)	Hill-topping	Butterfly Species	Count (Total)	Hill-topping
Nymphalidae (Brush Footed Butterflies)			<i>Leptotes marina</i> (Marine Blue)		
<i>Euphydryas editha quino</i> (Quino Checkerspot)			<i>Philotes sonorensis</i> (Sonoran Blue)		
<i>Euphydryas chalcedona</i> (Chalcedon Checkerspot)			<i>Lycaides melissa</i> (Melissa Blue)		
<i>Chlosyne gabbii gabbii</i> (Gabb's Checkerspot)			<i>Cupido amyntula</i> (Western Tailed-Blue)		
<i>Phycoides mylitta</i> (Mylitta Crescent)			<i>Brephidium exilis</i> (Western Pygmy-Blue)		
<i>Chlosyne leanira</i> (Leanira Checkerspot)			Riodinidae (Metalmarks)		
<i>Nymphalis antiopa</i> (Mourning Cloak)			<i>Apodemia mormo</i> (Mormon Metalmark)		
<i>Limenitis lorquini</i> (Lorquin's Admiral)			Papilionidae (Swallowtails)		
<i>Junonia coenia</i> (Common Buckeye)			<i>Papilio eurymedon</i> (Pale Swallowtail)		
<i>Vanessa annabella</i> (West Coast Lady)			<i>Papilio rutulus</i> (Western Tiger Swallowtail)		
<i>Vanessa atalanta</i> (Red Admiral)			<i>Papilio zelicaon</i> (Anise Swallowtail)		
<i>Vanessa cardui</i> (Painted Lady)			Pieridae (Whites and Orangetips)		
<i>Vanessa virginiensis</i> (American Lady)			<i>Anthocharis cethura</i> (Desert Orangetip)		
Danaidae			<i>Anthocharis sara</i> (Sara's Orangetip)	<u>1</u>	
<i>Danaus gilippus</i> (Queen)			<i>Pieris rapae</i> (Cabbage White)		
<i>Danaus plexippus</i> (Monarch)			<i>Pontia protodice</i> (Checkered White)	<u>1</u>	
Hesperiidae			<i>Colias eurytheme</i> (Orange Sulphur)		
<i>Heliopetes ericetorum</i> (Northern White-Skipper)			<i>Colias harfordii</i> (Harford's Sulphur)	<u>11</u>	
<i>Hylephila phyleus</i> (Fiery Skipper)			<i>Eurema nicippe</i> (Sleepy Orange)		
<i>Pyrgus albescens</i> (White Checkered-Skipper)	<u>144</u>		Satyridae (Satyrids)		
<i>Erynnis funeralis</i> (Funereal Duskywing)	<u>111</u>		<i>Coenonympha tullia californica</i> (California Ringlet)		
<i>Erynnis tristis</i> (Mournful Duskywing)			OTHERS:		
<i>Erynnis propertius</i> (Propertius Duskywing)					
<i>Ochlodes agricola</i> (Rural Skipper)					
Lycaenidae (Hairstreaks)					
<i>Atlides halesus</i> (Great Purple Hairstreak)					
<i>Callophrys augustinus</i> (Brown Elf)					
<i>Callophrys perplexa</i> (Perplexing/Green Hairstreak)					
<i>Strymon melinus</i> (Gray Hairstreak)					
<i>Glaucopsyche lygdamus</i> (Silvery Blue)					
<i>Plebejus acmon</i> (Acmon Blue)	<u>11</u>				
<i>Celastrina ladon</i> (Spring Azure)					

Surveyor Lindsay Messett

Date: 3/10/22

Comments:

Plantago and Castilleja still blooming and looking good. Some nectar sources are dying off but others are now blooming. This weeks survey had the most nectar sources blooming.

Plant Communities and Habitat Information:

Sagebrush / disturbed sagebrush scrub, disturbed floodplain sagebrush scrub, annual grassland, ruderal, disturbed areas

Host Plants Present:

Plantago erecta
Castilleja exserta

Nectar Plants Present:

lupine, buckwheat, mustard, blue dicks, red birds, fiddle neck, popcorn flower, gold fields

☐ Quino Sighting —

Date: —

GPS Location: —

Photographs Taken: —

1.	2.	3.
4.	5.	6.
7.	8.	9.
10.	11.	12.

Quino Checkerspot General Form

Adult Survey

Location Santiago Creek Dan
 Surveyor Lindsay Nesett Date 3/11/22 Survey Week Number 4
 Survey Partner(s) _____
 Total Acres: 357 Portion Surveyed: Downstream Elevation: Max 1057 Min 996

Time (24 hr)	% Cloud	Sky	Wind (range)	Temp (F)
Start <u>0815</u>	<u>0</u>	<input checked="" type="checkbox"/> clear <input type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower	<u>3-4 mph</u>	<u>68</u>
		<input type="checkbox"/> clear <input type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower		
<u>1030</u>	<u>0</u>	<input checked="" type="checkbox"/> clear <input type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower	<u>2-3 mph</u>	<u>70</u>
		<input type="checkbox"/> clear <input type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower		
<u>1250</u>	<u>0</u>	<input checked="" type="checkbox"/> clear <input type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower	<u>5-6 mph</u>	<u>73</u>
		<input type="checkbox"/> clear <input type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower		
Stop <u>1530</u>	<u>0</u>	<input checked="" type="checkbox"/> clear <input type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower	<u>6-8 mph</u>	<u>74</u>

Habitat onsite (circle as applicable): hilltops, ridges, rock outcrops, open soils, soil crusts, clay soils, old roads, *Plantago*, *Castilleja*, *Cordylanthus*, *Antirrhinum*, nectar sources.

Butterfly Species	Count (Total)	Hill-topping	Butterfly Species	Count (Total)	Hill-topping
Nymphalidae (Brush Footed Butterflies)			<i>Leptotes marina</i> (Marine Blue)		
<i>Euphydryas editha quino</i> (Quino Checkerspot)			<i>Philotes sonorensis</i> (Sonoran Blue)		
<i>Euphydryas chalcedona</i> (Chalcedon Checkerspot)			<i>Lycaeides melissa</i> (Melissa Blue)		
<i>Chlosyne gabbii gabbii</i> (Gabb's Checkerspot)			<i>Cupido amyntula</i> (Western Tailed-Blue)		
<i>Phycoides mylitta</i> (Mylitta Crescent)			<i>Brephidium exilis</i> (Western Pygmy-Blue)	<u>1</u>	
<i>Chlosyne leanira</i> (Leanira Checkerspot)			Riodinidae (Metalmarks)		
<i>Nymphalis antiopa</i> (Mourning Cloak)			<i>Apodemia mormo</i> (Mormon Metalmark)		
<i>Limenitis lorquini</i> (Lorquin's Admiral)			Papilionidae (Swallowtails)		
<i>Junonia coenia</i> (Common Buckeye)			<i>Papilio eurymedon</i> (Pale Swallowtail)	<u>1</u>	
<i>Vanessa annabella</i> (West Coast Lady)			<i>Papilio rutulus</i> (Western Tiger Swallowtail)		
<i>Vanessa atalanta</i> (Red Admiral)			<i>Papilio zelicaon</i> (Anise Swallowtail)		
<i>Vanessa cardui</i> (Painted Lady)			Pieridae (Whites and Orangetips)		
<i>Vanessa virginiensis</i> (American Lady)			<i>Anthocharis cethura</i> (Desert Orangetip)		
Danaidae			<i>Anthocharis sara</i> (Sara's Orangetip)	<u>111</u>	
<i>Danaus gilippus</i> (Queen)			<i>Pieris rapae</i> (Cabbage White)		
<i>Danaus plexippus</i> (Monarch)			<i>Pontia protodice</i> (Checkered White)		
Hesperiidae			<i>Colias eurytheme</i> (Orange Sulphur)		
<i>Heliopterus ericetorum</i> (Northern White-Skipper)			<i>Colias harfordii</i> (Harford's Sulphur)		
<i>Hylephila phyleus</i> (Fiery Skipper)			<i>Eurema nicippe</i> (Sleepy Orange)		
<i>Pyrgus albescens</i> (White Checkered-Skipper)	<u>11</u>		Satyridae (Satyrids)		
<i>Erynnis funeralis</i> (Funereal Duskywing)			<i>Coenonympha tullia californica</i> (California Ringlet)		
<i>Erynnis tristis</i> (Mournful Duskywing)			OTHERS:		
<i>Erynnis propertius</i> (Propertius Duskywing)					
<i>Ochlodes agricola</i> (Rural Skipper)					
Lycaenidae (Hairstreaks)					
<i>Atlides halesus</i> (Great Purple Hairstreak)					
<i>Callophrys augustinus</i> (Brown Elfin)					
<i>Callophrys perplexa</i> (Perplexing/Green Hairstreak)					
<i>Strymon melinus</i> (Gray Hairstreak)					
<i>Glaucopsyche lygdamus</i> (Silver Blue)					
<i>Plebejus acmon</i> (Acmon Blue)	<u>1</u>				
<i>Celastrina ladon</i> (Spring Azure)					

Surveyor Lindsay Messett

Date: 3/11/22

Comments:

Plantago is ~~beginning~~ beginning to dry out in some spots but is still looking good and much bigger in most polygons. Nectar sources are still plentiful throughout the survey area.

Plant Communities and Habitat Information:

Sagebrush scrub, disturbed sagebrush scrub, disturbed floodplain sagebrush scrub, annual grassland, ruderal disturbed areas.

Host Plants Present:

Plantago erecta
Castilleja exserta

Nectar Plants Present:

fiddleneck, popcorn flower, red warts, blue dicks, mustard erodium, goldfields.

☐ Quino Sighting

Date: _____

GPS Location: _____

Photographs Taken: _____

1.	2.	3.
4.	5.	6.
7.	8.	9.
10.	11.	12.

Quino Checkerspot General Form

Adult Survey

Location Santiago Creek Dam
 Surveyor Lindsay Messett Date 3/17/22 Survey Week Number 5
 Survey Partner(s) _____
 Total Acres: 357 Portion Surveyed: Upstream Elevation: Max 157 Min 994

Time (24 hr)	% Cloud	Sky	Wind (range)	Temp (F)
Start <u>0930</u>	<u>25</u>	<input type="checkbox"/> clear <input checked="" type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower	<u>1-2 mph</u>	<u>65</u>
		<input type="checkbox"/> clear <input type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower		
<u>1100</u>	<u>20</u>	<input type="checkbox"/> clear <input checked="" type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower	<u>2-3 mph</u>	<u>72</u>
		<input type="checkbox"/> clear <input type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower		
<u>1430</u>	<u>35</u>	<input type="checkbox"/> clear <input checked="" type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower	<u>3-4 mph</u>	<u>78</u>
		<input type="checkbox"/> clear <input type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower		
Stop <u>1600</u>	<u>30</u>	<input type="checkbox"/> clear <input checked="" type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower	<u>2-5 mph</u>	<u>80</u>

Habitat onsite (circle as applicable): hilltops, ridges, rock outcrops, open soils, soil crusts, clay soils, old roads, Plantago, Casilleja, Cordylanthus, Antirrhinum, nectar sources.

Butterfly Species	Count (Total)	Hill-topping	Butterfly Species	Count (Total)	Hill-topping
Nymphalidae (Brush Footed Butterflies)			<i>Leptotes marina</i> (Marine Blue)		
<i>Euphydryas editha quino</i> (Quino Checkerspot)			<i>Philotes sonorensis</i> (Sonoran Blue)		
<i>Euphydryas chalcedona</i> (Chalcedon Checkerspot)			<i>Lycaeides melissa</i> (Melissa Blue)		
<i>Chlosyne gabbii gabbii</i> (Gabb's Checkerspot)			<i>Cupido amyntula</i> (Western Tailed-Blue)		
<i>Phycoides mylitta</i> (Mylitta Crescent)			<i>Brephidium exilis</i> (Western Pygmy-Blue)	<u>11</u>	
<i>Chlosyne leanira</i> (Leanira Checkerspot)			Riodinidae (Metalmarks)		
<i>Nymphalis antiopa</i> (Mourning Cloak)			<i>Apodemia mormo</i> (Mormon Metalmark)		
<i>Limenitis lorquini</i> (Lorquin's Admiral)			Papilionidae (Swallowtails)		
<i>Junonia coenia</i> (Common Buckeye)			<i>Papilio eurymedon</i> (Pale Swallowtail)		
<i>Vanessa annabella</i> (West Coast Lady)			<i>Papilio rutulus</i> (Western Tiger Swallowtail)		
<i>Vanessa atalanta</i> (Red Admiral)			<i>Papilio zelicaon</i> (Anise Swallowtail)		
<i>Vanessa cardui</i> (Painted Lady)	<u>11</u>		Pieridae (Whites and Orangetips)		
<i>Vanessa virginiensis</i> (American Lady)			<i>Anthocharis cethura</i> (Desert Orangetip)		
Danaidae			<i>Anthocharis sara</i> (Sara's Orangetip)	<u>1111</u>	
<i>Danaus gilippus</i> (Queen)			<i>Pieris rapae</i> (Cabbage White)		
<i>Danaus plexippus</i> (Monarch)			<i>Pontia protodice</i> (Checkered White)	<u>111</u>	
Hesperiidae			<i>Colias eurytheme</i> (Orange Sulphur)		
<i>Heliopterus ericetorum</i> (Northern White-Skipper)			<i>Colias harfordii</i> (Harford's Sulphur)		
<i>Hylephila phyleus</i> (Fiery Skipper)			<i>Eurema nicippe</i> (Sleepy Orange)		
<i>Pyrgus albescens</i> (White Checkered-Skipper)			Satyridae (Satyrids)		
<i>Erynnis funeralis</i> (Funereal Duskywing)	<u>1111</u>		<i>Coenonympha tullia californica</i> (California Ringlet)		
<i>Erynnis tristis</i> (Mournful Duskywing)			OTHERS:		
<i>Erynnis propertius</i> (Propertius Duskywing)					
<i>Ochlodes agricola</i> (Rural Skipper)					
Lycaenidae (Hairstreaks)					
<i>Atlides halesus</i> (Great Purple Hairstreak)					
<i>Callophrys augustinus</i> (Brown Elfin)					
<i>Callophrys perplexa</i> (Perplexing/Green Hairstreak)					
<i>Strymon melinus</i> (Gray Hairstreak)					
<i>Glaucopsyche lygdamus</i> (Silvery Blue)					
<i>Plebejus acmon</i> (Acmon Blue)					
<i>Celastrina ladon</i> (Spring Azure)					

Surveyor Lindsay Messett

Date: 3/17/22

Comments:

Plantago is drying out in about half of the polygon where it occurs. Castilleja is also dry but some newer individuals have bloomed. Most nectar sources are still blooming.

Plant Communities and Habitat Information:

Sagebrush scrub, disturbed sagebrush scrub, disturbed floodplain sagebrush scrub, annual grassland, ruderal and disturbed areas.

Host Plants Present:

Plantago erecta
Castilleja exserta

Nectar Plants Present:

fiddle neck, goldfields, mustard, buckwheat, lupine, arduum red maids, popcorn flower.

☐ Quino Sighting

Date:

GPS Location:

Photographs Taken:

1.	2.	3.
4.	5.	6.
7.	8.	9.
10.	11.	12.

Quino Checkerspot General Form

Adult Survey

Location Santiago Creek Dam
 Surveyor Lindsay Messett Date 3/18/22 Survey Week Number 5
 Survey Partner(s) _____
 Total Acres: 307 Portion Surveyed: Downstream Elevation: Max 657 Min 996

Time (24 hr)	% Cloud	Sky	Wind (range)	Temp (F)
Start <u>0900</u>	<u>0</u>	<input checked="" type="checkbox"/> clear <input type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower	<u>1-2 mph</u>	<u>68</u>
		<input type="checkbox"/> clear <input type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower		
<u>1120</u>	<u>0</u>	<input checked="" type="checkbox"/> clear <input type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower	<u>1-2 mph</u>	<u>72</u>
		<input type="checkbox"/> clear <input type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower		
<u>1410</u>	<u>0</u>	<input checked="" type="checkbox"/> clear <input type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower	<u>2-3 mph</u>	<u>73</u>
		<input type="checkbox"/> clear <input type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower		
Stop <u>1515</u>	<u>0</u>	<input checked="" type="checkbox"/> clear <input type="checkbox"/> patchy <input type="checkbox"/> overcast <input type="checkbox"/> drizzle shower	<u>4-6 mph</u>	<u>74</u>

Habitat onsite (circle as applicable): hilltops, ridges, rock outcrops, open soils, soil crusts, clay soils, old roads, *Plantago*, *Castilleja*, *Cordylanthus*, *Antirrhinum*, nectar sources.

Butterfly Species	Count (Total)	Hill-topping	Butterfly Species	Count (Total)	Hill-topping
Nymphalidae (Brush Footed Butterflies)			<i>Leptotes marina</i> (Marine Blue)		
<i>Euphydryas editha quino</i> (Quino Checkerspot)			<i>Philotes sonorensis</i> (Sonoran Blue)		
<i>Euphydryas chalcedona</i> (Chalcedon Checkerspot)			<i>Lycaeides melissa</i> (Melissa Blue)		
<i>Chlosyne gabbii gabbii</i> (Gabb's Checkerspot)			<i>Cupido amyntula</i> (Western Tailed-Blue)		
<i>Phycoides mylitta</i> (Mylitta Crescent)			<i>Brephidium exilis</i> (Western Pygmy-Blue)	<u>1</u>	
<i>Chlosyne leanira</i> (Leanira Checkerspot)			Riodinidae (Metalmarks)		
<i>Nymphalis antiopa</i> (Mourning Cloak)	<u>1</u>		<i>Apodemia mormo</i> (Mormon Metalmark)	<u>1</u>	<u>1</u>
<i>Limenitis lorquini</i> (Lorquin's Admiral)			Papilionidae (Swallowtails)		
<i>Junonia coenia</i> (Common Buckeye)	<u>1</u>		<i>Papilio eurymedon</i> (Pale Swallowtail)		
<i>Vanessa annabella</i> (West Coast Lady)			<i>Papilio rutulus</i> (Western Tiger Swallowtail)		
<i>Vanessa atalanta</i> (Red Admiral)			<i>Papilio zelicaon</i> (Anise Swallowtail)		
<i>Vanessa cardui</i> (Painted Lady)	<u>11</u>		Pieridae (Whites and Orangetips)		
<i>Vanessa virginiensis</i> (American Lady)			<i>Anthocharis cethura</i> (Desert Orangetip)		
Danaidae			<i>Anthocharis sara</i> (Sara's Orangetip)	<u>1</u>	<u>1</u>
<i>Danaus gilippus</i> (Queen)			<i>Pieris rapae</i> (Cabbage White)	<u>1111</u>	
<i>Danaus plexippus</i> (Monarch)	<u>1</u>		<i>Pontia protodice</i> (Checkered White)	<u>111</u>	
Hesperiidae			<i>Colias eurytheme</i> (Orange Sulphur)		
<i>Heliopterus ericetorum</i> (Northern White-Skipper)			<i>Colias harfordii</i> (Harford's Sulphur)		
<i>Hylephila phyleus</i> (Fiery Skipper)	<u>1</u>		<i>Eurema nicippe</i> (Sleepy Orange)		
<i>Pyrgus albescens</i> (White Checkered-Skipper)	<u>111</u>		Satyridae (Satyrids)		
<i>Erynnis funeralis</i> (Funereal Duskywing)	<u>111</u>		<i>Coenonympha tullia californica</i> (California Ringlet)		
<i>Erynnis tristis</i> (Mournful Duskywing)			OTHERS:		
<i>Erynnis propertius</i> (Propertius Duskywing)					
<i>Ochlodes agricola</i> (Rural Skipper)					
Lycaenidae (Hairstreaks)					
<i>Atlides halesus</i> (Great Purple Hairstreak)					
<i>Callophrys augustinus</i> (Brown Elf)					
<i>Callophrys perplexa</i> (Perplexing/Green Hairstreak)					
<i>Strymon melinus</i> (Gray Hairstreak)					
<i>Glaucopteryx lydamus</i> (Silvery Blue)					
<i>Plebejus acmon</i> (Acmon Blue)	<u>11</u>				
<i>Celastrina ladon</i> (Spring Azure)					

Surveyor Lindsay Massett

Date: 3/17/22

Comments:

Most of the Plantago is dried out. There is still some flowering in the most eastern polygon. Nectar sources are still blooming but getting sparser than in previous weeks.

Plant Communities and Habitat Information:

sagebrush / disturbed sagebrush scrub, disturbed floodplain sagebrush scrub, annual grassland, ruderal and disturbed areas.

Host Plants Present:

Plantago erecta
Castilleja exserta

Nectar Plants Present:

Adder's tongue, buckwheat, goldfields, eridium, mustard, pop corn flower, blue dicks, lupine.

☐ Quino Sighting

Date: _____

GPS Location: _____

Photographs Taken: _____

1.	2.	3.
4.	5.	6.
7.	8.	9.
10.	11.	12.

ATTACHMENT D

CNDDB FORMS

CNDDDB Online Field Survey Form Report



California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/



Source code MES22F0001
Quad code 3311776
Occ. no. _____
EO index no. _____
Map index no. _____

This data has been reported to the CNDDDB, but may not have been evaluated by the CNDDDB staff

Scientific name: *Falco peregrinus anatum*

Common name: American peregrine falcon

Date of field work (mm-dd-yyyy): 02-27-2022

Comment about field work date(s):

OBSERVER INFORMATION

Observer: Lindsay A. Messett

Affiliation: Psomas

Address: 7236 E Stearns Street , Long Beach, CA 90815

Email: lindsay.messett@psomas.com

Phone: (562) 833-4276

Other observers:

DETERMINATION

Keyed in:

Compared w/ specimen at:

Compared w/ image in:

By another person:

Other: Familiarity with the species

Identification explanation:

Identification confidence: Very confident

Species found: Yes If not found, why not?

Level of survey effort: Incidentally observed during a focused Quino checkerspot butterfly survey

Total number of individuals: 2

Collection? No

Collection number:

Museum/Herbarium:

ANIMAL INFORMATION

How was the detection made? Seen

Number detected in each age class:

2

adults

juveniles

larvae

egg mass

unknown

Age class comment: Pair observed flying together

Bird site use:

- ☐ Nesting ☐ Rookery ☐ Nesting colony ☐ Burrow site ☐ Lek
☐ Non-breeding (over-wintering) ☐ Communal roost ☐ Other

Site use description: No known nesting locations on the project site, but there is suitable foraging habitat and suitable nesting habitat adjacent to the site.

What was the observed behavior? The pair was observed flying together over Santiago Dam. They flew high and continued traveling off site to the northeast.

Describe any evidence of reproduction:

SITE INFORMATION

Habitat description: The closest vegetation type was ornamental vegetation. The surrounding area largely contained sagebrush scrub.

Slope:

Land owner/manager: Private - Irvine Ranch

Aspect:

Site condition + population viability: Good

Immediate & surrounding land use: Open space, Santiago Dam, Irvine Regional Park

Visible disturbances:

Threats:

General comments:

MAP INFORMATION

ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTM E NAD83	UTM N NAD83	UTM Zone
	Orange	Black Star Canyon	-9999	33.78627	-117.72250	433111	3738694	11
1	Public Land Survey	Feature Comment						
	S T04S R08W 33	American peregrine falcon (pair)						

The mapped feature is accurate within: 5 m

Source of mapped feature: [Iphone Avenza Maps](#)

Mapping notes:

Location/directions comments:

Attachment(s):

CNDDDB Online Field Survey Form Report



California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/



Source code MES22F0002
Quad code 3311776
Occ. no. _____
EO index no. _____
Map index no. _____

This data has been reported to the CNDDDB, but may not have been evaluated by the CNDDDB staff

Scientific name: *Polioptila californica californica*

Common name: coastal California gnatcatcher

Date of field work (mm-dd-yyyy): 02-18-2022

Comment about field work date(s):

OBSERVER INFORMATION

Observer: Lindsay A. Messett

Affiliation: Psomas

Address: 7236 E Stearns Street , Long Beach, CA 90815

Email: lindsay.messett@psomas.com

Phone: (562) 833-4276

Other observers:

DETERMINATION

Keyed in:

Compared w/ specimen at:

Compared w/ image in:

By another person:

Other: Familiarity with the species

Identification explanation:

Identification confidence: Very confident

Species found: Yes If not found, why not?

Level of survey effort: Incidentally observed during focused Quino checkerspot butterfly survey

Total number of individuals: 4

Collection? No

Collection number:

Museum/Herbarium:

ANIMAL INFORMATION

How was the detection made? Heard calling then seen

Number detected in each age class:

4

adults

juveniles

larvae

egg mass

unknown

Age class comment: Two separate pairs were observed.

Bird site use:

- ☐ Nesting ☐ Rookery ☐ Nesting colony ☐ Burrow site ☐ Lek
☐ Non-breeding (over-wintering) ☐ Communal roost ☐ Other

Site use description: Gnatcatchers occur on the site year-round.

What was the observed behavior? One pair was observed carrying nesting material and the second pair was observed foraging together.

Describe any evidence of reproduction: The individuals were paired and one pair was observed carrying nesting material.

SITE INFORMATION

Habitat description: sagebrush scrub

Slope:

Land owner/manager: Private - Irvine Ranch

Aspect:

Site condition + population viability: Good

Immediate & surrounding land use: Open space, Santiago Dam, Irvine Regional Park

Visible disturbances:

Threats:

General comments:

MAP INFORMATION



ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTM E NAD83	UTM N NAD83	UTM Zone
	Orange	Black Star Canyon	-9999	33.78832	-117.72598	432791	3738923	11
1	Public Land Survey	Feature Comment						
	S T04S R08W 28	coastal California gnatcatcher (Pair)						

The mapped feature is accurate within: 5 m

Source of mapped feature: [Iphone Avenza Maps](#)

Mapping notes: [Mapped point represents one pair that was observed nest building. A second pair was observed foraging together at the following location 33.787196, -117.722768](#)

Location/directions comments:

Attachment(s):

CNDDDB Online Field Survey Form Report



California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/



Source code MES22F0003
Quad code 3311776
Occ. no. _____
EO index no. _____
Map index no. _____

This data has been reported to the CNDDDB, but may not have been evaluated by the CNDDDB staff

Scientific name: *Aimophila ruficeps canescens*

Common name: southern California rufous-crowned sparrow

Date of field work (mm-dd-yyyy): 03-04-2022

Comment about field work date(s):

OBSERVER INFORMATION

Observer: Lindsay A. Messett

Affiliation: Psomas

Address: 7236 E Stearns Street , Long Beach, CA 90815

Email: lindsay.messett@psomas.com

Phone: (562) 833-4276

Other observers:

DETERMINATION

Keyed in:

Compared w/ specimen at:

Compared w/ image in:

By another person:

Other: Familiarity with the species

Identification explanation:

Identification confidence: Very confident

Species found: Yes If not found, why not?

Level of survey effort: Incidentally observed during focused Quino checkerspot butterfly survey

Total number of individuals: 1

Collection? No

Collection number:

Museum/Herbarium:

ANIMAL INFORMATION

How was the detection made? Heard singing then seen

Number detected in each age class:

1

adults

juveniles

larvae

egg mass

unknown

Age class comment:

Bird site use:

- ☐ Nesting ☐ Rookery ☐ Nesting colony ☐ Burrow site ☐ Lek
☐ Non-breeding (over-wintering) ☐ Communal roost ☐ Other

Site use description: southern California rufous-crowned sparrows occur year-round on the site.

What was the observed behavior? Detected the individual through vocalization then subsequently observed foraging and singing within sagebrush scrub vegetation

Describe any evidence of reproduction:

SITE INFORMATION

Habitat description: sagebrush scrub

Slope:

Land owner/manager: Private - Irvine Ranch

Aspect:

Site condition + population viability: Good

Immediate & surrounding land use: Open space, Santiago Dam, Irvine Regional Park

Visible disturbances:

Threats:

General comments:

MAP INFORMATION



ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTM E NAD83	UTM N NAD83	UTM Zone
	Orange	Black Star Canyon	-9999	33.78888	-117.72317	433051	3738983	11
1	Public Land Survey	Feature Comment						
	S T04S R08W 28	southern California rufous-crowned sparrow						

The mapped feature is accurate within: 5 m

Source of mapped feature: Iphone Avenza Maps

Mapping notes:

Location/directions comments:

Attachment(s):

APPENDIX G
CROTCH'S BUMBLE BEE SURVEY

September 19, 2024

Justin Garcia
California Endangered Species Act,
Memorandum of Understanding Coordinator
California Department of Fish and Wildlife
1010 Riverside Pkwy
West Sacramento, California 95605

VIA EMAIL
Justin.Garcia@wildlife.ca.gov

Hillary Sardiñas
Bumble Bee Coordinator
California Department of Fish and Wildlife
1010 Riverside Pkwy
West Sacramento, California 95605

VIA EMAIL
Hillary.Sardinas@wildlife.ca.gov

Kyle Rice
Regional Biologist
South Coast Region (Region 5)
3883 Ruffin Road
San Diego, California 92123

VIA EMAIL
Kyle.Rice@wildlife.ca.gov

Subject: Results of a Focused Presence/Absence Surveys for Crotch's Bumble Bee for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California

Dear Justin Garcia, Hillary Sardiñas, and Kyle Rice:

This Letter Report presents the results of focused surveys for the Crotch's bumble bee (*Bombus crotchii*) for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California (Exhibit 1). The purpose of the surveys was to determine the presence or absence of the Crotch's bumble bee in the biological survey area. Surveys were conducted by a Biologist who holds the necessary Memorandum of Understanding (MOU) to handle this species and were completed according to the guidelines established by the California Department of Fish and Wildlife (CDFW 2023).

PROJECT LOCATION AND DESCRIPTION

The project site is located at Santiago Creek Dam at the northwest end of Irvine Lake in unincorporated Orange County, California (Exhibit 1). It is south of State Route (SR) 261 and east of SR-241 and Santiago Canyon Road. Surrounding land use primarily consists of undeveloped open space. Irvine Regional Park is located northwest of SR-241; Limestone Canyon Regional Park is located south of Santiago Canyon Road; and Oak Canyon Park is located at the southeast end of Irvine Lake. The closed Santiago Canyon Landfill is located adjacent to the west of Irvine Lake.

5 Hutton Centre Drive
Suite 300
Santa Ana, CA 92707

Tel 714.751.7373
www.Psomas.com

Justin Garcia
Hillary Sardiñas
Kyle Rice
September 19, 2024
Page 2

The project site is located on the U.S. Geological Survey's (USGS') Black Star Canyon 7.5-minute quadrangle (Exhibit 2). Irvine Lake (named Santiago Creek Reservoir on the USGS) was created by constructing a dam across Santiago Creek. Santiago Creek, a named blueline stream, enters Irvine Lake from the east and continues downstream of the dam flowing north and then west. It has a relatively broad floodplain both above and below the dam. The slopes around the western and northern portions of the lake are relatively steep while the areas to the southeast and east include areas that are relatively flat. Three unnamed blueline streams enter the lake from the north and eight unnamed blueline streams enter the lake from the west, southeast, and south. One unnamed blueline stream enters the project site in the northwest, downstream of the Dam, while Fremont Canyon Creek merges with Santiago Creek downstream of the project site. Elevations in the project site range from approximately 657 to 996 feet above mean sea level.

The project site is located in the Central–Coastal Subregion of the Natural Communities Conservation Plan/Habitat Conservation Plan (NCCP/HCP). Santiago Dam and its associated structures are located within designated “Non-Reserve Open Space”, while Habitat Reserve and Conservation Easements surround the lake; a Special Linkage is located southeast of the lake. The purpose of this plan is to provide regional protection and recovery of multiple species and habitat while allowing compatible land use and appropriate development. Irvine Ranch Water District (IRWD) is a participating jurisdiction and, as such, will comply with the terms of the NCCP/HCP Implementation Agreement.

IRWD is proposing to abandon the existing Santiago Creek Dam outlet tower and construct a new inclined outlet structure to be located on the left abutment of the existing dam. Additionally, based on feedback from the Department of Safety of Dams, the dam spillway and the dam require structural improvements. Existing structures include the dam crest, the intake tower in Irvine Lake, the spillway channel, the control houses, the energy dissipater structure, the aboveground outlet pipe, and the dam crest access road. The project is currently in the design phase but would be located within the survey area provided by IRWD.

SURVEY AREA

A variety of vegetation types occur in the Biological Study Area (BSA) for the project, including sagebrush scrub, disturbed sagebrush scrub, sagebrush-coyote bush scrub, southern cactus scrub, disturbed southern cactus scrub, disturbed floodplain sage scrub, toyon-sumac chaparral, annual grassland, ruderal, riparian herb, southern willow scrub, mulefat scrub, disturbed mulefat scrub, southern sycamore riparian woodland/southern coast live oak riparian forest, southern black willow forest, disturbed southern black willow forest, southern black willow forest/riparian herb, coast live oak woodland, western sycamore, and vegetated fluctuating shoreline (Exhibit 3). Other landcovers include cliff, open water, fluctuating shoreline, perennial stream, ornamental, developed, and disturbed areas.

The Crotch's bumble bee survey area was limited to the impact areas within the BSA, including permanent and temporary impact areas and the proposed additional inundation area (i.e., a two-foot change in elevation around the entire perimeter of the lake). The survey area included all habitat areas, excluding open water and developed areas.

Justin Garcia
 Hillary Sardiñas
 Kyle Rice
 September 19, 2024
 Page 3

The survey area contained suitable habitat, and/or nectar sources for Crotch's bumble bee. These areas were generally dominated by California sagebrush (*Artemisia californica*), leafy California buckwheat (*Eriogonum fasciculatum* var. *foliolosum*), deerweed (*Acmispon glaber*), laurel sumac (*Malosma laurina*), lemonade berry (*Rhus integrifolia*), scaly scale-broom (*Lepidospartum squamatum*), toyon (*Heteromeles arbutifolia*), and California brickellbush (*Brickellia californica*). Openings between shrubs have native herbs, such as erect plantain (*Plantago erecta*), and narrow-toothed pectocarya (*Pectocarya linearis* ssp. *ferocula*), as well as non-native fennel (*Foeniculum vulgare*) and non-native grasses (*Avena* sp. and *Bromus* spp.).

While all habitat was surveyed, higher amounts of time were spent in habitats that provided suitable feeding areas (i.e., those areas with flowering plants) and potential nesting areas (i.e., those areas with rodent burrows, leaf litter, and brush piles) within the survey area (Exhibit 3). Less time was spent in marginal/lower quality habitat where suitable nectar sources were not readily available (i.e. cliff, coast live oak woodland, disturbed mulefat scrub, mulefat scrub, disturbed southern black willow forest, southern black willow forest, fluctuating shoreline, southern sycamore riparian woodland, southern willow scrub, and western sycamore).

Plants with flowers blooming during these surveys included the following: short-podded mustard (*Herschfeldia incana*), black mustard (*Brassica nigra*), Italian thistle (*Carduus pycnocephalus* ssp. *pycnocephalus*), telegraph weed (*Heterotheca grandiflora*), narrow leaf milkweed (*Asclepias fascicularis*), California buckwheat, deerweed, black sage (*Salvia melifera*), white sage (*Salvia apiana*), tree tobacco (*Nicotiana glauca*), California cudweed (*Pseudognaphalium californicum*), laurel sumac, clustered small tarweed (*Madia exigua*), toyon, Wright's jimsonweed (*Datura wrightii*), bristly ox-tongue (*Helminthotheca echioides*), prickly lettuce (*Lactuca serriola*), golden yarrow (*Eriophyllum confertiflorum* var. *confertiflorum*), monkey flower (*Diplacus australis*), vinegar weed (*Trichostema lanceolatum*), saltcedar (*Tamarix ramosissima*), and scaly scale-broom. These flowering plants were distributed throughout the survey area and decreased in number over the time between the first and third surveys. Photographs of representative habitat in the survey area are provided in Attachment A.

BACKGROUND

The Crotch's bumble bee is a near endemic species in California. It occurs throughout most of southwestern California including the Mediterranean region, along the Pacific coast, western deserts, Great Valley, and adjacent foothills (Williams *et al.* 2014; Zungri 2005). It was historically common in the Central Valley of California, but currently appears to be absent from most of it, especially in the center of its historic range (Hatfield *et al.* 2014). It has also been documented in southwest Nevada near the California border and in Baja California, Mexico in the Sierra de Jaurez Mountain Range (Labougle 1990; Williams 2014); however, there are only 12 records of this species in Mexico (ECOSUR 2014). While this species can be found in most native habitats, it prefers grassland and scrub habitat types.

Bumble bees are social insects that live in colonies composed of a queen, workers, males, and gynes/new queens. Colonies are annual and only the new, mated queens overwinter. The mated queens emerge from hibernation in the spring and begin forage for pollen and nectar and look for a new colony nest location. Bumble bees do not dig their own nest cavities, but instead utilize abandoned rodent burrows, hollow logs, leaf litter, tufted grass patches, rock piles, and above ground man-made structures. The Crotch's bumble bee is a ground nester and often makes its nest in abandoned mammal burrows. Once a nest site is located, the queen will lay

Justin Garcia
 Hillary Sardiñas
 Kyle Rice
 September 19, 2024
 Page 4

the first clutch of eggs. After hatching, the larvae feed on stored pollen (i.e., brood clump) for approximately two weeks before pupating for another two weeks. The adults that emerge from these pupae are females/workers who then take over foraging for resources, and tending to new clutches of eggs and larvae, while the queen lays more eggs. The workers/females also help to regulate the temperature of the nest and defend the nest against predators (Williams 2014). Colonies persist through the spring and summer months with successive broods of workers/females being produced as more floral resources become available. At some point in the summer, the colony switches to produce males and queens. The timing of this switch is not well understood but is generally thought to be related to the age of the queen and the size of the colony (Williams 2014). Adult male bumble bees do not forage for the colony but instead, leave the nest to feed at flowers and search for mates. The male Crotch's bumble bee perches on pheromone-scented vegetation and waits for queens to fly by. While male bumble bees feed and search for mates, newly emerged queens leave the colony to feed during the day. The queens eat a large amount of pollen and nectar to build up fat reserves for overwintering. Queens typically mate only once with only one male, and then begin their search for an overwintering location. Little is known about overwintering sites; however, overwintering queens have been reported to use animal burrows, holes in loose dirt, leaves, or compost piles (Williams 2014). Once the new queen has mated, the colony declines, and the remaining bees die before winter begins.

The Crotch's bumble bee is a larger bumble bee with the queen measuring approximately 22 to 25 millimeters (mm) and the workers measuring approximately 12 to 20 mm (Williams 2014). Crotch's bumble bee is a short-tongued species and prefers food plants from the following families: *Asclepias*, *Chaenactis*, *Lupinus*, *Medicago*, *Phacelia*, and *Salvia* (Williams 2014). The hairs on Crotch's bumble bee are very short and even, giving it a clean appearance. The head of this species is considered short, with the cheek (oculo-malar area) distinctly shorter than broad (Williams 2014). Crotch's bumble bee females/workers show yellow only on the front of the thorax and on the second abdominal segment (terga 2), males show yellow on both the front and back of the thorax and on both abdominal segments 1 and 2 (terga 1 and 2). In certain parts of its range, Crotch's bumble bee may also show some reddish-brown coloration on the lower abdomen segments (terga 4 and 5). Bumble bee species most similar in appearance to the Crotch's bumble bee include the brown-belted bumble bee (*Bombus griseocollis*), southern plains bumble bee (*Bombus fraternus*), red-belted bumble bee (*Bombus rufocinctus*), frigid bumble bee (*Bombus frigidus*), and Nevada bumble bee (*Bombus nevadensis*) (Williams 2014). These species generally do not occur in southern California; therefore, misidentification of Crotch's with these species is unlikely. Bumble bee species that are present within the southern California range of Crotch's bumble bee include California bumble bee (*Bombus californicus*), yellow-faced bumble bee (*Bombus vosnesenskii*), Vandyke bumble bee (*Bombus vandykii*), and black-tail bumble bee (*Bombus melanopygus*).

Crotch's bumble bee has been impacted by many environmental factors including rapid urbanization and the spread of agriculture. This is most evident in the Central Valley of California where this species now appears to be absent. Climate change, specifically increasing aridity, is an additional threat, especially because Crotch's bumble bee has a very narrow climatic specialization compared to most bumble bees (NatureServe 2014). Bumble bees in general are threatened by several additional factors including pesticide use, pathogens from managed pollinators, as well as competition with non-native bees (Goulson 2010; Williams *et al.* 2009; Williams and Osborne 2009; Cameron *et al.* 2011; Fürst *et al.* 2014; Hatfield *et al.* 2012). Reduced genetic diversity resulting from any of these threats is also a limiting factor

Justin Garcia
Hillary Sardiñas
Kyle Rice
September 19, 2024
Page 5

for bumble bee populations, because their method of sex-determination can be disrupted by inbreeding.

The Crotch's bumble bee was proposed as a Candidate to be State listed as Endangered in June 2019. The status of the Crotch's bumble bee has changed multiple times based on court rulings between June 2019 and September 2022. In November 2020, the Sacramento Superior Court ruled that insects are not eligible for listing under the California Endangered Species Act because the law does not mention insects (*Almond Alliance of California v. CDFW*). In February 2021, the California Fish and Game Commission appealed the decision. The Third District Court of Appeals ruled that the bees could be protected because the law's definition of fish includes invertebrates. In September 2022, the California Supreme Court decided that it would not review the petition for appeal, allowing the decision from the Third District Court to stand stating that the intent of the law is to protect declining species. Therefore, the proposed Candidate status was reinstated in September 2022.

SURVEY METHODS

In June 2023, the California Department of Fish and Wildlife (CDFW) issued survey guidelines for Candidate bumble bee species recommending at least three visual surveys conducted two to four weeks apart during the appropriate Colony Active Period (April to August for Crotch's bumble bee) to ensure the highest probability of detecting the species (CDFW 2023). Surveys must be conducted at a rate of three acres per hour within optimal habitat by a qualified Biologist (i.e., one with appropriate permits and experience in the identification of bee species). Psomas Senior Biologist Lindsay Messett (Scientific Collecting Permit [SCP]; 182810004-20009-001¹) conducted all focused surveys for Crotch's bumble bee. The survey included all suitable foraging and potential nesting habitats for the Crotch's bumble bee in the survey area. Surveys were conducted on June 20 and 21; July 16 and 17; and August 5 and 6, 2024.

Ms. Messett conducted the surveys by walking meandering transects, slowly across the survey area, through all appropriate habitats, to obtain a 100 percent survey cover. The surveys were paced at approximately three acres per hour in optimal habitats but were more quickly paced in areas lacking available nectar sources. Ms. Messett scanned for bee activity on the ground and spent additional time at any flowering plants to look for foraging bees. Potential nest sites (e.g., forest edges, unmowed areas, and cavities such as mammal burrows) were inspected with binoculars for evidence of bumble bee use. If multiple exiting/entering bumble bees were observed at a cavity, further observation was made until nesting could be confirmed (e.g., multiple individuals entering the cavity).

Surveys were non-lethal (capture, photograph, release) and were conducted in accordance with the CDFW Survey Considerations for California Endangered Species Act Candidate Bumble Bee Species (CDFW 2023) and authorizations in Ms. Messett's SCP and MOU issued by CDFW. All bumble bees observed were captured using a butterfly net. Bees were carefully transferred to a clear, plastic vial and placed in a cooler with ice to chill. Once the bees were cooled, they were removed from the vial and photographed. Photographs focused on specific identifiable areas of the bees (i.e. the top of the abdomen, side of the thorax and abdomen, and the front and side views of the head). The bees were processed within 15 minutes of capture

¹ Lindsay Messett's SCP includes a MOU to allow her to capture and handle Crotch's bumble bee according to the survey guidelines.

Justin Garcia
Hillary Sardiñas
Kyle Rice
September 19, 2024
Page 6

and were released within 100 feet of the capture site. Bumble bee species were identified by Ms. Messett using *Bumble Bees of North America: An Identification Guide* (Williams *et al.* 2014). Photographs of the bumble bees observed during the surveys were also provided to taxonomist Dr. Keng-Lou James Hung, PhD (University of Oklahoma) to confirm species identification; representative photos are included in Attachment A.

Surveys were conducted at least one hour after sunrise and two hours before sunset (ideally between 9:00 AM and 1:00 PM) during suitable weather conditions. Surveys should be conducted on warm, but not hot, sunny days (i.e., between 65 and 90 degrees Fahrenheit [°F]) with low wind (i.e., wind speed less than 8 miles per hour). Surveys may be conducted during partly cloudy or overcast conditions if a person's shadow is visible; however, surveys should not be conducted during wet, foggy, or rainy conditions. A summary of weather conditions during each survey is provided in Table 1. Survey data was recorded on Bumble Bee Survey Field Datasheets (adapted for Crotch's bumble bee from Protocols for the Rusty Patched Bumble Bee) and are included as Attachment B.

Ms. Messett is a Certified Wildlife Biologist® with the Wildlife Society and has over 24 years of experience in surveying special status wildlife species throughout southern and central California including invertebrates, birds, amphibians, and mammals. She currently holds a U.S. Fish and Wildlife Service 10(a)(1)(A) permit (TE 067064-6) for the following invertebrate species: Quino checkerspot butterfly and El Segundo blue butterfly. She also holds a CDFW SCP (S-182810004-20009-001) that includes the following invertebrate species: Quino checkerspot butterfly and Crotch's bumble bee in addition to a MOU for handling and processing Crotch's bumble bee. Ms. Messett has attended multiple bumble bee trainings and live webinars presented by the The Xerces Society in partnership with the Western Section of the Wildlife Society including the California Rare Bumble Bees Workshop (May 4, 2021), The Bumble Bee Field Course (July 21–23, 2023), Western Bumble Bee Identification for Bumble Bee Atlas Volunteers (October 11, 2023), and Male Bumble Bee Identification along the Pacific Coast of North America (December 6, 2023). She is also a listed volunteer on the Xerces Society's SCP (S-210530001-21053-001) and MOU (Dated October 18, 2022).

Justin Garcia
 Hillary Sardiñas
 Kyle Rice
 September 19, 2024
 Page 7

TABLE 1
SUMMARY OF CROTCH'S BUMBLE BEE SURVEYS

Survey Number	Survey Location	Date	Time (Start/End)	Acres Surveyed (acres)	Surveyor	Weather Conditions		
						Temperature (°F) (Start/End)	Wind (mph) (Start/End)	Cloud Cover (%) (Start/End)
1	Downstream of Santiago Dam	June 20, 2024	9:00 AM/3:00 PM	15	Messett	66/80	1–1/1–2	0/0
1	Upstream of Santiago Dam	June 21, 2024	8:10 AM/3:55 PM	35	Messett	68/76	0–1/4–5	0/0
2	Downstream of Santiago Dam	July 16, 2024	9:00 AM/2:50 PM	15	Messett	68/81	0–1/3–4	10/0
2	Upstream of Santiago Dam	July 17, 2024	8:00 AM/3:45 PM	35	Messett	71/80	1–2/1–2	75/30
3	Downstream of Santiago Dam	August 5, 2024	9:00 AM/12:50 PM	15	Messett	80/92	1–2/1–2	0/0
3	Upstream of Santiago Dam	August 6, 2024	8:25 AM/2:45 PM	35	Messett	71/80	0–1/1–2	0/0

°F: Fahrenheit; mph: miles per hour; %: percent.

SURVEY RESULTS

One male Crotch's bumble bee was observed during the second focused survey on July 17, 2024, upstream of Santiago Dam. This individual was observed foraging in a small patch of leafy California buckwheat, in the southern portion of the survey area (Exhibit 3). No Crotch's bumble bees were observed during the third focused survey. A California Natural Diversity Database (CNDDB) form for this observation will be submitted electronically by Ms. Messett and is included in Attachment C.

At the time of the focused surveys, most plants were no longer flowering. The available floral resources in the survey area during the late summer appeared to provide a limited amount of habitat for bumble bees; floral resources were likely higher in the spring and early summer. The estimated percent cover of floral resources was approximately 20 to 30 percent of the survey area during the June visit. Percent cover of floral resources continually decreased on the second and third surveys. During the focused surveys, the species in bloom consisted primarily of short-podded mustard, black mustard, leafy California buckwheat and deerweed. The entire survey area was surveyed; however, more time was spent in areas that had the most flowering resources during each survey. Potential bumble bee nest sites and overwintering habitat included small rodent burrows and leaf litter located in the survey area.

The following bees were also observed during the focused surveys: western honeybee (*Apis mellifera*), yellow-faced bumble bee, California bumble bee, and black-tailed bumble bee.

Justin Garcia
Hillary Sardiñas
Kyle Rice
September 19, 2024
Page 8

Photographs of all bumble bees were submitted to taxonomist Dr. Keng-Lou James Hung and identifications were confirmed.

OTHER OBSERVATIONS

Two additional special status species were observed in the survey area during the surveys: coastal California gnatcatcher (*Polioptila californica californica*), a federally listed Threatened and California Species of Special Concern, and least Bell's vireo (*Vireo bellii pusillus*), a federally and State listed Endangered species (Exhibit 3). The CNDDB forms for these species are included in Attachment C and have been submitted online by Ms. Messett.

RECOMMENDATIONS

Because Crotch's bumble bee was observed during the focused surveys, IRWD would need to consult with CDFW to obtain an Incidental Take Permit for the loss of Crotch's bumble bee habitat. Avoidance and minimization measures would also be required to minimize take of the species.

Per CDFW guidelines, it is recommended that a biological monitor be present onsite during vegetation clearing and/or ground-disturbing activities that take place during the queen flight period (i.e., February to March), colony active period (i.e., April to August), or gyne flight period (i.e., September to October). No biological monitoring would be required if vegetation clearing or ground-disturbing occurs from November to January.

Psomas appreciates the opportunity to assist on this project. If you have any comments or questions, please contact Amber Heredia (Amber.Heredia@psomas.com) or Lindsay Messett (Lindsay.Messett@psomas.com).

Sincerely,

P S O M A S



Amber O. Heredia
Senior Project Manager



Lindsay A. Messett, CWB®
Senior Biologist

Justin Garcia
Hillary Sardiñas
Kyle Rice
September 19, 2024
Page 9

I certify that the information in this survey report and enclosed exhibits fully and accurately present my work.



Lindsay A. Messett, CWB®
Senior Biologist
(SCP; 182810004-20009-001)

Attachments: Exhibits 1–3
A – Representative Photographs
B – Survey Datasheets
C – CNDDDB Forms

cc: Andy Uk (uk@irwd.com)
Fiona Sanchez (Sanchezf@irwd.com)
WildlifeResearchPermits@wildlife.ca.gov

R:\Projects\IRW_IRWD\3IRW010204\Documentation\CBB\Santiago CBB Report-091924.docx

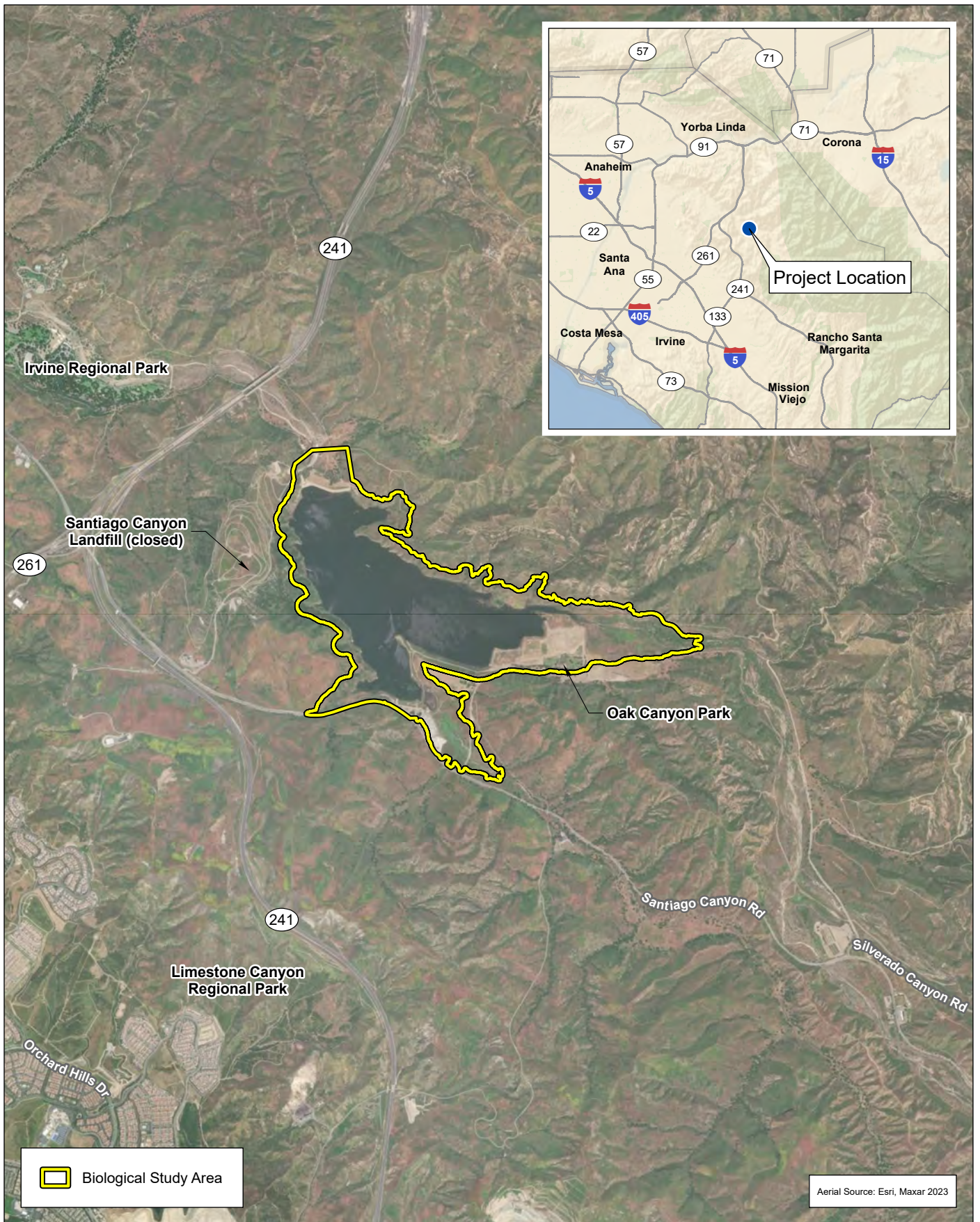
REFERENCES

- California Department of Fish and Wildlife (CDFW). 2023 (June 6, 2023). *Survey Considerations for California Endangered Species Act (CESA) Candidate Bumble Bee Species*. Sacramento, CA: CDFW.
- Cameron, S.A., Lozier, J.D., Strange, J.P., Koch, J.B., Cordes, N., Solter, L.F. and Griswold, T.L. 2011. Patterns of widespread decline in North American bumble bees. *Proceedings of the National Academy of Science (USA)* 108(2): 662–667.
- ECOSUR. 2014. *Mexican Bumble Bee Database based on ECOSUR (El Colegio de la Frontera Sur) and other Mexican collections*.
- Fürst, M.A., McMahon, D.P., Osborne, J.L., Paxton, R.J. and Brown, M.J.F. 2014. Disease associations between honeybees and bumblebees as a threat to wild pollinators. *Nature* 506: 364–366.
- Goulson, D. 2010. *Bumblebees: behaviour, ecology, and conservation*. Oxford University Press, Oxford.
- Hatfield, R., Colla, S.R., Jepsen, S., Richardson, L., Thorp, R. and Foltz Jordan, S. 2014. Draft IUCN Assessments for North American *Bombus* spp. for the North American IUCN Bumble Bee Specialist Group. The Xerces Society for Invertebrate Conservation, www.xerces.org, Portland, OR.

Justin Garcia
Hillary Sardiñas
Kyle Rice
September 19, 2024
Page 10

- Hatfield, R., Jepsen, S., Mader, E., Black, S.H. and Shepherd, M. 2012. *Conserving Bumble Bees. Guidelines for Creating and Managing Habitat for America's Declining Pollinators*. The Xerces Society for Invertebrate Conservation., Portland, OR.
- Labougle, J. M. 1990. *Bombus* of Mexico and Central America (Hymenoptera, Apidae). *University of Kansas Science Bulletin* 54 (3): 35–73.
- NatureServe. 2014. NatureServe Explorer: An Online Encyclopedia of Life. Arlington, Virginia. Available at: <http://explorer.natureserve.org>. (Accessed: July 18, 2014).
- Williams, P.H., Thorp, R.W., Richardson, L.L. and Colla, S.R. 2014. *The Bumble bees of North America: An Identification guide*. Princeton University Press, Princeton.
- Williams, P.H. and Osborne, J.L. 2009. Bumble bee vulnerability and conservation world-wide. *Apidologie* 40: 367–387.
- Williams, P.H., Colla, S.R. and Xie, Z. 2009. Bumblebee vulnerability: common correlates of winners and losers across three continents. *Conservation Biology* 23: 931–940.
- Zungri, D. 2005. Notes on three species of *Bombus* (Hymenoptera: Apidae) in the Central Valley of California: new records of distribution and abundance. *Pan-Pacific Entomologist* 81(3–4): 179–180.

D:\Projects\IRW\SantiagoCreek\PRO\Santiago_Dam_CBB\Santiago_Dam_CBB.aprxex_RL_LV



Regional Location and Local Vicinity

Exhibit 1

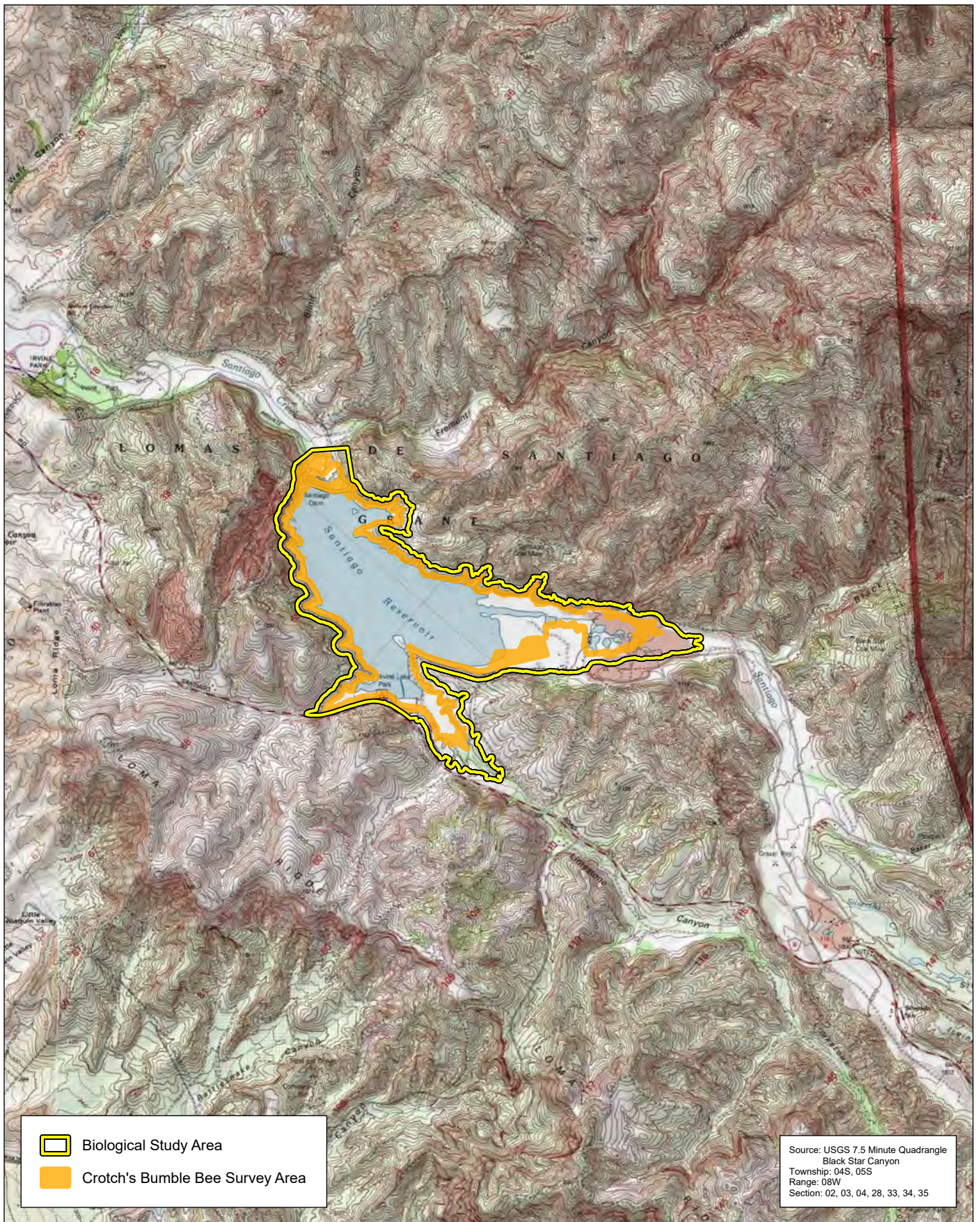
Santiago Creek Dam Outlet Tower and Spillway Improvement Project



0 2,000 4,000
Feet

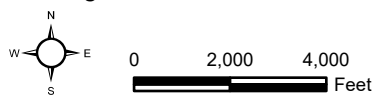


(Rev: 9-05-2024 PLO) R:\Projects\IRW_IRWD\3\IRW010204\Graphics\CBB\ex_RL_LV.pdf

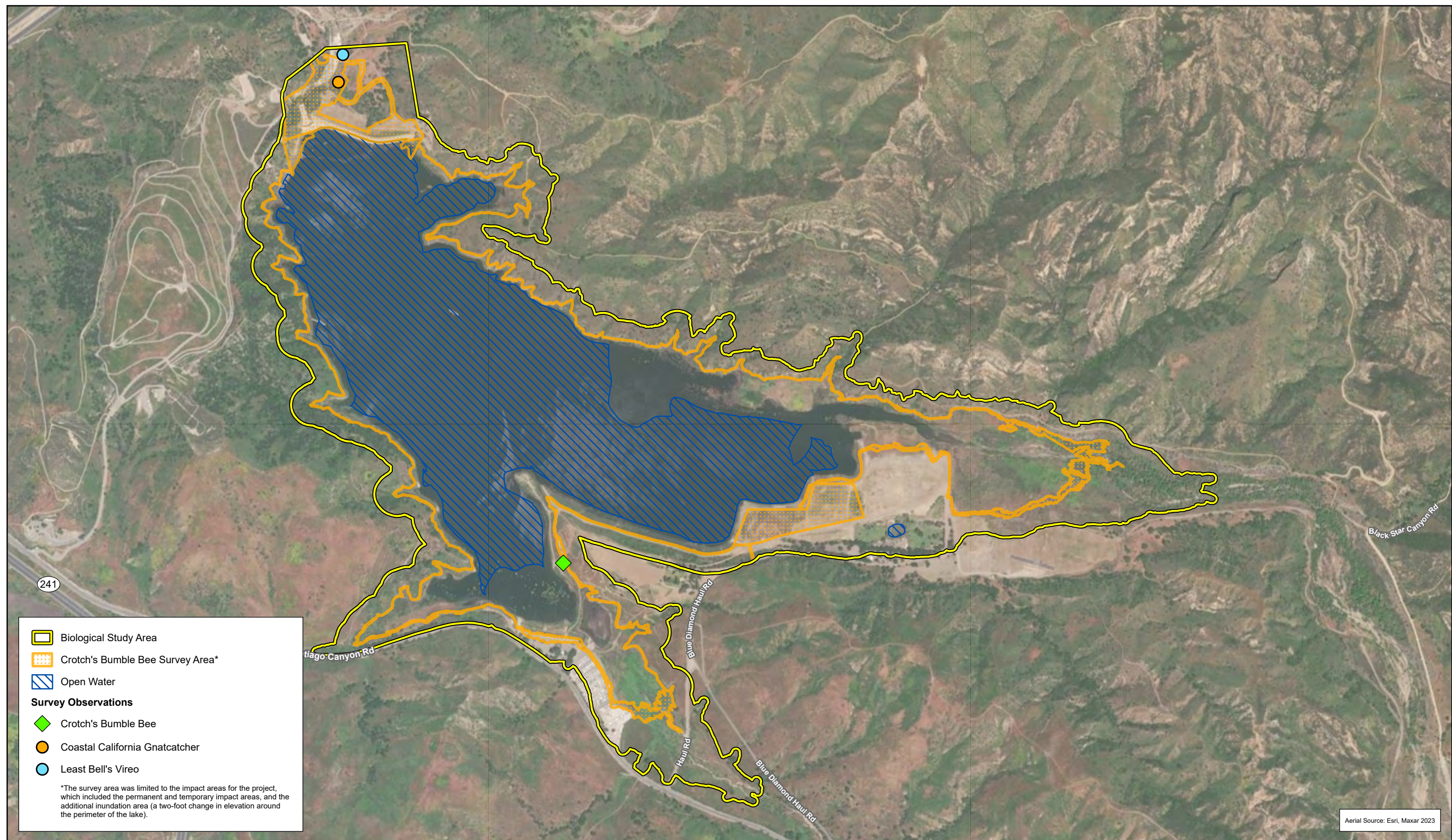


U.S. Geological Survey 7.5-Minute Digital Quadrangle
Santiago Creek Dam Outlet Tower and Spillway Improvement Project

Exhibit 2



D:\Projects\IRW\SantiagoCreek\PRO\Santiago_Dam_CBB\Santiago_Dam_CBB.aprx,ex_Survey_Area



Crotch's Bumble Bee Survey Area and Results

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

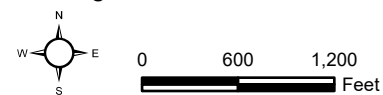


Exhibit 3



(Rev: 9-16-2024 PLO) R:\Projects\IRW_IRWD\3\IRW010204\Graphics\CBB\ex_Survey_Area.pdf

ATTACHMENT A
REPRESENTATIVE PHOTOGRAPHS



July 17, 2024. Male Crotch's bumble bee observed upstream of Santiago Dam during the second focused survey. Note that the bumble bee was chilled during the photo and was released unharmed once it warmed up.



July 17, 2024. Overview of nectar resources (leafy California buckwheat) at the Crotch's bumble bee location.

Representative Photographs

Attachment A-1

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

PSOMAS



June 20, 2024. Black-tailed bumble bee observed downstream of the Santiago Dam during the first focused survey.



June 20, 2024. Overview of nectar resources (leafy California buckwheat and white sage) at the black-tailed bumble bee location.

Representative Photographs

Attachment A-2

Santiago Creek Dam Outlet Tower and Spillway Improvement Project





July 17, 2024. Yellow-faced bumble bee observed upstream of the Santiago Dam during the second focused survey.



July 21, 2024. California bumble bee observed upstream of the Santiago Dam during the first focused survey.

Representative Photographs

Attachment A-3

Santiago Creek Dam Outlet Tower and Spillway Improvement Project





July 21, 2024. Overview of nectar resources (leafy California buckwheat and deerweed) at the yellow-faced bumble bee and California bumble bee location.



June 20, 2024. Overview of the large mowed area within survey area, downstream of Santiago Dam.

Representative Photographs

Attachment A-4

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

PSOMAS

ATTACHMENT B
SURVEY DATASHEETS

Bumble Bee Survey Field Data Sheet	Unique Survey ID: —
Page 1 of 2	Federal Recovery Permit Number:

MOU: 5-182810004-20009-001

Permittee/Surveyor Name(s)		Email Address		Project Name		Site Name	
Lindsay Messett		lindsay.messett@psomas.com		Santiago Creek Dam		Downstream of Dam	
Day	Month	Year	Temperature (F)		Est. Wind Speed (mph)		Est. Cloud Cover (%)
20	06	2024	66 / 80		14 / 1-2		0 / 0
Protocol Name (from FWS survey doc)	Transect Length (m) (if applicable)	Transect Width (m) (if applic.)	Transect ID (if applic.)	Total combined time spent surveying (min) Hours All surveyors	Survey Start Time	Survey End Time	Total Survey Area (m ²) Acres
Foraging/ Nesting	—	—	—	6.0	9:00	3:00	14.9
							Total Site Area (m ²) (including area not surveyed) Acres
							19.0

Centroid of Survey Area (Decimal Degrees)		Survey Area Boundaries (Decimal Degrees)			
LAT	LONG	LAT North of Boundary	LAT South of Boundary	LONG West of Boundary	LONG East of Boundary
33.787794	-117.725419	33.788922	33.786327	-117.728256	-117.722907

Habitat Type (Circle dominant type) From National Land Cover Database, each classification is further defined here https://www.mrlc.gov/nlcd11_leg.php		% Est. Vegetative cover (circle one)	Number of native plant spp. in flower (circle one)	Description of dominant management practices on the survey area	Description of observed or likely stressors in survey area (e.g., use of pesticides, tilling, etc.)
Open water	Mixed Forest	<10%	0 species	Mowing of grassland + ruderal areas	Access roads vehicle tracks through open areas
Developed Park	Ever. Forest	10-24%	1-4 species		
Developed- Low/Med/High	Shrubland	25-49%	5-9 species		
	Grassland	50-75%	10- 14 spp		
Barren Land	Pasture/Hay	>75%	15+ spp		
Decid. Forest	Cultivated Crop				
	Woody wetland				
	Herb. wetland				
	Other				
File/folder names of representative survey area photograph(s)				Supporting map file/folder name(s)	
—				—	

Bumble Bee Survey Field Data Sheet Page <u>2</u> of <u>2</u>		Unique Survey ID: Date: <u>5/20/2024</u>	Transect ID (if applicable) <u>—</u>
Were <i>Bombus</i> present? <u>Y</u> or N		Are Honey Bees (<i>Apis</i>) present? <u>Y</u> or N	<i>Bombus</i> to <i>Apis</i> Ratio (circle closest estimate) 20+:1, 2-19:1; 1:1; less than <u>1:1</u>

Species	No. of Females	No. of Males	No. of Queens	Flowers or species of plant being used	Actual (A) or Estimated (E) counts?	% ID Conf*	Distance (m) Distance sampling only
<i>Bombus melanopygus</i>	1	0	0	<i>Salvia apiana</i>	A	100	—
Flowering Plants:							Native
<i>Hirschfeldia incana</i>							N
<i>Brassica nigra</i>							N
<i>Asclepias fasciculans</i>							Y
<i>Salvia apiana</i>							Y
<i>Salvia nemorosa</i>							Y
<i>Achillea glabra</i>							Y
<i>Eriogonum fasciculatum</i> var. <i>foliolosum</i>							Y
<i>Carduus pycnocephalus</i> ssp. <i>pycnocephalus</i>							N

*Self evaluation of your confidence in your identification of each species (95-100% confident, 75-94%, 50-74%, 5-49%, <5%).

Individual Bee Data for <i>B. crotchii</i> (Enter each <i>B. crotchii</i> capture point as separate row)					<i>B. crotchii</i> Capture Point (Decimal degrees)		Distance Sampling only
Species	No. of Females	No. of Males	No. of Queens	Flowers or species of plant being used	LAT	LONG	Distance (m)
<i>B. crotchii</i>	—	—	—	—	—	—	—
<i>B. crotchii</i>							
<i>B. crotchii</i>							
<i>B. crotchii</i>							
<i>B. crotchii</i>							

File Names of Photographs and Map Files:

Bumble Bee Survey Field Data Sheet	Unique Survey ID: —
Page 1 of 2	Federal Recovery Permit Number:

Mail: S-182810004-20009-001

Permittee/Surveyor Name(s)		Email Address		Project Name		Site Name	
Lindsay Messett		lindsay.messette@psma.gov		Santiago Creek Dam		Upstream of Dam	
Day	Month	Year	Temperature (F)	Est. Wind Speed (mph)	Est. Cloud Cover (%)		
21	06	2024	68/70	0-14-5	0/0		
Protocol Name (from FWS survey doc)	Transect Length (m) (if applicable)	Transect Width (m) (if applic.)	Transect ID (if applic.)	Total combined time spent surveying (min) Hours All surveyors	Survey Start Time	Survey End Time	Total Survey Area (m ²) Acres
Foraging/ nesting	—	—	—	7.08	8:10	3:15	34.8
							Total Site Area (m ²) (including area not surveyed) Acres
							36.8

Centroid of Survey Area (Decimal Degrees)		Survey Area Boundaries (Decimal Degrees)			
LAT	LONG	LAT North of Boundary	LAT South of Boundary	LONG West of Boundary	LONG East of Boundary
33.774224	-117.714401	33.784438	33.769492	-117.723532	-117.712182

Habitat Type (Circle dominant type) From National Land Cover Database, each classification is further defined here https://www.mrlc.gov/nlcd11_leg.php		% Est. Vegetative cover (circle one)	Number of native plant spp. in flower (circle one)	Description of dominant management practices on the survey area	Description of observed or likely stressors in survey area (e.g., use of pesticides, tilling, etc.)
Open water	Mixed Forest	<10%	0 species	Mowing of grassland + riparian areas	access roads vehicle tracks through open areas. Fire dept. Ashing/drills.
Developed Park	Ever. Forest	10-24%	1-4 species		
Developed-Low/Med/High	Shrubland	25-49%	5-9 species		
	Grassland	50-75%	10-14 spp		
Barren Land	Pasture/Hay	>75%	15+ spp		
Decid. Forest	Cultivated Crop				
	Woody wetland				
	Herb. wetland				
	Other				
File/folder names of representative survey area photograph(s)				Supporting map file/folder name(s)	
—				—	

Bumble Bee Survey Field Data Sheet Page <u>2</u> of <u>2</u>		Unique Survey ID: Date: <u>01/21/2024</u>	Transect ID (if applicable) <u>—</u>
Were <i>Bombus</i> present? <u>Y</u> or N		Are Honey Bees (<i>Apis</i>) present? <u>Y</u> or N	<i>Bombus</i> to <i>Apis</i> Ratio (circle closest estimate) 20+:1, 2-19:1; 1:1; less than 1:1 <u>(1:1)</u>

Species	No. of Females	No. of Males	No. of Queens	Flowers or species of plant being used	Actual (A) or Estimated (E) counts?	% ID Conf*	Distance (m) Distance sampling only
<i>Bombus californicus</i>	2	0	0	<i>Acnistroglaphys</i>	A	100	—
<i>Bombus vosnesenskii</i>	5	0	0	<i>Acnistroglaphys</i>	A	100	—
Flowering Plants:							Native
<i>Acnistroglaphys</i>							Y
<i>Hirschfeldia incana</i>							N
<i>Salvia melifera</i>							Y
<i>Asclepias fascicularis</i>							Y
<i>Brassica nigra</i>							N
<i>Tamarix ramosissima</i>							N
<i>Eriogonum fasciculatum</i> var. <i>foliosum</i>							Y

*Self evaluation of your confidence in your identification of each species (95-100% confident, 75-94%, 50-74%, 5-49%, <5%).

Individual Bee Data for <i>B. crotchii</i> (Enter each <i>B. crotchii</i> capture point as separate row)					<i>B. crotchii</i> Capture Point (Decimal degrees)		Distance Sampling only
Species	No. of Females	No. of Males	No. of Queens	Flowers or species of plant being used	LAT	LONG	Distance (m)
<i>B. crotchii</i>	—	—	—	—	—	—	—
<i>B. crotchii</i>							
<i>B. crotchii</i>							
<i>B. crotchii</i>							
<i>B. crotchii</i>							

File Names of Photographs and Map Files:

Bumble Bee Survey Field Data Sheet	Unique Survey ID: —
Page 1 of 2	Federal Recovery Permit Number:

MOU: S-182810004 - 20009-001

Permittee/Surveyor Name(s)		Email Address		Project Name		Site Name	
Lindsay Messett		lindsay.messett@psomas.com		Santiago creek Dam		Downstream of dam	
Day	Month	Year	Temperature (F)		Est. Wind Speed (mph)	Est. Cloud Cover (%)	
16	07	2024	68/81		0-1/3-4	10/0	
Protocol Name (from FWS survey doc)	Transect Length (m) (if applicable)	Transect Width (m) (if applic.)	Transect ID (if applic.)	Total combined time spent surveying (min) Hours All surveyors	Survey Start Time	Survey End Time	Total Survey Area (m ²) Acres
Foraging/ Nesting	—	—	—	5.83	9:00	2:50	14.9
							19.0

Centroid of Survey Area (Decimal Degrees)		Survey Area Boundaries (Decimal Degrees)			
LAT	LONG	LAT North of Boundary	LAT South of Boundary	LONG West of Boundary	LONG East of Boundary
33.787294	-117.725419	33.788922	33.786387	-117.728256	-117.722907

Habitat Type (Circle dominant type) From National Land Cover Database, each classification is further defined here https://www.mrlc.gov/nlcd11_leg.php		% Est. Vegetative cover (circle one)	Number of native plant spp. in flower (circle one)	Description of dominant management practices on the survey area	Description of observed or likely stressors in survey area (e.g., use of pesticides, tilling, etc.)
Open water	Mixed Forest	<10%	0 species	Mowing of grassland + ruderal areas	access roads vehicle tracks through open areas
Developed Park	Ever. Forest	10-24%	1-4 species		
Developed-Low/Med/High	Shrubland	25-49%	5-9 species		
	Grassland	50-75%	10-14 spp		
Barren Land	Pasture/Hay	>75%	15+ spp		
Decid. Forest	Cultivated Crop				
	Woody wetland				
	Herb. wetland				
	Other				
File/folder names of representative survey area photograph(s)				Supporting map file/folder name(s)	

Bumble Bee Survey Field Data Sheet Page <u>2</u> of <u>2</u>		Unique Survey ID: Date: <u>7/16/2024</u>	Transect ID (if applicable) <u>—</u>
Were <i>Bombus</i> present? Y or <u>N</u>		Are Honey Bees (<i>Apis</i>) present? <u>Y</u> or N	<i>Bombus</i> to <i>Apis</i> Ratio (circle closest estimate) 20+:1, 2-19:1; 1:1; less than <u>1:1</u>

Species	No. of Females	No. of Males	No. of Queens	Flowers or species of plant being used	Actual (A) or Estimated (E) counts?	% ID Conf*	Distance (m) Distance sampling only
Flowering Plants:							<u>Native</u>
<i>Eriogonum fasciculatum</i> var. <i>foliosum</i>							<u>Y</u>
<i>Hirshfeldia incana</i>							<u>N</u>
<i>Nicotiana glauca</i>							<u>N</u>
<i>Madia eximia</i>							<u>Y</u> N
<i>Datura wrightii</i>							<u>Y</u>
<i>Pseudognaphalium californicum</i>							<u>Y</u>
<i>Malosma laurina</i>							<u>Y</u>

*Self evaluation of your confidence in your identification of each species (95-100% confident, 75-94%, 50-74%, 5-49%, <5%).

Individual Bee Data for <i>B. crotchii</i> (Enter each <i>B. crotchii</i> capture point as separate row)					<i>B. crotchii</i> Capture Point (Decimal degrees)		Distance Sampling only
Species	No. of Females	No. of Males	No. of Queens	Flowers or species of plant being used	LAT	LONG	Distance (m)
<i>B. crotchii</i>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>
<i>B. crotchii</i>							
<i>B. crotchii</i>							
<i>B. crotchii</i>							
<i>B. crotchii</i>							

File Names of Photographs and Map Files:

Bumble Bee Survey Field Data Sheet	Unique Survey ID: —
Page 1 of 2	Federal Recovery Permit Number:

MOU: 8-182810004-20009-001

Permittee/Surveyor Name(s)		Email Address		Project Name		Site Name	
Lindsay Messett		lindsay.nessett@psomas.com		Santiago Creek Dam		Upstream of Dam	
Day	Month	Year	Temperature (F)		Est. Wind Speed (mph)		Est. Cloud Cover (%)
17	07	2024	71 / 80		1-2 / 1-2		75 / 30
Protocol Name (from FWS survey doc)	Transect Length (m) (if applicable)	Transect Width (m) (if applic.)	Transect ID (if applic.)	Total combined time spent surveying (min) Hours All surveyors	Survey Start Time	Survey End Time	Total Survey Area (m ²) Acres
Foraging / Nesting	—	—	—	7:75	8:00	3:45	34.8
							Total Site Area (m ²) (including area not surveyed) Acres
							36.8

Centroid of Survey Area (Decimal Degrees)		Survey Area Boundaries (Decimal Degrees)			
LAT	LONG	LAT North of Boundary	LAT South of Boundary	LONG West of Boundary	LONG East of Boundary
33.724226	-117.714404	33.784438	33.769492	-117.723532	-117.712182

Habitat Type (Circle dominant type) From National Land Cover Database, each classification is further defined here https://www.mrlc.gov/nlcd11_leg.php		% Est. Vegetative cover (circle one)	Number of native plant spp. in flower (circle one)	Description of dominant management practices on the survey area	Description of observed or likely stressors in survey area (e.g., use of pesticides, tilling, etc.)
Open water	Mixed Forest	<10%	0 species	Mowing of grassland + riparian areas	Access roads Vehicle tracks through open areas. Fire dept. Fishing ditches
Developed Park	Ever Forest	10-24%	1-4 species		
Developed-Low/Med/High	Shrubland	25-49%	5-9 species		
	Grassland	50-75%	10-14 spp		
Barren Land	Pasture/Hay	>75%	15+ spp		
Decid. Forest	Cultivated Crop				
	Woody wetland				
	Herb. wetland				
	Other				
File/folder names of representative survey area photograph(s)				Supporting map file/folder name(s)	
—				—	

Bumble Bee Survey Field Data Sheet Page <u>2</u> of <u>2</u>	Unique Survey ID: Date: <u>7/17/2024</u>	Transect ID (if applicable) <u>—</u>
Were <i>Bombus</i> present? <u>Y</u> or N	Are Honey Bees (<i>Apis</i>) present? <u>Y</u> or N	<i>Bombus</i> to <i>Apis</i> Ratio (circle closest estimate) 20+:1, 2-19:1, 1:1; less than 1:1

Species	No. of Females	No. of Males	No. of Queens	Flowers or species of plant being used	Actual (A) or Estimated (E) counts?	% ID Conf*	Distance (m) Distance sampling only
<i>Bombus vosnesenskii</i>	4	0	0	<i>Eriogonum fasciculatum</i> var. <i>foliolosum</i>	A	100	—
Flowering Plants:							Native
<i>Eriogonum fasciculatum</i> var. <i>foliolosum</i>							4
<i>Grindelia incana</i>							N
<i>Helminthotheca echioides</i>							N
<i>Carduus pycnocephalus</i> ssp. <i>pycnocephalus</i>							N
<i>Eriophyllum lanceolatum</i> confertiflorum							4
<i>Asclepias fascicularis</i>							4
<i>Madia exigua</i>							4
<i>Arnica montana</i>							4

*Self evaluation of your confidence in your identification of each species (95-100% confident, 75-94%, 50-74%, 5-49%, <5%).

Individual Bee Data for <i>B. crotchii</i> (Enter each <i>B. crotchii</i> capture point as separate row)					<i>B. crotchii</i> Capture Point (Decimal degrees)		Distance Sampling only
Species	No. of Females	No. of Males	No. of Queens	Flowers or species of plant being used	LAT	LONG	Distance (m)
<i>B. crotchii</i>	0	1	0	<i>Eriogonum fasciculatum</i> var. <i>foliolosum</i>	33.771007	-117.715966	—
<i>B. crotchii</i>							
<i>B. crotchii</i>							
<i>B. crotchii</i>							
<i>B. crotchii</i>							

File Names of Photographs and Map Files:

Bumble Bee Survey Field Data Sheet	Unique Survey ID: —
Page <u>1</u> of <u>2</u>	Federal Recovery Permit Number:

Mon: 5-182810001-20009-001

Permittee/Surveyor Name(s)		Email Address		Project Name		Site Name	
Lindsay Messett		lindsay.messett@psomas.com		Santiago Creek Dam		Downstream of Dam	
Day	Month	Year	Temperature (F)		Est. Wind Speed (mph)	Est. Cloud Cover (%)	
05	08	2024	80/92		1-2/1-2	0/0	
Protocol Name (from FWS survey doc)	Transect Length (m) (if applicable)	Transect Width (m) (if applic.)	Transect ID (if applic.)	Total combined time spent surveying (min) Hours All surveyors	Survey Start Time	Survey End Time	Total Survey Area (m ²) Acres Total Site Area (m ²) (including area not surveyed) Acres
Foraging/ Nesting	—	—	—	3.83	9:00	12:50	14.9 19.0

Centroid of Survey Area (Decimal Degrees)		Survey Area Boundaries (Decimal Degrees)			
LAT	LONG	LAT North of Boundary	LAT South of Boundary	LONG West of Boundary	LONG East of Boundary
33.787794	-117.725419	33.788922	33.786387	-117.728256	-117.722907

Habitat Type (Circle dominant type) From National Land Cover Database, each classification is further defined here https://www.mrlc.gov/nlcd11_leg.php		% Est. Vegetative cover (circle one)	Number of native plant spp. in flower (circle one)	Description of dominant management practices on the survey area	Description of observed or likely stressors in survey area (e.g., use of pesticides, tilling, etc.)
Open water	Mixed Forest	<10%	0 species	Mowing of grassland + riparian areas	access roads vehicle tracks through open areas.
Developed Park	Ever. Forest	10-24%	1-4 species		
Developed-Low/Med/High	Shrubland	25-49%	5-9 species		
	Grassland	50-75%	10-14 spp		
	Pasture/Hay	>75%	15+ spp		
Barren Land	Cultivated Crop				
Decid. Forest	Woody wetland				
	Herb. wetland				
	Other				
File/folder names of representative survey area photograph(s)				Supporting map file/folder name(s)	

Bumble Bee Survey Field Data Sheet Page <u>2</u> of <u>2</u>		Unique Survey ID: Date: <u>8/5/2024</u>	Transect ID (if applicable) <u>—</u>
Were <i>Bombus</i> present? Y or <u>N</u>		Are Honey Bees (<i>Apis</i>) present? <u>Y</u> or N	<i>Bombus</i> to <i>Apis</i> Ratio (circle closest estimate) 20+:1, 2-19:1; 1:1; less than <u>1:1</u>

Species	No. of Females	No. of Males	No. of Queens	Flowers or species of plant being used	Actual (A) or Estimated (E) counts?	% ID Conf*	Distance (m) Distance sampling only
Flowering Plants:							Active
<i>Erigeron fasciculatus</i> var. <i>foliosus</i>							Y
<i>Hirschfeldia incana</i>							N
<i>Datura wrightii</i>							Y
<i>Trichostema lanceolatum</i>							Y
<i>Heterotheca grandiflora</i>							Y
<i>Eriophyllum confertiflorum</i> var. <i>confertiflorum</i>							Y
<i>Lepidospartum squamatum</i>							Y

*Self evaluation of your confidence in your identification of each species (95-100% confident, 75-94%, 50-74%, 5-49%, <5%).

Individual Bee Data for <i>B. crotchii</i> (Enter each <i>B. crotchii</i> capture point as separate row)					<i>B. crotchii</i> Capture Point (Decimal degrees)		Distance Sampling only
Species	No. of Females	No. of Males	No. of Queens	Flowers or species of plant being used	LAT	LONG	Distance (m)
<i>B. crotchii</i>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>
<i>B. crotchii</i>							
<i>B. crotchii</i>							
<i>B. crotchii</i>							
<i>B. crotchii</i>							

File Names of Photographs and Map Files:

Bumble Bee Survey Field Data Sheet	Unique Survey ID: —
Page <u>1</u> of <u>2</u>	Federal Recovery Permit Number:

MOA: 8-182810004-20009-001

Permittee/Surveyor Name(s)		Email Address		Project Name		Site Name	
Lindsay Messett		lindsay.messett@psnas.com		Santiago Creek Dam		Upstream of Dam	
Day	Month	Year	Temperature (F)		Est. Wind Speed (mph)		Est. Cloud Cover (%)
06	08	2024	71/80		0-1/1-2		0/0
Protocol Name (from FWS survey doc)	Transect Length (m) (if applicable)	Transect Width (m) (if applic.)	Transect ID (if applic.)	Total combined time spent surveying (min) Hours All surveyors	Survey Start Time	Survey End Time	Total Survey Area (m ²) Acres
Foraging / Nesting	—	—	—	6.75	825	245	34.8
							Total Site Area (m ²) (including area not surveyed) Acres
							36.8

Centroid of Survey Area (Decimal Degrees)		Survey Area Boundaries (Decimal Degrees)			
LAT	LONG	LAT North of Boundary	LAT South of Boundary	LONG West of Boundary	LONG East of Boundary
33.787794	-117.725419	33.788922	33.786387	-117.728256	-117.722907

Habitat Type (Circle dominant type) From National Land Cover Database, each classification is further defined here https://www.mrlc.gov/nlcd11_leg.php		% Est. Vegetative cover (circle one)	Number of native plant spp. in flower (circle one)	Description of dominant management practices on the survey area	Description of observed or likely stressors in survey area (e.g., use of pesticides, tilling, etc.)
Open water	Mixed Forest	<10%	0 species	Mowed areas of grassland + ruderal	access roads vehicle tracks fire dept. drills fishing
Developed Park	Ever. Forest	10-24%	14 species		
Developed-Low/Med/High	Shrubland	25-49%	5-9 species		
	Grassland	50-75%	10-14 spp		
Barren Land	Pasture/Hay	>75%	15+ spp		
Decid. Forest	Cultivated Crop				
	Woody wetland				
	Herb. wetland				
	Other				
File/folder names of representative survey area photograph(s)				Supporting map file/folder name(s)	
—				—	

Bumble Bee Survey Field Data Sheet Page <u>2</u> of <u>2</u>	Unique Survey ID: Date: <u>8/6/2024</u>	Transect ID (if applicable) <u>—</u>
Were <i>Bombus</i> present? Y or <u>N</u>	Are Honey Bees (<i>Apis</i>) present? <u>Y</u> or N	<i>Bombus</i> to <i>Apis</i> Ratio (circle closest estimate) 20+:1, 2-19:1; 1:1; less than <u>1:1</u>

Species	No. of Females	No. of Males	No. of Queens	Flowers or species of plant being used	Actual (A) or Estimated (E) counts?	% ID Conf*	Distance (m) Distance sampling only
Flowering Plants							Native
Tamarix ramosissima							N
Erigeron fasciculatus var foliolosus							Y
Datura wrightii							Y
Hirschfeldia incana							N

*Self evaluation of your confidence in your identification of each species (95-100% confident, 75-94%, 50-74%, 5-49%, <5%).

Individual Bee Data for <i>B. crotchii</i> (Enter each <i>B. crotchii</i> capture point as separate row)					<i>B. crotchii</i> Capture Point (Decimal degrees)		Distance Sampling only
Species	No. of Females	No. of Males	No. of Queens	Flowers or species of plant being used	LAT	LONG	Distance (m)
<i>B. crotchii</i>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>
<i>B. crotchii</i>							
<i>B. crotchii</i>							
<i>B. crotchii</i>							
<i>B. crotchii</i>							

File Names of Photographs and Map Files:

ATTACHMENT C
CNDDB FORMS

CNDDDB Online Field Survey Form Report



California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/



Source code MES24F0008
Quad code 3311776
Occ. no. _____
EO index no. _____
Map index no. _____

This data has been reported to the CNDDDB, but may not have been evaluated by the CNDDDB staff

Scientific name: *Bombus crotchii*

Common name: Crotch's bumble bee

Date of field work (mm-dd-yyyy): 07-17-2024

Comment about field work date(s):

OBSERVER INFORMATION

Observer: Lindsay A. Messett

Affiliation: Psomas

Address: 7236 E Stearns Street , Long Beach, CA 90815

Email: lindsay.messett@psomas.com

Phone: (562) 833-4276

Other observers:

DETERMINATION

Keyed in:

Compared w/ specimen at:

Compared w/ image in:

By another person: Confirmed by taxonomist

Other: Familiarity with the species, and hold a MOU for handling the species

Identification explanation:

Identification confidence: Very confident

Species found: Yes If not found, why not?

Level of survey effort: Observed during focused surveys.

Total number of individuals: 1

Collection? No

Collection number:

Museum/Herbarium:

ANIMAL INFORMATION

How was the detection made? Seen

Number detected in each age class:

1

adults

juveniles

larvae

egg mass

other

Age class comment: Individual was an adult male.

Site use description: Site provides nectar, pollen and nesting habitat.

What was the observed behavior? The individual was observed foraging in a small patch of leafy California buckwheat (*Eriogonum fasciculatum* var. *foliolosum*).

Describe any evidence of reproduction: The site provides abundant small rodent burrows that are suitable for nest locations.

SITE INFORMATION

Habitat description: Disturbed sagebrush scrub

Slope:

Landowner/manager: Private - Irvine Ranch

Aspect:

Site condition + population viability: Good

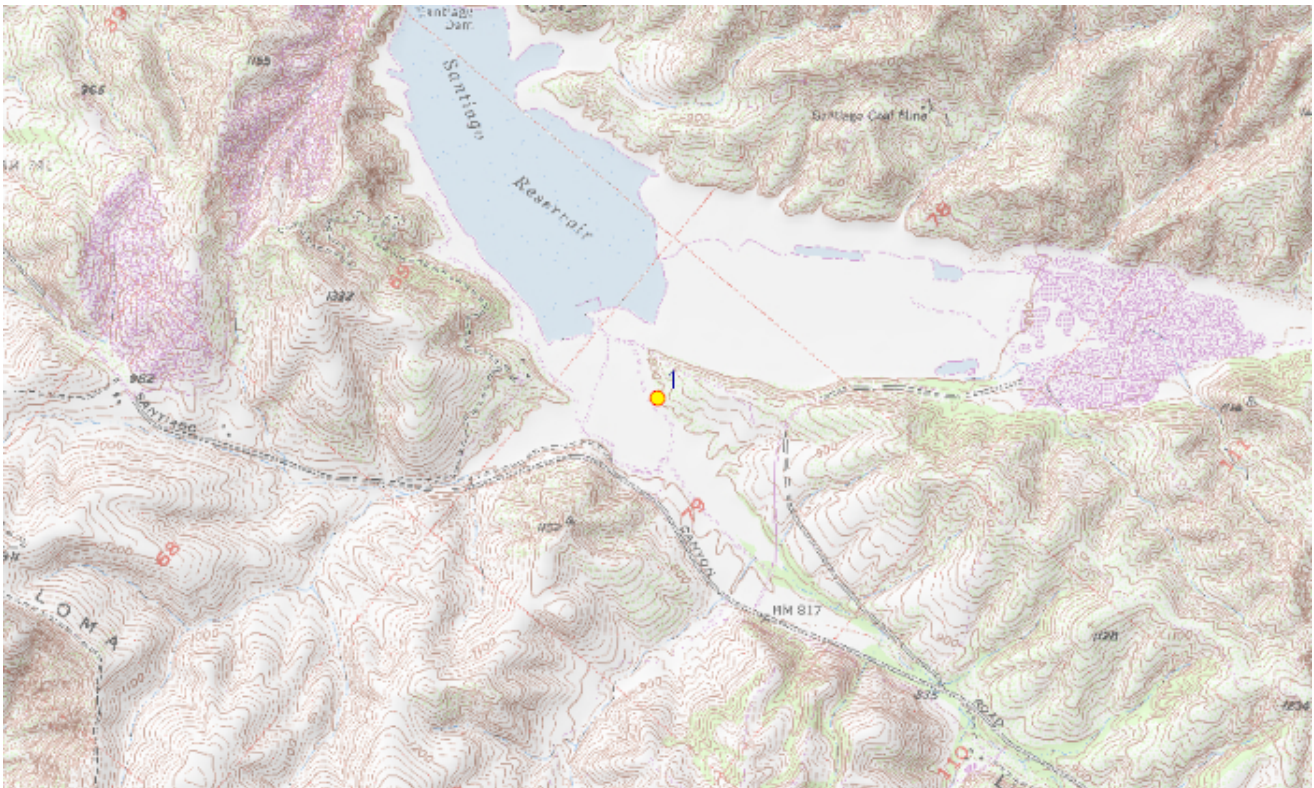
Immediate & surrounding land use: Irvine Lake, open space within the NCCP Reserve and Irvine Regional Park

Visible disturbances: Human activities: fishing, hiking, motor vehicles driving on surrounding access roads

Threats: Non-native vegetation

General comments:

MAP INFORMATION



ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTM E NAD83	UTM N NAD83	UTM Zone
	Orange	Black Star Canyon	793	33.77100	-117.71596	433705	3736996	11
1	Public Land Survey	Feature Comment						
	S T05S R08W 4	Crotch's bumble bee (male)						

The mapped feature is accurate within: 5 m

Source of mapped feature: iPhone Avenza Maps

Mapping notes: The mapped point represents one individual male bumble bee.

Location/directions comments:

Attachment(s):

CNDDDB Online Field Survey Form Report



California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/



Source code MES24F0010
Quad code 3311776
Occ. no. _____
EO index no. _____
Map index no. _____

This data has been reported to the CNDDDB, but may not have been evaluated by the CNDDDB staff

Scientific name: *Poliioptila californica californica*

Common name: coastal California gnatcatcher

Date of field work (mm-dd-yyyy): 06-20-2024

Comment about field work date(s):

OBSERVER INFORMATION

Observer: Lindsay A. Messett

Affiliation: Psomas

Address: 7236 E Stearns Street , Long Beach, CA 90815

Email: lindsay.messett@psomas.com

Phone: (562) 833-4276

Other observers:

DETERMINATION

Keyed in:

Compared w/ specimen at:

Compared w/ image in:

By another person:

Other: Familiarity with the species

Identification explanation: Individuals were heard calling then subsequently observed foraging within sagebrush scrub vegetation.

Identification confidence: Very confident

Species found: Yes If not found, why not?

Level of survey effort: Incidentally observed during focused Crotch's bumble bee surveys

Total number of individuals: 2

Collection? No

Collection number:

Museum/Herbarium:

ANIMAL INFORMATION

How was the detection made? Heard calling then seen

Number detected in each age class:

1

1

adults

juveniles

larvae

egg mass

other

Age class comment: Adult male traveling with one fledgling

Bird site use:

- ☒ Nesting ☐ Rookery ☐ Nesting colony ☐ Burrow site ☐ Lek
☐ Non-breeding (over-wintering) ☐ Communal roost ☐ Other (foraging, fly-over, etc.)

Site use description: [Used for nesting and foraging](#)

What was the observed behavior? [Adult male was observed traveling and foraging with one fledgling](#)

Describe any evidence of reproduction: [The presence of a fledgling indicates successful breeding occurred in the immediate vicinity.](#)

SITE INFORMATION

Habitat description: [Sagebrush scrub](#)

Slope:

Landowner/manager: [Private - Irvine Ranch](#)

Aspect:

Site condition + population viability: [Good](#)

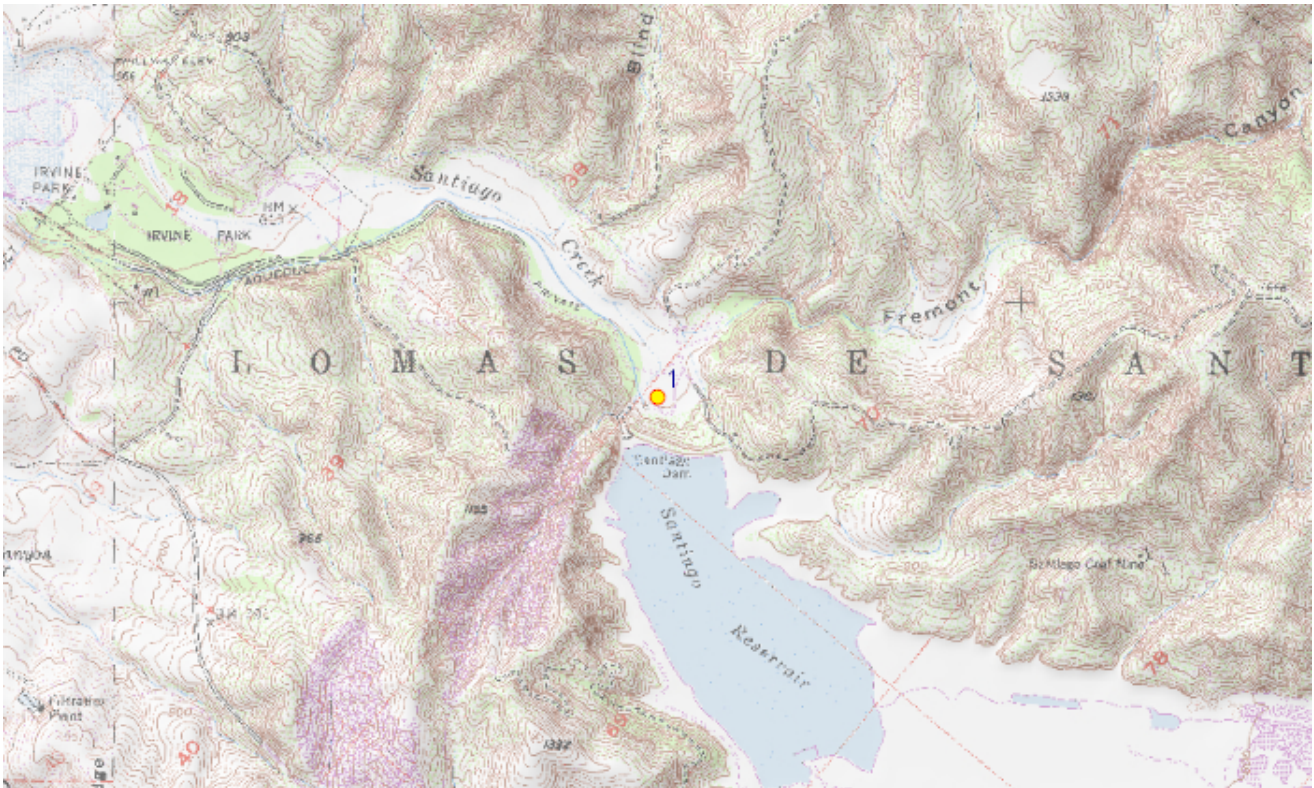
Immediate & surrounding land use: [Irvine Lake, open space in NCCP Reserve and Irvine Regional Park](#)

Visible disturbances: [Non-native vegetation](#)

Threats:

General comments:

MAP INFORMATION



ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTM E NAD83	UTM N NAD83	UTM Zone
	Orange	Black Star Canyon	675	33.78814	-117.72594	432794	3738903	11
1	Public Land Survey	Feature Comment						
	S T04S R08W 28	CAGN (male with fledgling)						

The mapped feature is accurate within: [5 m](#)

Source of mapped feature: [iPhone Avenza Maps](#)

Mapping notes: Mapped point represents an adult male with one fledgling.

Location/directions comments:

Attachment(s):

CNDDDB Online Field Survey Form Report



California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/



Source code MES24F0009
Quad code 3311776
Occ. no. _____
EO index no. _____
Map index no. _____

This data has been reported to the CNDDDB, but may not have been evaluated by the CNDDDB staff

Scientific name: Vireo bellii pusillus

Common name: least Bell's vireo

Date of field work (mm-dd-yyyy): 06-20-2024

Comment about field work date(s): Also observed during subsequent surveys on July 16, and August 5, 2024.

OBSERVER INFORMATION

Observer: Lindsay A. Messett

Affiliation: Psomas

Address: 7236 E Stearns Street , Long Beach, CA 90815

Email: lindsay.messett@psomas.com

Phone: (562) 833-4276

Other observers: _____

DETERMINATION

Keyed in:

Compared w/ specimen at:

Compared w/ image in:

By another person:

Other: Familiarity with the species

Identification explanation:

Identification confidence: Very confident

Species found: Yes If not found, why not?

Level of survey effort: Incidentally observed during focused Crotch's bumble bee surveys

Total number of individuals: 4

Collection? No

Collection number: _____

Museum/Herbarium: _____

ANIMAL INFORMATION

How was the detection made? Heard singing then seen

Number detected in each age class:

2

2

adults

juveniles

larvae

egg mass

other

Age class comment: Family group consisting of a pair with two fledglings

Bird site use:

- ☒ Nesting ☐ Rookery ☐ Nesting colony ☐ Burrow site ☐ Lek
☐ Non-breeding (over-wintering) ☐ Communal roost ☐ Other (foraging, fly-over, etc.)

Site use description:

What was the observed behavior? The pair was traveling through mulefat scrub vegetation with two fledglings and was observed feeding them on multiple occasions.

Describe any evidence of reproduction: Yes, two fledglings were observed indication that successful nesting had occurred.

SITE INFORMATION

Habitat description: Mulefat scrub and disturbed mulefat scrub

Slope: Landowner/manager: Private - Irvine Ranch

Aspect:

Site condition + population viability: Good

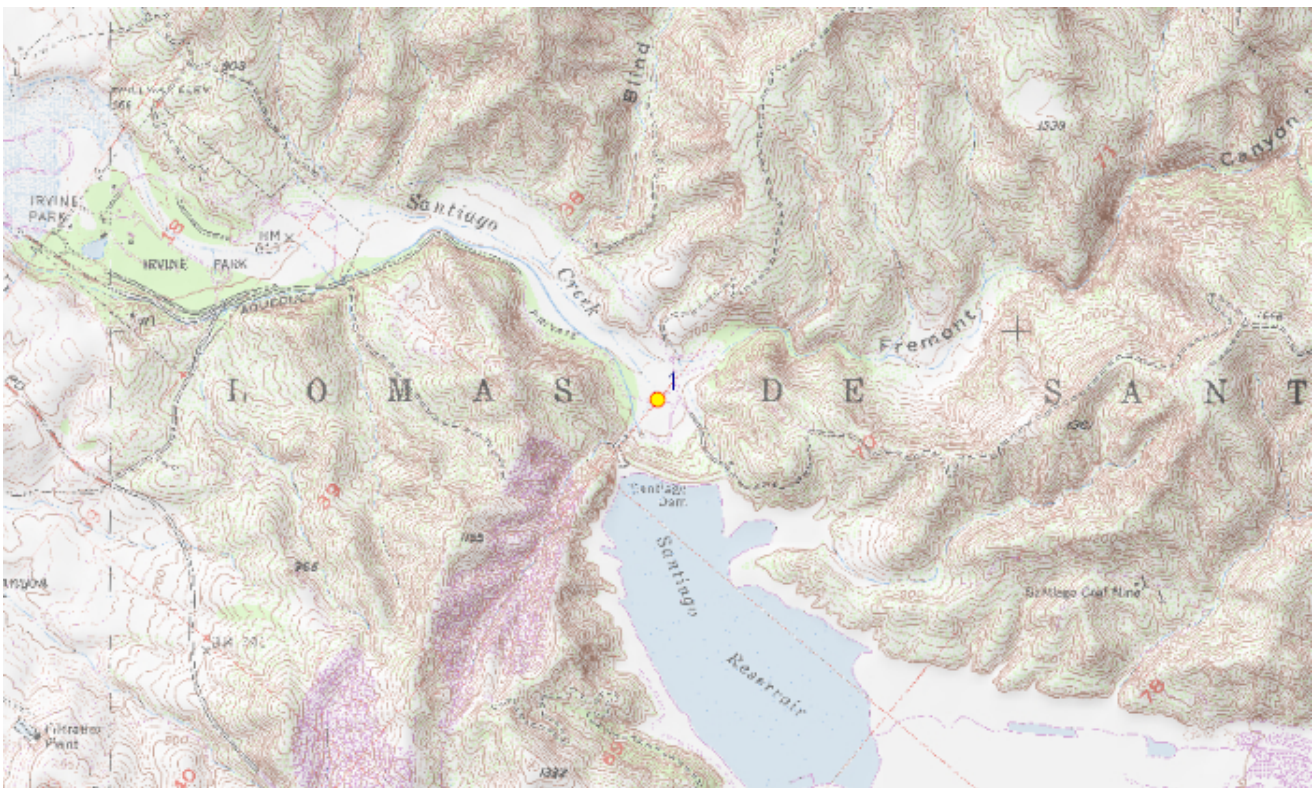
Immediate & surrounding land use: Irvine Lake, open space in NCCP Reserve, Irvine Regional Park

Visible disturbances:

Threats: Non-native vegetation

General comments:

MAP INFORMATION



ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTM E NAD83	UTM N NAD83	UTM Zone
1	Orange	Black Star Canyon	667	33.78913	-117.72576	432811	3739013	11
	Public Land Survey	Feature Comment						
	S T04S R08W 28	Least Bell's Vireo (Family Group)						

The mapped feature is accurate within: 5 m

Source of mapped feature: iPhone Avenza Maps

Mapping notes: Mapped point represents a family group consisting of a pair traveling with 2 fledglings. The family group was also observed at various locations during subsequent surveys: 33.788656, -117.726633 and 33.786843, -117.724584

Location/directions comments:

Attachment(s):

APPENDIX H
ARROYO TOAD SURVEYS

August 18, 2020

Stacey Love
Recovery Permit Coordinator
U.S. Fish and Wildlife Service
2177 Salk Avenue, Suite 250
Carlsbad, California 92008

VIA EMAIL AND MAIL
Stacey_Love@fws.gov

Subject: Results of Focused Presence/Absence Surveys for Arroyo Toad for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California

Dear Ms. Love:

This Letter Report presents the results of focused diurnal and nocturnal surveys to determine the presence or absence of the arroyo toad (*Anaxyrus californicus*) for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project (hereinafter referred to as the “Project”) located in Orange County, California (Exhibit 1).

PROJECT DESCRIPTION AND LOCATION

The Irvine Ranch Water District and Serrano Water District are jointly proposing to abandon the existing Santiago Creek Dam outlet tower and construct a new inclined outlet structure to be located on the left (west) abutment of the existing dam. Additionally, based on feedback from the Department of Safety of Dams, the dam spillway requires structural improvements. Existing structures include the dam crest, the intake tower in Irvine Lake, the spillway channel, the control houses, the energy dissipater structure, the aboveground outlet pipe, and the dam crest access road. The Project is currently in the early design phase.

Santiago Creek Dam is located at the north end of Irvine Lake in unincorporated Orange County, California (Exhibit 1). The survey area is located northeast of State Route (SR) 261 and southeast of State Route 241 (SR-241). The survey area is depicted on the U.S. Geological Survey’s (USGS’) Black Star Canyon 7.5-minute quadrangle (Exhibit 2). Topography is relatively flat, with rolling hills to the east and a steep cliff to the west. Elevations range from approximately 635 to 898 feet above mean sea level (msl). Santiago Creek, a blue line stream, occurs in the survey area. Santiago Creek travels roughly northwest, and a tributary from Fremont Canyon joins it from the east. Fremont Canyon is characterized by very steep slopes, shallow soils, and watercourses contained within bedrock channels. Surrounding land uses primarily consist of undeveloped open space. Irvine Regional Park is located northwest of SR-241; Limestone Canyon Nature Preserve is located south of Santiago Canyon Road; and Oak Canyon Park is located at the southeast end of Irvine Lake. Residential development is located west of SR-241.

The survey area for the arroyo toad surveys included all suitable habitat along Santiago Creek extending 0.62 mile (1 kilometer) upstream of the project survey area, which includes a tributary from Fremont Canyon (Exhibit 3). The following vegetation types and other areas occur within the project survey area: sagebrush scrub, disturbed sagebrush scrub, disturbed floodplain sage scrub, toyon – sumac chaparral, annual grassland, ruderal, southern willow

5 Hutton Centre Drive
Suite 300
Santa Ana, CA 92707

Tel 714.751.7373
Fax 714.545.8883
www.Psomas.com

Stacey Love
August 18, 2020
Page 2

scrub, mulefat scrub, coast live oak woodland, western sycamore, cliff, open water, ornamental, developed, and disturbed. Representative site photos are included in Attachment A.

SPECIES BACKGROUND

The arroyo is a federally listed Endangered species and a California Species of Special Concern. At the time of listing, the arroyo toad was considered a subspecies of southwestern arroyo toad (*Bufo microscaphus*) until genetic studies (Gergus 1998) separated the arroyo toad (*B. californicus*) from the Arizona toad (*B. microscaphus*). Recent research (Frost et al. 2006) places both species in the genus *Anaxyrus*.

The arroyo toad is a small, olive green or gray to tan toad with warty skin and dark spots. It has a light-colored V-shaped stripe across the head between and including the eyelids, and a light spot on each sacral hump and in the middle of its back. It normally lacks a mid-dorsal stripe (i.e., a stripe down the center of its back). The underside of the arroyo toad is usually buff-colored and unspotted. The parotid glands are oval-shaped, widely separated, and pale toward the front; and the cranial crests are absent or weak. Reproductive adult toads typically range from 2.2 to 2.6 inches snout to vent length for males and 2.6 to 3.3 inches for females (USFWS 1999). Its movement consists of hopping rather than walking (USFWS 1994). Arroyo toads are nocturnal (i.e., active at night). Adults feed primarily on ants but will also consume beetles, spiders, larvae, caterpillars, and other invertebrates (USFWS 2009). Males become sexually mature in one to two years, and females become sexually mature in two to three years; arroyo toads can live up to five years (Sweet 1992, 1993).

Tadpoles are black in coloration at hatching and develop a tan coloration on the upper side; gold and dark crossbars on the tail; and an opaque, white venter on the underside before metamorphosing (Sweet 1992; USFWS 1999). Tadpoles typically metamorphose at a length of 1.1 to 1.6 inches (USFWS 1999). Juveniles have a white-gray-tan coloring with dark spots on the upper side and a white underside. The V-shaped line on the head is visible on juveniles, but the parotid glands are typically not yet visible (Sweet 1992; Sanders 1950). Juveniles usually grow to about 1.2 to 1.6 inches their first year (sometimes up to 2.0 inches) and then do not grow again until the following spring (Sweet 1992).

The arroyo toad population is currently distributed in coastal drainages and along the desert slopes of the Transverse and Peninsular Ranges from approximately 1,000 feet to 4,600 feet above mean sea level; however, the species has been recorded from sea level to 8,000 feet above msl in Baja California (Patten and Myers 1992; Jennings and Hayes 1994; Welsh 1988; Beaman et al. 1995; USFWS 1999). It occurs in intermittent washes/streams and perennial streams. In the northern portion of their range, they generally occur in third- to sixth-order¹ or greater streams; however, in the southern portion of their range, they can occur in first- and second-order streams (USFWS 1999; Griffin et al. 1999; USFWS 2009). “Episodic flooding is critical to keeping the low stream terraces relatively vegetation free and soils friable enough for juveniles and adults to create burrows” (Jennings and Hayes 1994). The most favorable breeding habitat for arroyo toad consists of slow-moving streams with shallow pools, nearby sandbars, and adjacent stream terraces.

Outside the breeding season, arroyo toads are essentially terrestrial, using a variety of upland habitats, including sycamore-cottonwood woodlands, oak woodlands, coastal sage scrub, chaparral, and grasslands (Holland 1995; Griffin et al. 1999; USFWS 2009). Adult toads burrow into sandy terraces where they shelter during the day when the surface is damp or during longer periods during the dry season (Sweet 1989). During the non-breeding season (i.e., August–January), arroyo toad will aestivate (a state of

¹ Stream order is a relative size of streams. The smallest tributaries are referred to as first-order streams. Two first-order streams combine to create a second-order stream, and so on (Sweet 1992).

Stacey Love
August 18, 2020
Page 3

dormancy similar to hibernation) to prevent dehydration during hot or dry times of the year (Ramirez 2003).

Adult male arroyo toads will sometimes travel 1.2 to 1.9 miles along a stream course, often becoming more sedentary once reaching a large size. Females are more sedentary, typically maintaining an area of movement less than 330 feet. Adult and subadult arroyo toads can range widely into the uplands, commonly 0.3 mile, with some movements up to 1.2 miles from the stream (USFWS 1999).

During the breeding season, typically from February to July, males will make advertisement vocalizations above water from shallow areas along the creek margins. The advertisement call is a soft, high, whistling trill that lasts from 4 to 9 seconds in duration and is audible up to approximately 985 feet under ideal conditions (Gergus et al. 1997). Two parallel egg strings of 2,000 to 10,000 eggs are deposited in shallow water (i.e., usually less than 4 inches in depth with an average of 1.4 inches) on fine sediment with very low current (0.2 foot per second) and little or no emergent vegetation (Sweet 1992; USFWS 1999). These eggs hatch four to six days later (Sweet 1992). Streams where arroyo toad occur must have water from approximately late March through mid-June to allow tadpoles to develop (Sweet 1989). The tadpole stage usually lasts about ten weeks (USFWS 2009). Tadpoles feed on loose organic material such as interstitial algae, bacteria, and diatoms from just beneath the surface layer of fine sediments or within the interstices of gravel deposits; they do not forage on macroscopic vegetation (Sweet 1992; Jennings and Hayes 1994; USFWS 2009). After metamorphosis in June or July, the juveniles remain on the adjacent gravel bars or sandy stream terraces for 8 to 12 weeks (depending on site conditions and rainfall), where they forage for insects (Sweet 1992; USFWS 1994).

On February 9, 2011, the USFWS published the Revised Critical Habitat for the arroyo toad. The Revised Critical Habitat designated 98,366 acres of critical habitat for the arroyo toad in portions of Santa Barbara, Ventura, Los Angeles, San Bernardino, Riverside, Orange, and San Diego Counties, California (USFWS 2011). The survey area is not located in designated Critical Habitat for this species.

This species is a Conditionally Covered Species in the Central Coastal Natural Communities Conservation Plan/Habitat Conservation Plan (NCCP/HCP). The NCCP/HCP states that “within the subregion, arroyo toad may occur in Limestone Canyon, Boxer Canyon (in the Santiago Canyon drainage), and the Silverado watershed... None of these areas have been thoroughly surveyed for arroyo toad” (County of Orange 1996). The NCCP/HCP also states that the Transportation Corridor Agency conducted surveys in the Santiago Creek area and have not identified the presence of the species (County of Orange 1996). The records in the California Natural Diversity Database match those reported from the NCCP/HCP; there is a 1974 record from Limestone Canyon and a record with no date from a tributary of Silverado Canyon (CDFW 2020). There have been no recent observations of the species reported in the vicinity.

SURVEY METHODS

The USFWS’ 1999 Arroyo Toad Protocol requires that a minimum of six surveys be performed during the breeding season (i.e., March 15–July 1), with at least one survey conducted in April, one in May, and one in June. The surveys included diurnal and nocturnal searches to determine the presence of eggs, tadpoles, and adults. During the diurnal surveys, water was examined for the presence of arroyo toad egg masses and tadpoles. Nocturnal surveys began one hour after dusk during weather conditions conducive to toad activity. Nocturnal search methods included walking along the creek banks and stopping periodically to listen for the breeding calls of adult males. Headlamps and flashlights were used to visually identify toads when a breeding call was heard. If any arroyo toads were found, the individual or population was documented, recorded with a Global Positioning System unit, and mapped on an aerial

Stacey Love
August 18, 2020
Page 4

photograph. The number of individuals were noted on each subsequent visit, and data were collected on general habitat characteristics for any arroyo toads observed.

Psomas Senior Biologists Jonathan Aguayo and Lindsay Messett conducted the focused surveys in all potentially suitable habitat for arroyo toad in the survey area according to the USFWS-established survey methodology described above. The survey area included all suitable habitat along Santiago Creek, including a tributary from Fremont Canyon. Mr. Aguayo and Ms. Messett conducted focused surveys for the arroyo toad on April 17 and 24; May 15 and 22; and June 12 and 19, 2020.

Diurnal surveys were conducted from approximately 5:00 PM until dusk, and nocturnal surveys were conducted from one hour after dusk until approximately 10:30 PM. Surveys focused on detecting toads by visual identification; listening for the advertising call of adult males; and checking potentially suitable breeding habitat for tadpoles and/or eggs. Biologists scanned pools for eggs, larvae, metamorphs, juveniles, and breeding and/or calling adults in potentially suitable breeding locations along the creek, and for foraging individuals in the adjacent riparian and upland areas. Surveyors moved in an upstream direction during the surveys. Headlamps, flashlights, and binoculars were used to visually identify toads, frogs, and their larvae detected at night. Nocturnal surveys were conducted during appropriate environmental conditions conducive to the activity patterns of the arroyo toad. Generally, these conditions are nighttime temperatures greater than 50 degrees Fahrenheit (°F) at dusk, with low winds (less than 10 miles per hour); nights with a full or nearly full moon were avoided. Survey dates, times, and weather data are shown in Table 1. Survey conditions and results were documented in field notes.

TABLE 1
SUMMARY OF SURVEY DATA AND CONDITIONS FOR ARROYO TOAD

Survey	Survey Date	Survey Type	Surveying Biologists	Start/End Time	Wind (miles/hour)		Temperature (°F)		Cloud Cover
					Start	End	Start	End	
1	4/17/2020	Diurnal	Aguayo, Messett	5:00 PM–7:20 PM	6–7	4–5	63	60	70%
		Nocturnal		8:15 PM–10:20 PM	4–5	4–5	59	57	50%
2	4/24/2020	Diurnal	Aguayo, Messett	4:50 PM–7:10 PM	6–7	4–5	93	86	40%
		Nocturnal		8:15 PM–10:15 PM	3–4	3–4	82	79	70%
3	5/15/2020	Diurnal	Aguayo, Messett	5:15 PM–7:40 PM	4–5	0–1	73	68	clear
		Nocturnal		8:30 PM–10:20 PM	0–1	2–3	66	64	clear
4	5/22/2020	Diurnal	Aguayo, Messett	5:25 PM–7:20 PM	4–5	3–4	70	64	clear
		Nocturnal		8:30 PM–10:15 PM	2–3	2–3	61	59	clear
5	6/12/2020	Diurnal	Aguayo, Messett	5:35 PM–7:40 PM	2–3	4–5	73	64	clear
		Nocturnal		8:40 PM–10:30 PM	3–4	1–2	63	61	clear
6	6/19/2020	Diurnal	Aguayo, Messett	5:40 PM–7:45 PM	3–4	4–5	72	67	clear
		Nocturnal		8:40 PM–10:20 PM	4–5	4–5	63	62	clear

°F: degrees Fahrenheit.

Stacey Love
August 18, 2020
Page 5

SURVEY RESULTS

No arroyo toad was observed or detected within the survey area during the focused surveys.

Other amphibian species detected during surveys include western toad (*Anaxyrus boreas*), California treefrog (*Pseudacris cadaverina*), and Baja California treefrog (*Pseudacris hypochondriaca*). Representative photos of the frogs observed are included in Attachment A. A complete list of all wildlife species detected during the surveys is provided in Attachment B.

OTHER OBSERVATIONS

Two-striped garter snake (*Thamnophis hammondi*), a California Species of Special Concern, was observed during the survey conducted on May 15, 2020 (Exhibit 4). A California Natural Diversity Database (CNDDDB) form documenting this observation is included in Attachment C and will be submitted online to the California Department of Fish and Wildlife (CDFW) by Mr. Aguayo.

A male coastal California gnatcatcher (*Poliophtila californica californica*), a federally listed Threatened species and a California Species of Special Concern, was detected during the survey conducted on May 15, 2020. Coastal cactus wren (*Campylorhynchus brunneicapillus sandiegensis*), a Species of Special Concern, was detected on multiple surveys. CNDDDB forms documenting these species will be included with the Results of Coastal California Gnatcatcher Survey Report and will be submitted online by Ms. Messett.

American peregrine falcon (*Falco peregrinus anatum*), a CDFW Fully Protected species, was detected during the survey conducted on April 24, 2020 (Exhibit 4). The American peregrine falcon was not observed nesting in the survey area; therefore, a CNDDDB form was not prepared for this species.

Psomas appreciates the opportunity to assist on this Project. If you have any comments or questions, please call Amber Heredia at 714.751.7373.

Sincerely,

P S O M A S



Amber O. Heredia
Senior Project Manager



Jonathan Aguayo
Senior Biologist

Enclosures: Exhibits 1–4
Attachment A – Site Photographs
Attachment B – Wildlife Compendium
Attachment C – California Natural Diversity Database Forms

cc: Jo Ann Corey, corey@irwd.com
Jacob Moeder, Moeder@irwd.com

Stacey Love
August 18, 2020
Page 6

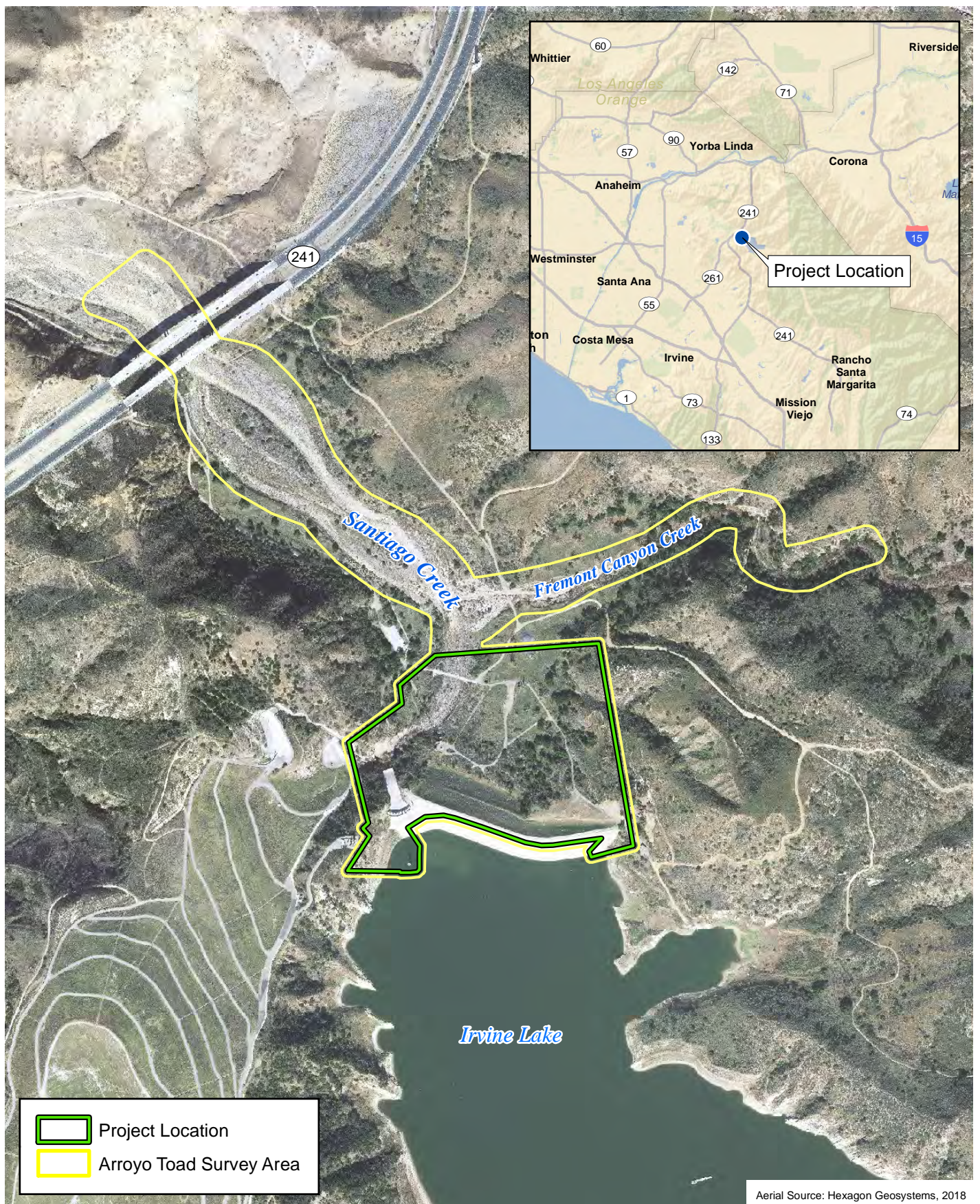
REFERENCES

- Beaman, K.R., S.J. Meyers, and C. McGaugh. 1995. Report on Surveys for Arroyo Toads on Deep Creek. Contract report to USDA, Forest Service, San Bernardino National Forest.
- California Department of Fish and Wildlife (CDFW). 2020 (August 13, date accessed). California Natural Diversity Database. Records of Occurrence for the USGS Corona South, Black Star Canyon, Orange, Tustin, and El Toro 7.5-minute quadrangles. Sacramento, CA: CDFW, Natural Heritage Division.
- County of Orange. 1996 (July 17). Natural Community Conservation Plan & Habitat Conservation Plan, County of Orange, Parts I and II: NCCP/HCP, Final (Administrative Record Copy). Prepared by R.J. Meade Consulting. La Jolla, CA.
- Frost, D.R. et al. 2006. The Amphibian Tree of Life. *Bulletin of the American Museum of Natural History* 297:1–370. New York, NY: American Museum of Natural History.
- Gergus, E.W.A., B.K. Sullivan, and K.B. Malmos. 1997. Call Variation in the *Bufo microscaphus* Complex: Implications for Species Boundaries and the Evolution of Mate Recognition. *Ethology* 103: 979–989. Maldon, MA: John Wiley & Sons, Inc.
- Gergus, E.W.A. 1998. Systematics of the *Bufo microscaphus* complex: Allozyme evidence. *Herpetologica* 54:317–325. Salt Lake City, UT: Society for the Study of Amphibians and Reptiles.
- Griffin, P.C., T.J. Case, and R.N. Fisher. 1999. *Radio Telemetry Study of Bufo californicus*, Arroyo Toad Movement Patterns and Habitat Preferences Contract Report to the California Department of Transportation Southern Biology Pool. Sacramento, CA: Western Ecological Research Center.
- Holland, D.C. 1995. Sensitive Species Hydroecological Evaluation – Santa Margarita River: Arroyo Southwestern Toad (*Bufo microscaphus californicus*) Camp. Camp Pendleton. 14 pp.
- Jennings, M.R. and M.P. Hayes. 1994. *Amphibian and Reptile Species of Special Concern in California* (Contract No. 8023). Sacramento, CA: CDFG, Inland Fisheries Division.
- Patten, M.A., and S.J. Myers. 1992. Geographic distribution. *Bufo microscaphus californicus* (arroyo toad). *Herpetological Review*, 23(4):122.
- Psomas. 2020 [in preparation]. *Results of the Coastal California Gnatcatcher Survey for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California*. Santa Ana, CA: Psomas.
- Ramirez, R.S., Jr. 2003. Arroyo toad (*Bufo californicus*) hydrogeomorphic habitat baseline analysis/radio telemetry study - Rancho Las Flores San Bernardino County, California. Final report to Rancho Las Flores Limited Partnership by Cadre Environmental, Carlsbad, California. vi + 101 pp.
- Sanders, R.M. 1950. A herpetological survey of Ventura County, California. Master's thesis. Stanford University, Stanford, California. 140 pp.
- Sweet, S.S. 1993. *Second Report on the Biology and Status of the Arroyo Toad (Bufo microscaphus californicus) on the Los Padres National Forest of Southern California* (Report to United States

Stacey Love
August 18, 2020
Page 7

- Department of Agriculture, Forest Service, Los Padres National Forest, Goleta, California).
Goleta, CA: USDA.
- . 1992. *Ecology and Status of the Arroyo Toad (Bufo microscaphus californicus) on the Los Padres National Forest of Southern California, with Management Recommendations* (Contract report to United States Department of Agriculture, Forest Service, Los Padres National Forest). Goleta, CA: USDA.
- . 1989. Observations on the biology and status of the arroyo toad, *Bufo microscaphus californicus*, with a proposal for additional research. Department of Biological Sciences, University of California, Santa Barbara, California. Unpublished report. 23 pp.
- U.S. Fish and Wildlife Service (USFWS). 2011 (February 9). Endangered and Threatened Wildlife and Plants; Revised Critical Habitat for the Arroyo Toad; Final Rule. *Federal Register* 76(27): 7245–7467. Washington, D.C.: USFWS.
- . 2009. Arroyo toad (*Anaxyrus californicus*) 5-Year Review: Summary and Evaluation. Ventura Fish and Wildlife Office, Ventura, California.
- . 1999. Arroyo southwestern toad (*Bufo microscaphus californicus*) recovery plan. Portland, Oregon. 119 pp. <http://www.amphibians.org/wp-content/uploads/2013/07/Arroyo-Southwestern-Toad-Recovery-Plan.pdf>.
- . 1994 (December 16). Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for the Arroyo Southwestern Toad. *Federal Register* 59(241): 64859–64867. Washington, D.C.: USFWS.
- Welsh, H.H., Jr. 1988. An ecogeographic analysis of the herpetofauna of the Sierra San Pedro Mártir region, Baja California: With a contribution to the biogeography of Baja California herpetofauna. *Proceedings of the California Academy of Sciences*, 4th series, 46:1-72.

D:\Projects\3IRW000905\MXDARTOlex_Project_Location_20200805.mxd



Aerial Source: Hexagon Geosystems, 2018

Project Location

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

Exhibit 1

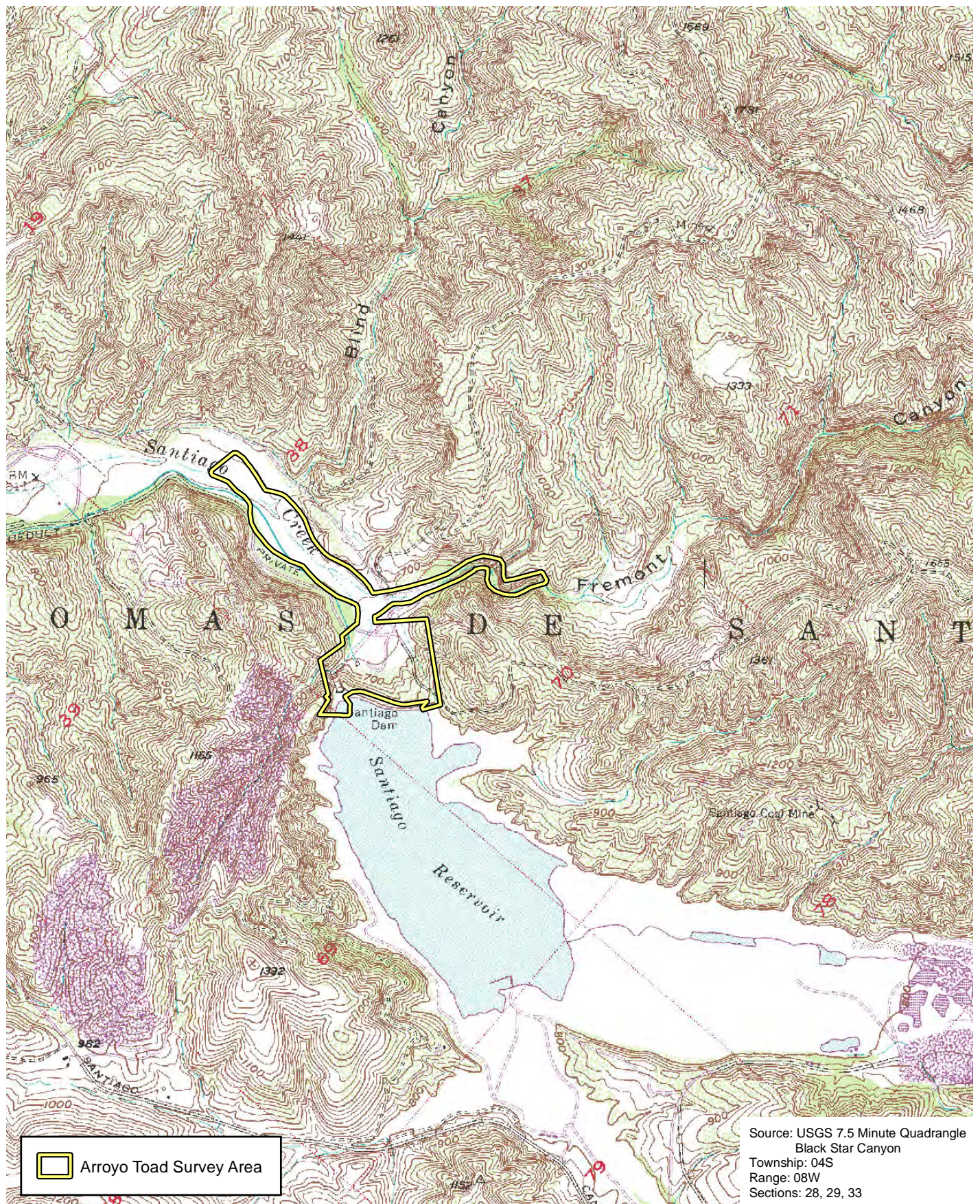


850 425 0 850
Feet



(Rev: 8-18-2020 MMD) R:\Projects\IRW_IRWD\3IRW000905\Graphics\ARTOlex_Project_Location.pdf

D:\Projects\3IRW000905\MXDARTOlex_USGS_20200805.mxd



U.S. Geological Survey 7.5-minute Digital Quadrangle

Exhibit 2

Santiago Creek Dam Outlet Tower and Spillway Improvement Project



2,000 1,000 0 2,000
Feet



(Rev: 8-18-2020 MMD) R:\Projects\IRW_IRWD\3IRW000905\Graphics\ARTOlex_USGS.pdf

D:\Projects\3\IRW\00905\MDARTO\lex_SurveyArea_20200806.mxd



Survey Area

Santiago Creek Dam Outlet Tower and Spillway Improvement Project



Exhibit 3



(Rev: 08/18/2020 RMB) R:\Projects\IRW_IRWD\3\IRW000905\Graphics\ARTO\lex_SurveyArea.pdf

D:\Projects\3IRW00905\MXD\ARTO\ex_SpecialStatusSpeciesObserved_20200806.mxd



Special Status Species Observed

Santiago Creek Dam Outlet Tower and Spillway Improvement Project



Exhibit 4



(Rev: 08/18/2020 RMB) R:\Projects\IRW_IRWD\3IRW000905\Graphics\ARTO\ex_SpecialStatusSpeciesObserved.pdf

ATTACHMENT A
SITE PHOTOGRAPHS



Photo 1: View of suitable habitat along Santiago Creek located in the northwestern portion of the survey area.



Photo 2: View of suitable habitat along the tributary from Fremont Canyon in the middle portion of the survey area.

Site Photographs

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

Attachment A-1





Photo 3: View of suitable habitat along the tributary from Fremont Canyon in the eastern portion of the survey area.



Photo 4: View of western toad egg strings found along the tributary from Fremont Canyon.

Site Photographs

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

Attachment A-2





Photo 5: View of a western toad found along the tributary from Fremont Canyon.



Photo 6: View of a California treefrog found along the tributary from Fremont Canyon.

Site Photographs

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

Attachment A-3



ATTACHMENT B
WILDLIFE COMPENDIUM

WILDLIFE COMPENDIUM

Scientific Name	Common Name
AMPHIBIANS	
BUFONIDAE – TRUE TOAD FAMILY	
<i>Anaxyrus boreas</i>	western toad
HYLIDAE – TREEFROG FAMILY	
<i>Pseudacris cadaverina</i>	California treefrog
<i>Pseudacris hypochondriaca</i>	Baja California treefrog
LIZARDS	
PHRYNOSOMATIDAE – SPINY LIZARD FAMILY	
<i>Sceloporus occidentalis</i>	western fence lizard
<i>Uta stansburiana</i>	common side-blotched lizard
SNAKES	
NATRICIDAE – HARMLESS LIVE-BEARING SNAKE FAMILY	
<i>Thamnophis hammondi</i>	two-striped garter snake
BIRDS	
ANATIDAE – SWAN, GOOSE, AND DUCK FAMILY	
<i>Branta canadensis</i>	Canada goose
<i>Anas platyrhynchos</i>	mallard
ODONTOPHORIDAE – NEW WORLD QUAIL FAMILY	
<i>Callipepla californica</i>	California quail
COLUMBIDAE – PIGEON AND DOVE FAMILY	
<i>Zenaida macroura</i>	mourning dove
CAPRIMULGIDAE – NIGHTJAR FAMILY	
<i>Chordeiles acutipennis</i>	lesser nighthawk
<i>Phalaenoptilus nuttallii</i>	common poorwill
APODIDAE – SWIFT FAMILY	
<i>Aeronautes saxatalis</i>	white-throated swift
TROCHILIDAE – HUMMINGBIRD FAMILY	
<i>Calypte anna</i>	Anna's hummingbird
<i>Selasphorus sasin</i>	Allen's hummingbird
PHALACROCORACIDAE – CORMORANT FAMILY	
<i>Phalacrocorax auratus</i>	double-crested cormorant
ARDEIDAE – HERON FAMILY	
<i>Ardea Herodias</i>	great blue heron
<i>Ardea alba</i>	great egret
CATHARTIDAE – NEW WORLD VULTURE FAMILY	
<i>Cathartes aura</i>	turkey vulture
ACCIPITRIDAE – HAWK FAMILY	
<i>Buteo jamaicensis</i>	red-tailed hawk
TYTONIDAE – BARN OWL FAMILY	
<i>Tyto alba</i>	barn owl
STRIGIDAE – TYPICAL OWL FAMILY	
<i>Megascops kennicottii</i>	western screech-owl
<i>Bubo virginianus</i>	great horned owl
PICIDAE – WOODPECKER FAMILY	
<i>Melanerpes formicivorus</i>	acorn woodpecker

WILDLIFE COMPENDIUM

Scientific Name	Common Name
FALCONIDAE – FALCON FAMILY	
<i>Falco sparverius</i>	American kestrel
<i>Falco peregrinus</i>	peregrine falcon
PSITTACIDAE – PARROT FAMILY	
<i>Amazona viridigenalis</i> *	red-crowned parrot*
TYRANNIDAE – TYRANT FLYCATCHER FAMILY	
<i>Empidonax difficilis</i>	pacific-slope flycatcher
<i>Sayornis nigricans</i>	black phoebe
<i>Myiarchus cinerascens</i>	ash-throated flycatcher
<i>Tyrannus vociferans</i>	Cassin's kingbird
CORVIDAE – JAY AND CROW FAMILY	
<i>Aphelocoma californica</i>	California scrub-jay
<i>Corvus corax</i>	common raven
PARIDAE – TITMOUSE FAMILY	
<i>Baeolophus inornatus</i>	oak titmouse
AEGITHALIDAE – BUSHTIT FAMILY	
<i>Psaltirparus minimus</i>	bushtit
TROGLODYTIDAE – WREN FAMILY	
<i>Troglodytes aedon</i>	house wren
<i>Thryomanes bewickii</i>	Bewick's wren
<i>Campylorhynchus brunneicapillus</i>	cactus wren
POLIOPTILIDAE – GNATCATCHER FAMILY	
<i>Poliophtila caerulea</i>	blue-gray gnatcatcher
<i>Poliophtila californica</i>	California gnatcatcher
SYLVIIDAE – SILVIID WARBLERS FAMILY	
<i>Chamaea fasciata</i>	wrentit
MIMIDAE – MOCKINGBIRD AND THRASHER FAMILY	
<i>Toxostoma redivivum</i>	California thrasher
STURNIDAE – STARLING FAMILY	
<i>Sturnus vulgaris</i> *	European starling*
PTILOGONATIDAE – SILKY-FLYCATCHER FAMILY	
<i>Phainopepla nitens</i>	phainopepla
FRINGILLIDAE – FINCH FAMILY	
<i>Haemorhous mexicanus</i>	house finch
<i>Spinus psaltria</i>	lesser goldfinch
PARULIDAE – WOOD-WARBLER FAMILY	
<i>Cardellina pusilla</i>	Wilson's warbler
EMBERIZIDAE – SPARROW FAMILY	
<i>Pipilo maculatus</i>	spotted towhee
<i>Melospiza crissalis</i>	California towhee
<i>Melospiza melodia</i>	song sparrow
ICTERIDAE – BLACKBIRDS AND ORIOLES	
<i>Icterus cucullatus</i>	hooded oriole
CARDINALIDAE – CARDINALS, GROSBILLS, AND ALLIES FAMILY	
<i>Piranga ludoviciana</i>	western tanager
<i>Pheucticus melanocephalus</i>	black-headed grosbeak

WILDLIFE COMPENDIUM

Scientific Name	Common Name
MAMMALS	
SCIURIDAE – SQUIRREL FAMILY	
<i>Otospermophilus beecheyi</i>	California ground squirrel
CRICETIDAE – NEW WORLD RATS AND MICE FAMILY	
<i>Peromyscus</i> sp.	mouse
LEPORIDAE – HARE AND RABBIT FAMILY	
<i>Sylvilagus audubonii</i>	desert cottontail
VESPERTILIONIDAE – VESPERTILIONID BAT FAMILY	
Order <i>Chiroptera</i>	bat
FELIDAE – CAT FAMILY	
<i>Puma concolor</i>	mountain lion (tracks)
CANIDAE – CANID FAMILY	
<i>Canis latrans</i>	coyote
CERVIDAE – CERVID FAMILY	
<i>Odocoileus hemionus</i>	southern mule deer
* Non-native species	

ATTACHMENT C

CALIFORNIA NATURAL DIVERSITY DATABASE FORMS

CNDDDB Online Field Survey Form Report



California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/



Source code AGU20F0012
Quad code 3311776
Occ. no. _____
EO index no. _____
Map index no. _____

This data has been reported to the CNDDDB, but may not have been evaluated by the CNDDDB staff

Scientific name: *Thamnophis hammondi*

Common name: *two-striped gartersnake*

Date of field work (mm-dd-yyyy): *05-15-2020*

Comment about field work date(s):

OBSERVER INFORMATION

Observer: *Jonathan Aguayo*

Affiliation: *Psomas*

Address: *6292 San Harco Circle , Buena Park, CA 90620*

Email: *jonathan.aguayo@psomas.com*

Phone: *(805) 204-6986*

Other observers: *Lindsay Messett*

DETERMINATION

Keyed in:

Compared w/ specimen at:

Compared w/ image in:

By another person:

Other: *Familiarity with California snake species through research, workshops and/or training*

Identification explanation:

Identification confidence: *Very confident*

Species found: *Yes* If not found, why not?

Level of survey effort: *Incidental observation during arroyo toad survey*

Total number of individuals: *1*

Collection? *No*

Collection number:

Museum/Herbarium:

ANIMAL INFORMATION

How was the detection made? *Seen*

Number detected in each age class:

1

adults

juveniles

larvae

egg mass

unknown

Age class comment:

Site use description:

What was the observed behavior? *Swimming in Fremont Canyon creek*

Describe any evidence of reproduction: *None*

SITE INFORMATION

Habitat description: [Southern willow scrub along Fremont Canyon Creek](#)

Slope:

Land owner/manager: [Private; Irvine Ranch](#)

Aspect:

Site condition + population viability: [Good](#)

Immediate & surrounding land use: [Undeveloped open space.](#)

Visible disturbances:

Threats:

General comments:

MAP INFORMATION



ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTM E NAD83	UTM N NAD83	UTM Zone
	Orange	Black Star Canyon	680	33.79152	-117.72137	433220	3739274	11
1	Public Land Survey	Feature Comment						
	S T04S R08W 28	two-striped garter snake						

The mapped feature is accurate within: [10 m](#)

Source of mapped feature: [Ipad - Avenza Maps](#)

Mapping notes:

Location/directions comments:

Attachment(s):

August 23, 2022

Stacey Love
Recovery Permit Coordinator
U.S. Fish and Wildlife Service
2177 Salk Avenue, Suite 250
Carlsbad, California 92008

VIA EMAIL AND MAIL
Stacey_Love@fws.gov

Subject: Results of Focused Presence/Absence Surveys for Arroyo Toad for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California

Dear Ms. Love:

This Letter Report presents the results of focused diurnal and nocturnal surveys to determine the presence or absence of the arroyo toad (*Anaxyrus californicus*) for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project (hereinafter referred to as the “project site”) located in Orange County, California (Exhibit 1). The purpose of the surveys was to determine the presence or absence of the arroyo toad upstream of Santiago Creek Dam/Irvine Lake. Focused surveys were conducted downstream of Santiago Creek Dam in Spring 2020 (Psomas 2020). Surveys were conducted by a Biologist with the necessary experience and were completed according to the guidelines established by the U.S. Fish and Wildlife Service (USFWS).

PROJECT DESCRIPTION AND LOCATION

The project site is located at Santiago Creek Dam at the northwest end of Irvine Lake in unincorporated Orange County, California (Exhibit 1). The Biological Study Area includes Santiago Creek Dam, downstream areas along Santiago Creek, areas around Irvine Lake, and upstream areas along Santiago Creek. The Biological Study Area is south of State Route (SR) 261 and east of SR-241 and Santiago Canyon Road. Surrounding land use primarily consists of undeveloped open space. Irvine Regional Park is located northwest of SR-241; Limestone Canyon Regional Park is located south of Santiago Canyon Road; and Oak Canyon Park is located at the southeast end of Irvine Lake. The closed Santiago Canyon Landfill is located adjacent to the west of Irvine Lake.

The Biological Study Area is located on the U.S. Geological Survey’s (USGS’) Black Star Canyon 7.5-minute quadrangle (Exhibit 2). Irvine Lake (named Santiago Creek Reservoir on the USGS) was created by constructing a dam across Santiago Creek. Santiago Creek, a named blueline stream, enters Irvine Lake from the east and continues downstream of the dam flowing north and then west. It has a relatively broad floodplain both above and below the dam. The slopes around the western and northern portions of the lake are relatively steep while the areas to the southeast and east include areas that are relatively flat. Three unnamed blueline streams enter the lake from the north and eight unnamed blueline streams enter the lake from the west, southeast, and south. One unnamed blueline stream enters the Biological Study Area in the northwest, downstream of the dam, while Fremont Canyon Creek merges with Santiago Creek downstream of the Biological Study Area. Elevations in the Biological Study Area range from approximately 657 to 996 feet above mean sea level (msl).

5 Hutton Centre Drive
Suite 300
Santa Ana, CA 92707

Tel 714.751.7373
Fax 714.545.8883
www.Psomas.com

Stacey Love
August 23, 2022
Page 2

The Biological Study Area is in the Central/Coastal Subregion of the Natural Communities Conservation Plan/Habitat Conservation Plan (NCCP/HCP). Santiago Creek Dam and its associated structures are located within designated “Non-Reserve Open Space”, while Habitat Reserve and Conservation Easements surround the lake; a Special Linkage is located southeast of the lake. The purpose of this plan is to provide regional protection and recovery of multiple species and habitat while allowing compatible land use and appropriate development. Irvine Ranch Water District (IRWD)¹ is a participating jurisdiction and, as such, will comply with the terms of the NCCP/HCP Implementation Agreement.

The IRWD and Serrano Water District are jointly proposing to abandon the existing Santiago Creek Dam outlet tower and construct a new inclined outlet structure to be located on the left abutment of the existing dam. Additionally, based on feedback from the Division of Safety of Dams, the dam spillway requires structural improvements. Existing structures include the dam crest, the intake tower in Irvine Lake, the spillway channel, the control houses, the energy dissipater structure, the aboveground outlet pipe, and the dam crest access road. The project is currently in the design phase. Staging areas are currently planned to be placed in disturbed areas on the east side of Irvine Lake, adjacent to where Santiago Creek flows into the lake. Focused surveys were conducted along Santiago Creek upstream of the lake to determine whether arroyo toad is present or absent adjacent to the proposed staging areas on the east side of the lake.

SURVEY AREA

The arroyo toad survey area included all suitable habitat along Santiago Creek, extending 0.62 mile (1 kilometer) from the most upstream project impact on the east side of Irvine Lake (Exhibit 3). The following vegetation types and other areas occur within the arroyo toad survey area: sagebrush scrub, ruderal, riparian herb, disturbed mulefat scrub, southern sycamore riparian woodland, southern black willow forest, disturbed southern black willow forest, and coast live oak woodland. Site photographs of representative habitat in the survey area are provided in Attachment A.

SPECIES BACKGROUND

The arroyo is a federally listed Endangered species and a California Species of Special Concern. At the time of listing, the arroyo toad was considered a subspecies of southwestern arroyo toad (*Bufo microscaphus*) until genetic studies (Gergus 1998) separated the arroyo toad (*B. californicus*) from the Arizona toad (*B. microscaphus*). Recent research (Frost et al. 2006) places both species in the genus *Anaxyrus*.

The arroyo toad is a small, olive green or gray to tan toad with warty skin and dark spots. It has a light-colored V-shaped stripe across the head between and including the eyelids, and a light spot on each sacral hump and in the middle of its back. It normally lacks a mid-dorsal stripe (i.e., a stripe down the center of its back). The underside of the arroyo toad is usually buff-colored and unspotted. The parotid glands are oval-shaped, widely separated, and pale toward the front; and the cranial crests are absent or weak. Reproductive adult toads typically range from 2.2 to 2.6 inches snout to vent length for males and 2.6 to 3.3 inches for females (USFWS 1999). Its movement consists of hopping rather than walking (USFWS 1994). Arroyo toads are nocturnal (i.e., active at night). Adults feed primarily on ants but will also consume beetles, spiders, larvae, caterpillars, and other invertebrates (USFWS 2009). Males become sexually mature in one to two years, and females become sexually mature in two to three years; arroyo toads can live up to five years (Sweet 1992, 1993).

¹ The Santiago County Water District (SCWD) was also a participating jurisdiction in the NCCP/HCP. The SCWD consolidated with IRWD in 2006.

Stacey Love
August 23, 2022
Page 3

Tadpoles are black in coloration at hatching and develop a tan coloration on the upper side; gold and dark crossbars on the tail; and an opaque, white venter on the underside before metamorphosing (Sweet 1992; USFWS 1999). Tadpoles typically metamorphose at a length of 1.1 to 1.6 inches (USFWS 1999). Juveniles have a white-gray-tan coloring with dark spots on the upper side and a white underside. The V-shaped line on the head is visible on juveniles, but the parotid glands are typically not yet visible (Sweet 1992; Sanders 1950). Juveniles usually grow to about 1.2 to 1.6 inches their first year (sometimes up to 2.0 inches) and then do not grow again until the following spring (Sweet 1992).

The arroyo toad population is currently distributed in coastal drainages and along the desert slopes of the Transverse and Peninsular Ranges from approximately 1,000 feet to 4,600 feet above msl; however, the species has been recorded from sea level to 8,000 feet above msl in Baja California (Patten and Myers 1992; Jennings and Hayes 1994; Welsh 1988; Beaman et al. 1995; USFWS 1999). It occurs in intermittent washes/streams and perennial streams. In the northern portion of their range, they generally occur in third- to sixth-order² or greater streams; however, in the southern portion of their range, they can occur in first- and second-order streams (USFWS 1999; Griffin et al. 1999; USFWS 2009). “Episodic flooding is critical to keeping the low stream terraces relatively vegetation free and soils friable enough for juveniles and adults to create burrows” (Jennings and Hayes 1994). The most favorable breeding habitat for arroyo toad consists of slow-moving streams with shallow pools, nearby sandbars, and adjacent stream terraces.

Outside the breeding season, arroyo toads are essentially terrestrial, using a variety of upland habitats, including sycamore-cottonwood woodlands, oak woodlands, coastal sage scrub, chaparral, and grasslands (Holland 1995; Griffin et al. 1999; USFWS 2009). Adult toads burrow into sandy terraces where they shelter during the day when the surface is damp or during longer periods during the dry season (Sweet 1989). During the non-breeding season (i.e., August–January), arroyo toad will aestivate (a state of dormancy similar to hibernation) to prevent dehydration during hot or dry times of the year (Ramirez 2003).

Adult male arroyo toads will sometimes travel 1.2 to 1.9 miles along a stream course, often becoming more sedentary once reaching a large size. Females are more sedentary, typically maintaining an area of movement less than 330 feet. Adult and subadult arroyo toads can range widely into the uplands, commonly 0.3 mile, with some movements up to 1.2 miles from the stream (USFWS 1999).

During the breeding season, typically from February to July, males will make advertisement vocalizations above water from shallow areas along the creek margins. The advertisement call is a soft, high, whistling trill that lasts from 4 to 9 seconds in duration and is audible up to approximately 985 feet under ideal conditions (Gergus et al. 1997). Two parallel egg strings of 2,000 to 10,000 eggs are deposited in shallow water (i.e., usually less than 4 inches in depth with an average of 1.4 inches) on fine sediment with very low current (0.2 foot per second) and little or no emergent vegetation (Sweet 1992; USFWS 1999). These eggs hatch four to six days later (Sweet 1992). Streams where arroyo toad occur must have water from approximately late March through mid-June to allow tadpoles to develop (Sweet 1989). The tadpole stage usually lasts about ten weeks (USFWS 2009). Tadpoles feed on loose organic material such as interstitial algae, bacteria, and diatoms from just beneath the surface layer of fine sediments or within the interstices of gravel deposits; they do not forage on macroscopic vegetation (Sweet 1992; Jennings and Hayes 1994; USFWS 2009). After metamorphosis in June or July, the juveniles remain on the adjacent gravel bars or sandy stream terraces for 8 to 12 weeks (depending on site conditions and rainfall), where they forage for insects (Sweet 1992; USFWS 1994).

² Stream order is a relative size of streams. The smallest tributaries are referred to as first-order streams. Two first-order streams combine to create a second-order stream, and so on (Sweet 1992).

Stacey Love
August 23, 2022
Page 4

On February 9, 2011, the USFWS published the Revised Critical Habitat for the arroyo toad. The Revised Critical Habitat designated 98,366 acres of critical habitat for the arroyo toad in portions of Santa Barbara, Ventura, Los Angeles, San Bernardino, Riverside, Orange, and San Diego Counties, California (USFWS 2011). The survey area is not located in designated Critical Habitat for this species.

This species is a Conditionally Covered Species in the Central Coastal NCCP/HCP. The NCCP/HCP states that “within the subregion, arroyo toad may occur in Limestone Canyon, Boxer Canyon (in the Santiago Canyon drainage), and the Silverado watershed... None of these areas have been thoroughly surveyed for arroyo toad” (County of Orange 1996). The NCCP/HCP also states that the Transportation Corridor Agency conducted surveys in the Santiago Creek area and have not identified the presence of the species (County of Orange 1996). The records in the California Natural Diversity Database (CNDDB) match those reported from the NCCP/HCP; there is a 1974 record from Limestone Canyon and a record with no date from a tributary of Silverado Canyon (CDFW 2022). There have been no recent observations of the species reported in the vicinity.

SURVEY METHODS

The USFWS’ 1999 Arroyo Toad Protocol requires that a minimum of six surveys be performed during the breeding season (i.e., March 15–July 1), with at least one survey conducted in April, one in May, and one in June. The surveys included diurnal and nocturnal searches to determine the presence of eggs, tadpoles, and adults. During the diurnal surveys, water was examined for the presence of arroyo toad egg masses and tadpoles. Nocturnal surveys began one hour after dusk during weather conditions conducive to toad activity. Nocturnal search methods included walking along the creek banks and stopping periodically to listen for the breeding calls of adult males. Headlamps and flashlights were used to visually identify toads when a breeding call was heard. If any arroyo toads were found, the individual or population would be documented, recorded with a Global Positioning System unit, and mapped on an aerial photograph. The number of individuals would be noted on each subsequent visit, and data collected on general habitat characteristics for any arroyo toads observed.

Psomas Senior Biologists Jonathan Aguayo and Lindsay Messett conducted the focused surveys in all potentially suitable habitat for arroyo toad in the survey area according to the USFWS-established survey methodology described above. The survey area included all suitable habitat along Santiago Creek. Mr. Aguayo and Ms. Messett conducted focused surveys for the arroyo toad on March 25; April 1 and 8; May 27; and June 10 and 23, 2022.

Diurnal surveys were conducted from approximately 4:00 PM until dusk, and nocturnal surveys were conducted from one hour after dusk until approximately 11:00 PM. Surveys focused on detecting toads by visual identification; listening for the advertising call of adult males; and checking potentially suitable breeding habitat for tadpoles and/or eggs. Biologists scanned pools for eggs, larvae, metamorphs, juveniles, and breeding and/or calling adults in potentially suitable breeding locations along the creek, and for foraging individuals in the adjacent riparian and upland areas. Surveyors moved in an upstream direction during the surveys. Headlamps, flashlights, and binoculars were used to visually identify toads, frogs, and their larvae detected at night. Nocturnal surveys were conducted during appropriate environmental conditions conducive to the activity patterns of the arroyo toad. Generally, these conditions are nighttime temperatures greater than 50 degrees Fahrenheit (°F) at dusk, with low winds (less than 10 miles per hour); nights with a full or nearly full moon were avoided. Survey dates, times, and weather data are shown in Table 1. Survey conditions and results were documented in field notes.

TABLE 1
SUMMARY OF SURVEY DATA AND CONDITIONS FOR ARROYO TOAD

Survey	Survey Date	Survey Type	Surveying Biologists	Start/End Time	Wind (miles/hour)		Temperature (°F)		Cloud Cover
					Start	End	Start	End	
1	3/25/2022	Diurnal	Aguayo, Messett	4:20 PM–6:55 PM	6	4	75	71	30–20%
		Nocturnal		7:42 PM–10:48 PM	4	3	69	58	10%
2	4/1/2022	Diurnal	Aguayo, Messett	3:45 PM–7:07 PM	4	8	69	59	clear
		Nocturnal		8:10 PM–10:49 PM	6	3	57	53	clear
3	4/8/2022	Diurnal	Aguayo, Messett	3:54 PM–7:16 PM	8	4	94	81	20%–clear
		Nocturnal		8:10 PM–10:36 PM	4	3	78	72	clear
4	5/27/2022	Diurnal	Aguayo, Messett	4:40 PM–7:43 PM	6	6	68	61	40%
		Nocturnal		8:39 PM–10:55 PM	5	4	60	57	50%
5	6/10/2022	Diurnal	Aguayo, Messett	4:50 PM–7:52 PM	7	5	80	71	clear
		Nocturnal		8:33 PM–10:42 PM	4	3	68	63	clear
6	6/23/2022	Diurnal	Aguayo, Messett	4:48 PM–7:04 PM	7	5	87	82	clear
		Nocturnal		8:42 PM–10:39 PM	3	1	76	70	clear

°F: degrees Fahrenheit.

SURVEY RESULTS

No arroyo toad was observed or detected in the survey area during the focused surveys.

Other amphibian species detected during surveys include western toad (*Anaxyrus boreas*), California treefrog (*Pseudacris cadaverina*), Baja California treefrog (*Pseudacris hypochondriaca*), and the non-native American bullfrog (*Lithobates catesbeianus*). Representative photos of the frogs/toad observed are included in Attachment A. A complete list of all wildlife species detected during the surveys is provided in Attachment B.

OTHER OBSERVATIONS

Two-striped garter snake (*Thamnophis hammondi*), a California Species of Special Concern, was observed during the surveys. Three individuals were observed during the survey conducted on April 8, 2022 (Exhibit 3). A CNDDB form documenting this observation is included in Attachment C and will be submitted online to the California Department of Fish and Wildlife by Mr. Aguayo.

Stacey Love
August 23, 2022
Page 6

Psomas appreciates the opportunity to assist on this Project. If you have any comments or questions, please contact Amber Heredia at Amber.Heredia@psomas.com or 714.481.8049.

Sincerely,

P S O M A S



Amber O. Heredia
Senior Project Manager, Resource Management



Jonathan Aguayo
Senior Biologist

Enclosures: Exhibits 1–3
Attachment A – Site Photographs
Attachment B – Wildlife Compendium
Attachment C – California Natural Diversity Database Form

cc: Jacob Moeder, Moeder@irwd.com

Stacey Love
August 23, 2022
Page 7

REFERENCES

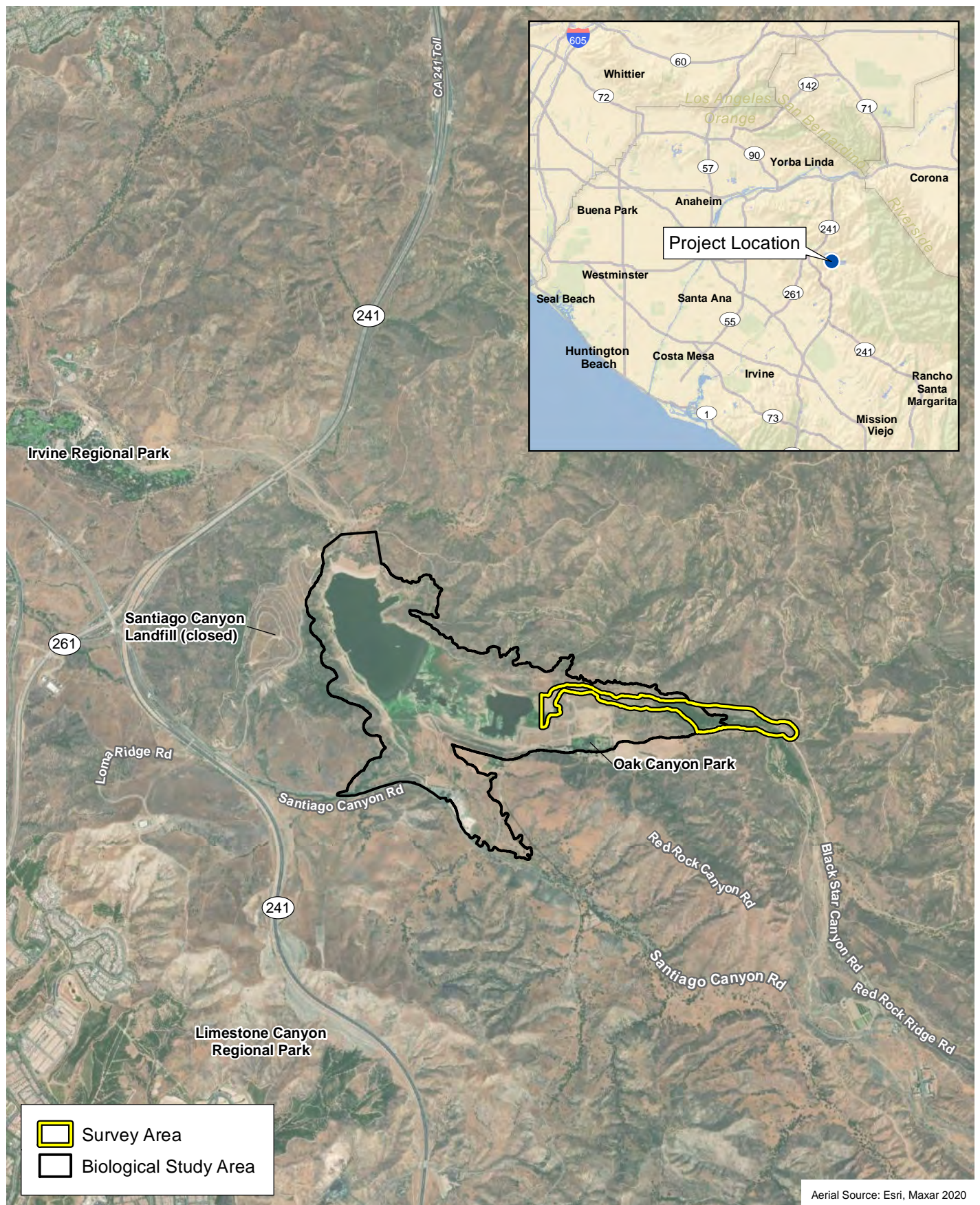
- Beaman, K.R., S.J. Meyers, and C. McGaugh. 1995. Report on Surveys for Arroyo Toads on Deep Creek. Contract report to USDA, Forest Service, San Bernardino National Forest.
- California Department of Fish and Wildlife (CDFW). 2022 (August 17, date accessed). California Natural Diversity Database. Records of Occurrence for the USGS Corona South, Black Star Canyon, Orange, Tustin, and El Toro 7.5-minute quadrangles. Sacramento, CA: CDFW, Natural Heritage Division.
- County of Orange. 1996 (July 17). Natural Community Conservation Plan & Habitat Conservation Plan, County of Orange, Parts I and II: NCCP/HCP, Final (Administrative Record Copy). Prepared by R.J. Meade Consulting. La Jolla, CA.
- Frost, D.R. et al. 2006. The Amphibian Tree of Life. *Bulletin of the American Museum of Natural History* 297:1–370. New York, NY: American Museum of Natural History.
- Gergus, E.W.A., B.K. Sullivan, and K.B. Malmos. 1997. Call Variation in the *Bufo microscaphus* Complex: Implications for Species Boundaries and the Evolution of Mate Recognition. *Ethology* 103: 979–989. Maldon, MA: John Wiley & Sons, Inc.
- Gergus, E.W.A. 1998. Systematics of the *Bufo microscaphus* complex: Allozyme evidence. *Herpetologica* 54:317–325. Salt Lake City, UT: Society for the Study of Amphibians and Reptiles.
- Griffin, P.C., T.J. Case, and R.N. Fisher. 1999. *Radio Telemetry Study of Bufo californicus*, Arroyo Toad Movement Patterns and Habitat Preferences Contract Report to the California Department of Transportation Southern Biology Pool. Sacramento, CA: Western Ecological Research Center.
- Holland, D.C. 1995. Sensitive Species Hydroecological Evaluation – Santa Margarita River: Arroyo Southwestern Toad (*Bufo microscaphus californicus*) Camp. Camp Pendleton. 14 pp.
- Jennings, M.R. and M.P. Hayes. 1994. *Amphibian and Reptile Species of Special Concern in California* (Contract No. 8023). Sacramento, CA: CDFG, Inland Fisheries Division.
- Patten, M.A., and S.J. Myers. 1992. Geographic distribution. *Bufo microscaphus californicus* (arroyo toad). *Herpetological Review*, 23(4):122.
- Psomas. 2020 (August 18). *Results of Focused Presence/Absence Surveys for Arroyo Toad for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California*. Santa Ana, CA: Psomas. Santa Ana, CA: Psomas.
- Ramirez, R.S., Jr. 2003. Arroyo toad (*Bufo californicus*) hydrogeomorphic habitat baseline analysis/radio telemetry study - Rancho Las Flores San Bernardino County, California. Final report to Rancho Las Flores Limited Partnership by Cadre Environmental, Carlsbad, California. vi + 101 pp.
- Sanders, R.M. 1950. A herpetological survey of Ventura County, California. Master's thesis. Stanford University, Stanford, California. 140 pp.
- Sweet, S.S. 1993. *Second Report on the Biology and Status of the Arroyo Toad (Bufo microscaphus californicus) on the Los Padres National Forest of Southern California* (Report to United States

Stacey Love
August 23, 2022
Page 8

Department of Agriculture, Forest Service, Los Padres National Forest, Goleta, California).
Goleta, CA: USDA.

- . 1992. *Ecology and Status of the Arroyo Toad (Bufo microscaphus californicus) on the Los Padres National Forest of Southern California, with Management Recommendations* (Contract report to United States Department of Agriculture, Forest Service, Los Padres National Forest). Goleta, CA: USDA.
- . 1989. Observations on the biology and status of the arroyo toad, *Bufo microscaphus californicus*, with a proposal for additional research. Department of Biological Sciences, University of California, Santa Barbara, California. Unpublished report. 23 pp.
- U.S. Fish and Wildlife Service (USFWS). 2011 (February 9). Endangered and Threatened Wildlife and Plants; Revised Critical Habitat for the Arroyo Toad; Final Rule. *Federal Register* 76(27): 7245–7467. Washington, D.C.: USFWS.
- . 2009. Arroyo toad (*Anaxyrus californicus*) 5-Year Review: Summary and Evaluation. Ventura Fish and Wildlife Office, Ventura, California.
- . 1999. Arroyo southwestern toad (*Bufo microscaphus californicus*) recovery plan. Portland, Oregon. 119 pp. <http://www.amphibians.org/wp-content/uploads/2013/07/Arroyo-Southwestern-Toad-Recovery-Plan.pdf>.
- . 1994 (December 16). Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for the Arroyo Southwestern Toad. *Federal Register* 59(241): 64859–64867. Washington, D.C.: USFWS.
- Welsh, H.H., Jr. 1988. An ecogeographic analysis of the herpetofauna of the Sierra San Pedro Mártir region, Baja California: With a contribution to the biogeography of Baja California herpetofauna. *Proceedings of the California Academy of Sciences*, 4th series, 46:1-72.

D:\Projects\3IRW\010200\MXDARTOex_ProjectLocation_20220819.mxd



Project Location

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

Exhibit 1

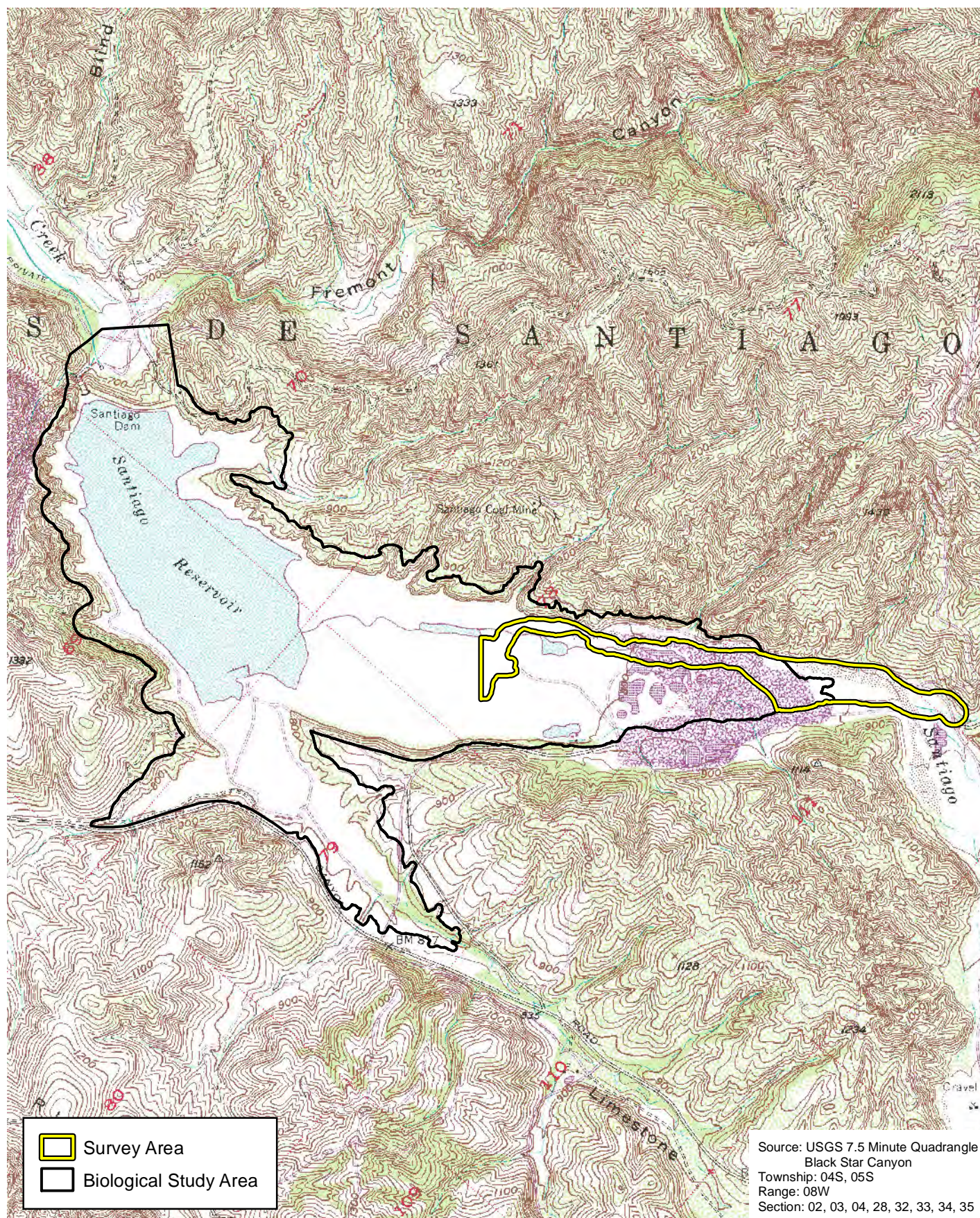


4,000 2,000 0 4,000
Feet



(Rev: 08/19/2022 JVR) R:\Projects\IRW_IRWD\3IRW010200\Graphics\ARTOex_ProjectLocation.pdf

D:\Projects\3IRW\010200\MXD\ART0ex_USGS_20220819.mxd



U.S. Geological Survey 7.5-Minute Digital Quadrangle

Exhibit 2

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

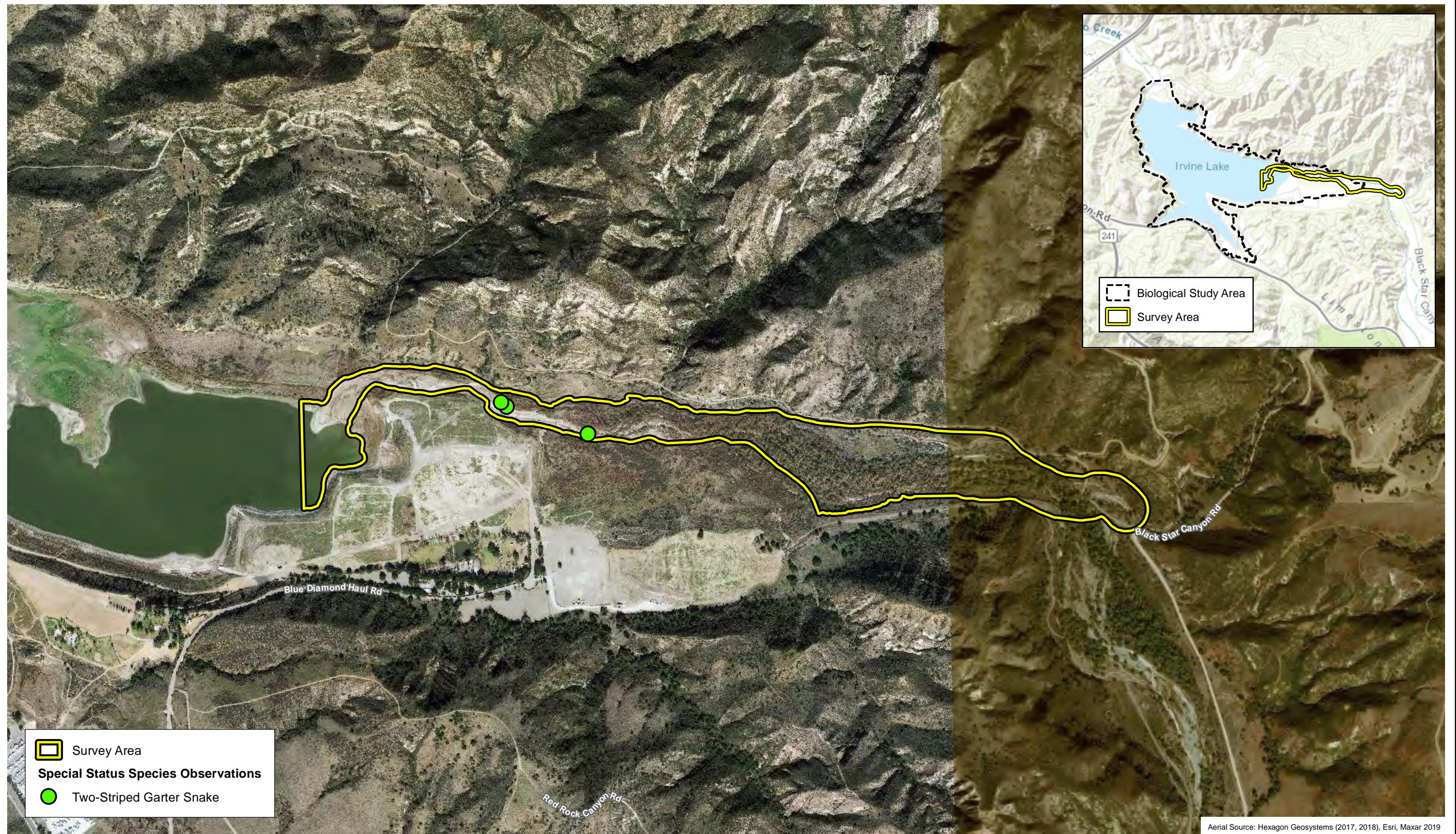


2,120 1,060 0 2,120
Feet



(Rev: 8-19-2022 JVR) R:\Projects\IRW_IRWD\3IRW010200\Graphics\ART0ex_SurveyArea_USGS.pdf

D:\Projects\31RW010200MXD\ARTO\ex_SS_Species_20220819.mxd



Arroyo Toad Survey Area and Results

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

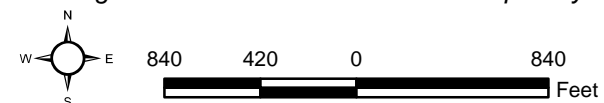


Exhibit 3



(Rev: 08/19/2022 JVR)R:\Projects\IRW_IRWD\31RW010200\Graphics\ARTO\ex_SS_Species.pdf

ATTACHMENT A
SITE PHOTOGRAPHS



View of suitable habitat along Santiago Creek located in the western portion of the survey area.



View of suitable habitat along Santiago Creek in the middle portion of the survey area.

Site Photographs

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

Attachment A-1





View of suitable habitat along Santiago Creek in the eastern portion of the survey area.



View of western toad tadpoles found along Santiago Creek.

Site Photographs

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

Attachment A-2





View of a western toad found along Santiago Creek.



View of a Baja California treefrog found along Santiago Creek.

Site Photographs

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

Attachment A-3

PSOMAS



View of a California treefrog found along Santiago Creek.



View of a two-striped garter snake found along Santiago Creek.

Site Photographs

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

Attachment A-4



ATTACHMENT B
WILDLIFE COMPENDIUM

WILDLIFE COMPENDIUM

Scientific Name	Common Name
AMPHIBIANS	
BUFONIDAE – TRUE TOAD FAMILY	
<i>Anaxyrus boreas</i>	western toad
RANIDAE – TRUE FROG FAMILY	
<i>Lithobates catesbeianus</i> *	American bullfrog
HYLIDAE – TREEFROG FAMILY	
<i>Pseudacris cadaverina</i>	California treefrog
<i>Pseudacris hypochondriaca</i>	Baja California treefrog
LIZARDS	
PHRYNOSOMATIDAE – SPINY LIZARD FAMILY	
<i>Sceloporus occidentalis</i>	western fence lizard
SNAKES	
NATRICIDAE – HARMLESS LIVE-BEARING SNAKE FAMILY	
<i>Thamnophis hammondi</i>	two-striped garter snake
BIRDS	
ANATIDAE – SWAN, GOOSE, AND DUCK FAMILY	
<i>Anas platyrhynchos</i>	mallard
ODONTOPHORIDAE – NEW WORLD QUAIL FAMILY	
<i>Callipepla californica</i>	California quail
COLUMBIDAE – PIGEON AND DOVE FAMILY	
<i>Zenaida macroura</i>	mourning dove
CAPRIMULGIDAE – NIGHTJAR FAMILY	
<i>Chordeiles acutipennis</i>	lesser nighthawk
<i>Phalaenoptilus nuttallii</i>	common poorwill
TROCHILIDAE – HUMMINGBIRD FAMILY	
<i>Calypte anna</i>	Anna's hummingbird
CHARADRIIDAE – PLOVER FAMILY	
<i>Charadrius vociferus</i>	killdeer
SCOLOPACIDAE – SANDPIPER FAMILY	
<i>Gallinago delicata</i>	Wilson's snipe
CATHARTIDAE – NEW WORLD VULTURE FAMILY	
<i>Cathartes aura</i>	turkey vulture
ACCIPITRIDAE – HAWK FAMILY	
<i>Buteo jamaicensis</i>	red-tailed hawk
STRIGIDAE – TYPICAL OWL FAMILY	
<i>Bubo virginianus</i>	great horned owl
PICIDAE – WOODPECKER FAMILY	
<i>Melanerpes formicivorus</i>	acorn woodpecker
<i>Picoides nuttallii</i>	Nuttall's woodpecker
FALCONIDAE – FALCON FAMILY	
<i>Falco sparverius</i>	American kestrel
TYRANNIDAE – TYRANT FLYCATCHER FAMILY	
<i>Sayornis nigricans</i>	black phoebe
<i>Myiarchus cinerascens</i>	ash-throated flycatcher
<i>Tyrannus vociferans</i>	Cassin's kingbird

WILDLIFE COMPENDIUM

Scientific Name	Common Name
CORVIDAE – JAY AND CROW FAMILY	
<i>Aphelocoma californica</i>	California scrub-jay
<i>Corvus corax</i>	common raven
PARIDAE – TITMOUSE FAMILY	
<i>Baeolophus inornatus</i>	oak titmouse
AEGITHALIDAE – BUSHTIT FAMILY	
<i>Psaltiriparus minimus</i>	bushtit
TROGLODYTIDAE – WREN FAMILY	
<i>Troglodytes aedon</i>	house wren
<i>Thryomanes bewickii</i>	Bewick's wren
TURDIDAE – THRUSH FAMILY	
<i>Turdus migratorius</i>	American robin
MIMIDAE – MOCKINGBIRD AND THRASHER FAMILY	
<i>Toxostoma redivivum</i>	California thrasher
FRINGILLIDAE – FINCH FAMILY	
<i>Haemorhous mexicanus</i>	house finch
<i>Spinus psaltria</i>	lesser goldfinch
PARULIDAE – WOOD-WARBLER FAMILY	
<i>Cardellina pusilla</i>	Wilson's warbler
EMBERIZIDAE – SPARROW FAMILY	
<i>Chondestes grammacus</i>	lark sparrow
<i>Melospiza melodia</i>	song sparrow
<i>Pipilo maculatus</i>	spotted towhee
<i>Melospiza crissalis</i>	California towhee
ICTERIDAE – BLACKBIRDS AND ORIOLES	
<i>Icterus cucullatus</i>	hooded oriole
MAMMALS	
SCIURIDAE – SQUIRREL FAMILY	
<i>Otospermophilus beecheyi</i>	California ground squirrel
LEPORIDAE – HARE AND RABBIT FAMILY	
<i>Sylvilagus audubonii</i>	desert cottontail
VESPERTILIONIDAE – VESPERTILIONID BAT FAMILY	
Order <i>Chiroptera</i>	bat
FELIDAE – CAT FAMILY	
<i>Lynx rufus</i>	bobcat (tracks)
<i>Puma concolor</i>	mountain lion (tracks)
CANIDAE – CANID FAMILY	
<i>Canis latrans</i>	coyote (scat)
CERVIDAE – CERVID FAMILY	
<i>Odocoileus hemionus</i>	southern mule deer
* Non-native species	

ATTACHMENT C

CALIFORNIA NATURAL DIVERSITY DATABASE FORM

CNDDDB Online Field Survey Form Report



California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/



Source code [AGU22F0018](#)
Quad code [3311776](#)
Occ. no. _____
EO index no. _____
Map index no. _____

This data has been reported to the CNDDDB, but may not have been evaluated by the CNDDDB staff

Scientific name: *Thamnophis hammondi*

Common name: *two-striped gartersnake*

Date of field work (mm-dd-yyyy): *04-08-2022*

Comment about field work date(s):

OBSERVER INFORMATION

Observer: *Jonathan Aguayo*

Affiliation: *Psomas*

Address: *6292 San Harco Circle , Buena Park, CA 90620*

Email: *jonathan.aguayo@psomas.com*

Phone: *(805) 204-6986*

Other observers: *Lindsay Messett*

DETERMINATION

Keyed in:

Compared w/ specimen at:

Compared w/ image in:

By another person:

Other: *Familiarity with California snakes through research, workshops and/or training*

Identification explanation:

Identification confidence: *Very confident*

Species found: *Yes* If not found, why not?

Level of survey effort: *Incidental observation during arroyo toad surveys.*

Total number of individuals: *3*

Collection?

Collection number:

Museum/Herbarium:

ANIMAL INFORMATION

How was the detection made? *Seen*

Number detected in each age class:

3

adults

juveniles

larvae

egg mass

unknown

Age class comment:

Site use description:

What was the observed behavior? *Swimming in Santiago Creek*

Describe any evidence of reproduction: *None*

SITE INFORMATION

Habitat description: The following vegetation types and other areas occur within the survey area: sagebrush scrub, ruderal, riparian herb, disturbed mulefat scrub, southern sycamore riparian woodland, southern black willow forest, disturbed southern black willow forest, and coast live oak woodland along Santiago Creek.

Slope:

Land owner/manager: Private; Irvine Ranch

Aspect:

Site condition + population viability: Good

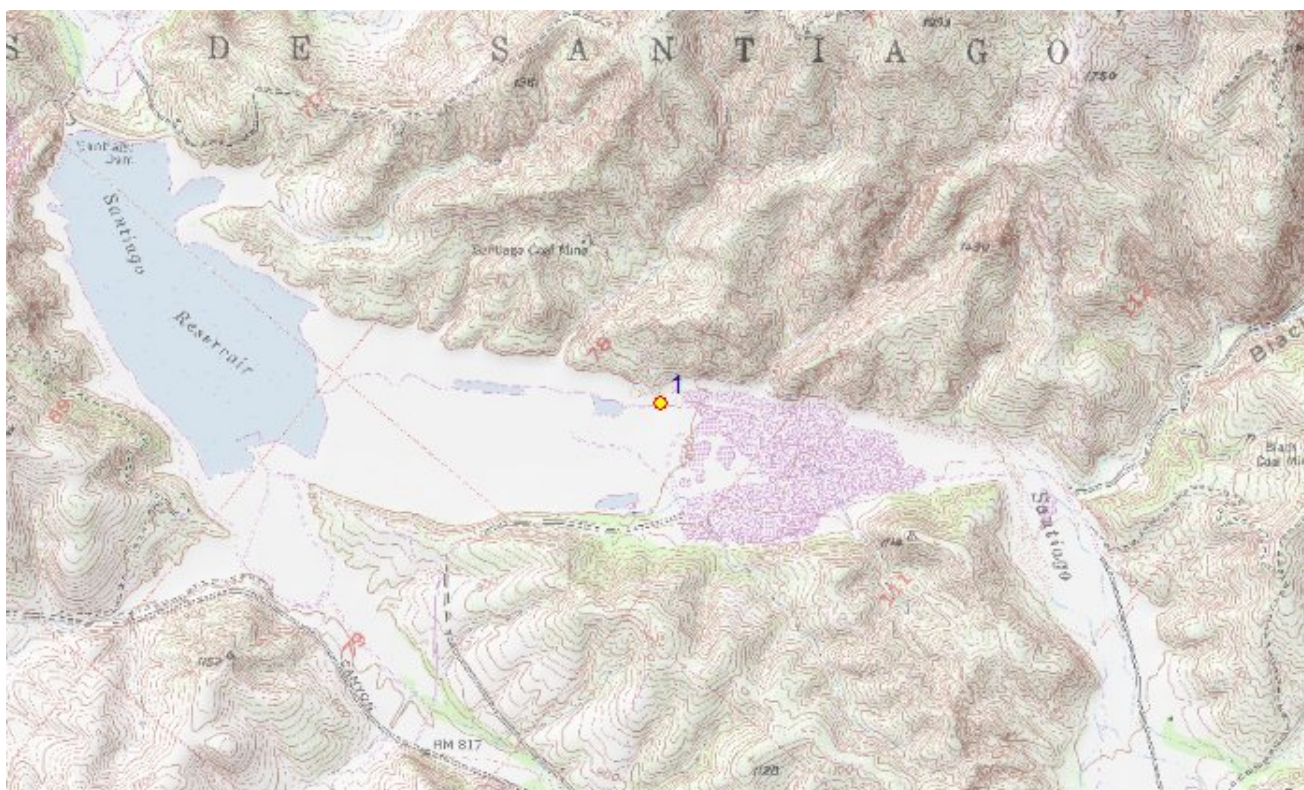
Immediate & surrounding land use: Undeveloped open space

Visible disturbances:

Threats:

General comments:

MAP INFORMATION



ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTM E NAD83	UTM N NAD83	UTM Zone
	Orange	Black Star Canyon	787	33.77594	-117.70023	435165	3737534	11
1	Public Land Survey	Feature Comment						
	S T04S R08W 34	Two-striped gartersnake						

The mapped feature is accurate within: 10 m

Source of mapped feature: Avenza Maps - Iphone

Mapping notes: #1: 33.775943, -117.700302; #2: 33.775883, -117.700213; and #3: 33.775168, -117.697781

Location/directions comments:

Attachment(s):

APPENDIX I
SOUTHWESTERN POND TURTLE SURVEYS

October 21, 2024

Jennifer Pareti
Senior Environmental Scientist, Specialist
California Department of Fish and Wildlife
South Coast Region
3030 Old Ranch Parkway, Suite 400
Seal Beach, California 90740

VIA EMAIL
Jennifer.Pareti@wildlife.ca.gov

Kyle Rice
Regional Biologist
South Coast Region (Region 5)
3883 Ruffin Road
San Diego, California 92123

VIA EMAIL
Kyle.Rice@wildlife.ca.gov

Chad Hirano
Scientific Collecting Permit (SCP) Coordinator
California Department of Fish and Wildlife
1010 Riverside Parkway
West Sacramento, California 95605

VIA EMAIL
Chad.Hirano@wildlife.ca.gov

Subject: Results of Visual Survey and Trapping Program for Southwestern Pond Turtle for the Santiago Creek Dam Outlet Tower and Spillway Improvements Project, Orange County, California

Dear Jennifer Pareti, Kyle Rice, and Chad Hirano:

This Letter Report presents the results of the visual survey and trapping program for the southwestern [western] pond turtle (*Actinemys pallida* [*Emys marmorata*]) conducted at the Santiago Creek Dam Outlet Tower and Spillway Improvements Project (hereinafter referred to as the "Project site") located in Orange County, California. The purpose of this program was to assess the presence or absence of this species on or adjacent to the Project site. A qualified Biologist with the necessary experience and a California Department of Fish and Wildlife (CDFW) Scientific Collecting Permit conducted the surveys.

PROJECT LOCATION AND DESCRIPTION

The Project site is located at Santiago Creek Dam at the northwest end of Irvine Lake in unincorporated Orange County, California (Exhibit 1). The Biological Study Area (BSA) includes Santiago Creek Dam, downstream areas of Santiago Creek; Irvine Lake; and upstream areas along Santiago Creek. The BSA is located south of State Route (SR) 261, east of SR-241, and north of Santiago Canyon Road. Surrounding land use primarily consists of undeveloped open space. Irvine Regional Park is located northwest of SR-241; Limestone Canyon Regional Park is located south of Santiago

5 Hutton Centre Drive
Suite 300
Santa Ana, CA 92707

Tel 714.751.7373
www.Psomas.com

Jennifer Pareti, Kyle Rice, Chad Hirano
October 21, 2024
Page 2

Canyon Road; and Oak Canyon Park is located at the southeast end of Irvine Lake. The closed Santiago Canyon Landfill is located adjacent to the west of Irvine Lake.

The BSA is located on the U.S. Geological Survey's (USGS') Black Star Canyon 7.5-minute quadrangle (Exhibit 2). Irvine Lake (named Santiago Creek Reservoir on the USGS) was created by constructing a dam across Santiago Creek. Santiago Creek, a named blue-line stream, enters Irvine Lake from the east and continues downstream of the dam flowing north and then west. It has a relatively broad floodplain both above and below the dam. The slopes around the western and northern portions of the lake are relatively steep while the areas to the southeast and east include areas that are relatively flat. Three unnamed blue-line streams enter the lake from the north, and eight unnamed blue-line streams enter the lake from the west, southeast, and south. One unnamed blue-line stream enters the BSA in the northwest, downstream of the dam, while Fremont Canyon Creek merges with Santiago Creek downstream of the dam. Elevations in the BSA range from approximately 657 to 996 feet above mean sea level.

The BSA is in the Central/Coastal Subregion of the Natural Communities Conservation Plan/Habitat Conservation Plan (NCCP/HCP). Santiago Creek Dam and its associated structures are located within designated "Non-Reserve Open Space", while Habitat Reserve and Conservation Easements surround the lake; a Special Linkage is located southeast of the lake. The purpose of this plan is to provide regional protection and recovery of multiple species and habitat while allowing compatible land use and appropriate development. Irvine Ranch Water District (IRWD) is a participating jurisdiction and, as such, will comply with the terms of the NCCP/HCP Implementation Agreement.

IRWD is proposing to abandon the existing Santiago Creek Dam outlet tower and construct a new inclined outlet structure to be located on the left abutment of the existing dam. Additionally, structural improvements will also be made to the dam spillway and dam. Staging areas are currently planned to be placed north (downstream) of the existing dam and in disturbed areas on the southeast side of Irvine Lake, adjacent to where Santiago Creek flows into the lake. Visual surveys and a trapping program have been conducted to determine the presence or absence of southwestern pond turtles in suitable habitat within the BSA. Representative site photographs are included in Attachment A.

SPECIES BACKGROUND

The southwestern pond turtle is a California Species of Special Concern and a U.S. Forest Service Sensitive Species. In 2015, the U.S. Fish and Wildlife Service (USFWS) published a finding that the listing of this species may be warranted and requested that information on this species be submitted to the USFWS for review (USFWS 2015). In 2023, the USFWS proposed to list the southwestern pond turtle as Threatened under the Endangered Species Act (USFWS 2023); a final decision is pending.

Historically, this species was known as the western pond turtle (*Emys marmorata*) or Pacific pond turtle (*Clemmys marmorata*), but its taxonomy has been revised multiple times in recent years due to genetic studies. The species has alternated between the genera *Emys* and *Actinemys*. Current nomenclature recognizes two distinct species: the southwestern pond turtle (*Actinemys pallida*) and the northwestern pond turtle (*Actinemys marmorata*).

The southwestern pond turtle is a relatively flat, dark turtle of moderate size, with a carapace (shell) length that rarely exceeds 10 inches (Spinks et al. 2003). They are cryptically colored

Jennifer Pareti, Kyle Rice, Chad Hirano

October 21, 2024

Page 3

brown, olive brown, or dark brown (USGS 2006b). The carapace is usually brown or blackish in color with a series of darker spots, lines, or dashes that radiate out from the center of each shield (Stebbins and McGinnis 2012). Their head and body have a mottled appearance (USGS 2006b). Males tend to have thicker tails, while females have thinner tails. Males tend to have concave plastrons (i.e., shells), while females tend to have flat or slightly convex plastrons; the carapaces of females are also taller to allow room for eggs. The cloacal opening (i.e., opening for digestive, urinary, and reproductive tracts) is also further back in males than in females (USGS 2006b). They typically reach sexual maturity when they are approximately 4 inches and four to six years of age (USGS 2006b).

The southwestern pond turtle is found in southern California, ranging from Monterey County south through Los Angeles, Riverside, and San Diego counties into northern Baja California, Mexico (USFWS 2023). It inhabits ponds, lakes, marshes, reservoirs, seasonal standing or slow-moving streams, canals, sloughs, vernal pools, and occasionally in brackish water (Germano and Bury 2001). Sufficient cover (e.g., vegetation, undercut banks) and basking sites are important components of suitable habitat (Spinks et al. 2003). Suitable basking sites include partially submerged logs, rocks, floating vegetation, and open mud banks (CDFW 2000). Adults are often observed basking on logs or other objects protruding out of the water or floating in the warmer surface water. They have both good hearing and eyesight and are easily disturbed; they are often heard splashing into the water to take cover before being seen (USGS 2006b). Their omnivorous diet primarily consists of aquatic invertebrates, but they also consume carrion, small fish, frogs, and plants (USGS 2006b).

Breeding typically occurs from April to May, although timing varies depending on location and seasonal conditions (Jennings and Hayes 1994). Females move from the water to adjacent upland habitats to lay eggs, usually sometime in late May to early July, although movement could occur as early as April or as late as August (Ernst et al. 1994). Nest site selection favors unshaded slopes that may be at least in part south-facing, likely to ensure that substrate temperatures will be high enough to incubate the eggs (Rathbun et al. 2002). The southwestern pond turtle can nest in a variety of soil conditions, but the soil must be at least 4 inches deep and have relatively high internal humidity (CDFW 2000). Clutch size varies from 1 to 13 eggs, positively correlated with body size; they can sometimes double-clutch (i.e., have more than one nest per year) (Goodman 1997a, 1997b; Lovich and Meyer 2002; Holland 1991, 1994; Hays et al. 1999; Pires 2001). Most hatchlings emerge in the early fall, while some may over-winter in the nest (Holland 1994).

Adults may remain active in the water year-round if conditions are suitable (i.e., enough water, warm temperatures) (USGS 2006b). Basking behavior may also be witnessed year-round due to warmer year-round temperatures (USGS 2006b). However, during the coldest months (i.e., October to April), this species will often seek upland refugia (i.e., shelter with appropriate temperature and moisture conditions) and enter a period of aestivation. Aestivation is a period of inactivity and decreased metabolic rate in response to seasonal temperature changes (similar to hibernation); it occurs more frequently in more temperate, high-elevation areas of the species' range (Holland and Goodman 1996). Terrestrial refugia are typically covered with dense leaf litter produced by a thick overstory of woody vegetation, such as in dense riparian thickets of willows (Rathbun et al. 2002). Southwestern pond turtles may choose sites where they can bask in direct sunlight or may bury themselves deep into leaf litter and duff (Rathbun et al. 2002). Winter refugia are often found in the same upland habitats as nesting sites. Southwestern pond turtles can also hibernate underwater in bottom mud (CDFW 2000).

Jennifer Pareti, Kyle Rice, Chad Hirano

October 21, 2024

Page 4

The southwestern pond turtle faces several ongoing threats, including habitat loss, worsening drought conditions, and predation by invasive species. Urban development, especially for flood control, and agricultural expansion have led to significant habitat fragmentation and population declines (Spinks et al. 2003). Invasive, non-native plant species such as tamarisk (*Tamarix ramosissima*) and giant reed (*Arundo donax*) have altered stream morphology, reduced plant diversity, and eliminated basking sites (Lovich et al. 1994). The introduction of non-native turtle species, such as the red-eared slider (*Trachemys scripta elegans*) and western painted turtle (*Chrysemys picta bellii*), leads to competition for resources. These invasive turtles often have higher reproductive rates, which can result in them outcompeting the native southwestern pond turtle (Spinks et al. 2003; Lovich & Meyer 2002). As the southwestern pond turtle is the only native freshwater turtle in its historic range, it may lack competitive advantages against these invasive species. Additionally, the invasive American bullfrog (*Lithobates catesbeianus*) is a voracious predator that will eat any live animal it can swallow, and American bullfrog predation of hatchling and young western pond turtles has been recorded (Holland 1994). The intensity of American bullfrog predation is severe enough to eliminate recruitment in some southwestern pond turtle populations (Overtree and Collings 1997).

USGS (2004) conducted a Habitat Assessment and Baseline Surveys for the Western Spadefoot (*Spea hammondi*) and the Western Pond Turtle (*Emys marmorata*) on the Irvine Ranch Land Reserve. This survey effort included trapping of Irvine Lake for a total of 80 trap days¹ from September 29–October 3, 2003. No southwestern pond turtles were observed in Irvine Lake during this effort (USGS 2004).

SURVEY METHODS

Visual Survey

There is currently no standardized USFWS protocol in place for the southwestern pond turtle; therefore, surveys generally followed the Visual Survey Protocol for the Southcoast Ecoregion (USGS 2006a). Survey methods were focused on the detection of southwestern pond turtle adults and juveniles through visual observation; the visual surveys did not include dip netting or seining. Any southwestern pond turtles observed would have been documented and recorded using a Global Positioning System (GPS) or iPad to map the location on an aerial photograph.

Psomas Senior Biologist Jonathan Aguayo conducted visual surveys across all potentially suitable habitats for the southwestern pond turtle within the BSA. He walked slowly up the stream channel, either in the water or immediately adjacent to the water, visually searching for pond turtles with and without binoculars, concentrating on pools, surface water, banks, and suitable basking sites within the BSA. He searched aquatic habitat with and without binoculars for the presence of basking or underwater pond turtles. He observed open pools or possible basking areas from a distance and then approached slowly and quietly to help prevent disturbing basking turtles. He listened for the splash of water, which could indicate possible unseen turtles entering the water. If a splash was heard, he spent additional time observing the area for a turtle to resurface. Visual surveys were performed on August 20 and 30, 2024, during weather conditions favorable for turtle activity (Table 1).

¹ Trap days are the total number of traps used multiplied by the number of days the site was trapped. In this case, the site was trapped for four days using 20 traps for a total of 80 trap days.

Jennifer Pareti, Kyle Rice, Chad Hirano
 October 21, 2024
 Page 5

The USGS (2006a) Visual Survey Protocol describes assessing habitat by stream segment in order to determine areas suitable for trapping. As all habitat along Santiago Creek and within Irvine Lake were considered suitable for southwestern pond turtle, and areas suitable for trapping had already been determined based on previous field surveys of the BSA, visual survey methods for the current survey did not include an assessment of habitat by stream segment.

TABLE 1
SUMMARY OF SURVEY CONDITIONS FOR THE
SOUTHWESTERN POND TURTLE VISUAL SURVEYS

Survey Number	Date	Time (Start/End)	Biologist	Weather Conditions		
				Temperature (°F) (Start/End)	Wind (mph) (Start/End)	Cloud Cover (%) (Start/End)
1	August 20, 2024	8:00 AM/2:30 PM	Aguayo	72/96	2/6	0/0
2	August 30, 2024	9:20 AM/3:40 PM	Aguayo	67/81	1/5	80/0

°F: Fahrenheit; mph: miles per hour; %: percent.

Turtle Trapping

Trapping surveys follow the methodology outlined in the Western Pond Turtle Trapping Survey Protocol for the Southcoast Ecoregion (USGS 2006b). A five-day/four-night trapping program was conducted in August 2024. Nylon mesh hoop traps and floating basking traps were placed in suitable locations in Irvine Lake, baited with cans of sardines in oil to attract turtles. Traps were set near habitat features likely to be used by pond turtles (possible basking areas, areas with underwater refugia). The hoop traps measured 2.5 feet in diameter by 6 feet long with 1-inch square mesh and featured a one-way funnel entrance. Floating basking traps measured 20 inches wide by 28 inches long and 13 inches deep, with two 13-inch wings. Both hoop and basking traps were equipped with floats and securely fastened to immovable objects to prevent submersion to allow for captured turtles (and other animals) to surface for air.

Traps were left in place for a maximum of 24 hours before being checked by Biologists to retrieve captured turtles and other aquatic species (e.g. fish, frogs, invertebrates). General weather data (i.e., ambient air temperature, sky conditions, wind speed) and water temperature were recorded at the start and end of each trapping session. Two trapping sessions, one on the west side of Irvine Lake and another on the east side of Irvine Lake, were required to adequately cover Irvine Lake. As described above, Santiago Creek was surveyed visually because it was not deep enough for trap placement.

Mr. Aguayo (Scientific Collecting Permit [SCP] ID: S-190310010-20076-001) and Senior Biologist Lindsay Messett (SCP ID: S-182810004-20009-001) were the Principal Investigators for the trapping sessions, with assistance from Psomas Biologists Trevor Bristle, Jack Underwood, Cristina Juran, and Tyler Glaser. Both Mr. Aguayo and Ms. Messett are knowledgeable about the southwestern pond turtle and hold the necessary CDFW authorization to trap and handle the species. All traps were tagged with Mr. Aguayo's CDFW SCP number, under which the live trapping was conducted.

TABLE 2
SUMMARY OF SURVEY DATA AND CONDITIONS FOR SOUTHWESTERN POND TURTLE
TRAPPING ON THE WEST SIDE OF IRVINE LAKE

Survey Number	Survey Date	Surveying Biologists	Start/End Time	Water Temperature (°F)		Wind (mph)		Temperature (°F)		Cloud Cover (%)
				Start	End	Start	End	Start	End	
1	8/19/2024	Aguayo, Bristle	9:36 AM/3:33 PM	81.2	84.0	2	6	72	89	0
2	8/20/2024	Messett, Bristle	8:00 AM/10:35 AM	80.5	81.6	1	1	65	87	0
3	8/21/2024	Messett, Bristle	7:00 AM/11:00 AM	79.6	Thermometer broke	1	1	64	86	0
4	8/22/2024	Aguayo, Bristle	7:15 AM/10:25 AM	78.5	80.1	1	1	60	77	0
5	8/23/2024	Aguayo, Messett, Underwood	6:48 AM/10:56 AM	79.7	80.2	4	7	62	75	100

°F: degrees Fahrenheit; mph: miles per hour; %: percent.

Jennifer Pareti, Kyle Rice, Chad Hirano
October 21, 2024
Page 7

TABLE 3
SUMMARY OF SURVEY DATA AND CONDITIONS FOR SOUTHWESTERN POND TURTLE TRAPPING ON THE EAST SIDE OF IRVINE LAKE

Survey Number	Survey Date	Surveying Biologists	Start/End Time	Water Temperature (°F)		Wind (mph)		Temperature (°F)		Cloud Cover (%)
				Start	End	Start	End	Start	End	
1	8/26/2024	Aguayo, Bristle, Juran	7:58 AM/9:08 AM	79.2	81.3	1	2	64	88	0
2	8/27/2024	Aguayo, Bristle	7:08 AM/9:08 AM	78.9	79.2	1	2	62	70	0
3	8/28/2024	Aguayo, Bristle	6:52 AM/9:05 AM	78.5	79.0	2	3	61	70	100
4	8/29/2024	Aguayo, Bristle	6:42 AM/8:49 AM	78.8	79.2	1	1	60	65	100
5	8/30/2024	Aguayo, Bristle, Glaser	6:37 AM/9:25 AM	78.8	78.6	2	3	60	68	100

°F: degrees Fahrenheit; mph: miles per hour; %: percent.

TABLE 4
TRAP LOCATIONS

Trap Number	Trap Locations (UTM)
West Side of Irvine Lake Session	
Hoop Trap 1	432668, 3738686
Hoop Trap 2	432552, 3738413
Hoop Trap 3	432612, 3738174
Hoop Trap 4	432740, 3737889
Hoop Trap 5	432842, 3737634
Hoop Trap 6	433033, 3737511
Hoop Trap 7	433223, 3737184
Hoop Trap 8	433416, 3736912
Hoop Trap 9	433614, 3737009
Basking Trap 10	433494, 3737392
Hoop Trap 11	433790, 3737230
Hoop Trap 12	434032, 3737122
Hoop Trap 13	434324, 3737106
Hoop Trap 14	434461, 3737263
Hoop Trap 15	434687, 3737382
Hoop Trap 16	434589, 3737554

TABLE 4
TRAP LOCATIONS

Trap Number	Trap Locations (UTM)
East Side of Irvine Lake of Dam	
Hoop Trap 17	434425, 3737594
Hoop Trap 18	434127, 3737633
Hoop Trap 19	433951, 3737854
Hoop Trap 20	433724, 3737956
Hoop Trap 21	433514, 3738092
Hoop Trap 22	433345, 3738187
Hoop Trap 23	433155, 3738335
Hoop Trap 24	433370, 3738467
Hoop Trap 25	433115, 3738586
Basking Trap 26	433847, 3737582
Basking Trap 27	434030, 3737445
UTM: Universal Transver Mercator coordinates	

SURVEY RESULTS

Habitat Description

Irvine Lake is a man-made reservoir with fluctuating water levels. The banks primarily consist of clay and silt. Riparian vegetation is present along the eastern and southeastern shoreline and is dominated by willows (*Salix* sp.) and mule fat (*Baccharis salicifolia* ssp. *salicifolia*) with emergent vegetation and aquatic plants present in shallow lake areas. Banks in these areas provide suitable upland nesting sites (e.g., sandy or loose soil) and basking opportunities (e.g., open mud banks). In contrast, the western side of the lake lacks emergent vegetation and riparian canopy cover. It provides limited upland habitat for nesting pond turtles due to steep cliffs and compacted soils from heavy foot traffic associated with recreational fishing. While large rocks, boulders, or logs are absent within the lake, some floating vegetation provides basking opportunities for turtles. Irvine Lake is regularly stocked with fish, and a significant number were observed during the surveys. The presence of non-native fish poses a threat to southwestern pond turtles by competing for food and preying on hatchlings.

Downstream of the dam, Santiago Creek consists of an alluvial wash with braided channels. The creek bed varies in width from 15 to 300 feet wide with substrate that consists primarily of sand and cobble. Topography is relatively flat, with low stream grade and flow velocity. During the surveys in late summer, the creek was almost entirely dry, with only a small amount of shallow water present in Fremont Canyon Creek, upstream of its confluence with Santiago Creek. No pools were present along Santiago Creek downstream of the dam during the surveys; therefore, there was no suitable basking habitat. Riparian vegetation downstream of Santiago Dam consists of sparse mule fat scrub scattered across a broad alluvial wash. Due to the limited water/pools, areas downstream of the dam along Santiago Creek would have limited potential to provide upland nesting habitat to turtles using Irvine Lake.

Jennifer Pareti, Kyle Rice, Chad Hirano

October 21, 2024

Page 9

Upstream of the lake, Santiago Creek is a meandering perennial stream with braided channels. The creek varies in width from 15 to 650 feet wide with substrate that consists primarily of gravel, sand, and cobble, although some areas contain a mix of clay and silt. Topography is relatively flat, with low stream grade and flow velocity. Where the creek flows into Irvine Lake, stream morphology is characterized by shallow pools, slow-flowing water, and broad alluvial washes. Further upstream, Santiago Creek includes alternating sections of riffles, runs, and shallow pools (depths ranging from approximately one to three feet). These pools provide aquatic refugia with submerged vegetation and roots, and mats of algae. Riparian vegetation along Santiago Creek upstream of the lake is dominated by willows, mule fat, Fremont cottonwood (*Populus fremontii* ssp. *fremontii*), and western sycamore (*Platanus racemosa*). Multiple red-swamp crayfish (*Procambarus larkia*) and small non-native fish were observed during the survey. Red-swamp crayfish pose a threat to southwestern pond turtles by preying on their eggs and competing for food.

Visual Survey

No southwestern pond turtles were observed during the visual surveys.

Turtle Trapping

Over the course of the trapping effort, 108 trap days were completed (i.e., 27 traps multiplied by four days of trapping each). No southwestern pond turtles were captured during the trapping effort. Aquatic species captured during the trapping included 3 red-eared sliders, 3 channel catfish (*Ictalurus punctatus*), and 10 bluegill (*Lepomis macrochirus*) (Tables 5 and 6). Other species observed during the trapping included red-swamp crayfish, California treefrog (*Pseudacris cadaverina*), and Baja California treefrog (*Pseudacris hypochondriaca*).

Representative photographs of the turtle trapping effort and the species captured during the sessions are included in Attachment B. Survey data sheets are provided in Attachment C.

Jennifer Pareti, Kyle Rice, Chad Hirano
October 21, 2024
Page 10

TABLE 5
SUMMARY OF TRAPPING RESULTS FOR SOUTHWESTERN POND TURTLE
TRAPPING ON THE WEST SIDE OF IRVINE LAKE

Survey Number	Survey Date	Trap Number	Trap Results
1	8/19/2024	Installation of Hoop Trap 1	N/A
		Installation of Hoop Trap 2	N/A
		Installation of Hoop Trap 3	N/A
		Installation of Hoop Trap 4	N/A
		Installation of Hoop Trap 5	N/A
		Installation of Hoop Trap 6	N/A
		Installation of Hoop Trap 7	N/A
		Installation of Hoop Trap 8	N/A
		Installation of Hoop Trap 9	N/A
		Installation of Basking Trap 10	N/A
		Installation of Hoop Trap 11	N/A
		Installation of Hoop Trap 12	N/A
		Installation of Hoop Trap 13	N/A
		Installation of Hoop Trap 14	N/A
		Installation of Hoop Trap 15	N/A
		Installation of Hoop Trap 16	N/A
2	8/20/2024	Hoop Trap 1	No animals captured
		Hoop Trap 2	No animals captured
		Hoop Trap 3	No animals captured
		Hoop Trap 4	No animals captured
		Hoop Trap 5	No animals captured
		Hoop Trap 6	No animals captured
		Hoop Trap 7	2 bluegill
		Hoop Trap 8	No animals captured
		Hoop Trap 9	No animals captured
		Basking Trap 10	No animals captured
		Hoop Trap 11	No animals captured
		Hoop Trap 12	Out of water (unknown reason)
		Hoop Trap 13	No animals captured
		Hoop Trap 14	No animals captured
		Hoop Trap 15	No animals captured
		Hoop Trap 16	No animals captured
3	8/21/2024	Hoop Trap 1	No animals captured
		Hoop Trap 2	No animals captured
		Hoop Trap 3	No animals captured
		Hoop Trap 4	3 bluegill
		Hoop Trap 5	1 bluegill
		Hoop Trap 6	No animals captured
		Hoop Trap 7	No animals captured
		Hoop Trap 8	No animals captured
		Hoop Trap 9	No animals captured

Jennifer Pareti, Kyle Rice, Chad Hirano
 October 21, 2024
 Page 11

TABLE 5
SUMMARY OF TRAPPING RESULTS FOR SOUTHWESTERN POND TURTLE
TRAPPING ON THE WEST SIDE OF IRVINE LAKE

Survey Number	Survey Date	Trap Number	Trap Results
		Basking Trap 10	No animals captured
		Hoop Trap 11	1 bluegill
		Hoop Trap 12	1 bluegill
		Hoop Trap 13	No animals captured
		Hoop Trap 14	No animals captured
		Hoop Trap 15	No animals captured
		Hoop Trap 16	No animals captured
4	8/22/2024	Hoop Trap 1	No animals captured
		Hoop Trap 2	No animals captured
		Hoop Trap 3	No animals captured
		Hoop Trap 4	No animals captured
		Hoop Trap 5	No animals captured
		Hoop Trap 6	1 bluegill
		Hoop Trap 7	1 channel catfish
		Hoop Trap 8	No animals captured
		Hoop Trap 9	No animals captured
		Basking Trap 10	No animals captured
		Hoop Trap 11	No animals captured
		Hoop Trap 12	No animals captured
		Hoop Trap 13	No animals captured
		Hoop Trap 14	No animals captured
		Hoop Trap 15	No animals captured
		Hoop Trap 16	No animals captured
5	8/23/2024	Hoop Trap 1	No animals captured
		Hoop Trap 2	No animals captured
		Hoop Trap 3	No animals captured
		Hoop Trap 4	No animals captured
		Hoop Trap 5	No animals captured
		Hoop Trap 6	No animals captured
		Hoop Trap 7	No animals captured
		Hoop Trap 8	No animals captured
		Hoop Trap 9	No animals captured
		Basking Trap 10	No animals captured
		Hoop Trap 11	No animals captured
		Hoop Trap 12	No animals captured
		Hoop Trap 13	No animals captured
		Hoop Trap 14	No animals captured
		Hoop Trap 15	No animals captured
		Hoop Trap 16	No animals captured

Jennifer Pareti, Kyle Rice, Chad Hirano
October 21, 2024
Page 12

TABLE 6
SUMMARY OF TRAPPING RESULTS FOR SOUTHWESTERN POND TURTLE
TRAPPING ON THE EAST SIDE OF IRVINE LAKE

Survey Number	Survey Date	Trap Numbers	Trap Results
1	8/26/2024	Installation of Hoop Trap 17	N/A
		Installation of Hoop Trap 18	N/A
		Installation of Hoop Trap 19	N/A
		Installation of Hoop Trap 20	N/A
		Installation of Hoop Trap 21	N/A
		Installation of Hoop Trap 22	N/A
		Installation of Hoop Trap 23	N/A
		Installation of Hoop Trap 24	N/A
		Installation of Hoop Trap 25	N/A
		Installation of Basking Trap 26	N/A
		Installation of Basking Trap 27	N/A
2	8/27/2024	Hoop Trap 17	No animals captured
		Hoop Trap 18	No animals captured
		Hoop Trap 19	No animals captured
		Hoop Trap 20	No animals captured
		Hoop Trap 21	No animals captured
		Hoop Trap 22	No animals captured
		Hoop Trap 23	No animals captured
		Hoop Trap 24	No animals captured
		Hoop Trap 25	No animals captured
		Basking Trap 26	No animals captured
		Basking Trap 27	No animals captured
3	8/28/2024	Hoop Trap 17	No animals captured
		Hoop Trap 18	No animals captured
		Hoop Trap 19	1 red-eared slider
		Hoop Trap 20	No animals captured
		Hoop Trap 21	No animals captured
		Hoop Trap 22	No animals captured
		Hoop Trap 23	No animals captured
		Hoop Trap 24	No animals captured
		Hoop Trap 25	No animals captured
		Basking Trap 26	No animals captured
		Basking Trap 27	No animals captured

Jennifer Pareti, Kyle Rice, Chad Hirano
October 21, 2024
Page 13

TABLE 6
SUMMARY OF TRAPPING RESULTS FOR SOUTHWESTERN POND TURTLE
TRAPPING ON THE EAST SIDE OF IRVINE LAKE

Survey Number	Survey Date	Trap Numbers	Trap Results
4	8/29/2024	Hoop Trap 17	No animals captured
		Hoop Trap 18	No animals captured
		Hoop Trap 19	No animals captured
		Hoop Trap 20	1 red-eared slider
		Hoop Trap 21	No animals captured
		Hoop Trap 22	No animals captured
		Hoop Trap 23	No animals captured
		Hoop Trap 24	No animals captured
		Hoop Trap 25	1 channel catfish
		Basking Trap 26	No animals captured
		Basking Trap 27	No animals captured
5	8/30/2024	Hoop Trap 17	No animals captured
		Hoop Trap 18	No animals captured
		Hoop Trap 19	1 red-eared slider/1 bluegill
		Hoop Trap 20	No animals captured
		Hoop Trap 21	No animals captured
		Hoop Trap 22	No animals captured
		Hoop Trap 23	No animals captured
		Hoop Trap 24	No animals captured
		Hoop Trap 25	1 channel catfish
		Basking Trap 26	No animals captured
		Basking Trap 27	No animals captured

Psomas appreciates the opportunity to assist on this Project. If you have any comments or questions, please contact Amber Heredia at Amber.Heredia@psomas.com.

Sincerely,

PSOMAS



Amber O. Heredia
Senior Project Manager, Resource Management



Jonathan Aguayo
Senior Biologist

Enclosures: Exhibits 1–3
Attachment A – Site Photographs
Attachment B – Turtle Trapping Photographs
Attachment C – Survey Data Sheets

Jennifer Pareti, Kyle Rice, Chad Hirano
October 21, 2024
Page 14

cc: Stacey Love (stacey_love@fws.gov)
Will Miller (william_b_miller@fws.gov)
Laura Patterson (laura.patterson@wildlife.ca.gov)
Katherine Baumberger (kbaumberger@usgs.gov)
Andy Uk (uk@irwd.com)
Fiona Sanchez (Sanchezf@irwd.com)
WildlifeResearchPermits@wildlife.ca.gov

R:\Projects\IRW_IRWD\3IRW010205\Documentation\Pond Turtle\Santiago_Pond Turtle Report-102124.docx

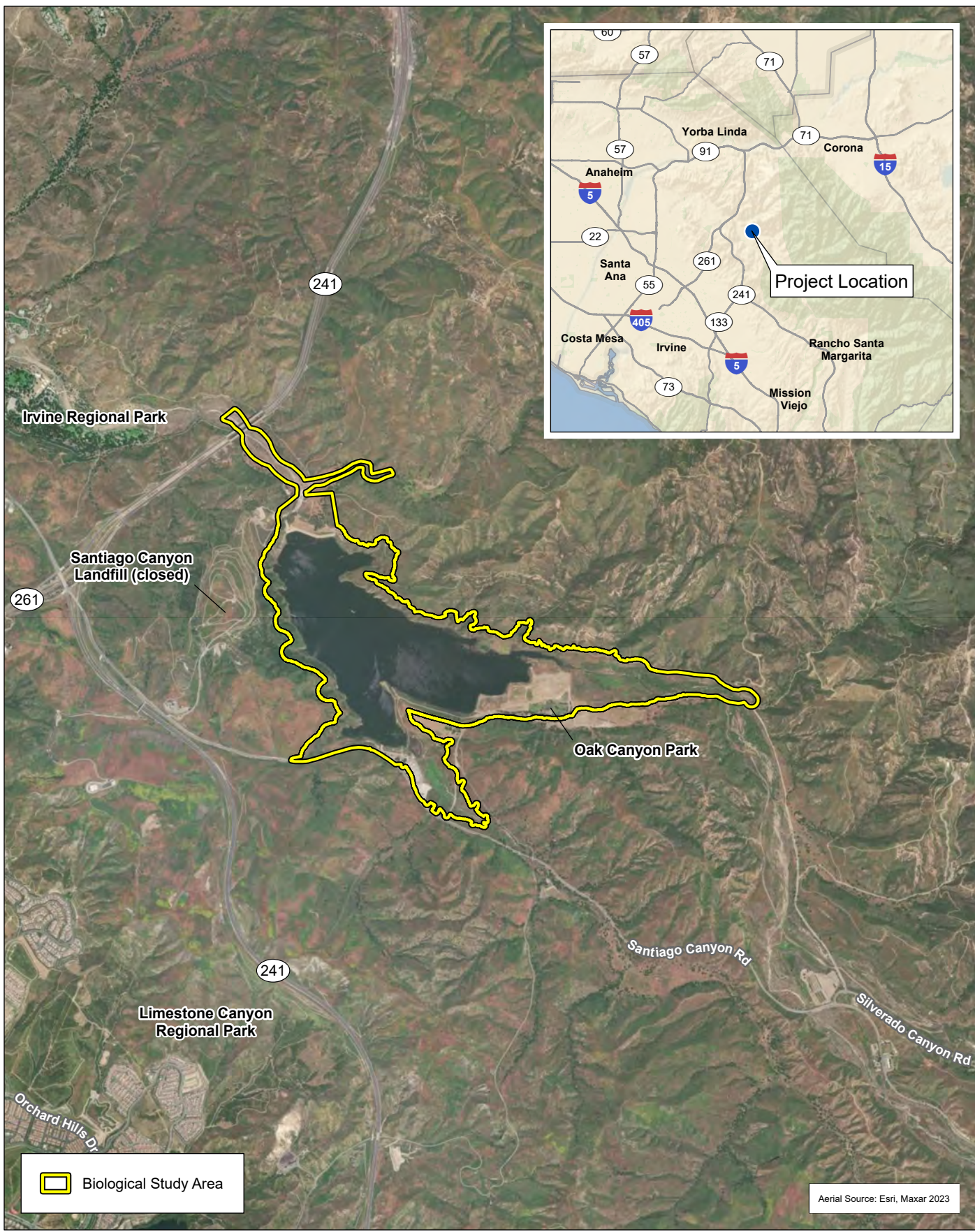
REFERENCES

- California Department of Fish and Wildlife (CDFW). 2000. Biogeographic Data Branch (CDFW BDB). California Wildlife Habitat Relationships System (CWHR). Western Pond Turtle (*Actinemys marmorata*). By: S. Morey. California Interagency Wildlife Task Group. Sacramento, CA: CDFW BDB.
<https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=2657&inline=1>.
- Ernst, C.H., J.E. Lovich, and R.W. Barbour. 1994. *Turtles of the United States and Canada*. Washington, D.C.: Smithsonian Press.
- Germano, D.J., and R.B. Bury. 2001. Western Pond Turtles (*Clemmys marmorata*) in the Central Valley of California: Status and Population Structure. *2001 Transactions of the Western Section of the Wildlife Society*. 37:22–36. Rancho Cordova, CA: The Wildlife Society, Western Section.
- Goodman, R.H., Jr. 1997a. The Biology of the Southwestern Pond Turtle (*Clemmys marmorata pallida*) in the Chino Hills State Park and the West Fork of the San Gabriel River. (Masters Thesis). Pomona, CA: California State Polytechnic University, Pomona.
- . 1997b. Occurrence of double clutching in the southwestern pond turtle, *Clemmys marmorata pallida*, in the Los Angeles Basin. *Chelonian Conservation and Biology* 2:419–420.
- Hayes, D.W., K.R. McAllister, S.A. Richardson, and D.W. Stinson. 1999. *Washington state recovery plan for the western pond turtle*. Olympia, WA: Washington Department of Fish and Wildlife.
- Holland, D.C. 1994. *The Western Pond Turtle: Habitat and History*. Portland, OR: U.S. Department of Energy, Bonneville Power Administration.
- . 1991. *Status and reproductive dynamics of a population of western pond turtles (Clemmys marmorata) in Klickitat County, Washington in 1990*. Unpublished report. Olympia, WA: Washington Department of Wildlife.
- Holland, D.C., and R.H. Goodman, Jr. 1996. *Clemmys marmorata* (western pond turtle) Terrestrial Habitat Use. *Herpetological Review* 27:198–199. Salt Lake City, UT: Society for the Study of Amphibians and Reptiles.

Jennifer Pareti, Kyle Rice, Chad Hirano
October 21, 2024
Page 15

- Jennings, M.R., and M.P. Hayes. 1994. *Amphibian and Reptile Species of Special Concern in California* (Contract No. 8023). Sacramento, CA: CDFG, Inland Fisheries Division.
- Lovich, J., and K. Meyer. 2002. The western pond turtle (*Clemmys marmorata*) in the Mojave River, California, U.S.A.: highly adapted survivor or tenuous relict? *Journal of Zoology*, London, 256:537-545.
- Lovich, J.E., T.B. Egan, and R.C. de Gouvenain. 1994. Tamarisk Control on Public Lands in the Desert of Southern California: Two Case Studies. 46th Annual California Weed Conference, California Weed Science Society.
- Overtree, L., and G. Collings. 1997. Western Pond Turtles in the Kern Valley Region. *The Tortuga Gazette* 33:1–2. Van Nuys, CA: California Turtle and Tortoise Club.
- Pires, M.N. 2001. Allocation of reproductive output in the western pond (*Clemmys marmorata*) in southern California. M.S. Thesis, California State Polytechnic University, Pomona.
- Rathbun, G.B., N.J. Scott, Jr., and T.G. Murphey. 2002. Terrestrial Habitat Use by Pacific Pond Turtles in a Mediterranean Climate. *The Southwestern Naturalist* 47(2): 225–235. Lubbock, TX: Southwestern Association of Naturalists.
- Spinks, P.Q., G.B. Pauly, J.J. Crayon, and H.B. Shaffer. 2003. "Survival of the western pond turtle (*Emys marmorata*) in an urban California environment." US Geological Survey Staff -- Published Research. University of Nebraska: USGS. 526.<http://digitalcommons.unl.edu/usgsstaffpub/526>.
- Stebbins, R.C., and S.M. McGinnis. 2012. *Field Guide to Amphibians and Reptiles of California*. Berkeley, CA: University of California Press.
- United States Fish and Wildlife Service (USFWS). 2023. "U.S. Fish and Wildlife Service proposes federal protections for both species of western pond turtle under the Endangered Species Act." U.S. Fish and Wildlife Service. <https://www.fws.gov/press-release/2023-09/us-fish-and-wildlife-service-proposes-federal-protections-both-species>
- . 2018. ECOS Environmental Conservation Online System. Species Profile for Western Pond Turtle (*Actinemys marmorata*). <https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=C06B>.
- . 2015 (April 10). 90-Day Findings on 10 Petitions. *Federal Register* 80 (69). Pp 19259-19263.
- U.S. Department of the Interior, U.S. Geological Survey (USGS). 2006a. Draft USGS Western Pond Turtle (*Emys marmorata*) Visual Survey Protocol for the Southcoast Ecoregion. Sacramento, CA: USGS.
- . 2006b. Draft USGS Western Pond Turtle (*Emys marmorata*) Trapping Survey Protocol for the Southcoast Ecoregion. Sacramento, CA: USGS.
- . 2004. Habitat Assessment and Baseline Surveys for the Western Spadefoot (*Spea hammondi*) and the Western Pond Turtle (*Emys marmorata*) on the Irvine Ranch Land Reserve. San Diego, CA: USGS.

D:\Projects\IRW\SantiagoCreek\PRO\Santiago_Dam_Turtle\aprx\ex_RL_LV_Aerial



Regional Location and Local Vicinity

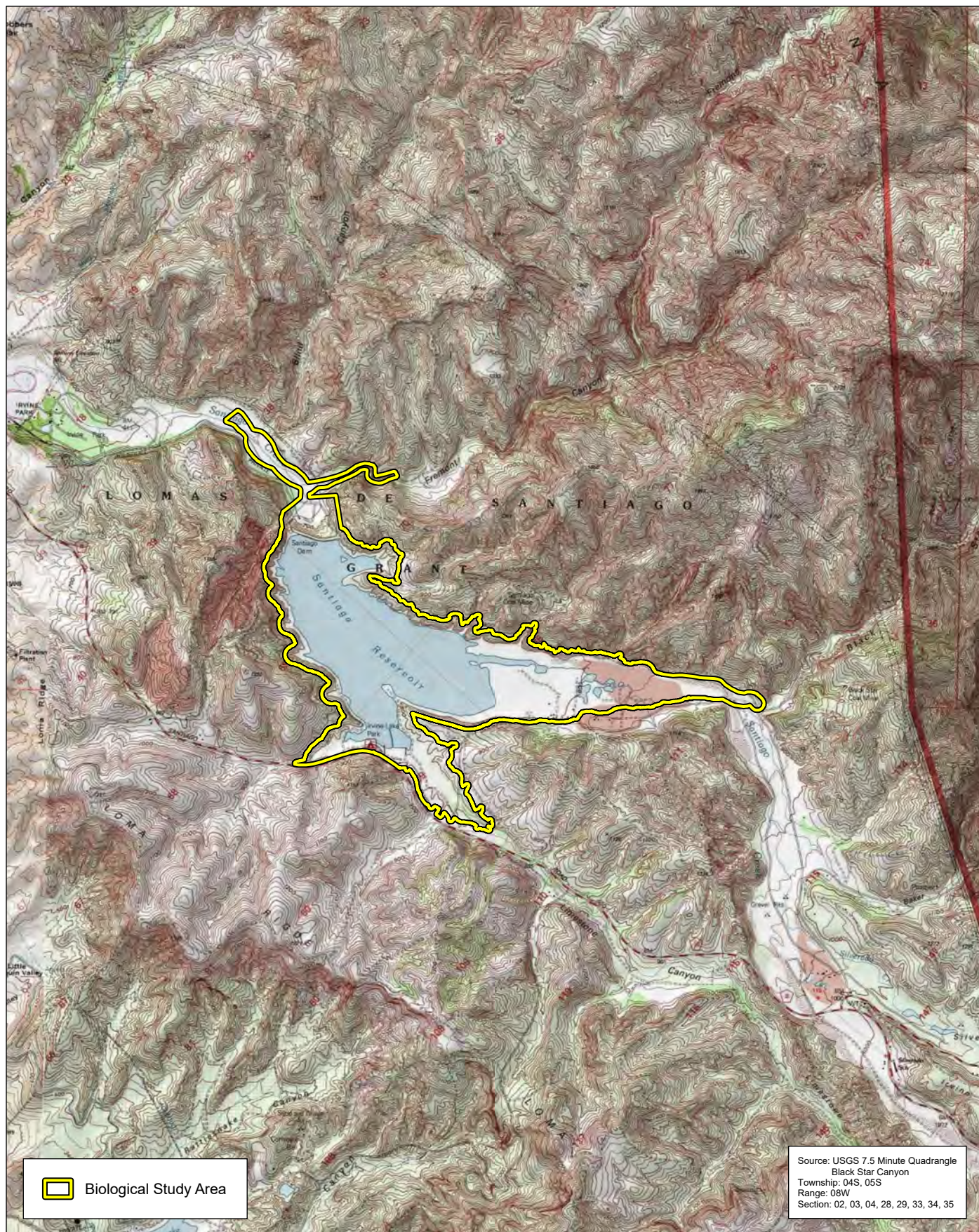
Exhibit 1

Santiago Creek Dam Outlet Tower and Spillway Improvements Project



0 2,000 4,000
Feet





U.S. Geological Survey 7.5-Minute Digital Quadrangle
Santiago Creek Dam Outlet Tower and Spillway Improvements Project

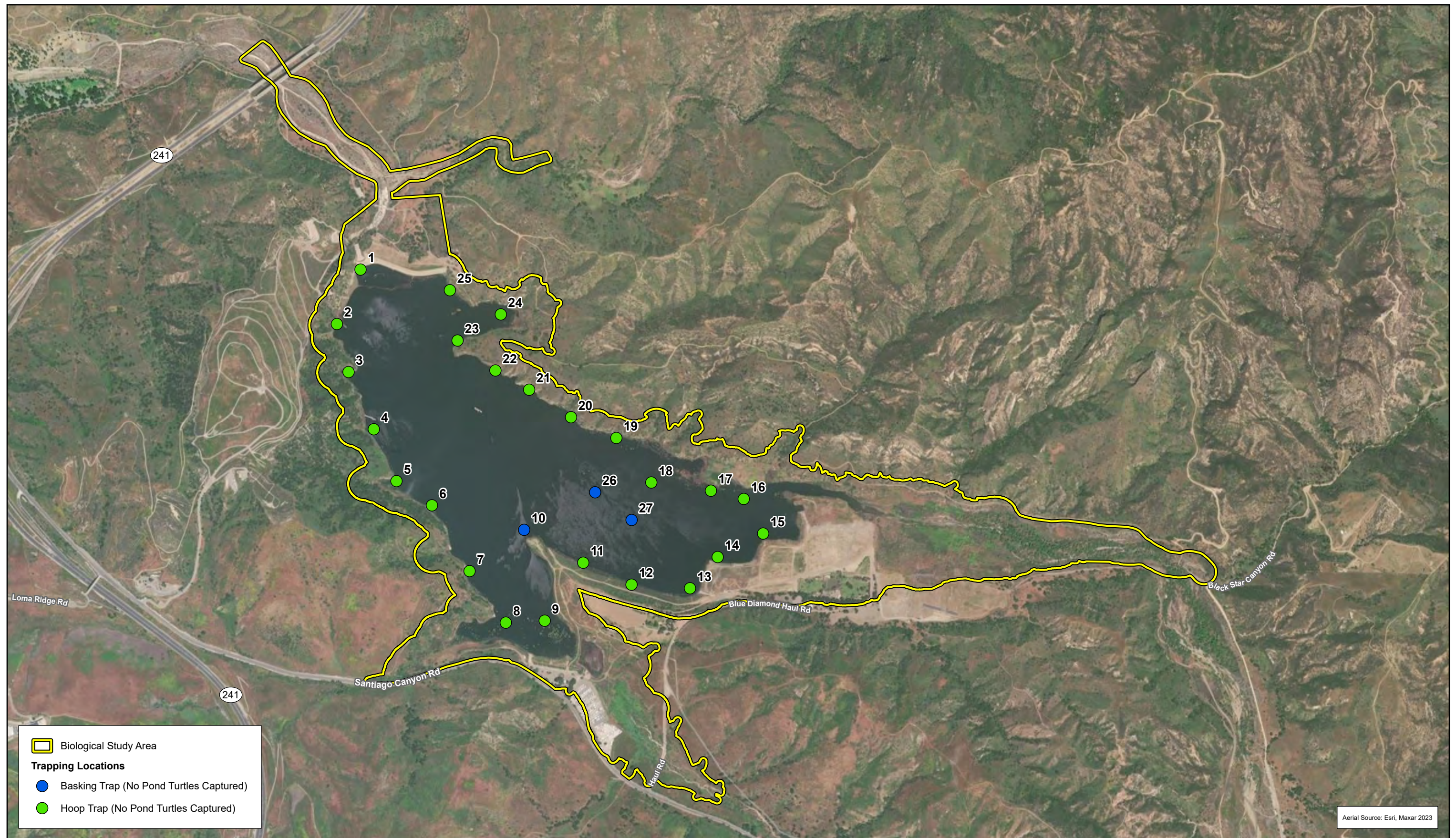
Exhibit 2



0 2,000 4,000
Feet



D:\Projects\IRW\SantiagoCreek\PRO\Santiago_Dam_Turtle\april\april_Trapping_Results



ATTACHMENT A
SITE PHOTOGRAPHS



Photo 1. View of suitable habitat at Irvine Lake in the middle portion of the survey area, upstream of Santiago Creek Dam.



Photo 2. View of suitable shallow pool in the southwestern portion of the survey area.

Site Photographs

Attachment A-1

Santiago Creek Dam Outlet Tower and Spillway Improvements Project

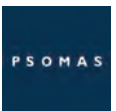




Photo 3. View of suitable habitat along Santiago Creek in the eastern portion of the survey area, upstream of Santiago Creek Dam and Irvine Lake.



Photo 4. View of suitable habitat along the tributary from Fremont Canyon in the western portion of the survey area, downstream of Santiago Creek Dam.

Site Photographs

Attachment A-2

Santiago Creek Dam Outlet Tower and Spillway Improvements Project



ATTACHMENT B
TURTLE TRAPPING PHOTOGRAPHS



Photo 1. View of installed Hoop Trap #5 on the west side of Irvine Lake.



Photo 2. View of installed Basking Trap #10 on the west side of Irvine Lake.

Turtle Trapping Photographs

Attachment B-1

Santiago Creek Dam Outlet Tower and Spillway Improvements Project

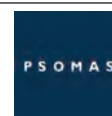




Photo 3. View of installed Hoop trap #17 on the east side of Irvine Lake.



Photo 4. View of installed Basking Trap #26 on the east side of Irvine Lake.

Turtle Trapping Photographs

Attachment B-2

Santiago Creek Dam Outlet Tower and Spillway Improvements Project





Photo 5. View of channel catfish caught from Hoop Trap #7 (August 22, 2024) on the west side of Irvine Lake.



Photo 6. View of red-eared slider caught from Hoop Trap #19 (August 28, 2024) on the east side of Irvine Lake.

Turtle Trapping Photographs

Santiago Creek Dam Outlet Tower and Spillway Improvements Project

Attachment B-3

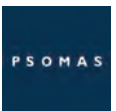




Photo 7. View of red-eared slider caught from Hoop Trap #20 (August 29, 2024) on the east side of Irvine Lake.

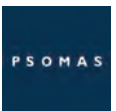


Photo 8. View of red-eared slider caught from Hoop Trap #19 (August 30, 2024) on the east side of Irvine Lake.

Turtle Trapping Photographs

Attachment B-4

Santiago Creek Dam Outlet Tower and Spillway Improvements Project



ATTACHMENT C
SURVEY DATA SHEETS

DRAFT

Appendix 2. Paper data form.

Turtle: Trapping Survey Form

Date 8/20/24 Survey Name Frye Lake Survey Completed ☒ Y ☐ N

Project Code 32R2 Observer1 L. Garrett Obsv1 Task observer/recorder/processor Block

Survey Type visual/trapping Observer2 T. Beuth Obsv2 Task observer/recorder/processor Site

Start Time 1800 Observer3 Obsv3 Task observer/recorder/processor Site Photo ☒ Y ☐ N

End Time 1035 Observer4 Obsv4 Task observer/recorder/processor # photos

Start Lat	End Lat	
Start Long	End Long	Site
Start Elev	End Elev	Length
Datum	Drainage	

Weather:

Air Temp (°C)	<u>0700 - 65°F / 1140 - 87°F</u>
Water Temp (°C)	<u>0805 - 80.5°F / 1040 - 81.6°F</u>
Condition	<u>clear or few clouds, partly cloudy or variable, cloudy or overcast, fog, mist or drizzle, showers or light rain, heavy rain, sleet or hail, snow, no data</u>
Wind Speed	<u>1 calm, 2-3 light air movement, 4-7 light breeze, 8-12 gentle breeze, 13-18 moderate breeze, 19-24 fresh breeze, 25-31 strong breeze, 32-38 near gale, >39 gale and above, no data</u>

All Animals:

Observ Method	Trap Name (if applicable)	Trap Type (if applicable)	Trap Number (if applicable)	Lat/Long	Date/Time Trap Set	Date/Time Trap Pulled	Elapsed Hours
1 audio/hand/trap/vis	1	Funnel		33.786183, -117.712279	0837	N/A	
2 audio/hand/trap/vis	2	Funnel		33.783766, -117.718510	0841		
3 audio/hand/trap/vis	3	Funnel		33.781564, -117.717847	0840		
4 audio/hand/trap/vis	4	Funnel		33.778002, -117.716449	0855		
5 audio/hand/trap/vis	5	Funnel		33.776706, -117.715322	0908		
6 audio/hand/trap/vis	6	Funnel		33.775411, -117.714600	0913		
7 audio/hand/trap/vis	7	Funnel		33.772690, -117.711411	0925		
8 audio/hand/trap/vis	8	Funnel		33.770334, -117.710344	0948		
9 audio/hand/trap/vis	9	Funnel		33.771120, -117.716243	0954		
10 audio/hand/trap/vis	10	Solar		33.774508, -117.718768	1003		
11 audio/hand/trap/vis	11	Funnel		33.771126, -117.716059	1005		
12 audio/hand/trap/vis	12	Funnel		33.772164, -117.712333	1016		

All Animals (continued):

Type	Species	Age Category	Disposition	Sex	Length (mm)	Notched	Tissue	Photo	# Photo
1		A,J,Mm,L1,L2,H,Em,U	R D E C	M F U X		Y N	Y N U	Y/N	
2		A,J,Mm,L1,L2,H,Em,U	R D E C	M F U X		Y N	Y N U	Y/N	
3		A,J,Mm,L1,L2,H,Em,U	R D E C	M F U X		Y N	Y N U	Y/N	
4		A,J,Mm,L1,L2,H,Em,U	R D E C	M F U X		Y N	Y N U	Y/N	
5		A,J,Mm,L1,L2,H,Em,U	R D E C	M F U X		Y N	Y N U	Y/N	
6		A,J,Mm,L1,L2,H,Em,U	R D E C	M F U X		Y N	Y N U	Y/N	
7		A,J,Mm,L1,L2,H,Em,U	R D E C	M F U X		Y N	Y N U	Y/N	
8		A,J,Mm,L1,L2,H,Em,U	R D E C	M F U X		Y N	Y N U	Y/N	
9		A,J,Mm,L1,L2,H,Em,U	R D E C	M F U X		Y N	Y N U	Y/N	
10		A,J,Mm,L1,L2,H,Em,U	R D E C	M F U X		Y N	Y N U	Y/N	
11		A,J,Mm,L1,L2,H,Em,U	R D E C	M F U X		Y N	Y N U	Y/N	
12		A,J,Mm,L1,L2,H,Em,U	R D E C	M F U X		Y N	Y N U	Y/N	

Additional Fields for Pond Turtles:

	Carapace Width (mm)	Carapace Height (mm)	Plastron Length (mm)	Weight (g)	Shell Damage	Type of Shell Damage	Other ID Markings
1					Y N		Y N
2					Y N		Y N
3					Y N		Y N
4					Y N		Y N
5					Y N		Y N
6					Y N		Y N
7					Y N		Y N
8					Y N		Y N
9					Y N		Y N
10					Y N		Y N
11					Y N		Y N
12					Y N		Y N

DRAFT

Recapture	ID #	Location Within Habitat	Animal Behavior
1	Y N	pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
2	Y N	pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
3	Y N	pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
4	Y N	pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
5	Y N	pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
6	Y N	pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
7	Y N	pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
8	Y N	pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
9	Y N	pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
10	Y N	pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
11	Y N	pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
12	Y N	pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other

[illegible][illegible]

Notes: 2 bluegill caught on trap #7.
no other fish caught. Trap #12 was
out of the water (was dead).
Unknown reason.

ID	mph & Indicator
0	<1 calm, smoke rises vertically
1	2-3 light air movement
2	4-7 light breeze
3	8-12 gentle breeze
4	13-18 moderate breeze
5	19-24 fresh breeze
6	25-31 strong breeze
7	32-38 near gale
8	>39 gale and above
9	No data

ID	Description
0	Clear or few clouds
1	Partly cloudy or variable
2	Cloudy or overcast
3	Fog
4	Mist or drizzle
5	Showers or light rain
6	Heavy rain
7	Sleet or hail
8	Snow
9	No data

A	Adult
J	Juvenile
Mm	Metamorph
L	Larvae
H	Hatchling
Em	Egg/Egg Mass

R	Release
D	Dead
E	Escape
C	Collected

Y	Yes
N	No
U	Unknown
X	Not Checked

DRAFT

Appendix 2. Paper data form.

Turtle: Trapping Survey Form

Date 8/21/24 Survey Name Jenine Lake Survey Completed ☒ Y ☐ N

Project Code 3 Observer1 L. Missett Obsv1 Task observer/recorder/processor Block _____

Survey Type visual/trapping Observer2 T. Briske Obsv2 Task observer/recorder/processor Site _____

Start Time 0700 Observer3 _____ Obsv3 Task observer/recorder/processor Site Photo ☒ Y ☐ N

End Time 1100 Observer4 _____ Obsv4 Task observer/recorder/processor # photos _____

Start Lat _____	End Lat _____	
Start Long _____	End Long _____	Site _____
Start Elev _____	End Elev _____	Length _____
Datum _____	Drainage _____	

Weather:

Air Temp (°C)	<u>0700 - 64°F / 1050 - 86°F</u>
Water Temp (°C)	<u>0750 - 78.5°F / thermometer broke</u>
Condition	<u>clear or few clouds, partly cloudy or variable, cloudy or overcast, fog, mist or drizzle, showers or light rain, heavy rain, sleet or hail, snow, no data</u>
Wind Speed	<u>≤1 calm, 2-3 light air movement, 4-7 light breeze, 8-12 gentle breeze, 13-18 moderate breeze, 19-24 fresh breeze, 25-31 strong breeze, 32-38 near gale, >39 gale and above, no data</u>

All Animals:

Observ Method	Trap Name (if applicable)	Trap Type (if applicable)	Trap Number (if applicable)	Lat/Long	Date/Time Trap Set	Date/Time Trap Pulled	Elapsed Hours
1 audio/hand/trap/vis	1	Funnel		See Day 1	0747	NA	
2 audio/hand/trap/vis	2	Funnel			0756		
3 audio/hand/trap/vis	3	Funnel			0804		
4 audio/hand/trap/vis	4	Funnel			0817		
5 audio/hand/trap/vis	5	Funnel			0827		
6 audio/hand/trap/vis	6	Funnel			0822		
7 audio/hand/trap/vis	7	Funnel			0841		
8 audio/hand/trap/vis	8	Funnel			0847		
9 audio/hand/trap/vis	9	Funnel			0855		
10 audio/hand/trap/vis	10	Solal			0904		
11 audio/hand/trap/vis	11	Funnel			0912		
12 audio/hand/trap/vis	12	Funnel			0924		

All Animals (continued):

Type	Species	Age Category	Disposition	Sex	Length (mm)	Notched	Tissue	Photo	# Photo
1		A,J,Mm,L1,L2,H,Em,U	R D E C	M F U X		Y N	Y N U	Y/N	
2		A,J,Mm,L1,L2,H,Em,U	R D E C	M F U X		Y N	Y N U	Y/N	
3		A,J,Mm,L1,L2,H,Em,U	R D E C	M F U X		Y N	Y N U	Y/N	
4		A,J,Mm,L1,L2,H,Em,U	R D E C	M F U X		Y N	Y N U	Y/N	
5		A,J,Mm,L1,L2,H,Em,U	R D E C	M F U X		Y N	Y N U	Y/N	
6		A,J,Mm,L1,L2,H,Em,U	R D E C	M F U X		Y N	Y N U	Y/N	
7		A,J,Mm,L1,L2,H,Em,U	R D E C	M F U X		Y N	Y N U	Y/N	
8		A,J,Mm,L1,L2,H,Em,U	R D E C	M F U X		Y N	Y N U	Y/N	
9		A,J,Mm,L1,L2,H,Em,U	R D E C	M F U X		Y N	Y N U	Y/N	
10		A,J,Mm,L1,L2,H,Em,U	R D E C	M F U X		Y N	Y N U	Y/N	
11		A,J,Mm,L1,L2,H,Em,U	R D E C	M F U X		Y N	Y N U	Y/N	
12		A,J,Mm,L1,L2,H,Em,U	R D E C	M F U X		Y N	Y N U	Y/N	

Additional Fields for Pond Turtles:

	Carapace Width (mm)	Carapace Height (mm)	Plastron Length (mm)	Weight (g)	Shell Damage	Type of Shell Damage	Other ID Markings
1					Y N		Y N
2					Y N		Y N
3					Y N		Y N
4					Y N		Y N
5					Y N		Y N
6					Y N		Y N
7					Y N		Y N
8					Y N		Y N
9					Y N		Y N
10					Y N		Y N
11					Y N		Y N
12					Y N		Y N

	Recapture	ID #	Location Within Habitat	Animal Behavior
1	Y	N	pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
2	Y	N	pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
3	Y	N	pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
4	Y	N	pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
5	Y	N	pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
6	Y	N	pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
7	Y	N	pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
8	Y	N	pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
9	Y	N	pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
10	Y	N	pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
11	Y	N	pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
12	Y	N	pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other

[illegible][illegible]

Notes: Trap #4 - x3 bluegill Trap #5
- x1 bluegill Trap #1 - x1 bluegill
Trap #2 - x1 bluegill No catfish at
other traps

General	
Y	Yes
N	No
U	Unknown
X	Not Checked

DRAFT

Appendix 2. Paper data form.

Turtle: Trapping Survey Form

Date	8/21/24	Survey Name	Trine Lake	Survey Completed	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N
Project Code	3	Observer1	J. Aguirre	Obsv1 Task	observer/recorder/processor
Survey Type	visual/trapping	Observer2	T. Bussell	Obsv2 Task	observer/recorder/processor
Start Time	0715	Observer3		Obsv3 Task	observer/recorder/processor
End Time	1025	Observer4		Obsv4 Task	observer/recorder/processor
				Site Photo	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N
				# photos	

Start Lat	End Lat	
Start Long	End Long	Site
Start Elev	End Elev	Length
Datum	Drainage	

Weather:

Air Temp (°C)	0715 - 60°F / 1025 - 77°F
Water Temp (°C)	0725 - 78.5°F / 0922 - 80.1°F
Condition	clear or few clouds, partly cloudy or variable, cloudy or overcast, fog, mist or drizzle, showers or light rain, heavy rain, sleet or hail, snow, no data
Wind Speed	<1 calm, 2-3 light air movement, 4-7 light breeze, 8-12 gentle breeze, 13-18 moderate breeze, 19-24 fresh breeze, 25-31 strong breeze, 32-38 near gale, >39 gale and above, no data

All Animals:

Observ Method	Trap Name (if applicable)	Trap Type (if applicable)	Trap Number (if applicable)	Lat/Long	Date/Time Trap Set	Date/Time Trap Pulled	Elapsed Hours
1 audio/hand/trap/vis	1	Funnel		see Day 1	0735	NA	
2 audio/hand/trap/vis	2	Funnel			0743		
3 audio/hand/trap/vis	3	Funnel			0750		
4 audio/hand/trap/vis	4	Funnel			0756		
5 audio/hand/trap/vis	5	Funnel			0801		
6 audio/hand/trap/vis	6	Funnel			0806		
7 audio/hand/trap/vis	7	Funnel			0815		
8 audio/hand/trap/vis	8	Funnel			0827		
9 audio/hand/trap/vis	9	Funnel			0834		
10 audio/hand/trap/vis	10	Solar			0841		
11 audio/hand/trap/vis	11	Funnel			0848		
12 audio/hand/trap/vis	12	Funnel			0854		

All Animals (continued):

Type	Species	Age Category	Disposition	Sex	Length (mm)	Notched	Tissue	Photo	# Photo
1		A,J,Mm,L1,L2,H,Em,U	R D E C	M F U X		Y N	Y N U	Y/N	
2		A,J,Mm,L1,L2,H,Em,U	R D E C	M F U X		Y N	Y N U	Y/N	
3		A,J,Mm,L1,L2,H,Em,U	R D E C	M F U X		Y N	Y N U	Y/N	
4		A,J,Mm,L1,L2,H,Em,U	R D E C	M F U X		Y N	Y N U	Y/N	
5		A,J,Mm,L1,L2,H,Em,U	R D E C	M F U X		Y N	Y N U	Y/N	
6		A,J,Mm,L1,L2,H,Em,U	R D E C	M F U X		Y N	Y N U	Y/N	
7		A,J,Mm,L1,L2,H,Em,U	R D E C	M F U X		Y N	Y N U	Y/N	
8		A,J,Mm,L1,L2,H,Em,U	R D E C	M F U X		Y N	Y N U	Y/N	
9		A,J,Mm,L1,L2,H,Em,U	R D E C	M F U X		Y N	Y N U	Y/N	
10		A,J,Mm,L1,L2,H,Em,U	R D E C	M F U X		Y N	Y N U	Y/N	
11		A,J,Mm,L1,L2,H,Em,U	R D E C	M F U X		Y N	Y N U	Y/N	
12		A,J,Mm,L1,L2,H,Em,U	R D E C	M F U X		Y N	Y N U	Y/N	

Additional Fields for Pond Turtles:

	Carapace Width (mm)	Carapace Height (mm)	Plastron Length (mm)	Weight (g)	Shell Damage	Type of Shell Damage	Other ID Markings
1					Y N		Y N
2					Y N		Y N
3					Y N		Y N
4					Y N		Y N
5					Y N		Y N
6					Y N		Y N
7					Y N		Y N
8					Y N		Y N
9					Y N		Y N
10					Y N		Y N
11					Y N		Y N
12					Y N		Y N

8/22/24

DRAFT

Appendix 2. Paper data form (continued).

	Recapture	ID #	Location Within Habitat	Animal Behavior
1	Y N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
2	Y N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
3	Y N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
4	Y N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
5	Y N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
6	Y N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
7	Y N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
8	Y N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
9	Y N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
10	Y N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
11	Y N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
12	Y N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other

Pond Turtle Trap Information:

Trap Name	Trap Type	Trap Number	Lat/Long	Date/Time Trap Set	Date/Time Trap Pulled	Elapsed Hours
13	Funnel		See Day 1	0902h	NA	
14	Funnel			0912h		
15	Funnel			0918h		
16	Funnel			0922h		

Temperature Loggers Form:

Logger ID	Lat/Long

Notes:

Trap # 6 - xl blue gill.
 Trap # 7 - xl catfish
 No other catches.

Wind Speed

ID	mph & Indicator
0	<1 calm, smoke rises vertically
1	2-3 light air movement
2	4-7 light breeze
3	8-12 gentle breeze
4	13-18 moderate breeze
5	19-24 fresh breeze
6	25-31 strong breeze
7	32-38 near gale
8	>39 gale and above
9	No data

Sky Code

ID	Description
0	Clear or few clouds
1	Partly cloudy or variable
2	Cloudy or overcast
3	Fog
4	Mist or drizzle
5	Showers or light rain
6	Heavy rain
7	Sleet or hail
8	Snow
9	No data

Animal Age Category

A	Adult
J	Juvenile
Mn	Metamorph
L	Larvae
H	Hatchling
Em	Egg/Egg Mass

Disposition

R	Release
D	Dead
E	Escape
C	Collected

General

Y	Yes
N	No
U	Unknown
X	Not Checked

DRAFT

Appendix 2. Paper data form.

Turtle: Trapping Survey Form

Date 8/23/24 Survey Name Santiago Survey Completed ☒ Y ☐ N

Project Code visual/trapping Observer1 S. (Indivisible) Obsv1 Task observer/recorder/processor Block

Survey Type visual/trapping Observer2 S. (Indivisible) Obsv2 Task observer/recorder/processor Site

Start Time 0648 Observer3 S. (Indivisible) Obsv3 Task observer/recorder/processor Site Photo ☒ Y ☐ N

End Time 1056 Observer4 Obsv4 Task observer/recorder/processor # photos

Start Lat	End Lat	
Start Long	End Long	Site
Start Elev	End Elev	Length
Datum	Drainage	

Weather:

Air Temp (°C)	<u>61°F (6:48 am) - 75°F (10:56 am)</u>
Water Temp (°C)	<u>79.7°F (8:25 am) - 80.2°F (9:24 am)</u>
Condition	<u>clear or few clouds, partly cloudy or variable, cloudy or overcast, fog, mist or drizzle, showers or light rain, heavy rain, sleet or hail, snow, no data</u>
Wind Speed	<u><1 calm, 2-3 light air movement, 4-7 light breeze, 8-12 gentle breeze, 13-18 moderate breeze, 19-24 fresh breeze, 25-31 strong breeze, 32-38 near gale, >39 gale and above, no data</u>

All Animals:

Observ Method	Trap Name (if applicable)	Trap Type (if applicable)	Trap Number (if applicable)	Lat/Long	Date/Time Trap Set	Date/Time Trap Pulled	Elapsed Hours
1 audio/hand/trap/vis	1	Funnel		See Log	n/a	742	
2 audio/hand/trap/vis	2	Funnel				753	
3 audio/hand/trap/vis	3	Funnel				800	
4 audio/hand/trap/vis	4	Funnel				658	
5 audio/hand/trap/vis	5	Funnel				823	
6 audio/hand/trap/vis	6	Funnel				231	
7 audio/hand/trap/vis	7	Funnel				712	
8 audio/hand/trap/vis	8	Funnel				245	
9 audio/hand/trap/vis	9	Funnel				718	
10 audio/hand/trap/vis	10	Solar				722	
11 audio/hand/trap/vis	11	Funnel				735	
12 audio/hand/trap/vis	12	Funnel				746	

All Animals (continued):

Type	Species	Age Category	Disposition	Sex	Length (mm)	Notched	Tissue	Photo	#
1		A,J,Mm,L1,L2,H,Em,U	R D E C	M F U X		Y N	Y N U	Y/N	
2		A,J,Mm,L1,L2,H,Em,U	R D E C	M F U X		Y N	Y N U	Y/N	
3		A,J,Mm,L1,L2,H,Em,U	R D E C	M F U X		Y N	Y N U	Y/N	
4		A,J,Mm,L1,L2,H,Em,U	R D E C	M F U X		Y N	Y N U	Y/N	
5		A,J,Mm,L1,L2,H,Em,U	R D E C	M F U X		Y N	Y N U	Y/N	
6		A,J,Mm,L1,L2,H,Em,U	R D E C	M F U X		Y N	Y N U	Y/N	
7		A,J,Mm,L1,L2,H,Em,U	R D E C	M F U X		Y N	Y N U	Y/N	
8		A,J,Mm,L1,L2,H,Em,U	R D E C	M F U X		Y N	Y N U	Y/N	
9		A,J,Mm,L1,L2,H,Em,U	R D E C	M F U X		Y N	Y N U	Y/N	
10		A,J,Mm,L1,L2,H,Em,U	R D E C	M F U X		Y N	Y N U	Y/N	
11		A,J,Mm,L1,L2,H,Em,U	R D E C	M F U X		Y N	Y N U	Y/N	
12		A,J,Mm,L1,L2,H,Em,U	R D E C	M F U X		Y N	Y N U	Y/N	

Additional Fields for Pond Turtles:

Carapace Width (mm)	Carapace Height (mm)	Plastron Length (mm)	Weight (g)	Shell Damage	Type of Shell Damage	Other ID Markings
1				Y N		Y N
2				Y N		Y N
3				Y N		Y N
4				Y N		Y N
5				Y N		Y N
6				Y N		Y N
7				Y N		Y N
8				Y N		Y N
9				Y N		Y N
10				Y N		Y N
11				Y N		Y N
12				Y N		Y N

8/23/24

DRAFT**Appendix 2. Paper data form (continued).**

	Recapture	ID #	Location Within Habitat	Animal Behavior
1	Y N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
2	Y N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
3	Y N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
4	Y N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
5	Y N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
6	Y N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
7	Y N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
8	Y N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
9	Y N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
10	Y N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
11	Y N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
12	Y N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other

Pond Turtle Trap Information:

Trap Name	Trap Type	Trap Number	Lat/Long	Date/Time Trap Set	Date/Time Trap Pulled	Elapsed Hours
13	Funnel		See Page 1	n/a	759	
14	Funnel		↓	↓	807	
15	Funnel				921	
16	Funnel		↓	↓	929	

Temperature Loggers Form:

Logger ID	Lat/Long

Notes:

Wind Speed

ID	mph & Indicator
0	<1 calm, smoke rises vertically
1	2-3 light air movement
2	4-7 light breeze
3	8-12 gentle breeze
4	13-18 moderate breeze
5	19-24 fresh breeze
6	25-31 strong breeze
7	32-38 near gale
8	>39 gale and above
9	No data

Sky Code

ID	Description
0	Clear or few clouds
1	Partly cloudy or variable
2	Cloudy or overcast
3	Fog
4	Mist or drizzle
5	Showers or light rain
6	Heavy rain
7	Sleet or hail
8	Snow
9	No data

Animal Age Category

A	Adult
J	Juvenile
Mm	Metamorph
L	Larvae
H	Hatchling
Em	Egg/Egg Mass

Disposition

R	Release
D	Dead
E	Escape
C	Collected

General

Y	Yes
N	No
U	Unknown
X	Not Checked

DRAFT

Appendix 2. Paper data form.

Turtle: Trapping Survey Form

Date 8/27/04 Survey Name Trapping Survey Survey Completed ☒ Y ☐ N

Project Code 52844/010105 Observer1 J. Agnew Obsv1 Task observer/recorder/processor Block

Survey Type visual/trapping Observer2 J. B. Smith Obsv2 Task observer/recorder/processor Site

Start Time 0708 Observer3 Obsv3 Task observer/recorder/processor Site Photo ☒ Y ☐ N

End Time 0808 Observer4 Obsv4 Task observer/recorder/processor # photos

Start Lat	End Lat	
Start Long	End Long	Site
Start Elev	End Elev	Length
Datum	Drainage	

Weather:

Air Temp (°C) 62.0°F (07:08 AM) - 70°F (09:08 AM)

Water Temp (°C) 0.730-78.2°F/0848-79.2°F

Condition clear or few clouds, partly cloudy or variable, cloudy or overcast, fog, mist or drizzle, showers or light rain,
heavy rain, sleet or hail, snow, no data

Wind Speed <1 calm, 2-3 light air movement, 4-7 light breeze, 8-12 gentle breeze, 13-18 moderate breeze, 19-24 fresh breeze,
25-31 strong breeze, 32-38 near gale, >39 gale and above, no data

All Animals:

Observ Method	Trap Name (if applicable)	Trap Type (if applicable)	Trap Number (if applicable)	Lat/Long	Date/Time Trap Set	Date/Time Trap Pulled	Elapsed Hours
1 audio/hand/trap/vis	17	Funnel		33.776444, -117.70812	0738	A/A	
2 audio/hand/trap/vis	18	Funnel		33.776777, -117.711443	0747		
3 audio/hand/trap/vis	19	Funnel		33.778777, -117.713360	0748		
4 audio/hand/trap/vis	20	Funnel		33.779667, -117.715817	0753		
5 audio/hand/trap/vis	21	Funnel		33.780882, -117.718101	0758		
6 audio/hand/trap/vis	22	Funnel		33.782125, -117.719218	0802		
7 audio/hand/trap/vis	23	Funnel		33.783046, -117.721977	0809		
8 audio/hand/trap/vis	24	Funnel		33.784248, -117.719689	0813		
9 audio/hand/trap/vis	25	Funnel		33.785203, -117.722451	0820		
10 audio/hand/trap/vis	26	Salon		33.786305, -117.719462	0840		
11 audio/hand/trap/vis	27	Salon		33.787974, -117.721422	0844		
12 audio/hand/trap/vis							

All Animals (continued):

Type	Species	Age Category	Disposition	Sex	Length (mm)	Notched	Tissue	Photo	# Photo
1		A,J,Mm,L1,L2,H,Em,U	R D E C	M F U X		Y N	Y N U	Y/N	
2		A,J,Mm,L1,L2,H,Em,U	R D E C	M F U X		Y N	Y N U	Y/N	
3		A,J,Mm,L1,L2,H,Em,U	R D E C	M F U X		Y N	Y N U	Y/N	
4		A,J,Mm,L1,L2,H,Em,U	R D E C	M F U X		Y N	Y N U	Y/N	
5		A,J,Mm,L1,L2,H,Em,U	R D E C	M F U X		Y N	Y N U	Y/N	
6		A,J,Mm,L1,L2,H,Em,U	R D E C	M F U X		Y N	Y N U	Y/N	
7		A,J,Mm,L1,L2,H,Em,U	R D E C	M F U X		Y N	Y N U	Y/N	
8		A,J,Mm,L1,L2,H,Em,U	R D E C	M F U X		Y N	Y N U	Y/N	
9		A,J,Mm,L1,L2,H,Em,U	R D E C	M F U X		Y N	Y N U	Y/N	
10		A,J,Mm,L1,L2,H,Em,U	R D E C	M F U X		Y N	Y N U	Y/N	
11		A,J,Mm,L1,L2,H,Em,U	R D E C	M F U X		Y N	Y N U	Y/N	
12		A,J,Mm,L1,L2,H,Em,U	R D E C	M F U X		Y N	Y N U	Y/N	

Additional Fields for Pond Turtles:

	Carapace Width (mm)	Carapace Height (mm)	Plastron Length (mm)	Weight (g)	Shell Damage	Type of Shell Damage	Other ID Markings
1					Y N		Y N
2					Y N		Y N
3					Y N		Y N
4					Y N		Y N
5					Y N		Y N
6					Y N		Y N
7					Y N		Y N
8					Y N		Y N
9					Y N		Y N
10					Y N		Y N
11					Y N		Y N
12					Y N		Y N

DRAFT

Appendix 2. Paper data form (continued).

	Recapture	ID #	Location Within Habitat	Animal Behavior
1	Y	N	pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
2	Y	N	pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
3	Y	N	pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
4	Y	N	pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
5	Y	N	pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
6	Y	N	pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
7	Y	N	pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
8	Y	N	pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
9	Y	N	pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
10	Y	N	pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
11	Y	N	pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
12	Y	N	pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other

Pond Turtle Trap Information:

[illegible]

Temperature Loggers Form:

[illegible]

Notes: No catfish (fish/turtle) in any
traps.

Wind Speed

10	mph & Indicator
0	<1 calm, smoke rises vertically
1	2-3 light air movement
2	4-7 light breeze
3	8-12 gentle breeze
4	13-18 moderate breeze
5	19-24 fresh breeze
6	25-31 strong breeze
7	32-38 near gale
8	>39 gale and above
9	No data

Sky Code

10	Description
0	Clear or few clouds
1	Partly cloudy or variable
2	Cloudy or overcast
3	Fog
4	Mist or drizzle
5	Showers or light rain
6	Heavy rain
7	Sleet or hail
8	Snow
9	No data

Animal Age Category

A	Adult
J	Juvenile
Mm	Metamorph
L	Larvae
H	Hatchling
Em	Egg/Egg Mass

Disposition

R	Release
D	Dead
E	Escape
C	Collected

General

Y	Yes
N	No
U	Unknown
X	Not Checked

DRAFT

Appendix 2. Paper data form.

Turtle: Trapping Survey Form

Date 8/18/24 Survey Name Forvie Lake Survey Completed ☒ Y ☐ N

Project Code 82h/060305 Observer1 J. Average Obsv1 Task observer/recorder/processor Block _____

Survey Type visual/trapping Observer2 T. Bartle Obsv2 Task observer/recorder/processor Site _____

Start Time 0652 Observer3 _____ Obsv3 Task observer/recorder/processor Site Photo ☒ Y ☐ N

End Time 0905 Observer4 _____ Obsv4 Task observer/recorder/processor # photos _____

Start Lat _____	End Lat _____
Start Long _____	End Long _____
Start Elev _____	End Elev _____
Datum _____	Drainage _____
Site _____	
Length _____	

Weather:

Air Temp (°C) 62° (6:52 Am) — 70° (9:05 Am)

Water Temp (°C) 23.4 — 28.6 / 0851 — 29.0 °F

Condition clear or few clouds, partly cloudy or variable, cloudy or overcast, fog, mist or drizzle, showers or light rain, heavy rain, sleet or hail, snow, no data

Wind Speed <1 calm, 2-3 light air movement, 4-7 light breeze, 8-12 gentle breeze, 13-18 moderate breeze, 19-24 fresh breeze, 25-31 strong breeze, 32-38 near gale, >39 gale and above, no data

All Animals:

Observ Method	Trap Name (if applicable)	Trap Type (if applicable)	Trap Number (if applicable)	Lat/Long	Date/Time Trap Set	Date/Time Trap Pulled	Elapsed Hours
1 audio/hand/trap/vis	17	Funnel		See Day 1	0717	11/4	
2 audio/hand/trap/vis	18	Funnel			0721		
3 audio/hand/trap/vis	19	Funnel			0757		
4 audio/hand/trap/vis	20	Funnel			0801		
5 audio/hand/trap/vis	21	Funnel			0806		
6 audio/hand/trap/vis	22	Funnel			0811		
7 audio/hand/trap/vis	23	Funnel			0816		
8 audio/hand/trap/vis	24	Funnel			0820		
9 audio/hand/trap/vis	25	Funnel			0827		
10 audio/hand/trap/vis	26	Solar			0845		
11 audio/hand/trap/vis	27	Solar			0851		
12 audio/hand/trap/vis							

All Animals (continued):

Carapace

Type	Species	Age Category	Disposition	Sex	Length (mm)	Notched	Tissue	Photo	# Photo
1	Red-eared slider	A,J,Mm,L1,L2,H,Em,U	(R) D E C M (F) U X		265.84	Y (N)	Y (N) U	(N)	
2		A,J,Mm,L1,L2,H,Em,U	R D E C M F U X			Y N	Y N U	Y/N	
3		A,J,Mm,L1,L2,H,Em,U	R D E C M F U X			Y N	Y N U	Y/N	
4		A,J,Mm,L1,L2,H,Em,U	R D E C M F U X			Y N	Y N U	Y/N	
5		A,J,Mm,L1,L2,H,Em,U	R D E C M F U X			Y N	Y N U	Y/N	
6		A,J,Mm,L1,L2,H,Em,U	R D E C M F U X			Y N	Y N U	Y/N	
7		A,J,Mm,L1,L2,H,Em,U	R D E C M F U X			Y N	Y N U	Y/N	
8		A,J,Mm,L1,L2,H,Em,U	R D E C M F U X			Y N	Y N U	Y/N	
9		A,J,Mm,L1,L2,H,Em,U	R D E C M F U X			Y N	Y N U	Y/N	
10		A,J,Mm,L1,L2,H,Em,U	R D E C M F U X			Y N	Y N U	Y/N	
11		A,J,Mm,L1,L2,H,Em,U	R D E C M F U X			Y N	Y N U	Y/N	
12		A,J,Mm,L1,L2,H,Em,U	R D E C M F U X			Y N	Y N U	Y/N	

Additional Fields for Pond Turtles:

	Carapace Width (mm)	Carapace Height (mm)	Plastron Length (mm)	Weight (g)	Shell Damaged	Type of Shell Damage	Other ID Markings
1	199.34	24.83	297.54	2,816.4	Y (N)		Y (N)
2					Y N		Y N
3					Y N		Y N
4					Y N		Y N
5					Y N		Y N
6					Y N		Y N
7					Y N		Y N
8					Y N		Y N
9					Y N		Y N
10					Y N		Y N
11					Y N		Y N
12					Y N		Y N

8/28/24

DRAFT

Appendix 2. Paper data form (continued).

	Recapture	ID #	Location Within Habitat	Animal Behavior
1	Y N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
2	Y N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
3	Y N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
4	Y N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
5	Y N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
6	Y N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
7	Y N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
8	Y N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
9	Y N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
10	Y N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
11	Y N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
12	Y N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other

Pond Turtle Trap Information:

Trap Name	Trap Type	Trap Number	Lat/Long	Date/Time Trap Set	Date/Time Trap Pulled	Elapsed Hours

Temperature Loggers Form:

Logger ID	Lat/Long

Notes:

No fish caught. *1 cap- coral
slider caught in Trap #19.

Wind Speed

ID	mph & Indicator
0	<1 calm, smoke rises vertically
1	2-3 light air movement
2	4-7 light breeze
3	8-12 gentle breeze
4	13-18 moderate breeze
5	19-24 fresh breeze
6	25-31 strong breeze
7	32-38 near gale
8	>39 gale and above
9	No data

Sky Code

ID	Description
0	Clear or few clouds
1	Partly cloudy or variable
2	Cloudy or overcast
3	Fog
4	Mist or drizzle
5	Showers or light rain
6	Heavy rain
7	Sleet or hail
8	Snow
9	No data

Animal Age Category

A	Adult
J	Juvenile
Mm	Metamorph
L	Larvae
H	Hatchling
Em	Egg/Egg Mass

Disposition

R	Release
D	Dead
E	Escape
C	Collected

General

Y	Yes
N	No
U	Unknown
X	Not Checked

DRAFT

Appendix 2. Paper data form.

Turtle: Trapping Survey Form

Date 8/29/24 Survey Name Trine Lake Survey Completed ☒ Y ☐ N

Project Code TRV 2024 Observer1 J. Aguayo Obsv1 Task observer/recorder/processor Block

Survey Type visual/trapping Observer2 T. Brattle Obsv2 Task observer/recorder/processor Site

Start Time 0642 Observer3 Obsv3 Task observer/recorder/processor Site Photo ☒ Y ☐ N

End Time 0849 Observer4 Obsv4 Task observer/recorder/processor # photos

Start Lat <u> </u>	End Lat <u> </u>	Site <u> </u>
Start Long <u> </u>	End Long <u> </u>	Length <u> </u>
Start Elev <u> </u>	End Elev <u> </u>	
Datum <u> </u>	Drainage <u> </u>	

Weather:

Air Temp (°C)	<u>60° (6:42 AM) - 65° (8:49)</u>
Water Temp (°C)	<u>63.1 - 78.8 F / 0.82 F - 79.2 F</u>
Condition	<u>clear or few clouds, partly cloudy or variable, cloudy or overcast, fog, mist or drizzle, showers or light rain, heavy rain, sleet or hail, snow, no data</u>
Wind Speed	<u><1 calm, 2-3 light air movement, 4-7 light breeze, 8-12 gentle breeze, 13-18 moderate breeze, 19-24 fresh breeze, 25-31 strong breeze, 32-38 near gale, >39 gale and above, no data</u>

All Animals:

Observ Method	Trap Name (if applicable)	Trap Type (if applicable)	Trap Number (if applicable)	Lat/Long	Date/Time Trap Set	Date/Time Trap Pulled	Elapsed Hours
1 audio/hand/trap/vis	17	Funnel		See Map 1	0703	NA	
2 audio/hand/trap/vis	18	Funnel			0708		
3 audio/hand/trap/vis	19	Funnel			0713		
4 audio/hand/trap/vis	20	Funnel			0718		
5 audio/hand/trap/vis	21	Funnel			0717		
6 audio/hand/trap/vis	22	Funnel			0741		
7 audio/hand/trap/vis	23	Funnel			0747		
8 audio/hand/trap/vis	24	Funnel			0752		
9 audio/hand/trap/vis	25	Funnel			0802		
10 audio/hand/trap/vis	26	Solar			0820		
11 audio/hand/trap/vis	27	Solar			0824		
12 audio/hand/trap/vis							

All Animals (continued):

Type	Species	Age Category	Disposition	Sex	Length (mm)	Notched	Tissue	Photo	# Photo
1	Red-necked	A,J,Mm,L1,L2,H,Em,U	(R) D E C M F U X	(F) U X	229.10	Y (N)	Y (N) U	(Y/N)	
2		A,J,Mm,L1,L2,H,Em,U	R D E C M F U X	F U X		Y N	Y N U	Y/N	
3		A,J,Mm,L1,L2,H,Em,U	R D E C M F U X	F U X		Y N	Y N U	Y/N	
4		A,J,Mm,L1,L2,H,Em,U	R D E C M F U X	F U X		Y N	Y N U	Y/N	
5		A,J,Mm,L1,L2,H,Em,U	R D E C M F U X	F U X		Y N	Y N U	Y/N	
6		A,J,Mm,L1,L2,H,Em,U	R D E C M F U X	F U X		Y N	Y N U	Y/N	
7		A,J,Mm,L1,L2,H,Em,U	R D E C M F U X	F U X		Y N	Y N U	Y/N	
8		A,J,Mm,L1,L2,H,Em,U	R D E C M F U X	F U X		Y N	Y N U	Y/N	
9		A,J,Mm,L1,L2,H,Em,U	R D E C M F U X	F U X		Y N	Y N U	Y/N	
10		A,J,Mm,L1,L2,H,Em,U	R D E C M F U X	F U X		Y N	Y N U	Y/N	
11		A,J,Mm,L1,L2,H,Em,U	R D E C M F U X	F U X		Y N	Y N U	Y/N	
12		A,J,Mm,L1,L2,H,Em,U	R D E C M F U X	F U X		Y N	Y N U	Y/N	

Additional Fields for Pond Turtles:

	Carapace Width (mm)	Carapace Height (mm)	Plastron Length (mm)	Weight (g)	Shell Damag	Type of Shell Damage	Other ID Markings
1	181.67	101.39	215.44	205.6	Y (N)		Y (N)
2					Y N		Y N
3					Y N		Y N
4					Y N		Y N
5					Y N		Y N
6					Y N		Y N
7					Y N		Y N
8					Y N		Y N
9					Y N		Y N
10					Y N		Y N
11					Y N		Y N
12					Y N		Y N

8/28/24

	Recapture	ID #	Location Within Habitat	Animal Behavior
1	Y N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
2	Y N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
3	Y N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
4	Y N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
5	Y N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
6	Y N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
7	Y N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
8	Y N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
9	Y N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
10	Y N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
11	Y N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
12	Y N		pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other

[illegible][illegible]

Notes: x1 red-cored slider caught in
Trap # 20. One large copperhead caught in
Trap # 25. No other catches

ID	mph & Indicator
0	<1 calm, smoke rises vertically
1	2-3 light air movement
2	4-7 light breeze
3	8-12 gentle breeze
4	13-18 moderate breeze
5	19-24 fresh breeze
6	25-31 strong breeze
7	32-38 near gale
8	>39 gale and above
9	No data

ID	Description
0	Clear or few clouds
1	Partly cloudy or variable
2	Cloudy or overcast
3	Fog
4	Mist or drizzle
5	Showers or light rain
6	Heavy rain
7	Sleet or hail
8	Snow
9	No data

A	Adult
J	Juvenile
Mm	Metamorph
L	Larvae
H	Halchling
Em	Egg/Egg Mass

R	Release
D	Dead
E	Escape
C	Collected

Y	Yes
N	No
U	Unknown
X	Not Checked

DRAFT

Appendix 2. Paper data form.

Turtle: Trapping Survey Form

Date 8/30/24 Survey Name Trapping Lnk Survey Completed ☒ Y ☐ N

Project Code 372001225 Observer1 J. A. ... Obsv1 Task observer/recorder/processor Block

Survey Type visual/trapping Observer2 T. ... Obsv2 Task observer/recorder/processor Site

Start Time 0637 Observer3 Obsv3 Task observer/recorder/processor Site Photo ☒ Y ☐ N

End Time 0915 Observer4 Obsv4 Task observer/recorder/processor # photos

Start Lat	End Lat	
Start Long	End Long	Site
Start Elev	End Elev	Length
Datum	Drainage	

Weather:

Air Temp (°C)	<u>60°F (6:37am) - 68° (0920am)</u>
Water Temp (°C)	<u>71.7 - 78.8°F / 0711 - 78.5°F</u>
Condition	<u>clear or few clouds, partly cloudy or variable, cloudy or overcast, fog, mist or drizzle, showers or light rain, heavy rain, sleet or hail, snow, no data</u>
Wind Speed	<u><1 calm, 2-3 light air movement, 4-7 light breeze, 8-12 gentle breeze, 13-18 moderate breeze, 19-24 fresh breeze, 25-31 strong breeze, 32-38 near gale, >39 gale and above, no data</u>

All Animals:

Observ Method	Trap Name (if applicable)	Trap Type (if applicable)	Trap Number (if applicable)	Lat/Long	Date/Time Trap Set	Date/Time Trap Pulled	Elapsed Hours
1 audio/hand/trap/vis	17	Kumuk		See Day 1	0711	0722	
2 audio/hand/trap/vis	18	Kumuk				0728	
3 audio/hand/trap/vis	19	Kumuk				0747	
4 audio/hand/trap/vis	20	Kumuk				0817	
5 audio/hand/trap/vis	21	Kumuk				0826	
6 audio/hand/trap/vis	22	Kumuk				0833	
7 audio/hand/trap/vis	23	Kumuk				0847	
8 audio/hand/trap/vis	24	Kumuk				0847	
9 audio/hand/trap/vis	25	Kumuk				0901	
10 audio/hand/trap/vis	26	Solar				0952	
11 audio/hand/trap/vis	27	Solar				0956	
12 audio/hand/trap/vis							

All Animals (continued):

Type	Species	Age Category	Disposition	Sex	Length (mm)	Notched	Tissue	Photo	# Photo
1	Red-crested scud	A,J,Mm,L1,L2,H,Em,U	(R) D E C M F U X	(R) U X	146.10	Y (N)	Y (N)	U	Y/N
2		A,J,Mm,L1,L2,H,Em,U	R D E C M F U X	F U X		Y N	Y N	U	Y/N
3		A,J,Mm,L1,L2,H,Em,U	R D E C M F U X	F U X		Y N	Y N	U	Y/N
4		A,J,Mm,L1,L2,H,Em,U	R D E C M F U X	F U X		Y N	Y N	U	Y/N
5		A,J,Mm,L1,L2,H,Em,U	R D E C M F U X	F U X		Y N	Y N	U	Y/N
6		A,J,Mm,L1,L2,H,Em,U	R D E C M F U X	F U X		Y N	Y N	U	Y/N
7		A,J,Mm,L1,L2,H,Em,U	R D E C M F U X	F U X		Y N	Y N	U	Y/N
8		A,J,Mm,L1,L2,H,Em,U	R D E C M F U X	F U X		Y N	Y N	U	Y/N
9		A,J,Mm,L1,L2,H,Em,U	R D E C M F U X	F U X		Y N	Y N	U	Y/N
10		A,J,Mm,L1,L2,H,Em,U	R D E C M F U X	F U X		Y N	Y N	U	Y/N
11		A,J,Mm,L1,L2,H,Em,U	R D E C M F U X	F U X		Y N	Y N	U	Y/N
12		A,J,Mm,L1,L2,H,Em,U	R D E C M F U X	F U X		Y N	Y N	U	Y/N

Additional Fields for Pond Turtles:

	Carapace Width (mm)	Carapace Height (mm)	Plastron Length (mm)	Weight (g)	Shell Damage	Type of Shell Damage	Other ID Markings
1	114.68	57.12	136.33	480.7	Y (N)		Y (N)
2					Y N		Y N
3					Y N		Y N
4					Y N		Y N
5					Y N		Y N
6					Y N		Y N
7					Y N		Y N
8					Y N		Y N
9					Y N		Y N
10					Y N		Y N
11					Y N		Y N
12					Y N		Y N

8/30/24

Appendix 2. Paper data form (continued).

	Recapture	ID #	Location Within Habitat	Animal Behavior
1	Y	N	pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
2	Y	N	pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
3	Y	N	pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
4	Y	N	pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
5	Y	N	pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
6	Y	N	pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
7	Y	N	pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
8	Y	N	pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
9	Y	N	pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
10	Y	N	pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
11	Y	N	pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other
12	Y	N	pool, run, riffle, bank, upland, splashzone, other	calling, basking, foraging, mating, hiding, other

Pond Turtle Trap Information:

[illegible]

Temperature Loggers Form:

[illegible]

Notes:

es: x1 redhead slider in Trap #18.
x1 Bluegill in Trap #19.
x1 catfish in Trap #25.
No other catches

Wind Speed

ID	mph & Indicator
0	<1 calm, smoke rises vertically
1	2-3 light air movement
2	4-7 light breeze
3	8-12 gentle breeze
4	13-18 moderate breeze
5	19-24 fresh breeze
6	25-31 strong breeze
7	32-38 near gale
8	>39 gale and above
9	No data

Sky Code

ID	Description
0	Clear or few clouds
1	Partly cloudy or variable
2	Cloudy or overcast
3	Fog
4	Mist or drizzle
5	Showers or light rain
6	Heavy rain
7	Sleet or hail
8	Snow
9	No data

Animal Age Category

A	Adult
J	Juvenile
Mm	Melamorph
L	Larvae
H	Hatchling
Em	Egg/Egg Mass

Disposition

R	Release
D	Dead
E	Escape
G	Collected

General

Y	Yes
N	No
U	Unknown
X	Not Checked

APPENDIX J

COASTAL CALIFORNIA GNATCATCHER SURVEYS

August 24, 2020

Stacey Love
Recovery Permit Coordinator
U.S. Fish and Wildlife Service
2177 Salk Avenue, Suite 250
Carlsbad, California 92008

VIA EMAIL
Stacey_Love@fws.gov

Subject: Results of Focused Presence/Absence Surveys for the Coastal California Gnatcatcher for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California

Dear Ms. Love:

This Letter Report presents the results of focused surveys for the coastal California gnatcatcher (*Poliophtila californica californica*) for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project (hereinafter referred to as the “project site”) located in Orange County, California. The purpose of the surveys was to determine the presence or absence of the coastal California gnatcatcher on or immediately adjacent to the project site. Surveys were conducted by a Biologist who holds the necessary Federal Endangered Species Act survey permit and were completed according to the guidelines established by the U.S. Fish and Wildlife Service (USFWS). Notification of the intent to conduct protocol-level surveys was submitted to the USFWS on April 8, 2020.

PROJECT LOCATION AND DESCRIPTION

The Irvine Ranch Water District (IRWD) and Serrano Water District are jointly proposing to abandon the existing Santiago Creek Dam outlet tower and construct a new inclined outlet structure to be located on the left abutment of the existing dam. Additionally, based on feedback from the Department of Safety of Dams, the dam spillway requires structural improvements. Existing structures include the dam crest, the intake tower in Irvine Lake, the spillway channel, the control houses, the energy dissipater structure, the aboveground outlet pipe, and the dam crest access road. The project is currently in the early design phase but would be located within the survey area provided by IRWD.

Santiago Creek Dam is located at the north end of Irvine Lake in unincorporated Orange County, California (Exhibit 1). It is south of State Route (SR) 261 and east of SR-241 and Santiago Canyon Road. The project site is depicted on the U.S. Geological Survey’s Black Star Canyon 7.5-minute quadrangle (Exhibit 2). Topography in the center of the survey area is relatively flat, with rolling hills to the east and a steep cliff to the west. Elevations range from approximately 657 to 898 feet above mean sea level (msl). Santiago Creek, a blue-line stream, occurs in the survey area. Surrounding land uses primarily consist of undeveloped open space. Irvine Regional Park is located northwest of SR-241; Limestone Canyon Regional Park is located south of Santiago Canyon Road; and Oak Canyon Park is located at the southeast end of Irvine Lake. Residential development is located west of SR-241.

5 Hutton Centre Drive
Suite 300
Santa Ana, CA 92707

Tel 714.751.7373
Fax 714.545.8883
www.Psomas.com

Stacey Love
August 24, 2020
Page 2

The project site is located in the Central/Coastal Subregion of the Natural Communities Conservation Plan/Habitat Conservation Plan (NCCP/HCP). The purpose of this plan is to provide regional protection and recovery of multiple species and habitat while allowing compatible land use and appropriate development. IRWD is a participating jurisdiction and, as such, will comply with the terms of the NCCP/HCP Implementation Agreement.

The following vegetation types and other areas occur within the project site: sagebrush scrub, disturbed sagebrush scrub, disturbed floodplain sage scrub, toyon – sumac chaparral, annual grassland, ruderal, southern willow scrub, mulefat scrub, coast live oak woodland, western sycamore, cliff, open water, ornamental, developed, and disturbed (Exhibit 3).

SURVEY AREA

The survey area for the gnatcatcher surveys includes all suitable habitat (i.e., sagebrush scrub, disturbed sagebrush scrub, and disturbed floodplain sagebrush scrub) on the project site and within a 500-foot buffer around the tentative impact footprint. The Biologist reduced the survey area boundary where offsite areas were not accessible due to property boundaries (i.e., Santiago Landfill), topography (i.e., cliff), and where there was no suitable habitat (i.e., Irvine Lake) (Exhibit 4).

Specifically, coastal California gnatcatcher surveys were conducted in portions of the survey area that contained suitable sagebrush scrub habitat of appropriate size and stature. Sagebrush scrub habitats were distributed throughout the survey area and on the surrounding slopes. These habitat types were generally dominated by California sagebrush (*Artemisia californica*), leafy California buckwheat (*Eriogonum fasciculatum* var. *foliolosum*), deerweed (*Acmispon glaber*), laurel sumac (*Malosma laurina*), lemonade berry (*Rhus integrifolia*), scaly scale-broom (*Lepidospartum squamatum*), toyon (*Heteromeles arbutifolia*), and California brickellbush (*Brickellia californica*). Openings between shrubs have native herbs, such as erect plantain (*Plantago erecta*) and narrow-toothed pectocarya (*Pectocarya linearis* ssp. *ferocula*) as well as non-native fennel (*Foeniculum vulgare*) and non-native grasses. Site photographs of representative habitat in the survey area are provided in Attachment A.

BACKGROUND

The coastal California gnatcatcher is a federally listed Threatened species and a California Species of Special Concern. This species occurs in most of Baja California, Mexico's arid regions, but this subspecies is extremely localized in the United States, where it predominantly occurs in coastal regions of highly urbanized Los Angeles, Orange, Riverside, and San Diego Counties (Atwood 1992). In California, this subspecies is a resident of coastal sage scrub vegetation types. The breeding season for the coastal California gnatcatcher ranges from late February to August. Nests are generally placed in a shrub about three feet above ground. Brood parasitism by brown-headed cowbirds (*Molothrus ater*) and loss of habitat to urban development have been cited as causes of coastal California gnatcatcher population decline (Unitt 1984; Atwood 1990).

Taxonomic studies indicate that the California gnatcatcher consists of four subspecies, which extend from southwestern California to southern Baja California, Mexico. The coastal California gnatcatcher, the northernmost gnatcatcher subspecies, is restricted to lowland areas from central Ventura County through Los Angeles, San Bernardino, Riverside, Orange, and San Diego Counties to the Baja California, Mexico, border (Atwood and Lerman 2006; Mellink and Rea 1994). The USFWS has rejected multiple petitions claiming that the coastal California gnatcatcher should be delisted because it is not a valid subspecies (USFWS 2011, 2016).

Stacey Love
 August 24, 2020
 Page 3

The coastal California gnatcatcher has been recorded from sea level to approximately 3,000 feet above msl (USFWS 2003); however, more than 90 percent of gnatcatcher records are from between sea level and 820 feet above msl along the coast and between sea level and 1,800 feet above msl inland (Atwood and Bolsinger 1992). USFWS estimates regarding the population size of the coastal California gnatcatcher in Southern California have been about 3,000 pairs (Atwood and Bontrager 2001). In the *5-Year Review: Summary and Evaluation* for the gnatcatcher, the USFWS cited a study estimating that there were approximately 1,324 gnatcatcher pairs over approximately 111,000 acres of public and quasi-public lands in Orange and San Diego Counties (Winchell and Doherty 2008). Because the Winchell and Doherty study covered only a portion of the U.S. range (focusing on the coast and limited to one year), this study cannot extrapolate beyond the sampling region; however, the USFWS states that it is likely more gnatcatchers are in the U.S. portion of the range than was suggested by earlier estimates (USFWS 2010).

The coastal California gnatcatcher typically occurs within coastal and inland sage scrub vegetation types, which often occur in a patchy distribution pattern throughout the gnatcatcher's range. Coastal California gnatcatchers also use chaparral, grassland, and riparian habitats that are in proximity to sage scrub for dispersal and foraging (Atwood et al. 1998; Campbell et al. 1998; USFWS 2003). Availability of these non-sage scrub areas is essential during certain times of the year, particularly during drought conditions or for dispersal, foraging, or nesting (USFWS 2003).

The USFWS published a Revised Final Rule designating Critical Habitat for the coastal California gnatcatcher in 2007 (USFWS 2007). This revised rule designates 197,303 acres of Critical Habitat in San Diego, Orange, Riverside, San Bernardino, Los Angeles, and Ventura Counties. The survey area is not located within the designated critical habitat for the coastal California gnatcatcher.

SURVEY METHODS

The USFWS's survey protocol for the coastal California gnatcatcher requires three visits, conducted at least one week apart, to all potentially occupied habitat areas for surveys within an NCCP area (USFWS 1997a, 1997b). All visits must be conducted between 6 AM and 12 PM, and no more than 100 acres of suitable habitat may be surveyed per visit. Psomas Senior Biologist Lindsay Messett (USFWS Permit No. TE 067064-3) conducted all focused surveys for coastal California gnatcatcher. Surveys were conducted on April 30, May 27, and June 25, 2020.

Ms. Messett avoided weather conditions that were too cold (i.e., below 55 degrees Fahrenheit [$^{\circ}$ F]), too hot (i.e., above 95 $^{\circ}$ F), or too windy (i.e., wind speed greater than 15 miles per hour) to comply with USFWS survey protocol requirements. A summary of weather conditions during each survey is provided in Table 1, below. Ms. Messett conducted the surveys by slowly walking through all appropriate habitats while listening and watching for gnatcatcher activity and by using a combination of recordings of gnatcatcher vocalizations and "pishing" sounds to elicit responses from any gnatcatchers present. The frequency of vocalization playback and "pishing" varied depending on conditions such as habitat patch size, topography in each area, and ambient noise conditions. All wildlife species detected during the surveys were recorded (Attachment B).

TABLE 1
SUMMARY OF COASTAL CALIFORNIA GNATCATCHER SURVEYS

Survey Number	Date	Time (Start/End)	Surveyor	Weather Conditions			Gnatcatchers Observed and/or Detected
				Temperature (°F) (Start/End)	Wind (mph) (Start/End)	Cloud Cover (%) (Start/End)	
1	April 30, 2020	0715/1030	Messett	65/70	0–1/0–1	100/50	One male California gnatcatcher was observed
2	May 27, 2020	0815/1140	Messett	65/76	0–1/0–1	10/Clear	A pair of California gnatcatchers was observed incubating a nest
3	June 25, 2020	0650/1000	Messett	68/77	0–1/0–1	90/40	A family group of California gnatcatchers (pair and three fledglings) was observed foraging together
°F: degrees Fahrenheit; mph: miles per hour; %: percent.							

SURVEY RESULTS

One California gnatcatcher territory was observed in the survey area (Exhibit 4). A male California gnatcatcher was observed foraging alone in sagebrush scrub located central portion of the survey area during the first survey on April 30, 2020. It briefly responded to recorded playback and continued to forage in the northwestern portion of the survey area. On the second survey, a pair was observed in the northwestern portion of the survey area. During this second survey, a female California gnatcatcher was initially observed foraging alone in the northwest corner of the survey area. Ms. Messett followed the female and after approximately 30 minutes, she observed a nest exchange with the female entering and the male exiting a large scalebroom (*Lepidospartum squamatum*) shrub located just outside of the northern project site boundary. Both the male and female were observed incubating the nest. During the third survey on June 25, 2020, Ms. Messett observed a family group with at least three fledglings foraging together in sagebrush scrub, south of the nest location. The recent fledglings were observed displaying food begging behavior while the adults were observed feeding them. During subsequent focused surveys for least Bell's vireo, the pair was observed foraging in the northwestern portion of the survey area and a juvenile was observed foraging alone in the central portion of the survey area.

Stacey Love
August 24, 2020
Page 5


OTHER OBSERVATIONS


Two other special status species were observed and/or detected in the survey area during the surveys: southern California rufous-crowned sparrow (*Aimophila ruficeps canescens*) and coastal cactus wren (*Campylorhynchus brunneicapillus sandiegensis*) (Exhibit 4). Southern California rufous-crowned sparrow is a California Department of Fish and Wildlife (CDFW) Watch List species and the coastal cactus wren is a California Species of Special Concern. These species are tracked by the CDFW's California Natural Diversity Database (CNDDDB). CNDDDB forms are included in Attachment C and will be submitted online by Ms. Messett.

Psomas appreciates the opportunity to assist on this project. If you have any comments or questions, please contact Amber Heredia (Amber.Heredia@psomas.com) or Lindsay Messett (Lindsay.Messett@psomas.com).


Sincerely,

P S O M A S


Amber O. Heredia
Senior Project Manager


Lindsay A. Messett, CWB®
Senior Biologist

I certify that the information in this survey report and enclosed exhibits fully and accurately present my work.


Lindsay A. Messett, CWB®
Senior Biologist
(TE067064-3)

Attachments: Exhibits 1–4
A – Site Photographs
B – Wildlife Compendium
C – CNDDDB Forms

cc: Jo Ann Corey, corey@irwd.com
Jacob Moeder, Moeder@irwd.com
Christine.Beck@wildlife.ca.gov

Stacey Love
August 24, 2020
Page 6

REFERENCES

- Atwood, J.L. 1992. Rare, Local, Little-Known, and Declining North American Breeders – A Closer Look. *Birding* 25: 228–233. Colorado Springs, CO: American Birding Association.
- . 1990. *Status Review of the California Gnatcatcher (*Poliophtila californica*)*. Manomet, MA: Manomet Bird Observatory.
- Atwood, J.L. and J.S. Bolsinger. 1992. Elevational Distribution of the California Gnatcatchers in the United States. *Journal of Field Ornithology* 63(2):159–168. Waco, TX: Ornithological Societies of North America.
- Atwood, J. L. and D.R. Bontrager. 2001. California Gnatcatcher (*Poliophtila californica*). *The Birds of North America*, No. 574 (A. Poole and F. Gill, Eds.). Philadelphia, PA: The Academy of Natural Sciences.
- Atwood, J.L., D.R. Bontrager, and A.L. Gorospe. 1998. Use of Refugia by California Gnatcatchers Displaced by Habitat Loss. *Western Birds* 29: 406–412. San Diego, CA: Western Field Ornithologists.
- Atwood, J.L. and S.B. Lerman. 2006. Family Poliophtilidae (Gnatcatchers) (pp. 350–377). *Handbook of the Birds of the World. Vol. 11: Old World Flycatchers to Old World Warblers* (J. del Hoyo, A. Elliott, and D.A. Christie, Eds.). Barcelona, Spain: Lynx Ediciones.
- Campbell, K. F., R.A. Erickson, W.E. Haas, and M.A. Patten. 1998. California Gnatcatcher Use of Habitats Other Than Coastal Sage Scrub: Conservation and Management Implications. *Western Birds* 29: 421–433. San Diego, CA: Western Field Ornithologists.
- Mellink, E. and A.M. Rea. 1994. Taxonomic Status of the California Gnatcatchers of Northwestern Baja California, Mexico. *Western Birds* 25: 50–62. San Diego, CA: Western Field Ornithologists.
- Unitt, P. 1984. *The Birds of San Diego County (Memoir 13)*. San Diego, CA: San Diego Society of Natural History.
- U.S. Fish and Wildlife Service (USFWS). 2016 (August 31). Endangered and Threatened Wildlife and Plants; 12-Month Finding on a Petition to Delist the Coastal California Gnatcatcher. *Federal Register* 81(169): 59952–59975. Washington, D.C.: USFWS. <https://www.gpo.gov/fdsys/pkg/FR-2016-08-31/pdf/2016-20864.pdf>.
- . 2011 (October 26). Endangered and Threatened Wildlife and Plants; 90-Day Finding on a Petition to Delist the Coastal California Gnatcatcher as Threatened. *Federal Register* 76(207): 66255–66260. Washington, D.C.: USFWS. <http://www.gpo.gov/fdsys/pkg/FR-2011-10-26/pdf/2011-27644.pdf>.
- . 2010 (September 29). *Coastal California Gnatcatcher (*Poliophtila californica californica*) 5-Year Review: Summary and Evaluation*. Carlsbad, CA: USFWS, Carlsbad Field Office.
- . 2007 (December 19). Endangered and Threatened Wildlife and Plants; Revised Designation of Critical Habitat for the Coastal California Gnatcatcher (*Poliophtila californica californica*); Final Rule. *Federal Register* 72(243): 72009–72213. Washington, D.C.: USFWS.

Stacey Love
August 24, 2020
Page 7

- . 2003 (April 24). Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Coastal California Gnatcatcher (*Poliophtila californica californica*) and Determination of Distinct Vertebrate Population Segment for the California Gnatcatcher (*Poliophtila californica*); Proposed Rule. *Federal Register* 68(79): 20227–20312. Washington, D.C.: USFWS.
<https://www.fws.gov/policy/library/2003/03-9435.html>.
 - . 1997a (February 28). *Coastal California Gnatcatcher (Poliophtila californica californica) Presence/Absence Survey Guidelines*. Washington, D.C.: USFWS.
 - . 1997b (July 28). *Coastal California Gnatcatcher (Poliophtila californica californica) Presence/Absence Survey Protocol*. Washington, D.C.: USFWS.
- Winchell, C.S., and P.F. Doherty. 2008. Using California Gnatcatcher to Test Underlying Models of Habitat Conservation Plans. *Journal of Wildlife Management* 72: 1322–1327. Flagstaff, AZ: The Wildlife Society.



Project Location

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

Exhibit 1

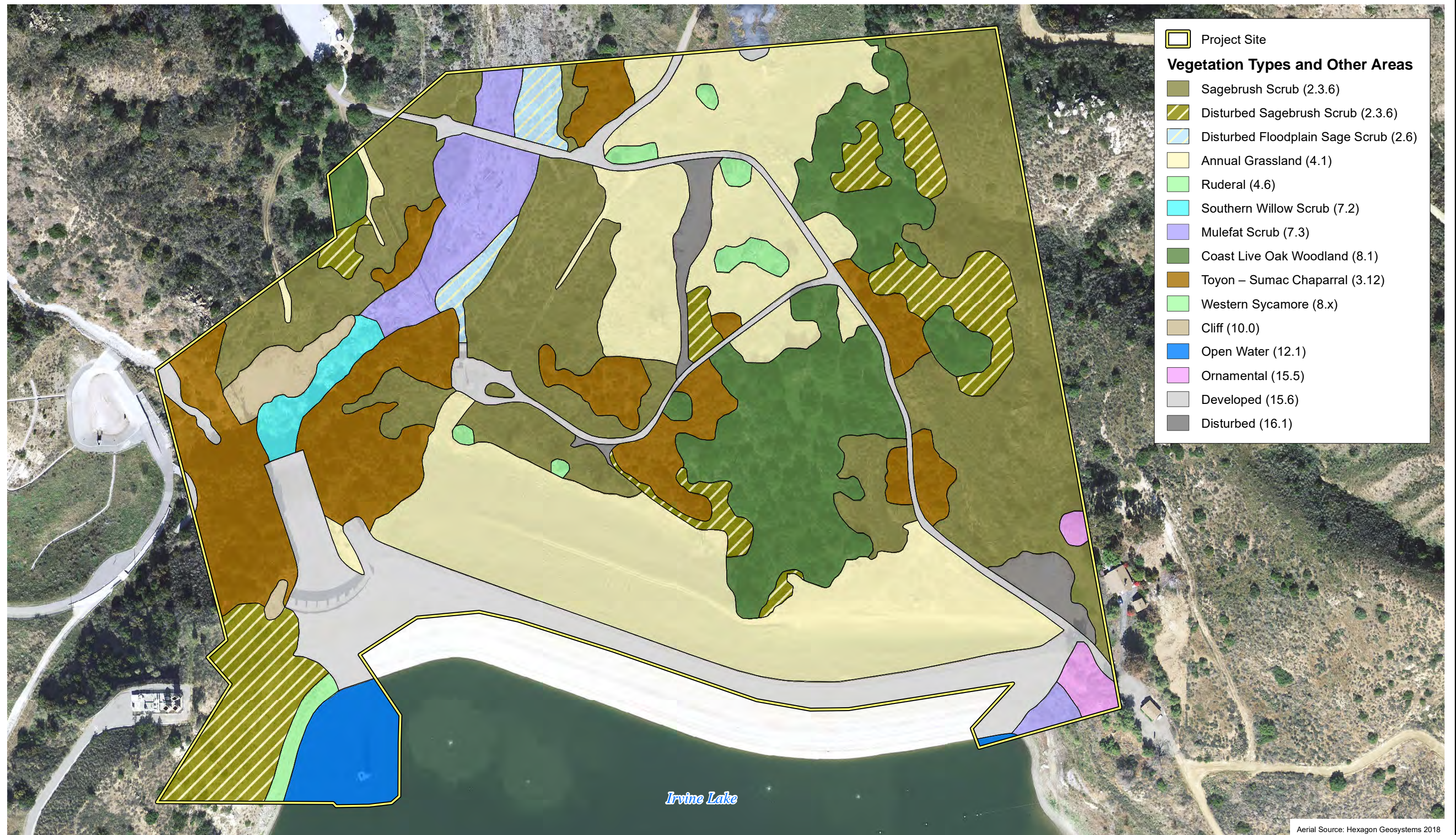


1,100 550 0 1,100
Feet



(Rev: 8-18-2020 RMB) R:\Projects\IRW_IRWD\3IRW000905\Graphics\CAGN\ex_LV_RL.pdf

D:\Projects\3\RW00905\MXD\CAGN\ex_Vegetation_20200818.mxd



Vegetation Types and Other Areas

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

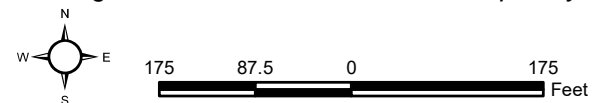


Exhibit 3



(Rev: 08/18/2020 RMB) R:\Projects\IRW_IRWD\3\RW000905\Graphics\CAGN\ex_Vegetation.pdf

D:\Projects\3IRW00905\MXD\CAGN\ex_BiologicalResources_20200818.mxd



Survey Area and Biological Resources

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

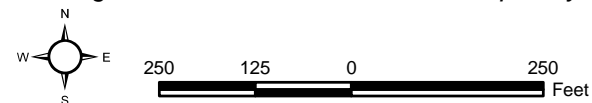


Exhibit 4



(Rev: 08/24/2020 RMB) R:\Projects\IRW_IRWD\3IRW000905\Graphics\CAGN\ex_SurveyArea_BiologicalResources.pdf

ATTACHMENT A
SITE PHOTOGRAPHS



Photo 1: Sagebrush scrub located in the eastern portion of the survey area, looking east.



Photo 2: Sagebrush scrub located in the far western portion of the survey area, looking southwest.

D:\Projects\3IRW00905\GRAPHICS\CAGN\AttA-1_SitePhotographs.ai

Site Photographs

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

Attachment A-1





Photo 3: Sagebrush scrub located in the central portion of the survey area, looking south.



Photo 4: Coastal California gnatcatcher nest location in the northwestern portion of the survey area, looking north. Red circle shows nest location.

Site Photographs

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

Attachment A-2



ATTACHMENT B
WILDLIFE COMPENDIUM

WILDLIFE SPECIES DETECTED DURING THE SURVEYS

Species	
Scientific Name	Common Name
BIRDS	
ANATIDAE - SWAN, GOOSE, AND DUCK FAMILY	
<i>Branta canadensis</i>	Canada goose
ODONTOPHORIDAE - NEW WORLD QUAIL FAMILY	
<i>Callipepla californica</i>	California quail
COLUMBIDAE - PIGEON AND DOVE FAMILY	
<i>Columba livia</i> *	rock pigeon
<i>Zenaidura macroura</i>	mourning dove
CUCULIDAE - CUCKOO AND ROADRUNNER FAMILY	
<i>Geococcyx californianus</i>	greater roadrunner
CAPRIMULGIDAE - NIGHTJAR FAMILY	
<i>Chordeiles acutipennis</i>	lesser nighthawk
TROCHILIDAE - HUMMINGBIRD FAMILY	
<i>Calypte anna</i>	Anna's hummingbird
<i>Selasphorus rufus</i>	rufous hummingbird
CATHARTIDAE - NEW WORLD VULTURE FAMILY	
<i>Cathartes aura</i>	turkey vulture
ACCIPITRIDAE - HAWK FAMILY	
<i>Buteo jamaicensis</i>	red-tailed hawk
STRIGIDAE - TYPICAL OWL FAMILY	
<i>Megascops kennicottii</i>	western screech-owl
<i>Bubo virginianus</i>	great horned owl
PICIDAE - WOODPECKER FAMILY	
<i>Melanerpes formicivorus</i>	acorn woodpecker
PSITTACIDAE - PARROT FAMILY	
<i>Amazona viridigenalis</i> *	red-crowned parrot*
TYRANNIDAE - TYRANT FLYCATCHER FAMILY	
<i>Myiarchus cinerascens</i>	ash-throated flycatcher
<i>Tyrannus vociferans</i>	Cassin's kingbird
VIREONIDAE - VIREO FAMILY	
<i>Vireo gilvus</i>	warbling vireo
CORVIDAE - JAY AND CROW FAMILY	
<i>Aphelocoma californica</i>	California scrub-jay
<i>Corvus brachyrhynchos</i>	American crow
HIRUNDINIDAE - SWALLOW FAMILY	
<i>Petrochelidon pyrrhonota</i>	cliff swallow
<i>Hirundo rustica</i>	barn swallow
AEGITHALIDAE - BUSHTIT FAMILY	
<i>Psaltiriparus minimus</i>	bushtit
TROGLODYTIDAE - WREN FAMILY	
<i>Troglodytes aedon</i>	house wren
<i>Thryomanes bewickii</i>	Bewick's wren
<i>Campylorhynchus brunneicapillus sandiegensis</i>	coastal cactus wren

WILDLIFE SPECIES DETECTED DURING THE SURVEYS

Species	
Scientific Name	Common Name
POLIOPTILIDAE - GNATCATCHER FAMILY	
<i>Poliioptila caerulea</i>	blue-gray gnatcatcher
<i>Poliioptila californica</i>	California gnatcatcher
SYLVIIDAE - SILVIID WARBLERS FAMILY	
<i>Chamaea fasciata</i>	wrentit
MIMIDAE - MOCKINGBIRD AND THRASHER FAMILY	
<i>Toxostoma redivivum</i>	California thrasher
<i>Mimus polyglottos</i>	northern mockingbird
STURNIDAE - STARLING FAMILY	
<i>Sturnus vulgaris*</i>	European starling*
FRINGILLIDAE - FINCH FAMILY	
<i>Haemorhous mexicanus</i>	house finch
<i>Spinus psaltria</i>	lesser goldfinch
PASSERELLIDAE - NEW WORLD SPARROW FAMILY	
<i>Pipilo maculatus</i>	spotted towhee
<i>Aimophila ruficeps</i>	rufous-crowned sparrow
<i>Melospiza crissalis</i>	California towhee
<i>Melospiza melodia</i>	song sparrow
ICTERIDAE - BLACKBIRDS AND ORIOLES	
<i>Icterus cucullatus</i>	hooded oriole
PARULIDAE - WOOD-WARBLER FAMILY	
<i>Geothlypis trichas</i>	common yellowthroat
<i>Cardellina pusilla</i>	Wilson's warbler
CARDINALIDAE - CARDINALS AND ALLIES	
<i>Piranga ludoviciana</i>	western tanager
<i>Pheucticus melanocephalus</i>	black-headed grosbeak
MAMMALS	
SCIURIDAE - SQUIRREL FAMILY	
<i>Otospermophilus beecheyi</i>	California ground squirrel
LEPORIDAE - HARE AND RABBIT FAMILY	
<i>Sylvilagus audubonii</i>	desert cottontail
* Non-native	

ATTACHMENT C
CNDDB FORMS

CNDDDB Online Field Survey Form Report



California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/



Source code MES20F0004
Quad code 3311776
Occ. no. _____
EO index no. _____
Map index no. _____

This data has been reported to the CNDDDB, but may not have been evaluated by the CNDDDB staff

Scientific name: *Polioptila californica californica*

Common name: coastal California gnatcatcher

Date of field work (mm-dd-yyyy): 05-27-2020

Comment about field work date(s): Observed a nest location on this day, also observed the pair and fledglings on subsequent surveys.

OBSERVER INFORMATION

Observer: Lindsay A. Messett

Affiliation: Psomas

Address: 7236 E Stearns Street , Long Beach, CA 90815

Email: lindsay.messett@psomas.com

Phone: (562) 833-4276

Other observers:

DETERMINATION

Keyed in:

Compared w/ specimen at:

Compared w/ image in:

By another person:

Other: Familiarity with the species

Identification explanation: Identified by visual and aural vocalizations

Identification confidence: Very confident

Species found: Yes If not found, why not?

Level of survey effort: Focused presence/absence survey

Total number of individuals: 5

Collection? No

Collection number:

Museum/Herbarium:

ANIMAL INFORMATION

How was the detection made? Heard calling then seen

Number detected in each age class:

2

3

adults

juveniles

larvae

egg mass

unknown

Age class comment: Observed the pair incubating on a nest, then later they were observed traveling with recent fledglings and later one juvenile was incidentally observed (assumed to be disbursed from the same family group)

Bird site use:

- ☒ Nesting ☐ Rookery ☐ Nesting colony ☐ Burrow site ☐ Lek
☐ Non-breeding (over-wintering) ☐ Communal roost ☐ Other

Site use description: Used for nesting and foraging

What was the observed behavior? Observed male foraging alone. Observed female foraging alone then observed a nest exchange with the male. Later I observed the pair feeding recent fledglings. During a different survey i also incidentally observed a juvenile foraging alone.

Describe any evidence of reproduction: Observed a nest, as well as fledglings and a juvenile

SITE INFORMATION

Habitat description: sagebrush scrub

Slope:

Land owner/manager: Private- Irvine Ranch

Aspect:

Site condition + population viability: Good

Immediate & surrounding land use: Open space, Santiago Dam and Irvine Regional Park

Visible disturbances:

Threats:

General comments:

MAP INFORMATION

ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTM E NAD83	UTM N NAD83	UTM Zone
	Orange	Black Star Canyon	660	33.78942	-117.72637	432756	3739045	11
1	Public Land Survey	Feature Comment						
	S T04S R08W 28	coastal California gnatcatcher nest location						

The mapped feature is accurate within: 10 m

Source of mapped feature: [Iphone Avenza Maps](#)

Mapping notes:

Location/directions comments:

Attachment(s):

CNDDDB Online Field Survey Form Report



California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/



Source code MES20F0005
Quad code 3311776
Occ. no. _____
EO index no. _____
Map index no. _____

This data has been reported to the CNDDDB, but may not have been evaluated by the CNDDDB staff

Scientific name: *Aimophila ruficeps canescens*

Common name: southern California rufous-crowned sparrow

Date of field work (mm-dd-yyyy): 04-30-2020

Comment about field work date(s):

OBSERVER INFORMATION

Observer: Lindsay A. Messett

Affiliation: Psomas

Address: 7236 E Stearns Street , Long Beach, CA 90815

Email: lindsay.messett@psomas.com

Phone: (562) 833-4276

Other observers:

DETERMINATION

Keyed in:

Compared w/ specimen at:

Compared w/ image in:

By another person:

Other: familiarity with the species

Identification explanation:

Identification confidence: Very confident

Species found: Yes If not found, why not?

Level of survey effort: Focused presence/absence survey for coastal California gnatcatcher

Total number of individuals: 4

Collection? No

Collection number:

Museum/Herbarium:

ANIMAL INFORMATION

How was the detection made? Heard singing then seen

Number detected in each age class:

4

adults

juveniles

larvae

egg mass

unknown

Age class comment:

Bird site use:

- ☒ Nesting ☐ Rookery ☐ Nesting colony ☐ Burrow site ☐ Lek
☐ Non-breeding (over-wintering) ☐ Communal roost ☐ Other

Site use description:

What was the observed behavior? 2 pairs were observed on a slope of sagebrush scrub over the course of 3 focused gnatcatcher surveys. The pairs were observed in the same general areas each survey and were observed carrying either food or nesting material

Describe any evidence of reproduction: Observed carrying food and/or nesting material

SITE INFORMATION

Habitat description: Sagebrush scrub vegetation on a steep, rocky slope

Slope:

Land owner/manager: Private - Irvine Ranch

Aspect:

Site condition + population viability: Good

Immediate & surrounding land use: Open space, Santiago Dam and Irvine Regional Park

Visible disturbances:

Threats:

General comments:

MAP INFORMATION

ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTM E NAD83	UTM N NAD83	UTM Zone
	Orange	Black Star Canyon	760	33.78824	-117.72326	433043	3738912	11
1	Public Land Survey	Feature Comment						
	S T04S R08W 28							

The mapped feature is accurate within: 10 m

Source of mapped feature: [iphone avenza maps](#)

Mapping notes:

Location/directions comments:

Attachment(s):

CNDDDB Online Field Survey Form Report



California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/



Source code MES20F0006
Quad code 3311776
Occ. no. _____
EO index no. _____
Map index no. _____

This data has been reported to the CNDDDB, but may not have been evaluated by the CNDDDB staff

Scientific name: *Campylorhynchus brunneicapillus sandiegensis*

Common name: coastal cactus wren

Date of field work (mm-dd-yyyy): 04-30-2020

Comment about field work date(s):

OBSERVER INFORMATION

Observer: Lindsay A. Messett

Affiliation: Psomas

Address: 7236 E Stearns Street , Long Beach, CA 90815

Email: lindsay.messett@psomas.com

Phone: (562) 833-4276

Other observers:

DETERMINATION

Keyed in:

Compared w/ specimen at:

Compared w/ image in:

By another person:

Other: Familiarity with the species

Identification explanation:

Identification confidence: Very confident

Species found: Yes If not found, why not?

Level of survey effort: Observed while conducting focused presence/absence survey for coastal California gnatcatcher survey

Total number of individuals: 2

Collection? No

Collection number:

Museum/Herbarium:

ANIMAL INFORMATION

How was the detection made? Heard calling then seen

Number detected in each age class:

1

adults

juveniles

larvae

egg mass

unknown

Age class comment:

Bird site use:

- ☒ Nesting ☐ Rookery ☐ Nesting colony ☐ Burrow site ☐ Lek
☐ Non-breeding (over-wintering) ☐ Communal roost ☒ Other

Site use description: [nesting and foraging](#)

What was the observed behavior? [perched on top of prickly pear cactus calling](#)

Describe any evidence of reproduction: [Observed a nest located just outside of the survey area](#)

SITE INFORMATION

Habitat description: [Sagebrush scrub](#)

Slope:

Land owner/manager: [Private - Irvine Ranch](#)

Aspect:

Site condition + population viability: [Good](#)

Immediate & surrounding land use: [Open space, Santiago Dam, Irvine Regional Park](#)

Visible disturbances:

Threats:

General comments:

MAP INFORMATION



ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTM E NAD83	UTM N NAD83	UTM Zone
	Orange	Black Star Canyon	671	33.78923	-117.72678	432717	3739024	11
1	Public Land Survey	Feature Comment						
	S T04S R08W 28	coastal cactus wren						

The mapped feature is accurate within: [10 m](#)

Source of mapped feature: [iphone avenza maps](#)

Mapping notes:

Location/directions comments:

Attachment(s):

July 25, 2022

Stacey Love
Recovery Permit Coordinator
U.S. Fish and Wildlife Service
2177 Salk Avenue, Suite 250
Carlsbad, California 92008

VIA EMAIL
Stacey_Love@fws.gov

David Mayer
Regional Biologist
South Coast Region (Region 5)
3883 Ruffin Road
San Diego, California 92123

VIA EMAIL
David.Mayer@wildlife.ca.gov

Subject: Results of Focused Presence/Absence Surveys for the Coastal California Gnatcatcher for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California

Dear Ms. Love and Mr. Mayer:

This Letter Report presents the results of focused surveys for the coastal California gnatcatcher (*Poliophtila californica californica*) for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project (hereinafter referred to as the “project site”) located in Orange County, California. The purpose of the surveys was to determine the presence or absence of the coastal California gnatcatcher upstream of Santiago Dam. Focused surveys were conducted downstream of Santiago Dam in Spring 2020 (Psomas 2020). Surveys were conducted by a Biologist who holds the necessary Federal Endangered Species Act survey permit and were completed according to the guidelines established by the U.S. Fish and Wildlife Service (USFWS). Notification of the intent to conduct protocol-level surveys was submitted to the USFWS on March 8, 2022.

PROJECT LOCATION AND DESCRIPTION

The project site is located at Santiago Creek Dam at the northwest end of Irvine Lake in unincorporated Orange County, California (Exhibit 1). It is south of State Route (SR) 261 and east of SR-241 and Santiago Canyon Road. Surrounding land use primarily consists of undeveloped open space. Irvine Regional Park is located northwest of SR-241; Limestone Canyon Regional Park is located south of Santiago Canyon Road; and Oak Canyon Park is located at the southeast end of Irvine Lake. The closed Santiago Canyon Landfill is located adjacent to the west of Irvine Lake.

The project site is located on the U.S. Geological Survey’s (USGS’) Black Star Canyon 7.5-minute quadrangle (Exhibit 2). Irvine Lake (named Santiago Creek Reservoir on the USGS) was created by constructing a dam across Santiago Creek. Santiago Creek, a named blueline stream, enters Irvine Lake from the east and continues downstream of the dam flowing north and then west. It has a relatively broad floodplain both above and below the dam. The slopes around the western and northern portions of the lake are relatively steep

5 Hutton Centre Drive
Suite 300
Santa Ana, CA 92707

Tel 714.751.7373
Fax 714.545.8883
www.Psomas.com

Stacey Love
David Mayer
July 27, 2022
Page 2

while the areas to the southeast and east include areas that are relatively flat. Three unnamed blue line streams enter the lake from the north and eight unnamed blue line streams enter the lake from the west, southeast, and south. One unnamed blue line stream enters the project site in the northwest, downstream of the Dam, while Fremont Canyon Creek merges with Santiago Creek downstream of the project site. Elevations in the project site range from approximately 657 to 996 feet above mean sea level (msl).

The project site is located in the Central/Coastal Subregion of the Natural Communities Conservation Plan/Habitat Conservation Plan (NCCP/HCP). Santiago Dam and its associated structures are located within designated “Non-Reserve Open Space”, while Habitat Reserve and Conservation Easements surround the lake; a Special Linkage is located southeast of the lake. The purpose of this plan is to provide regional protection and recovery of multiple species and habitat while allowing compatible land use and appropriate development. Irvine Ranch Water District (IRWD)¹ is a participating jurisdiction and, as such, will comply with the terms of the NCCP/HCP Implementation Agreement.

The IRWD and Serrano Water District are jointly proposing to abandon the existing Santiago Creek Dam outlet tower and construct a new inclined outlet structure to be located on the left abutment of the existing dam. Additionally, based on feedback from the Division of Safety of Dams, the dam spillway requires structural improvements. Existing structures include the dam crest, the intake tower in Irvine Lake, the spillway channel, the control houses, the energy dissipater structure, the aboveground outlet pipe, and the dam crest access road. The project is currently in the design phase but would be located within the survey area provided by IRWD.

SURVEY AREA

A variety of vegetation types occur on the project site, including sagebrush scrub, disturbed sagebrush scrub, sagebrush-coyote bush scrub, southern cactus scrub, disturbed southern cactus scrub, disturbed floodplain sage scrub, toyon-sumac chaparral, annual grassland, ruderal, riparian herb, southern willow scrub, mulefat scrub, disturbed mulefat scrub, southern sycamore riparian woodland/southern coast live oak riparian forest, southern black willow forest, disturbed southern black willow forest, southern black willow forest/riparian herb, coast live oak woodland, western sycamore, and vegetated fluctuating shoreline. Other landcover includes cliff, open water, fluctuating shoreline, perennial stream, ornamental, developed, and disturbed areas (Exhibit 3).

The survey area for the gnatcatcher surveys includes all suitable habitat (i.e., sagebrush scrub, disturbed sagebrush scrub, sagebrush-coyote bush scrub, southern cactus scrub, disturbed southern cactus scrub, and disturbed floodplain sagebrush scrub) upstream of the Dam on the project site. The Biologist reduced the survey area boundary where offsite areas were not accessible due to property boundaries (i.e., Santiago Landfill), topography (i.e., cliff), and where there was no suitable habitat (i.e., Irvine Lake) (Exhibit 4).

Specifically, coastal California gnatcatcher surveys were conducted in portions of the survey area that contained suitable sagebrush scrub habitat of appropriate size and stature. Sagebrush scrub habitats were distributed throughout the survey area and on the surrounding slopes. These habitat types were generally dominated by California sagebrush (*Artemisia californica*), leafy California buckwheat (*Eriogonum fasciculatum* var. *foliolosum*), deerweed (*Acmispon glaber*), laurel sumac (*Malosma laurina*), lemonade berry (*Rhus integrifolia*), and toyon (*Heteromeles arbutifolia*). Openings between shrubs have native herbs, such as erect plantain (*Plantago erecta*) and narrow-toothed pectocarya (*Pectocarya linearis* ssp.

¹ The Santiago County Water District (SCWD) was also a participating jurisdiction in the NCCP/HCP. The SCWD consolidated with IRWD in 2006.

Stacey Love
David Mayer
July 27, 2022
Page 3

ferocula) as well as non-native fennel (*Foeniculum vulgare*) and non-native grasses. Site photographs of representative habitat in the survey area are provided in Attachment A.

BACKGROUND

The coastal California gnatcatcher is a federally listed Threatened species and a California Species of Special Concern. This species occurs in most of Baja California, Mexico's arid regions, but this subspecies is extremely localized in the United States, where it predominantly occurs in coastal regions of highly urbanized Los Angeles, Orange, Riverside, and San Diego Counties (Atwood 1992). In California, this subspecies is a resident of coastal sage scrub vegetation types. The breeding season for the coastal California gnatcatcher ranges from late February to August. Nests are generally placed in a shrub about three feet above ground. Brood parasitism by brown-headed cowbirds (*Molothrus ater*) and loss of habitat to urban development have been cited as causes of coastal California gnatcatcher population decline (Unitt 1984; Atwood 1990).

Taxonomic studies indicate that the California gnatcatcher consists of four subspecies, which extend from southwestern California to southern Baja California, Mexico. The coastal California gnatcatcher, the northernmost gnatcatcher subspecies, is restricted to lowland areas from central Ventura County through Los Angeles, San Bernardino, Riverside, Orange, and San Diego Counties to the Baja California, Mexico, border (Atwood and Lerman 2006; Mellink and Rea 1994). The USFWS has rejected multiple petitions claiming that the coastal California gnatcatcher should be delisted because it is not a valid subspecies (USFWS 2011, 2016).

The coastal California gnatcatcher has been recorded from sea level to approximately 3,000 feet above msl (USFWS 2003); however, more than 90 percent of gnatcatcher records are from between sea level and 820 feet above msl along the coast and between sea level and 1,800 feet above msl inland (Atwood and Bolsinger 1992). USFWS estimates regarding the population size of the coastal California gnatcatcher in Southern California have been about 3,000 pairs (Atwood and Bontrager 2001). In the 2010 *5-Year Review: Summary and Evaluation* for the gnatcatcher, the USFWS cited a study estimating that there were approximately 1,324 gnatcatcher pairs over approximately 111,000 acres of public and quasi-public lands in Orange and San Diego Counties (Winchell and Doherty 2008). Because the Winchell and Doherty study covered only a portion of the U.S. range (focusing on the coast and limited to one year), this study cannot extrapolate beyond the sampling region; however, the USFWS states that it is likely more gnatcatchers are in the U.S. portion of the range than was suggested by earlier estimates (USFWS 2010). The most recent *5-Year Review* concluded that the threats affecting the species have not changed and that the coastal California gnatcatcher should remain a Threatened species (USFWS 2020).

The coastal California gnatcatcher typically occurs within coastal and inland sage scrub vegetation types, which often occur in a patchy distribution pattern throughout the gnatcatcher's range. Coastal California gnatcatchers also use chaparral, grassland, and riparian habitats that are in proximity to sage scrub for dispersal and foraging (Atwood et al. 1998; Campbell et al. 1998; USFWS 2003). Availability of these non-sage scrub areas is essential during certain times of the year, particularly during drought conditions or for dispersal, foraging, or nesting (USFWS 2003).

The USFWS published a Revised Final Rule designating Critical Habitat for the coastal California gnatcatcher in 2007 (USFWS 2007). This revised rule designates 197,303 acres of Critical Habitat in San Diego, Orange, Riverside, San Bernardino, Los Angeles, and Ventura Counties. The survey area is not located within the designated critical habitat for the coastal California gnatcatcher.

Stacey Love
David Mayer
July 27, 2022
Page 4

SURVEY METHODS

The USFWS's survey protocol for the coastal California gnatcatcher requires three visits, conducted at least one week apart, to all potentially occupied habitat areas for surveys within an NCCP area (USFWS 1997a, 1997b). All visits must be conducted between 6 AM and 12 PM, and no more than 100 acres of suitable habitat may be surveyed per visit. Psomas Senior Biologist Lindsay Messett (USFWS Permit No. TE 067064-5) conducted all focused surveys for coastal California gnatcatcher. Surveys were conducted on March 25, April 4, and June 9, 2022.

Ms. Messett avoided weather conditions that were too cold (i.e., below 55 degrees Fahrenheit [$^{\circ}$ F]), too hot (i.e., above 95° F), or too windy (i.e., wind speed greater than 15 miles per hour) to comply with USFWS survey protocol requirements. A summary of weather conditions during each survey is provided in Table 1, below. Ms. Messett conducted the surveys by slowly walking through all appropriate habitats while listening and watching for gnatcatcher activity and by using a combination of recordings of gnatcatcher vocalizations and "pishing" sounds to elicit responses from any gnatcatchers present. The frequency of vocalization playback and "pishing" varied depending on conditions such as habitat patch size, topography in each area, and ambient noise conditions. All wildlife species detected during the surveys were recorded (Attachment B).

TABLE 1
SUMMARY OF COASTAL CALIFORNIA GNATCATCHER SURVEYS

Survey Number	Date	Time (Start/End)	Surveyor	Weather Conditions			Gnatcatchers Observed and/or Detected
				Temperature ($^{\circ}$ F) (Start/End)	Wind (mph) (Start/End)	Cloud Cover (%) (Start/End)	
1	March 25, 2022	0700/1300	Messett	55/83	0–1/1–2	100/Clear	One California gnatcatcher was detected through vocalization
2	April 14, 2022	0730/1200	Messett	55/69	0–1/4–5	Clear/20	No California gnatcatchers were observed/detected
3	June 9, 2022	0700/1155	Messett	62/76	1–2/3–4	100/Clear	No California gnatcatchers were observed/detected

$^{\circ}$ F: degrees Fahrenheit; mph: miles per hour; %: percent.

SURVEY RESULTS

One coastal California gnatcatcher was detected just outside the northern portion of the survey area during the first focused survey on March 25, 2022 (Exhibit 4). It briefly responded to recorded playback and continued moving northeast of the survey area. This individual was detected through vocalization and not directly observed; therefore, the sex and breeding status was undetermined. No additional California gnatcatchers were observed or detected during the remaining focused surveys.

Stacey Love
David Mayer
July 27, 2022
Page 5

OTHER OBSERVATIONS

Eight other special status species were observed and/or detected in the survey area during the surveys: American white pelican (*Pelecanus erythrorhynchos*, California Species of Special Concern), bald eagle (*Haliaeetus leucocephalus*, State Endangered, California Fully Protected), least Bell's vireo (*Vireo bellii pusillus*, State Endangered, Federally Endangered), coastal cactus wren (*Campylorhynchus brunneicapillus sandiegensis*, California Species of Special Concern), grasshopper sparrow (*Ammodramus savannarum*, California Species of Special Concern), southern California rufous-crowned sparrow (*Aimophila ruficeps canescens*, a California Department of Fish and Wildlife [CDFW] Watch List), yellow-breasted chat (*Icteria virens*, California Species of Special Concern), and yellow warbler (*Setophaga petechia*, California Species of Special Concern) (Exhibit 4). These species are tracked by the CDFW's California Natural Diversity Database (CNDDDB). The least Bell's vireo, yellow-breasted chat, and yellow warbler were all observed within riparian habitat; exhibits showing the location of these species and CNDDDB forms documenting these species will be included with the Results of Focused Presence/Absence Surveys for the Least Bell's Vireo and Southwestern Willow Flycatcher Report (Psomas 2022 [in preparation]). CNDDDB forms for the remaining species are included in Attachment C and will be submitted online by Ms. Messett.

Psomas appreciates the opportunity to assist on this project. If you have any comments or questions, please contact Amber Heredia (Amber.Heredia@psomas.com) or Lindsay Messett (Lindsay.Messett@psomas.com).

Sincerely,

P S O M A S



Amber O. Heredia
Senior Project Manager



Lindsay A. Messett, CWB®
Senior Biologist

I certify that the information in this survey report and enclosed exhibits fully and accurately present my work.



Lindsay A. Messett, CWB®
Senior Biologist
(TE067064-5)

Attachments: Exhibits 1–4
A – Site Photographs
B – Wildlife Compendium
C – CNDDDB Forms

cc: Kellie Welch, Welch@irwd.com
Jacob Moeder, Moeder@irwd.com

Stacey Love
David Mayer
July 27, 2022
Page 6

REFERENCES

- Atwood, J.L. 1992. Rare, Local, Little-Known, and Declining North American Breeders – A Closer Look. *Birding* 25: 228–233. Colorado Springs, CO: American Birding Association.
- . 1990. *Status Review of the California Gnatcatcher (*Poliophtila californica*)*. Manomet, MA: Manomet Bird Observatory.
- Atwood, J.L. and J.S. Bolsinger. 1992. Elevational Distribution of the California Gnatcatchers in the United States. *Journal of Field Ornithology* 63(2):159–168. Waco, TX: Ornithological Societies of North America.
- Atwood, J. L. and D.R. Bontrager. 2001. California Gnatcatcher (*Poliophtila californica*). *The Birds of North America*, No. 574 (A. Poole and F. Gill, Eds.). Philadelphia, PA: The Academy of Natural Sciences.
- Atwood, J.L., D.R. Bontrager, and A.L. Gorospe. 1998. Use of Refugia by California Gnatcatchers Displaced by Habitat Loss. *Western Birds* 29: 406–412. San Diego, CA: Western Field Ornithologists.
- Atwood, J.L. and S.B. Lerman. 2006. Family Poliophtilidae (Gnatcatchers) (pp. 350–377). *Handbook of the Birds of the World. Vol. 11: Old World Flycatchers to Old World Warblers* (J. del Hoyo, A. Elliott, and D.A. Christie, Eds.). Barcelona, Spain: Lynx Ediciones.
- Campbell, K. F., R.A. Erickson, W.E. Haas, and M.A. Patten. 1998. California Gnatcatcher Use of Habitats Other Than Coastal Sage Scrub: Conservation and Management Implications. *Western Birds* 29: 421–433. San Diego, CA: Western Field Ornithologists.
- Mellink, E. and A.M. Rea. 1994. Taxonomic Status of the California Gnatcatchers of Northwestern Baja California, Mexico. *Western Birds* 25: 50–62. San Diego, CA: Western Field Ornithologists.
- Unitt, P. 1984. *The Birds of San Diego County (Memoir 13)*. San Diego, CA: San Diego Society of Natural History.
- Psomas. 2022 [in preparation]. *Results of Focused Presence/Absence Surveys for the Least Bell's Vireo and Southwestern Willow Flycatcher for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California*. Santa Ana, CA: Psomas.
- . 2020. *Results of Focused Presence/Absence Surveys for the Coastal California Gnatcatcher for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California*. Santa Ana, CA: Psomas. Santa Ana, CA: Psomas.
- U.S. Fish and Wildlife Service (USFWS). 2020 (June 2). Endangered and Threatened Wildlife and Plants; 5 Year Review for the Coastal California Gnatcatcher. USFWS. https://ecos.fws.gov/docs/tess/species_nonpublish/3451/pdf
- . 2016 (August 31). Endangered and Threatened Wildlife and Plants; 12-Month Finding on a Petition to Delist the Coastal California Gnatcatcher. *Federal Register* 81(169): 59952–59975. Washington, D.C.: USFWS. <https://www.gpo.gov/fdsys/pkg/FR-2016-08-31/pdf/2016-20864.pdf>.

Stacey Love
David Mayer
July 27, 2022
Page 7

- . 2011 (October 26). Endangered and Threatened Wildlife and Plants; 90-Day Finding on a Petition to Delist the Coastal California Gnatcatcher as Threatened. *Federal Register* 76(207): 66255–66260. Washington, D.C.: USFWS. <http://www.gpo.gov/fdsys/pkg/FR-2011-10-26/pdf/2011-27644.pdf>.
 - . 2010 (September 29). *Coastal California Gnatcatcher (Polioptila californica californica) 5-Year Review: Summary and Evaluation*. Carlsbad, CA: USFWS, Carlsbad Field Office.
 - . 2007 (December 19). Endangered and Threatened Wildlife and Plants; Revised Designation of Critical Habitat for the Coastal California Gnatcatcher (*Polioptila californica californica*); Final Rule. *Federal Register* 72(243): 72009–72213. Washington, D.C.: USFWS.
 - . 2003 (April 24). Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Coastal California Gnatcatcher (*Polioptila californica californica*) and Determination of Distinct Vertebrate Population Segment for the California Gnatcatcher (*Polioptila californica*); Proposed Rule. *Federal Register* 68(79): 20227–20312. Washington, D.C.: USFWS. <https://www.fws.gov/policy/library/2003/03-9435.html>.
 - . 1997a (February 28). *Coastal California Gnatcatcher (Polioptila californica californica) Presence/Absence Survey Guidelines*. Washington, D.C.: USFWS.
 - . 1997b (July 28). *Coastal California Gnatcatcher (Polioptila californica californica) Presence/Absence Survey Protocol*. Washington, D.C.: USFWS.
- Winchell, C.S., and P.F. Doherty. 2008. Using California Gnatcatcher to Test Underlying Models of Habitat Conservation Plans. *Journal of Wildlife Management* 72: 1322–1327. Flagstaff, AZ: The Wildlife Society.

D:\Projects\3IRW010200\MXDCAGN\ex_RL_LV_20220725.mxd



Regional Location and Local Vicinity

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

Exhibit 1

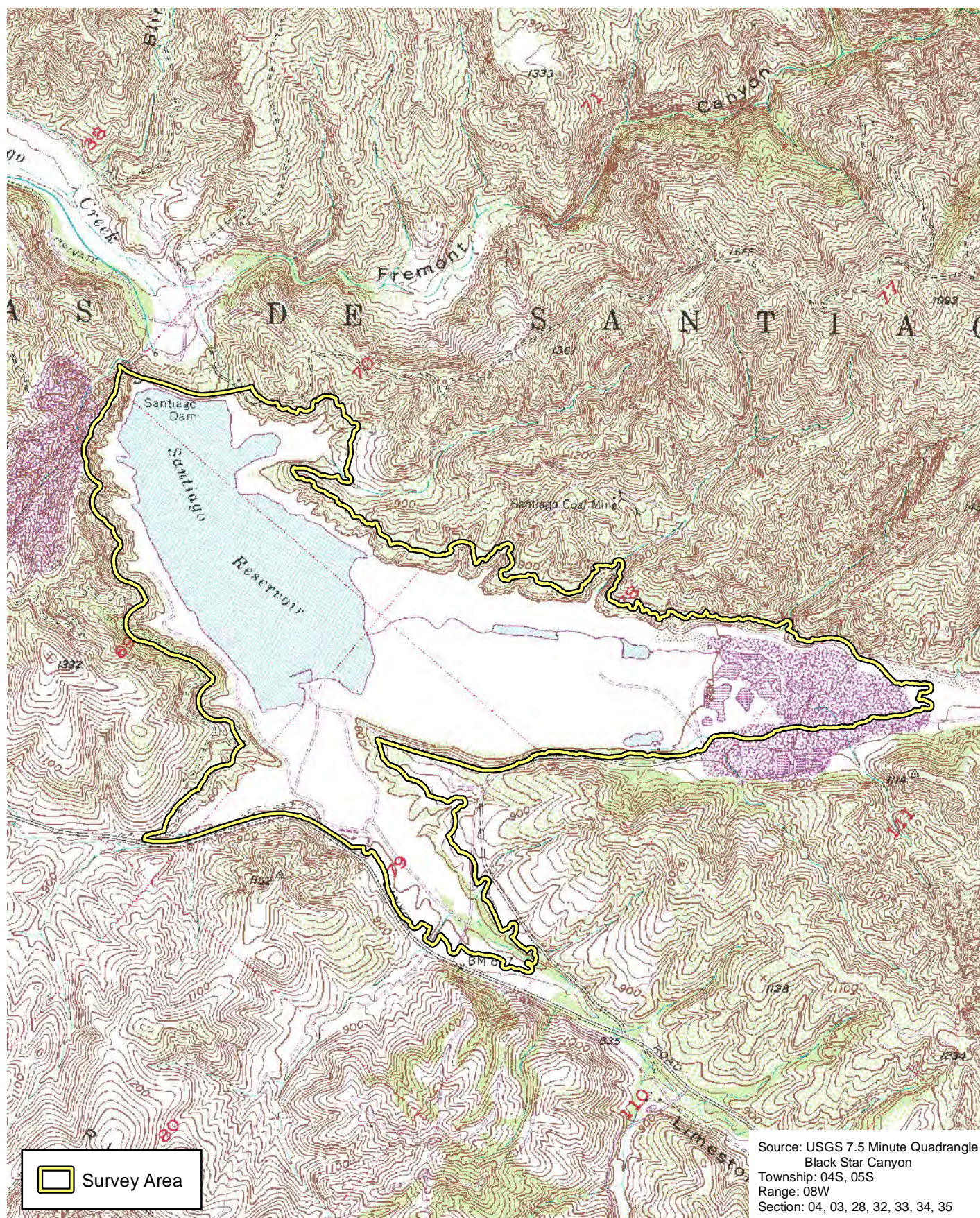


4,000 2,000 0 4,000
Feet



(Rev: 07/25/2022 MMD) R:\Projects\IRW_IRWD\3IRW010200\Graphics\CAGN\ex_RL_LV.pdf

D:\Projects\3IRW010200\MXD\CAGNex_SurveyArea_USGS_20220725.mxd



Coastal California Gnatcatcher Survey Area

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

Exhibit 2

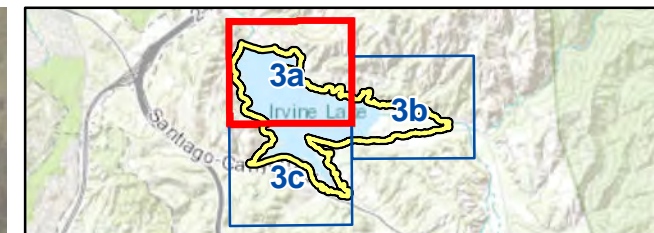
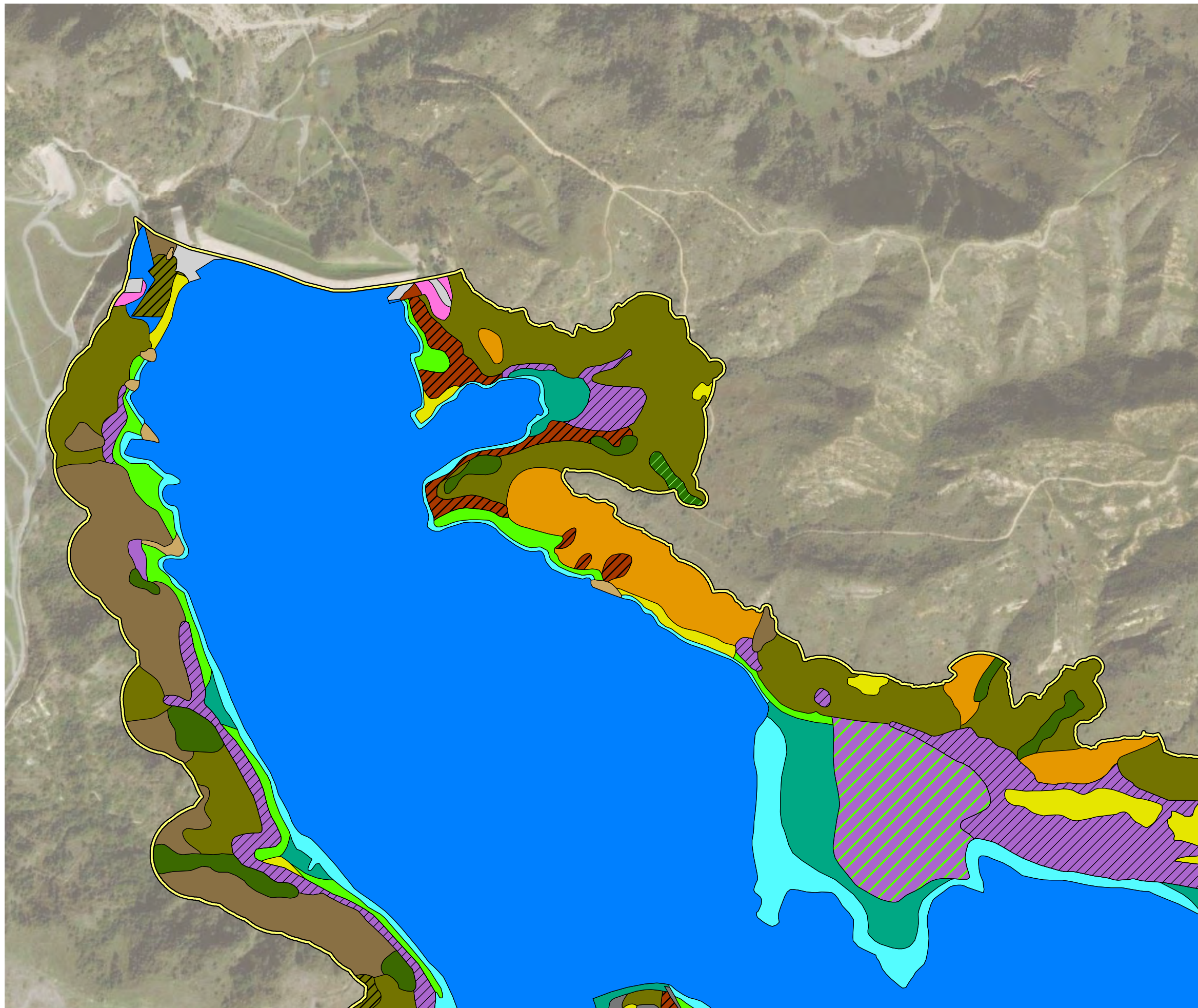


2,000 1,000 0 2,000
Feet

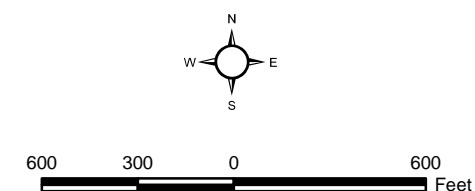
PSOMAS

(Rev: 7-25-2022 MMD) R:\Projects\IRW_IRWD\3IRW010200\Graphics\CAGNex_SurveyArea_USGS.pdf

D:\Projects\3\IRW010200\MXD\CAGN\ex_BioResources_20220720.mxd



- Survey Area
- Vegetation Types and Other Areas**
- Sagebrush Scrub (2.3.6)
 - Disturbed Sagebrush Scrub (2.3.6)
 - Southern Cactus Scrub (2.4)
 - Toyon - Sumac Chaparral (3.12)
 - Ruderal (4.6)
 - Riparian Herb (7.1)
 - Mulefat Scrub (7.3)
 - Disturbed Mulefat Scrub (7.3)
 - Southern Sycamore Riparian Woodland/Southern Coast Live Oak Riparian Forest (7.4/7.5)
 - Southern Black Willow Forest (7.7)
 - Disturbed Southern Black Willow Forest (7.7)
 - Southern Black Willow Forest/Riparian Herb (7.7/7.1)
 - Coast Live Oak Woodland (8.1)
 - Cliff (10)
 - Open Water (12.1)
 - Fluctuating Shoreline (12.2)
 - Vegetated Fluctuating Shoreline (12.2)
 - Ornamental (15.5)
 - Developed (15.6)
 - Disturbed (16.1)



Aerial Source: Esri, Maxar 2020

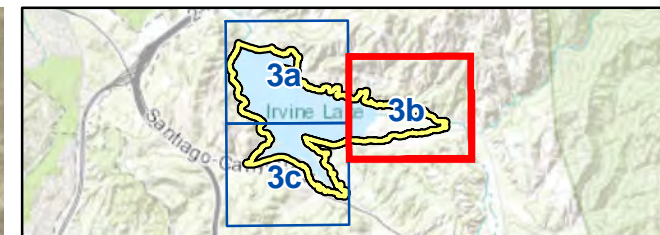
Biological Resources Exhibit 3a

*Santiago Creek Dam Outlet Tower
and Spillway Improvement Project*

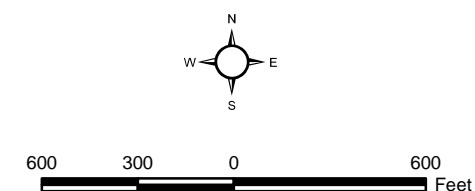


(Rev: 07/25/2022 MMD) R:\Projects\IRW_IRWD\3\IRW010200\Graphics\CAGN\ex_BioResources.pdf

D:\Projects\3IRW010200MXD\CAGN\ex_BioResources_20220720.mxd



- Survey Area
- Vegetation Types and Other Areas**
- Sagebrush Scrub (2.3.6)
 - Sagebrush - Coyote Brush Scrub (2.3.12)
 - Ruderal (4.6)
 - Riparian Herb (7.1)
 - Disturbed Mulefat Scrub (7.3)
 - Southern Sycamore Riparian Woodland (7.4)
 - Southern Black Willow Forest (7.7)
 - Disturbed Southern Black Willow Forest (7.7)
 - Coast Live Oak Woodland (8.1)
 - Open Water (12.1)
 - Fluctuating Shoreline (12.2)
 - Vegetated Fluctuating Shoreline (12.2)
 - Perennial Stream (13.1)
 - Ornamental (15.5)
 - Developed (15.6)
 - Disturbed (16.1)



Aerial Source: Esri, Maxar 2020

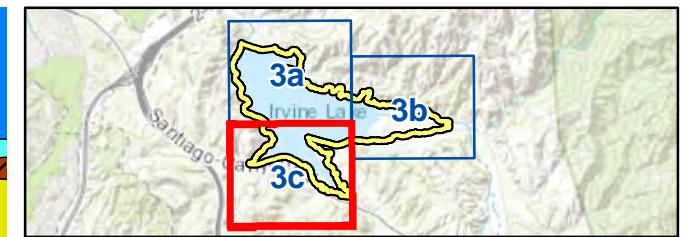
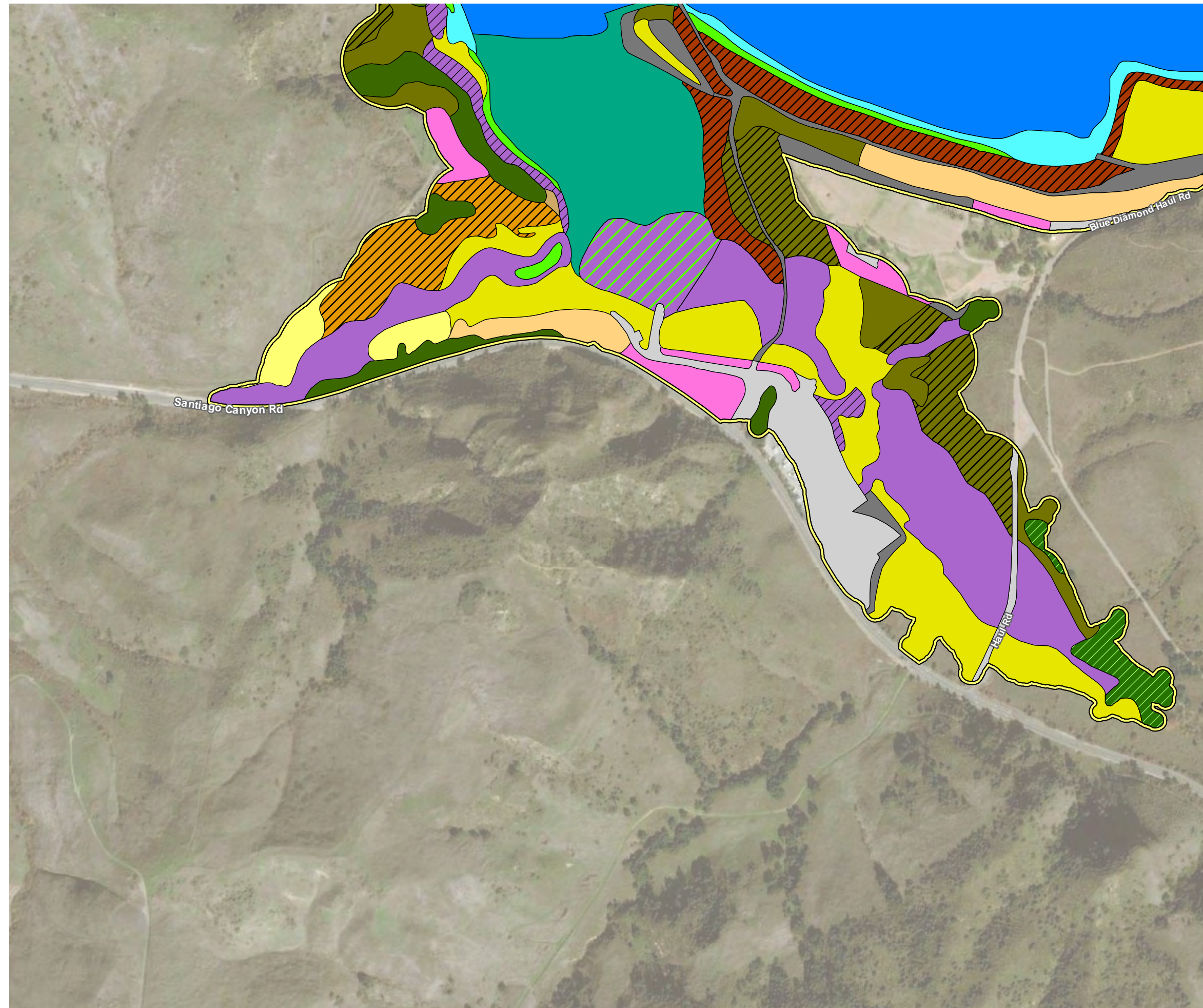
Biological Resources Exhibit 3b

*Santiago Creek Dam Outlet Tower
and Spillway Improvement Project*

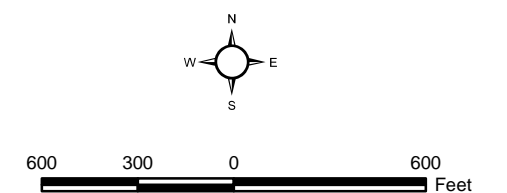


(Rev: 07/25/2022 MMD) R:\Projects\IRW_IRWD\3IRW010200\Graphics\CAGN\ex_BioResources.pdf

D:\Projects\3IRW010200MXD\CAGN\ex_BioResources_20220720.mxd



- Survey Area
- Vegetation Types and Other Areas**
- Sagebrush Scrub (2.3.6)
 - Disturbed Sagebrush Scrub (2.3.6)
 - Sagebrush - Coyote Brush Scrub (2.3.12)
 - Disturbed Southern Cactus Scrub (2.4)
 - Annual Grassland (4.1)
 - Ruderal (4.6)
 - Riparian Herb (7.1)
 - Disturbed Mulefat Scrub (7.3)
 - Southern Sycamore Riparian Woodland/Southern Coast Live Oak Riparian Forest (7.4/7.5)
 - Southern Black Willow Forest (7.7)
 - Disturbed Southern Black Willow Forest (7.7)
 - Southern Black Willow Forest/Riparian Herb (7.7/7.1)
 - Coast Live Oak Woodland (8.1)
 - Cliff (10)
 - Open Water (12.1)
 - Fluctuating Shoreline (12.2)
 - Vegetated Fluctuating Shoreline (12.2)
 - Ornamental (15.5)
 - Developed (15.6)
 - Disturbed (16.1)



Aerial Source: Esri, Maxar 2020

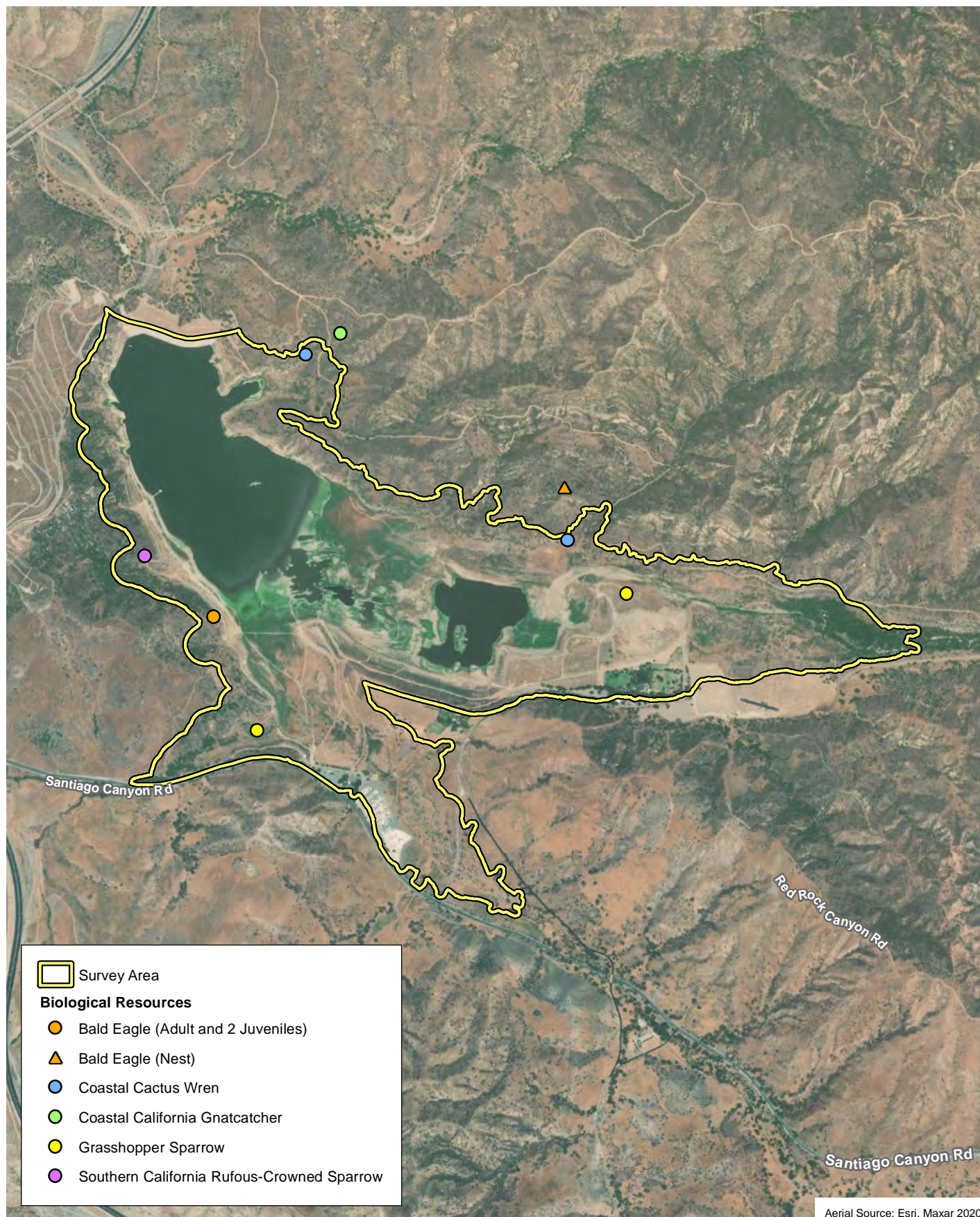
Biological Resources Exhibit 3c

*Santiago Creek Dam Outlet Tower
and Spillway Improvement Project*



(Rev: 07/25/2022 MMD) R:\Projects\IRW_IRWD\3IRW010200\Graphics\CAGN\ex_BioResources.pdf

D:\Projects\3IRW010200\MXDCAGNex_SurveyArea_Results_20220725.mxd



Survey Area and Results

Exhibit 4

Santiago Creek Dam Outlet Tower and Spillway Improvement Project



2,000 1,000 0 2,000
Feet

PSOMAS

(Rev: 07/25/2022 MMD) R:\Projects\IRW_IRWD\3IRW010200\Graphics\CAGNex_SurveyArea_Results.pdf

ATTACHMENT A
SITE PHOTOGRAPHS



Photo 1 – Coastal California gnatcatcher location just outside the northern portion of the survey area, looking northeast.



Photo 2 – Sagebrush scrub located in the eastern portion of the survey area, looking northwest.

Site Photographs

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

Attachment A-1

PSOMAS

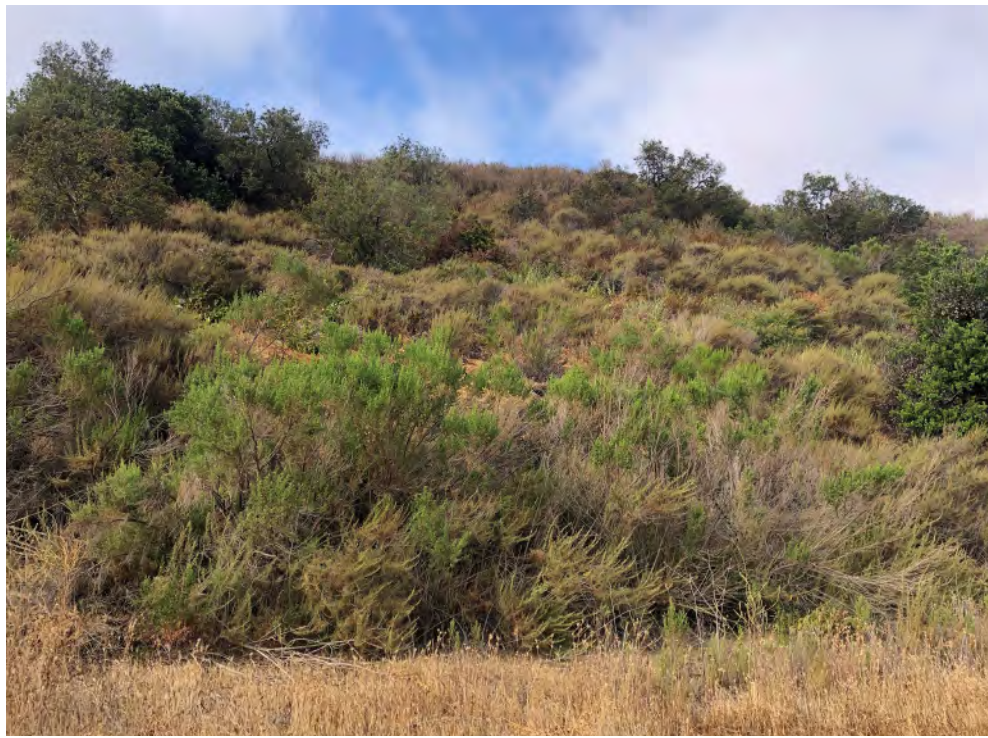


Photo 3 – Sagebrush scrub located in the southern portion of the survey area, looking south.



Photo 4 – Sagebrush scrub located in the western portion of the survey area, looking northwest.

Site Photographs

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

Attachment A-2



ATTACHMENT B
WILDLIFE COMPENDIUM

WILDLIFE SPECIES DETECTED DURING THE SURVEYS

Scientific Name	Common Name	Special Status
SNAKES		
COLUBRIDAE – COLUBRID SNAKE FAMILY		
<i>Pituophis catenifer</i>	gopher snake	
BIRDS		
ANATIDAE – SWAN, GOOSE, AND DUCK FAMILY		
<i>Branta canadensis</i>	Canada goose	
<i>Anas platyrhynchos</i>	mallard	
ODONTOPHORIDAE – NEW WORLD QUAIL FAMILY		
<i>Callipepla californica</i>	California quail	
PODICIPEDIDAE – GREBE FAMILY		
<i>Aechmophorus occidentalis</i>	western grebe	
COLUMBIDAE – PIGEON AND DOVE FAMILY		
<i>Zenaida macroura</i>	mourning dove	
CUCULIDAE – CUCKOO AND ROADRUNNER		
<i>Geococcyx californianus</i>	greater roadrunner	
TROCHILIDAE – HUMMINGBIRD FAMILY		
<i>Calypte anna</i>	Anna's hummingbird	
<i>Selasphorus sasin</i>	Allen's hummingbird	
RALLIDAE – RAIL AND COOT FAMILY		
<i>Fulica americana</i>	American coot	
CHARADRIIDAE – PLOVER FAMILY		
<i>Charadrius vociferus</i>	killdeer	
LARIDAE – GULL AND TERN FAMILY		
<i>Thalasseus elegans</i>	elegant tern	
PHALACROCORACIDAE – CORMORANT FAMILY		
<i>Phalacrocorax auritus</i>	double-crested cormorant	
PELECANIDAE – PELICAN FAMILY		
<i>Pelecanus erythrorhynchos</i>	American white pelican	SSC
ARDEIDAE – HERON FAMILY		
<i>Ardea alba</i>	great egret	
CATHARTIDAE – NEW WORLD VULTURE FAMILY		
<i>Cathartes aura</i>	turkey vulture	
ACCIPITRIDAE – HAWK FAMILY		
<i>Haliaeetus leucocephalus</i>	bald eagle	SE, FP
<i>Buteo lineatus</i>	red-shouldered hawk	
<i>Buteo jamaicensis</i>	red-tailed hawk	
PICIDAE – WOODPECKER FAMILY		
<i>Melanerpes formicivorus</i>	acorn woodpecker	
<i>Picoides nuttallii</i>	Nuttall's woodpecker	
FALCONIDAE – FALCON FAMILY		
<i>Falco sparverius</i>	American kestrel	
TYRANNIDAE – TYRANT FLYCATCHER FAMILY		
<i>Empidonax difficilis</i>	Pacific-slope flycatcher	
<i>Sayornis saya</i>	Say's phoebe	

WILDLIFE SPECIES DETECTED DURING THE SURVEYS

Scientific Name	Common Name	Special Status
<i>Myiarchus cinerascens</i>	ash-throated flycatcher	
<i>Tyrannus vociferans</i>	Cassin's kingbird	
VIREONIDAE – VIREO FAMILY		
<i>Vireo bellii pusillus</i>	least Bell's vireo	FE, SE
CORVIDAE – JAY AND CROW FAMILY		
<i>Aphelocoma californica</i>	California scrub-jay	
<i>Corvus corax</i>	common raven	
ALAUDIDAE – LARK FAMILY		
<i>Eremophila alpestris actia</i>	California horned lark	
HIRUNDINIDAE – SWALLOW FAMILY		
<i>Hirundo rustica</i>	barn swallow	
<i>Petrochelidon pyrrhonota</i>	cliff swallow	
AEGITHALIDAE – BUSHTIT FAMILY		
<i>Psaltirparus minimus</i>	bushtit	
TROGLODYTIDAE – WREN FAMILY		
<i>Troglodytes aedon</i>	house wren	
<i>Thryomanes bewickii</i>	Bewick's wren	
<i>Campylorhynchus brunneicapillus sandiegensis</i>	coastal cactus wren	SSC
POLIOPTILIDAE – GNATCATCHER FAMILY		
<i>Polioptila caerulea</i>	blue-gray gnatcatcher	
<i>Polioptila californica</i>	California gnatcatcher	FT, SSC
SYLVIIDAE – SILVIID WARBLERS FAMILY		
<i>Chamaea fasciata</i>	wrentit	
TURDIDAE – THRUSH FAMILY		
<i>Sialia mexicana</i>	western bluebird	
MIMIDAE – MOCKINGBIRD AND THRASHER FAMILY		
<i>Toxostoma redivivum</i>	California thrasher	
<i>Mimus polyglottos</i>	northern mockingbird	
STURNIDAE – STARLING FAMILY		
<i>Sturnus vulgaris*</i>	European starling*	
FRINGILLIDAE – FINCH FAMILY		
<i>Haemorrhous mexicanus</i>	house finch	
<i>Spinus psaltria</i>	lesser goldfinch	
<i>Spinus lawrencei</i>	Lawrence's goldfinch	
PASSERELLIDAE – NEW WORLD SPARROW FAMILY		
<i>Ammodramus savannarum</i>	grasshopper sparrow	SSC
<i>Zonotrichia leucophrys</i>	white-crowned sparrow	
<i>Melospiza melodia</i>	song sparrow	
<i>Melospiza crissalis</i>	California towhee	
<i>Aimophila ruficeps</i>	rufous-crowned sparrow	
<i>Pipilo maculatus</i>	spotted towhee	

WILDLIFE SPECIES DETECTED DURING THE SURVEYS

Scientific Name	Common Name	Special Status
ICTERIIDAE – YELLOW-BREASTED CHAT FAMILY		
<i>Icteria virens</i>	yellow-breasted chat	SSC
ICTERIDAE – BLACKBIRDS AND ORIOLES		
<i>Sturnella neglecta</i>	western meadowlark	
<i>Icterus cucullatus</i>	hooded oriole	
<i>Agelaius phoeniceus</i>	red-winged blackbird	
PARULIDAE – WOOD-WARBLER FAMILY		
<i>Geothlypis trichas</i>	common yellowthroat	
<i>Setophaga petechia</i>	yellow warbler	SSC
<i>Setophaga coronata</i>	yellow-rumped warbler	
CARDINALIDAE – CARDINALS AND ALLIES		
<i>Pheucticus melanocephalus</i>	black-headed grosbeak	
<i>Passerina caerulea</i>	blue grosbeak	
<i>Passerina amoena</i>	lazuli bunting	
MAMMALS		
SCIURIDAE – SQUIRREL FAMILY		
<i>Otospermophilus beecheyi</i>	California ground squirrel	
GEOMYIDAE – POCKET GOPHER FAMILY		
<i>Thomomys bottae</i>	Botta's pocket gopher	
LEPORIDAE – HARE AND RABBIT FAMILY		
<i>Sylvilagus audubonii</i>	desert cottontail	
CANIDAE – CANID FAMILY		
<i>Canis latrans</i>	coyote	
CERVIDAE – CERVID FAMILY		
<i>Odocoileus hemionus</i>	southern mule deer	
USFWS: U.S. Fish and Wildlife Service		
<u>Species Status:</u>		
Federal (USFWS)	State (CDFW)	
FE Endangered	SE Endangered	
FT Threatened	FP Fully Protected	
	SSC Species of Special Concern	

ATTACHMENT C

CNDDB FORMS

CNDDDB Online Field Survey Form Report



California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/



Source code MES22F0011
Quad code 3311776
Occ. no. _____
EO index no. _____
Map index no. _____

This data has been reported to the CNDDDB, but may not have been evaluated by the CNDDDB staff

Scientific name: *Pelecanus erythrorhynchos*

Common name: American white pelican

Date of field work (mm-dd-yyyy): 03-25-2022

Comment about field work date(s): Additionally observed during second survey on April 14, 2022.

OBSERVER INFORMATION

Observer: Lindsay A. Messett

Affiliation: Psomas

Address: 7236 E Stearns Street , Long Beach, CA 90815

Email: lindsay.messett@psomas.com

Phone: (562) 833-4276

Other observers:

DETERMINATION

Keyed in:

Compared w/ specimen at:

Compared w/ image in:

By another person:

Other: Familiarity with the species

Identification explanation: Identified visually

Identification confidence: Very confident

Species found: Yes If not found, why not?

Level of survey effort: Incidentally observed during focused gnatcatcher surveys.

Total number of individuals: 6

Collection? No

Collection number:

Museum/Herbarium:

ANIMAL INFORMATION

How was the detection made? Seen

Number detected in each age class:

6

adults

juveniles

larvae

egg mass

unknown

Age class comment: Six adults flew into the reservoir during focused survey

Bird site use:

- ☐ Nesting ☐ Rookery ☐ Nesting colony ☐ Burrow site ☐ Lek
☐ Non-breeding (over-wintering) ☐ Communal roost ☒ Other

Site use description: [Used for foraging](#)

What was the observed behavior? [Six adults flew into the site, landed in the reservoir and began foraging.](#)

Describe any evidence of reproduction: [None](#)

SITE INFORMATION

Habitat description: [open water/reservoir](#)

Slope:

Land owner/manager: [Private - Irvine Ranch](#)

Aspect:

Site condition + population viability: [Good](#)

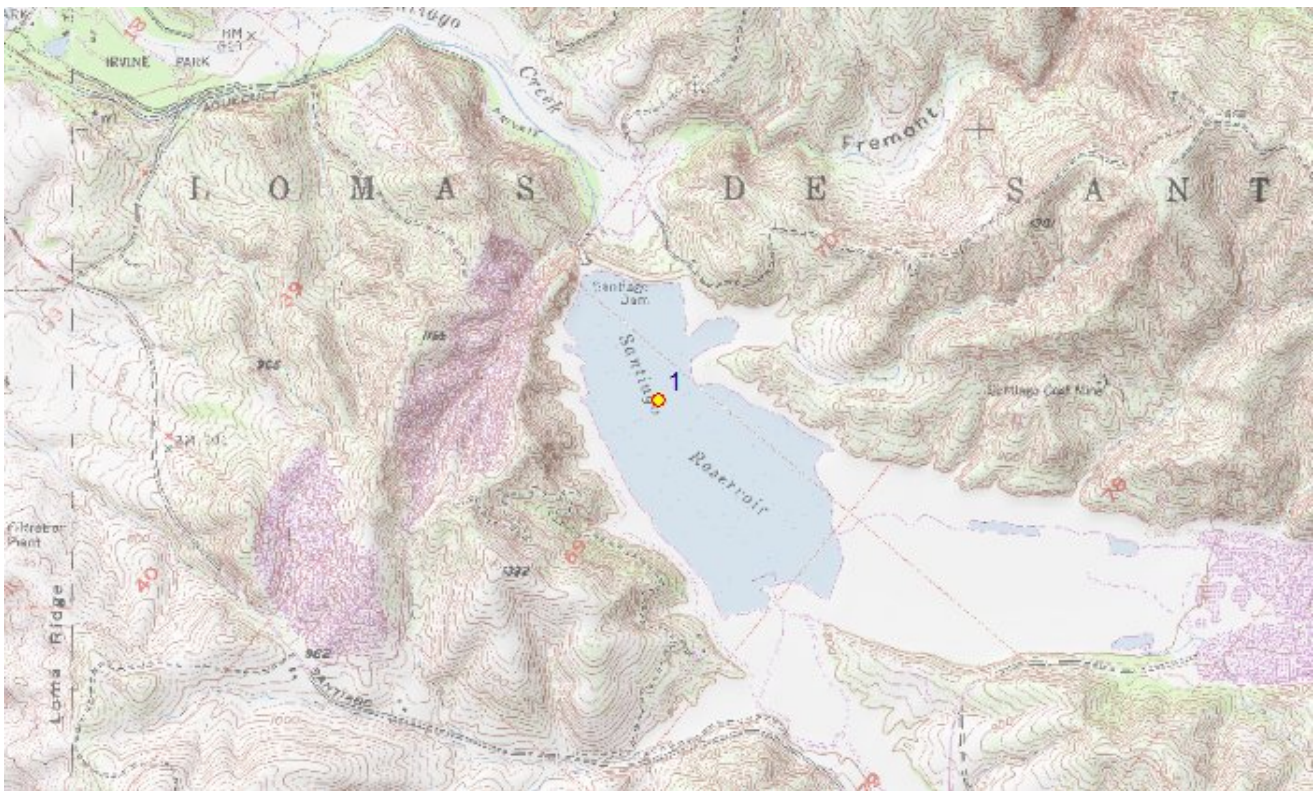
Immediate & surrounding land use: [Open space, Santiago Dam and Irvine Regional Park](#)

Visible disturbances:

Threats:

General comments:

MAP INFORMATION



ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTM E NAD83	UTM N NAD83	UTM Zone
	Orange	Black Star Canyon	782	33.78141	-117.72398	432970	3738155	11
1	Public Land Survey	Feature Comment						
	S T04S R08W 33	American white pelican						

The mapped feature is accurate within: [5 m](#)

Source of mapped feature: [Iphone Avenza Maps](#)

Mapping notes: [Point represents 6 individuals](#)

Location/directions comments:

Attachment(s):

CNDDDB Online Field Survey Form Report



California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/



Source code MES22F0015
Quad code 3311776
Occ. no. _____
EO index no. _____
Map index no. _____

This data has been reported to the CNDDDB, but may not have been evaluated by the CNDDDB staff

Scientific name: *Haliaeetus leucocephalus*

Common name: bald eagle

Date of field work (mm-dd-yyyy): 03-25-2022

Comment about field work date(s): Individuals observed during subsequent surveys on April 14, and June 9, 2022

OBSERVER INFORMATION

Observer: Lindsay A. Messett

Affiliation: Psomas

Address: 7236 E Stearns Street , Long Beach, CA 90815

Email: lindsay.messett@psomas.com

Phone: (562) 833-4276

Other observers:

DETERMINATION

Keyed in:

Compared w/ specimen at:

Compared w/ image in:

By another person:

Other: Familiarity with the species

Identification explanation:

Identification confidence: Very confident

Species found: Yes If not found, why not?

Level of survey effort: Observed during focused gnatcatcher surveys

Total number of individuals: 4

Collection? No

Collection number:

Museum/Herbarium:

ANIMAL INFORMATION

How was the detection made? Seen

Number detected in each age class:

2

2

adults

juveniles

larvae

egg mass

unknown

Age class comment: Pair had a nest with 2 nestlings

Bird site use:

- ☒ Nesting ☐ Rookery ☐ Nesting colony ☐ Burrow site ☐ Lek
☐ Non-breeding (over-wintering) ☐ Communal roost ☐ Other

Site use description: [Nesting and foraging](#)

What was the observed behavior? [Pair was observed at the nest location along with 2 older nestlings](#)

Describe any evidence of reproduction: [Nest with nestlings was observed](#)

SITE INFORMATION

Habitat description: [Ornamental trees with surrounding sagebrush scrub and grassland](#)

Slope:

Land owner/manager: [Private - Irvine Ranch](#)

Aspect:

Site condition + population viability: [Good](#)

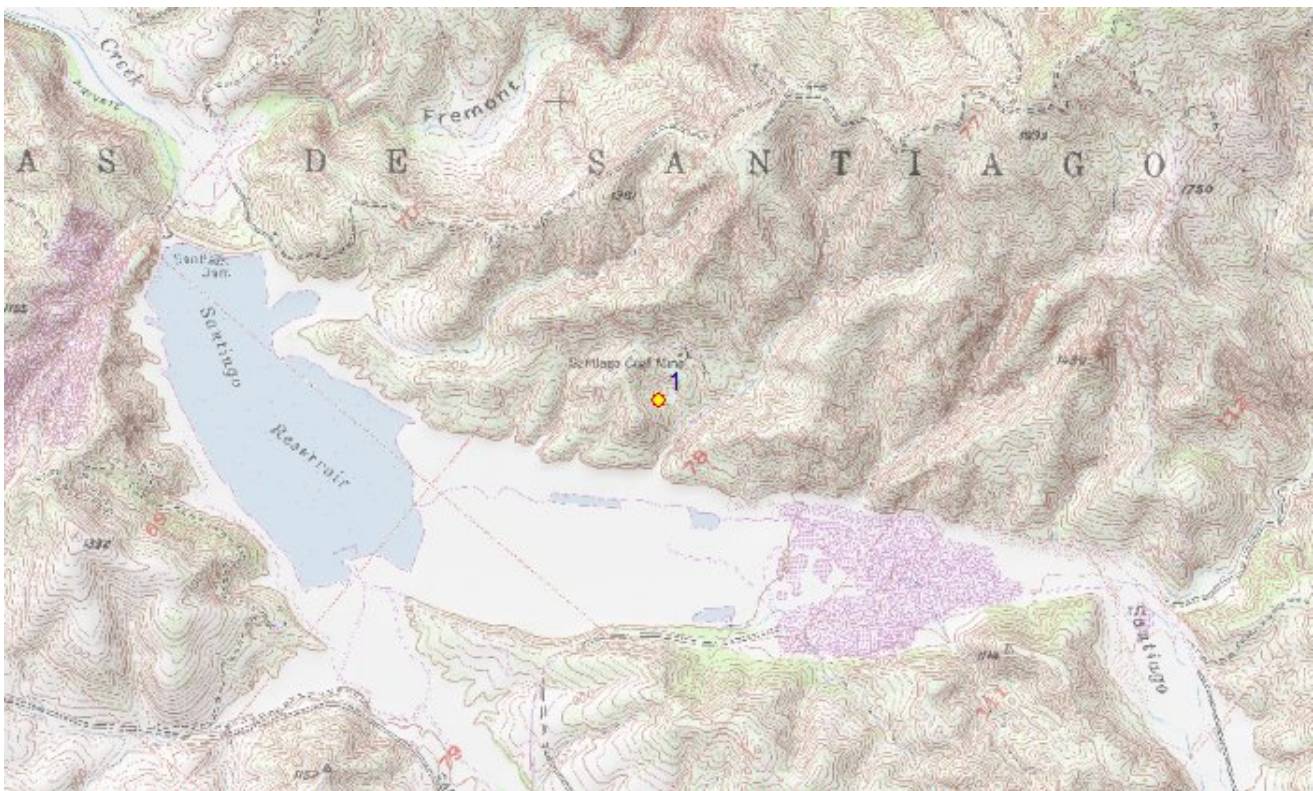
Immediate & surrounding land use: [Open space, Santiago Dam, Irvine Regional Park](#)

Visible disturbances:

Threats:

General comments:

MAP INFORMATION



ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTM E NAD83	UTM N NAD83	UTM Zone
	Orange	Black Star Canyon	926	33.78037	-117.70476	434749	3738027	11
1	Public Land Survey	Feature Comment						
	S T04S R08W 34	BAEA approximate nest location						

The mapped feature is accurate within: [5 m](#)

Source of mapped feature: [Iphone Avenza Maps](#)

Mapping notes: [Point](#) represents the approximate nest location.

Location/directions comments:

Attachment(s):

CNDDDB Online Field Survey Form Report



California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/



Source code MES22F0012
Quad code 3311776
Occ. no. _____
EO index no. _____
Map index no. _____

This data has been reported to the CNDDDB, but may not have been evaluated by the CNDDDB staff

Scientific name: *Campylorhynchus brunneicapillus sandiegensis*

Common name: coastal cactus wren

Date of field work (mm-dd-yyyy): 03-25-2022

Comment about field work date(s): Observed/detected during subsequent surveys on April 14, and June 9, 2022

OBSERVER INFORMATION

Observer: Lindsay A. Messett

Affiliation: Psomas

Address: 7236 E Stearns Street , Long Beach, CA 90815

Email: lindsay.messett@psomas.com

Phone: (562) 833-4276

Other observers:

DETERMINATION

Keyed in:

Compared w/ specimen at:

Compared w/ image in:

By another person:

Other: Familiarity with the species

Identification explanation:

Identification confidence: Very confident

Species found: Yes If not found, why not?

Level of survey effort: Observed incidentally during focused gnatcatcher surveys

Total number of individuals: 2

Collection?

Collection number:

Museum/Herbarium:

ANIMAL INFORMATION

How was the detection made? Heard singing then seen

Number detected in each age class:

2

adults

juveniles

larvae

egg mass

unknown

Age class comment: Observed 2 adult individuals at separate locations.

Bird site use:

- ☒ Nesting ☐ Rookery ☐ Nesting colony ☐ Burrow site ☐ Lek
☐ Non-breeding (over-wintering) ☐ Communal roost ☐ Other

Site use description: [Used for nesting and foraging](#)

What was the observed behavior? [Both individuals were observed singing from cactus patches.](#)

Describe any evidence of reproduction: [One nest was observed](#)

SITE INFORMATION

Habitat description: [sagebrush scrub](#)

Slope:

Land owner/manager: [Private - Irvine Ranch](#)

Aspect:

Site condition + population viability: [Good](#)

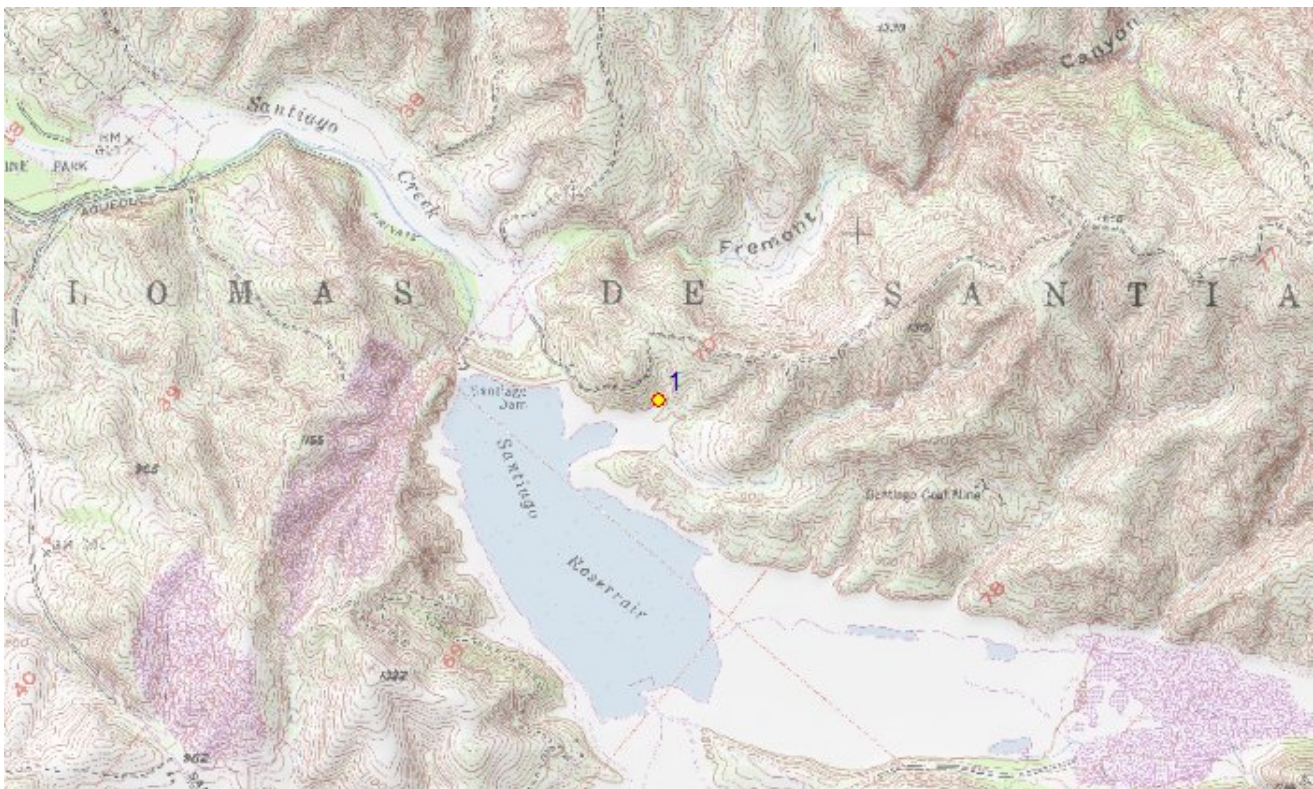
Immediate & surrounding land use: [Open space, Santiago Dam and Irvine Regional Park](#)

Visible disturbances:

Threats:

General comments:

MAP INFORMATION



ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTM E NAD83	UTM N NAD83	UTM Zone
	Orange	Black Star Canyon	837	33.78538	-117.71838	433492	3738592	11
1	Public Land Survey	Feature Comment						
	S T04S R08W 33	coastal cactus wren						

The mapped feature is accurate within: [5 m](#)

Source of mapped feature: [Iphone Avenza Maps](#)

Mapping notes: Point represents one individual detected through vocalization. This location also includes a nest (status unknown). The second individual was detected through vocalization at a separate location at 33.777009, -117.698625

Location/directions comments:

Attachment(s):

CNDDDB Online Field Survey Form Report



California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/



Source code MES22F0014
Quad code 3311776
Occ. no. _____
EO index no. _____
Map index no. _____

This data has been reported to the CNDDDB, but may not have been evaluated by the CNDDDB staff

Scientific name: *Ammodramus savannarum*

Common name: grasshopper sparrow

Date of field work (mm-dd-yyyy): 04-19-2022

Comment about field work date(s): Both pairs observed on subsequent visit on June 19, 2022.

OBSERVER INFORMATION

Observer: Lindsay A. Messett

Affiliation: Psomas

Address: 7236 E Stearns Street , Long Beach, CA 90815

Email: lindsay.messett@psomas.com

Phone: (562) 833-4276

Other observers: _____

DETERMINATION

Keyed in: _____

Compared w/ specimen at: _____

Compared w/ image in: _____

By another person: _____

Other: Familiarity with the species

Identification explanation: _____

Identification confidence: Very confident

Species found: Yes If not found, why not? _____

Level of survey effort: Observed during focused gnatcatcher surveys

Total number of individuals: 4

Collection? No

Collection number: _____

Museum/Herbarium: _____

ANIMAL INFORMATION

How was the detection made? Heard singing then seen

Number detected in each age class:

4

adults

juveniles

larvae

egg mass

unknown

Age class comment: Two pairs observed

Bird site use:

- ☒ Nesting ☐ Rookery ☐ Nesting colony ☐ Burrow site ☐ Lek
☐ Non-breeding (over-wintering) ☐ Communal roost ☐ Other

Site use description: [Used for nesting and foraging](#)

What was the observed behavior? [Both pairs were flushed from grassland areas. Males were both detected initially through vocalizations.](#)

Describe any evidence of reproduction: [Assumed nesting due to behavior \(ie, males singing and female flushed out of dense vegetation\).](#)

SITE INFORMATION

Habitat description: [Annual grassland](#)

Slope:

Land owner/manager: [Private - Irvine Ranch](#)

Aspect:

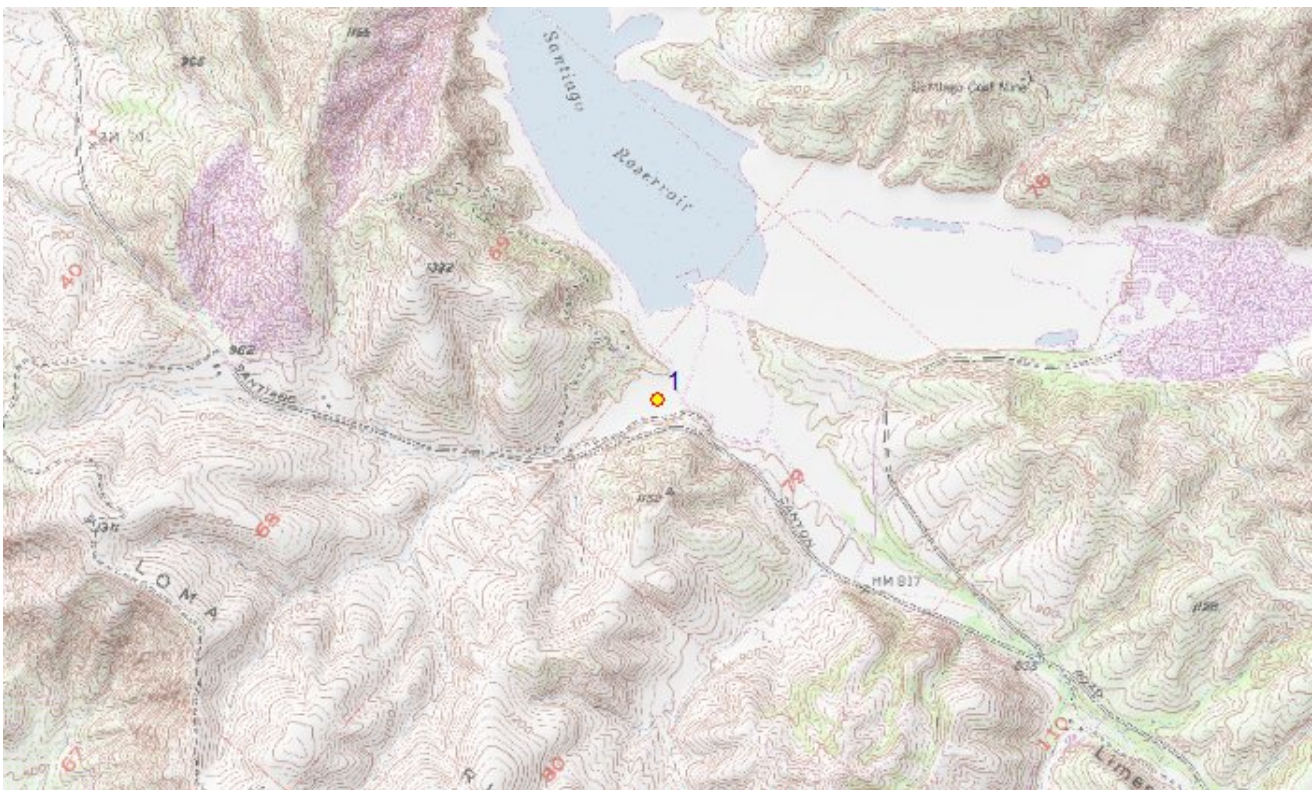
Site condition + population viability: [Good](#)

Immediate & surrounding land use: [Open space, Santiago Dam, Irvine Regional Park](#)

Visible disturbances:

Threats:

General comments:

MAP INFORMATION

ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTM E NAD83	UTM N NAD83	UTM Zone
	Orange	Black Star Canyon	782	33.76985	-117.72054	433279	3736871	11
1	Public Land Survey	Feature Comment						
	S T05S R08W 4	GHSP pair						

The mapped feature is accurate within: [5 m](#)

Source of mapped feature: [Iphone Avenza Maps](#)

Mapping notes: [Point represents one pair of grasshopper sparrows \(assumed nesting due to behavior ie flushed out of thick grassland area\). Second pair was observed on multiple occasions at 33.775723, -117.702390](#)

Location/directions comments:

Attachment(s):

CNDDDB Online Field Survey Form Report



California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/



Source code MES22F0013
Quad code 3311776
Occ. no. _____
EO index no. _____
Map index no. _____

This data has been reported to the CNDDDB, but may not have been evaluated by the CNDDDB staff

Scientific name: *Aimophila ruficeps canescens*

Common name: southern California rufous-crowned sparrow

Date of field work (mm-dd-yyyy): 03-25-2022

Comment about field work date(s): Observed on subsequent survey on June 9, 2022.

OBSERVER INFORMATION

Observer: Lindsay A. Messett

Affiliation: Psomas

Address: 7236 E Stearns Street , Long Beach, CA 90815

Email: lindsay.messett@psomas.com

Phone: (562) 833-4276

Other observers:

DETERMINATION

Keyed in:

Compared w/ specimen at:

Compared w/ image in:

By another person:

Other: Familiarity with the species

Identification explanation:

Identification confidence: Very confident

Species found: Yes If not found, why not?

Level of survey effort: Observed while conducting focused gnatcatcher surveys.

Total number of individuals: 2

Collection? No

Collection number:

Museum/Herbarium:

ANIMAL INFORMATION

How was the detection made? Heard singing then seen

Number detected in each age class:

2

adults

juveniles

larvae

egg mass

unknown

Age class comment: Pair detected singing within sagebrush scrub

Bird site use:

- ☒ Nesting ☐ Rookery ☐ Nesting colony ☐ Burrow site ☐ Lek
☐ Non-breeding (over-wintering) ☐ Communal roost ☐ Other

Site use description: [Used for nesting and foraging](#)

What was the observed behavior? [Pair was detected singing, calling and foraging together](#)

Describe any evidence of reproduction: [No evidence of active nesting was observed](#)

SITE INFORMATION

Habitat description: [sagebrush scrub](#)

Slope:

Land owner/manager: [Private - Irvine Ranch](#)

Aspect:

Site condition + population viability: [Good](#)

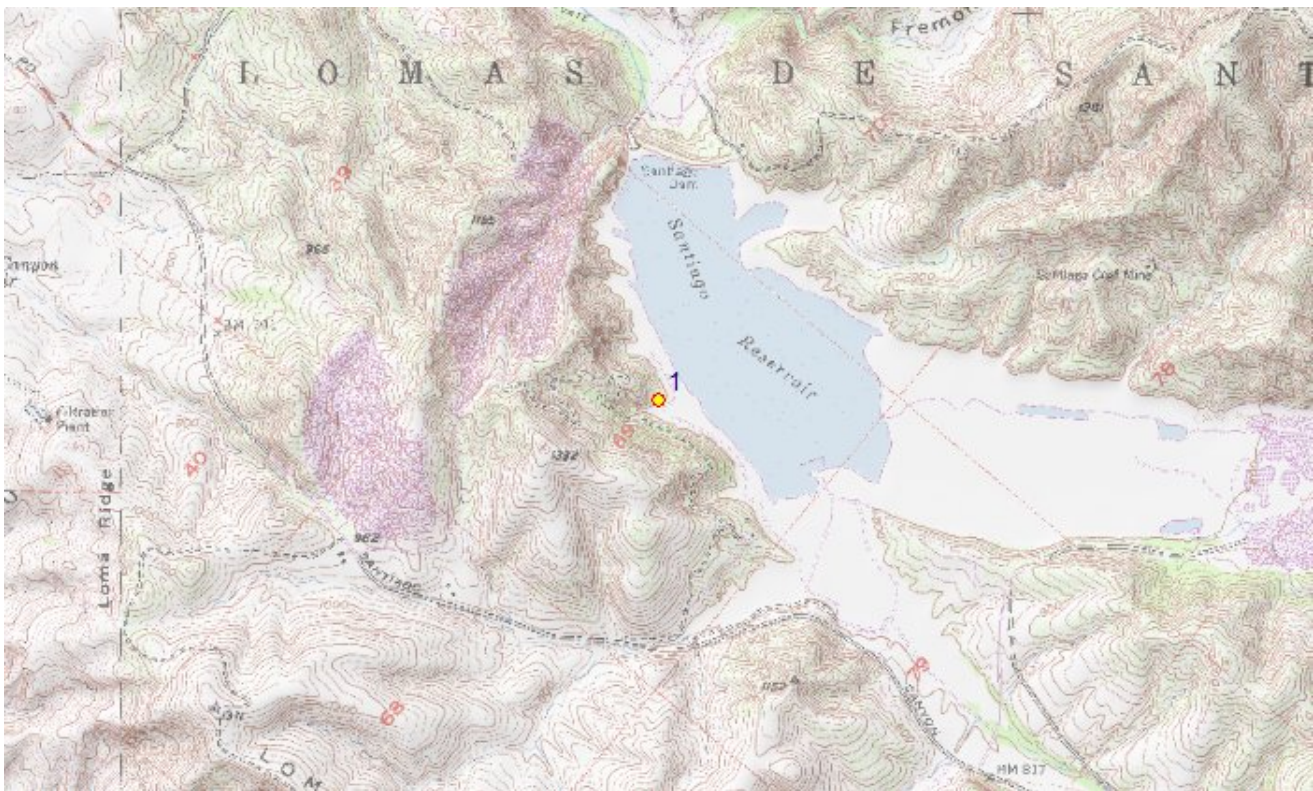
Immediate & surrounding land use: [Open space, Santiago Dam, Irvine Regional Park](#)

Visible disturbances:

Threats:

General comments:

MAP INFORMATION



ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTM E NAD83	UTM N NAD83	UTM Zone
	Orange	Black Star Canyon	806	33.77700	-117.72622	432759	3737668	11
1	Public Land Survey	Feature Comment						
	S T04S R08W 33	RCSP pair						

The mapped feature is accurate within: [5 m](#)

Source of mapped feature: [Iphone Avenza Maps](#)

Mapping notes:

Location/directions comments:

Attachment(s):

APPENDIX K

LEAST BELL'S VIREO/SOUTHWESTERN WILLOW FLYCATCHER SURVEYS

August 26, 2020

Stacey Love
Recovery Permit Coordinator
U.S. Fish and Wildlife Service
2177 Salk Avenue, Suite 250
Carlsbad, California 92008

VIA EMAIL
Stacey_Love@fws.gov

Christine Beck
Regional Biologist
South Coast Region (Region 5)
3883 Ruffin Road
San Diego, California 92123

Christine.Beck@wildlife.ca.gov

Subject: Results of Focused Presence/Absence Surveys for the Least Bell's Vireo for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California

Dear Ms. Love and Ms. Beck:

This Letter Report presents the results of focused surveys for the least Bell's vireo (*Vireo bellii pusillus*) for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project (hereinafter referred to as the "project site") located in Orange County, California. The purpose of the surveys was to determine the presence or absence of the least Bell's vireo on or immediately adjacent to the project site. Surveys were conducted by a Biologist with the necessary experience and were completed according to the guidelines established by the U.S. Fish and Wildlife Service (USFWS). Notification of the intent to conduct protocol-level surveys was submitted to California Department of Fish and Wildlife (CDFW) on April 8, 2020.

PROJECT LOCATION AND DESCRIPTION

The Irvine Ranch Water District (IRWD) and Serrano Water District are jointly proposing to abandon the existing Santiago Creek Dam outlet tower and construct a new inclined outlet structure to be located on the left abutment of the existing dam. Additionally, based on feedback from the Department of Safety of Dams, the dam spillway requires structural improvements. Existing structures include the dam crest, the intake tower in Irvine Lake, the spillway channel, the control houses, the energy dissipater structure, the aboveground outlet pipe, and the dam crest access road. The project is currently in the early design phase but would be located within the project site provided by IRWD.

Santiago Creek Dam is located at the north end of Irvine Lake in unincorporated Orange County, California (Exhibit 1). It is south of State Route (SR) 261 and east of SR-241 and Santiago Canyon Road. The project site is depicted on the U.S. Geological Survey's Black Star Canyon 7.5-minute quadrangle (Exhibit 2). Topography in the center of the survey area is relatively flat, with rolling hills to the east and a steep cliff to the west. Elevations range from approximately 657 to 898 feet above mean sea level (msl). Santiago Creek, a blueline stream,

5 Hutton Centre Drive
Suite 300
Santa Ana, CA 92707

Tel 714.751.7373
Fax 714.545.8883
www.Psomas.com

Ms. Stacey Love and Ms. Christine Beck
 August 26, 2020
 Page 2

occurs in the survey area. Surrounding land uses primarily consist of undeveloped open space. Irvine Regional Park is located northwest of SR-241; Limestone Canyon Regional Park is located south of Santiago Canyon Road; and Oak Canyon Park is located at the southeast end of Irvine Lake. Residential development is located west of SR-241.

The project site is located in the Central/Coastal Subregion of the Natural Communities Conservation Plan/Habitat Conservation Plan (NCCP/HCP). The purpose of this plan is to provide regional protection and recovery of multiple species and habitat while allowing compatible land use and appropriate development. IRWD is a participating jurisdiction and, as such, will comply with the terms of the NCCP/HCP Implementation Agreement.

The following vegetation types and other areas occur within the project site: sagebrush scrub, disturbed sagebrush scrub, disturbed floodplain sage scrub, toyon – sumac chaparral, annual grassland, ruderal, southern willow scrub, mulefat scrub, coast live oak woodland, western sycamore, cliff, open water, ornamental, developed, and disturbed (Exhibit 3).

SURVEY AREA

The survey area for the least Bell's vireo surveys includes all suitable habitat (i.e., southern willow scrub and mule fat scrub) on the project site and within a 500-foot buffer north of the project site along Santiago Creek. The Biologist reduced the survey area boundary where offsite areas were not accessible due to property boundaries (i.e., Santiago Landfill), topography (i.e., cliff), and where there was no suitable habitat (i.e., Irvine Lake) (Exhibit 4).

Specifically, least Bell's vireo surveys were conducted in portions of the survey area that contained suitable riparian habitat of appropriate size and stature. Riparian habitats occur along Santiago Creek downstream from the existing spillway and within the low flow channel of the creek. These habitat types were generally dominated by arroyo willow (*Salix lasiolepis*) and mule fat (*Baccharis salicifolia* ssp. *salicifolia*), with scattered white alder (*Alnus rhombifolia*), western sycamore (*Platanus racemosa*), and Fremont cottonwood (*Populus fremontii* ssp. *fremontii*). California sagebrush (*Artemisia californica*), flatsedge (*Cyperus* sp.), non-native fennel (*Foeniculum vulgare*), mustards (*Hirschfeldia* spp. and *Brassica* spp.), and non-native grasses (*Avena* spp. and *Bromus* spp.) also occur in these areas. Additionally, a depression in the streambed holds standing water surrounded by cattails (*Typha* sp.). Site photographs of representative habitat in the survey area are provided in Attachment A.

SPECIES BACKGROUND

Least Bell's Vireo

Least Bell's vireo is a federally and State listed Endangered species. It is one of four subspecies of the Bell's vireo (*Vireo bellii*); this subspecies is the westernmost of the four subspecies, breeding entirely in southwestern California and northwestern Baja California, Mexico. Although not well known, the winter range of the least Bell's vireo is believed to be the west coast of Central America from southern Sonora, Mexico, south to northwestern Nicaragua, including the cape region of Baja California, Mexico (Brown 1993). The least Bell's vireo arrives in southern California from mid-March to early April and departs for its wintering grounds in August to mid-September.

The least Bell's vireo is a small, gray migratory songbird that is about 4.5 to 5 inches long. It has short, rounded wings and a short, straight bill for catching insects. Feathers are gray above and pale below. "The least Bell's vireo is easily recognized on the breeding grounds by its distinctive song" (Coues 1903).

Ms. Stacey Love and Ms. Christine Beck
August 26, 2020
Page 3

Males establish and defend territories through counter-singing, chasing, and sometimes physically confronting neighboring males (USFWS 1998).

Least Bell's vireos consume a "wide variety of insects including bugs, beetles, grasshoppers, moths, and particularly caterpillars" (Chapin 1925; Bent 1950). They obtain prey through foliage gleaning (i.e., picking prey from leaves or bark) and through hovering (i.e., removing prey from vegetation surfaces while fluttering in the air) (Salata 1983; Miner 1989). Vireos will forage in all layers of the canopy but tend to concentrate their foraging in the lower to mid-strata from 9 to 18 feet in height (Miner 1989). Vireos forage in both riparian and adjacent upland habitat (Salata 1983; Kus and Miner 1987).

The least Bell's vireo is an obligate riparian species (i.e., nests exclusively in riparian habitat) and prefers early-successional habitat. On its breeding grounds, it typically inhabits structurally diverse woodlands along watercourses. In California, least Bell's vireo habitat consists of southern willow scrub, mule fat scrub, sycamore alluvial woodland, coast live oak riparian forest, arroyo willow riparian forest, and cottonwood bottomland forest (Faber et al. 1989). Although least Bell's vireos typically nest in willow-dominated areas, plant species composition does not appear to be as important in nest site selection as habitat structure (USFWS 1998). The most critical factor in habitat structure is the presence of a dense understory shrub layer from approximately 3 to 6 feet above ground, where nests are typically placed, and a dense stratified canopy for foraging (Goldwasser 1981; Gray and Greaves 1981; Salata 1981, 1983; RECON 1989). This structure is typically met by willows that are between four and ten years of age (RECON 1988; Franzreb 1989). As stands mature, the tall canopy tends to shade out the shrub layer, making the sites less suitable for nesting; however, least Bell's vireos will continue to use such areas if patches of understory exist (USFWS 1998). Vireo nest placement tends to occur in openings and along the riparian edge, where exposure to sunlight allows the development of shrubs (USFWS 1998). The riparian ecosystems required by the vireo are dynamic systems; and the scouring of vegetation during periodic floods is required to create the low, dense vegetation favored by the bird (USFWS 1986).

Males arrive on the breeding grounds about one week prior to females, and older birds arrive before first-year birds. Pair formation occurs within a few days, and pairs build a nest together over the next four to five days. The typical clutch size for least Bell's vireo is four eggs, which are incubated for approximately 14 days. The young remain in the nest for approximately 10 to 12 days. Adults continue to care for the young for at least two weeks post-fledging, as the family groups forage over larger areas. The largest causes of least Bell's vireo nest failure are nest parasitism by brown-headed cowbird (*Molothrus ater*) and egg predation; nests also fail due to vegetation clearing, trampling by humans and cattle, ant infestations, and rainstorms. Least Bell's vireo will make up to five nesting attempts per season, assuming adequate energy resources; typically, a pair will successfully fledge young from one to two nests per season. Few nests are initiated after mid-July (USFWS 1998). The least Bell's vireo often shows a strong site fidelity, returning not just to the same drainage and the same territory but even to the same tree where it previously nested. However, vireos may move locations due to habitat loss or failure to attract a mate (USFWS 1998).

The least Bell's vireo was formerly considered a common breeder in riparian habitats throughout the Central Valley and other low-elevation riverine systems throughout California and Baja California, Mexico (USFWS 1998). At the time of its listing, the least Bell's vireo had been eliminated from 95 percent of its former range (USFWS 1986). The decline of least Bell's vireo is attributed to the widespread loss of riparian woodlands coupled with the increase in brown-headed cowbirds (USFWS 1986). Loss of riparian habitat has been attributed to flood control and water development projects, agricultural development, livestock grazing, spread of invasive exotic plant species, degradation of habitat by off-road vehicles, and urban development. With the implementation of intensive brown-headed cowbird management programs, the least Bell's vireo numbers have dramatically increased (USFWS 1998). Vireos have also expanded their range into areas where they were formerly extirpated.

Ms. Stacey Love and Ms. Christine Beck
 August 26, 2020
 Page 4

On February 2, 1994, the USFWS issued their final determination of Critical Habitat for the least Bell's vireo, identifying approximately 37,560 acres as Critical Habitat in Santa Barbara, Ventura, Los Angeles, San Bernardino, Riverside, and San Diego Counties (USFWS 1994). The project site is not located in designated Critical Habitat for this species.

SURVEY METHODS

The USFWS protocol for the least Bell's vireo requires that at least eight surveys be conducted from April 10 to July 31 with a ten-day interval between each site visit (USFWS 2001). Psomas Senior Biologist Lindsay Messett conducted all focused surveys for least Bell's vireo. Surveys were conducted on April 30, May 12 and 27, June 9, and 25, and July 6, 17, and 28, 2020.

Ms. Messett systematically surveyed the riparian habitats by walking slowly and methodically along their margins; habitat is narrow enough that transects through the habitat were not necessary. As the least Bell's vireo survey protocol does not require the playback of least Bell's vireo vocalizations, recorded least Bell's vireo vocalizations were not used during the surveys. Any least Bell's vireos detected were recorded with a Global Positioning System (GPS) unit (Garmin Vista) or an iPad. Although not required during a presence/absence survey, time was also taken to visually observe any individuals detected to identify their sex and age to determine the fate of the territory over the course of the surveys (e.g., juveniles observed indicate successful nesting).

All surveys were conducted under optimal weather conditions and during early morning hours when bird activity is at its peak (Table 1). It should be noted that the timing of a few of the surveys began later because on these mornings, Ms. Messett was surveying for coastal California gnatcatcher (*Poliophtila californica californica*) in the adjacent upland habitat. If a least Bell's vireo was singing during the gnatcatcher survey, Ms. Messett likely would have heard it in the adjacent riparian habitat. All bird species detected during the survey were recorded, including notable observations of special status species or other birds (e.g., brown-headed cowbird). A complete list of wildlife species observed during the surveys is included in Attachment B.

TABLE 1
SUMMARY OF SURVEY DATA AND CONDITIONS FOR
LEAST BELL'S VIREO SURVEYS

Survey Dates	Surveyors	Time	Air Temperature (°F) (Start/End)		Cloud Cover (Start/End)	Wind (mph) (Start/End)
April 30	Messett	10:00 AM – 11:30 AM	71	75	50/Clear	0–1/0–1
May 12	Messett	7:30 AM – 11:00 AM	61	69	10/80	0–1/0–1
May 27	Messett	6:30 AM – 8:15 AM	65	76	10/Clear	0–1/0–2
June 9	Messett	6:50 AM – 10:45 AM	70	91	Clear/Clear	0–1/1–2
June 25	Messett	10:00 AM – 11:40 AM	68	77	90/40	0–1/0–1
July 6	Messett	6:45 AM – 10:30 AM	68	83	10/Clear	0–1/1–3
July 17	Messett	7:00 AM – 10:10 AM	67	74	100/Clear	0–1/0–1
July 28	Messett	6:40 AM – 10:25 AM	65	70	Clear/Clear	0–1/1–2

Ms. Stacey Love and Ms. Christine Beck
August 26, 2020
Page 5

SURVEY RESULTS

Least Bell's Vireo

No least Bell's vireo were observed in the survey area over the course of the surveys.

Following completion of the survey on July 17, 2020, Ms. Messett was incidentally observed a male least Bell's vireo when she was opening the gate to leave through Irvine Regional Park. The gate and vireo observation are located approximately one-mile northwest of the survey area. The male vireo was observed singing continuously (indicating that he was likely not paired) and foraging within a coast live oak (*Quercus agrifolia*) just within the boundary of Irvine Regional Park. A California Natural Diversity Database (CNDDDB) form will be submitted online by Ms. Messett but one is not included in this report because of the distance from the survey area.

The required Least Bell's Vireo Survey Data Summary Form is included in Attachment C. The incidental vireo observation is not included in this form because of its distance from the survey area. Additionally, the area of the incidental observation was not systematically surveyed so it is unknown if this male was a transient male or if he maintained a territory over the breeding season.

Other Observations

Two sensitive species were observed and/or detected in the survey area during the surveys: coastal California gnatcatcher and coastal cactus wren (*Campylorhynchus brunneicapillus sandiegensis*). The coastal California gnatcatcher is a federally listed Threatened species and a California Species of Special Concern. The coastal cactus wren is a California Species of Special Concern. Both species were observed and/or detected during multiple surveys. CNDDDB forms documenting these species will be submitted online by Ms. Messett and are included with the Results of Coastal California Gnatcatcher Survey Report (Psomas 2020).

Brown-headed cowbirds were not observed in the survey area during the surveys.

Psomas appreciates the opportunity to assist on this project. If you have any comments or questions, please contact Amber Heredia (Amber.Heredia@psomas.com) or Lindsay Messett (Lindsay.Messett@psomas.com).

Sincerely,

P S O M A S



Amber O. Heredia
Senior Project Manager



Lindsay A. Messett, CWB®
Senior Biologist

Ms. Stacey Love and Ms. Christine Beck
August 26, 2020
Page 6

I certify that the information in this Survey Report and enclosed exhibits fully and accurately represents my work.



Lindsay A. Messett, CWB®
Senior Biologist (TE 067064-3)

Enclosures: Exhibits 1–4
Attachment A – Site Photographs
Attachment B – Wildlife Compendium
Attachment C – Least Bell's Vireo Survey Data Summary Form

cc: Jo Ann Corey, corey@irwd.com
Jacob Moeder, Moeder@irwd.com

Ms. Stacey Love and Ms. Christine Beck
August 26, 2020
Page 7

REFERENCES

- Bent, A.C. 1950. Life histories of North American wagtails, shrikes, vireos, and their allies. U.S. National Museum Bulletin 197, 41 pp.
- Brown, B.T. 1993. Bell's Vireo (*Vireo bellii*). *The Birds of North America*, No. 35 (A. Poole, P. Stettenheim, and F. Gill, Eds.). Philadelphia, PA and Washington, D.C.: The Academy of Natural Sciences and AOU (respectively).
- Chapin, E. 1925. Food habits of the vireos; a family of insectivorous birds. Bulletin.1355: 1–44. Washington, D.C.: United States Department of Agriculture.
- Coues, E. 1903. Key to North American birds (5th ed.). Boston, MA: The Page Co.
- Faber, P., E. Keller, A. Sands, B. Massey. 1989. *The Ecology of Riparian Habitats of the Southern California Coastal Region: A Community Profile* (Biological Report 85 [7.27]). Washington, D.C: U.S. Fish and Wildlife Service, Research and Development, National Wetlands Research Center.
- Franzreb, K.E. 1989. *Ecology and Conservation of the Endangered Least Bell's Vireo* (Biological Report 89[1]). Sacramento, CA: USFWS, Endangered Species Office.
- Goldwasser, S. 1981. *Habitat Requirements of the Least Bell's Vireo* (Final Report, Job IV-38.1). Sacramento, CA: CDFG.
- Gray, V. And J. Greaves. 1981 (September). The Riparian Forest as Habitat for the Least Bell's Vireo (*Vireo bellii pusillus*). Paper presented at the California Riparian Systems Conference, University of California, Davis.
- Kus, B.E., and K.L. Miner. 1987. Foraging behavior of the least Bell's vireo: use of riparian and non-riparian habitats. San Diego State University, San Diego, CA. 22 pp. Unpubl. Rep.
- Miner, K. L. 1989. Foraging ecology of the Least Bell's Vireo, *Vireo bellii pusillus*. Tesis de Maestria. San Diego State University. San Diego, California. USA.
- Psomas. 2020 (August 24). *Results of the Coastal California Gnatcatcher Survey for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California*. Santa Ana, CA: Psomas.
- Regional Environmental Consultants (RECON). 1989. Comprehensive Species Management Plan for the Least Bell's Vireo (*Vireo bellii pusillus*). Prepared for San Diego Association of Governments, San Diego.
- . 1988. Draft Comprehensive Species Management Plan for the Least Bell's Vireo (Prepared for the San Diego Association of Governments). San Diego, CA: RECON.
- Salata, L.R. 1983. *Status of the Least Bell's Vireo on Camp Pendleton, California: Report on Research Done in 1983*. Laguna Niguel, CA: USFWS.
- . 1981. Least Bell's vireo research, Camp Pendleton Marine Corps Base, San Diego County, California, 1981. Unpubl. Rept., Natural Resources Officer, Camp Pendleton.

Ms. Stacey Love and Ms. Christine Beck
August 26, 2020
Page 8

U.S. Fish and Wildlife Service (USFWS). 2001 (January 19). Least Bell's Vireo Survey Guidelines. Carlsbad, CA: USFWS.

———. 1998 (May 6). *Draft Recovery Plan for the Least Bell's Vireo*. USFWS, Portland, OR. 139 pp.

———. 1994 (February 2). Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Least Bell's Vireo. *Federal Register* 59(22): 4845–4867. Washington, D.C.: USFWS.

———. 1986 (May 2). Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for the Least Bell's Vireo. *Federal Register* 51(85):16474–16482. Washington, D.C.: USFWS.

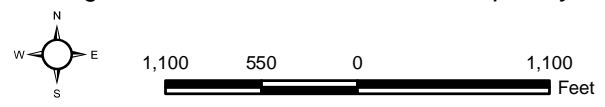
D:\Projects\3\IRW000905\MXD\LBV\ex_LV_RL_20200824.mxd



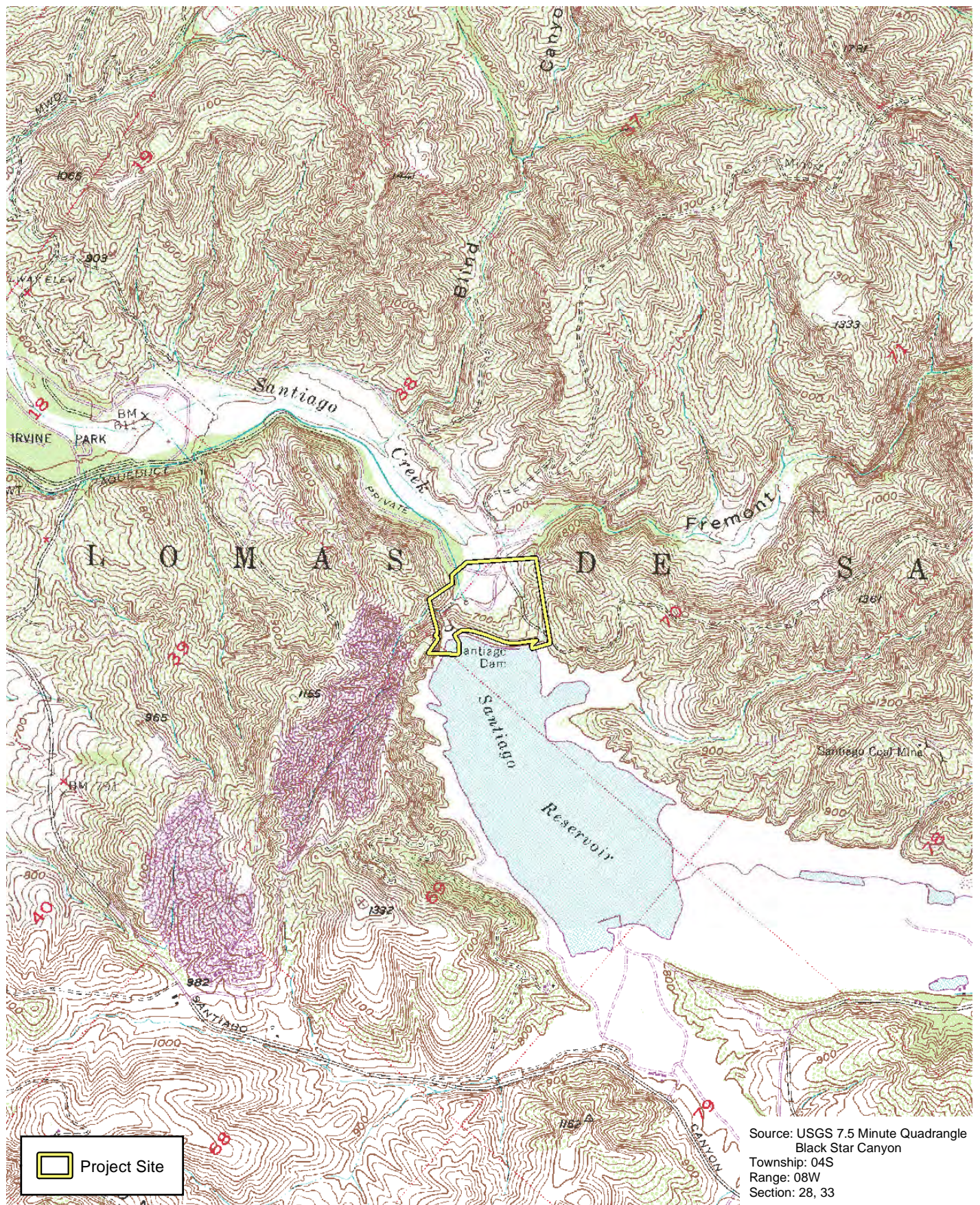
Project Location

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

Exhibit 1



D:\Projects\3IRW000905\MXD\LBVex_USGS_20200824.mxd



U.S. Geological Survey 7.5-minute Digital Quadrangle

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

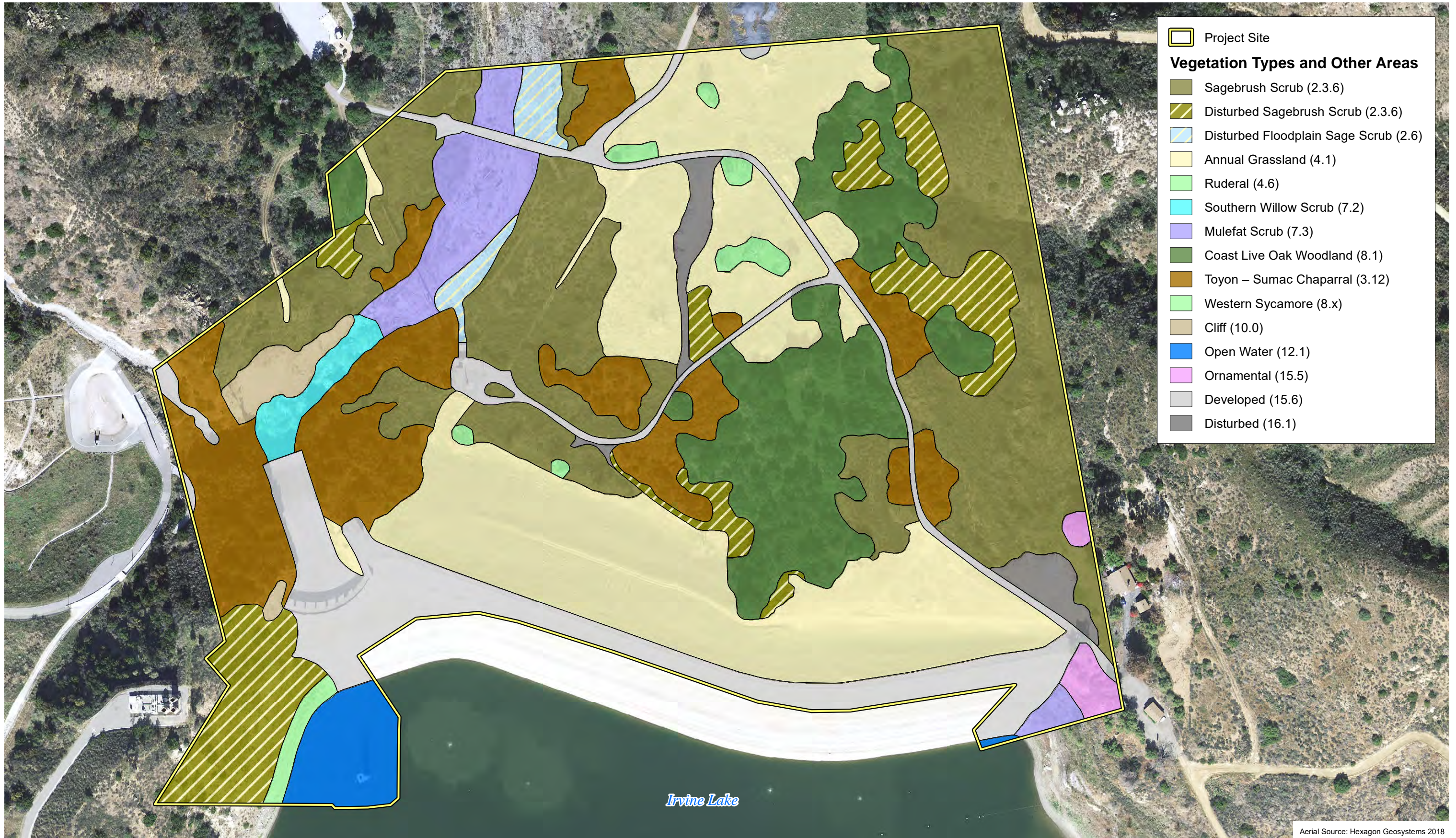
Exhibit 2



2,000 1,000 0 2,000
Feet



(Rev: 8-24-2020 RMB) R:\Projects\IRW_IRWD\3IRW000905\Graphics\LBVex_USGS.pdf



Vegetation Types and Other Areas

Santiago Creek Dam Outlet Tower and Spillway Improvement Project



Exhibit 3



(Rev: 08/24/2020 RMB) R:\Projects\IRW_IRWD\3IRW000905\Graphics\LBV\ex_Vegetation.pdf

D:\Projects\3\IRW\00905\MXD\LBV\ex_BiologicalResources_20200824.mxd



Survey Area and Biological Resources

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

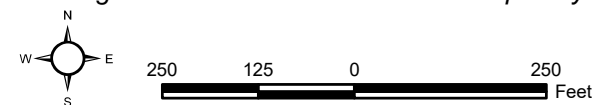


Exhibit 4



(Rev: 08/25/2020 RMB) R:\Projects\IRW_IRWD\3\IRW000905\Graphics\LBV\ex_SurveyArea_BiologicalResources.pdf

ATTACHMENT A
SITE PHOTOGRAPHS



Photo 1: Southern willow scrub located in the western portion of the survey area, looking southwest.



Photo 2: Mulefat scrub located in the western portion of the survey area, looking southwest.

Site Photographs

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

Attachment A-1





Photo 3: Mulefat scrub located in the northern portion of the survey area, looking north.



Photo 4: Overview of mulefat scrub located in the western portion of the survey area, looking west.

D:\Projects\3IRW00905\GRAPHICS\LBV\AttA-2_SitePhotographs.ai

Site Photographs

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

Attachment A-2



ATTACHMENT B
WILDLIFE COMPENDIUM

WILDLIFE SPECIES OBSERVED DURING THE SURVEYS

Species		Special Status
Scientific Name	Common Name	
BIRDS		
ANATIDAE - SWAN, GOOSE, AND DUCK FAMILY		
<i>Branta canadensis</i>	Canada goose	
ODONTOPHORIDAE - NEW WORLD QUAIL FAMILY		
<i>Callipepla californica</i>	California quail	
COLUMBIDAE - PIGEON AND DOVE FAMILY		
<i>Columba livia</i> *	rock pigeon	
<i>Zenaida macroura</i>	mourning dove	
CUCULIDAE - CUCKOO AND ROADRUNNER FAMILY		
<i>Geococcyx californianus</i>	greater roadrunner	
CAPRIMULGIDAE - NIGHTJAR FAMILY		
<i>Chordeiles acutipennis</i>	lesser nighthawk	
TROCHILIDAE - HUMMINGBIRD FAMILY		
<i>Calypte anna</i>	Anna's hummingbird	
<i>Selasphorus rufus</i>	rufous hummingbird	
CATHARTIDAE - NEW WORLD VULTURE FAMILY		
<i>Cathartes aura</i>	turkey vulture	
ACCIPITRIDAE - HAWK FAMILY		
<i>Buteo jamaicensis</i>	red-tailed hawk	
TYTONIDAE - BARN OWL FAMILY		
<i>Tyto alba</i>	barn owl	
STRIGIDAE - TYPICAL OWL FAMILY		
<i>Bubo virginianus</i>	great horned owl	
PICIDAE - WOODPECKER FAMILY		
<i>Melanerpes formicivorus</i>	acorn woodpecker	
PSITTACIDAE - PARROT FAMILY		
<i>Amazona viridigenalis</i> *	red-crowned parrot*	
TYRANNIDAE - TYRANT FLYCATCHER FAMILY		
<i>Myiarchus cinerascens</i>	ash-throated flycatcher	
<i>Tyrannus vociferans</i>	Cassin's kingbird	
VIREONIDAE - VIREO FAMILY		
<i>Vireo gilvus</i>	warbling vireo	
CORVIDAE - JAY AND CROW FAMILY		
<i>Aphelocoma californica</i>	California scrub-jay	
<i>Corvus brachyrhynchos</i>	American crow	
HIRUNDINIDAE - SWALLOW FAMILY		
<i>Petrochelidon pyrrhonota</i>	cliff swallow	
<i>Hirundo rustica</i>	barn swallow	
AEGITHALIDAE - BUSHTIT FAMILY		
<i>Psaltiriparus minimus</i>	bushtit	
TROGLODYTIDAE - WREN FAMILY		
<i>Troglodytes aedon</i>	house wren	
<i>Thryomanes bewickii</i>	Bewick's wren	
<i>Campylorhynchus brunneicapillus sandiegensis</i>	coastal cactus wren	SSC

WILDLIFE SPECIES OBSERVED DURING THE SURVEYS

Species		Special Status
Scientific Name	Common Name	
POLIOPTILIDAE - GNATCATCHER FAMILY		
<i>Polioptila caerulea</i>	blue-gray gnatcatcher	
<i>Polioptila californica</i>	California gnatcatcher	FT, SSC (subsp. californica)
SYLVIIDAE - SILVIID WARBLERS FAMILY		
<i>Chamaea fasciata</i>	wren	
MIMIDAE - MOCKINGBIRD AND THRASHER FAMILY		
<i>Toxostoma redivivum</i>	California thrasher	
<i>Mimus polyglottos</i>	northern mockingbird	
STURNIDAE - STARLING FAMILY		
<i>Sturnus vulgaris</i> *	European starling*	
FRINGILLIDAE - FINCH FAMILY		
<i>Haemorhous mexicanus</i>	house finch	
<i>Spinus psaltria</i>	lesser goldfinch	
PASSERELLIDAE - NEW WORLD SPARROW FAMILY		
<i>Pipilo maculatus</i>	spotted towhee	
<i>Melospiza crissalis</i>	California towhee	
<i>Melospiza melodia</i>	song sparrow	
ICTERIDAE - BLACKBIRDS AND ORIOLES		
<i>Icterus cucullatus</i>	hooded oriole	
PARULIDAE - WOOD-WARBLER FAMILY		
<i>Geothlypis trichas</i>	common yellowthroat	
<i>Cardellina pusilla</i>	Wilson's warbler	
CARDINALIDAE - CARDINALS AND ALLIES		
<i>Piranga ludoviciana</i>	western tanager	
<i>Pheucticus melanocephalus</i>	black-headed grosbeak	
MAMMALS		
SCIURIDAE - SQUIRREL FAMILY		
<i>Otospermophilus beecheyi</i>	California ground squirrel	
LEPORIDAE - HARE AND RABBIT FAMILY		
<i>Sylvilagus audubonii</i>	desert cottontail	
USFWS: U.S. Fish and Wildlife Service; CDFW: California Department of Fish and Wildlife		
* Non-native		
Species Status:		
Federal (USFWS) State (CDFW)		
FT Threatened SSC Species of Special Concern		

ATTACHMENT C

LEAST BELL'S VIREO SURVEY DATA SUMMARY FORM

LEAST BELL'S VIREO SURVEY DATA SUMMARY

Site Information				
Project Title:	Santiago Creek Dam Outlet Tower and Spillway Improvement Project			
Landowner:	County of Orange			
Survey Information				
Surveyors:	Lindsay Messett			Year: 2020
Survey Begin Coordinates		Survey End Coordinates		Datum
Northing:	3738817	Northing:	3739165	NAD83
Easting:	432635	Easting:	432774	NAD 83
Survey Length (Km)		Total Number of Surveys		Total Number of Survey Hours
0.40		8		21.0
Least Bell's Vireo Detection Information				

Number of males that were:

Paired:	0	Based on observation of female, nest, young, or nesting behavior (nest-building, food carrying).
Undetermined Status:	0	The total number of resident males not confirmed as paired.
Transient:	0	Only detected once despite repeated surveys, or were not detected at the same location for more than 2 weeks.
Total number of males:	0	The sum of the three categories above.

Coordinates for LBVI Territories (continue on second sheet if necessary)

[illegible]

September 27, 2022

Stacey Love
Recovery Permit Coordinator
U.S. Fish and Wildlife Service
2177 Salk Avenue, Suite 250
Carlsbad, California 92008

VIA EMAIL
Stacey_Love@fws.gov

David Mayer
Regional Biologist
South Coast Region (Region 5)
3883 Ruffin Road
San Diego, California 92123

VIA EMAIL
David.Mayer@wildlife.ca.gov

Subject: Results of Focused Presence/Absence Surveys for the Least Bell's Vireo and Southwestern Willow Flycatcher for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California

Dear Ms. Love and Mr. Mayer:

This Letter Report presents the results of focused surveys for the least Bell's vireo (*Vireo bellii pusillus*) and southwestern willow flycatcher (*Empidonax traillii extimus*) for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project (hereinafter referred to as the "project site") located in Orange County, California. The purpose of the surveys was to determine the presence or absence of the least Bell's vireo and southwestern willow flycatcher upstream of Santiago Dam. Focused surveys for least Bell's vireo were conducted downstream of Santiago Dam in Spring 2020 (Psomas 2020). A Biologist with the necessary experience and the Federal Endangered Species Act 10(a) survey permit conducted the surveys according to U.S. Fish and Wildlife Service (USFWS) protocol for these species (Sogge et al. 2010; USFWS 2001). Notification of the intent to conduct protocol-level surveys was submitted to the USFWS on April 28, 2022.

PROJECT LOCATION AND DESCRIPTION

The project site is located at Santiago Creek Dam at the northwest end of Irvine Lake in unincorporated Orange County, California (Exhibit 1). The Biological Study Area includes Santiago Creek Dam, downstream areas along Santiago Creek, areas around Irvine Lake, and upstream areas along Santiago Creek. The Biological Study Area is south of State Route (SR) 261 and east of SR-241 and Santiago Canyon Road. Surrounding land use primarily consists of undeveloped open space. Irvine Regional Park is located northwest of SR-241; Limestone Canyon Regional Park is located south of Santiago Canyon Road; and Oak Canyon Park is located at the southeast end of Irvine Lake. The closed Santiago Canyon Landfill is located adjacent to the west of Irvine Lake.

The Biological Study Area is located on the U.S. Geological Survey's (USGS') Black Star Canyon 7.5-minute quadrangle (Exhibit 2). Irvine Lake (named Santiago Creek Reservoir on the USGS) was created by constructing a dam across Santiago Creek. Santiago Creek, a

5 Hutton Centre Drive
Suite 300
Santa Ana, CA 92707

Tel 714.751.7373
Fax 714.545.8883
www.Psomas.com

Stacey Love
David Mayer
September 27, 2022
Page 2

named blueline stream, enters Irvine Lake from the east and continues downstream of the dam flowing north and then west. It has a relatively broad floodplain both above and below the dam. The slopes around the western and northern portions of the lake are relatively steep while the areas to the southeast and east include areas that are relatively flat. Three unnamed blueline streams enter the lake from the north and eight unnamed blueline streams enter the lake from the west, southeast, and south. One unnamed blueline stream enters the Biological Study Area in the northwest, downstream of the Dam, while Fremont Canyon Creek merges with Santiago Creek downstream of the dam. Elevations in the Biological Study Area range from approximately 657 to 996 feet above mean sea level.

The Biological Study Area is in the Central/Coastal Subregion of the Natural Communities Conservation Plan/Habitat Conservation Plan (NCCP/HCP). Santiago Creek Dam and its associated structures are located within designated “Non-Reserve Open Space”, while Habitat Reserve and Conservation Easements surround the lake; a Special Linkage is located southeast of the lake. The purpose of this plan is to provide regional protection and recovery of multiple species and habitat while allowing compatible land use and appropriate development. Irvine Ranch Water District (IRWD)¹ is a participating jurisdiction and, as such, will comply with the terms of the NCCP/HCP Implementation Agreement.

The IRWD and Serrano Water District are jointly proposing to abandon the existing Santiago Creek Dam outlet tower and construct a new inclined outlet structure to be located on the left abutment of the existing dam. Additionally, based on feedback from the Division of Safety of Dams, the dam spillway requires structural improvements. Existing structures include the dam crest, the intake tower in Irvine Lake, the spillway channel, the control houses, the energy dissipater structure, the aboveground outlet pipe, and the dam crest access road. The project is currently in the design phase. Staging areas are currently planned to be placed in disturbed areas on the east side of Irvine Lake, adjacent to where Santiago Creek flows into the lake. Focused surveys were conducted along Santiago Creek upstream of the lake to determine whether least Bell’s vireo or southwestern willow flycatcher are present or absent adjacent to the proposed staging areas on the east side of the lake.

SURVEY AREA

A variety of vegetation types occur in the Biological Study Area, including sagebrush scrub, disturbed sagebrush scrub, sagebrush-coyote bush scrub, southern cactus scrub, disturbed southern cactus scrub, disturbed floodplain sage scrub, toyon-sumac chaparral, annual grassland, ruderal, riparian herb, southern willow scrub, mulefat scrub, disturbed mulefat scrub, southern sycamore riparian woodland/southern coast live oak riparian forest, southern black willow forest, disturbed southern black willow forest, southern black willow forest/riparian herb, coast live oak woodland, western sycamore, and vegetated fluctuating shoreline. Other landcover includes cliff, open water, fluctuating shoreline, perennial stream, ornamental, developed, and disturbed areas.

The survey area for the least Bell’s vireo includes all suitable riparian habitats (i.e., riparian herb, southern willow scrub, mulefat scrub, disturbed mulefat scrub, southern sycamore riparian woodland/southern coast live oak riparian forest, southern black willow forest, disturbed southern black willow forest, and southern black willow forest/riparian herb) upstream of the dam (Exhibit 3). The Biologist reduced the survey area boundary where offsite areas were not accessible due to property boundaries (i.e., Santiago Landfill), topography (i.e., cliff), and where there was no suitable habitat (Exhibit 4). Representative site photos are included in Attachment A.

¹ The Santiago County Water District (SCWD) was also a participating jurisdiction in the NCCP/HCP. The SCWD consolidated with IRWD in 2006.

Stacey Love
David Mayer
September 27, 2022
Page 3

BACKGROUND

Least Bell's Vireo

Least Bell's vireo is a federally and State listed Endangered species. It is one of four subspecies of the Bell's vireo (*Vireo bellii*); this subspecies is the westernmost of the four subspecies, breeding entirely in southwestern California and northwestern Baja California, Mexico. Although not well known, the winter range of the least Bell's vireo is believed to be the west coast of Central America from southern Sonora, Mexico, south to northwestern Nicaragua, including the cape region of Baja California, Mexico (Brown 1993). The least Bell's vireo arrives in southern California from mid-March to early April and departs for its wintering grounds in August to mid-September.

The least Bell's vireo is a small, gray migratory songbird that is about 4.5 to 5 inches long. It has short, rounded wings and a short, straight bill for catching insects. Feathers are gray above and pale below. "The least Bell's vireo is easily recognized on the breeding grounds by its distinctive song" (Coues 1903). Males establish and defend territories through counter-singing, chasing, and sometimes physically confronting neighboring males (USFWS 1998).

Least Bell's vireos consume a "wide variety of insects including bugs, beetles, grasshoppers, moths, and particularly caterpillars" (Chapin 1925; Bent 1950). They obtain prey through foliage gleaning (picking prey from leaves or bark) and through hovering (removing prey from vegetation surfaces while fluttering in the air) (Salata 1983; Miner 1989). Vireos will forage in all layers of the canopy but tend to concentrate their foraging in the lower to mid-strata from 9 to 18 feet in height (Miner 1989). Vireos forage in both riparian and adjacent upland habitat (Salata 1983; Kus and Miner 1987).

The least Bell's vireo is an obligate riparian species (i.e., nests exclusively in riparian habitat) and prefers early-successional habitat. On its breeding grounds, it typically inhabits structurally diverse woodlands along watercourses. In California, least Bell's vireo habitat consists of southern willow scrub, mule fat scrub, sycamore alluvial woodland, coast live oak riparian forest, arroyo willow riparian forest, and cottonwood bottomland forest (Faber et al. 1989). Although least Bell's vireos typically nest in willow-dominated areas, plant species composition does not appear to be as important in nest site selection as habitat structure (USFWS 1998). The most critical factor in habitat structure is the presence of a dense understory shrub layer from approximately 3 to 6 feet above ground, where nests are typically placed, and a dense stratified canopy for foraging (Goldwasser 1981; Gray and Greaves 1981; Salata 1981, 1983; RECON 1989). This structure is typically met by willows (*Salix* spp.) that are between four and ten years of age (RECON 1988; Franzreb 1989). As stands mature, the tall canopy tends to shade out the shrub layer, making the sites less suitable for nesting; however, least Bell's vireos will continue to use such areas if patches of understory exist (USFWS 1998). Vireo nest placement tends to occur in openings and along the riparian edge, where exposure to sunlight allows the development of shrubs (USFWS 1998). The riparian ecosystems required by the vireo are dynamic systems; and the scouring of vegetation during periodic floods is required to create the low, dense vegetation favored by the bird (USFWS 1986).

Males arrive on the breeding grounds about one week prior to females, and older birds arrive before first-year birds. Pair formation occurs within a few days, and pairs build a nest together over the next four to five days. The typical clutch size for least Bell's vireo is four eggs, which are incubated for approximately 14 days. The young remain in the nest for approximately 10 to 12 days. Adults continue to care for the young for at least two weeks post-fledging, as the family groups forage over larger areas. The

Stacey Love
David Mayer
September 27, 2022
Page 4

largest causes of least Bell's vireo nest failure are nest parasitism² by brown-headed cowbird (*Molothrus ater*) and egg predation; nests also fail due to vegetation clearing, trampling by humans and cattle, ant infestations, and rainstorms. Least Bell's vireo will make up to five nesting attempts per season, assuming adequate energy resources; typically, a pair will successfully fledge young from one to two nests per season. Few nests are initiated after mid-July (USFWS 1998). The least Bell's vireo often shows a strong site fidelity, returning not just to the same drainage and the same territory but even to the same tree where it previously nested. However, vireos may move locations due to habitat loss or failure to attract a mate (USFWS 1998).

The least Bell's vireo was formerly considered a common breeder in riparian habitats throughout the Central Valley and other low-elevation riverine systems throughout California and Baja California, Mexico (USFWS 1998). At the time of its listing, the least Bell's vireo had been eliminated from 95 percent of its former range (USFWS 1986). The decline of least Bell's vireo is attributed to the widespread loss of riparian woodlands coupled with the increase in brown-headed cowbirds (USFWS 1986). Loss of riparian habitat has been attributed to flood control and water development projects, agricultural development, livestock grazing, spread of invasive exotic plant species, degradation of habitat by off-road vehicles, and urban development. With the implementation of intensive brown-headed cowbird management programs, the least Bell's vireo numbers have dramatically increased (USFWS 1998). Vireos have also expanded their range into areas where they were formerly extirpated.

On February 2, 1994, the USFWS issued their final determination of Critical Habitat for the least Bell's vireo, identifying approximately 37,560 acres as Critical Habitat in Santa Barbara, Ventura, Los Angeles, San Bernardino, Riverside, and San Diego Counties (USFWS 1994). The Biological Study Area is not located in designated Critical Habitat for this species.

Southwestern Willow Flycatcher

Southwestern willow flycatcher is a federally and State listed Endangered species. It is one of four subspecies of the willow flycatcher (*Empidonax traillii*) (Sedgwick 2000); the breeding range of the southwestern willow flycatcher includes southern California, southern Nevada, southern Utah, Arizona, New Mexico, western Texas, and extreme northwestern Mexico (i.e., Baja California del Norte, Sonora, and Chihuahua) (USFWS 2002). The winter range of the southwestern willow flycatcher includes the tropical regions of southern Mexico, Central America, and northern South America (Sogge et al. 2010).

The southwestern willow flycatcher arrives in southern California in mid-May and departs for its wintering grounds in late July to mid-September. The spring migration of southwestern willow flycatcher is earlier than that of the northern subspecies of willow flycatchers (Unitt 1984; USFWS 1993). As a result, the presence of more abundant subspecies that migrate through the range of the southwestern willow flycatcher during its breeding season complicates surveys for nesting southwestern willow flycatchers. Similarly, the other subspecies may pass through southern California during their fall migration in July and August while the southwestern willow flycatcher is still breeding; therefore, there is only a short period from June 15 to July 20 when the presence of a willow flycatcher in southern California can be determined to be southwestern subspecies of the willow flycatcher (USFWS 2002).

² Nest parasitism is when one species lays its eggs in another species' nest and the young are raised by the host bird, often to the detriment of their biological young.

Stacey Love
David Mayer
September 27, 2022
Page 5

The southwestern willow flycatcher occurs in dense riparian habitat along rivers, streams, and other wetlands. Typically, southwestern willow flycatchers nests in thickets of trees and shrubs 13 to 23 feet or greater in height, with a dense understory and a high percentage of canopy cover (USFWS 1995). The dense patches are often interspersed with small openings, open water, or small areas of shorter/sparse vegetation that create a mosaic of habitat that is not uniformly dense (USFWS 2002). In almost all cases, slow-moving or still surface water and/or saturated soil is present during wet or non-drought years (USFWS 2002). Plant species composition of low to mid-elevation sites ranges from monotypic stands to mixtures of broadleaf trees and shrubs including willows, cottonwoods (*Populus* spp.), coast live oak (*Quercus agrifolia*), ash (*Fraxinus* sp.), alder (*Alnus* sp.), blackberry (*Rubus* sp.), and nettle (*Urtica* sp.) (USFWS 2002). They can also nest in riparian habitats dominated by a mix of native and introduced species, such as Russian olive (*Elaeagnus angustifolia*) and tamarisk (*Tamarix* sp.) or in monotypic stands of these introduced species; however, southwestern willow flycatchers rarely nest in giant reed (*Arundo donax*) (USFWS 2002). Overall, nest site selection appears to be driven more by plant structure than species composition (Sogge et al. 2010).

In California, the southwestern willow flycatcher was once considered common in all lower elevation riparian areas in the southern third of the state including the Los Angeles Basin, Riverside/San Bernardino area, and San Diego County (Wheelock 1912; Willett 1912; Grinnell and Miller 1944; Unitt 1984, 1987). The primary cause of the southwestern willow flycatcher's decline is the loss and modification of riparian habitat (USFWS 2002). With the increase in urbanization and agricultural development, these systems have declined or have been further degraded by reduction in water flow, interruption of the natural hydrogeological events or cycles, physical modifications to streams, removal of riparian vegetation, invasion by non-native invasive plant species, livestock grazing, and recreation (USFWS 2002). Additionally, agriculture and certain other types of development can increase foraging habitat for brown-headed cowbirds in proximity to southwestern willow flycatcher breeding habitat, which can increase nest parasitism³ (USFWS 2002). Flycatcher habitat and their populations are threatened further with additional stressors such as introductions of tamarisk leaf beetle (*Diorhabda carinulata*), which defoliates tamarisk, and shot hole borer beetle (*Euwallacea* sp.)/Fusarium (*Fusarium euwallaceae*), a beetle/fungi complex that causes tree die-off (USFWS 2017). All of these threats to the flycatcher and its habitat vary in severity over the southwest; and, at any given location, multiple stressors are likely to be at work, with cumulative and synergistic effects (USFWS 2017).

On January 3, 2013, the USFWS published a Revised Final Critical Habitat for the southwestern willow flycatcher (USFWS 2013). This final rule designated 208,973 acres (1,227 stream miles) in 24 Management Units on a combination of federal, State, tribal, and private lands in California, Nevada, Utah, Arizona, and New Mexico. In California, critical habitat was designated in Inyo, Kern, Los Angeles, Riverside, Santa Barbara, San Bernardino, San Diego, and Ventura Counties. The Biological Study Area is not located within the 2013 Revised Critical Habitat for the southwestern willow flycatcher.

SURVEY METHODS

The USFWS protocol for the least Bell's vireo requires that at least eight surveys be conducted from April 10 to July 31 with a ten-day interval between each site visit (USFWS 2001). The USFWS protocol for the southwestern willow flycatcher requires a total of five surveys, with the first survey conducted between May 15 and May 31; the second and third surveys between June 1 and June 24; and the fourth and fifth surveys between June 25 and July 17 (Sogge et al. 2010). Psomas Senior Biologist Jonathan Aguayo (USFWS Permit No. TE 96514A-3) conducted all focused surveys for least Bell's vireo and

³ Nest parasitism is when one species lays its eggs in another species' nest and the young are raised by the host bird, often to the detriment of their biological young.

Stacey Love
David Mayer
September 27, 2022
Page 6

southwestern willow flycatcher. Because the survey area contained more than 80 acres of suitable habitat, 2 days were required to cover the entire survey area for each of the 8 visits. Mr. Aguayo conducted focused surveys for the least Bell's vireo on April 13, 14, 24, and 25; May 12, 13, 25, and 26; June 7, 8, 21, and 22; and July 1, 4, 13, and 14, 2022. Focused surveys for southwestern willow flycatcher were conducted on May 25 and 26; June 7, 8, 21, and 22; and July 1, 4, 13, and 14, 2022. Per guidance issued from the USFWS, focused surveys for least Bell's vireo and southwestern willow flycatcher were not conducted concurrently. During the last five surveys, surveys were conducted for southwestern willow flycatcher first; surveys for least Bell's vireo followed (described below).

Mr. Aguayo systematically surveyed the riparian habitats by walking slowly and methodically along their margins; habitat is narrow enough that transects through the habitat were not necessary. Following the willow flycatcher protocol, recorded vocalizations were used to elicit a response from any potentially territorial southwestern willow flycatchers. As the least Bell's vireo survey protocol does not require the playback of least Bell's vireo vocalizations, recorded least Bell's vireo vocalizations were not used during the surveys. Any least Bell's vireos or southwestern willow flycatchers observed were recorded, and their locations were mapped in the field. Because of the high density of least Bell's vireos in the survey area, great care was taken in the field to verify that adjacent territories were occupied by distinct males. Although not required during a presence/absence survey, time was also taken to visually observe the individuals detected to identify their sex and age to determine the fate of the territory over the course of the surveys (e.g., juveniles observed indicate successful nesting).

All surveys were conducted under optimal weather conditions during early morning hours when bird activity is at its peak (Table 1). As mentioned above, the surveys were conducted sequentially, with surveys for the southwestern willow flycatcher conducted first (i.e., first thing in the morning) and surveys for the least Bell's vireo conducted afterwards. The survey area was split into two mainly linear routes; therefore, southwestern willow flycatchers were surveyed from the starting point to the end, and least Bell's vireos were surveyed on the way back. All bird species detected during the survey were recorded, including notable observations of special status species or other birds (e.g., brown-headed cowbird). A complete list of wildlife species observed during the surveys is included in Attachment B.

Stacey Love
David Mayer
September 27, 2022
Page 7

TABLE 1
SUMMARY OF SURVEY DATA AND CONDITIONS FOR LEAST BELL'S
VIREO AND SOUTHWESTERN WILLOW FLYCATCHER SURVEYS

Survey No.	Survey Dates	Survey for Flycatcher (F)/ Vireo (V)	Time	Air Temperature (°F)		Cloud Cover (%) Start/End	Wind (mph)
				Start	End		
1A	April 13, 2022	V	6:10 AM–11:00 AM	43	61	0/0	2–4
1B	April 14, 2022	V	6:12 AM–11:00 AM	45	63	0/0	1–5
2A	April 24, 2022	V	5:55 AM–11:00 AM	54	79	0/0	3–7
2B	April 25, 2022	V	6:02 AM–11:00 AM	57	83	0/0	2–6
3A	May 12, 2022	V	5:44 AM–11:00 AM	55	73	15/5	3–6
3B	May 13, 2022	V	5:44 AM–11:00 AM	56	79	0/0	3–4
4A	May 25, 2022	F	5:34 AM–8:22 AM	56	68	40/20	1–2
		V	8:22 AM–11:00 AM	68	74	20/10	2–5
4B	May 26, 2022	F	5:31 AM–8:30 AM	55	62	0/0	1–2
		V	8:30 AM–11:00 AM	62	71	0/0	2–4
5A	June 7, 2022	F	5:38 AM–8:37 AM	56	66	60/10	1–2
		V	8:37 AM–11:00 AM	66	75	10/5	2–4
5B	June 8, 2022	F	5:36 AM–8:34 AM	56	66	30/0	1–2
		V	8:34 AM–11:00 AM	66	75	0/0	2–5
6A	June 21, 2022	F	5:40 AM–8:38 AM	62	74	0/0	1–3
		V	8:38 AM–11:00 AM	74	82	10/10	3–6
6B	June 22, 2022	F	5:35 AM–8:37 AM	65	77	60/40	2–4
		V	8:37 AM–10:52 AM	77	83	40/30	4–5
7A	July 1, 2022	F	5:32 AM–8:36 AM	58	68	100/0	1–3
		V	8:36 AM–11:00 AM	68	76	0/0	3–5
7B	July 4, 2022	F	5:50 AM–8:46 AM	53	62	20/0	2–3
		V	8:46 AM–11:00 AM	62	70	0/0	3–4
8A	July 13, 2022	F	5:52 AM–8:44 AM	55	62	15/0	2–3
		V	8:44 AM–11:00 AM	62	74	0/0	3–7
8B	July 14, 2022	F	6:14 AM–8:38 AM	59	66	10/0	3–6
		V	8:38 AM–10:49 AM	66	73	0/0	6–8

°F: degrees Fahrenheit; mph: miles per hour

SURVEY RESULTS

Least Bell's Vireo

A total of 29 least Bell's vireo locations were observed during the focused surveys (Exhibit 4). A total of 27 locations consisted of territories occupied by breeding pairs, 1 location consisted of a territory occupied by an unpaired male, and 1 location consisted of a transient male. A territory is defined as a singing male observed or heard consistently in the same general location on multiple surveys (i.e., defending a territory). A transient male is one observed during only one survey. The territory points shown on Exhibit 4 represent either a nest location or the general area where least Bell's vireos were observed and/or detected most of the time.

Stacey Love
David Mayer
September 27, 2022
Page 8

A total of 25 pairs were observed to have successfully nested; a total of 38 juveniles were observed during focused surveys. The survey results include only the number of nestlings/fledglings that were visually or aurally confirmed; additional fledglings may have been undetected in the habitat.

Details on each location are described below and summarized in Table 2. Representative species and habitat photos are included in Attachment A. The California Natural Diversity Database (CNDDB) form is included in Attachment C and will be submitted online by Mr. Aguayo. The required Least Bell's Vireo Survey Data Summary Form is included in Attachment D.

Location 1: On the first survey (April 13, 2022), a male was observed foraging and moving around in the southern portion of the survey area. On the second survey (April 24, 2022), a pair was confirmed; the pair was observed foraging and moving around together. On the third and fourth surveys (May 12 and 25, 2022), the pair was observed briefly before staying hidden and quiet, indicating they were most likely nesting. On the fifth survey (June 7, 2022), the pair was observed feeding two juveniles; therefore, this territory was successful. On the sixth survey (June 21, 2022), the pair was observed foraging with the two juveniles. On the seventh and eighth surveys (July 1 and 13, 2022), the pair was observed foraging and moving around together. Habitat in this location consists of southern black willow forest dominated by Goodding's black willow (*Salix gooddingii*) with arroyo willow (*Salix lasiolepis*), blue elderberry (*Sambucus nigra* ssp. *caerulea*), and mule fat (*Baccharis salicifolia* ssp. *salicifolia*).

Location 2: On the first and second surveys (April 13 and 24, 2022), a pair was observed foraging and moving around together in the southern portion of the survey area. On the third and fourth surveys (May 12 and 25, 2022), the pair was observed briefly before staying hidden and quiet, indicating they were most likely nesting. On the fifth survey (June 7, 2022), the pair was observed feeding two juveniles; therefore, this territory was successful. On the sixth survey (June 21, 2022), the pair was observed foraging with the two juveniles. On the seventh and eighth surveys (July 1 and 13, 2022), the pair was observed foraging and moving around together. Habitat in this location consists of southern black willow forest dominated by Goodding's black willow with arroyo willow, blue elderberry, and mule fat.

Location 3: On the first survey (April 13, 2022), a male was observed foraging and moving around in the southern portion of the survey area. On the second survey (April 24, 2022), a pair was confirmed; the pair was observed foraging and moving around together. On the third survey (May 12, 2022), the pair was observed briefly before staying hidden and quiet, indicating they were most likely nesting. On the fourth survey (May 25, 2022), the male was detected singing briefly and the female was not observed, indicating there may be an active nest. On the fifth survey (June 7, 2022), the pair was observed foraging with two juveniles; therefore, this territory was successful. The male was observed foraging and moving around during the sixth, seventh, and eighth surveys (June 21; July 1 and 13, 2022). Habitat in this location consists of southern black willow forest dominated by Goodding's black willow with blue elderberry and mule fat.

TABLE 2
SUMMARY OF LEAST BELL’S VIREO OBSERVATIONS

LBV Location Number	Survey 1 (April 13 and 14)	Survey 2 (April 24 and 25)	Survey 3 (May 12 and 13)	Survey 4 (May 25 and 26)	Survey 5 (June 7 and 8)	Survey 6 (June 21 and 22)	Survey 7 (July 1 and 4)	Survey 8 (July 13 and 14)	Nest Success ^a
1	Male observed foraging and moving around	Pair observed foraging and moving around together	Pair observed briefly; staying hidden and quiet	Pair observed briefly; staying hidden and quiet	Pair feeding two juveniles	Pair foraging with two juveniles	Pair observed foraging and moving around together	Pair observed foraging and moving around together	Fledged two juveniles
2	Pair observed foraging and moving around together	Pair observed foraging and moving around together	Pair observed briefly; staying hidden and quiet	Pair observed briefly; staying hidden and quiet	Pair feeding two juveniles	Pair foraging with two juveniles	Pair observed foraging and moving around together	Pair observed foraging and moving around together	Fledged two juveniles
3	Male observed foraging and moving around	Pair observed foraging and moving around together	Pair observed briefly; staying hidden and quiet	Male singing briefly; female not observed	Pair foraging with two juveniles	Male observed foraging and moving around	Male observed foraging and moving around	Male observed foraging and moving around	Fledged two juveniles
4	Male observed foraging and moving around	Male observed foraging and staying hidden; followed by female observed separately foraging	Male observed briefly; staying hidden and quiet	Male observed briefly; staying hidden and quiet	Pair feeding two juveniles	Pair foraging with two juveniles	Pair observed foraging and moving around together	Pair observed foraging and moving around together	Fledged two juveniles
5	Pair observed foraging and moving around together	Pair observed foraging and moving around together	Pair observed briefly; staying hidden and quiet	Pair observed briefly; staying hidden and quiet	Pair carrying food into vegetation	Pair foraging with one juvenile	Pair observed foraging and moving around together	Male observed foraging and moving around	Fledged one juvenile
6	Pair observed foraging and moving around together	Pair observed foraging and moving around together	Female carrying nest material into vegetation; male following close by	Pair observed incubating nest	Pair feeding nestlings in the nest	Pair feeding three juveniles	Pair foraging with three juveniles	Not observed	Fledged three juveniles
7	Male observed foraging and moving around	Male observed foraging and moving around	Male observed foraging and moving around	Male observed foraging and moving around	Pair carrying food into vegetation	Not observed	Pair feeding two juveniles	Pair foraging with two juveniles	Fledged two juveniles
8	Male observed foraging and moving around	Male observed briefly; staying hidden and quiet	Male observed briefly; staying hidden and quiet	Pair observed briefly; staying hidden and quiet	Pair feeding one juvenile	Male observed foraging and moving around	Male observed foraging and moving around	Not observed	Fledged one juvenile
9	Male observed foraging and moving around	Pair observed briefly; staying hidden and quiet	Pair observed briefly; staying hidden and quiet	Pair observed briefly; staying hidden and quiet	Pair carrying food into vegetation	Pair feeding one juvenile	Male observed foraging and moving around	Male observed foraging and moving around	Fledged one juvenile
10	Pair observed foraging and moving around together	Pair observed foraging and moving around together	Pair observed briefly; staying hidden and quiet	Pair feeding nestling in the nest	Pair feeding one juvenile	Pair foraging with one juvenile	Male observed foraging and moving around	Male observed foraging and moving around	Fledged one juvenile
11	Male observed foraging and moving around	Pair observed briefly; staying hidden and quiet	Male observed foraging and staying hidden; followed by female observed separately foraging	Male observed briefly; staying hidden and quiet	Male observed foraging and moving around	Male observed foraging and moving around	Male observed foraging and moving around	Male observed foraging and moving around	Unknown
12	Male observed foraging and moving around	Pair observed foraging and moving around together	Pair observed briefly; staying hidden and quiet	Pair observed briefly; staying hidden and quiet	Pair feeding one juvenile	Pair foraging with one juvenile	Male observed foraging and moving around	Male observed foraging and moving around	Fledged one juvenile
13	Pair observed foraging and moving around together	Pair observed foraging and moving around together	Male carrying food into vegetation	Pair carrying food into vegetation	Pair feeding two juveniles	Pair observed foraging and moving around together	Male observed foraging and moving around	Not observed	Fledged two juveniles
14	Male observed foraging and moving around	Pair observed foraging and moving around together	Pair observed briefly; staying hidden and quiet	Pair observed briefly; staying hidden and quiet	Pair carrying food; juveniles begging vocalizations heard	Pair observed foraging and moving around together	Pair observed foraging and moving around together	Not observed	Fledged two juveniles
15	Male observed foraging and moving around	Pair observed briefly; staying hidden and quiet	Male observed briefly; staying hidden and quiet	Male observed briefly; staying hidden and quiet	Pair defending two juveniles from California scrub jay	Male observed foraging and moving around	Not observed	Not observed	Fledged two juveniles
16	Male observed foraging and moving around	Pair observed briefly; staying hidden and quiet	Not observed	Male observed briefly; staying hidden and quiet	Not observed	Male observed briefly; staying hidden and quiet	Pair observed briefly; staying hidden and quiet	Pair observed foraging and moving around together	Unknown
17	Male observed foraging and moving around	Male observed foraging and moving around	Not observed	Not observed	Not observed	Not observed	Not observed	Not observed	Not applicable; unpaired male
18	Male observed foraging and moving around	Pair observed briefly; staying hidden and quiet	Male observed briefly; staying hidden and quiet	Male observed briefly; staying hidden and quiet	Male observed briefly; staying hidden and quiet	Pair foraging with one juvenile	Pair observed foraging and moving around together	Pair observed foraging and moving around together	Fledged one juvenile
19	Male observed foraging and moving around	Pair observed briefly; staying hidden and quiet	Male observed briefly; staying hidden and quiet	Male observed foraging and staying hidden; followed by female observed separately foraging	Pair entering vegetation; nestling begging vocalizations heard	Pair carrying food; juveniles begging vocalizations heard	Pair observed foraging and moving around together	Male observed foraging and moving around	Fledged an unknown number of juveniles
20	Pair observed foraging and moving around together	Pair observed briefly; staying hidden and quiet	Pair observed briefly; staying hidden and quiet	Pair feeding two juveniles	Pair foraging with two juveniles	Pair foraging with one juvenile	Not observed	Not observed	Fledged two juveniles

Stacey Love
David Mayer
September 27, 2022
Page 11

Location 4: On the first survey (April 13, 2022), a male was observed foraging and moving around in the southern portion of the survey area. On the second survey (April 24, 2022), a pair was confirmed; a male was observed foraging before staying hidden then a female was observed foraging, indicating they were most likely incubating a nest. On the third and fourth surveys (May 12 and 25, 2022), the male was observed briefly before staying hidden and quiet, indicating he was most likely nesting. On the fifth survey (June 7, 2022), the pair was observed feeding two juveniles; therefore, this territory was successful. On the sixth survey (June 21, 2022), the pair was observed foraging with the two juveniles. On the seventh and eighth surveys (July 1 and 13, 2022), the pair was observed foraging and moving around together. Habitat in this location consists of southern black willow forest dominated by Goodding's black willow with mule fat.

Location 5: On the first and second surveys (April 13 and 24, 2022), a pair was observed foraging and moving around together in the southern portion of the survey area. On the third and fourth surveys (May 12 and 25, 2022), the pair was observed briefly before staying hidden and quiet, indicating they were most likely nesting. On the fifth survey (June 7, 2022), the pair was observed carrying food to a presumed nest location within riparian vegetation, indicating there was an active nest with nestlings nearby. On the sixth survey (June 21, 2022), the pair was observed foraging with one juvenile; therefore, this territory was successful. On the seventh survey (July 1, 2022), the pair was observed foraging and moving around together. On the eighth survey (July 13, 2022), the male was observed foraging and moving around. Habitat in this location consists of southern black willow forest dominated by Goodding's black willow with arroyo willow, mule fat, and saltcedar (*Tamarix ramosissima*).

Location 6: On the first and second surveys (April 13 and 24, 2022), a pair was observed foraging and moving around together in the southern portion of the survey area. On the third survey (May 12, 2022), a pair was confirmed; the female was observed carrying nesting material to a presumed nest location within riparian vegetation with the male following close by, indicating there was an active nest nearby. On the fourth survey (May 25, 2022), the pair was observed incubating a nest in a blue elderberry. On the fifth survey (June 7, 2022), the pair was observed feeding nestlings on the nest. On the sixth survey (June 21, 2022), the nest was confirmed to have successfully fledged young; the pair was observed feeding three juveniles near the nest location. On the seventh survey (July 1, 2022), the pair was observed foraging with three juveniles. On the eighth survey (July 13, 2022), no vireos were detected at this location. Habitat in this location consists of southern black willow forest dominated by Goodding's black willow with arroyo willow, blue elderberry, mule fat, and saltcedar.

Location 7: On the first, second, third, and fourth surveys (April 13 and 24; May 12 and 25, 2022), a male was observed foraging and moving around within dense vegetation in the southern portion of the survey area. On the fifth survey (June 7, 2022), a pair was confirmed; the pair was observed carrying food to a presumed nest location within riparian vegetation, indicating there was an active nest with nestlings nearby. On the sixth survey (June 21, 2022), no vireos were detected at this location. On the seventh survey (July 1, 2022), the pair was observed feeding two juveniles; therefore, this territory was successful. On the eighth survey (July 13, 2022), the pair was observed foraging with the two juveniles. Habitat in this location consists of southern black willow forest dominated by Goodding's black willow with arroyo willow, mule fat, and saltcedar.

Stacey Love
David Mayer
September 27, 2022
Page 12

Location 8: On the first survey (April 13, 2022), a male was observed foraging and moving around in the southern portion of the survey area. On the second and third surveys (April 25 and May 12, 2022), the male was observed briefly before staying hidden and quiet, indicating that he was possibly paired. On the fourth survey (May 25, 2022), a pair was confirmed; the pair was observed briefly before staying hidden and quiet, indicating they were most likely nesting. On the fifth survey (June 7, 2022), the pair was observed feeding one juvenile; therefore, this territory was successful. On the sixth and seventh surveys (June 21, and July 1, 2022), the male was observed foraging and moving around. On the eighth survey (July 13, 2022), no vireos were detected at this location. Habitat in this location consists of southern black willow forest/riparian herb dominated by Goodding's black willow with arroyo willow, mule fat, and saltcedar.

Location 9: On the first survey (April 13, 2022), a male was observed foraging and moving around in the southwestern portion of the survey area. On the second survey (April 24, 2022), a pair was confirmed; the pair was observed briefly before staying hidden and quiet, indicating they were most likely nesting. On the third and fourth surveys (May 12 and 25, 2022), the pair was again observed briefly before staying hidden and quiet, indicating there was a nest nearby. On the fifth survey (June 7, 2022), the pair was observed carrying food to a presumed nest location within riparian vegetation, indicating there was an active nest with nestlings nearby. On the sixth survey (June 21, 2022), the pair was observed feeding one juvenile; therefore, this territory was successful. On the seventh and eighth surveys (July 1 and 13, 2022), the male was observed foraging and moving around. Habitat in this location consists of southern black willow forest and riparian herb dominated by Goodding's black willow with arroyo willow, mule fat, and saltcedar.

Location 10: On the first and second surveys (April 13 and 24, 2022), a pair was observed foraging and moving around together in the southwestern portion of the survey area. On the third survey (May 12, 2022), the pair was observed briefly before staying hidden and quiet, indicating they were most likely nesting. On the fourth survey (May 25, 2022), the pair was observed feeding a nestling in a nest within a Goodding's black willow. On the fifth survey (June 7, 2022), the nest was confirmed to have successfully fledged young; the pair was observed feeding one juvenile. On the sixth survey (June 21, 2022), the pair was observed foraging with one juvenile. On the seventh and eighth surveys (July 1 and 13, 2022), the male was observed foraging and moving around. Habitat in this location consists of disturbed southern black willow forest dominated by Goodding's black willow with mule fat.

Location 11: On the first survey (April 13, 2022), a male was observed foraging in the middle portion of the survey area. On the second survey (April 24, 2022), a pair was confirmed; the pair was observed briefly before staying hidden and quiet, indicating they were most likely nesting. On the third survey (May 12, 2022), the male was observed foraging and then staying hidden followed by a female observed foraging, indicating they were most likely incubating a nest. On the fourth survey (May 25, 2022), the male was observed briefly before staying hidden and quiet. On the fifth, sixth, seventh, and eighth surveys (June 7 and 21; July 1 and 13, 2022), the male was observed foraging and moving around. No nestlings or fledglings were detected during the surveys; therefore, it is unknown if this territory was successful. Habitat in this location consists of disturbed mulefat scrub with scattered mule fat, coyote brush (*Baccharis pilularis* ssp. *consanguinea*), California sagebrush (*Artemisia californica*), and saltcedar.

Stacey Love
David Mayer
September 27, 2022
Page 13

Location 12: On the first survey (April 13, 2022), a male was observed foraging and moving around in the middle portion of the survey area. On the second survey (April 24, 2022), a pair was confirmed; the pair was observed foraging and moving around together. On the third and fourth surveys (May 12 and 25, 2022), the pair was observed briefly before staying hidden and quiet, indicating they were most likely nesting. On the fifth survey (June 7, 2022), the pair was observed feeding one juvenile; therefore, this territory was successful. On the sixth survey (June 21, 2022), the pair was observed foraging with one juvenile. On the seventh and eighth surveys (July 1 and 13, 2022), the male was observed foraging and moving around. Habitat in this location consists of disturbed mulefat scrub with scattered mule fat, saltcedar, and grayish shortpod mustard (*Hirschfeldia incana*).

Location 13: On the first and second surveys (April 13 and 24, 2022), a pair was observed foraging and moving around together in the middle portion of the survey area. On the third survey (May 12, 2022), the male was observed carrying food to a presumed nest location within riparian vegetation. On the fourth survey (May 25, 2022), the pair was observed carrying food to a presumed nest location within dense vegetation, indicating there was an active nest with nestlings nearby. On the fifth survey (June 7, 2022), the pair was observed feeding two juveniles; therefore, this territory was successful. On the sixth survey (June 21, 2022), the pair was observed foraging and moving around together. On the seventh survey (July 1, 2022), the male was observed foraging and moving around. On the eighth survey (July 13, 2022), no vireos were detected at this location. Habitat in this location consists of disturbed mulefat scrub with mule fat, coyote brush, saltcedar, and grayish shortpod mustard.

Location 14: On the first survey (April 13, 2022), a male was observed foraging and moving around in the middle portion of the survey area. On the second survey (April 24, 2022), a pair was confirmed; the pair was observed foraging and moving around together. On the third and fourth surveys (May 12 and 25, 2022), the pair was observed briefly before staying hidden and quiet, indicating they were most likely nesting. On the fifth survey (June 7, 2022), the pair was observed carrying food and juvenile food begging vocalizations were heard; therefore, this territory was successful. On the sixth and seventh surveys (June 21 and July 1, 2022), the pair was observed foraging and moving around together. On the eighth survey (July 13, 2022), no vireos were detected at this location. Habitat in this location consists of disturbed mulefat scrub with mule fat, coyote brush, California sagebrush, and saltcedar.

Location 15: On the first survey (April 14, 2022), a male was observed foraging in the eastern portion of the survey area. On the second survey (April 25, 2022), a pair was confirmed; the pair was observed briefly before staying hidden and quiet, indicating they were most likely nesting. On the third and fourth surveys (May 13 and 26, 2022), the male was observed briefly before staying hidden. On the fifth survey (June 8, 2022), the pair was observed defending two juveniles from a California scrub jay (*Aphelocoma californica*); therefore, this territory was successful. On the sixth survey (June 22, 2022), the male was observed foraging and moving around. On the seventh and eighth surveys (July 4 and 14, 2022), no vireos were detected at this location. Habitat in this location consists of southern sycamore riparian woodland with of a closed riparian canopy dominated by western sycamore (*Platanus racemosa*). Other species in the tree canopy include Goodding's black willow, arroyo willow, Fremont cottonwood (*Populus fremontii* ssp. *fremontii*), and coast live oak.

Stacey Love
David Mayer
September 27, 2022
Page 14

Location 16: On the first survey (April 14, 2022), a male was observed foraging in the eastern portion of the survey area. On the second survey (April 25, 2022), a pair was confirmed; the pair was observed briefly before staying hidden and quiet, indicating they were most likely nesting. On the third and fifth surveys (May 13 and June 8, 2022), no vireos were detected at this location. On the fourth and sixth survey (May 26 and June 22, 2022), the male was observed briefly before staying hidden, indicating he was most likely nesting. On the seventh survey (July 4, 2022), the pair was observed briefly before staying hidden and quiet, indicating they were most likely nesting. On the eighth survey (July 14, 2022), the pair was observed foraging and moving around together. No nestlings or fledglings were detected during the surveys; therefore, it is unknown if this territory was successful. Habitat in this location consists of southern sycamore riparian woodland dominated by western sycamore with Goodding's black willow, arroyo willow, Fremont cottonwood, and mule fat.

Location 17: On the first and second surveys (April 14 and 25, 2022), a male was observed foraging and moving around. No vireos were detected during subsequent surveys. Therefore, this location was categorized as an unpaired male. Habitat in this location consists of southern sycamore riparian woodland dominated by western sycamore with Goodding's black willow, arroyo willow, Fremont cottonwood, and mule fat.

Location 18: On the first survey (April 14, 2022), a male was observed foraging in the eastern portion of the survey area. On the second survey (April 25, 2022), a pair was confirmed; the pair was observed briefly before staying hidden and quiet, indicating they were most likely nesting. On the third, fourth, and fifth surveys (May 13 and 26; June 8, 2022), the male was observed briefly. On the sixth survey (June 22, 2022), the pair was observed foraging with one juvenile; therefore, this territory was successful. On the seventh and eighth surveys (July 4 and 14, 2022), the pair was observed foraging and moving around together. Habitat in this location consists of southern black willow forest dominated by Goodding's black willow with arroyo willow, western sycamore, Fremont cottonwood, and mule fat.

Location 19: On the first survey (April 14, 2022), a male was observed foraging in the eastern portion of the survey area. On the second survey (April 25, 2022), a pair was confirmed; the pair was observed briefly before staying hidden and quiet, indicating they were most likely nesting. On the third survey (May 13, 2022), the male was observed briefly before staying hidden. On the fourth survey (May 26, 2022), a male was observed foraging before staying hidden then a female was observed foraging, indicating they were most likely incubating a nest. On the fifth survey (June 8, 2022), the pair was observed entering the same general area of riparian vegetation and nestling food begging vocalizations were heard, indicating there was a nest. On the sixth survey (June 22, 2022), the pair was observed carrying food and juvenile food begging vocalizations were heard; therefore, this territory was successful. On the seventh survey (July 4, 2022), the pair was observed foraging and moving around together. On the eighth survey (July 14, 2022), the male was observed foraging and moving around. Habitat in this location consists of southern black willow forest dominated by Goodding's black willow with mule fat and saltcedar.

Location 20: On the first survey (April 14, 2022), a pair was observed foraging and moving around in the middle portion of the survey area. On the second and third surveys (April 25 and May 13, 2022), the pair was observed briefly before staying hidden and quiet, indicating they were most likely nesting. On the fourth survey (May 26, 2022), the pair was observed feeding two juveniles; therefore, this territory was successful. On the fifth survey (June 8, 2022), the pair was observed foraging with the two juveniles. On the sixth survey (June 22, 2022), the pair was observed foraging with one juvenile. On the seventh and eighth surveys (July 4 and July 14,

Stacey Love
David Mayer
September 27, 2022
Page 15

2022), no vireos were detected at this location. Habitat in this location consists of disturbed southern black willow forest dominated by Goodding's black willow with arroyo willow, mule fat, and saltcedar.

Location 21: On the first survey (April 14, 2022), a pair was observed foraging and moving around in the middle portion of the survey area. On the second and third surveys (April 25 and May 13, 2022), the pair was observed briefly before staying hidden and quiet, indicating they were most likely nesting. On the fourth survey (May 26, 2022), the pair was observed carrying food into riparian vegetation, indicating there was an active nest with nestlings nearby. On the fifth survey (June 8, 2022), the pair was observed feeding two juveniles; therefore, this territory was successful. On the sixth survey (June 22, 2022), the pair was observed foraging with two juveniles. On the seventh survey (July 4, 2022), the pair was observed foraging and moving around; a juvenile was observed foraging in the vicinity of the pair. On the eighth survey (July 14, 2022), the pair was observed foraging and moving around together. Habitat in this location consists of riparian herb and disturbed mulefat scrub dominated by mule fat with Goodding's black willow, arroyo willow, and saltcedar.

Location 22: On the first survey (April 14, 2022), a male was observed foraging in the middle portion of the survey area. On the second survey (April 25, 2022), a pair was confirmed; the pair was observed briefly before staying hidden and quiet, indicating they were most likely nesting. On the third and fourth surveys (May 13 and 26, 2022), the male was observed briefly before staying hidden and quiet. On the fifth survey (June 8, 2022), the pair was observed entering riparian vegetation and nestling food begging vocalizations were heard, indicating there was a nest. On the sixth and seventh surveys (June 22 and July 4, 2022), the male was observed briefly. On the eighth survey (July 14, 2022), the pair was observed foraging and moving around and a juvenile was observed foraging in the vicinity of the pair; therefore, this territory was successful. Habitat in this location consists of disturbed southern black willow forest dominated by Goodding's black willow with mule fat and saltcedar.

Location 23: On the first survey (April 14, 2022), a pair was observed foraging and moving around in the middle portion of the survey area. On the second, third, and fourth surveys (April 25; May 13 and 26, 2022), the male was observed briefly before staying hidden and quiet, indicating he was most likely nesting. On the fifth survey (June 8, 2022), the pair was observed carrying food into riparian vegetation, indicating there was an active nest with nestlings nearby. On the sixth survey (June 22, 2022), the pair was observed foraging with the two juveniles; therefore, this territory was successful. On the seventh survey (July 4, 2022), the male was observed foraging and moving around. On the eighth survey (July 14, 2022), no vireos were detected at this location. Habitat in this location consists of disturbed southern black willow forest dominated by Goodding's black willow, and saltcedar.

Location 24: On the first survey (April 14, 2022), a male was observed foraging in the middle portion of the survey area. On the second survey (April 25, 2022), a pair was confirmed; the pair was observed briefly before staying hidden and quiet, indicating they were most likely nesting. On the third and fourth surveys (May 13 and 26, 2022), the male was observed briefly before staying hidden and quiet. On the fifth survey (June 8, 2022), the pair was observed feeding one juvenile; therefore, this territory was successful. On the sixth survey (June 22, 2022), the pair was observed foraging and moving around. On the seventh and eighth surveys (July 4 and 14, 2022), no vireos were detected at this location. Habitat in this location consists of disturbed southern black willow forest dominated by Goodding's black willow and saltcedar.

Stacey Love
David Mayer
September 27, 2022
Page 16

Location 25: On the first, second, and third surveys (April 14 and 25; May 13, 2022), a pair was observed briefly before staying hidden and quiet in the middle portion of the survey area, indicating they were most likely nesting. On the fourth survey (May 26, 2022), the pair was observed feeding two juveniles; therefore, this territory was successful. On the fifth survey (June 8, 2022), the pair was observed foraging with the two juveniles. On the sixth survey (June 22, 2022), the male was observed foraging and moving around. On the seventh survey (July 4, 2022), the male was observed foraging and moving around; a juvenile was observed foraging in the vicinity of the male. On the eighth survey (July 14, 2022), no vireos were detected at this location. Habitat in this location consists of disturbed southern black willow forest dominated by Goodding's black willow with mule fat and saltcedar.

Location 26: On the first and second surveys (April 14 and 25, 2022), a pair was observed briefly before staying hidden and quiet, indicating they were most likely nesting. On the third survey (May 13, 2022), the pair was observed feeding one juvenile; therefore, this territory was successful. On the fourth survey (May 26, 2022), the male was observed briefly. On the fifth survey (June 8, 2022), the pair was observed foraging and moving around together. On the sixth survey (June 22, 2022), the male was observed foraging and moving around. On the seventh survey (July 4, 2022), the pair was observed foraging and moving around together. On the eighth survey (July 14, 2022), no vireos were detected at this location. Habitat in this location consists of disturbed southern black willow forest dominated by Goodding's black willow and saltcedar.

Location 27: On the first survey (April 14, 2022), a male was observed foraging in the middle portion of the survey area. On the second survey (April 25, 2022), a pair was confirmed; the pair was observed briefly before staying hidden and quiet, indicating they were most likely nesting. On the third and fourth surveys (May 13 and 26, 2022), the male was observed briefly before staying hidden and quiet. On the fifth survey (June 8, 2022), the pair was observed carrying food and juvenile food begging vocalizations were heard; therefore, this territory was successful. On the sixth survey (June 22, 2022), the pair was observed foraging and moving around; a juvenile was observed foraging in the vicinity of the pair. On the seventh survey (July 4, 2022), the male was observed foraging and moving around. On the eighth survey (July 14, 2022), no vireos were detected at this location. Habitat in this location consists of southern black willow forest/riparian herb dominated by Goodding's black willow, cocklebur (*Xanthium strumarium*), white sweetclover (*Melilotus albus*), alkali-mallow (*Malvella leprosa*), and grayish shortpod mustard.

Location 28: On the first survey (April 14, 2022), a male was observed foraging in the western portion of the survey area. On the second survey (April 25, 2022), a pair was confirmed; the pair was observed briefly before staying hidden and quiet, indicating they were most likely nesting. On the third and fourth surveys (May 13 and 26, 2022), the pair was observed briefly before staying hidden and quiet. On the fifth survey (June 8, 2022), the pair was observed feeding one juvenile; therefore, this territory was successful. On the sixth survey (June 22, 2022), the pair was observed foraging and moving around together. On the seventh survey (July 4, 2022), the male was observed foraging and moving around. On the eighth survey (July 14, 2022), no vireos were detected at this location. Habitat in this location consists of disturbed southern black willow forest dominated by Goodding's black willow with mule fat and saltcedar.

Stacey Love
David Mayer
September 27, 2022
Page 17

Location 29: On the second survey (April 24, 2022), a male was observed foraging in the eastern portion of the survey area. No vireos were observed in this location on any of the remaining surveys; therefore, this location was presumed to be a transient individual.

Southwestern Willow Flycatcher

No southwestern willow flycatchers were detected during the surveys.

Six migrant willow flycatchers of undetermined subspecies were observed/detected in the survey area during the May/early June focused surveys (Exhibit 4). Three migrant willow flycatchers of undetermined subspecies were observed foraging and moving around together in the middle portion of the survey area on May 12, 2022. The same three migrant willow flycatchers were observed foraging and moving around together in the middle portion of the survey area the following day (May 13, 2022), north of the previous observation location. During the first willow flycatcher focused survey (May 25, 2022), one migrant willow flycatcher of undetermined subspecies was observed. During the second willow flycatcher focused survey (June 7 and June 8, 2022), two migrant willow flycatchers of undetermined subspecies were observed/detected. Of the six migrant willow flycatchers observed, two of the individuals responded to recorded playback by singing “fitzbew” multiple times while four individuals were detected singing unsolicited “fitzbew” vocalization. No willow flycatchers were detected during subsequent surveys; therefore, the observations were all assumed to be migrants of the other subspecies. Per USFWS protocol requirements, the Willow Flycatcher Survey and Detection Form (showing negative survey results) is included in Attachment E.

OTHER OBSERVATIONS

Seven other special status species were observed and/or detected in the survey area during the surveys: Belding’s orange-throated whiptail (*Aspidoscelis hyperythra beldingi*, California Department of Fish and Wildlife [CDFW] Watch List), coastal whiptail (*Aspidoscelis hyperythra*, California Species of Special Concern), white-tailed kite (*Elanus leucurus*, California Fully Protected), coastal cactus wren (*Campylorhynchus brunneicapillus sandiegensis*, California Species of Special Concern), grasshopper sparrow (*Ammodramus savannarum*, California Species of Special Concern), yellow-breasted chat (*Icteria virens*, California Species of Special Concern), and yellow warbler (*Setophaga petechia*, California Species of Special Concern) (Exhibit 4). These species are tracked by the CDFW’s CNDDDB. The coastal cactus wren CNDDDB form was included with the *Results of Focused Presence/Absence Surveys for the Coastal California Gnatcatcher Report* (Psomas 2022) and was submitted online by Lindsay Messett. CNDDDB forms for the remaining species are included in Attachment C and will be submitted online by Mr. Aguayo.

One to two brown-headed cowbirds were observed by Mr. Aguayo during the April focused surveys. No brown-headed cowbirds were observed by Mr. Aguayo during the May, June, and July focused surveys.

Stacey Love
David Mayer
September 27, 2022
Page 18

Psomas appreciates the opportunity to assist on this project. If you have any comments or questions, please contact Amber Heredia (Amber.Heredia@psomas.com) or Jonathan Aguayo (Jonathan.Aguayo@psomas.com).

Sincerely,

P S O M A S



Amber O. Heredia
Senior Project Manager, Resource Management



Jonathan Aguayo
Senior Biologist

I certify that the information in this survey report and enclosed exhibits fully and accurately present my work.



Jonathan Aguayo
Senior Biologist
(TE96514A-3)

Enclosures: Exhibits 1–4
Attachment A – Site Photographs
Attachment B – Wildlife Compendium
Attachment C – California Natural Diversity Database Forms
Attachment D – Least Bell’s Vireo Survey Data Summary Form
Attachment E – Willow Flycatcher Survey and Detection Form

cc: Kellie Welch, Welch@irwd.com
Jacob Moeder, Moeder@irwd.com

Stacey Love
David Mayer
September 27, 2022
Page 19

REFERENCES

- Bent, A.C. 1950. Life histories of North American wagtails, shrikes, vireos, and their allies. U.S. National Museum Bulletin 197, 41 pp.
- Brown, B.T. 1993. Bell's Vireo (*Vireo bellii*). *The Birds of North America*, No. 35 (A. Poole, P. Stettenheim, and F. Gill, Eds.). Philadelphia, PA and Washington, D.C.: The Academy of Natural Sciences and AOU (respectively).
- Chapin, E. 1925. Food habits of the vireos; a family of insectivorous birds. Bulletin.1355: 1–44. Washington, D.C.: United States Department of Agriculture.
- Coues, E. 1903. Key to North American birds (5th ed.). Boston, MA: The Page Co.
- Faber, P., E. Keller, A. Sands, B. Massey. 1989. *The Ecology of Riparian Habitats of the Southern California Coastal Region: A Community Profile* (Biological Report 85 [7.27]). Washington, D.C: U.S. Fish and Wildlife Service, Research and Development, National Wetlands Research Center.
- Franzreb, K.E. 1989. *Ecology and Conservation of the Endangered Least Bell's Vireo* (Biological Report 89[1]). Sacramento, CA: USFWS, Endangered Species Office.
- Goldwasser, S. 1981. *Habitat Requirements of the Least Bell's Vireo* (Final Report, Job IV-38.1). Sacramento, CA: CDFG.
- Gray, V. And J. Greaves. 1981 (September). The Riparian Forest as Habitat for the Least Bell's Vireo (*Vireo bellii pusillus*). Paper presented at the California Riparian Systems Conference, University of California, Davis.
- Grinnell, J. and A.H. Miller. 1944. The distribution of the birds of California. *Pacific Coast Avifauna* No. 27. Cooper Ornithological Club: Berkeley, California.
- Kus, B.E., and K.L. Miner. 1987. Foraging behavior of the least Bell's vireo: use of riparian and non-riparian habitats. San Diego State University, San Diego, CA. 22 pp. Unpubl. Rep.
- Miner, K. L. 1989. Foraging ecology of the Least Bell's Vireo, *Vireo bellii pusillus*. Tesis de Maestria. San Diego State University. San Diego, California. USA.
- Psomas. 2022 (July 25). *Results of Focused Presence/Absence Surveys for the Coastal California Gnatcatcher for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California*. Santa Ana, CA: Psomas.
- . 2020 (August 26). *Results of Focused Presence/Absence Surveys for the Least Bell's Vireo for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California*. Santa Ana, CA: Psomas.
- Regional Environmental Consultants (RECON). 1989. Comprehensive Species Management Plan for the Least Bell's Vireo (*Vireo bellii pusillus*). Prepared for San Diego Association of Governments, San Diego.

Stacey Love
David Mayer
September 27, 2022
Page 20

- . 1988. Draft Comprehensive Species Management Plan for the Least Bell's Vireo (Prepared for the San Diego Association of Governments). San Diego, CA: RECON.
- Salata, L.R. 1983. *Status of the Least Bell's Vireo on Camp Pendleton, California: Report on Research Done in 1983*. Laguna Niguel, CA: USFWS.
- . 1981. Least Bell's vireo research, Camp Pendleton Marine Corps Base, San Diego County, California, 1981. Unpubl. Rept., Natural Resources Officer, Camp Pendleton.
- Sedgwick, J.A. 2000. Willow Flycatcher (*Empidonax traillii*). *The Birds of North America*, No. 533 (A. Poole and F. Gill, Eds.). Philadelphia, PA: The Academy of Natural Sciences.
- Sogge, M.K., D. Ahlers, and S.J. Sferra. 2010. A Natural History Summary and Survey Protocol for the Southwestern Willow Flycatcher: U.S. Geological Survey Techniques and Methods (prepared in cooperation with the Bureau of Reclamation and the U.S. Fish and Wildlife Service). Menlo Park, CA: USGS, Western Region.
- Unitt, P. 1987. *Empidonax traillii extimus*: An Endangered Subspecies. *Western Birds*, 18(3): 137–162. San Diego, CA: Western Field Ornithologists.
- . 1984. *The Birds of San Diego County* (Memoir 13). San Diego, CA: San Diego Society of Natural History.
- U.S. Fish and Wildlife Service (USFWS). 2017 (August). 12-Month Findings on Petitions To List a Species and Remove a Species From the Federal Lists of Endangered and Threatened Wildlife and Plants; Notice of 12-month Petition Findings (Beaverpond Marstonia and Southwestern Willow Flycatcher).
- . 2013 (January 3). Endangered and Threatened Wildlife and Plants: Final Rule, Designation of Critical Habitat for Southwestern Willow Flycatcher. *Federal Register*. 78(2): 344–534. Washington, D.C.: USFWS.
- . 2002. *Southwestern Willow Flycatcher Recovery Plan*. Albuquerque, NM: USFWS.
- . 2001 (January 19). Least Bell's Vireo Survey Guidelines. Carlsbad, CA: USFWS.
- . 1998 (May 6). *Draft Recovery Plan for the Least Bell's Vireo*. USFWS, Portland, OR. 139 pp.
- . 1995 (February 27). Endangered and Threatened Wildlife and Plants: Final Rule, Determining Endangered Status for the Southwestern Willow Flycatcher. *Federal Register*. 60(38): 10693–10715. Washington, D.C.: USFWS.
- . 1994 (February 2). Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Least Bell's Vireo. *Federal Register* 59(22): 4845–4867. Washington, D.C.: USFWS.
- . 1993 (July 23). Endangered and Threatened Wildlife and Plants; Proposed Rule to List the Southwestern Willow Flycatcher as Endangered With Critical Habitat. *Federal Register* 58(140): 39495–39522. Washington, D.C.: USFWS.

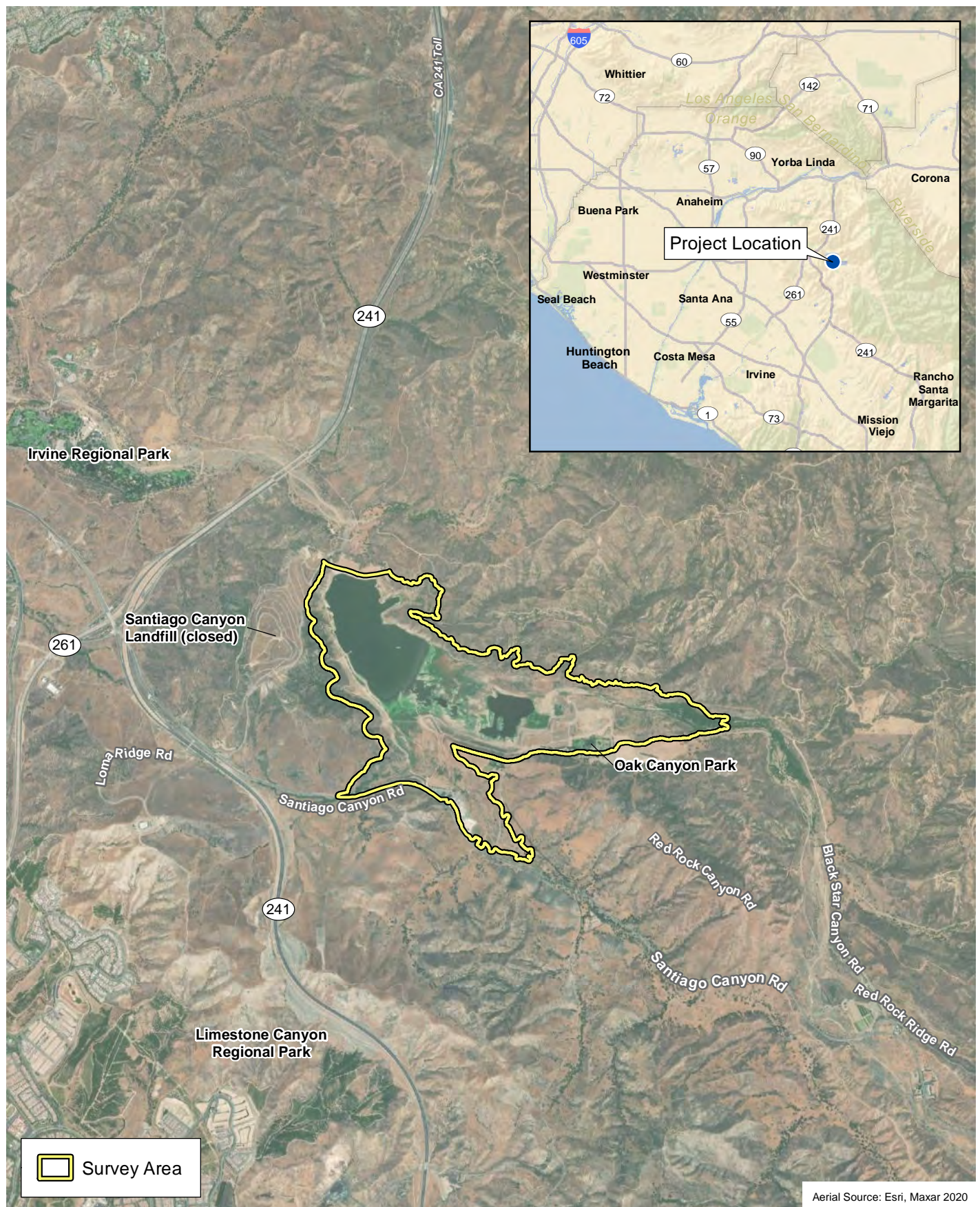
Stacey Love
David Mayer
September 27, 2022
Page 21

———. 1986 (May 2). Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for the Least Bell's Vireo. *Federal Register* 51(85):16474–16482. Washington, D.C.: USFWS.

Wheelock, I.G. 1912. Birds of California: an introduction to more than three hundred common birds of the state and adjacent islands. A.C. McClurg and Company, Chicago, Illinois.

Willett, G. 1912. Birds of the Pacific Slope of Southern California. *Pacific Coast Avifauna* No. 7. Cooper Ornithological Club.

D:\Projects\3IRW\010200\MXDLBV_SWF\ex_RL_LV_20220829.mxd



Regional Location and Local Vicinity

Exhibit 1

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

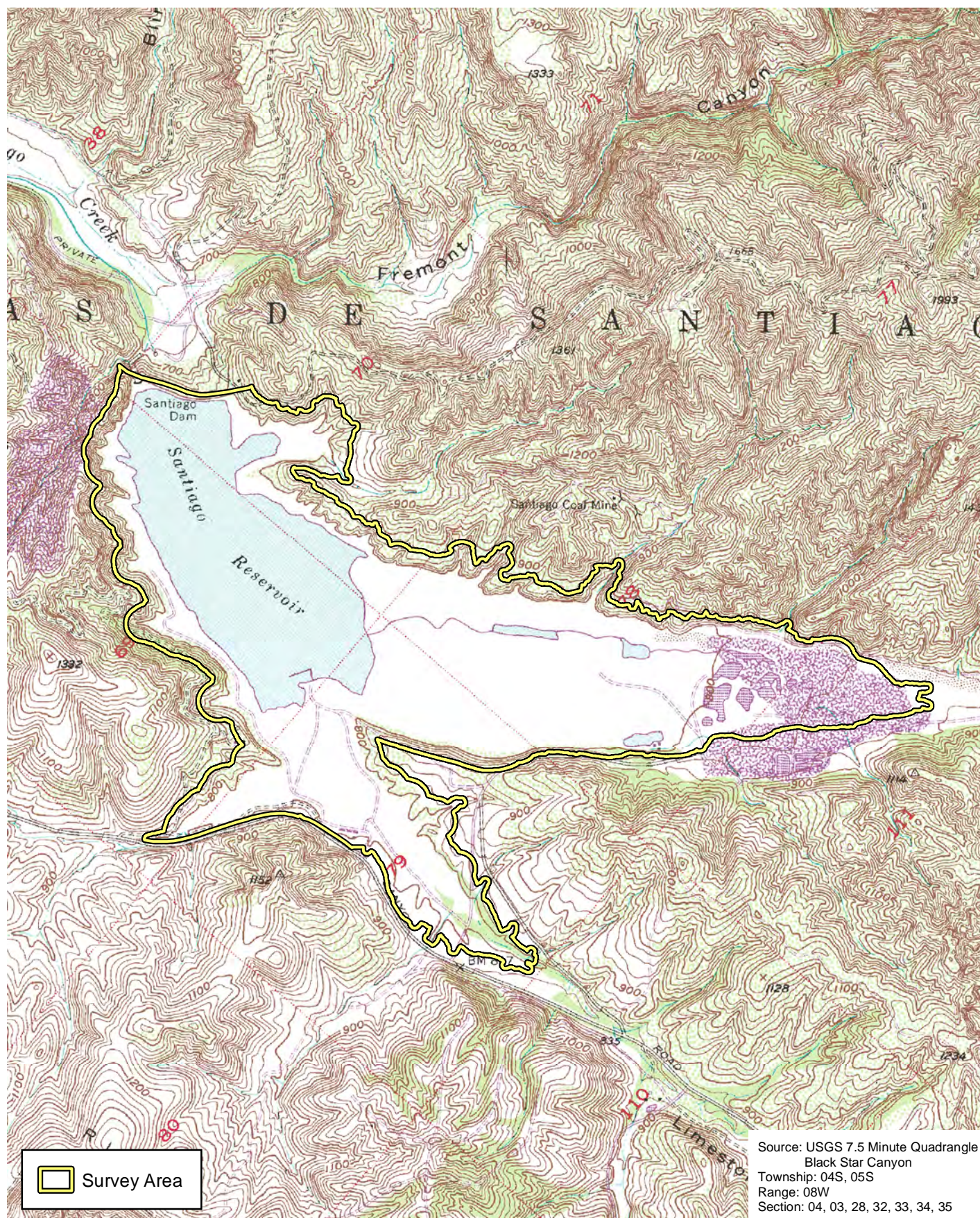


4,000 2,000 0 4,000
Feet



(Rev: 08/29/2022 MMD) R:\Projects\IRW_IRWD\3IRW010200\Graphics\LBV_SWF\ex_RL_LV.pdf

D:\Projects\3IRW010200\MXD\LBV_SWFlex_SurveyArea_USGS_20220829.mxd



Riparian Bird Survey Area

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

Exhibit 2

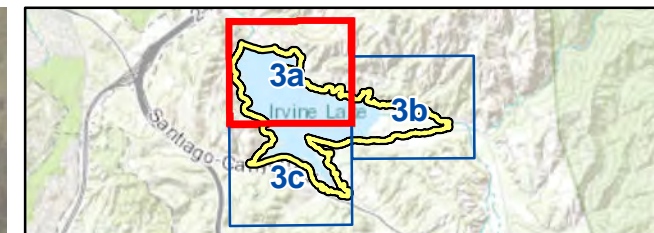
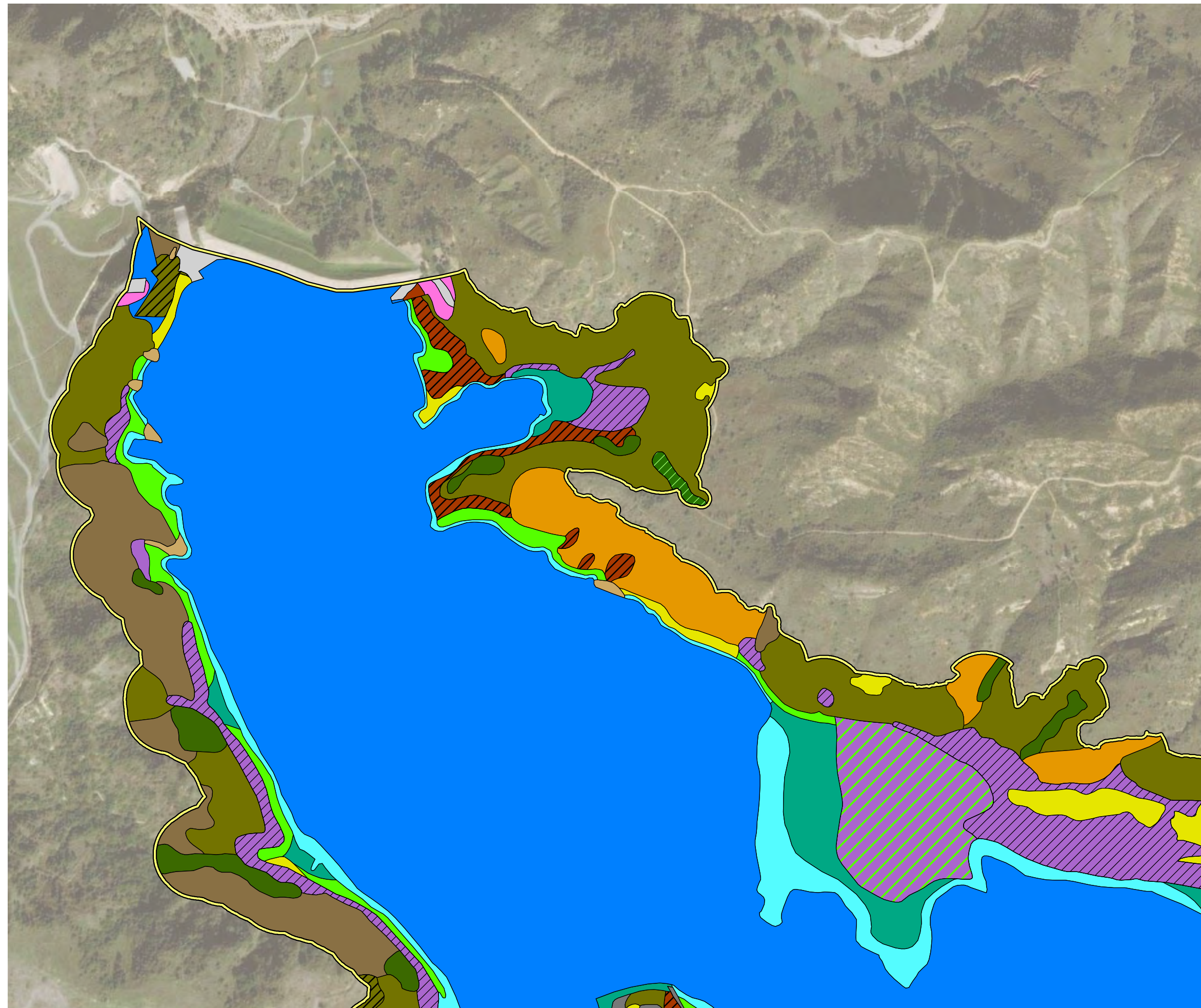


2,000 1,000 0 2,000
Feet

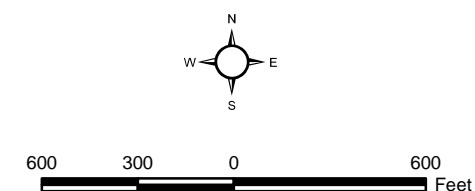


(Rev: 9-27-2022 JVR) R:\Projects\IRW_IRWD\3IRW010200\Graphics\LBV_SWFlex_SurveyArea_USGS.pdf

D:\Projects\3IRW010200MXD\LBV_SWFlex_BioResources_20220829.mxd



- Survey Area
- Vegetation Types and Other Areas**
- Sagebrush Scrub (2.3.6)
 - Disturbed Sagebrush Scrub (2.3.6)
 - Southern Cactus Scrub (2.4)
 - Toyon - Sumac Chaparral (3.12)
 - Ruderal (4.6)
 - Riparian Herb (7.1)
 - Mulefat Scrub (7.3)
 - Disturbed Mulefat Scrub (7.3)
 - Southern Sycamore Riparian Woodland/Southern Coast Live Oak Riparian Forest (7.4/7.5)
 - Southern Black Willow Forest (7.7)
 - Disturbed Southern Black Willow Forest (7.7)
 - Southern Black Willow Forest/Riparian Herb (7.7/7.1)
 - Coast Live Oak Woodland (8.1)
 - Cliff (10)
 - Open Water (12.1)
 - Fluctuating Shoreline (12.2)
 - Vegetated Fluctuating Shoreline (12.2)
 - Ornamental (15.5)
 - Developed (15.6)
 - Disturbed (16.1)



Aerial Source: Esri, Maxar 2020

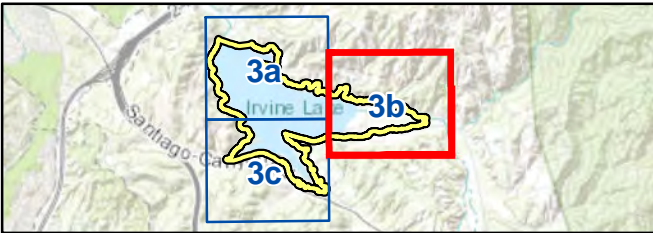
Biological Resources Exhibit 3a

*Santiago Creek Dam Outlet Tower
and Spillway Improvement Project*

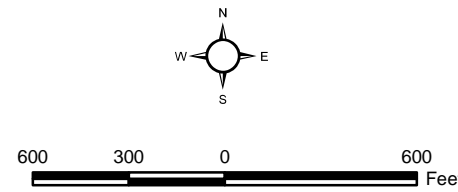


(Rev: 08/29/2022 MMD) R:\Projects\IRW_IRWD\3IRW010200\Graphics\LBV_SWFlex_BioResources.pdf

D:\Projects\3\IRW010200MMD\LBV_SWFlex_BioResources_20220829.mxd



- Survey Area
- Vegetation Types and Other Areas**
- Sagebrush Scrub (2.3.6)
 - Sagebrush - Coyote Brush Scrub (2.3.12)
 - Ruderal (4.6)
 - Riparian Herb (7.1)
 - Disturbed Mulefat Scrub (7.3)
 - Southern Sycamore Riparian Woodland (7.4)
 - Southern Black Willow Forest (7.7)
 - Disturbed Southern Black Willow Forest (7.7)
 - Coast Live Oak Woodland (8.1)
 - Open Water (12.1)
 - Fluctuating Shoreline (12.2)
 - Vegetated Fluctuating Shoreline (12.2)
 - Perennial Stream (13.1)
 - Ornamental (15.5)
 - Developed (15.6)
 - Disturbed (16.1)



Aerial Source: Esri, Maxar 2020

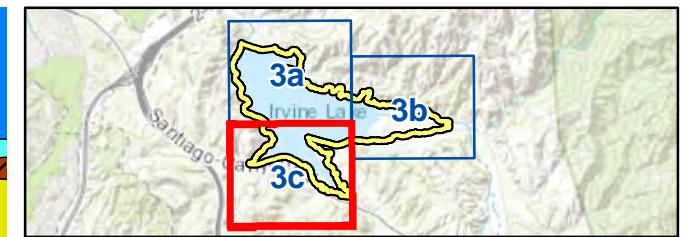
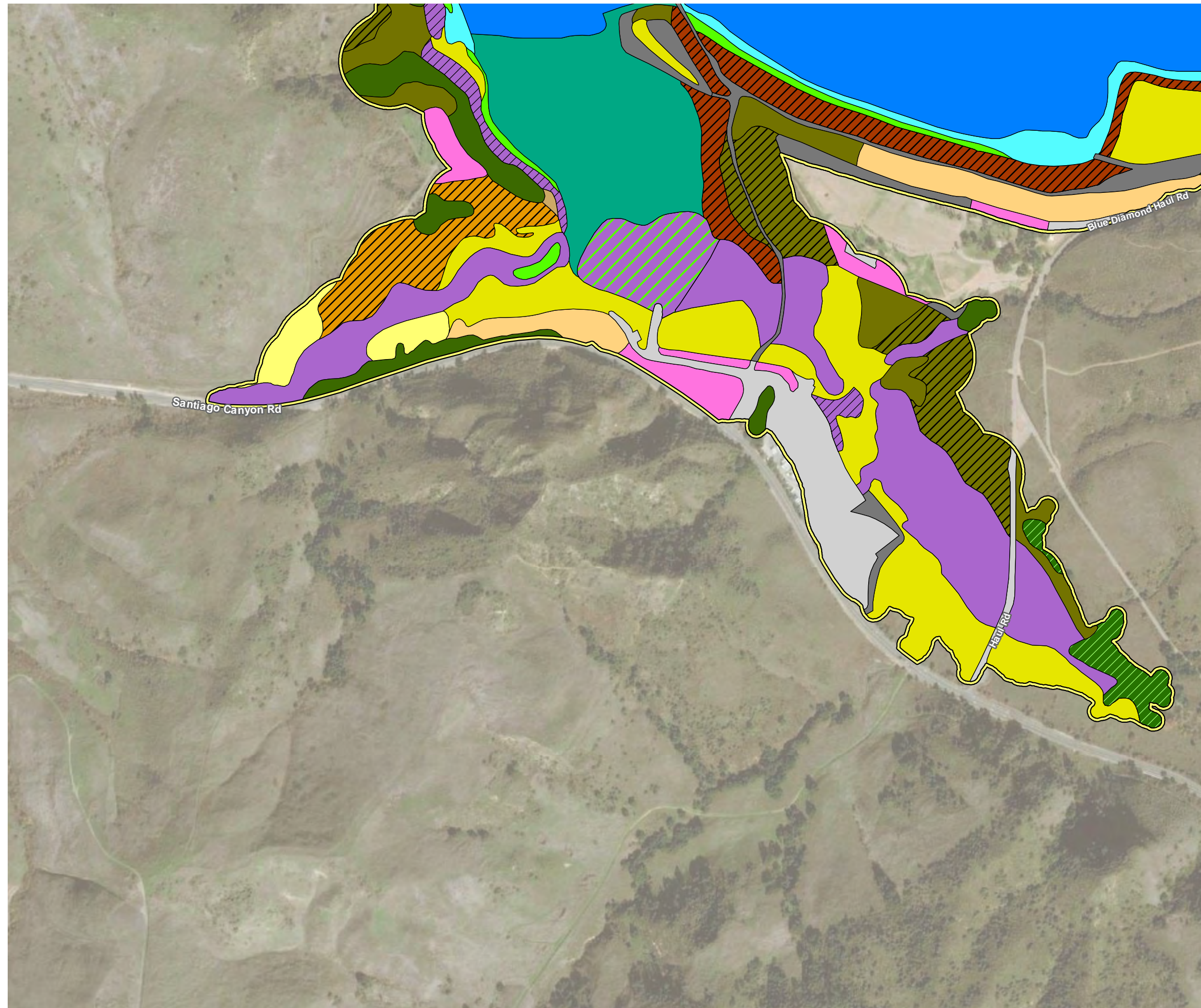
Biological Resources Exhibit 3b

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

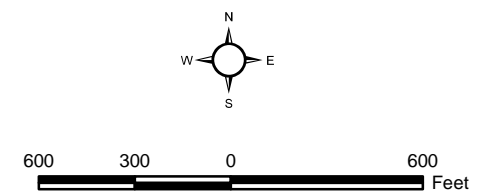


(Rev: 08/29/2022 MMD) R:\Projects\IRW_IRWD\3\IRW010200\Graphics\LBV_SWFlex_BioResources.pdf

D:\Projects\3\IRW010200MXD\LBV_SWFlex_BioResources_20220829.mxd



- Survey Area
- Vegetation Types and Other Areas**
- Sagebrush Scrub (2.3.6)
 - Disturbed Sagebrush Scrub (2.3.6)
 - Sagebrush - Coyote Brush Scrub (2.3.12)
 - Disturbed Southern Cactus Scrub (2.4)
 - Annual Grassland (4.1)
 - Ruderal (4.6)
 - Riparian Herb (7.1)
 - Disturbed Mulefat Scrub (7.3)
 - Southern Sycamore Riparian Woodland/Southern Coast Live Oak Riparian Forest (7.4/7.5)
 - Southern Black Willow Forest (7.7)
 - Disturbed Southern Black Willow Forest (7.7)
 - Southern Black Willow Forest/Riparian Herb (7.7/7.1)
 - Coast Live Oak Woodland (8.1)
 - Cliff (10)
 - Open Water (12.1)
 - Fluctuating Shoreline (12.2)
 - Vegetated Fluctuating Shoreline (12.2)
 - Ornamental (15.5)
 - Developed (15.6)
 - Disturbed (16.1)



Aerial Source: Esri, Maxar 2020

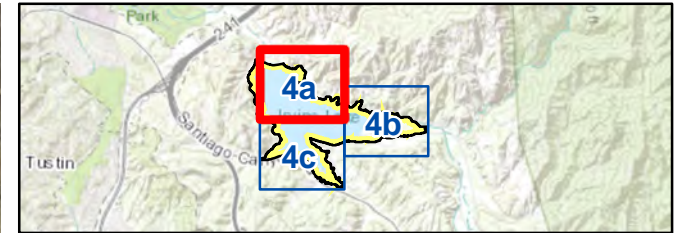
Biological Resources Exhibit 3c

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

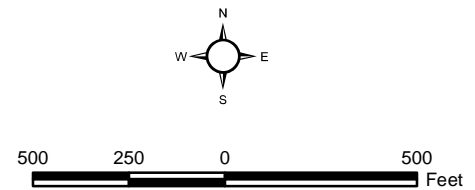


(Rev: 08/29/2022 MMD) R:\Projects\IRW_IRWD\3\IRW010200\Graphics\LBV_SWFlex_BioResources.pdf

D:\Projects\3\IRW010200\MXDLBV_SWFlex_SS_Observed_20220909.mxd



- Survey Area
- Special Status Species Observed**
- Grasshopper Sparrow Individual
 - Least Bell's Vireo Pair
 - White-Tailed Kite Pair
 - Yellow-Breasted Chat Individual
 - Yellow-Breasted Chat Pair



Aerial Source: Esri, Maxar 2020

**Special Status
Species Observed**

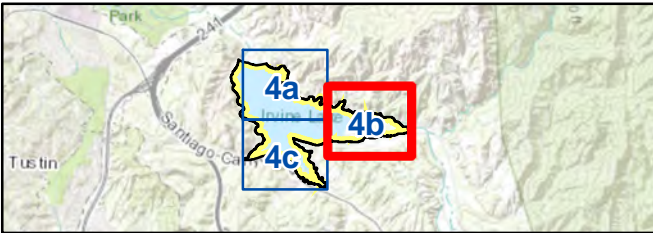
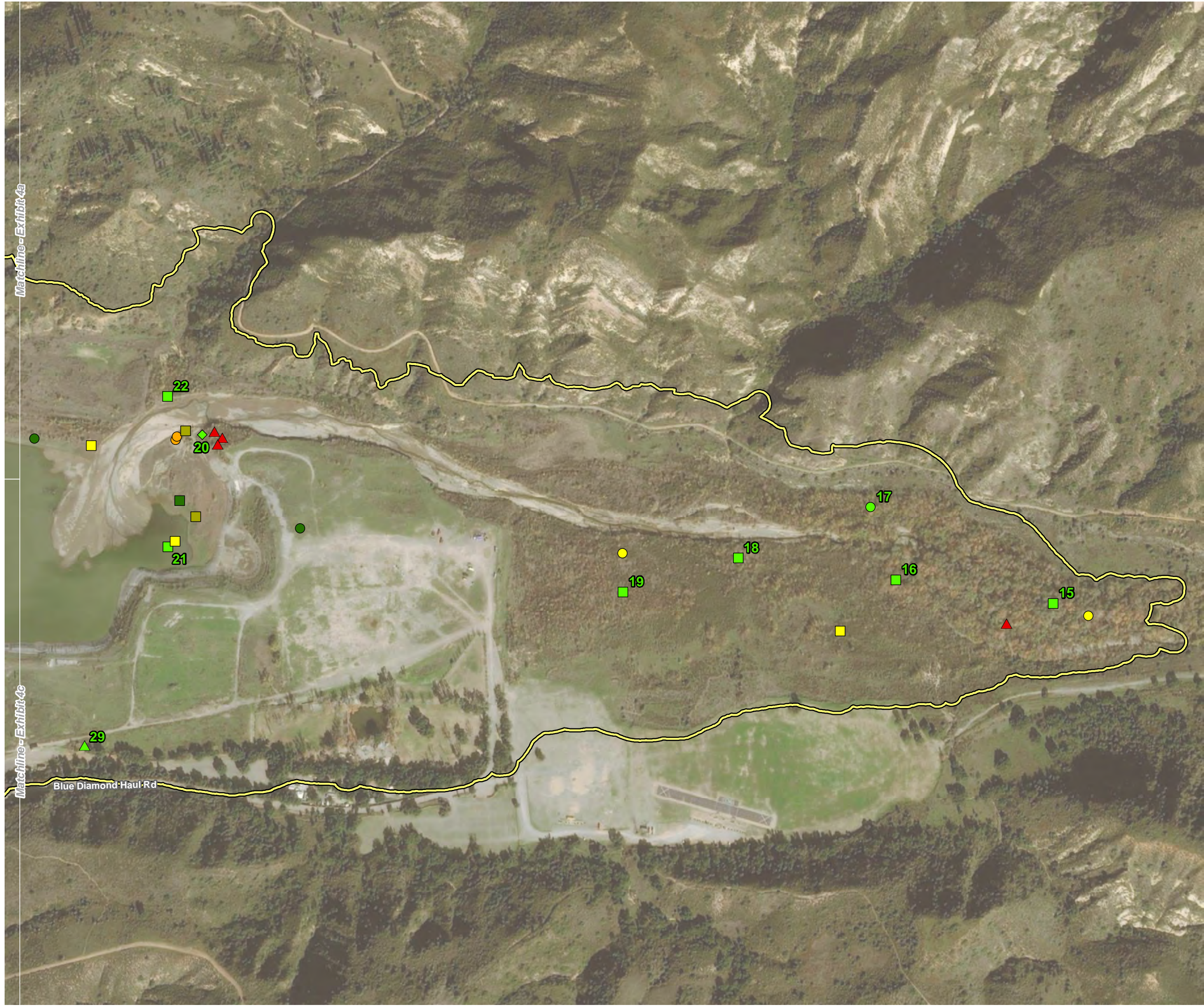
*Santiago Creek Dam Outlet Tower
and Spillway Improvement Project*

(Rev: 09/28/2022 JVR) R:\Projects\IRW_IRWD\3\IRW010200\Graphics\LBV_SWFlex_SS_Observed.pdf

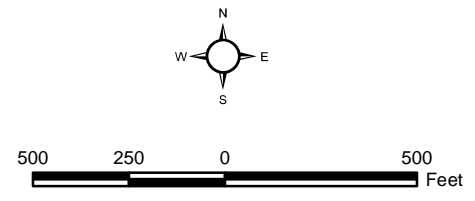
Exhibit 4a

PSOMAS

D:\Projects\3IRW010200MXDLBV_SWFlex_SS_Observed_20220908.mxd



- Survey Area
- Special Status Species Observed**
- Belding's Orange-Throated Whiptail Individual
 - Grasshopper Sparrow Individual
 - Grasshopper Sparrow Pair
 - Least Bell's Vireo Individual Male
 - Least Bell's Vireo Individual Male (Observed On Only One Visit)
 - Least Bell's Vireo Pair
 - Least Bell's Vireo Pair (Nest)
 - Willow Flycatcher Migrant (Observed On Only One Visit)
 - Yellow Warbler Pair
 - Yellow-Breasted Chat Individual
 - Yellow-Breasted Chat Pair



Aerial Source: Esri, Maxar 2020

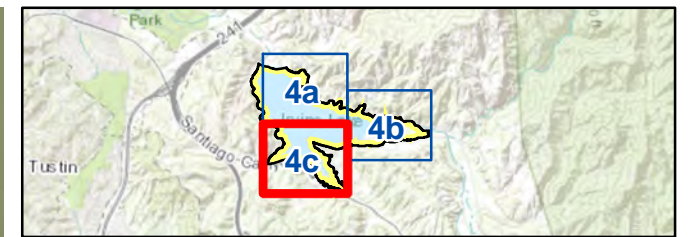
Special Status
Species Observed

Exhibit 4b

Santiago Creek Dam Outlet Tower
and Spillway Improvement Project

(Rev: 09/28/2022 JVR) R:\Projects\IRW\IRWD\3IRW010200\Graphics\LBV_SWFlex_SS_Observed.pdf

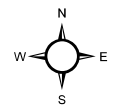
D:\Projects\3\IRW010200MXDLBV_SWFlex_SS_Observed_20220909.mxd



Survey Area

Special Status Species Observed

- Coastal Whiptail Individual
- Least Bell's Vireo Pair
- Least Bell's Vireo Pair (Nest)
- Willow Flycatcher Migrant (Observed On Only One Visit)
- Yellow Warbler Pair
- Yellow-Breasted Chat Individual
- Yellow-Breasted Chat Pair



500 250 0 500 Feet

Aerial Source: Esri, Maxar 2020

Special Status Species Observed Exhibit 4c

Santiago Creek Dam Outlet Tower and Spillway Improvement Project



(Rev: 09/28/2022 JVR) R:\Projects\IRW\IRWD\3\IRW010200\Graphics\LBV_SWFlex_SS_Observed.pdf

ATTACHMENT A
SITE PHOTOGRAPHS



View of riparian habitat in the southern portion of the survey area facing southeast. A pair of least Bell's vireos nested in this area at Location 1.



View of riparian habitat in the southern portion of the survey area facing north. A pair of least Bell's vireos nested in this area at Location 3.

D:\Projects\3IRW010200\Graphics\LBV_SWFAtt_SP1_20220829.ai

Site Photographs

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

Attachment A-1





View of riparian habitat in the southwestern portion of the survey area facing southeast. A pair of least Bell's vireos nested in this area at Location 9.



View of riparian habitat in the southwestern portion of the survey area facing southeast. A pair of least Bell's vireos nested in this area at Location 10.

Site Photographs

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

Attachment A-2





View of least Bell's vireo observed in the middle portion of the survey area at Location 20.



View of riparian habitat in the middle portion of the survey area facing north. A pair of least Bell's vireos nested in this area at Location 20.

Site Photographs

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

Attachment A-3





View of least Bell's vireo observed in the middle portion of the survey area at Location 14.



View of riparian habitat in the eastern portion of the survey area facing east. A pair of least Bell's vireos nested in this area at Location 19.

Site Photographs

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

Attachment A-4





View of a migrant willow flycatcher observed in the southern portion of the survey area.



View of a migrant willow flycatcher observed in the southern portion of the survey area.

Site Photographs

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

Attachment A-5



ATTACHMENT B
WILDLIFE COMPENDIUM

WILDLIFE SPECIES DETECTED DURING THE SURVEYS

Scientific Name	Common Name	Special Status
LIZARDS		
PHRYNOSOMATIDAE – SPINY LIZARD FAMILY		
<i>Sceloporus occidentalis</i>	western fence lizard	
<i>Uta stansburiana</i>	common side-blotched lizard	
TEIIDAE – WHIPTAIL LIZARD FAMILY		
<i>Aspidoscelis hyperythra beldingi</i>	Belding's orange-throated whiptail	WL
<i>Aspidoscelis tigris stejnegeri</i>	coastal whiptail	SSC
SNAKES		
COLUBRIDAE – COLUBRID SNAKE FAMILY		
<i>Coluber flagellum piceus</i>	red racer	
<i>Pituophis catenifer</i>	gopher snake	
BIRDS		
ANATIDAE – SWAN, GOOSE, AND DUCK FAMILY		
<i>Branta canadensis</i>	Canada goose	
<i>Anas platyrhynchos</i>	mallard	
<i>Bucephala albeola</i>	bufflehead	
ODONTOPHORIDAE – NEW WORLD QUAIL FAMILY		
<i>Callipepla californica</i>	California quail	
PODICIPEDIDAE – GREBE FAMILY		
<i>Podilymbus podiceps</i>	pie-billed grebe	
<i>Aechmophorus occidentalis</i>	western grebe	
<i>Aechmophorus clarkii</i>	Clark's grebe	
COLUMBIDAE – PIGEON AND DOVE FAMILY		
<i>Zenaidura macroura</i>	mourning dove	
CUCULIDAE – CUCKOO AND ROADRUNNER		
<i>Geococcyx californianus</i>	greater roadrunner	
APODIDAE – SWIFT FAMILY		
<i>Aeronautes saxatalis</i>	white-throated swift	
TROCHILIDAE – HUMMINGBIRD FAMILY		
<i>Archilochus alexandri</i>	black-chinned hummingbird	
<i>Calypte anna</i>	Anna's hummingbird	
<i>Calypte costae</i>	Costa's hummingbird	
<i>Selasphorus sasin</i>	Allen's hummingbird	
RALLIDAE – RAIL AND COOT FAMILY		
<i>Fulica americana</i>	American coot	
CHARADRIIDAE – PLOVER FAMILY		
<i>Charadrius vociferus</i>	killdeer	
SCOLOPACIDAE – SANDPIPER FAMILY		
<i>Calidris minutilla</i>	least sandpiper	
LARIDAE – GULL AND TERN FAMILY		
<i>Larus delawarensis</i>	ring-billed gull	
<i>Sterna forsteri</i>	Forster's tern	
PHALACROCORACIDAE – CORMORANT FAMILY		

WILDLIFE SPECIES DETECTED DURING THE SURVEYS

Scientific Name	Common Name	Special Status
<i>Phalacrocorax auritus</i>	double-crested cormorant	
ARDEIDAE – HERON FAMILY		
<i>Ardea alba</i>	great egret	
<i>Egretta thula</i>	snowy egret	
CATHARTIDAE – NEW WORLD VULTURE FAMILY		
<i>Cathartes aura</i>	turkey vulture	
ACCIPITRIDAE – HAWK FAMILY		
<i>Elanus leucurus</i>	white-tailed kite	FP
<i>Accipiter striatus</i>	sharp-shinned hawk	
<i>Buteo lineatus</i>	red-shouldered hawk	
<i>Buteo jamaicensis</i>	red-tailed hawk	
PICIDAE – WOODPECKER FAMILY		
<i>Melanerpes formicivorus</i>	acorn woodpecker	
<i>Picoides nuttallii</i>	Nuttall's woodpecker	
FALCONIDAE – FALCON FAMILY		
<i>Falco sparverius</i>	American kestrel	
TYRANNIDAE – TYRANT FLYCATCHER FAMILY		
<i>Empidonax difficilis</i>	Pacific-slope flycatcher	
<i>Sayornis nigricans</i>	black phoebe	
<i>Sayornis saya</i>	Say's phoebe	
<i>Myiarchus cinerascens</i>	ash-throated flycatcher	
<i>Tyrannus vociferans</i>	Cassin's kingbird	
VIREONIDAE – VIREO FAMILY		
<i>Vireo bellii pusillus</i>	least Bell's vireo	FE, SE
<i>Vireo gilvus</i>	warbling vireo	
CORVIDAE – JAY AND CROW FAMILY		
<i>Aphelocoma californica</i>	California scrub-jay	
<i>Corvus brachyrhynchos</i>	American crow	
<i>Corvus corax</i>	common raven	
ALAUDIDAE – LARK FAMILY		
<i>Eremophila alpestris</i>	horned lark	
HIRUNDINIDAE – SWALLOW FAMILY		
<i>Tachycineta bicolor</i>	tree swallow	
<i>Stelgidopteryx serripennis</i>	northern rough-winged swallow	
<i>Hirundo rustica</i>	barn swallow	
<i>Petrochelidon pyrrhonota</i>	cliff swallow	
PARIDAE – TITMOUSE FAMILY		
<i>Baeolophus inornatus</i>	oak titmouse	
AEGITHALIDAE – BUSHTIT FAMILY		
<i>Psaltiriparus minimus</i>	bushtit	
TROGLODYTIDAE – WREN FAMILY		
<i>Troglodytes aedon</i>	house wren	
<i>Thryomanes bewickii</i>	Bewick's wren	

WILDLIFE SPECIES DETECTED DURING THE SURVEYS

Scientific Name	Common Name	Special Status
<i>Campylorhynchus brunneicapillus sandiegensis</i>	coastal cactus wren	SSC
POLIOPTILIDAE – GNATCATCHER FAMILY		
<i>Polioptila caerulea</i>	blue-gray gnatcatcher	
SYLVIIDAE – SILVIID WARBLERS FAMILY		
<i>Chamaea fasciata</i>	wrentit	
TURDIDAE – THRUSH FAMILY		
<i>Sialia mexicana</i>	western bluebird	
<i>Turdus migratorius</i>	American robin	
MIMIDAE – MOCKINGBIRD AND THRASHER FAMILY		
<i>Toxostoma redivivum</i>	California thrasher	
<i>Mimus polyglottos</i>	northern mockingbird	
STURNIDAE – STARLING FAMILY		
<i>Sturnus vulgaris</i> *	European starling*	
BOMBYCILLIDAE – WAXWING FAMILY		
<i>Bombycilla cedrorum</i>	cedar waxwing	
PTILOGONATIDAE – SILKY-FLYCATCHER FAMILY		
<i>Phainopepla nitens</i>	phainopepla	
FRINGILLIDAE – FINCH FAMILY		
<i>Haemorrhous mexicanus</i>	house finch	
<i>Spinus psaltria</i>	lesser goldfinch	
PASSERELLIDAE – NEW WORLD SPARROW FAMILY		
<i>Ammodramus savannarum</i>	grasshopper sparrow	SSC
<i>Chondestes grammacus</i>	lark sparrow	
<i>Zonotrichia leucophrys</i>	white-crowned sparrow	
<i>Melospiza melodia</i>	song sparrow	
<i>Melospiza lincolni</i>	Lincoln's sparrow	
<i>Melospiza crissalis</i>	California towhee	
<i>Pipilo maculatus</i>	spotted towhee	
ICTERIIDAE – YELLOW-BREASTED CHAT FAMILY		
<i>Icteria virens</i>	yellow-breasted chat	SSC
ICTERIDAE – BLACKBIRDS AND ORIOLES		
<i>Sturnella neglecta</i>	western meadowlark	
<i>Icterus cucullatus</i>	hooded oriole	
<i>Icterus bullockii</i>	Bullock's oriole	
<i>Agelaius phoeniceus</i>	red-winged blackbird	
<i>Molothrus ater</i>	brown-headed cowbird	
<i>Quiscalus mexicanus</i>	great-tailed grackle	
PARULIDAE – WOOD-WARBLER FAMILY		
<i>Geothlypis trichas</i>	common yellowthroat	
<i>Setophaga petechia</i>	yellow warbler	SSC
<i>Setophaga coronata</i>	yellow-rumped warbler	
<i>Cardellina pusilla</i>	Wilson's warbler	

WILDLIFE SPECIES DETECTED DURING THE SURVEYS

Scientific Name	Common Name	Special Status
CARDINALIDAE – CARDINALS AND ALLIES		
<i>Pheucticus melanocephalus</i>	black-headed grosbeak	
<i>Passerina caerulea</i>	blue grosbeak	
<i>Passerina amoena</i>	lazuli bunting	
MAMMALS		
SCIURIDAE – SQUIRREL FAMILY		
<i>Otospermophilus beecheyi</i>	California ground squirrel	
GEOMYIDAE – POCKET GOPHER FAMILY		
<i>Thomomys bottae</i>	Botta's pocket gopher	
LEPORIDAE – HARE AND RABBIT FAMILY		
<i>Sylvilagus audubonii</i>	desert cottontail	
CANIDAE – CANID FAMILY		
<i>Canis latrans</i>	coyote	
<i>Urocyon cinereoargenteus</i>	common gray fox	
CERVIDAE – CERVID FAMILY		
<i>Odocoileus hemionus</i>	southern mule deer	
USFWS: U.S. Fish and Wildlife Service		
Species Status:		
Federal (USFWS)	State (CDFW)	
FE Endangered	SE Endangered	
	FP Fully Protected	
	SSC Species of Special Concern	
	WL Watch List	

ATTACHMENT C

CALIFORNIA NATURAL DIVERSITY DATABASE FORMS

CNDDDB Online Field Survey Form Report



California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/



Source code AGU22F0024
Quad code 3311776
Occ. no. _____
EO index no. _____
Map index no. _____

This data has been reported to the CNDDDB, but may not have been evaluated by the CNDDDB staff

Scientific name: *Vireo bellii pusillus*

Common name: *least Bell's vireo*

Date of field work (mm-dd-yyyy): *07-14-2022*

Comment about field work date(s): *April 13, 14, 24, and 25; May 12, 13, 25, and 26; June 7, 8, 21, and 22; and July 1, 4, 13, and 14.*

OBSERVER INFORMATION

Observer: *Jonathan Aguayo*

Affiliation: *Psomas*

Address: *6292 San Harco Circle , Buena Park, CA 90620*

Email: *jonathan.aguayo@psomas.com*

Phone: *(805) 204-6986*

Other observers: _____

DETERMINATION

Keyed in: _____

Compared w/ specimen at: _____

Compared w/ image in: _____

By another person: _____

Other: *Familiarity with species visually and aurally*

Identification explanation: _____

Identification confidence: *Very confident*

Species found: *Yes* If not found, why not? _____

Level of survey effort: *8 protocol surveys; 2 days were required to cover the entire survey area for each of the 8 visits.*

Total number of individuals: *93*

Collection? _____

Collection number: _____

Museum/Herbarium: _____

ANIMAL INFORMATION

How was the detection made? *Heard singing then seen*

Number detected in each age class:

55

38

adults

juveniles

larvae

egg mass

unknown

Age class comment: _____

28 least Bell's vireo locations:

- 1) 33.764777°, -117.710305° (Pair with 2 juveniles)
- 2) 33.765114°, -117.711182° (Pair with 2 juveniles)
- 3) 33.765876°, -117.712117° (Pair with 2 juveniles)
- 4) 33.768001°, -117.714219° (Pair with 2 juveniles)
- 5) 33.769314°, -117.714889° (Pair with 1 juvenile)
- 6) 33.768878°, -117.715414° (Pair with 3 juveniles)
- 7) 33.769731°, -117.716091° (Pair with 2 juveniles)
- 8) 33.770402°, -117.718515° (Pair with 1 juvenile)
- 9) 33.770277°, -117.719961° (Pair with 1 juvenile)
- 10) 33.772119°, -117.721014° (Pair with 1 juvenile)
- 11) 33.773265°, -117.716250° (Pair)
- 12) 33.772626°, -117.714527° (Pair with 1 juvenile)
- 13) 33.772080°, -117.712309° (Pair with 2 juveniles)
- 14) 33.771542°, -117.710188° (Pair; juvenile heard)
- 15) 33.774118°, -117.690132° (Pair with 2 juveniles)
- 16) 33.774419°, -117.692770° (Pair)
- 17) 33.775328°, -117.693509° (male)
- 18) 33.774692°, -117.695418° (Pair with 1 juvenile)
- 19) 33.774194°, -117.697336° (Pair; juvenile heard)
- 20) 33.776310°, -117.704417° (Pair with 2 juveniles)
- 21) 33.774737°, -117.704965° (Pair with 2 juveniles)
- 22) 33.776838°, -117.705004° (Pair with 1 juvenile)
- 23) 33.776837°, -117.708460° (Pair with 2 juveniles)
- 24) 33.776944°, -117.710168° (Pair with 1 juvenile)
- 25) 33.778569°, -117.711445° (Pair with 2 juveniles)
- 26) 33.778805°, -117.712710° (Pair with 1 juvenile)
- 27) 33.776649°, -117.714474° (Pair with 1 juvenile)
- 28) 33.780173°, -117.716426° (Pair with 1 juvenile)

Bird site use:

- ☒ Nesting ☐ Rookery ☐ Nesting colony ☐ Burrow site ☐ Lek
☐ Non-breeding (over-wintering) ☐ Communal roost ☐ Other

Site use description:

What was the observed behavior? Pairs were observed foraging, nest building, incubating nest, feeding nestlings, and feeding juveniles. Individual male was observed foraging.

Describe any evidence of reproduction: Twenty-five pairs were observed to have successfully nested; a total of thirty-eight juveniles were observed during focused survey.

SITE INFORMATION

Habitat description: Riparian herb, southern willow scrub, mulefat scrub, disturbed mulefat scrub, southern sycamore riparian woodland/southern coast live oak riparian forest, southern black willow forest, disturbed southern black willow forest, and southern black willow forest/riparian herb occur upstream of the Dam on the project site.

Slope:

Land owner/manager: Private - Irvine Ranch

Aspect:

Site condition + population viability: Excellent

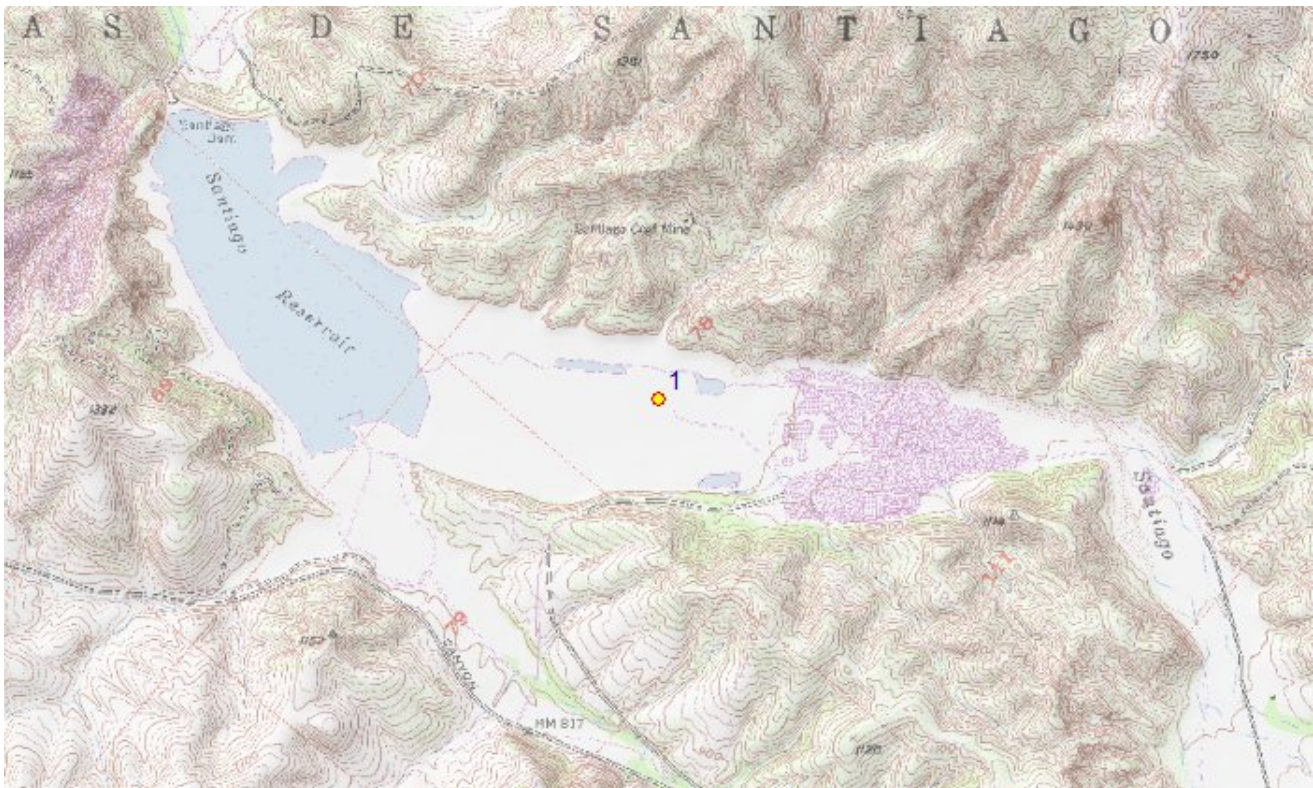
Immediate & surrounding land use: Undeveloped open space, Santiago Dam, and Irvine Regional Park.

Visible disturbances: Noise/human activity associated with shoreline fishing. Noise/wind disturbance associated with helicopter training exercises by Orange County Sheriff Department and Orange County Fire Authority.

Threats:

General comments:

MAP INFORMATION



ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTM E NAD83	UTM N NAD83	UTM Zone
	Orange	Black Star Canyon	782	33.77529	-117.70502	434721	3737464	11
1	Public Land Survey	Feature Comment						
	S T04S R08W 34	28 Territories (27 pairs and 1 male)						

The mapped feature is accurate within: 5 m

Source of mapped feature: [Avenza Maps - Iphone](#)

Mapping notes: [Please see attachment.](#)

Location/directions comments:

Attachment(s): [28 LBVI locations.docx](#)

CNDDDB Online Field Survey Form Report



California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/



Source code AGU22F0025
Quad code 3311776
Occ. no. _____
EO index no. _____
Map index no. _____

This data has been reported to the CNDDDB, but may not have been evaluated by the CNDDDB staff

Scientific name: *Aspidoscelis hyperythra*

Common name: orange-throated whiptail

Date of field work (mm-dd-yyyy): 05-26-2022

Comment about field work date(s): Incidental observation during protocol focused surveys for least Bell's vireo

OBSERVER INFORMATION

Observer: Jonathan Aguayo

Affiliation: Psomas

Address: 6292 San Harco Circle , Buena Park, CA 90620

Email: jonathan.aguayo@psomas.com

Phone: (805) 204-6986

Other observers:

DETERMINATION

Keyed in:

Compared w/ specimen at:

Compared w/ image in:

By another person:

Other: Familiarity with California reptiles through research, workshops, and/or training.

Identification explanation:

Identification confidence: Very confident

Species found: Yes If not found, why not?

Level of survey effort:

Total number of individuals: 2

Collection?

Collection number:

Museum/Herbarium:

ANIMAL INFORMATION

How was the detection made? Seen

Number detected in each age class:

2

adults

juveniles

larvae

egg mass

unknown

Age class comment:

Site use description:

What was the observed behavior? Foraging

Describe any evidence of reproduction:

SITE INFORMATION

Habitat description: Juveniles observed within ruderal and riparian herb. Ruderal is dominated by grayish shortpod mustard (*Hirschfeldia incana*). Riparian herb is dominated by mule fat (*Baccharis salicifolia* ssp. *salicifolia*) with Goodding's black willow (*Salix gooddingii*), arroyo willow (*Salix lasiolepis*), mule fat, and saltcedar (*Tamarix ramosissima*).

Slope:

Land owner/manager: Private - Irvine Ranch

Aspect:

Site condition + population viability: Excellent

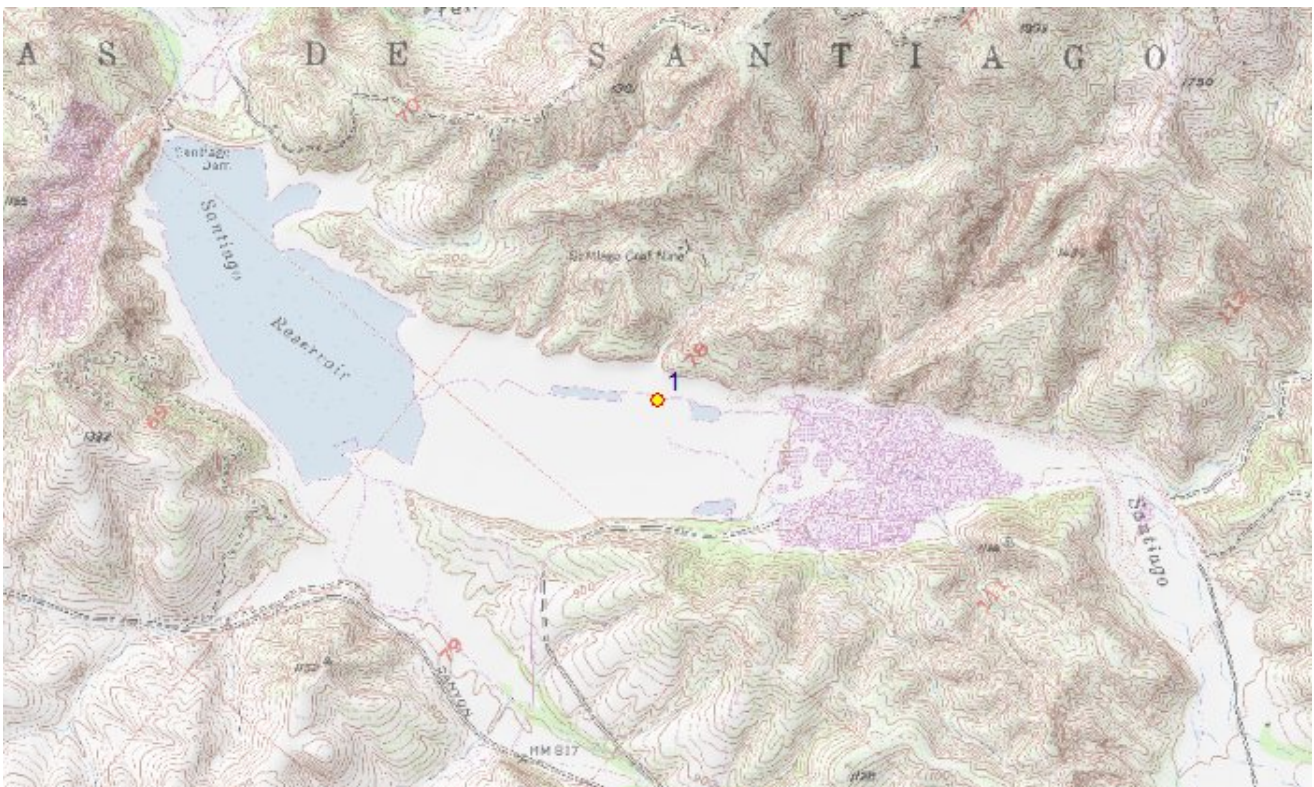
Immediate & surrounding land use: Undeveloped open space, Santiago Dam, and Irvine Regional Park.

Visible disturbances: Noise/human activity associated with shoreline fishing. Noise/wind disturbance associated with helicopter training exercises by Orange County Sheriff Department and Orange County Fire Authority.

Threats:

General comments:

MAP INFORMATION



ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTM E NAD83	UTM N NAD83	UTM Zone
	Orange	Black Star Canyon	782	33.77628	-117.70483	434740	3737574	11
1	Public Land Survey	Feature Comment						
	S T04S R08W 34	2 juveniles						

The mapped feature is accurate within: 5 m

Source of mapped feature: Avenza Maps - Iphone

Mapping notes:

Location/directions comments:

Attachment(s):

CNDDDB Online Field Survey Form Report



California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/



Source code AGU22F0026
Quad code 3311776
Occ. no. _____
EO index no. _____
Map index no. _____

This data has been reported to the CNDDDB, but may not have been evaluated by the CNDDDB staff

Scientific name: *Aspidoscelis tigris stejnegeri*

Common name: coastal whiptail

Date of field work (mm-dd-yyyy): 06-08-2022

Comment about field work date(s): Incidental observation during protocol focused surveys for least Bell's vireo

OBSERVER INFORMATION

Observer: Jonathan Aguayo

Affiliation: Psomas

Address: 6292 San Harco Circle , Buena Park, CA 90620

Email: jonathan.aguayo@psomas.com

Phone: (805) 204-6986

Other observers:

DETERMINATION

Keyed in:

Compared w/ specimen at:

Compared w/ image in:

By another person:

Other: Familiarity with California reptiles through research, workshops, and/or training.

Identification explanation:

Identification confidence: Very confident

Species found: Yes If not found, why not?

Level of survey effort:

Total number of individuals: 3

Collection? No

Collection number:

Museum/Herbarium:

ANIMAL INFORMATION

How was the detection made? Seen

Number detected in each age class:

3

adults

juveniles

larvae

egg mass

unknown

Age class comment:

Site use description:

What was the observed behavior? Foraging

Describe any evidence of reproduction:

SITE INFORMATION

Habitat description: Individuals observed within southern black willow forest. Southern black willow forest is dominated by Goodding's black willow (*Salix gooddingii*), with arroyo willow (*Salix lasiolepis*), blue elderberry (*Sambucus nigra* ssp. *caerulea*), and mule fat (*Baccharis salicifolia* ssp. *salicifolia*).

Slope:

Land owner/manager: Private - Irvine Ranch

Aspect:

Site condition + population viability: Excellent

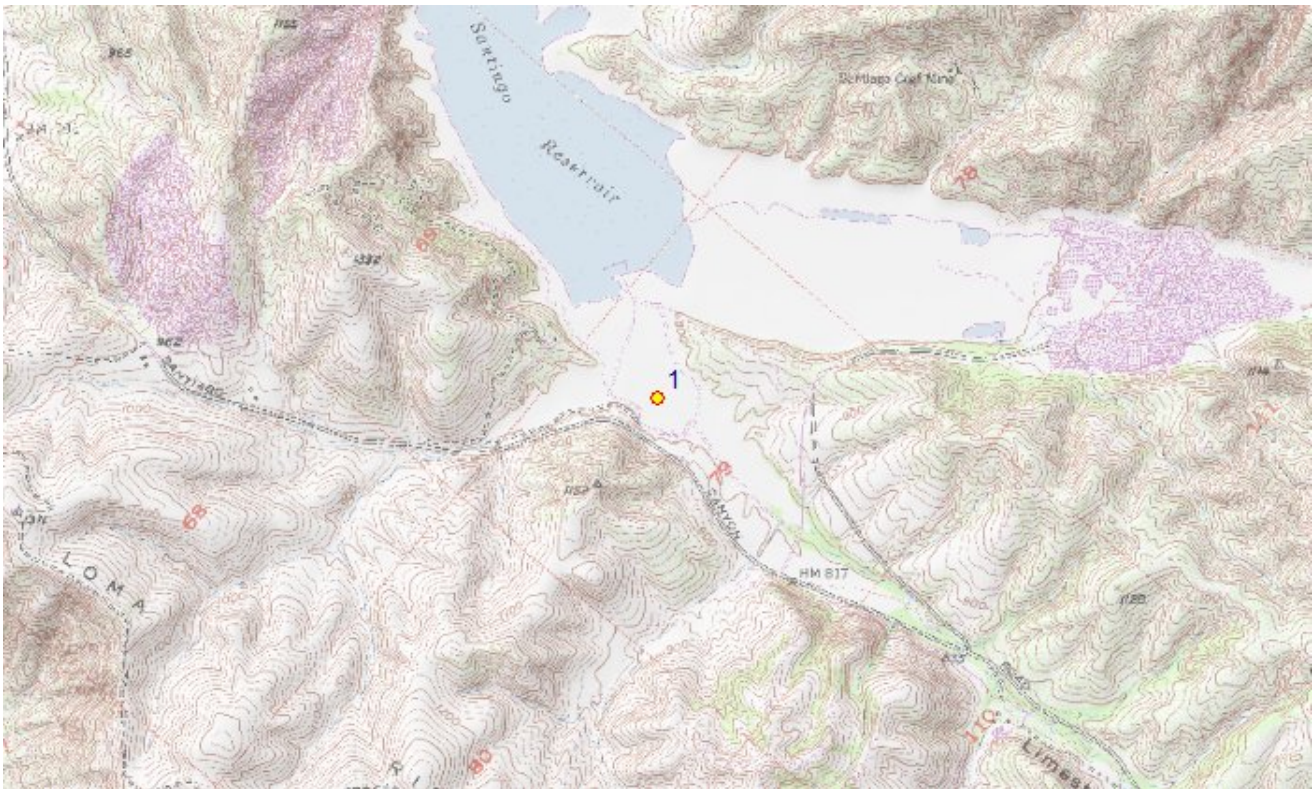
Immediate & surrounding land use: Undeveloped open space, Santiago Dam, and Irvine Regional Park.

Visible disturbances: Noise/human activity associated with shoreline fishing. Noise/wind disturbance associated with helicopter training exercises by Orange County Sheriff Department and Orange County Fire Authority.

Threats:

General comments:

MAP INFORMATION



ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTM E NAD83	UTM N NAD83	UTM Zone
	Orange	Black Star Canyon	782	33.76960	-117.71720	433588	3736841	11
1	Public Land Survey	Feature Comment						
	S T05S R08W 4	coastal whiptail #1						

The mapped feature is accurate within: 5 m

Source of mapped feature: Avenza Maps - Iphone

Mapping notes: Coastal whiptail #2: 33.769770, -117.717106; and coastal whiptail #3: 33.769081, -117.715273

Location/directions comments:

Attachment(s):

CNDDDB Online Field Survey Form Report



California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/



Source code AGU22F0020
Quad code 3311776
Occ. no. _____
EO index no. _____
Map index no. _____

This data has been reported to the CNDDDB, but may not have been evaluated by the CNDDDB staff

Scientific name: *Elanus leucurus*

Common name: white-tailed kite

Date of field work (mm-dd-yyyy): 07-01-2022

Comment about field work date(s): Additionally observed during on April 13 and June 7, 2022

OBSERVER INFORMATION

Observer: Jonathan Aguayo

Affiliation: Psomas

Address: 6292 San Harco Circle , Buena Park, CA 90620

Email: jonathan.aguayo@psomas.com

Phone: (805) 204-6986

Other observers:

DETERMINATION

Keyed in:

Compared w/ specimen at:

Compared w/ image in:

By another person:

Other: Familiarity with the species, visually and aurally

Identification explanation: Identified visually

Identification confidence: Very confident

Species found: Yes If not found, why not?

Level of survey effort: Incidental observation during least Bell's vireo surveys

Total number of individuals: 2

Collection?

Collection number:

Museum/Herbarium:

ANIMAL INFORMATION

How was the detection made? Seen

Number detected in each age class:

2

adults

juveniles

larvae

egg mass

unknown

Age class comment:

Bird site use:

- ☐ Nesting ☐ Rookery ☐ Nesting colony ☐ Burrow site ☐ Lek
☐ Non-breeding (over-wintering) ☐ Communal roost ☒ Other

Site use description: Pair observed using site for perching and foraging.

What was the observed behavior? Pair observed perched together and foraging near Irvine Lake.

Describe any evidence of reproduction: None

SITE INFORMATION

Habitat description: Pair was found in southern black willow forest/riparian herb with Goodding's black willow (*Salix gooddingii*), cocklebur (*Xanthium strumarium*), white sweetclover (*Melilotus albus*), alkali-mallow (*Malvella leprosa*), and grayish shortpod mustard.

Slope:

Land owner/manager: Private - Irvine Ranch

Aspect:

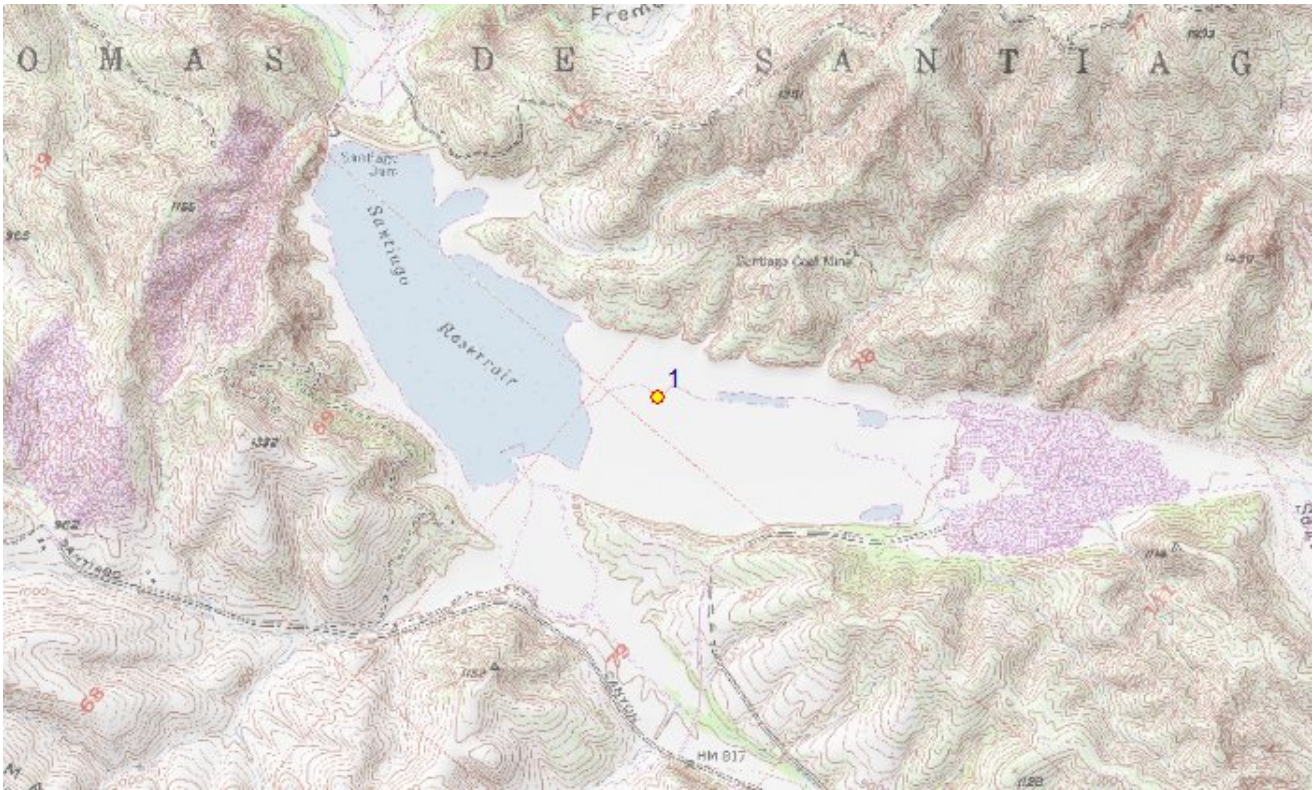
Site condition + population viability: Good

Immediate & surrounding land use: Open space, Santiago Dam, and Irvine Regional Park.

Visible disturbances: Noise/human activity associated with shoreline fishing. Noise/wind disturbance associated with helicopter training and training exercises by Orange County Sheriff Department and Orange County Fire Authority.

Threats:

General comments:

MAP INFORMATION

ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTM E NAD83	UTM N NAD83	UTM Zone
	Orange	Black Star Canyon	782	33.77660	-117.71249	434030	3737615	11
1	Public Land Survey	Feature Comment						
	S T04S R08W 34	WTKI Pair						

The mapped feature is accurate within: [5 m](#)

Source of mapped feature: [Avenza Maps - Iphone](#)

Mapping notes:

Location/directions comments:

Attachment(s):

CNDDDB Online Field Survey Form Report



California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/



Source code AGU22F0028
Quad code 3311776
Occ. no. _____
EO index no. _____
Map index no. _____

This data has been reported to the CNDDDB, but may not have been evaluated by the CNDDDB staff

Scientific name: *Ammodramus savannarum*

Common name: grasshopper sparrow

Date of field work (mm-dd-yyyy): 06-08-2022

Comment about field work date(s): Incidental observations on May 26 and June 8, 2022

OBSERVER INFORMATION

Observer: Jonathan Aguayo

Affiliation: Psomas

Address: 6292 San Harco Circle , Buena Park, CA 90620

Email: jonathan.aguayo@psomas.com

Phone: (805) 204-6986

Other observers:

DETERMINATION

Keyed in:

Compared w/ specimen at:

Compared w/ image in:

By another person:

Other: Familiarity with species visually and aurally

Identification explanation:

Identification confidence: Very confident

Species found: Yes If not found, why not?

Level of survey effort:

Total number of individuals: 4

Collection? No

Collection number:

Museum/Herbarium:

ANIMAL INFORMATION

How was the detection made? Heard singing then seen

Number detected in each age class:

4

adults

juveniles

larvae

egg mass

unknown

Age class comment:

Bird site use:

- ☒ Nesting ☐ Rookery ☐ Nesting colony ☐ Burrow site ☐ Lek
☐ Non-breeding (over-wintering) ☐ Communal roost ☐ Other

Site use description:

What was the observed behavior? Individuals observed foraging. Pair observed defending territory and appeared to be nesting.

Describe any evidence of reproduction:

SITE INFORMATION

Habitat description: Pair and individuals observed within ruderal vegetation. Ruderal is dominated by grayish shortpod mustard (*Hirschfeldia incana*) with some native herbs and non-native grasses.

Slope:

Land owner/manager: Private - Irvine Ranch

Aspect:

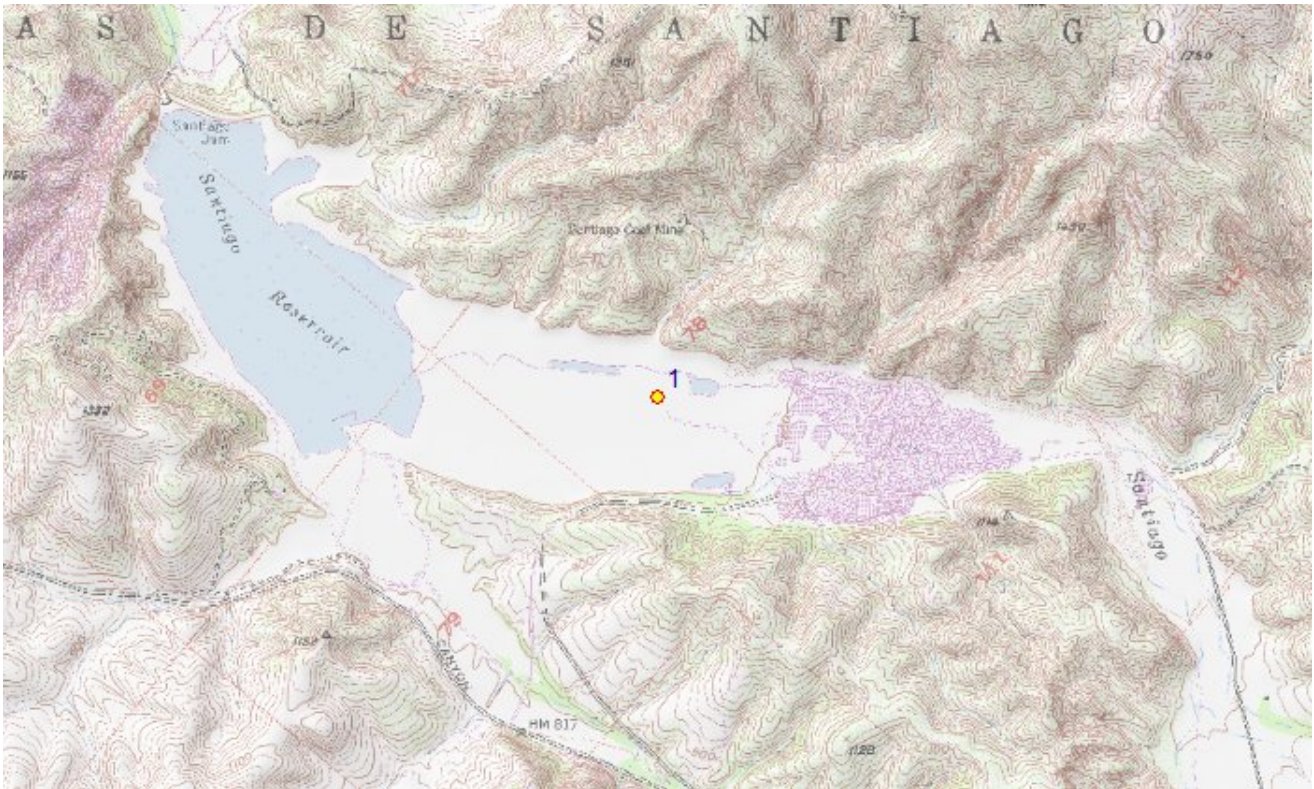
Site condition + population viability: Good

Immediate & surrounding land use: Undeveloped open space, Santiago Dam, and Irvine Regional Park.

Visible disturbances: Noise/human activity associated with shoreline fishing. Noise/wind disturbance associated with helicopter training exercises by Orange County Sheriff Department and Orange County Fire Authority. Maintenance mowing of the area.

Threats:

General comments:

MAP INFORMATION

ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTM E NAD83	UTM N NAD83	UTM Zone
	Orange	Black Star Canyon	782	33.77539	-117.70477	434744	3737476	11
1	Public Land Survey	Feature Comment						
	S T04S R08W 34	grasshopper sparrow pair						

The mapped feature is accurate within: 5 m

Source of mapped feature: [Avenza Maps - Iphone](#)

Mapping notes: Pair: 33.775394, -117.704775 (pair observed on May 26 and June 8, 2022); Individual #1: 33.775022, -117.702750 (observed on 5/26/22); and individual #2: 33.776226, -117.707214 (observed on 6/8/2022)

Location/directions comments:

Attachment(s):

CNDDDB Online Field Survey Form Report



California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/



Source code AGU22F0029
Quad code 3311776
Occ. no. _____
EO index no. _____
Map index no. _____

This data has been reported to the CNDDDB, but may not have been evaluated by the CNDDDB staff

Scientific name: *Icteria virens*

Common name: yellow-breasted chat

Date of field work (mm-dd-yyyy): 07-14-2022

Comment about field work date(s): Incidental observations on May 12, 13, 25, and 26; June 7, 8, 21, and 22; and July 1, 4, 13, and 14.

OBSERVER INFORMATION

Observer: Jonathan Aguayo

Affiliation: Psomas

Address: 6292 San Harco Circle , Buena Park, CA 90620

Email: jonathan.aguayo@psomas.com

Phone: (805) 204-6986

Other observers:

DETERMINATION

Keyed in:

Compared w/ specimen at:

Compared w/ image in:

By another person:

Other: Familiarity with species visually and aurally

Identification explanation:

Identification confidence: Very confident

Species found: Yes If not found, why not?

Level of survey effort: Incidental observation during protocol focused surveys for least Bell's vireo

Total number of individuals: 43

Collection? No

Collection number:

Museum/Herbarium:

ANIMAL INFORMATION

How was the detection made? Heard singing then seen

Number detected in each age class:

36

7

adults

juveniles

larvae

egg mass

unknown

Age class comment:

Bird site use:

- ☒ Nesting ☐ Rookery ☐ Nesting colony ☐ Burrow site ☐ Lek
☐ Non-breeding (over-wintering) ☐ Communal roost ☐ Other

Site use description:

What was the observed behavior? Pairs were observed foraging and feeding juveniles. Individual were observed foraging.

Describe any evidence of reproduction: Pairs observed feeding juveniles.

SITE INFORMATION

Habitat description: Riparian herb, southern willow scrub, mulefat scrub, disturbed mulefat scrub, southern sycamore riparian woodland/southern coast live oak riparian forest, southern black willow forest, disturbed southern black willow forest, and southern black willow forest/riparian herb occur upstream of the Dam on the project site.

Slope: Land owner/manager: Private - Irvine Ranch

Aspect:

Site condition + population viability: Excellent

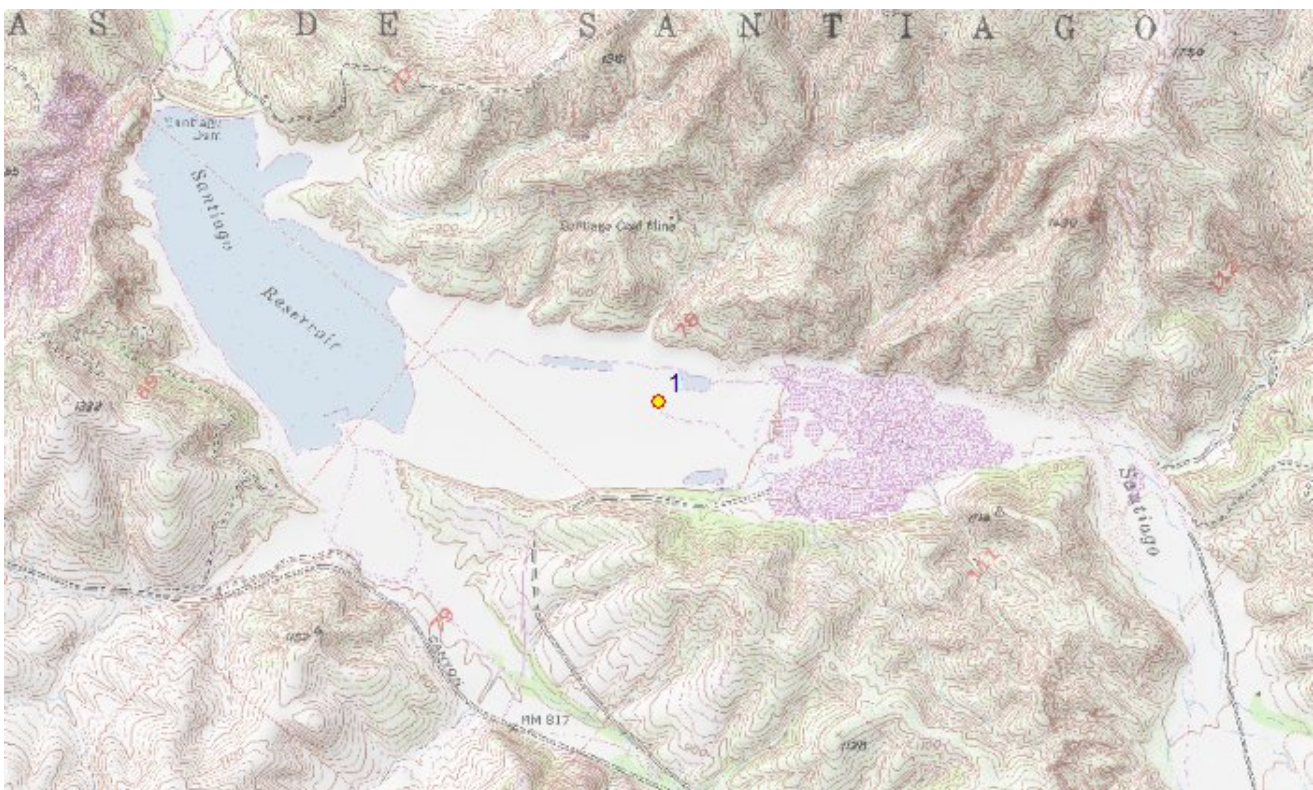
Immediate & surrounding land use: Undeveloped open space, Santiago Dam, and Irvine Regional Park.

Visible disturbances: Noise/human activity associated with shoreline fishing. Noise/wind disturbance associated with helicopter training exercises by Orange County Sheriff Department and Orange County Fire Authority.

Threats:

General comments:

MAP INFORMATION



ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTM E NAD83	UTM N NAD83	UTM Zone
	Orange	Black Star Canyon	782	33.77507	-117.70436	434782	3737440	11
1	Public Land Survey	Feature Comment						
	S T04S R08W 34	28 pairs and 7 individuals						

The mapped feature is accurate within: 5 m

Source of mapped feature: [Avenza Maps - Iphone](#)

Mapping notes: [Please see attachment.](#)

Location/directions comments:

Attachment(s): [21 YBCH locations.docx](#)

21 yellow-breasted chat locations:

- 1) 33.768784°, -117.723804° (Pair)
- 2) 33.768758°, -117.714398° (Pair)
- 3) 33.764610°, -117.711081° (Pair)
- 4) 33.772185°, -117.712763° (Pair with 2 juveniles)
- 5) 33.770131°, -117.720144° (Pair)
- 6) 33.767752°, -117.713623° (Pair with 1 juvenile)
- 7) 33.776137°, -117.706273° (Pair)
- 8) 33.777870°, -117.710672° (Pair with 1 juvenile)
- 9) 33.776485°, -117.713231° (Individual)
- 10) 33.778968°, -117.714234° (Pair)
- 11) 33.769624°, -117.715906° (Pair with 2 juveniles)
- 12) 33.776820°, -117.708233° (Individual)
- 13) 33.773692°, -117.693693° (Pair)
- 14) 33.774735°, -117.697351° (Individual)
- 15) 33.773926°, -117.715910° (Individual)
- 16) 33.771552°, -117.710026° (Pair)
- 17) 33.765910°, -117.712344° (Individual)
- 18) 33.771802°, -117.721292° (Pair)
- 19) 33.773950°, -117.689537° (Individual)
- 20) 33.773118°, -117.715298° (Pair)
- 21) 33.774819°, -117.704847° (Pair with 1 juvenile)

CNDDDB Online Field Survey Form Report



California Natural Diversity Database
Department of Fish and Wildlife
1416 9th Street, Suite 1266
Sacramento, CA 95814
Fax: 916.324.0475
cnddb@wildlife.ca.gov
www.dfg.ca.gov/biogeodata/cnddb/



Source code AGU22F0027
Quad code 3311776
Occ. no. _____
EO index no. _____
Map index no. _____

This data has been reported to the CNDDDB, but may not have been evaluated by the CNDDDB staff

Scientific name: *Setophaga petechia*

Common name: *yellow warbler*

Date of field work (mm-dd-yyyy): *07-14-2022*

Comment about field work date(s): *Incidental observations on June 7, 8, 21, and 22; and July 1, 4, 13, and 14.*

OBSERVER INFORMATION

Observer: *Jonathan Aguayo*

Affiliation: *Psomas*

Address: *6292 San Harco Circle , Buena Park, CA 90620*

Email: *jonathan.aguayo@psomas.com*

Phone: *(805) 204-6986*

Other observers: _____

DETERMINATION

Keyed in:

Compared w/ specimen at:

Compared w/ image in:

By another person:

Other: *Familiarity with species visually and aurally*

Identification explanation:

Identification confidence: *Very confident*

Species found: *Yes* If not found, why not?

Level of survey effort: *Incidental observation during protocol focused surveys for least Bell's vireo*

Total number of individuals: *10*

Collection? *No*

Collection number:

Museum/Herbarium:

ANIMAL INFORMATION

How was the detection made? *Heard singing then seen*

Number detected in each age class:

10

adults

juveniles

larvae

egg mass

unknown

Age class comment:

Bird site use:

- ☒ Nesting ☐ Rookery ☐ Nesting colony ☐ Burrow site ☐ Lek
☐ Non-breeding (over-wintering) ☐ Communal roost ☐ Other

Site use description:

What was the observed behavior? [Pairs were observed foraging.](#) [Pairs appear to be nesting.](#)

Describe any evidence of reproduction:

SITE INFORMATION

Habitat description: [Riparian herb](#), [southern willow scrub](#), [mulefat scrub](#), [disturbed mulefat scrub](#), [southern sycamore riparian woodland/southern coast live oak riparian forest](#), [southern black willow forest](#), [disturbed southern black willow forest](#), and [southern black willow forest/riparian herb](#) occur upstream of the Dam on the project site.

Slope:

Land owner/manager: [Private - Irvine Ranch](#)

Aspect:

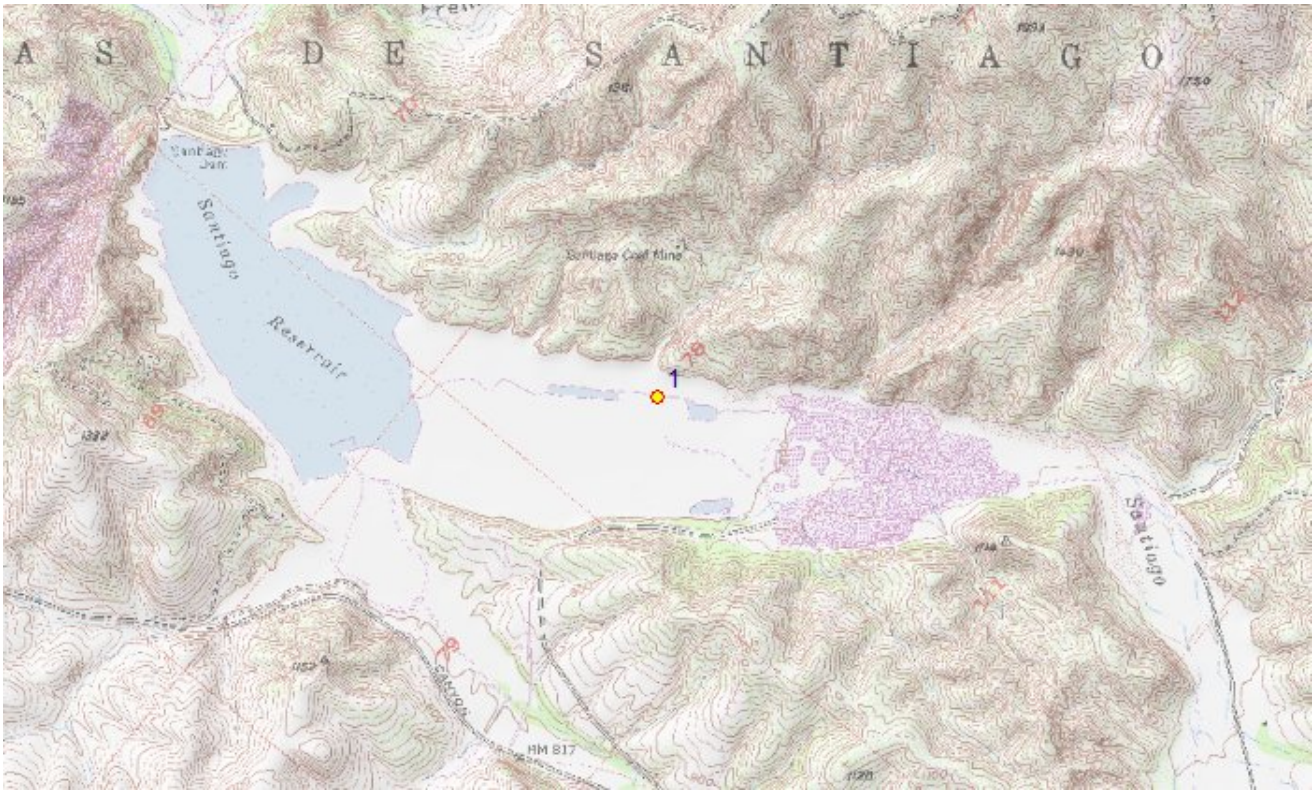
Site condition + population viability: [Excellent](#)

Immediate & surrounding land use: [Undeveloped open space](#), [Santiago Dam](#), and [Irvine Regional Park](#).

Visible disturbances: [Noise/human activity associated with shoreline fishing.](#) [Noise/wind disturbance associated with helicopter training exercises by Orange County Sheriff Department and Orange County Fire Authority.](#)

Threats:

General comments:

MAP INFORMATION

ID	County	24K Quadrangle	Elev. (ft)	Latitude NAD83	Longitude NAD83	UTM E NAD83	UTM N NAD83	UTM Zone
	Orange	Black Star Canyon	782	33.77636	-117.70469	434752	3737583	11
1	Public Land Survey	Feature Comment						
	S T04S R08W 34	YEWA Pair #1						

The mapped feature is accurate within: 5 m

Source of mapped feature: [Avenza Maps - Iphone](#)

Mapping notes: [Pair #2: 11s 434769, 3737450](#); [Pair #3: 11s 433759, 3736816](#); [Pair #4: 11s 433341, 3736877](#); and [Pair #5: 11s 434155, 3736307](#)

Location/directions comments:

Attachment(s):

ATTACHMENT D

LEAST BELL'S VIREO SURVEY DATA SUMMARY FORM

LEAST BELL'S VIREO SURVEY DATA SUMMARY

Site Information				
Project Title:	Santiago Creek Dam Outlet Tower and Spillway Improvement Project			
Landowner:	County of Orange			
Survey Information				
Surveyors:	Jonathan Aguayo		Year:	2022
Survey Begin Coordinates		Survey End Coordinates		Datum
Northing:	3736684	Northing:	3737277	NAD83
Easting:	432888	Easting:	436296	NAD83
Survey Length (Km)	Total Number of Surveys		Total Number of Survey Hours	
7.6	8		54.18	
Least Bell's Vireo Detection Information				

Number of males that were:

Paired:	27	Based on observation of female, nest, young, or nesting behavior (nest-building, food carrying).
Undetermined Status:	1	The total number of resident males not confirmed as paired.
Transient:	1	Only detected once despite repeated surveys, or were not detected at the same location for more than 2 weeks.
Total number of males:	29	The sum of the three categories above.

Coordinates for LBVI Territories (continue on second sheet if necessary)			
Territory ID	Northing	Easting	Status/Comments (e.g. paired)
1	3736302	434224	paired, fledged two juveniles
2	3736340	434143	paired, fledged two juveniles
3	3736425	434057	paired, fledged two juveniles
4	3736662	433864	paired, fledged two juveniles
5	3736808	433803	paired, fledged one juvenile
6	3736760	433754	paired, fledged three juveniles
7	3736855	433692	paired, fledged two juveniles
8	3736931	433468	paired, fledged one juvenile
9	3736918	433334	paired, fledged one juvenile
10	3737123	433238	paired, fledged one juvenile
11	3737247	433680	paired

Coordinates for LBVI Territories (continue on second sheet if necessary)

Territory ID	Northing	Easting	Status/Comments (e.g. paired)
12	3737175	433839	paired, fledged one juvenile
13	3737113	434044	paired, fledged two juveniles
14	3737052	434240	paired, juvenile heard
15	3737325	436099	paired, fledged two juveniles
16	3737360	435855	paired
17	3737444	435780	male
18	3737392	435610	paired, fledged one juvenile
19	3737338	435432	paired, juvenile heard
20	3737577	434778	paired, fledged two juveniles
21	3737403	434726	paired, fledged two juveniles
22	3737636	434724	paired, fledged one juvenile
23	3737638	434404	paired, fledged two juveniles
24	3737651	434246	paired, fledged one juvenile
25	3737832	434129	paired, fledged two juveniles
26	3737859	434012	paired, fledged one juvenile
27	3737621	433847	paired, fledged one juvenile
28	3738013	433669	paired, fledged one juvenile

ATTACHMENT E

WILLOW FLYCATCHER SURVEY AND DETECTION FORM

Willow Flycatcher (WIFL) Survey and Detection Form (revised April, 2010)

Site Name: Santiago Creek Dam Outlet Tower and Spillway Improvement Project State: California County: Orange
 USGS Quad Name: Black Star Canyon Elevation: 200 to 303 (meters)
 Creek, River, or Lake Name: Irvine Lake

Is copy of USGS map marked with survey area and WIFL sightings attached (as required)? Yes X No

Survey Coordinates: Start: E 434219 N 3736223 UTM Datum: NAD 83 (See instructions)
 Stop: E 432935 N 3736729 UTM Zone: 11S

If survey coordinates changed between visits, enter coordinates for each survey in comments section on back of this page.

****Fill in additional site information on back of this page****

Survey # Observer(s) (Full Name)	Date (m/d/y) Survey Time	Number of Adult WIFLs	Estimated Number of Pairs	Estimated Number of Territories	Nest(s) Found? Y or N If Yes, number of nests	Comments (e.g., bird behavior; evidence of pairs or breeding; potential threats [livestock, cowbirds, <i>Diorhabda</i> spp.]). If <i>Diorhabda</i> found, contact USFWS and State WIFL coordinator.	GPS Coordinates for WIFL Detections (this is an optional column for documenting individuals, pairs, or groups of birds found on each survey). Include additional sheets if necessary.			
							# Birds	Sex	UTM E	UTM N
Survey # 1 Observer(s): Jonathan Aguayo	Date: 5/25/2022	1	N/A	N/A	N	One individual was detected. Individual responded to recorded playback by singing "fitbew" multiple times.	1	Unk	434180	3736254
	Start: 5:34									
	Stop: 8:22									
	Total hrs: 2.8									
Survey # 2 Observer(s): Jonathan Aguayo	Date: 6/7/2022	1	N/A	N/A	N	One individual was detected. Individual was detected singing unsolicited "fitzbew" vocalization.	1	Unk	433875	3736658
	Start: 5:38									
	Stop: 8:37									
	Total hrs: 2.98									
Survey # 3 Observer(s): Jonathan Aguayo	Date: 6/21/2022	0	0	0	0	No WIFL detected				
	Start: 5:40									
	Stop: 8:38									
	Total hrs: 2.97									
Survey # 4 Observer(s): Jonathan Aguayo	Date: 7/1/2022	0	0	0	0	No WIFL detected				
	Start: 5:32									
	Stop: 8:36									
	Total hrs: 3.07									
Survey # 5 Observer(s): Jonathan Aguayo	Date: 7/13/2022	0	0	0	0	No WIFL detected				
	Start: 5:52									
	Stop: 8:44									
	Total hrs: 2.87									
Overall Site Summary Totals do not equal the sum of each column. Include only resident adults. Do not include migrants, nestlings, and fledglings. Be careful not to double count individuals.		Total Adult Residents	Total Pairs	Total Territories	Total Nests	Were any WIFLs color-banded? Yes <u> </u> No <u> </u> If yes, report color combination(s) in the comments section on back of form and report to USFWS.				
Total survey hrs: 14.69	0	0	0	0						

Reporting Individual: Jonathan Aguayo Date Report Completed: 9/28/2022
 US Fish & Wildlife Service Permit #: TE 96514A-3 State Wildlife Agency Permit #: EID-190240002

Submit form to USFWS and State Wildlife Agency by September 1st. Retain a copy for your records.

Fill in the following information completely. Submit form by September 1st. Retain a copy for your records.

Reporting Individual Jonathan Aguayo Phone # 8052046986
 Affiliation Psomas E-mail Jonathan.Aguayo@psomas.com
 Site Name Santiago Creek Dam Outlet Tower and Spillway Improvement Project Date report Completed 092822
 Was this site surveyed in a previous year? Yes No Unknown x
 Did you verify that this site name is consistent with that used in previous yrs? Yes No Not Applicable x
 If name is different, what name(s) was used in the past?
 If site was surveyed last year, did you survey the same general area this year? Yes No If no, summarize below.
 Did you survey the same general area during each visit to this site this year? Yes No If no, summarize below.
 Management Authority for Survey Area: Federal Municipal/County State Tribal Private x
 Name of Management Entity or Owner (e.g., Tonto National Forest) Private - Irvine Ranch

Length of area surveyed: 1.7 (km)

Vegetation Characteristics: Check (only one) category that best describes the predominant tree/shrub foliar layer at this site:

 Native broadleaf plants (entirely or almost entirely, > 90% native)
x Mixed native and exotic plants (mostly native, 50 - 90% native)
 Mixed native and exotic plants (mostly exotic, 50 - 90% exotic)
 Exotic/introduced plants (entirely or almost entirely, > 90% exotic)

Identify the 2-3 predominant tree/shrub species in order of dominance. Use scientific name.


Baccharis salicifolia ssp. salicifolia, Salix gooddingii, and Salix lasiolepis

Average height of canopy (Do not include a range): 6 (meters)

- Attach the following: 1) copy of USGS quad/topographical map (REQUIRED) of survey area, outlining survey site and location of WIFL detections;
 2) sketch or aerial photo showing site location, patch shape, survey route, location of any detected WIFLs or their nests;
 3) photos of the interior of the patch, exterior of the patch, and overall site. Describe any unique habitat features in Comments.

Comments (such as start and end coordinates of survey area if changed among surveys, supplemental visits to sites, unique habitat features.
Attach additional sheets if necessary.

Territory Summary Table. Provide the following information for each verified territory at your site.

Territory Number	All Dates Detected	UTM E	UTM N	Pair Confirmed? Y or N	Nest Found? Y or N	Description of How You Confirmed Territory and Breeding Status (e.g., vocalization type, pair interactions, nesting attempts, behavior)
1	5/25/2022	434180	3736254	N	N	No breeding or territorial behavior was observed.
2	6/7/2022	433875	3736658	N	N	No breeding or territorial behavior was observed. 

Attach additional sheets if necessary

Territory Summary Table, continued

Reporting Individual _____ Phone # _____
Affiliation _____ E-mail _____
Site Name _____ Date report Completed _____

Territory Number	All Dates Detected	UTM E	UTM N	Pair Confirmed? Y or N	Nest Found? Y or N	Description of How You Confirmed Territory and Breeding Status (e.g., vocalization type, pair interactions, re nesting attempts, behavior)

Comments

Willow Flycatcher (WIFL) Survey and Detection Form (revised April, 2010)

Site Name: Santiago Creek Dam Outlet Tower and Spillway Improvement Project State: California County: Orange
 USGS Quad Name: Black Star Canyon Elevation: 200 to 303 (meters)
 Creek, River, or Lake Name: Irvine Lake

Is copy of USGS map marked with survey area and WIFL sightings attached (as required)? Yes X No

Survey Coordinates: Start: E 436199 N 3737256 UTM Datum: NAD 83 (See instructions)
 Stop: E 433595 N 3737990 UTM Zone: 11S

If survey coordinates changed between visits, enter coordinates for each survey in comments section on back of this page.

****Fill in additional site information on back of this page****

Survey # Observer(s) (Full Name)	Date (m/d/y) Survey Time	Number of Adult WIFLs	Estimated Number of Pairs	Estimated Number of Territories	Nest(s) Found? Y or N If Yes, number of nests	Comments (e.g., bird behavior; evidence of pairs or breeding; potential threats [livestock, cowbirds, <i>Diorhabda</i> spp.]). If <i>Diorhabda</i> found, contact USFWS and State WIFL coordinator.	GPS Coordinates for WIFL Detections (this is an optional column for documenting individuals, pairs, or groups of birds found on each survey). Include additional sheets if necessary.			
							# Birds	Sex	UTM E	UTM N
Survey # 1 Observer(s): Jonathan Aguayo	Date: <u>5/26/2022</u>	0	0	0	0	No WIFL detected	# Birds	Sex	UTM E	UTM N
	Start: <u>5:31</u>									
	Stop: <u>8:30</u>									
	Total hrs: <u>2.98</u>									
Survey # 2 Observer(s): Jonathan Aguayo	Date: <u>6/8/2022</u>	1	N/A	N/A	N	One individual was detected. Individual responded to recorded playback by singing "fitbew" multiple times.	# Birds	Sex	UTM E	UTM N
	Start: <u>5:36</u>						1	Unk	436027	3737293
	Stop: <u>8:34</u>									
	Total hrs: <u>2.97</u>									
Survey # 3 Observer(s): Jonathan Aguayo	Date: <u>6/22/2022</u>	0	0	0	0	No WIFL detected	# Birds	Sex	UTM E	UTM N
	Start: <u>5:35</u>									
	Stop: <u>8:37</u>									
	Total hrs: <u>3.03</u>									
Survey # 4 Observer(s): Jonathan Aguayo	Date: <u>7/4/2022</u>	0	0	0	0	No WIFL detected	# Birds	Sex	UTM E	UTM N
	Start: <u>5:50</u>									
	Stop: <u>8:46</u>									
	Total hrs: <u>2.93</u>									
Survey # 5 Observer(s): Jonathan Aguayo	Date: <u>7/14/2022</u>	0	0	0	0	No WILF detected	# Birds	Sex	UTM E	UTM N
	Start: <u>6:14</u>									
	Stop: <u>8:38</u>									
	Total hrs: <u>2.4</u>									
Overall Site Summary Totals do not equal the sum of each column. Include only resident adults. Do not include migrants, nestlings, and fledglings. Be careful not to double count individuals. Total survey hrs: <u>14.31</u>		Total Adult Residents	Total Pairs	Total Territories	Total Nests	Were any WIFLs color-banded? Yes <u> </u> No <u> </u> If yes, report color combination(s) in the comments section on back of form and report to USFWS.				

Reporting Individual: Jonathan Aguayo Date Report Completed: 9/28/2022
 US Fish & Wildlife Service Permit #: TE 96514A-3 State Wildlife Agency Permit #: EID-190240002

Submit form to USFWS and State Wildlife Agency by September 1st. Retain a copy for your records.

Fill in the following information completely. Submit form by September 1st. Retain a copy for your records.

Reporting Individual Jonathan Aguayo Phone # 8052046986
 Affiliation Psomas E-mail Jonathan.Aguayo@psomas.com
 Site Name Santiago Creek Dam Outlet Tower and Spillway Improvement Project Date report Completed 092822
 Was this site surveyed in a previous year? Yes No Unknown x
 Did you verify that this site name is consistent with that used in previous yrs? Yes No Not Applicable x
 If name is different, what name(s) was used in the past?
 If site was surveyed last year, did you survey the same general area this year? Yes No If no, summarize below.
 Did you survey the same general area during each visit to this site this year? Yes No If no, summarize below.
 Management Authority for Survey Area: Federal Municipal/County State Tribal Private x
 Name of Management Entity or Owner (e.g., Tonto National Forest) Private - Irvine Ranch

Length of area surveyed: 2.15 (km)

Vegetation Characteristics: Check (only one) category that best describes the predominant tree/shrub foliar layer at this site:

- Native broadleaf plants (entirely or almost entirely, > 90% native)
x Mixed native and exotic plants (mostly native, 50 - 90% native)
 Mixed native and exotic plants (mostly exotic, 50 - 90% exotic)
 Exotic/introduced plants (entirely or almost entirely, > 90% exotic)

Identify the 2-3 predominant tree/shrub species in order of dominance. Use scientific name.

Baccharis salicifolia ssp. salicifolia, Salix gooddingii, and Salix lasiolepis

Average height of canopy (Do not include a range): 6 (meters)

- Attach the following: 1) copy of USGS quad/topographical map (REQUIRED) of survey area, outlining survey site and location of WIFL detections;
 2) sketch or aerial photo showing site location, patch shape, survey route, location of any detected WIFLs or their nests;
 3) photos of the interior of the patch, exterior of the patch, and overall site. Describe any unique habitat features in Comments.

Comments (such as start and end coordinates of survey area if changed among surveys, supplemental visits to sites, unique habitat features.
Attach additional sheets if necessary.

Territory Summary Table. Provide the following information for each verified territory at your site.

Territory Number	All Dates Detected	UTM E	UTM N	Pair Confirmed? Y or N	Nest Found? Y or N	Description of How You Confirmed Territory and Breeding Status (e.g., vocalization type, pair interactions, nesting attempts, behavior)
1	6/8/2022	436027	3737293	N	N	No breeding or territorial behavior was observed.

Attach additional sheets if necessary

Territory Summary Table, continued

Reporting Individual _____ Phone # _____
Affiliation _____ E-mail _____
Site Name _____ Date report Completed _____

Territory Number	All Dates Detected	UTM E	UTM N	Pair Confirmed? Y or N	Nest Found? Y or N	Description of How You Confirmed Territory and Breeding Status (e.g., vocalization type, pair interactions, re nesting attempts, behavior)

Comments

APPENDIX L

WESTERN YELLOW-BILLED CUCKOO SURVEY

September 30, 2022

Ms. Stacey Love
U.S. Fish and Wildlife Service
2177 Salk Avenue, Suite 250
Carlsbad, California 92008

VIA EMAIL
Stacey_Love@fws.gov

Subject: Results of the 2022 Western Yellow-Billed Cuckoo Surveys for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, Orange County, California

Dear Ms. Love:

This Letter Report presents the results of focused surveys to determine the presence or absence of the western yellow-billed cuckoo (*Coccyzus americanus occidentalis*) for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project, (hereinafter referred to as the “proposed project”) located in Orange County, California (Exhibit 1). The purpose of the surveys was to determine the presence or absence of the western yellow-billed cuckoo upstream of Santiago Dam. A Biologist with the necessary experience and the Federal Endangered Species Act 10(a) survey permit conducted the surveys according to U.S. Fish and Wildlife Service (USFWS) protocol for this species. Notification of the intent to conduct protocol-level surveys was submitted to the USFWS on May 26, 2022.

PROJECT DESCRIPTION AND LOCATION

The project site is located at Santiago Creek Dam at the northwest end of Irvine Lake in unincorporated Orange County, California (Exhibit 1). The Biological Study Area includes Santiago Creek Dam, downstream areas along Santiago Creek, areas around Irvine Lake, and upstream areas along Santiago Creek. The Biological Study Area is south of State Route (SR) 261 and east of SR-241 and Santiago Canyon Road. Surrounding land use primarily consists of undeveloped open space. Irvine Regional Park is located northwest of SR-241; Limestone Canyon Regional Park is located south of Santiago Canyon Road; and Oak Canyon Park is located at the southeast end of Irvine Lake. The closed Santiago Canyon Landfill is located adjacent to the west of Irvine Lake.

The Biological Study Area is located on the U.S. Geological Survey’s (USGS’) Black Star Canyon 7.5-minute quadrangle (Exhibit 2). Irvine Lake (named Santiago Creek Reservoir on the USGS) was created by constructing a dam across Santiago Creek. Santiago Creek, a named blueline stream, enters Irvine Lake from the east and continues downstream of the dam flowing north and then west. It has a relatively broad floodplain both above and below the dam. The slopes around the western and northern portions of the lake are relatively steep while the areas to the southeast and east include areas that are relatively flat. Three unnamed blueline streams enter the lake from the north and eight unnamed blueline streams enter the lake from the west, southeast, and south. One unnamed blueline stream enters the Biological Study Area in the northwest, downstream of the Dam, while Fremont Canyon Creek merges with Santiago Creek downstream of the Biological Study Area. Elevations in the Biological Study Area range from approximately 657 to 996 feet above mean sea level.

5 Hutton Centre Drive
Suite 300
Santa Ana, CA 92707

Tel 714.751.7373
Fax 714.545.8883
www.Psomas.com

Ms. Stacey Love
 September 30, 2022
 Page 2

The Biological Study Area is located in the Central/Coastal Subregion of the Natural Communities Conservation Plan/Habitat Conservation Plan (NCCP/HCP). Santiago Creek Dam and its associated structures are located within designated “Non-Reserve Open Space”, while Habitat Reserve and Conservation Easements surround the lake; a Special Linkage is located southeast of the lake. The purpose of this plan is to provide regional protection and recovery of multiple species and habitat while allowing compatible land use and appropriate development. Irvine Ranch Water District (IRWD)¹ is a participating jurisdiction and, as such, will comply with the terms of the NCCP/HCP Implementation Agreement.

The IRWD and Serrano Water District are jointly proposing to abandon the existing Santiago Creek Dam outlet tower and construct a new inclined outlet structure to be located on the left abutment of the existing dam. Additionally, based on feedback from the Division of Safety of Dams, the dam spillway requires structural improvements. Existing structures include the dam crest, the intake tower in Irvine Lake, the spillway channel, the control houses, the energy dissipater structure, the aboveground outlet pipe, and the dam crest access road. The project is currently in the design phase. Staging areas are currently planned to be placed in disturbed areas on the east side of Irvine Lake, adjacent to where Santiago Creek flows into the lake. Focused surveys were conducted along Santiago Creek upstream of the lake to determine whether western yellow-billed cuckoo is present or absent adjacent to the proposed staging areas on the east side of the lake.

SURVEY AREA

A variety of vegetation types occur in the Biological Study Area, including sagebrush scrub, disturbed sagebrush scrub, sagebrush-coyote bush scrub, southern cactus scrub, disturbed southern cactus scrub, disturbed floodplain sage scrub, toyon-sumac chaparral, annual grassland, ruderal, riparian herb, southern willow scrub, mulefat scrub, disturbed mulefat scrub, southern sycamore riparian woodland/southern coast live oak riparian forest, southern black willow forest, disturbed southern black willow forest, southern black willow forest/riparian herb, coast live oak woodland, western sycamore, and vegetated fluctuating shoreline. Other landcover includes cliff, open water, fluctuating shoreline, perennial stream, ornamental, developed, and disturbed areas.

The survey area for the western yellow-billed cuckoo includes all suitable riparian habitats (i.e., southern sycamore riparian woodland, southern black willow forest, disturbed southern black willow forest, and southern black willow forest/riparian herb) upstream of the dam (Exhibit 3). The Biologist reduced the survey area boundary where offsite areas were not accessible due to property boundaries (i.e., Santiago Landfill), topography (i.e., cliff), and where there was no suitable habitat (i.e., Irvine Lake) (Exhibit 4).

Specifically, western yellow-billed cuckoo surveys were conducted in portions of the survey area that contained suitable riparian habitat of appropriate size and stature. Riparian habitats were distributed throughout the survey area. These habitat types were generally dominated by Goodding’s black willow (*Salix gooddingii*), red willow (*Salix laevigata*), arroyo willow (*Salix lasiolepis*), Fremont cottonwood (*Populus fremontii* ssp. *fremontii*), western sycamore (*Platanus racemosa*), and white alder (*Alnus rhombifolia*). The understory and edges of these areas contained scattered mule fat (*Baccharis salicifolia* ssp. *salicifolia*), flatsedge (*Cyperus* sp.), broad-leaved cattail (*Typha latifolia*), saltcedar (*Tamarix ramosissima*), giant reed (*Arundo donax*), gum trees (*Eucalyptus* spp.), tree tobacco (*Nicotiana glauca*), and non-native grasses. Site photographs of representative habitat in the survey area are provided in Attachment A.

¹ The Santiago County Water District (SCWD) was also a participating jurisdiction in the NCCP/HCP. The SCWD consolidated with IRWD in 2006.

Ms. Stacey Love
 September 30, 2022
 Page 3

SPECIES BACKGROUND

Western yellow-billed cuckoo (Distinct Population Segment [DPS]) is a federally and State listed Endangered species. The USFWS concluded that the western population was discrete from the eastern population based on geographic separation during the breeding season, morphological differences, and behavioral differences (USFWS 2014a). The western yellow-billed cuckoo generally occurs west of the crest of the Rocky Mountains, specifically in southwest British Columbia in Canada; Washington, Idaho, western Montana, Oregon, California, Nevada, southwestern Wyoming, Utah, western Colorado, Arizona, western New Mexico, and Texas in the United States; and Baja California Sur, Sonora, Sinaloa, western Chihuahua, and northwestern Durango in Mexico (USFWS 2014a). It winters in South America east of the Andes, primarily south of the Amazon Basin in southern Brazil, Paraguay, Uruguay, eastern Bolivia, and northern Argentina (Ehrlich et al. 1992; American Ornithologists' Union 1998; Johnson et al. 2008). The western yellow-billed cuckoo arrives in southern California between late May and early July, with most arriving in mid-June; it departs for its wintering grounds from mid-September to mid-October (Halterman et al. 2015). The peak of breeding activity lasts about one month and is typically in July; but in some years it can begin as early as May and can end as late as September (Laymon et al. 1997; Halterman 1991, 2009; McNeil et al. 2013; Halterman et al. 2015).

The western yellow-billed cuckoo requires large tracts of riparian forest or woodland habitat along low-gradient rivers and streams in open riverine valleys that provide wide floodplain conditions (USFWS 2014b). The optimal size of habitat patches for the species is generally greater than 200 acres in extent and has dense canopy closure and high foliage volume of willows and cottonwoods (Laymon and Halterman 1989). Habitat between 100 acres and 200 acres, although considered suitable, are not consistently used by the species (Laymon and Halterman 1989). Habitat patches from 50 to 100 acres in size are considered marginal habitat; sites less than 37 acres are considered unsuitable habitat (Laymon and Halterman 1989). The species does not use narrow, steep-walled canyons (USFWS 2014b). Sites with strips of habitat less than 325 feet in width are rarely occupied for nesting (USFWS 2014b). Stopover and foraging sites can be similar to breeding sites but can be smaller in size (sometimes less than 10 acres in extent), narrower in width, and lack understory vegetation when compared to nesting sites (Laymon and Halterman 1989; USFWS 2014b). Minimum patch size for cuckoo occupancy is 12.4 acres; no cuckoos have been detected attempting to nest in patches this size or smaller in California or Arizona (Halterman et al. 2001; Johnson et al. 2010). They have also not been found nesting in narrow, linear habitat that is less than 33 to 66 feet wide (Halterman et al. 2015).

Optimal breeding habitat contains willow-dominated groves with dense canopy closure and well-foliaged branches for nest building with nearby foraging areas consisting of a mixture of cottonwoods and willows with a high volume of healthy foliage (USFWS 2014b). Sites can be relatively dense, contiguous stands or irregularly shaped mosaics of dense vegetation with open areas (USFWS 2014b). In California, habitat often consists of willows mixed with Fremont cottonwood (Halterman et al. 2015). Nest trees range from 10 feet to 98 feet in height and are an average of 35 feet in height. Nests are typically well-concealed in dense vegetation (Halterman 2002; Laymon et al. 1997; McNeil et al. 2013). Hydrologic conditions can vary from dry in some years to inundated in others (USFWS 2014b). Humid conditions created by surface and subsurface moisture appear to be important habitat parameters for selection of nest sites (USFWS 2014b). Multiple studies have found that cuckoo preferred nesting sites in younger riparian habitat which, when compared to mature woodlands, provided high productivity of invertebrate prey and reduced predator abundance (Layman 1998; McNeil et al. 2013; Carstensen et al. 2015; Stanek and Stanek 2012; Johnson et al. 2008). The dynamic transitional process of vegetation recruitment and maturity must be maintained to keep riparian habitat viable for this species over the long-term (USFWS 2014a).

Ms. Stacey Love
September 30, 2022
Page 4

Western yellow-billed cuckoos historically bred throughout riparian systems in western North America from southern British Columbia, Canada, to northwestern Mexico (Hughes 1999). In the past 90 years, the species' range in the western United States has contracted; the northern limit of breeding along the west coast is now in the Sacramento Valley, while the breeding limit in the western interior states is in southeastern Idaho (USFWS 2013). Within the three states with the highest historical number of yellow-billed cuckoo, past riparian habitat losses are estimated to be 90 to 95 percent in Arizona, 90 percent in New Mexico, and 90 to 99 percent in California (Ohmart 1994; USDOJ 1994; Noss et al. 1995; Greco 2008). The primary factors threatening the western yellow-billed cuckoo are the loss and degradation of habitat for the species from altered watercourse hydrology and natural stream processes, livestock overgrazing, encroachment from agriculture, and conversion of native habitat to predominantly non-native vegetation. Additional threats to the species include the effects of climate change, pesticides, wildfire, and small and widely separated habitat patches (USFWS 2014a). Compared to conditions historically, the areas currently used for nesting by the western yellow-billed cuckoo are very limited and disjunct. The breeding population is small, with 680 to 1,025 nesting pairs (350 to 495 pairs in the United States and 330 to 530 nesting pairs in Mexico) and with no site exceeding 60 nesting pairs. Estimating numbers is problematic because an individual can nest in more than one location in a single year, possibly causing overestimates of the number of nesting pairs (USFWS 2014b). The current nesting population in California, based on surveys conducted in 2010, likely does not exceed 40 to 50 pairs found in only the three core locations. Core areas in California include (1) the Sacramento River between Colusa and Red Bluff; (2) the South Fork of the Kern River upstream of Lake Isabella; and (3) lower Colorado River (Laymon and Halterman 1987).

This species formerly nested in the Los Angeles, San Gabriel, and the Santa Clara River systems (Allen and Garrett 1996). Breeding persisted until at least 1952 in the San Gabriel River near El Monte (Long 1993; Garrett and Dunn 1981). No nesting of this species has been documented in Los Angeles County since the late 1950s, although breeding is still "conceivable" in remnant riparian habitat along the Santa Clara River (Allen and Garrett 1996). In recent years, yellow-billed cuckoos occur in Los Angeles County and elsewhere in the Southern California Coastal Region only as rare migrants (Lehman 2015; Unitt 2004; Hamilton and Willick 1996; Garrett and Dunn 1981; Webster et al. 1980). Although no recent breeding observations have been confirmed in the Southern California Coastal Region, multiple observations of yellow-billed cuckoos have been reported at some locations with suitable breeding habitat, including the lower Santa Clara River in Ventura County, the Whittier Narrows area in Los Angeles County, Prado Basin in Riverside and San Bernardino Counties, San Joaquin Marsh in Orange County, and San Luis Rey River near Oceanside in San Diego County. These observations generally consist of single birds and sometimes occur at times that suggest summering individuals rather than migrants (McCaskie and Garrett 2013, 2014, 2015, 2016).

On April 21, 2021, the USFWS published a rule designating proposed critical habitat for the western DPS of the yellow-billed cuckoo (USFWS 2021). This proposed rule designated approximately 298,845 acres in Arizona, California, Colorado, Idaho, New Mexico, Texas, and Utah. In California, critical habitat includes the Sacramento River (Colusa, Glenn, Butte, and Tehama Counties), and the South Fork Kern River Valley (Kern County) (USFWS 2021). The Biological Study Area is not located within the proposed designated critical habitat area for this species.

SURVEY METHODS

The USFWS survey protocol for western yellow-billed cuckoo requires a minimum of four surveys be conducted in three time periods that span the peak of breeding activity for the western populations of this species: (1) one survey is required from June 15 to June 30 when migrating yellow-billed cuckoos are passing through but breeding birds are also arriving; (2) two surveys are required from July 1 to July 31 when individual cuckoos encountered are mostly breeders but are occasionally migrants, wandering

Ms. Stacey Love
September 30, 2022
Page 5

individuals, or young of the year; and (3) one survey is required from August 1 to August 15 when most breeding yellow-billed cuckoos have finished breeding activities and are departing. Each survey needs to be conducted 12 to 15 days apart. Focused surveys were conducted by Lindsay Messett (TE-067064-5).

Ms. Messett systematically surveyed the riparian habitats by walking slowly and methodically along the margins of riparian habitat and using meandering transects through the riparian habitat in the survey area. Per USFWS survey protocol for the species, Ms. Messett played recorded contact or “kowlp” calls of western yellow-billed cuckoo five times at one-minute intervals at each calling station (or point) established in the survey area. Compact speakers capable of broadcasting recorded bird calls in excess of 70 decibels were used during all surveys. Upon arriving at each calling point, Ms. Messett listened and watched for cuckoos for one minute prior to playing the broadcast contact calls. Calling points were established approximately every 328 feet in riparian habitat that provided potentially suitable or marginally suitable habitat for the western yellow-billed cuckoo. All surveys were conducted under optimal weather conditions (i.e., between 55 degrees Fahrenheit [°F] and 95°F with wind speeds between 0 and 15 miles per hour) and during the morning hours when bird activity is at a peak (Table 1). Additionally, per USFWS guidelines, all incidental observations of least Bell’s vireo (*Vireo bellii pusillus*) and willow flycatcher (*Empidonax traillii*) were recorded and mapped. All wildlife species detected during the surveys were recorded and are included in Attachment B.

TABLE 1
SUMMARY OF SURVEY DATA AND CONDITIONS FOR
WESTERN YELLOW-BILLED CUCKOO SURVEYS

Survey No.	Survey Date	Surveyor	Time	Air Temperature (°F)		Cloud Cover (%) Start/End	Wind (mph)
				Start	End		
1A	June 23, 2022	Messett	6:00 AM–10:50 AM	67	83	50/30	1–3
1B	June 24, 2022	Messett	6:15 AM–10:45 AM	55	80	0/0	0–6
2A	July 12, 2022	Messett	5:50 AM–11:00 AM	64	73	100/0	2–4
2B	July 13, 2022	Messett	5:45 AM–10:55 AM	63	72	100/0	1–2
3A	July 28, 2022	Messett	6:00 AM–11:05 AM	66	76	100/50	0–1
3B	July 29, 2022	Messett	6:05 AM–10:45 AM	67	78	90/75	4–5
4A	August 11, 2022	Messett	6:00 AM–10:30 AM	63	87	25/0	0–1
4B	August 12, 2022	Messett	5:54 AM–11:00 AM	70	82	25/10	0–4

(°F): Fahrenheit; %: percent; mph: miles per hour

Ms. Stacey Love
September 30, 2022
Page 6

RESULTS

No western yellow-billed cuckoos were observed in the survey area during the focused surveys. The required Yellow-Billed Cuckoo Survey Summary and Site Detection Forms are included as Attachment C.

Six other special status species were observed and/or detected in the survey area during the surveys: American white pelican (*Pelecanus erythrorhynchos*, California Species of Special Concern), bald eagle (*Haliaeetus leucocephalus*, State Endangered, California Fully Protected), least Bell's vireo (State Endangered, Federally Endangered), southern California rufous-crowned sparrow (*Aimophila ruficeps canescens*, California Department of Fish and Wildlife [CDFW] Watch List), yellow-breasted chat (*Icteria virens*, California Species of Special Concern), and yellow warbler (*Setophaga petechia*, California Species of Special Concern). These species are tracked by the CDFW's California Natural Diversity Database (CNDDDB). The least Bell's vireo, yellow-breasted chat, and yellow warbler were all observed within riparian habitat; exhibits showing the location of these species and CNDDDB forms documenting these species were included with the Results of Focused Presence/Absence Surveys for the Least Bell's Vireo and Southwestern Willow Flycatcher Report (Psomas 2022b). CNDDDB forms for the remaining species were included with the Results of Focused Presence/Absence Surveys for the Coastal California Gnatcatcher Report (Psomas 2022a).

One to three brown-headed cowbirds were observed during the first two focused surveys on June 23 and 24; and July 12 and 13, 2022.

Psomas appreciates the opportunity to assist on this project. If you have any comments or questions, please contact Amber Heredia (Amber.Heredia@psomas.com) or Lindsay Messett (Lindsay.Messett@psomas.com).

Sincerely,

P S O M A S



Amber O. Heredia
Senior Project Manager, Resource Management



Lindsay A. Messett, CWB®
Senior Biologist

I certify that the information in this survey report and attached exhibits fully and accurately represents my work.



Lindsay A. Messett, CWB®
Senior Biologist
(TE067064-5)

Ms. Stacey Love
September 30, 2022
Page 7

Enclosures: Exhibit 1
 Exhibit 2
 Exhibit 3
 Exhibit 4
 Attachment A – Site Photographs
 Attachment B – Wildlife Compendium
 Attachment C – Yellow-Billed Cuckoo Survey Summary and Site Detection Forms

cc: Kellie Welch, Welch@irwd.com
 Jacob Moeder, Moeder@irwd.com

R:\Projects\IRW_IRWD\3IRW010200\Documentation\YBCU\Santiago YBCU Focused Survey Report-093022.docx

Ms. Stacey Love
September 30, 2022
Page 8

REFERENCES CITED

- Allen, L.W., and K.L. Garrett. 1996. *Atlas Handbook: Los Angeles County Breeding Bird Atlas*. West Hollywood CA: Los Angeles Audubon Society.
- American Ornithologists' Union (AOU). 2017 (July). *Check-list of North and Middle American Birds* (7th ed., as revised through 58th Supplement). Washington, D.C.: AOU. <http://www.americanornithology.org/content/checklist-north-and-middle-american-birds>.
- . 1998. Checklist of North American Birds. (7th ed, as revised through 58th Supplement). Washington, D.C: AOU. <http://checklist.aou.org/>.
- Carstensen, D., D. Ahlers, and D. Moore. 2015. Yellow-billed Cuckoo Study Results – 2014: Middle Rio Grande from Los Lunas to Elephant Butte Reservoir, New Mexico. U.S. Bureau of Reclamation, Technical service Center, Denver, CO.
- Ehrlich, P.R., D.S. Dobkin, and D. Wheye. 1992. *Birds in Jeopardy*. Stanford, CA: Stanford University Press.
- Garrett, K., and J. Dunn. 1981. *Birds of Southern California: Status and Distribution*. Los Angeles, CA: Audubon Press.
- Greco, S.E. 2008. Long-term Conservation of the Yellow-billed Cuckoo Will Require Process-based Restoration on the Sacramento River. *Ecosis* 18(3):4–7.
- Halterman, M.D. 2009. Sexual dimorphism, detection probability, home range, and parental care in the yellow-billed cuckoo. Dissertation. Reno, NV: University of Nevada, Reno, USA.
- . 2002. Surveys and Life History Studies of the Yellow-Billed Cuckoo: Summer 2001. Admin. Rept., Bureau of Reclamation, Lower Colorado Regional Office, Boulder City, NV and Bureau of Land Management. Sierra Vista, AZ.: Bureau of Reclamation and BLM.
- . 1991. Distribution and Habitat use of the Yellow-billed Cuckoo (*Coccyzus americanus occidentalis*) on the Sacramento River, California, 1987–1990. Master's Thesis. Chico, CA: California State University.
- Halterman, M., M.J. Johnson, J.A. Holmes, and S.A. Laymon. 2015 (April). A Natural History Summary and Survey Protocol for the Western Distinct Population Segment of the Yellow-billed Cuckoo. Flagstaff, AZ: USFWS, Colorado Plateau Research Station. http://www.fws.gov/southwest/es/Documents/R2ES/YBCU_SurveyProtocol_FINAL_DRAFT_22Apr2015.pdf.
- Halterman, M.D., D.S. Gilmer, S.A. Laymon, and G.A. Falxa. 2001. Status of the Yellow-billed Cuckoo in California: 1999-2000. Report to the U.S. Geological Survey, Dixon, CA.: USGS.
- Hamilton, R.A., and D.R. Willick. 1996. *The Birds of Orange County, California: Status and Distribution*. Irvine, CA: Sea and Sage Audubon Society.
- Hughes, J.M. 1999. Yellow-billed Cuckoo (*Coccyzus americanus*). *The Birds of North America*, No. 418 (A. Poole and F. Gill, Eds.). Philadelphia, PA: The Academy of Natural Sciences.

Ms. Stacey Love
September 30, 2022
Page 9

- Johnson, M.J., S.L. Durst, C.M. Calvo, L. Stewart, M.K. Sogge, G. Bland, and T. Arundel. 2008. Yellow-billed cuckoo distribution, abundance, and habitat use along the lower Colorado River and its tributaries, 2007 Annual Report. U.S. Geological Survey Open-File Report 2008–1177.
- Johnson, M.J., R.T. Magill, and C. van Riper, III. 2010. Yellow-billed cuckoo distribution and habitat associations in Arizona, 1998–1999. In: *The Colorado Plateau IV: Integrating Research and Resources Management for Effective Conservation* (van Riper, C., III, B. F. Wakeling, and T. D. Sisk, eds). Tucson, AZ: University of Arizona Press.
- Laymon, S.A. 1998. Yellow-billed Cuckoo survey and monitoring protocol for California. Available from the author, P. O. Box 1236, Weldon, California 93282.
- Laymon, S.A., P.L. Williams, and M.D. Halterman. 1997. Breeding Status of the Yellow-billed Cuckoo in the South Fork Kern River Valley, Kern County, California: Summary Report 1985–1996. Prepared for the U.S. Department of Agriculture Forest Service, Sequoia National Forest, Cannell Meadow Ranger District.
- Laymon, S.A., and M.D. Halterman. 1989. A Proposed Habitat Management Plan for Yellow-Billed Cuckoos in California *Proceedings of the California Riparian Systems Conference: protection, management, and restoration for the 1990s* (September 22–24, 1988)(USDA Forest Service General Technical Report PSW-110 p 272–277). Berkeley, CA: USDA Forest Service, Pacific Southwest Forest and Range Experiment Station.
- . 1987. Distribution and status of the yellow-billed cuckoo in California: 1986–1987. Final Report to the California Department of Fish and Game, Nongame Bird and Mammal Section, Wildlife Management Division. Sacramento, CA: CDFG.
- Lehman, P.E. 2015. The Birds of Santa Barbara County, California (revised edition, April 2015; original edition 1994). <https://sites.google.com/site/lehmanbosbc/>.
- Long, M.C. 1993. Birds of the Whittier Narrows Recreation Area, Los Angeles County, California. South El Monte, CA: Whittier Narrows Nature Center Associates.
- McCaskie, G. and K.L. Garrett. 2016. The Nesting Season: June through July 2015. *North American Birds* 69(4):489–496.
- McCaskie, G. and K.L. Garrett. 2015. The Nesting Season: June through July 2014. *North American Birds* 68(4):552–556.
- McCaskie, G. and K.L. Garrett. 2014. The Nesting Season: June through July 2013. *North American Birds* 67(4):649–652.
- McCaskie, G. and K.L. Garrett. 2013. The Nesting Season: June through July 2012. *North American Birds* 66(4):732–736.
- McNeil, S.E., D. Tracy, J.R. Stanek, and J.E. Stanek. 2013. Yellow-billed Cuckoo Distribution, Abundance and Habitat Use on the Lower Colorado River and Tributaries, 2008–2012 Summary Report. Submitted to the Bureau of Reclamation, Lower Colorado River Multi-Species Conservation Program, Boulder City, Nevada, by the Southern Sierra Research Station. www.lcrmscp.gov/reports/2012/d7_sumrep_08-12.pdf.

Ms. Stacey Love
September 30, 2022
Page 10

- Noss, R.F., E.T. LaRoe III, and J.M. Scott. 1995. Endangered Ecosystems of the United States: A Preliminary Assessment of Loss and Degradation. U.S. Geological Survey, Biological Resources Division (National Biological Service), BSR no. 9501. Washington, DC.: USGS.
- Ohmart, R.D. 1994. The Effects of Human-Induced Changes on the Avifauna of Western Riparian Habitats. *Studies in Avian Biology* 15:273–285.
- Psomas. 2022a (July 25). *Results of Presence/Absence Surveys for the Coastal California Gnatcatcher for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project*. Santa Ana, CA.: Psomas.
- . 2022b (September 27). *Results of Presence/Absence Surveys for the Least Bell’s Vireo and Southwestern Willow Flycatcher for the Santiago Creek Dam Outlet Tower and Spillway Improvement Project*. Santa Ana, CA.: Psomas.
- Stanek, J. R., and J. E. Stanek. 2012. Yellow-billed Cuckoo Occupancy, Breeding, and Habitat Use in the South Fork Kern River Valley, 2012 Annual Report. Report to the U.S. Fish and Wildlife Service, Sacramento Office. Sacramento, CA: USFWS.
- Unitt, P. 2004. *San Diego County Bird Atlas* (San Diego Society of Natural History, No. 39). San Diego, CA: Ibis Publishing Co.
- U.S. Department of Interior (USDOI). 1994 (March). The Impact of Federal Programs on Wetlands, Vol. II, A Report to Congress by the Secretary of the Interior. Washington, DC: USDOI.
- United States Fish and Wildlife Service (USFWS). 2021 (April 21). Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Western Distinct Population Segment of the Yellow-Billed Cuckoo. *Federal Register* 86(75). Washington D.C.; USFWS.
- . 2014a. (August 15). Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Western Distinct Population Segment of the Yellow-Billed Cuckoo (*Coccyzus americanus*); Proposed Rule. *Federal Register* 79(158):48548 – 48652. Washington, D.C.; USFWS.
- . 2014b (August 15). Designation of Critical Habitat for the Western Distinct Population Segment of the Yellow-Billed Cuckoo; Proposed Rule. *Federal Register* 79(158): 48548-48652. Washington, D.C.: USFWS.
- . 2013 (October 3). Proposed Threatened Status for the Western Distinct Population Segment of the Yellow-billed Cuckoo (*Coccyzus americanus*). Proposed Rule. *Federal Register* 78(192): 61622-61666. Washington, D.C.: USFWS.
- Webster, R.E., P. Lehman, and L. Bevier. 1980. The Birds of Santa Barbara and Ventura Counties (Occasional Paper No. 10. Santa Barbara). Santa Barbara, CA: Santa Barbara Museum of Natural History.

D:\Projects\3IRW010200\WCDYBCU\ex_RL_LV_20220928.mxd



Aerial Source: Esri, Maxar 2020

Regional Location and Local Vicinity

Exhibit 1

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

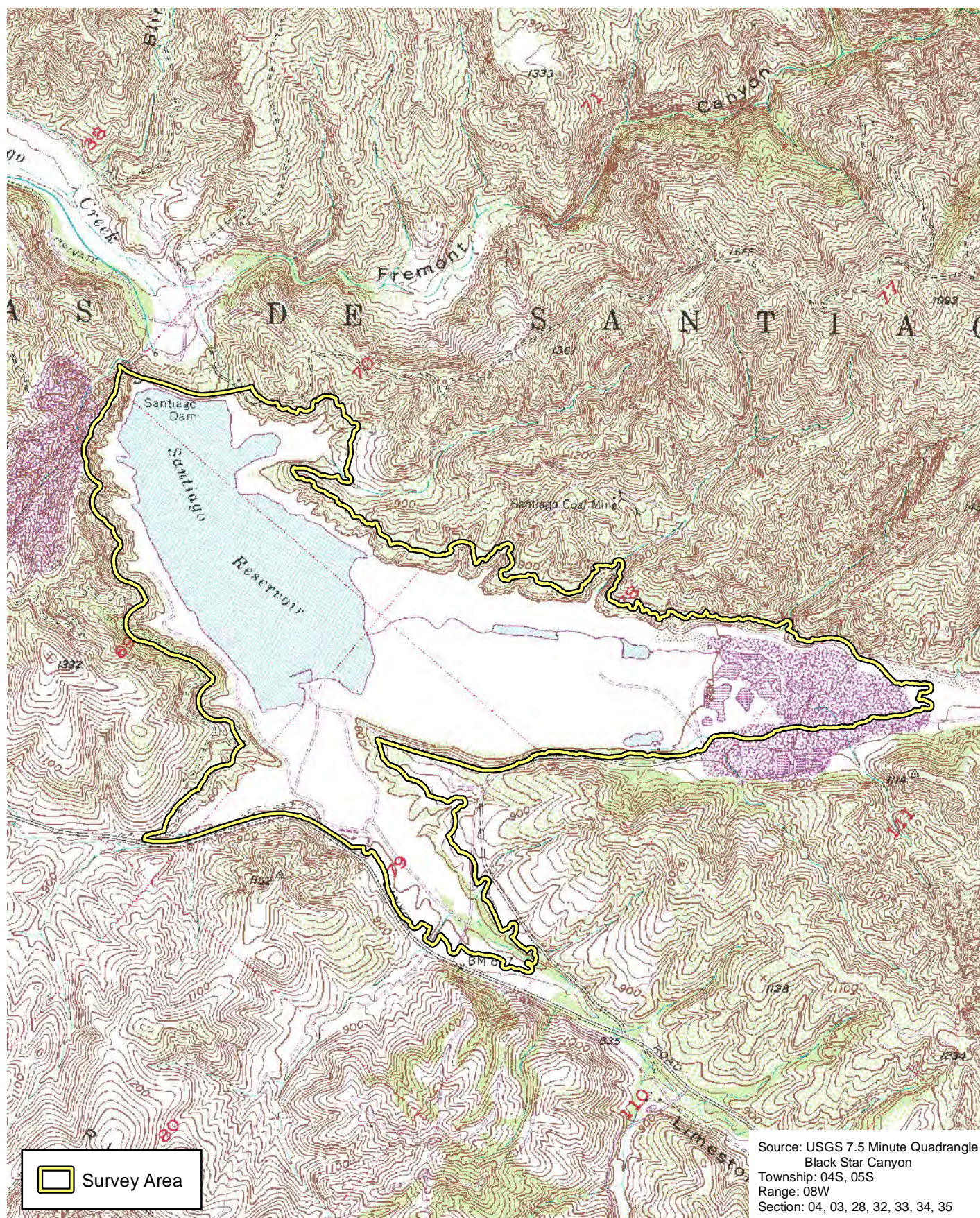


4,000 2,000 0 4,000
Feet



(Rev: 09/28/2022 MMD) R:\Projects\IRW_IRWD\3IRW010200\Graphics\YBCU\ex_RL_LV.pdf

D:\Projects\3IRW010200\MXD\YBCU\ex_SurveyArea_USGS_20220928.mxd



Riparian Bird Survey Area

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

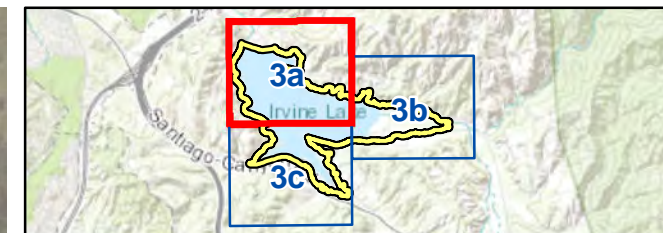
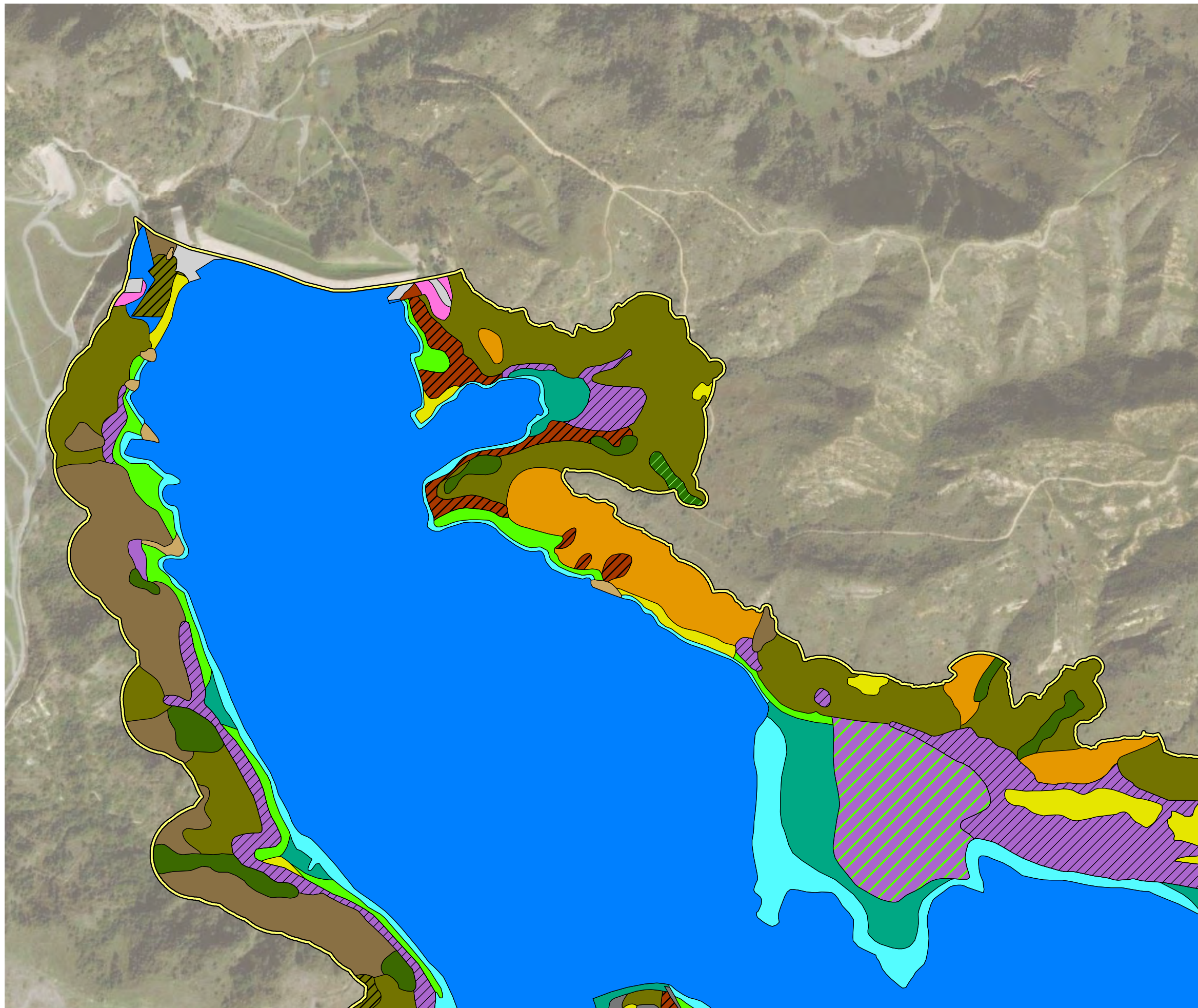
Exhibit 2



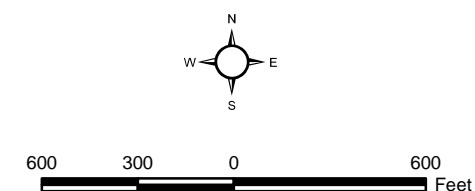
2,000 1,000 0 2,000
Feet



D:\Projects\3IRW010200MMD\YBCU\ex_BioResources_2020928.mxd



- Survey Area
- Vegetation Types and Other Areas**
- Sagebrush Scrub (2.3.6)
 - Disturbed Sagebrush Scrub (2.3.6)
 - Southern Cactus Scrub (2.4)
 - Toyon - Sumac Chaparral (3.12)
 - Ruderal (4.6)
 - Riparian Herb (7.1)
 - Mulefat Scrub (7.3)
 - Disturbed Mulefat Scrub (7.3)
 - Southern Sycamore Riparian Woodland/Southern Coast Live Oak Riparian Forest (7.4/7.5)
 - Southern Black Willow Forest (7.7)
 - Disturbed Southern Black Willow Forest (7.7)
 - Southern Black Willow Forest/Riparian Herb (7.7/7.1)
 - Coast Live Oak Woodland (8.1)
 - Cliff (10)
 - Open Water (12.1)
 - Fluctuating Shoreline (12.2)
 - Vegetated Fluctuating Shoreline (12.2)
 - Ornamental (15.5)
 - Developed (15.6)
 - Disturbed (16.1)



Aerial Source: Esri, Maxar 2020

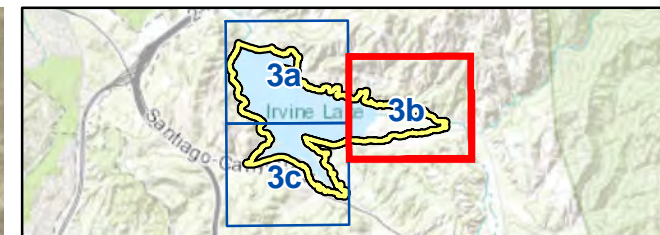
Biological Resources Exhibit 3a

Santiago Creek Dam Outlet Tower and Spillway Improvement Project

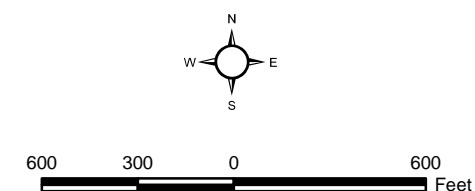


(Rev: 09/28/2022 MMD) R:\Projects\IRW_IRWD\3IRW010200\Graphics\YBCU\ex_BioResources.pdf

D:\Projects\3\IRW010200\MXD\YBCU\ex_BioResources_2020928.mxd



- Survey Area
- Vegetation Types and Other Areas**
- Sagebrush Scrub (2.3.6)
 - Sagebrush - Coyote Brush Scrub (2.3.12)
 - Ruderal (4.6)
 - Riparian Herb (7.1)
 - Disturbed Mulefat Scrub (7.3)
 - Southern Sycamore Riparian Woodland (7.4)
 - Southern Black Willow Forest (7.7)
 - Disturbed Southern Black Willow Forest (7.7)
 - Coast Live Oak Woodland (8.1)
 - Open Water (12.1)
 - Fluctuating Shoreline (12.2)
 - Vegetated Fluctuating Shoreline (12.2)
 - Perennial Stream (13.1)
 - Ornamental (15.5)
 - Developed (15.6)
 - Disturbed (16.1)



Aerial Source: Esri, Maxar 2020

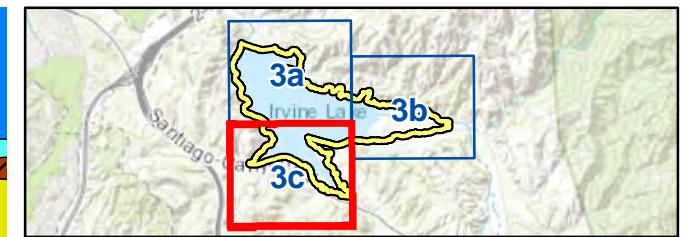
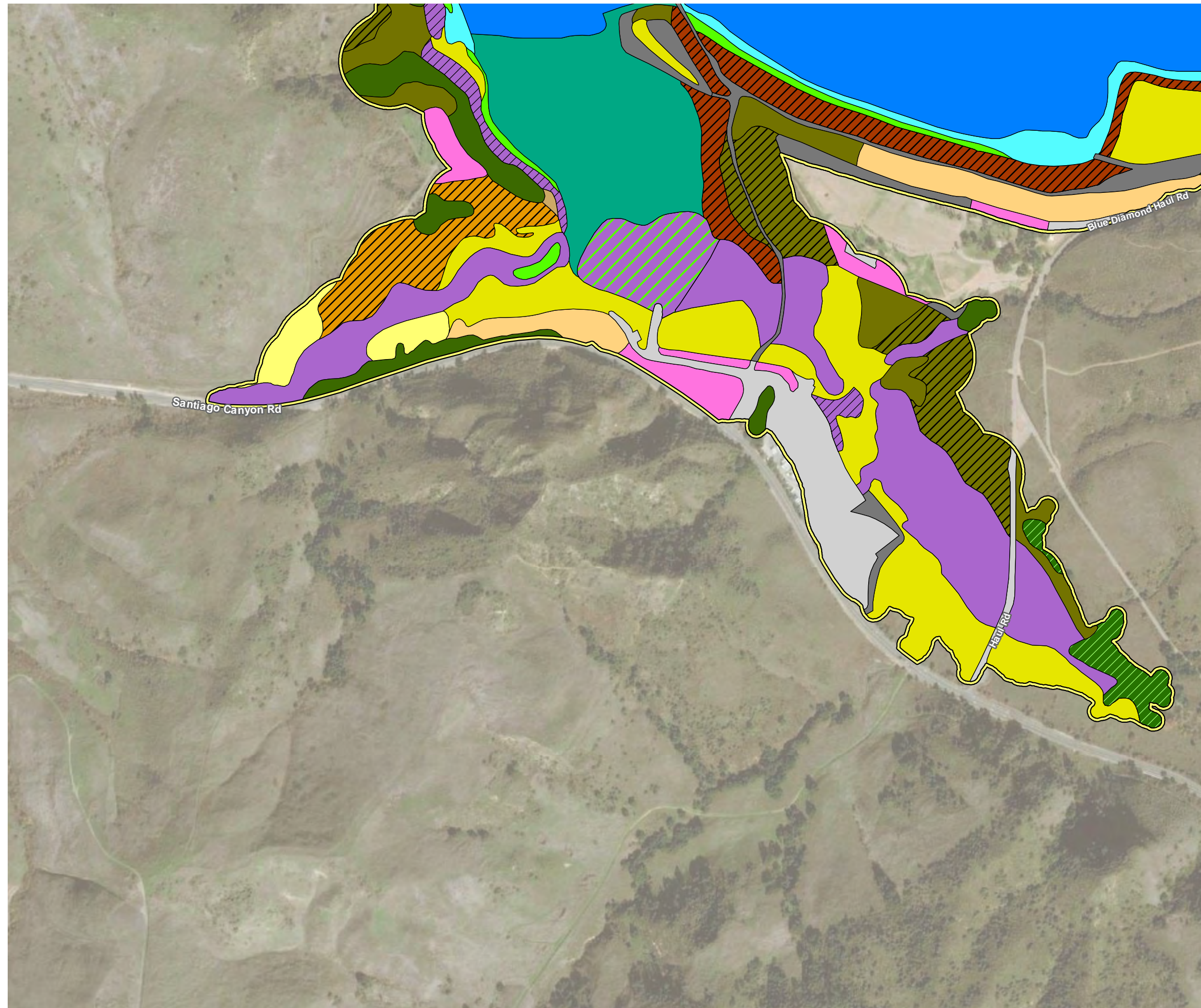
Biological Resources Exhibit 3b

*Santiago Creek Dam Outlet Tower
and Spillway Improvement Project*

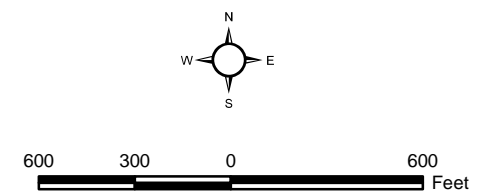


(Rev: 09/28/2022 MMD) R:\Projects\IRW_IRWD\3\IRW010200\Graphics\YBCU\ex_BioResources.pdf

D:\Projects\3IRW010200\MXD\YBCU\ex_BioResources_2020928.mxd



- Survey Area
- Vegetation Types and Other Areas**
- Sagebrush Scrub (2.3.6)
 - Disturbed Sagebrush Scrub (2.3.6)
 - Sagebrush - Coyote Brush Scrub (2.3.12)
 - Disturbed Southern Cactus Scrub (2.4)
 - Annual Grassland (4.1)
 - Ruderal (4.6)
 - Riparian Herb (7.1)
 - Disturbed Mulefat Scrub (7.3)
 - Southern Sycamore Riparian Woodland/Southern Coast Live Oak Riparian Forest (7.4/7.5)
 - Southern Black Willow Forest (7.7)
 - Disturbed Southern Black Willow Forest (7.7)
 - Southern Black Willow Forest/Riparian Herb (7.7/7.1)
 - Coast Live Oak Woodland (8.1)
 - Cliff (10)
 - Open Water (12.1)
 - Fluctuating Shoreline (12.2)
 - Vegetated Fluctuating Shoreline (12.2)
 - Ornamental (15.5)
 - Developed (15.6)
 - Disturbed (16.1)



Aerial Source: Esri, Maxar 2020

Biological Resources Exhibit 3c

Santiago Creek Dam Outlet Tower and Spillway Improvement Project



(Rev: 09/28/2022 MMD) R:\Projects\IRW_IRWD\3IRW010200\Graphics\YBCU\ex_BioResources.pdf

D:\Projects\3IRW010200\MXD\YBCU\ex_SurveyArea_20220928.mxd



Survey Area

Exhibit 4

Santiago Creek Dam Outlet Tower and Spillway Improvement Project



2,000 1,000 0 2,000
Feet



(Rev: 09/28/2022 MMD) R:\Projects\IRW_IRWD\3IRW010200\Graphics\YBCU\ex_SurveyArea.pdf

ATTACHMENT A
REPRESENTATIVE PHOTOGRAPHS



Southern sycamore riparian woodland/southern coast live oak riparian forest vegetation located in the eastern portion of the survey area, looking north.



Black willow forest vegetation located in the eastern portion of the survey area, looking east.

D:\Projects\3IRW010200\GRAPHICS\YBCU\Att_SP1_20220922.ai

Site Photographs

Attachment A-1

Santiago Creek Dam Outlet Tower and Spillway Improvement Project





Disturbed southern black willow forest vegetation located in the north/central portion of the survey area, looking north.



Southern black willow forest/riparian herb vegetation located in the eastern portion of the survey area, looking northeast.

Site Photographs

Attachment A-2

Santiago Creek Dam Outlet Tower and Spillway Improvement Project



ATTACHMENT B
WILDLIFE COMPENDIUM

WILDLIFE SPECIES OBSERVED DURING SURVEYS

Species		Special Status
Scientific Name	Common Name	
AMPHIBIANS		
HYLIDAE - TREEFROG FAMILY		
<i>Pseudacris cadaverina</i>	California treefrog	
<i>Pseudacris hypochondriaca</i>	Baja California treefrog	
LIZARDS		
PHRYNOSOMATIDAE - SPINY LIZARD FAMILY		
<i>Sceloporus occidentalis</i>	western fence lizard	
SNAKES		
COLUBRIDAE - COLUBRID SNAKE FAMILY		
<i>Pituophis catenifer</i>	gophersnake	
BIRDS		
ANATIDAE - SWAN, GOOSE, AND DUCK FAMILY		
<i>Branta canadensis</i>	Canada goose	
<i>Mareca americana</i>	American wigeon	
<i>Anas platyrhynchos</i>	mallard	
<i>Aythya affinis</i>	lesser scaup	
<i>Oxyura jamaicensis</i>	ruddy duck	
ODONTOPHORIDAE - NEW WORLD QUAIL FAMILY		
<i>Callipepla californica</i>	California quail	
PODICIPEDIDAE - GREBE FAMILY		
<i>Aechmophorus occidentalis</i>	western grebe	
COLUMBIDAE - PIGEON AND DOVE FAMILY		
<i>Columba livia</i> *	rock pigeon	
<i>Zenaida macroura</i>	mourning dove	
CUCULIDAE - CUCKOO AND ROADRUNNER FAMILY		
<i>Geococcyx californianus</i>	greater roadrunner	
CAPRIMULGIDAE - NIGHTJAR FAMILY		
<i>Chordeiles acutipennis</i>	lesser nighthawk	
TROCHILIDAE - HUMMINGBIRD FAMILY		
<i>Calypte anna</i>	Anna's hummingbird	
<i>Selasphorus sasin</i>	Allen's hummingbird	
CHARADRIIDAE - PLOVER FAMILY		
<i>Charadrius vociferus</i>	killdeer	
LARIDAE - GULL AND TERN FAMILY		
<i>Larus occidentalis</i>	western gull	
PHALACROCORACIDAE - CORMORANT FAMILY		
<i>Phalacrocorax auritus</i>	double-crested cormorant	
ARDEIDAE - HERON FAMILY		
<i>Ardea alba</i>	great egret	
<i>Egretta thula</i>	snowy egret	
<i>Nycticorax nycticorax</i>	black-crowned night-heron	
CATHARTIDAE - NEW WORLD VULTURE FAMILY		
<i>Cathartes aura</i>	turkey vulture	

WILDLIFE SPECIES OBSERVED DURING SURVEYS

Species		Special Status
Scientific Name	Common Name	
PANDIONIDAE - OSPREY FAMILY		
<i>Pandion haliaetus</i>	osprey	
ACCIPITRIDAE - HAWK FAMILY		
<i>Haliaeetus leucocephalus</i>	bald eagle	SE, FP
<i>Buteo jamaicensis</i>	red-tailed hawk	
STRIGIDAE - TYPICAL OWL FAMILY		
<i>Megascops kennicottii</i>	western screech-owl	
<i>Bubo virginianus</i>	great horned owl	
PICIDAE - WOODPECKER FAMILY		
<i>Melanerpes formicivorus</i>	acorn woodpecker	
<i>Picoides nuttallii</i>	Nuttall's woodpecker	
<i>Colaptes auratus</i>	northern flicker	
FALCONIDAE - FALCON FAMILY		
<i>Falco sparverius</i>	American kestrel	
<i>Falco peregrinus</i>	peregrine falcon	FP
TYRANNIDAE - TYRANT FLYCATCHER FAMILY		
<i>Sayornis nigricans</i>	black phoebe	
<i>Tyrannus vociferans</i>	Cassin's kingbird	
CORVIDAE - JAY AND CROW FAMILY		
<i>Aphelocoma californica</i>	California scrub-jay	
<i>Corvus brachyrhynchos</i>	American crow	
<i>Corvus corax</i>	common raven	
ALAUDIDAE - LARK FAMILY		
<i>Eremophila alpestris actia</i>	California horned lark	
HIRUNDINIDAE - SWALLOW FAMILY		
<i>Stelgidopteryx serripennis</i>	northern rough-winged swallow	
<i>Petrochelidon pyrrhonota</i>	cliff swallow	
AEGITHALIDAE - BUSHTIT FAMILY		
<i>Psaltiriparus minimus</i>	bushtit	
TROGLODYTIDAE - WREN FAMILY		
<i>Troglodytes aedon</i>	house wren	
<i>Thryomanes bewickii</i>	Bewick's wren	
POLIOPTILIDAE - GNATCATCHER FAMILY		
<i>Poliioptila caerulea</i>	blue-gray gnatcatcher	
<i>Poliioptila californica</i>	California gnatcatcher	FT, SSC (subsp. californica)
SYLVIIDAE - SILVIID WARBLERS FAMILY		
<i>Chamaea fasciata</i>	wrentit	
MIMIDAE - MOCKINGBIRD AND THRASHER FAMILY		
<i>Toxostoma redivivum</i>	California thrasher	
<i>Mimus polyglottos</i>	northern mockingbird	
STURNIDAE - STARLING FAMILY		
<i>Sturnus vulgaris*</i>	European starling*	

WILDLIFE SPECIES OBSERVED DURING SURVEYS

Species		Special Status
Scientific Name	Common Name	
FRINGILLIDAE - FINCH FAMILY		
<i>Haemorhous mexicanus</i>	house finch	
<i>Spinus psaltria</i>	lesser goldfinch	
PASSERELLIDAE - NEW WORLD SPARROW FAMILY		
<i>Pipilo maculatus</i>	spotted towhee	
<i>Aimophila ruficeps</i>	rufous-crowned sparrow	
<i>Melospiza crissalis</i>	California towhee	
<i>Melospiza melodia</i>	song sparrow	
ICTERIDAE - BLACKBIRDS AND ORIOLES		
<i>Sturnella neglecta</i>	western meadowlark	
<i>Icterus cucullatus</i>	hooded oriole	
<i>Agelaius phoeniceus</i>	red-winged blackbird	
PARULIDAE - WOOD-WARBLER FAMILY		
<i>Geothlypis trichas</i>	common yellowthroat	
<i>Setophaga coronata</i>	yellow-rumped warbler	
MAMMALS		
SCIURIDAE - SQUIRREL FAMILY		
<i>Otospermophilus beecheyi</i>	California ground squirrel	
GEOMYIDAE - POCKET GOPHER FAMILY		
<i>Thomomys bottae</i>	Botta's pocket gopher	
CRICETIDAE - NEW WORLD RATS AND MICE FAMILY		
<i>Neotoma bryanti</i>	Bryant's woodrat	
LEPORIDAE - HARE AND RABBIT FAMILY		
<i>Sylvilagus audubonii</i>	desert cottontail	
CANIDAE - CANID FAMILY		
<i>Canis latrans</i>	coyote	
MEPHITIDAE - SKUNK FAMILY		
<i>Mephitis mephitis</i>	striped skunk	
PROCYONIDAE - PROCYONID FAMILY		
<i>Procyon lotor</i>	northern raccoon	
CERVIDAE - CERVID FAMILY		
<i>Odocoileus hemionus</i>	southern mule deer	
USFWS: U.S. Fish and Wildlife Service; CDFW: California Department of Fish and Wildlife		
Species Status:		
Federal (USFWS) State (CDFW)		
FT Threatened SE Endangered		
ST Threatened		
FP Fully Protected		
SSC Species of Special Concern		

ATTACHMENT C

**YELLOW-BILLED CUCKOO SURVEY SUMMARY
AND SITE DETECTION FORMS**

Yellow Billed Cuckoo Survey Form

Site Name: <u>Santiago Creek Dam Outlet Tower and </u>		County: <u>Orange</u>		State: <u>California</u>	
USGS Quad Name: <u>Black Star Canyon</u>		Elevation: <u>657-956 feet</u>			
Creek, River, Wetland, or Lake Name: <u>Santiago Creek/ Irvine Lake</u>					
Site Coordinates:	Start: <u>E 434398</u>	<u>N 3736108</u>	UTM Zone: <u>NAD83</u>		
	Stop: <u>E 432612</u>	<u>N 3738297</u>	Datum: <u>11</u>		
Ownership: <input type="checkbox"/> BLM <input type="checkbox"/> Reclamation <input type="checkbox"/> NPS <input type="checkbox"/> USFWS <input type="checkbox"/> USFS <input type="checkbox"/> Tribal <input type="checkbox"/> State <input type="checkbox"/> Private <input checked="" type="checkbox"/> Other (Municipal/County)					
Was site surveyed in previous year? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown If yes, what site name was used? <u>Santiago Creek Dam Outlet Tower and Spillway Improvement </u>					

Survey # Observer(s) (Last Name, First Initial)	Date (m/d/y) Survey, Time, Total Hours	Total Number of YBCUs detected.	Time Detected (AM):	Detect Type: I=Incidental P=Playback A=aural V=visual B=both	Voc. Type: CN=Contact CO=coo AL=alarm OT=other (describe)	Playback #: Number of times 'Kowlp' call played before YBCU responded	Behavior code	Surveyor Detection Coordinates		Distance (m)	Bearing	C u c k o o #	Corrected Coordinates	
								UTM E	UTM N				UTM E	UTM N
Survey Period #1 Observer(s): Lindsay Masset t	Date:		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/23/2022													
	Start:													
	6:00													
	Stop:													
	10:50													
	Total hrs:	Total:												
4.83	0													
Survey Period #2 Observer(s): Lindsay Masset t	Date:		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	7/12/2022													
	Start:													
	5:50													
	Stop:													
	11:00													
	Total hrs:	Total:												
5.17	0													
Survey Period #3 Observer(s): Lindsay Masset t	Date:		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	7/28/2022													
	Start:													
	6:00													
	Stop:													
	11:05													
	Total hrs:	Total:												
5.08	0													
Survey Period #4 Observer(s): Lindsay Masset t	Date:		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	8/11/2022													
	Start:													
	6:00													
	Stop:													
	10:30													
	Total hrs:	Total:												
4.50	0													
Survey Period #5 Observer(s): 	Date:													
	Start:													
	Stop:													
	Total hrs:	Total:												
Survey Summary:		# Det	#PO	#PR	#CO		#Nests found	Total Survey Hours:						
Total YBCUs*		n/a	n/a	n/a	n/a		n/a	19.58						
Notes (refer to Cuckoo # associated with individual detections)	n/a													

*Include justification for these designations.

Behavior Codes: AN = at nest, BI = brooding or incubating, CF = adult carrying food, CN = carrying nest material, COP = copulation, CP = catches prey, DD = distraction displays/defense of nesting area, EF = eats food, FL = recently fledged young of species incapable of flight, FLY = flying, FO = foraging, FS = adult carrying a fecal sac, FY = adults feeding nestlings, JUV = juvenile, NB = nest building, NE = active nest with unbroken eggs in it, NY = nest with young seen or heard in it, ON = occupied nest, PR = preening, SI = sitting, US = used, inactive nest with blue-green eggshells.

Fill in the following information completely

Name of Reporting Individual Lindsay Messett Date Report completed _____

Affiliation Psomas Phone 714-751-7373 Email lindsay.messett@psomas.com

USFWS Permit # TE 067064-5 State Permit # S-182810004-20009-001-01

Site Name Santiago Creek Dam Outlet Tower and Spillway Improvement Project

Length of area surveyed _____ (in kilometers = km) _____

Did you survey the same general area during each visit to this site this year? ☒ Yes / No If no, summarize in comments below _____

If site was surveyed last year, did you survey the same general area this year? ☐ Yes / No If no, summarize in comments below n/a

Overall Vegetation Characteristics: Overall, are the species in tree/shrub layer at this site comprised predominantly of (check one):

Native broadleaf plants (>75% native) ☒ Mixed native and exotic plants (mostly native 51%-
Exotic/introduced plants (>75% exotic) ☐ Mixed native and exotic plants (mostly exotic 51%-

Average height of canopy (m) ¹⁰ _____ (specify units) meters

Estimated Canopy Cover (percent) ⁷⁵ _____

Overstory Vegetation: (provide percent estimate of the following dominant species). Use <1%; 10%, 25%, 50%, 75%, 90%, 100%.

<u>20</u> Cottonwood	<u>30</u> Goodding's Willow	<u> </u> Coyote Willow	<u>15</u> Other (specify) <u>arroyo willow</u>
<u>25</u> Tamarisk	<u> </u> Russian Olive	<u> </u> Other (specify)	<u>10</u> Other (specify) <u>sycamore</u>

Average height of understory canopy (m) ² _____ (specify units) meters

Estimated Understory Cover (percent) ⁹⁵ _____

Understory Vegetation: (provide percent estimate of the following dominant species). Use <1%; 10%, 25%, 50%, 75%, 90%, 100%.

<u> </u> Cottonwood	<u> </u> Goodding's Willow	<u> </u> Coyote Willow	<u>45</u> Other (specify) <u>mustard</u>
<u>15</u> Tamarisk	<u> </u> Russian Olive	<u> </u> Other (specify)	<u>40</u> Other (specify) <u>ring</u>
<u> </u> Baccharis	<u> </u> New Mexico Oli		

Was surface water or saturated soil present at or adjacent to site within 300 meters? ☒ Yes ☐ No (circle one)

Was surface water or saturated soil present at or adjacent to all patches surveyed? ☒ Yes ☐ No (circle one)

Comments. Please provide comments regarding differences between the survey patches within the site. For example, if the average canopy for this site is 30% cover, but within one patch it is 60% cover - please note. Also, please note significant differences between dominant overstory and understory vegetation among the patches. Document these differences with photographs whenever possible. Make sure to reference comments to photo number whenever available.

The survey area for the western yellow-billed cuckoo includes all suitable riparian habitats (i.e., southern sycamore riparian woodland, southern black willow forest, disturbed southern black willow forest, and southern black willow forest/riparian herb) upstream of the Dam on the project site.

Specifically, western yellow-billed cuckoo surveys were conducted in portions of the survey area that contained suitable riparian habitat of appropriate size and stature. Riparian habitats were distributed throughout the survey area. These habitat types were generally dominated by Goodding's black willow (*Salix gooddingii*), red willow (*Salix laevigata*), arroyo willow (*Salix lasiolepis*), Fremont cottonwood (*Populus fremontii* ssp. *fremontii*), western sycamore (*Platanus racemosa*), and white alder (*Alnus rhombifolia*). The understory and edges of these areas contained scattered mule fat (*Baccharis salicifolia* ssp. *salicifolia*), flatsedge (*Cyperus* sp.), broad-leaved cattail (*Typha latifolia*), saltcedar (*Tamarix ramosissima*), giant reed (*Arundo donax*), gum trees (*Eucalyptus* spp.), tree tobacco (*Nicotiana glauca*), and non-native grasses.

Please provide USGS 7.5 minute quad (or similar) showing survey area to each survey form _____

Name of Reporting Individual Lindsay Messett Phone # 714-751-7373

Affiliation Psomas Email lindsay.messett@psomas.com

Site Name Santiago Creek Dam Outlet Tower and Spillway Improvement Project

[illegible]

Notes - Cont. (refer to Cuckoo # associated with individual detections)

Yellow Billed Cuckoo Survey Form

Site Name: <u>Santiago Creek Dam Outlet Tower and </u>		County: <u>Orange</u>		State: <u>California</u>	
USGS Quad Name: <u>Black Star Canyon</u>		Elevation: <u>657-956 feet</u>			
Creek, River, Wetland, or Lake Name: <u>Santiago Creek/ Irvine Lake</u>					
Site Coordinates:	Start: <u>E 436208</u>	<u>N 3737311</u>	UTM Zone: <u>NAD83</u>		
	Stop: <u>E 433195</u>	<u>N 3738344</u>	Datum: <u>11</u>		
Ownership: <input type="checkbox"/> BLM <input type="checkbox"/> Reclamation <input type="checkbox"/> NPS <input type="checkbox"/> USFWS <input type="checkbox"/> USFS <input type="checkbox"/> Tribal <input type="checkbox"/> State <input type="checkbox"/> Private <input checked="" type="checkbox"/> Other (Municipal/County)					
Was site surveyed in previous year? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown If yes, what site name was used? <u>Santiago Creek Dam Outlet Tower and Spillway Improvement </u>					

Survey # Observer(s) (Last Name, First Initial)	Date (m/d/y) Survey, Time, Total Hours	Total Number of YBCUs detected.	Time Detected (AM):	Detect Type: I=Incidental P=Playback A=aural V=visual B=both	Voc. Type: CN=Contact CO=coo AL=alarm OT=other (describe)	Playback #: Number of times 'Kowlp' call played before YBCU responded	Behavior code	Surveyor Detection Coordinates		Distance (m)	Bearing	C u c k o o #	Corrected Coordinates	
								UTM E	UTM N				UTM E	UTM N
Survey Period #1 Observer(s): Lindsay Messett	Date:		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6/24/2022													
	Start:													
	6:15													
	Stop:													
	10:45													
	Total hrs:	Total:												
4.50	0													
Survey Period #2 Observer(s): Lindsay Messett	Date:		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	7/13/2022													
	Start:													
	5:45													
	Stop:													
	10:55													
	Total hrs:	Total:												
5.17	0													
Survey Period #3 Observer(s): Lindsay Messett	Date:		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	7/29/2022													
	Start:													
	6:05													
	Stop:													
	10:45													
	Total hrs:	Total:												
4.67	0													
Survey Period #4 Observer(s): Lindsay Messett	Date:		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	8/12/2022													
	Start:													
	5:54													
	Stop:													
	11:00													
	Total hrs:	Total:												
5.10	0													
Survey Period #5 Observer(s): 	Date:													
	Start:													
	Stop:													
	Total hrs:	Total:												
	4.5													
Survey Summary:		# Det	#PO	#PR	#CO		#Nests found	Total Survey Hours:						
Total YBCUs*		n/a	n/a	n/a	n/a		n/a	19.44						
Notes (refer to Cuckoo # associated with individual detections)	n/a													

*Include justification for these designations.

Behavior Codes: AN = at nest, BI = brooding or incubating, CF = adult carrying food, CN = carrying nest material, COP = copulation, CP = catches prey, DD = distraction displays/defense of nesting area, EF = eats food, FL = recently fledged young of species incapable of flight, FLY = flying, FO = foraging, FS = adult carrying a fecal sac, FY = adults feeding nestlings, JUV = juvenile, NB = nest building, NE = active nest with unbroken eggs in it, NY = nest with young seen or heard in it, ON = occupied nest, PR = preening, SI = sitting, US = used, inactive nest with blue-green eggshells.

Fill in the following information completely

Name of Reporting Individual <u>Lindsay Messett</u>		Date Report completed _____	
Affiliation <u>Psomas</u>	Phone <u>714-751-7373</u>	Email <u>lindsay.messett@psomas.com</u>	
USFWS Permit # <u>TE 067064-5</u>		State Permit # <u>S-182810004-20009-001-01</u>	
Site Name <u>Santiago Creek Dam Outlet Tower and Spillway Improvement Project</u>			
Length of area surveyed _____		(in kilometers = km) _____	
Did you survey the same general area during each visit to this site this year?		<input checked="" type="checkbox"/> Yes / No If no, summarize in comments below _____	
If site was surveyed last year, did you survey the same general area this year?		<input type="checkbox"/> Yes / No If no, summarize in comments below <u>n/a</u>	
Overall Vegetation Characteristics: Overall, are the species in tree/shrub layer at this site comprised predominantly of (check one):			
Native broadleaf plants (>75% native)	<input checked="" type="checkbox"/>	Mixed native and exotic plants (mostly native 51%-	<input type="checkbox"/>
Exotic/introduced plants (>75% exotic)	<input type="checkbox"/>	Mixed native and exotic plants (mostly exotic 51%-	<input type="checkbox"/>
Average height of canopy (m) ¹⁰ _____		(specify units) <u>meters</u>	
Estimated Canopy Cover (percent) ⁷⁵ _____			
Overstory Vegetation: (provide percent estimate of the following dominant species). Use <1%; 10%, 25%, 50%, 75%, 90%, 100%.			
<u>20</u> Cottonwood	<u>30</u> Goodding's Willow	<u> </u> Coyote Willow	<u>15</u> Other (specify) <u>arroyo willow</u>
<u>25</u> Tamarisk	<u> </u> Russian Olive	<u> </u> Other (specify)	<u>10</u> Other (specify) <u>sycamore</u>
Average height of understory canopy (m) ² _____		(specify units) <u>meters</u>	
Estimated Understory Cover (percent) ⁹⁵ _____			
Understory Vegetation: (provide percent estimate of the following dominant species). Use <1%; 10%, 25%, 50%, 75%, 90%, 100%.			
<u> </u> Cottonwood	<u> </u> Goodding's Willow	<u> </u> Coyote Willow	<u>45</u> Other (specify) <u>mustard</u>
<u>15</u> Tamarisk	<u> </u> Russian Olive	<u> </u> Other (specify)	<u>40</u> Other (specify) <u>ring</u>
<u> </u> Baccharis	<u> </u> New Mexico Oli		
Was surface water or saturated soil present at or adjacent to site within 300 meters?		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No (circle one)	
Was surface water or saturated soil present at or adjacent to all patches surveyed?		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No (circle one)	
Comments. Please provide comments regarding differences between the survey patches within the site. For example, if the average canopy for this site is 30% cover, but within one patch it is 60% cover - please note. Also, please note significant differences between dominant overstory and understory vegetation among the patches. Document these differences with photographs whenever possible. Make sure to reference comments to photo number whenever available.			
The survey area for the western yellow-billed cuckoo includes all suitable riparian habitats (i.e., southern sycamore riparian woodland, southern black willow forest, disturbed southern black willow forest, and southern black willow forest/riparian herb) upstream of the Dam on the project site.			
Specifically, western yellow-billed cuckoo surveys were conducted in portions of the survey area that contained suitable riparian habitat of appropriate size and stature. Riparian habitats were distributed throughout the survey area. These habitat types were generally dominated by Goodding's black willow (<i>Salix gooddingii</i>), red willow (<i>Salix laevigata</i>), arroyo willow (<i>Salix lasiolepis</i>), Fremont cottonwood (<i>Populus fremontii</i> ssp. <i>fremontii</i>), western sycamore (<i>Platanus racemosa</i>), and white alder (<i>Alnus rhombifolia</i>). The understory and edges of these areas contained scattered mule fat (<i>Baccharis salicifolia</i> ssp. <i>salicifolia</i>), flatsedge (<i>Cyperus</i> sp.), broad-leaved cattail (<i>Typha latifolia</i>), saltcedar (<i>Tamarix ramosissima</i>), giant reed (<i>Arundo donax</i>), gum trees (<i>Eucalyptus</i> spp.), tree tobacco (<i>Nicotiana glauca</i>), and non-native grasses.			
Please provide USGS 7.5 minute quad (or similar) showing survey area to each survey form _____			

Name of Reporting Individual Lindsay Messett Phone # 714-751-7373

Affiliation Psomas Email lindsay.messett@psomas.com

Site Name Santiago Creek Dam Outlet Tower and Spillway Improvement Project

[illegible]

Notes - Cont. (refer to Cuckoo # associated with individual detections)

APPENDIX M

JURISDICTIONAL DELINEATION

Jurisdictional Delineation Report for the Santiago Creek Dam Improvement Project in Unincorporated Orange County, California

Prepared for	Irvine Ranch Water District 15600 Sand Canyon Avenue Irvine, California 92618 Contact: Fiona Sanchez, Director of Water Resources
--------------	--

Prepared by	Psomas 5 Hutton Centre Drive, Suite 300 Santa Ana, California 92707 Contact: Amber Heredia Associate Principal, Resource Management
-------------	---

April 16, 2025

TABLE OF CONTENTS

<u>Section</u>	<u>Page</u>
Executive Summary	ES-1
1.0 Introduction.....	1
1.1 Project Location and Environmental Setting	1
1.2 Project Background.....	2
1.3 Purpose and Need.....	3
1.4 Project Objectives	4
1.5 Project Description.....	4
1.5.1 Additional Geotechnical Investigations	7
1.5.2 Construction Activities.....	7
1.6 Operation and Maintenance	9
1.6.1 Additional Inundation During Operation.....	10
1.7 Regulatory Authority.....	10
1.7.1 U.S. Army Corps of Engineers.....	10
1.7.2 Regional Water Quality Control Board	11
1.7.3 California Department of Fish and Wildlife	12
2.0 Methods	13
2.1 Survey Area.....	13
2.2 Literature Review	13
2.3 Jurisdictional Delineation.....	14
2.3.1 USACE Waters of the United States.....	15
2.3.2 RWQCB Waters of the State	15
2.3.3 CDFW Waters	16
3.0 Results.....	17
3.1 Literature Review	17
3.2 Jurisdictional Analysis.....	19
3.2.1 Waters of the United States Determination	20
3.2.2 Regional Water Quality Control Board Jurisdiction	24
3.2.3 California Department of Fish and Wildlife Jurisdiction	25
4.0 Impact Analysis.....	26
5.0 Regulatory Approval Process	32
5.1 Regulatory Permit Requirements	32
5.1.1 U.S. Army Corps of Engineers.....	32

5.1.2	Regional Water Quality Control Board	32
5.1.3	California Department of Fish and Wildlife	33
6.0	Recommendations	34
7.0	Disclaimer Statement	34
8.0	References	35

TABLES

<u>Table</u>	<u>Page</u>
1	IRWD/Lake Operational Modes 9
2	Mapped National Wetlands Inventory Resources 18
3	Water Quality Objectives for Irvine Lake 19
4	Summary of Jurisdictional Resources in the Survey Area..... 20
5	Project Impacts on USACE Jurisdictional Resources in the Survey Area* 28
6	Project Impacts on RWQCB Jurisdictional Resources in the Survey Area* 29
7	Project Impacts on CDFW Jurisdictional Resources in the Survey Area* 30
8	Summary of Project Impacts on Jurisdictional Resources in the Survey Area* 31

EXHIBITS

<u>Exhibit</u>		<u>Follows Page</u>
1	Regional Location and Local Vicinity	1
2	Existing Dam Features.....	1
3	U.S. Geological Survey 7.5-minute Digital Quadrangle	1
4	Santiago Dam Construction Features.....	7
5	Soil Types	13
6	National Wetlands Inventory	13
7	Jurisdictional Resources USACE Waters of the United States	17
8	Jurisdictional Resources RWQCB Waters of the State	17
9	Jurisdictional Resources CDFW Jurisdictional Waters	17
10	Project Impacts USACE Waters of the United States	26
11	Project Impacts RWQCB Waters of the State	26
12	Project Impacts CDFW Jurisdictional Waters.....	27

ATTACHMENTS

Attachment

- A Summary of Regulatory Authority
- B National Wetland Inventory Definitions
- C Representative Photographs
- D RWQCB and CDFW Jurisdictional Resources Detail
- E Datasheets
- F Literature Review Details – Soils
- G Literature Review Details – Basin Plan Beneficial Uses
- H Impact Acreage by Landowner

This page intentionally left blank

EXECUTIVE SUMMARY

This report provides baseline data regarding the type and extent of jurisdictional resources for the Santiago Creek Dam Improvement Project. Jurisdictional resources considered for this report include wetland and non-wetland waters of the United States (WOTUS) regulated by the U.S. Army Corps of Engineers (USACE); waters of the State regulated by the Regional Water Quality Control Board (RWQCB); and waters, including the bed, bank, and channel of all lakes, rivers, and/or streams (and associated wetland and riparian vegetation), as regulated by the California Department of Fish and Wildlife (CDFW).

The limits of non-wetland WOTUS and waters of the State were identified by the presence of an Ordinary High Water Mark (OHWM). Wetland features were identified based on the USACE's three-parameter approach in which wetlands are defined by the presence of hydrophytic vegetation, hydric soils, and wetland hydrology indicators. There have been multiple changes to the definition of WOTUS in recent years resulting in substantial changes to areas under federal jurisdiction. The current definition of WOTUS excludes all waters that are not determined to be "relatively permanent" in their flow regime. Isolated drainages (i.e., those lacking connectivity to a downstream WOTUS) are also not considered WOTUS. The limits of waters of the State include ephemeral and isolated waters along with all WOTUS. The limits of CDFW jurisdictional waters were identified as either the top of bank or the outer drip line of riparian vegetation associated with the feature.

The jurisdictional delineation was performed by Psomas on March 24, 2020, for the portion of the survey area north (downstream) of the existing dam and on October 14, 20, and 21, 2020, for the portion of the survey area south (upstream) of the dam around Irvine Lake. Based on the results of the field work, and the most current regulatory guidelines, it was determined that the total amount of jurisdictional resources in the survey area are as follows:

- **USACE Jurisdiction:** 428.476 acres (101.706 acres wetland; 326.770 acres non-wetland)
- **RWQCB Jurisdiction:** 435.205 acres (101.706 acres wetland; 333.499 acres non-wetland)
- **CDFW Jurisdiction:** 669.630 acres

The proposed Project would consist of structural improvements to the dam, spillway, replacement of the outlet tower, and raising the spillway by six feet (i.e., two feet over the existing maximum water level with the flashboards installed). Based on preliminary project design, the following jurisdictional resources would be impacted by the Project¹:

- **USACE Jurisdiction:**
 - 203.570 acres (wetland: 0.000 acre permanent, 63.915 acres temporary; non-wetland: 1.798 acres permanent, 137.857 acres temporary) and 0.673 acre

¹ The total impact by landowner (i.e., IRWD or County of Orange) is show in Attachment H.

within the additional inundation area (0.673 acre wetland; 0.000 acre non-wetland)

- **RWQCB Jurisdiction:**

- 203.641 acres (wetland: 0.000 acre permanent, 63.915 acres temporary; non-wetland: 1.861 acres permanent, 137.865 acres temporary) and 0.711 acre within the additional inundation area (0.673 acre wetland; 0.038 acre non-wetland)

- **CDFW Jurisdiction:**

- 233.774 acres (3.924 acres permanent, 229.850 acres temporary and 8.980 acres within the additional inundation area)

The following permits/certifications/agreements are anticipated to be required for project impacts:

- USACE Section 404 Individual Permit
- RWQCB Waste Discharge Requirements
- CDFW Section 1602 Lake or Streambed Alteration Agreement

1.0 INTRODUCTION

This Jurisdictional Delineation Report (report) has been prepared to provide baseline data concerning the type and extent of water resources under the jurisdiction of the U.S. Army Corps of Engineers (USACE), the Regional Water Quality Control Board (RWQCB), and the California Department of Fish and Wildlife (CDFW) in support of the Santiago Creek Dam Improvement Project (hereinafter referred to as the “Project”) proposed by the Irvine Ranch Water District (IRWD). This information has been reported in accordance with accepted scientific and technical standards that are consistent with the requirements of these agencies.

1.1 PROJECT LOCATION AND ENVIRONMENTAL SETTING

Santiago Creek Dam is located at the northwest end of Irvine Lake in unincorporated Orange County, California (Exhibit 1). The Project is south of State Route (SR) 261 and east of SR-241 and Santiago Canyon Road. Existing structures include the embankment dam, outlet tower in Irvine Lake, spillway channel, flashboard storage shed, control house/outlet works, energy dissipater structure, dam keeper’s house, a portion of the Irvine Lake pipeline, and dam access road (Exhibit 2).

The Project is located on the U.S. Geological Survey’s (USGS’) Black Star Canyon 7.5-minute quadrangle map (Exhibit 3). It is within the Santa Ana Watershed. The drainage area for the Project encompasses approximately 63.4 square miles. The Project is within the Santa Ana Watershed (Hydrologic Unit Code 18070203). Irvine Lake (named the Santiago Creek Reservoir by the USGS) was originally constructed in 1931 to store water for the benefit of the surrounding communities.

Irvine Lake was created by constructing a dam across Santiago Creek. Santiago Creek, a named blueline stream, enters Irvine Lake from the east and continues downstream of the dam flowing north and then west, ultimately reaching the Santa Ana River. It has a relatively broad floodplain above and below the dam. The slopes around the western and northern portions of the lake are relatively steep while the areas to the southeast and east are relatively flat. Three unnamed blueline streams enter the lake from the north and eight unnamed blueline streams enter the lake from the west, southeast, and south. One unnamed blueline stream enters the Project site in the northwest, downstream of the dam, while Fremont Canyon Creek merges with Santiago Creek downstream of the Project site. Elevations on the Project site range from approximately 657 to 996 feet above mean sea level (msl).

Surrounding land use primarily consists of undeveloped open space. Irvine Regional Park is located northwest of SR-241; Limestone Canyon Regional Park is located south of Santiago Canyon Road; and Oak Canyon Park is located at the southeast end of Irvine Lake. The closed Orange County Waste and Recycling (OCWR) Landfill Facility (i.e., Santiago Canyon Landfill) is located adjacent to the west of Irvine Lake. Residential development is located west of SR-241.

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx LV_RL



Regional Location and Local Vicinity

Santiago Creek Dam Improvement Project

Exhibit 1

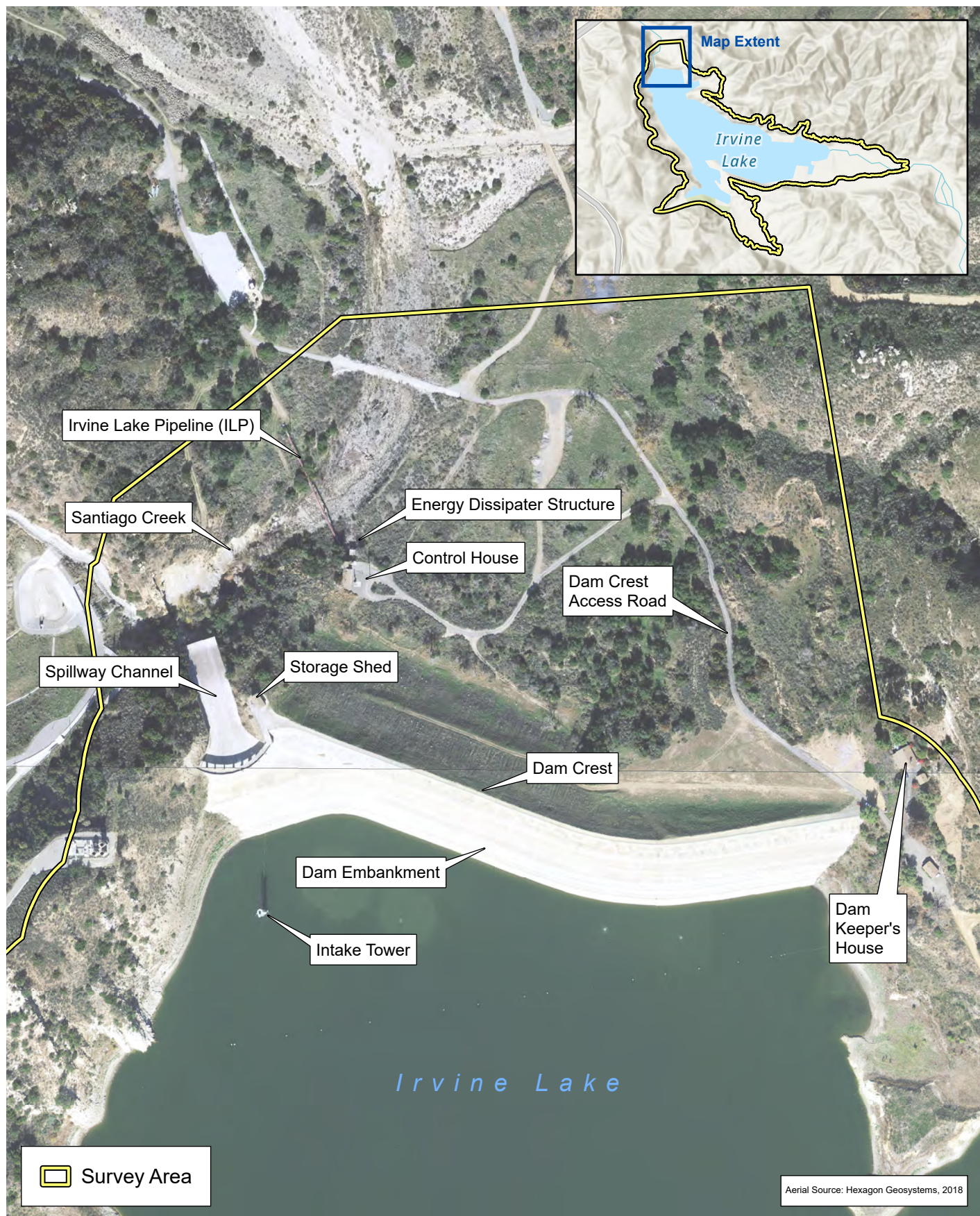


0 2,000 4,000
Feet



(Rev: 02/27/2025 JVR) R:\Projects\3IRW\3IRW010205\Graphics\UD\ex_LV_RL.pdf

D:\Projects\31RW\SantiagoCreek\PROJ\SCD\SCD_Project.aprx\ex_Existing_Dam_Features



Existing Dam Features

Santiago Creek Dam Improvement Project

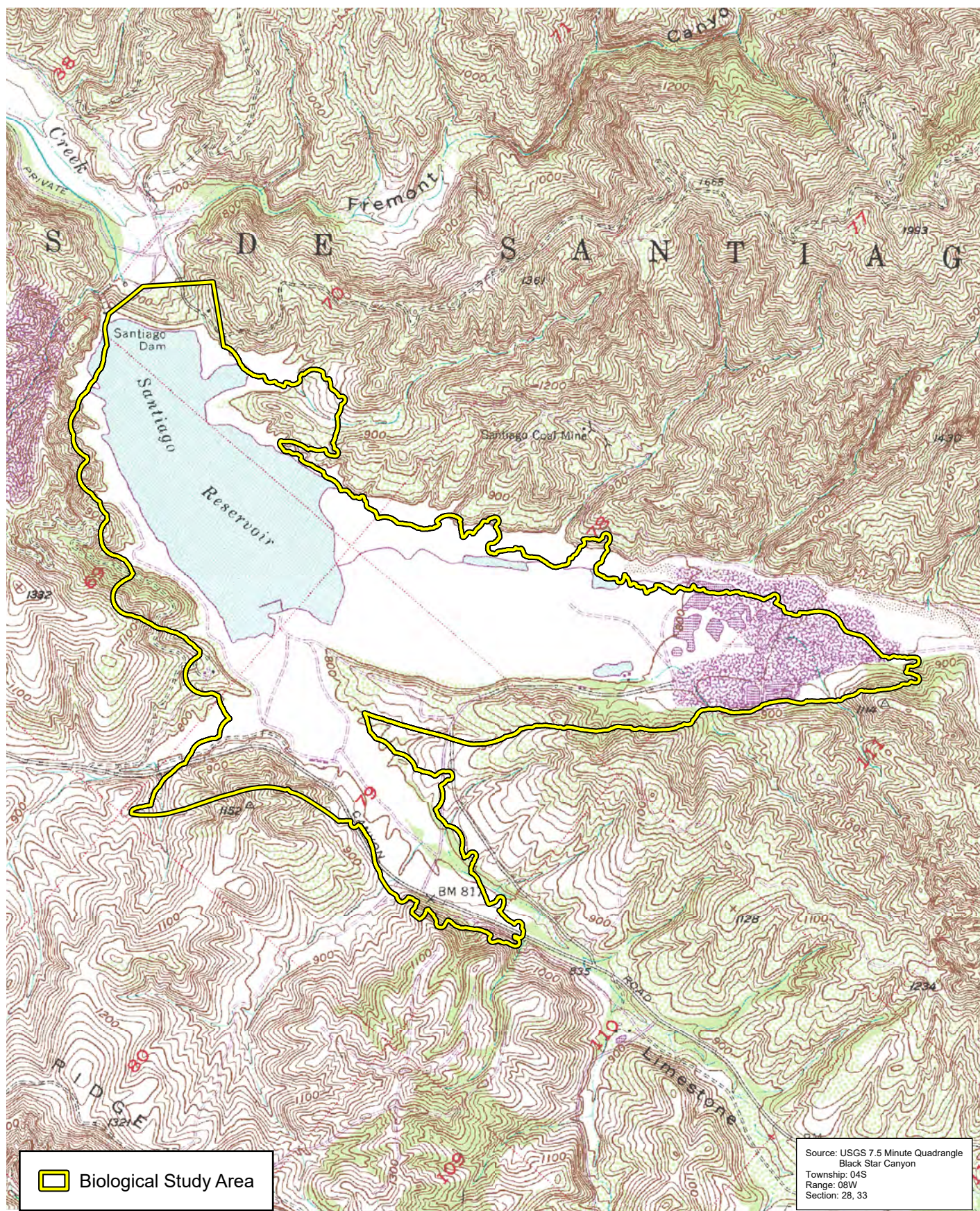


0 150 300
Feet

Exhibit 2



D:\Projects\31RW\SantiagoCreek\PRO\SCD\SCD - Project.apr\ex_USGS



U.S. Geological Survey 7.5-minute Digital Quadrangle

Exhibit 3

Santiago Creek Dam Improvement Project



0 1,000 2,000
Feet



The following vegetation types occur in the survey area: sagebrush scrub, disturbed sagebrush scrub, sagebrush-coyote bush scrub, southern cactus scrub, disturbed southern cactus scrub, disturbed floodplain sage scrub, toyon-sumac chaparral, annual grassland, ruderal, riparian herb, southern willow scrub, mulefat scrub, disturbed mulefat scrub, southern sycamore riparian woodland, southern sycamore-coast live oak riparian woodland, southern black willow forest, disturbed southern black willow forest, southern black willow forest/riparian herb, coast live oak woodland, and western sycamore. Other landcover includes cliff, open water, fluctuating shoreline, vegetated fluctuating shoreline, perennial stream, ornamental, developed, and disturbed areas.

1.2 PROJECT BACKGROUND

IRWD owns and operates Irvine Lake and the Santiago Creek Dam that serve as a critical water supply reservoir for IRWD's service area. The Santiago Creek Dam impounds water for Irvine Lake from Santiago Creek, local storm water runoff, and raw water from Metropolitan Water District of Southern California (MWD). It serves as a domestic and non-potable water supply for various cities in Orange County.

Irvine Lake is a reservoir of untreated water located east of Irvine Regional Park. The lake's capacity is currently approximately 24,000 acre-feet (AF) but it can hold an additional 2,700 AF when flash boards are installed on the spillway, temporarily raising the maximum water elevation an additional 4 feet to 795.9 feet. IRWD uses water from Irvine Lake for two purposes: 1) as a source of water for non-drinking purposes, such as irrigation uses, and 2) as a source of water for the Baker Water Treatment Plant, which produces drinking water for an estimated 85,000 homes in Orange County. IRWD can also provide water from Irvine Lake to Serrano Water District (SWD) through the Howiler Treatment Plan, which is owned and operated by IRWD, to serve SWD customers in the City of Villa Park and portions of the City of Orange. Per the terms of the Water Service Reliability Agreement executed between IRWD and SWD on December 12, 2024, IRWD can backstop and/or augment use of groundwater to enhance SWD's water supply reliability using water sourced from Irvine Lake. In the future, IRWD will construct an interconnection between SWD's and IRWD's potable system, which will allow IRWD to serve water from the Howiler Treatment Plant to IRWD customers. The construction and operation of the interconnection will be subject to separate environmental review.

Santiago Creek Dam is a compacted earthfill embankment completed in 1933 and certified by the State of California, Department of Water Resources (DWR), Division of Safety of Dams (DSOD), which identifies it as Dam No. 75-000. Santiago Creek Dam is located in Orange County, California and impounds water for Irvine Lake from Santiago Creek, a tributary to the Santa Ana River. Santiago Creek Dam is approximately 136 feet high and 1,425 feet long. It is roughly 760 feet wide at the base and contains approximately 800,000 cubic yards of materials. IRWD has appropriative rights to the flows of Santiago Creek including a right to diversion by storage in Irvine Lake for municipal, domestic, and agricultural uses. The reservoir provides flood control, water supply, fisheries enhancement, and recreational opportunities for the surrounding area. The existing silt level varies throughout the lake; however, it is estimated that the accumulated sediment currently occupies approximately 2,150 AF of the lake.

The sources of water for the Lake are flows from Santiago Creek, local runoff captured during rainfall events and untreated (imported) water purchased from MWD. The imported water is conveyed to the Lake through MWD's Santiago Lateral Pipeline (SLP). When water is drawn from the Lake from the existing outlet tower, water is conveyed via the Irvine Lake Pipeline (ILP) to downstream customers.

The outlet works for the dam consists of a tower, an outlet conduit, and a downstream control house. The outlet works are the normal means of releasing water impounded by the dam. The tower sits above the outlet pipe, or tunnel, and is used to transport water out of the reservoir. The outlet conduit conveys water from the reservoir through, under, or around a dam in a controlled manner. The downstream control house contains, or houses, electrical or other equipment. A concrete-encased welded steel pipe outlet conduit is located at the base of the outlet tower and runs beneath the dam to the toe of the dam where the pipeline splits in a bifurcation valve vault to permit water to flow into a 36-inch main pipe and 30-inch diverter pipe. The main pipe supplies water to IRWD and the Howiler Water Treatment Plant. The diverter pipe can release water from the lake into the streambed immediately downstream of the control house for dam safety purposes.

The existing dam spillway² is a reinforced concrete structure located on the left abutment of the dam and consists of an approach, broad-crested weir control structure, chute, and flip bucket at the downstream end. The spillway has vertical reinforced concrete walls through the length and a bridge structure with piers at the spillway crest. The spillway crest is located at elevation 791.9 feet. Historical records of spillway flows at Santiago Creek Dam indicate that the spillway has flowed 24 times between 1937 and 2019 (82 years).

Irvine Lake is held at varying levels depending on the time of year. In the wet winter months, water can be stored up to the 791.9-foot elevational contour³. The height of the existing spillway with flashboards installed is at the 795.9-foot elevation contour; this is the current maximum capacity of the reservoir and is only permitted in the summer months. Historically, the inflow into the reservoir during storm events is high enough to cause the water to flow over the spillway crest, located at the 791.9-foot elevation, approximately once every four to five years (1937 to 2019). From October 2002 to September 2020, the reservoir has been filled to the spillway crest four times and water has been high enough to flow over the spillway twice. The water levels in the lake during this period (2002 to 2020) fluctuated between the approximately 736-foot elevation contour and the 795-foot elevation contour. Between 2002 and 2020, the longest consecutive period of time that water was stored in the upper two feet of the reservoir (i.e., 793.9 to 795.9 feet) was approximately 35 days.

1.3 PURPOSE AND NEED

In 2012, and in collaboration with DSOD, IRWD initiated seismic evaluations of the existing outlet tower that resulted in a determination that the free-standing structure was seismically unstable. In 2017, at the request of DSOD, IRWD initiated a multi-phase spillway condition assessment. The assessment found that the spillway is nearing the end of its useful life and

² A spillway is a structure on a dam that allows water to flow around the dam to safely release excess water from a reservoir.

³ NAVD88 Datum is used throughout this document.

its design, while acceptable at the time of construction, does not meet current design standards (URS 2015). IRWD has also conducted an assessment of seismic performance of the dam embankment and has determined that modifications to the Santiago Creek Dam embankment are necessary.

In view of the findings of the seismic evaluation for the existing outlet tower and dam embankment, as well as the comprehensive assessment of the existing spillway, IRWD has elected to develop designs for an inclined outlet structure that will be placed near the left abutment of the existing dam, to modify the embankment, and to replace the existing spillway with a side-channel spillway on the left abutment. The spillway crest will also be raised by six feet, which is two feet higher than the top of the flashboards when installed, to regain operational storage capacity that was lost over the years due to sedimentation. The existing outlet tower would be demolished, and the new inclined outlet structure would connect to the existing outlet conduit within the reservoir. The dam embankment would be modified to include a filter drain system.

1.4 PROJECT OBJECTIVES

The primary objective of the proposed Project is to rehabilitate and replace the Santiago Creek Dam outlet tower and spillway facilities to modify the dam embankment to permit operation of the facilities to provide for a long-term water resource benefit. In implementing the proposed Project, IRWD would also obtain the following benefits:

- Construct new facilities and dam embankment modifications that will meet or exceed the current seismic, safety, and design requirements established by DSOD, which is the governing state agency associated with this Project;
- Satisfy IRWD's operational requirements in the present and the future;
- Extend the useful life of the facilities;
- Improve regional water supply reliability; and
- Minimize impacts to local environmental resources and surrounding property owners.

1.5 PROJECT DESCRIPTION

General elements of each portion of the Project are included below. A more detailed description of the proposed facilities is included in the Environmental Impact Report (EIR). The Project Description represents a conservative analysis to accommodate the range of uncertainty regarding the final design. Therefore, the quantities and measurements used throughout the analysis are estimates based on the best available information.

- The existing outlet tower would be demolished; with the portion of the tower located below the sediment to be filled with concrete and capped with a concrete plug or completely removed. A new inclined outlet structure would be constructed on the left abutment, including an approximately 54-inch steel pipe inclined along the slope that would act as the conveyance pipe for water into and out of the reservoir. The concrete-encased steel pipe would be situated in firm bedrock and anchored to the

slope by drilled foundation anchors. A series of steel riser pipes would extend vertically from the inclined 54-inch steel pipe and would act as intakes for reservoir water into the 54-inch pipe. Each riser would include an intake fish screen that would inhibit debris, silt, and aquatic life from entering the pipe.

- The inlet/outlet works would be configured to incorporate the new structure, including new valves and fittings. Water from the lake would enter into the new inclined inlet/outlet structure and would convey lake water through an existing conduit under the dam. At the downstream toe of the dam, a new fitting would be installed to bifurcate the flow either to the ILP or the emergency outlet pipeline. Water that enters the ILP would reach IRWD's distribution system. Water that enters the emergency outlet pipeline would be released to the creek at the end of the new spillway.
- The ILP would be increased from 36 inches to 54 inches to match the pipeline coming from the inclined inlet/outlet structure, as well as to increase the capacity of the line to improve the system's hydraulics. The relocation and upsizing improvements would also protect the ILP from future flood events, thereby enhancing the overall reliability of delivering water from Irvine Lake to customers.
- The existing spillway would be demolished and replaced with a new side-channel spillway in a rock cut on the left abutment. The alignment for the new spillway was selected as a result of several constraints including the footprint of the dam embankment, the location of the sloped outlet structure, and the steeply sloped hillside along the left abutment.
- To ensure the spillway structure is constructed on sound foundational material, many areas under the spillway structure would include the placement of roller compacted concrete. In addition, the floor of the spillway would be anchored into bedrock materials that would include drilling, grouting, post-tensioning and securing the anchors into the spillway slab.
- The end of the new spillway would include a stilling basin before discharging to a concrete and riprap apron. At the end of the stilling basin, a scour protection cutoff is included for additional mitigation of head cutting that may occur during significant discharges.
- The dam embankment improvements include removing the upper portion of the dam on the downstream side of the embankment, constructing a filter drain system, and encapsulating the filter drain system with embankment shell material composed of pervious material.
- A new access road and ramp would be constructed to provide vehicle access to the new inlet/outlet structure. A new shotcrete tie-back wall would be needed to cut the roadway into the existing slope without affecting the existing landfill facility above.
- A new dam control building would be constructed to house the valve system at the end of the existing dam crest. The preliminary layout shows a fire-hardened building with the approximate dimensions of 60 feet by 20 feet with a height of approximately 18 feet.

- The dam crest would be widened from 10 feet to between approximately 35 and 45 feet, the dam crest elevation would be raised approximately one foot, which would improve access and safety for dam maintenance. The paved dam crest would include protective railings on both sides of the road and replacement of piezometers to monitor the performance of the embankment dam. These embankment improvements would require excavations along the toe of the dam to key in the earthwork improvements to the face of the dam.
- The dam crest would be raised approximately one foot on the upstream side of the dam crest. This would raise the effective dam crest from an elevation of 811.9 feet up to approximately 812.9 feet for DSOD freeboard requirements during a probable maximum flood event.
- The Project would raise the spillway six feet to 797.9 feet, which is two feet higher than the existing maximum water storage elevation of 795.5 feet. Raising the spillway would allow the dam to impound water up to the 797.9-foot elevation contour year-round, which would allow storage of approximately 1,300 AF of additional water.
- A new emergency access walkway (five feet wide) and stair system would be constructed along the left wall of the new spillway channel to reach the inlet/outlet structure and dam crest from the adjacent closed OCWR landfill facility during a spillway event. The walkway would connect to the new access road (described above).
- A new steel bridge structure would be included for vehicles across the new spillway.
- Existing structures would be demolished, including the existing vertical outlet tower and portions of 60-inch outlet conduit, significant portions (or possibly all) of the existing spillway chute and walls, spillway bridge and piers, portions of the upstream dam embankment concrete facing, storage building on the dam crest, outlet works control building and valve vault, outlet works energy dissipator vault, portions of the ILP, catwalk and stairs assembly across Santiago Creek, the dam keeper's house, boat shop (unless re-purposed for IRWD use), and piezometers/monitoring wells. Site demolition activities are anticipated to occur in 2027/2028, and spillway demolition is expected to occur in 2028. The potential removal of the boat shop building would occur at the end of the construction period in 2030. When feasible, demolished materials would be recycled or reused.
- The existing Southern California Edison (SCE) overhead power lines and power poles in the vicinity would be relocated outside the construction limits. This relocation would be completed by SCE. There would be an approximately 15-foot-wide right-of-way (ROW) easement for long-term maintenance.
- Before beginning construction of the dam improvements, the lake would be dewatered, and an access road would be graded along the edge of the dewatered lakebed to allow construction access between the staging area and the dam structure.
- IRWD would maximize withdrawals from Irvine Lake in the time leading up to construction initiation to minimize the amount required to be dewatered. The dewatering process would combine several methods including dewatering using the valves and outlet tower to allow water to flow downstream, implementing a

temporary pumping system, and installing a subgrade dewatering system (e.g., dewatering wells). The temporary pumping system would include diesel-driven pumps and temporary above ground piping that would convey the water from the lake to a discharge point along Santiago Creek near the existing Arizona crossing (a type of culvert crossing). Dewatering would be used throughout the year as needed to manage the water level during and after storm events and to maintain a dry work environment. IRWD would coordinate downstream releases with impacted agencies and entities.

- Once the lake is dewatered and before the first dry season, the contractor would construct a temporary diversion berm and access ramp. The temporary diversion would provide a physical barrier to protect the work area from seasonal storms and would provide an elevated access road to allow construction equipment to access the downstream side of the dam.
- During construction, concrete crushing would occur in one of the staging areas. Concrete crushing would be expected to occur intermittently for approximately three weeks during the demolition phase of the Project but may also occur at various stages of the Project as concrete is removed from the existing spillway or dam. When feasible, demolished and removed materials would be recycled or reused.

1.5.1 Additional Geotechnical Investigations

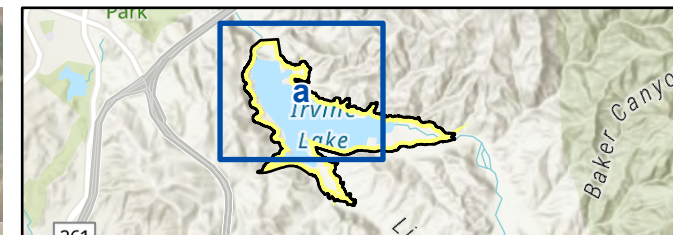
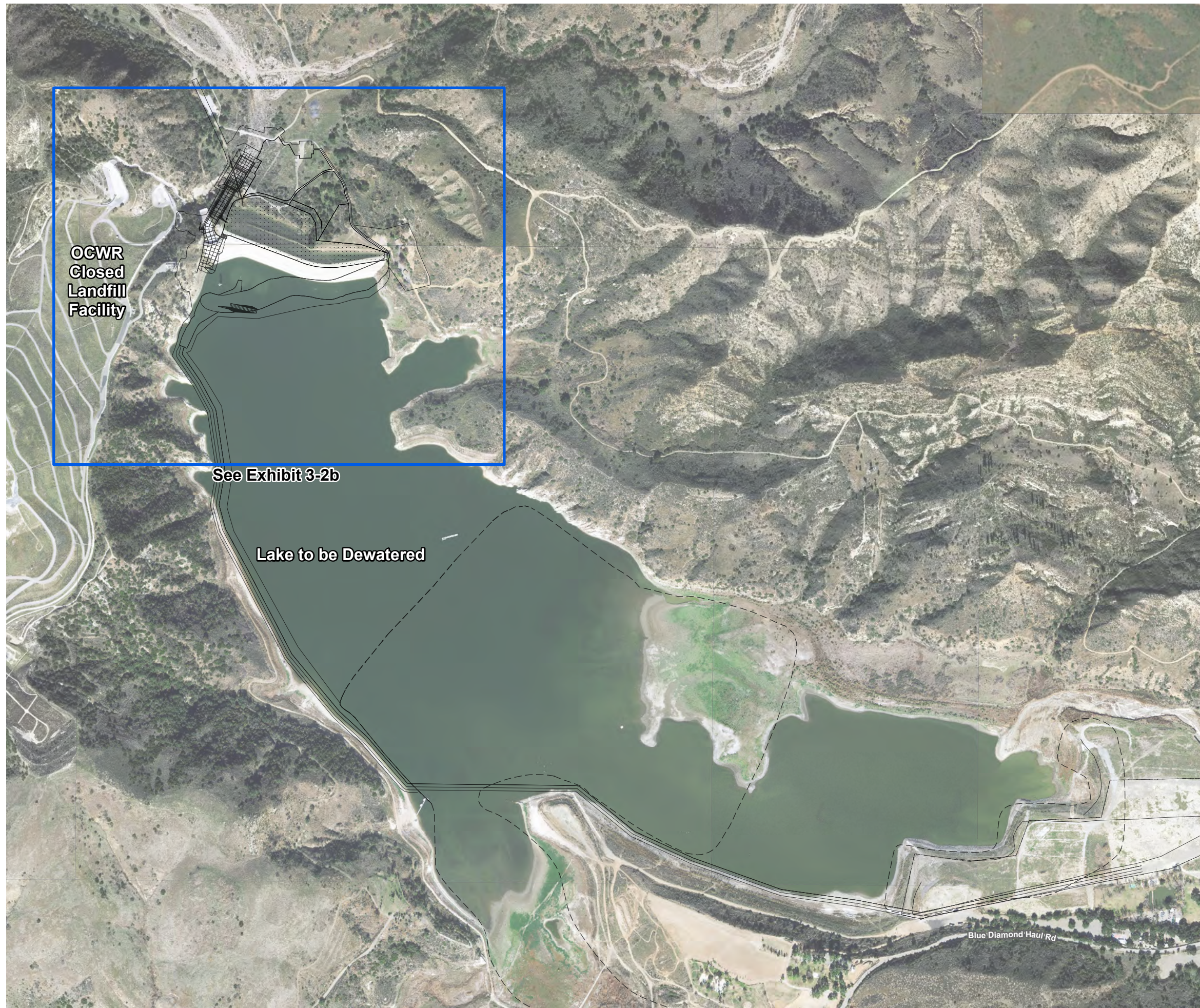
Although IRWD previously completed geotechnical investigations to support Project design and the development of detailed construction documents (2021–2024), additional geotechnical investigations were conducted in early 2025 to support the final design. These investigations included the performance of exploratory test pits, soil borings, packer testing, and non-intrusive geologic investigations and observations. The additional geotechnical investigations remained within the proposed limits of disturbance defined by the Project and will be mitigated as part of the overall Project.

1.5.2 Construction Activities

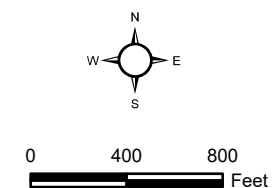
Construction Access and Staging

The primary construction access would lead into the lake from Santiago Canyon Road and Blue Diamond Haul Road. The primary contractor staging and equipment storage area, as well as the required concrete batch plant and construction trailers, would be located in the large, flat plateau area (known as “the Flats”) at the upstream end of the reservoir (Exhibit 4). The primary construction access/haul road would connect the staging area to the existing dam within the lakebed after the lake is dewatered. An earthen ramp would be constructed up the right abutment of the existing dam to allow construction vehicles to access the downstream side of the dam. To facilitate construction of the downstream features, a secondary staging area would be located on the downstream toe of the dam near the existing outlet structure building. It is anticipated that the secondary staging area would be utilized by the contractor to mobilize the roller compacted concrete batch plant. The secondary staging area may also be used to stage formwork, rebar, raw materials, and other related materials and equipment required to successfully construct the dam improvements. Material from the embankment would be removed, staged, and repurposed within the Project site.

D:\Projects\IRW\SantiagoCreek\PROJ\SCD\SCD_Project.aprx Construction Dam Area A



**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

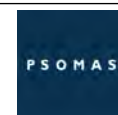


Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Santiago Dam Construction Features

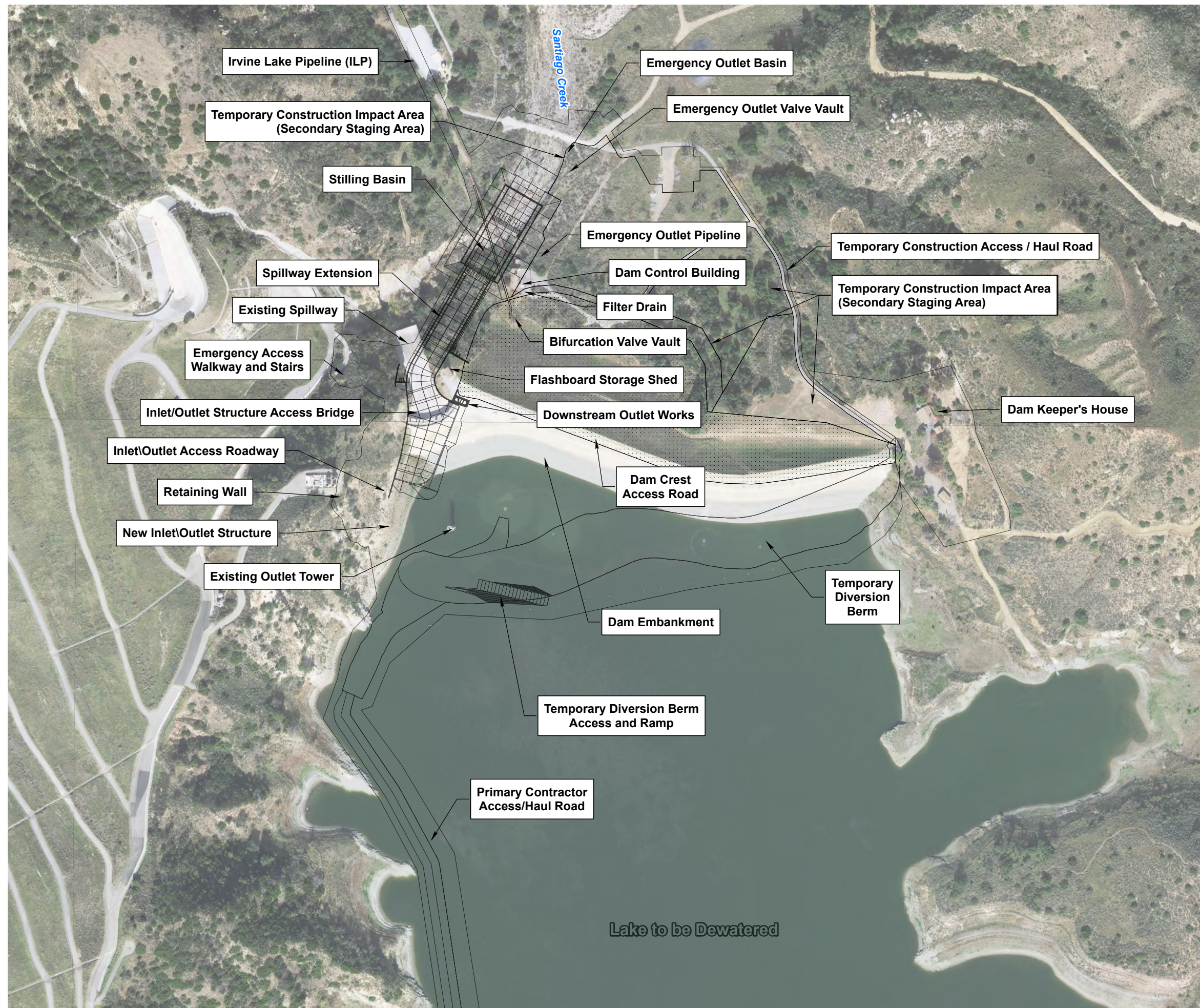
Exhibit 4a

Santiago Creek Dam Improvement Project

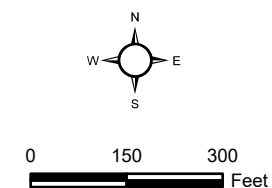


(Rev. 02/27/2025 JVR) <LINK>R:\Projects\IRW_IRWD\3IRW010205\Graphics\JDIex_Dam_Features_A.pdf

D:\Projects\IRW\SantiagoCreek\PROJ\SCD\SCD_Project.aprx\ex_Construction_Dam_Area_B

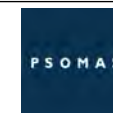


**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*



Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Santiago Dam Construction Features
Exhibit 4b
Santiago Creek Dam Improvement Project



(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JDLex_Dam_Features.pdf

Temporary Construction Water

Water would be utilized for various construction activities. The available water source in the Project vicinity is a 12-inch potable water line running along East Santiago Canyon Road south of Irvine Lake. IRWD would install a temporary highline from Santiago Canyon Road, along Blue Diamond Haul Road to the staging area. The temporary construction water line would be routed above-ground through the Irvine Lake parking area and along the primary contractor access/haul road to the proposed work areas. Construction activities may also use untreated water from the ILP as an additional water source.

Borrow Areas

Project construction would involve the removal and on-site transport of approximately 360,000 cubic yards (CY) of soil from on-site borrow pits, located within the limits of the lake, to serve as source material for the dam embankment. These materials would be moved from one on-site location to another and ultimately balanced on-site. The Project would include importing approximately 200,000 CY of material and exporting approximately 315,000 CY of material over the four-year construction period.

Construction Schedule

Construction work is anticipated to begin in Fall 2027 and the Project is expected to be completed within approximately four years. The approximately four-year construction window assumes down-time associated with weather restrictions and assumes working double 10-hour shifts (i.e., 20-hour workdays with nighttime work). The construction schedule assumes that a minimum of three dry seasons, which are generally between April to October, would be required to build the dam improvements in a systematic and phased fashion. It also assumes that the embankment improvements would be built concurrently with the spillway improvements. The exact date that construction begins is subject to change. The construction schedule will be refined as Project design plans are developed and finalized.

During construction, concrete crushing would occur in the staging area at the upstream end of the lake. Concrete crushing would be expected to occur during the day from April through November during the demolition phase of the Project. As mentioned above, concrete crushing would be expected to occur intermittently for approximately three weeks during the demolition phase of the Project but may occur at various stages of the Project as concrete is removed from the existing spillway or dam.

Various public agencies (e.g., Orange County Fire Authority, Orange County Sheriff's Department, etc.) currently use portions of the proposed staging area for takeoff and landings associated with training and operational activities. During construction of the proposed Project, HeloPods⁴ would be designated near the eastern edge of the lake near the Flats area at the upstream end of the reservoir for their continued use.

⁴ Portable, tactical helicopter dip sources which provide fire crews a water source to refill the helicopters water tanks closer to the location of a wildfire.

1.6 OPERATION AND MAINTENANCE

Once operational, all Project components would operate and be monitored through IRWD's Supervisory Control and Data Acquisition (SCADA) system. Reservoir level sensors would continue to monitor water levels in the reservoir. In addition, instrumentation and monitoring systems would continuously monitor the stability of the dam and identify situations that may require intervention, such as a controlled emergency release of water from the reservoir. Any upgrades to instrumentation and monitoring equipment would be determined during final design and may include, but are not limited to, survey monuments, inclinometers, seepage weirs, piezometers, reservoir level sensors, strong motion accelerographs, and a weather station.

Irvine Lake is generally operated in four IRWD operational modes as outlined in Table 1. Each mode has general operating parameters that allow for the safe, cost-effective operation of the lake while maximizing the potential average annual water runoff from storm events.

TABLE 1
IRWD/LAKE OPERATIONAL MODES

Season	
Winter	During the Winter Mode any available rainfall is captured in the lake and stored for use. This period begins with the first rainfall event in November/December and reduces or eliminates the need to purchase untreated imported water from MWD if runoff equals or is greater than demands.
Spring	During the Spring Mode under the first option, lake storage is evaluated to determine if available runoff captured during the winter will meet demands through October 1. If additional water is needed during a dry year, untreated imported water from MWD is purchased prior to May 1. Under the second option, water is not purchased prior to the summer season.
Summer	During the Summer Mode beginning May 1, under the first option, the lake is drafted down to meet IRWD demands. Under the second option water is purchased on a month-by-month basis to meet demands, which minimizes evaporation losses applied to imported supplies.
Fall	During the Fall Mode beginning October 1, purchased untreated imported water from MWD is used to maintain the Lake at the minimum operational level while maximizing available storage. Once sufficient runoff is received to meet demands or to begin filling the lake, staff transitions to the Winter Mode.
Under some water level and rain event conditions, the spillway may be utilized to pass storm flows around the dam. When the spillway is activated, the emergency outlet valve to Santiago Creek may be opened to release water and lower the water level in the reservoir and orders for untreated imported water are ceased.	
Source: IRWD 2020.	

Similar to the current reservoir, operation of the proposed Project would not require daily onsite staffing but would require only periodic maintenance. Water levels at Irvine Lake would fluctuate seasonally; water would be stored in winter when water supply exceeds demand, and the reservoir would be drawn down in summer when water demand exceeds supply. However, IRWD would develop a new operating plan for Irvine Lake that would be

updated each year to set targets for the volume of water to be contained in the reservoir on a daily, monthly, annual, or seasonal basis. Reservoir operations would vary with time based upon a wide variety of factors, such as: seasonal storage needs, water quality considerations, and impoundment requirements based on rainfall projections.

During precipitation events, IRWD may maintain reservoir levels well below the spillway crest to create sufficient space for stormwater runoff to enter the reservoir and avoid use of the spillway. The annual operating plan would identify an operating strategy that would reduce the potential for utilizing the spillway and maximize stormwater capture. Reservoir operations would be adjusted by IRWD during the year based on changes in projected demands and other factors as needed.

Under normal operating conditions, all flow out of the reservoir would be conveyed through the inlet/outlet pipeline. In the event of an emergency or for dam safety reasons, IRWD would release water through the cone valve to the creek. IRWD staff would continue to conduct routine safety and security checks of the site, similar to existing protocols.

1.6.1 Additional Inundation During Operation

The Project includes raising the spillway six feet to 797.9 feet, which is 2 feet higher than the existing maximum water storage elevation with the flashboards installed (759.9 feet). Raising the spillway would allow the lake to impound water up to the 797.9-foot elevation contour year-round, which would allow storage of approximately 1,300 AF of additional water. Under current operations, if Irvine Lake was full and the water was conveyed to the Baker Water Treatment Plant at full production while also feeding the Howiler Water Treatment Plant, the water level in the lake would be lowered by approximately 2 feet in approximately 18 days, assuming no additional inflow into the reservoir and excluding evaporation. IRWD estimates that the upper 2 feet of the reservoir (i.e., 795.9 to 797.9 feet in elevation) could be inundated for an approximate maximum of 30 to 45 days per year but typically would be inundated less often, and in some years not at all. As previously discussed, the existing lake capacity is currently approximately 24,000 AF, but it can hold an additional 2,700 AF when the flash boards are installed on the spillway. With proposed improvements, the lake would hold a maximum of 28,000 AF.

Other than raising the spillway, all other operations would remain similar to the existing operations of the dam.

1.7 REGULATORY AUTHORITY

This section summarizes the regulations of those federal and state agencies that have regulatory authority over activities that occur within their areas of jurisdiction. A detailed explanation of each agency's regulatory authority is provided in Attachment A.

1.7.1 U.S. Army Corps of Engineers

The USACE Regulatory Branch regulates activities that discharge dredged or fill materials into waters of the United States (WOTUS) under Section 404 of the federal Clean Water Act (CWA) and Section 10 of the Rivers and Harbors Act. The USACE's authority applies to all

WOTUS where the material (1) replaces any portion of a WOTUS with dry land or (2) changes the bottom elevation of any portion of any WOTUS. Activities that result in fill or dredge of WOTUS require a permit from the USACE.

The definition of WOTUS has been the subject of shifting regulations. Past federal revisions to regulations addressing the extent of USACE jurisdiction and the definition of WOTUS have been issued by the Obama Administration in 2015 and the Trump Administration in 2020. On January 18, 2023, the United States Environmental Protection Agency (USEPA) published a final Water Rule in the Federal Register that went into effect on March 20, 2023 (“the 2023 Rule”) (USACE and USEPA 2023a).

The definition of WOTUS changed again in response to the Supreme Court decision in the case of *Sackett v. USEPA*. On September 8, 2023, the USEPA and the USACE amended the Code of Federal Regulations to conform the definition of WOTUS to the Supreme Court decision (USACE and USEPA 2023b). This conforming rule amends the provisions of the agencies’ definition of WOTUS that were invalid under the Supreme Court’s interpretation of the CWA under *Sackett*.

Based on these changes, tributaries must have at least relatively permanent flow to be considered WOTUS from the federal definition. This would exclude ephemeral drainages from being WOTUS. This represents a substantial change to areas under federal jurisdiction in the arid west. This report provides interpretations of WOTUS under the Amended 2023 Rule. The current definition of WOTUS is provided in Attachment A.

1.7.2 Regional Water Quality Control Board

The State Water Resources Control Board (SWRCB), in conjunction with the nine RWQCBs, is the primary agency responsible for protecting water quality in California through the regulation of discharges to surface waters under the CWA and the California Porter-Cologne Water Quality Control Act (Porter-Cologne Act). The SWRCB’s and RWQCBs’ jurisdictions extend to all WOTUS as well as waters of the State that are outside federal jurisdiction, including wetlands.

The Porter-Cologne Act broadly defines “waters of the State” as any surface water or groundwater, including saline waters, within the boundaries of the State.” On August 28, 2019, the Office of Administrative Law (OAL) approved the State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to waters of the State. The procedures went into effect on May 28, 2020. Under these regulations, the SWRCB and its nine RWQCBs assert jurisdiction over all existing WOTUS, and all waters that would have been considered WOTUS under any historical definition. Impacts to WOTUS are authorized by the RWQCBs through a Water Quality Certification per Section 401 of the CWA. For isolated waters (i.e., waters that are not subject to USACE jurisdiction under section 404 of the CWA) the state takes jurisdiction under the Porter-Cologne Act. The permit required for impacts to waters of the state is a Report of Waste Discharge (ROWD).

To obtain ROWDs, file the ROWD Form 200 with the necessary supplemental information with the RWQCB at least 120 days before beginning to discharge waste. The RWQCB reviews the application for completeness and may request additional information. Once the

application is complete, the RWQCB determines whether they should adopt Waste Discharge Requirements (WDRs), prohibit the discharge, or waive the WDRs. If WDRs should be issued, the RWQCB prepares proposed WDRs and distributes them to persons and public agencies with known interest in the project for a minimum 30-day comment period. RWQCB staff members may modify the proposed WDRs based on comments received from the discharger and interested parties. The RWQCB holds a public hearing with at least a 30-day public notification. The RWQCB may adopt the proposed WDRs or modify and adopt them at the public hearing by majority vote. The entire process for developing and adopting the requirements normally takes about three months. WDRs are in effect until such time as the discharge is terminated or until revoked by the RWQCB. NPDES permits expire after five years and must be reissued.

There is no application fee for Form 200 (except for dairies). Instead, there is an annual fee that will be paid to the RWQCB.

1.7.3 California Department of Fish and Wildlife

The CDFW regulates activities that may affect rivers, streams, and lakes pursuant to the *California Fish and Game Code* (§§1600–1616). According to Section 1602 of the *California Fish and Game Code*, the CDFW has jurisdictional authority over any work that will (1) substantially divert or obstruct the natural flow of any river, stream, or lake; (2) substantially change or use any material from the bed, channel, or bank of any river, stream, or lake; or (3) deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it may pass into any river, stream, or lake. A Lake or Streambed Alteration (LSA) Agreement would be required for the aforementioned activities.

2.0 METHODS

2.1 SURVEY AREA

The survey area for the jurisdictional delineation includes the perimeter of Irvine Lake and an area north (downstream) of the dam (Exhibit 3). The survey area north of the dam was provided by IRWD and the survey area south of the dam was determined by adding a 250-foot buffer from the 797.9-foot elevation contour around the lake. Where the 250-foot buffer did not include the 811.9-foot contour, the survey area was extended 50-feet beyond the 811.9-foot contour to assess indirect effects on biological resources⁵. The survey area was truncated at the ridgeline around Irvine Lake and at Santiago Canyon Road because no impacts are expected to extend past the ridgeline or arterial roadway, respectively.

2.2 LITERATURE REVIEW

Prior to conducting the jurisdictional delineation and during report preparation, Psomas reviewed the following documents to aid in the identification of areas that may fall under agency jurisdiction: the USGS' Black Star Canyon 7.5-minute quadrangle map, color aerial photography provided by the Hexagon Geosystems (flown in 2017 and 2018) and ESRI, Maxar (flown in 2019); soil data provided by the U.S. Department of Agriculture's Natural Resources Conservation Service (Exhibit 5); the National Hydric Soils List (USDA NRCS 2020); the National Wetlands Inventory's Wetland Mapper (Exhibit 6); the USGS National Water Information System Mapper (USGS 2020a); and the Water Quality Control Plan for the Santa Ana River Basin (Santa Ana RWQCB 1995).

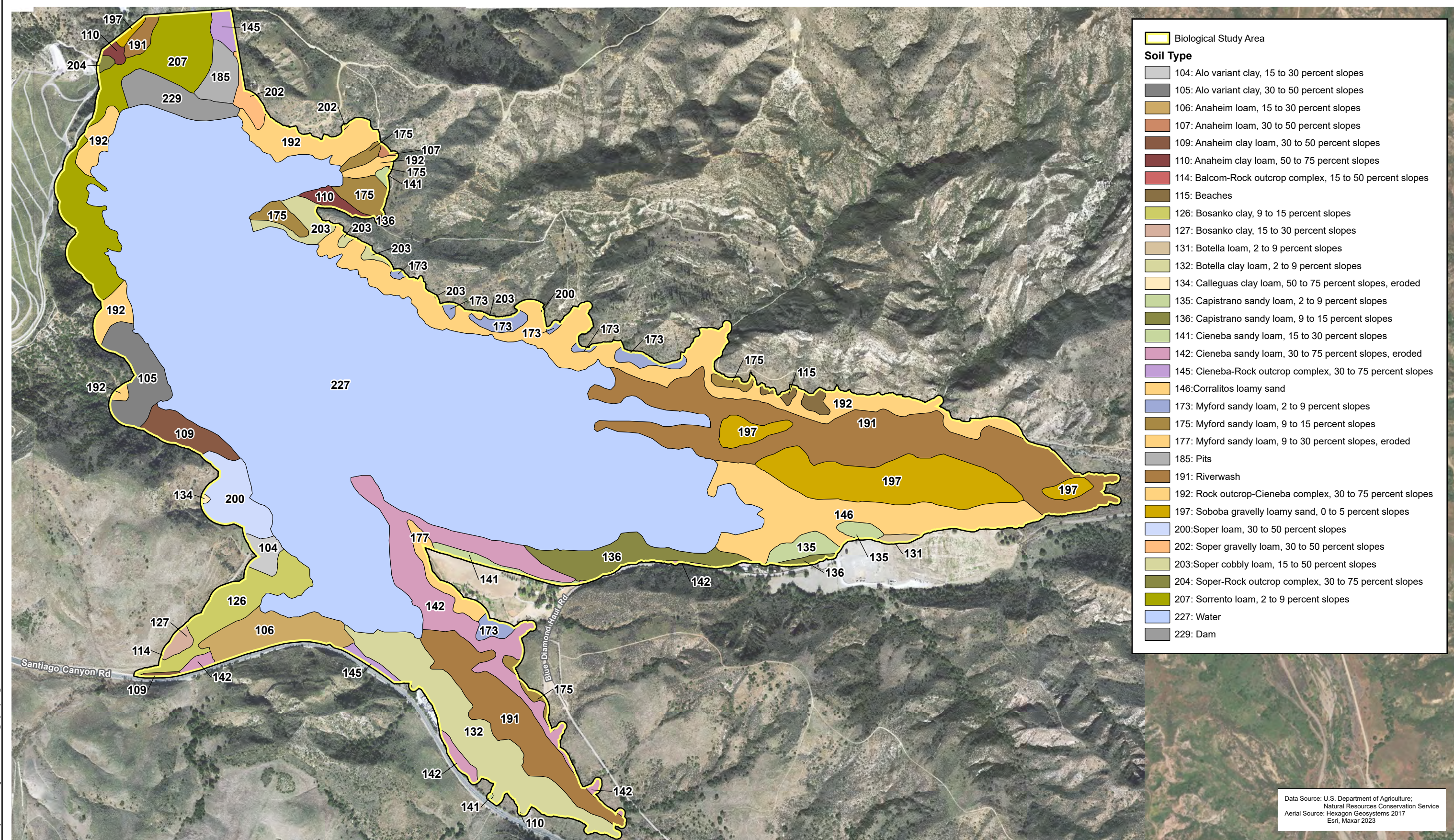
USGS Topographic Quadrangle. USGS quadrangle maps show geological formations and their characteristics and describe the physical settings of an area through topographic contour lines and other major surface features. These features include lakes, streams, rivers, buildings, roadways, landmarks, and other features that may fall under the jurisdiction of one or more regulatory agencies. In addition, the USGS maps provide topographic information that is useful in determining elevations; connectivity of streams, rivers, and other water features; latitude and longitude; and Universal Transverse Mercator Grid coordinates for the survey area.

Color Aerial Photography. Color aerial photographs were reviewed prior to conducting the field delineation to identify the extent of any drainages and riparian vegetation occurring in the survey area.

U.S. Department of Agriculture, Natural Resources Conservation Service. The presence of hydric soils is one of the chief indicators of jurisdictional wetlands. Psomas reviewed U.S. Department of Agriculture (USDA) soil data for the survey area.

U.S. Fish and Wildlife Service, National Wetlands Inventory: The Wetlands Mapper shows wetland resources available from the Wetlands Spatial Data Layer of the National

⁵ The study area extended to the 811.9-foot elevation because the impact boundary had not yet been developed when the surveys began.



- Biological Study Area**
- Soil Type**
- 104: Alo variant clay, 15 to 30 percent slopes
 - 105: Alo variant clay, 30 to 50 percent slopes
 - 106: Anaheim loam, 15 to 30 percent slopes
 - 107: Anaheim loam, 30 to 50 percent slopes
 - 109: Anaheim clay loam, 30 to 50 percent slopes
 - 110: Anaheim clay loam, 50 to 75 percent slopes
 - 114: Balcom-Rock outcrop complex, 15 to 50 percent slopes
 - 115: Beaches
 - 126: Bosanko clay, 9 to 15 percent slopes
 - 127: Bosanko clay, 15 to 30 percent slopes
 - 131: Botella loam, 2 to 9 percent slopes
 - 132: Botella clay loam, 2 to 9 percent slopes
 - 134: Calleguas clay loam, 50 to 75 percent slopes, eroded
 - 135: Capistrano sandy loam, 2 to 9 percent slopes
 - 136: Capistrano sandy loam, 9 to 15 percent slopes
 - 141: Cieneba sandy loam, 15 to 30 percent slopes
 - 142: Cieneba sandy loam, 30 to 75 percent slopes, eroded
 - 145: Cieneba-Rock outcrop complex, 30 to 75 percent slopes
 - 146: Corralitos loamy sand
 - 173: Myford sandy loam, 2 to 9 percent slopes
 - 175: Myford sandy loam, 9 to 15 percent slopes
 - 177: Myford sandy loam, 9 to 30 percent slopes, eroded
 - 185: Pits
 - 191: Riverwash
 - 192: Rock outcrop-Cieneba complex, 30 to 75 percent slopes
 - 197: Soboba gravelly loamy sand, 0 to 5 percent slopes
 - 200: Soper loam, 30 to 50 percent slopes
 - 202: Soper gravelly loam, 30 to 50 percent slopes
 - 203: Soper cobbly loam, 15 to 50 percent slopes
 - 204: Soper-Rock outcrop complex, 30 to 75 percent slopes
 - 207: Sorrento loam, 2 to 9 percent slopes
 - 227: Water
 - 229: Dam

Data Source: U.S. Department of Agriculture;
Natural Resources Conservation Service
Aerial Source: Hexagon Geosystems 2017
Esri, Maxar 2023

Soil Types
Santiago Creek Dam Improvement Project

N
W E
S

0 550 1,100
Feet

Spatial Data Infrastructure (USFWS 2020). This resource provides the classification of known wetlands following the *Classification of Wetlands and Deepwater Habitats of the United States* (FGDC 2013). This classification system is arranged in a hierarchy of (1) Systems that share the influence of similar hydrologic, geomorphologic, chemical, or biological factors (i.e., Marine, Estuarine, Riverine, Lacustrine, and Palustrine); (2) Subsystems (i.e., Subtidal and Intertidal; Tidal, Lower Perennial, Upper Perennial, and Intermittent; or Littoral and Limnetic); (3) Classes, which are based on substrate material and flooding regime or on vegetative life forms; (4) Subclasses, which recognize finer differences in life forms or substrate material than the Class; and (5) Dominance Types, which are named for the dominant plant or wildlife forms. In addition, modifying terms are applied to Classes or Subclasses. Full definitions of National Wetland Inventory (NWI) terms are found in Attachment B.

The mapped water resources are used to provide additional guidance on planning the field surveys. Given that wetland features mapped by the NWI may or may not exist at a site because of changing conditions and development, this resource provides only preliminary data and historic data based on aerial photographic interpretation and, therefore, must be ground-truthed.

USGS National Water Information System Mapper. The National Water Information System Mapper provides data from surface water sites, groundwater sites, springs, and atmospheric sites. Available data from surface water sites include daily, monthly, and annual discharge; peak streamflow; and water-year summaries.

Regional Water Quality Control Plans. California has nine RWQCBs. The survey area is located in RWQCB Region 8, the Santa Ana Region. The Santa Ana RWQCB has adopted a Water Quality Control Plan (or “Basin Plan”) for this region. The Basin Plan contains goals and policies, descriptions of conditions, and proposed solutions to surface and groundwater issues. The Basin Plan also establishes water quality standards for surface and groundwater resources and includes beneficial uses and levels of water quality that must be met and maintained to protect these uses. These water quality standards are implemented through various regulatory permits pursuant to the CWA, specifically Section 401 for Water Quality Certifications and Section 402 for Report of Waste Discharge (ROWD) permits.

2.3 JURISDICTIONAL DELINEATION

The analysis contained in this report relies on a jurisdictional delineation conducted by Psomas on March 24, 2020, for the portion of the survey area north (downstream) of the existing dam and on October 14, 20, and 21, 2020, for the portion of the survey area south (upstream) of the dam around Irvine Lake. Psomas Senior Regulatory Specialist Allison Rudalevige performed all surveys with assistance from Psomas Senior Biologist Jonathan Aguayo on October 14 and 20, 2020, and Psomas Senior Biologist Lindsay Messett on October 21, 2020. Areas under USACE, RWQCB, and CDFW authority were delineated using an aerial photograph (scale of 1-inch equals 175 feet [1" = 175'] north of the dam and scale of 1-inch equals 275 feet [1" = 275'] south of the dam) overlaid with 5-foot topographic contour data loaded onto Avenza Maps application on an Apple iPad. Large drainage features and waterbodies were delineated as polygons and narrow drainages were delineated as centerlines with corresponding width measurements. Soil test pits were dug in areas that

exhibited potential hydrophytic vegetation and wetland hydrology. Representative photographs of the survey area are included in Attachment C.

2.3.1 USACE Waters of the United States

Psomas assessed the presence of WOTUS by determining connectivity or adjacency of on-site features to points of discharge at Traditional Navigable Waters (TNW) and whether they are relatively permanent tributaries or wetlands adjacent to such waters that meet the current definition of WOTUS. Non-wetland WOTUS are delineated based on the limits of the OHWM, which can be determined by a number of factors, including (1) the presence of a clear, natural line impressed on the bank; (2) shelving; (3) changes in the character of the soil; (3) destruction of terrestrial vegetation; and (4) the presence of litter and debris. The OHWM limits of drainages occurring in the survey area were further verified using methods contained in *A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States, A Delineation Manual* (Lichvar and McColley 2008) and the *Updated Datasheet for the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States* (Curtis and Lichvar 2010). The elevation of the median reservoir level (as recorded between 2002 and 2020) was used to determine the OHWM limits around Irvine Lake.

In September 2008, the USACE issued the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (USACE 2008). This Regional Supplement is designed for use with the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987). Both the 1987 Wetlands Manual and the Arid West Supplement to the manual provide technical methods and guidelines for determining the presence of wetland WOTUS. Both documents prescribe using a three-parameter approach to identify wetlands. The three parameters needed to assign a site as a wetland include evidence of wetland hydrology, hydrophytic vegetation, and hydric soils. However, problem areas may periodically or permanently lack certain indicators due to seasonal or annual variability or the nature of the soils or plant species on site. Atypical wetlands lack certain indicators due to recent human activities or natural events. Guidance for determining the presence of wetlands in these situations is presented in the Regional Supplement.

2.3.2 RWQCB Waters of the State

Psomas determined the limits of RWQCB jurisdiction in the field following the methods described for USACE jurisdiction, above.⁶ The RWQCB shares USACE jurisdiction unless isolated conditions are present or waters are ephemeral. If isolated or ephemeral waters are present, the RWQCB takes jurisdiction using the USACE's definition of the OHWM. The SWRCB defines wetlands as areas that include (1) continuous or recurrent saturation of the upper substrate of sufficient duration to cause anaerobic conditions and (2) vegetation dominated by hydrophytes or lacking vegetation (SWRCB 2019).

⁶ RWQCB limits of jurisdiction are normally determined by the presence of the OHWM per USACE methods for the arid southwest. The limits of RWQCB jurisdiction are not affected by the September 8, 2023, Amended 2023 Rule published by the USEPA and USACE (USACE 2023b).

2.3.3 CDFW Waters

CDFW's jurisdiction was determined by measuring the distance from the top of one bank to the top of the opposite bank for the water features; if riparian vegetation is present, jurisdiction is extended to the outer limit of riparian vegetation located along the feature. CDFW jurisdiction within Irvine Lake generally extended to the 795.9-foot elevation contour around the lake, which is the current maximum elevation of the lake with the flashboards installed.

3.0 RESULTS

Seventeen potential jurisdictional features were mapped in the survey area: Irvine Lake, Santiago Creek, and 15 smaller drainages that discharge into Irvine Lake or Santiago Creek (referred to as Drainage 1, Drainage 2, et seq.) (Exhibits 7, 8, and 9; detailed mapping for USACE, RWQCB and CDFW is provided in Attachment D). Results of the literature review are provided in Section 3.1, and a detailed analysis of each regulatory agency's jurisdiction is provided in Section 3.2. Attachment E provides datasheets that summarize the overall condition of the individual wetlands, drainages, and indicators of OHWM.

3.1 LITERATURE REVIEW

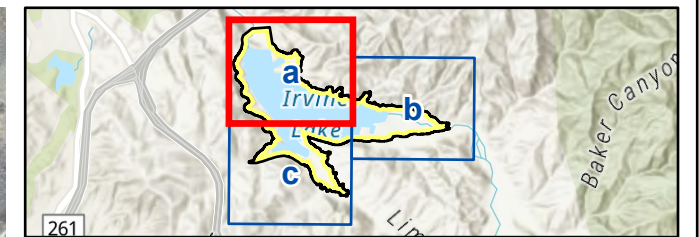
USGS Topographic Quadrangle. Topography in the survey area consists of relatively steep slopes around Irvine Lake with Santiago Creek encompassing a relatively broad floodplain both above and below the dam. Elevations range from approximately 657 to 996 feet above mean sea level (msl) in the survey area. Santiago Creek Dam is labeled on the USGS quadrangle map with Santiago Creek, a named blueline stream, and Irvine Lake (labeled as Santiago Reservoir on the quadrangle map) encompassing the majority of the survey area. One, unnamed blueline stream enters the survey area from the western edge north of the dam, and nine unnamed blueline streams enter Irvine Lake from the surrounding slopes.




Color Aerial Photography. Santiago Creek Dam, including the spillway; Irvine Lake; Santiago Creek; and multiple smaller drainages are clearly visible on aerial imagery. Fluctuations in the lake level are visible across historic aerials. Upstream of Irvine Lake, Santiago Creek encompasses a relatively broad floodplain that appears to contain dense, riparian vegetation. Below the spillway, Santiago Creek is confined to a narrow channel. The channel then broadens, and sparse vegetation is visible. Drainage 3 appears lined with concrete and riprap on the aerial imagery. The remaining drainages appear to contain varying degrees of associated riparian vegetation.

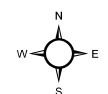
U.S. Department of Agriculture, Natural Resources Conservation Service. The survey area occurs in the following soil survey area: Orange County and Part of Riverside County, California. Within this survey area, the USDA NRCS has delineated the boundaries of "soil map units", which often contain components of multiple soil types that may be classified as hydric or non-hydric. The National Hydric Soils List identifies a soil map unit as "hydric" if it contains either a major or minor component that is at least in part hydric.

Soils mapped in the survey area include Alo variant clay, Anaheim loam, Anaheim clay loam, Balcom-rock outcrop complex, beaches, Bosank clay, Botella loam, Botella clay loam, Calleguas clay loam, Capistrano sandy loam, Cieneba sandy loam, Cieneba-rock outcrop complex, Corralitos loamy sand, Myford sandy loam, pits, riverwash, rock outcrop-Cieneba complex, Soboba gravelly loamy sand, Soper loam, Soper gravelly loam, Soper cobbly loam, Soper-rock outcrop complex, Sorrento loam, water, and dam (Exhibit 5). Of these soils, beaches, Corralitos loamy sand, pits, riverwash, and Soboba gravelly loamy sand (0 to 5 percent slopes) are considered hydric (USDA NRCS 2020). These soils are primarily found along Santiago Creek and the other main drainage entering Irvine Lake from the south. A description of the soils mapped in the survey area is provided in Attachment F of this report.

D:\Projects\3\IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_ID_USACE



-  Survey Area
-  Sampling Point Location
- Waters of the United States**
-  Wetland
-  Non-Wetland



0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources –
USACE Waters of the United States

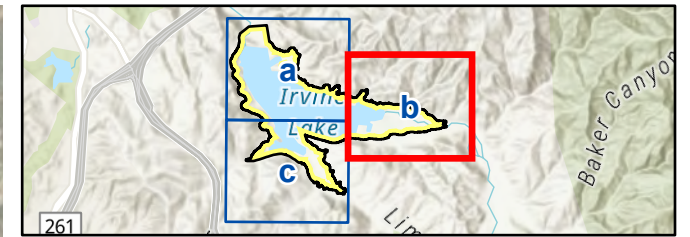
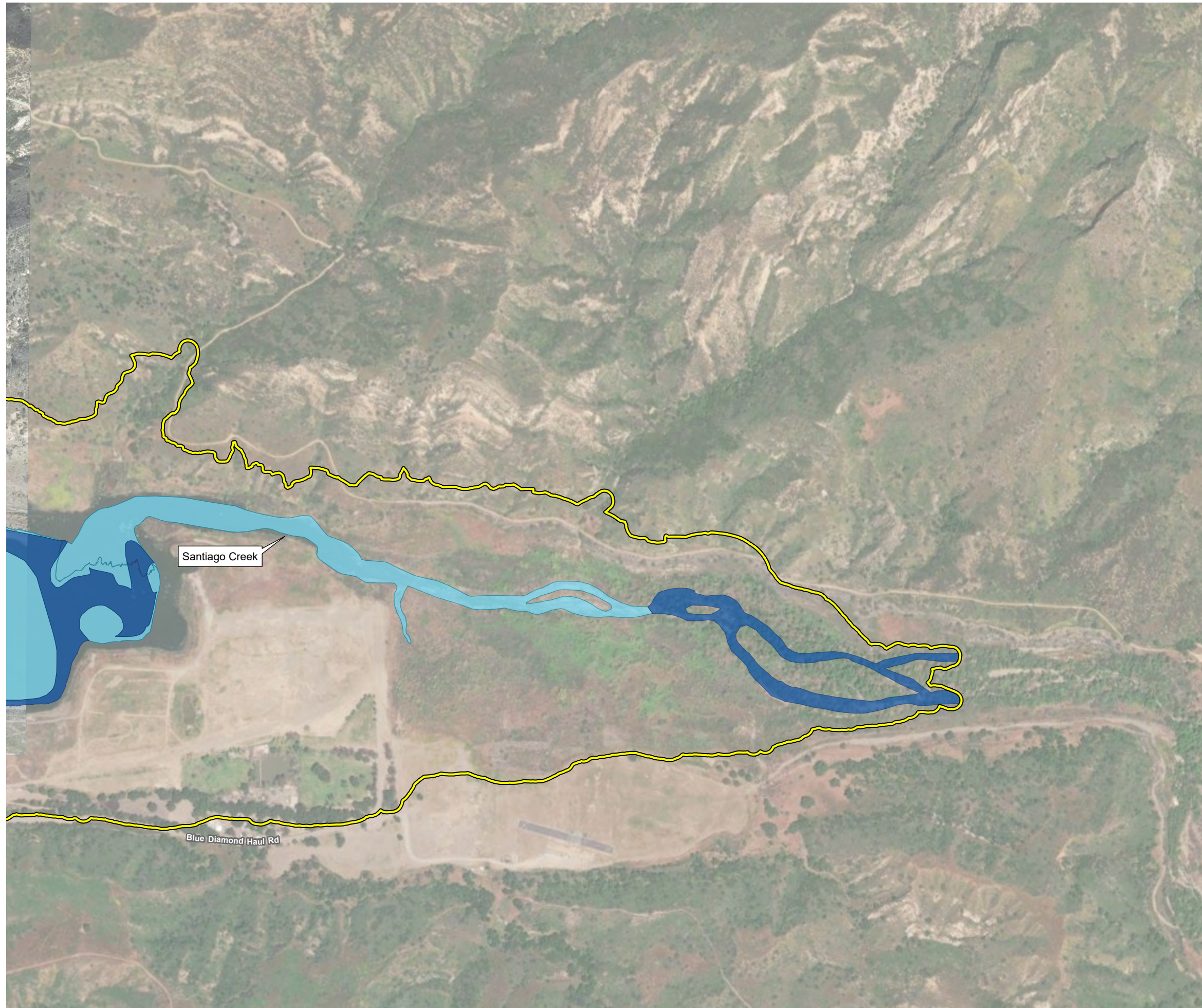
Exhibit 7a

*Santiago Creek Dam
Improvement Project*



(Rev. 02/27/2025 JVR) R:\Projects\IRW_IRWD\3\IRW010205\Graphics\ID\ex_ID_USACE.pdf

D:\Projects\3\IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprxex_ID_USACE



- Survey Area
- Sampling Point Location
- Waters of the United States**
 - Wetland
 - Non-Wetland



0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources –
USACE Waters of the United States

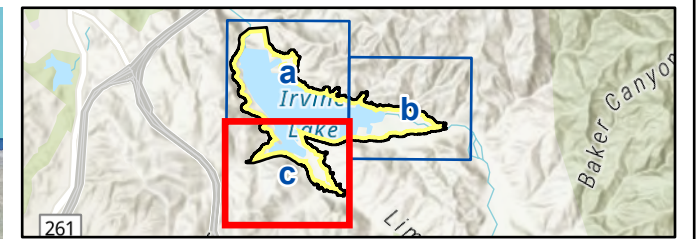
Exhibit 7b

*Santiago Creek Dam
Improvement Project*



(Rev. 02/27/2025 JVR) R:\Projects\IRW_IRWD\3\IRW010205\Graphics\ID\ex_ID_USACE.pdf

D:\Projects\3\IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprxex_ID_USACE



- Survey Area
- Sampling Point Location
- Waters of the United States**
- Wetland
- Non-Wetland



0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

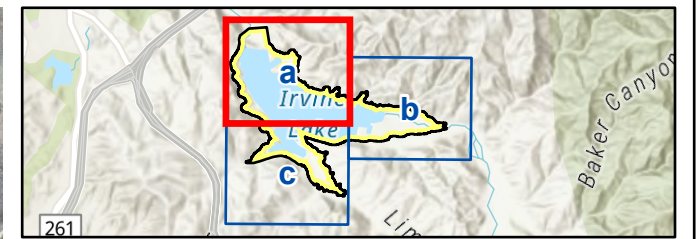
Jurisdictional Resources –
USACE Waters of the United States
*Santiago Creek Dam
Improvement Project*

Exhibit 7c



(Rev. 02/27/2025 JVR) R:\Projects\IRW_IRWD\3\IRW010205\Graphics\ID\ex_ID_USACE.pdf

D:\Projects\IRW\SantiagoCreek\PO\SCDS\CD_Project.aprx_kw_ID_RWQCB



- Survey Area
- Sampling Point Location
- Sheet Flow (non-jurisdictional)
- Waters of the State**
- Wetland
- Non-Wetland
- Non-Wetland Drainage Centerline



0 300 600 Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources –
RWQCB Waters of the State

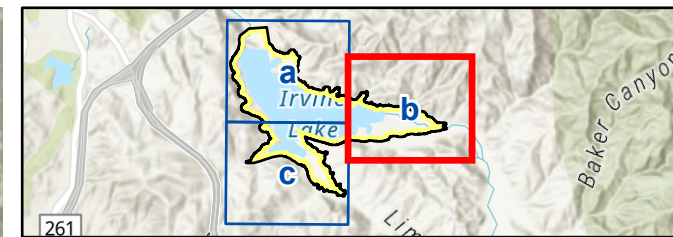
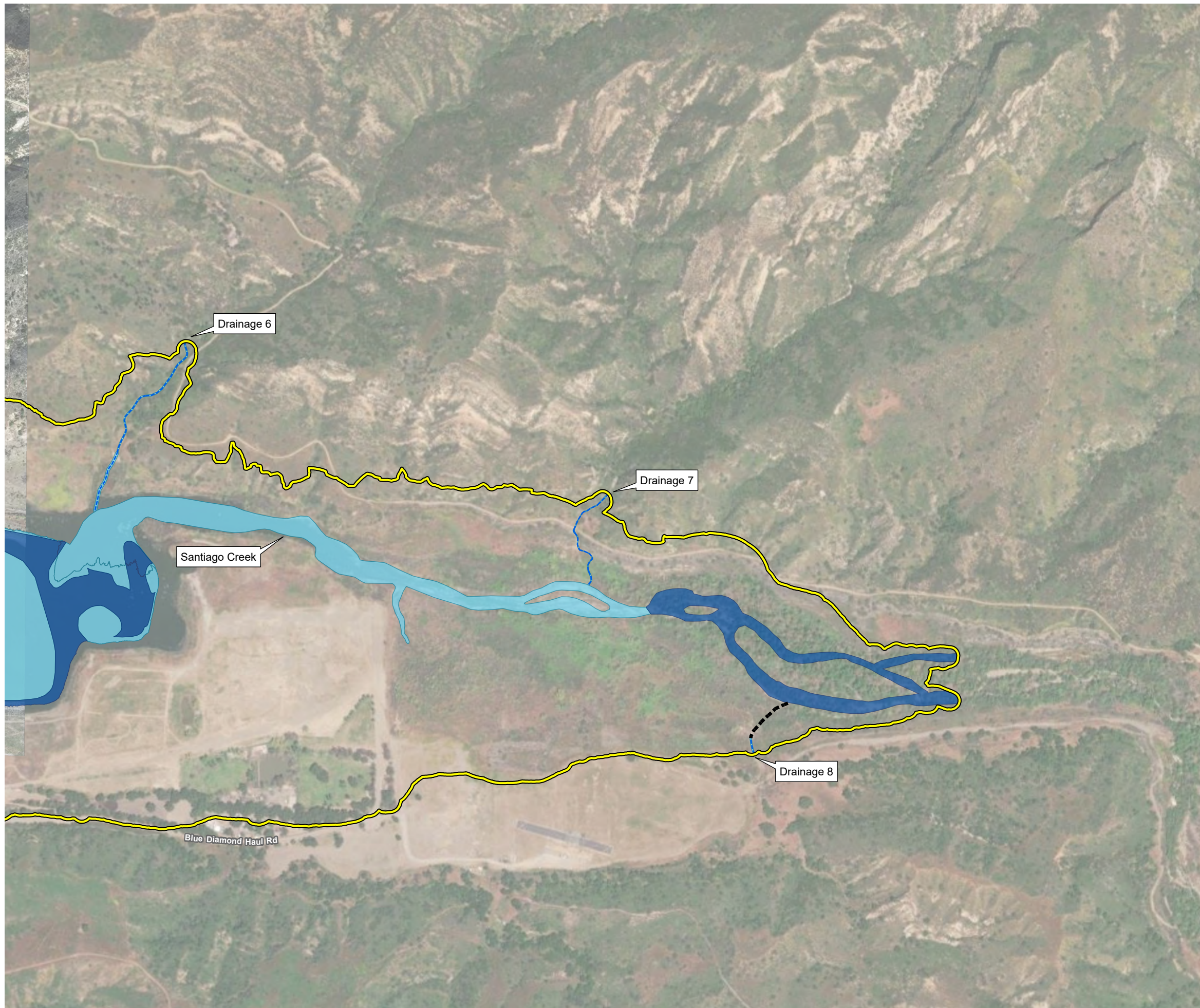
Exhibit 8a






*Santiago Creek Dam
Improvement Project*



(Rev. 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\ID\ex_ID_USACE.pdf

D:\Projects\IRW\SantiagoCreek\PO\SCDS\CD_Project.aprx\ex_8b_RWQCB



-  Survey Area
-  Sheet Flow (non-jurisdictional)
- Waters of the State**
 -  Wetland
 -  Non-Wetland
 -  Non-Wetland Drainage Centerline



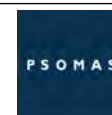
0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources –
RWQCB Waters of the State

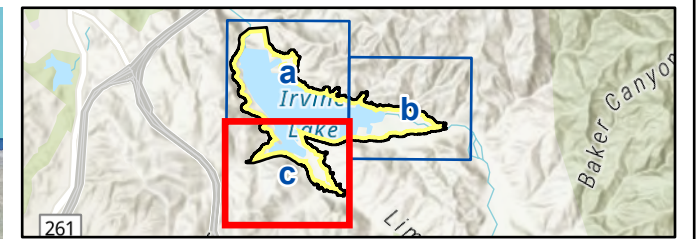
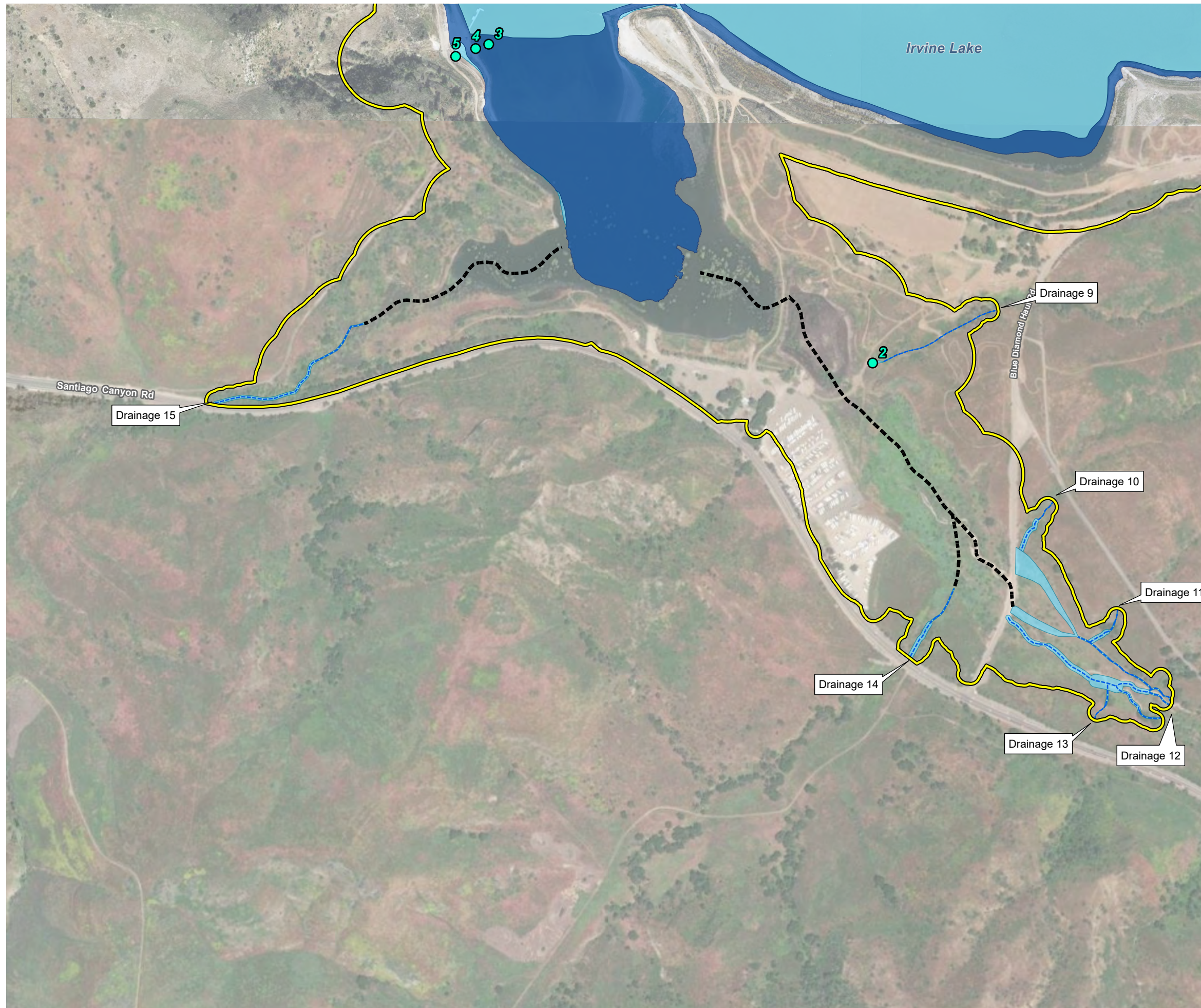
Exhibit 8b

*Santiago Creek Dam
Improvement Project*



(Rev. 02/27/2025 JVR) R:\Projects\IRW_IRWD\3\IRW010205\Graphics\JD\ex_8b_USACE.pdf

D:\Projects\IRW\SantiagoCreek\PO\SCDS\CD_Project.aprx_kw_id_RWQCB



- Survey Area
- Sampling Point Location
- Sheet Flow (non-jurisdictional)
- Waters of the State**
 - Wetland
 - Non-Wetland
 - Non-Wetland Drainage Centerline



0 300 600 Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources –
RWQCB Waters of the State

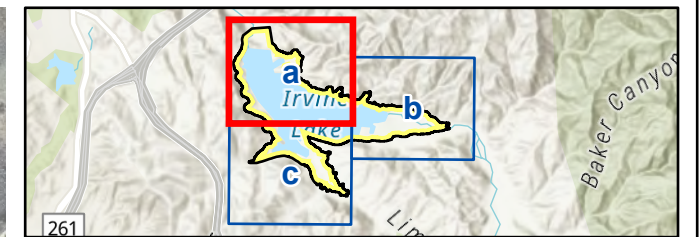
Exhibit 8c

Santiago Creek Dam
Improvement Project

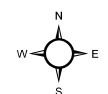


(Rev. 02/27/2025 JVR) R:\Projects\IRW_IRWD\3\IRW010205\Graphics\JD\ex_id_USACE.pdf

D:\Projects\IRW\SantiagoCreek\PROJ\SCD\SCD_Project.aprx ID: CDFW



- Survey Area
- Sampling Point Location
- CDFW Jurisdictional Waters**
- CDFW
- Drainage Centerline



0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources –
CDFW Jurisdictional Waters

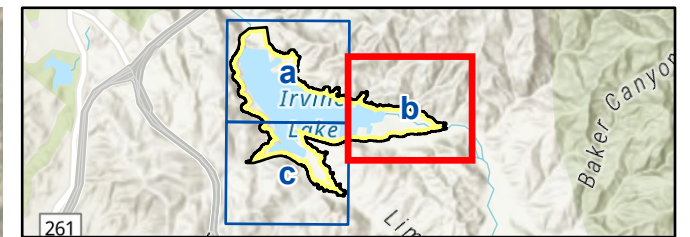
Exhibit 9a

*Santiago Creek Dam
Improvement Project*

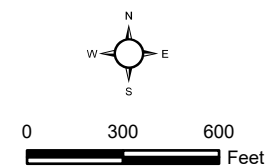


(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\IDex_ID_CDFW.pdf

D:\Projects\IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx ID_CDFW



- Survey Area
- CDFW Jurisdictional Waters**
 - CDFW
 - Drainage Centerline



Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

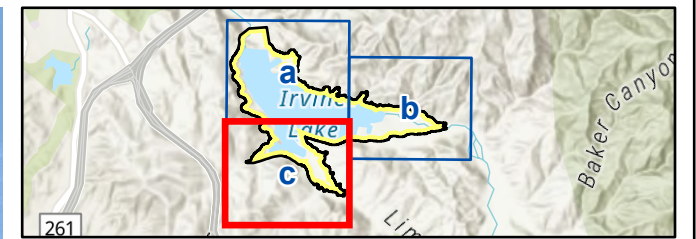
**Jurisdictional Resources –
CDFW Jurisdictional Waters**

*Santiago Creek Dam
Improvement Project*

(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\UDex_ID_CDFW.pdf

Exhibit 9b

D:\Projects\IRW\SantiagoCreek\PROJ\SCD\SCD_Project.aprx ID: CDFW



- Survey Area
- Sampling Point Location
- CDFW Jurisdictional Waters**
- CDFW
- Drainage Centerline



0 300 600 Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Jurisdictional Resources –
CDFW Jurisdictional Waters

Exhibit 9c

Santiago Creek Dam
Improvement Project



(Rev: 02/27/2025 JVR) R:\Projects\IRW\IRWD\3IRW010205\Graphics\UD\ex_ID_CDFW.pdf

U.S. Fish and Wildlife Service, National Wetlands Inventory. The NWI mapped various features in the survey area, including Irvine Lake, the spillway, Santiago Creek, Drainage 1, and Drainages 3 through 15 (Table 2; Exhibit 6). Various features are considered Lacustrine (i.e., lakes), Riverine (i.e., channelized areas like rivers and streams), and Palustrine (i.e., areas generally dominated by trees, shrubs, and emergent vegetation, but also including ponds). Additional areas mapped by the NWI did not exhibit bed, bank, or OHWM indicators during the field visit and were not considered jurisdictional waters. Irvine Lake and the downstream ends of Santiago Creek, Drainage 12, and Drainage 15 where they discharge into Irvine Lake were mapped as Lacustrine features. The main channel of Santiago Creek and Drainage 12 were mapped as Riverine with surrounding areas mapped as Palustrine. The upstream end of Drainage 15 was mapped as Palustrine. The spillway and smaller drainages were mapped as Riverine. The description for NWI mapped wetland resources is provided in Attachment B of this report.

TABLE 2
MAPPED NATIONAL WETLANDS INVENTORY RESOURCES

Feature	National Wetlands Inventory Classification(s)¹
Irvine Lake	L1UBHh, L2ABFh, L2UBFh, L2USAh, PFOCh
Existing Spillway	R4SBCr
Santiago Creek (Upstream of Irvine Lake)	L2UBFh, L2USCh, L2EM2Fh, R2UBF, R2USC, PFOC, PFOCh, PSSA, PSSC, PSS/EM1C, PEM1C
Santiago Creek (Downstream of Irvine Lake)	R4SBA, R4SBC, PSSA
Drainages 1	PSSA
Drainage 2	Not mapped
Drainage 3	R4SBAr
Drainages 4, 8, 9, 10, 11, and 13	R4SBA
Drainages 5, 6, 7, and 14	R4SBC
Drainage 12	L2EM2Fh, L2UBFh, R4SBC, PFO/SSA, PSSA
Drainage 15	PFO/EM1Ch, L2ABFh, L2UBFh
¹ Descriptions of NWI classifications are provided in Attachment B.	

The NWI data was used to provide additional guidance on planning the field surveys. Given that wetland features mapped for the NWI may or may not exist at present because of changing conditions and development, this resource provides preliminary data and historic data. These features were ground-truthed in the field during the delineation.

Regional Water Quality Control Plans. The Basin Plan discusses Santiago Creek (Reach 1 occurs downstream of Irvine Lake) and Irvine Lake. According to the Basin Plan, the water quality objective for Reach 1 of Santiago Creek is 600 milligrams per liter (mg/l) of total dissolved solids. Water quality objectives for Irvine Lake are shown in Table 3.

TABLE 3
WATER QUALITY OBJECTIVES FOR IRVINE LAKE

Water Quality Objectives (mg/l)					
Total Dissolved Solids	Hardness	Sodium	Chloride	Total Inorganic Nitrogen	Sulfate
730	360	110	130	6	310
mg/l: milligrams per liter					

Beneficial uses are defined in the Porter-Cologne Act as those uses of water that are necessary for tangible and intangible economic, social, and environmental benefits. Beneficial uses for Reach 1 of Santiago Creek include Municipal and Domestic Water Supply (MUN) waters, Groundwater Recharge (GRW) waters, Water Contact Recreation (REC-1) waters, Non-contact Water Recreation (REC-2) waters, Warm Fresh Water Habitat (WARM) waters, and Wildlife Habitat (WILD) waters. Beneficial uses for Irvine Lake include MUN waters, Agricultural Supply (AGR) waters, REC-1 waters, REC-2 waters, WARM waters, Cold Freshwater Habitat (COLD) waters, and WILD waters. Descriptions of the beneficial uses applicable to waters in the survey area are provided in Attachment G of this report.

3.2 JURISDICTIONAL ANALYSIS

Table 4 summarizes the type and extent of the jurisdictional features delineated in the survey area.

TABLE 4
SUMMARY OF JURISDICTIONAL RESOURCES IN THE SURVEY AREA

Feature	Jurisdiction (acres)						
	USACE WOTUS			RWQCB Waters of the State			CDFW Jurisdictional Resources
	Wetland	Non- wetland	Total	Wetland	Non- wetland	Total	Total
Irvine Lake	94.582	312.959	407.541	94.582	312.959	407.541	614.135
Santiago Creek	7.124	13.803	20.927	7.124	13.803	20.927	36.024
Drainage 1	—	0.008	0.008	—	0.008	0.008	0.027
Drainage 2	—	—	—	—	0.025	0.025	0.074
Drainage 3	—	—	—	—	0.071	0.071	0.168
Drainage 4	—	—	—	—	0.048	0.048	0.094
Drainage 5	—	—	—	—	0.144	0.144	0.359
Drainage 6	—	—	—	—	0.369	0.369	0.149
Drainage 7	—	—	—	—	0.100	0.100	0.148
Drainage 8	—	—	—	—	0.024	0.024	0.042
Drainage 9	—	—	—	—	0.066	0.066	1.237
Drainage 10	—	—	—	—	0.167	0.167	0.245
Drainage 11	—	—	—	—	0.114	0.114	0.318
Drainage 12	—	—	—	—	4.894	4.894	13.517
Drainage 13	—	—	—	—	0.039	0.039	0.114
Drainage 14	—	—	—	—	0.235	0.235	0.416
Drainage 15	—	—	—	—	0.433	0.433	2.563
Total	101.706	326.770	428.476	101.706	333.499	435.205	669.630
USACE: U.S. Army Corps of Engineers; WOTUS: waters of the United States; RWQCB: Regional Water Quality Control Board; CDFW: California Department of Fish and Wildlife.							

3.2.1 Waters of the United States Determination

Connectivity to a Traditional Navigable Water

Santiago Creek is a tributary of the Santa Ana River, which discharges into the Pacific Ocean (a TNW) approximately 23 river miles downstream from Santiago Creek Dam. Tributaries to TNWs that meet the relatively permanent standard, are also WOTUS. Data from the NWI and USGS stream gauge data were used to assist in the determination of whether Santiago Creek is relatively permanent water. According to the NWI, the central channel of Santiago Creek above the dam was classified as R2UBF, which has a semi-permanent flooding water regime. Stream gauge data was not available downstream or immediately upstream of Santiago Creek Dam, but a station was located at Modjeska Canyon. Average monthly discharge for January, February, and March (as recorded between 1961 and February 2020) was 15, 30, and 18 cubic feet per second (cfs), while discharge was less than 6 cfs for the remaining months (USGS 2020a), indicating increased flow for three months of the year (i.e.,

seasonally). The main channel of Santiago Creek below the dam is classified as R4SBC, which indicates that it is seasonally flooded (i.e., surface water is present for extended periods of time, see Attachment B). In addition, on-site observations indicate that Santiago Creek should be considered an intermittent stream. The area below the spillway had patches of obligate wetland plants (e.g., cattails [*Typha* sp.]), indicating that water is present for extended periods of time. Surface water was observed in portions of the creek both above and below the dam during various survey visits. For these reasons, Santiago Creek can be considered to meet the relatively permanent standard; thus, it is a WOTUS.

Irvine Lake is an impoundment of Santiago Creek, which has its headwaters in the Santa Ana Mountains. Impoundments of jurisdictional waters are WOTUS; therefore, Irvine Lake would be considered WOTUS.

Drainage 1, as shown on Exhibit 7, carries flow from the west side of Santiago Creek via a pipe culvert under an access road adjacent to an Arizona crossing. As an underground offshoot of Santiago Creek, this drainage would also be considered to have relatively permanent flow; thus, it is a WOTUS.

Drainage 2, as shown on Exhibit 7, is an outlet from Irvine Lake used to release lake water to the creek (IRWD 2020b). Additionally, IRWD conducts valve tests twice per year that release water into the channel. Given that release of flow in this drainage is limited, this drainage is considered to be ephemeral; thus, it is not a WOTUS.

Drainage 3, as shown on Exhibit 7, appears to drain flow from the hills west of the survey area and overflows from basins located along its length. The NWI classifies this drainage as R4SBAr, which indicates that it is temporarily flooded (Appendix B). During the March site visit, which occurred immediately following a rain event, surface water was not observed in this drainage. Therefore, it is considered to carry ephemeral flow and is not considered a WOTUS.

Drainages 4, 8, 9, 10, 11, and 13, as shown on Exhibit 7, drain flow from the hills surrounding Santiago Creek and Irvine Lake and are classified by the NWI as R4SBA, which indicates that they are temporarily flooded (Appendix B). With the exception of a small inundated area at the downstream end of Drainage 9, these areas were dry during the October site visits. Therefore, these drainages are considered to carry ephemeral flow and are not WOTUS.

Drainages 5, 6, 7, and 14, as shown on Exhibit 7, are classified by the NWI as R4SBC, which indicates that they are seasonally flooded (Appendix B). These areas were all dry at the time of the October site visits and historic aerial imagery does not show surface water in these areas. The streambeds are similar in appearance to Drainages 4, 8, 9, 10, 11, and 13, with sandy sediment in the channel and no hydrophytic vegetation present. Therefore, it is likely that these drainages only experience ephemeral flow; therefore, they are not WOTUS.

The low flow channels of Drainage 12 are classified as R4SBC, as shown on Exhibit 7, and are surrounded by PSSA, which indicates that the main drainage has a water regime considered to be seasonally flooded (Appendix B). Drainage 15, is classified as PFO/EM1Ch, as shown on Exhibit 7, which indicates that it has a water regime also considered to be seasonally flooded (Appendix B). These areas were all dry at the time of the October site visits. Historic

aerial imagery does not show surface water in these areas except at the downstream ends of Drainages 12 and 15 during periods of high reservoir levels and in April 2005 in Drainage 12. The low flow channels lack hydrophytic vegetation that would indicate regular flow, in contrast to Santiago Creek which has water cress (*Nasturtium officinale*), an obligate wetland species, along portions of its length. Therefore, while the NWI indicates that these areas may be seasonally flooded, field observations suggest that they are ephemeral; therefore, they are not WOTUS.

Limits of Waters of the United States

As discussed above, Irvine Lake, Santiago Creek, and Drainage 1 would be considered WOTUS. The limits of WOTUS were based on indicators of OHWM.

Jurisdictional limits for Irvine Lake were identified as the median reservoir level (762.2 above msl) and OHWM was confirmed during the October 2020 field visits. Indicators of OHWM include a defined water mark on the existing dam embankment, a change in vegetation species and cover around the reservoir, and a line of depositional material in unvegetated areas around the reservoir.

An Arid West Ephemeral and Intermittent Streams OHWM Datasheet was completed for a representative area in Santiago Creek showing evidence of an OHWM to determine extent of WOTUS (see Attachment E). Evidence of OHWM observed in the survey area included the presence of bed and bank, benches, drift deposits, sediment deposits, a change in average sediment texture, a change in vegetation species and cover, and a break in bank slope. Low terraces within the active floodplain of Santiago Creek were excluded from WOTUS jurisdiction. These areas were at a higher elevation and contained upland species, such as California buckwheat (*Eriogonum fasciculatum*). The OHWM in Santiago Creek was directly observed from Irvine Lake to approximately 300 feet upstream of the confluence with Drainage 7. Upstream of this area, dense riparian vegetation impeded access and the OHWM extent was not directly observed. Historic aerial imagery over multiple years was used to map the OHWM extent in Santiago Creek upstream of this point.

The OHWM indicators for Drainage 1 included the presence of bed and bank, a change in average sediment texture, and a change in vegetation cover.

Based on an assessment of jurisdictional waters, a total of 428.476 acres of WOTUS under the regulatory authority of the USACE occurs in the survey area (Table 4; Exhibit 7).

Wetlands Determination

Irvine Lake, Santiago Creek, and Drainage 1 are WOTUS and may be considered wetland or non-wetland.

Irvine Lake has water levels that change based on inflow, precipitation, and releases from the dam. At the time of the survey visit, the exposed lakebed included both vegetated and unvegetated areas. Vegetated areas within the OHWM were dominated by: (1) a variable cover of swamp prickly grass (*Crypsis schoenoides*, facultative wetland) close to the lake bottom; (2) a variable cover of cocklebur (*Xanthium strumarium*; facultative) primarily along

the edge of the OHWM, and (3) cocklebur with scattered Goodding's black willow (*Salix gooddingii*; facultative wetland). These areas would all be considered dominated by hydrophytic vegetation. A series of three sampling points (Sampling Points 3, 4, and 5 on Exhibit 7; Attachment E) were assessed along the western edge of the lake, two were below the mapped OHWM and one was just above the OHWM. Indicators of hydrophytic vegetation, hydric soils, and wetland hydrology were observed at the two sampling points below the OHWM; hydric soils were not observed above the OHWM. Given the lack of hydric soil indicators, areas above the OHWM were not considered wetland WOTUS. Areas along the shoreline below the OHWM that are dominated by hydrophytic vegetation are considered wetland WOTUS because they meet all three wetland criteria. Unvegetated areas below the OHWM represent a "problematic wetland situation" according to USACE (2008) guidelines and can be considered wetland WOTUS meeting two of the three wetland criteria (i.e., hydrology and soils) because temporal shifts in vegetation would meet the third wetland criteria periodically. During the site visit, it was observed that the lakebed within the OHWM had various stages of growth of swamp prickly grass, with young individuals in areas that were recently inundated and mature individuals growing in areas that were not as recently inundated. As vegetation fluctuates with the lake levels, the currently unvegetated areas are expected to contain hydrophytic vegetation periodically. Therefore, the unvegetated shoreline below the OHWM is also considered wetland WOTUS.

Wetland hydrology indicators (e.g., surface water, drift deposits, inundation visible on aerial imagery) are present along the length of Santiago Creek upstream of Irvine Lake. Immediately upstream of Irvine Lake, Santiago Creek is confined to a narrow channel with vertical banks. The area within the OHWM is sparsely vegetated and has a sandy substrate. Vegetation increases in density farther upstream. These upstream areas have a canopy dominated by hydrophytic vegetation, consisting primarily of Goodding's black willow, western sycamore (*Platanus racemosa*; facultative), and mule fat (*Baccharis salicifolia* ssp. *salicifolia*; facultative); water cress (*Nasturtium officinale*; obligate wetland) is scattered along the waterline. The soils are sandy with rock and cobbles present in the channel. Riparian areas represent a problematic vegetation situation. The USACE (2008) recommends that where hydric soils and/or hydrology are problematic, "emphasis should be placed on the understory, which may be more indicative of current wetland or non-wetland conditions". Therefore, the upstream portions of the channel exhibiting obligate wetland species in the understory (i.e., water cress) were mapped as wetland WOTUS. However, it should be noted that portions of the creek were inaccessible due to thick vegetation and could not be delineated in the field; therefore, these areas were mapped using aerial photographs and the designation as a wetland WOTUS is assumed. Given the sparse vegetation in the downstream portions of the channel, these areas are not considered wetland WOTUS.

A sampling point was assessed in a portion of Santiago Creek north of the dam that contained obligate wetland vegetation and adjacent surface water (Sampling Point 1 on Exhibit 7; Attachment E). Indicators of hydrophytic vegetation and wetland hydrology were present, but hydric soils were not present. Therefore, this area was not considered to be a wetland. The remaining portions of Santiago Creek and Drainage 1 had fewer indicators of wetland hydrology; vegetation was sparse and primarily consisted of facultative species (e.g., mule fat) and facultative upland or upland species (e.g., scalebroom [*Lepidospartum squamatum*])

and fennel [*Foeniculum vulgare*]]. Therefore, these areas were not considered wetland WOTUS.

Based on an assessment of jurisdictional waters, a total of 101.706 acres of wetland WOTUS under the regulatory authority of the USACE occurs in the survey area (Table 4; Exhibit 7).

3.2.2 Regional Water Quality Control Board Jurisdiction

The RWQCB asserts jurisdiction over all WOTUS so that the extent of RWQCB “waters of the State” matches the USACE’s jurisdiction. Therefore, all features with USACE jurisdiction (i.e., Irvine Lake, Santiago Creek, and Drainage 1) are also subject to the jurisdiction of the RWQCB. The Porter-Cologne Act provides the State with the authority to regulate waters of the State that are not under USACE jurisdiction (i.e., isolated or ephemeral waters). This provision allows Drainages 2 through 15 to be considered waters of the State.

Limits of Waters of the State

The limits of waters of the State for Santiago Creek, Irvine Lake, and Drainage 1 are the same as for USACE. Drainages 2, 3, 6, 7, 10, 11, and 13 have indicators of an OHWM for their entire extent. This includes a break in bank slope, change in sediment texture, change in vegetation type and cover, and the presence of sediment and drift deposits at or below the OHWM. However, Drainages 4, 5, 8, 9, 12, 14, and 15 only exhibit indicators of OHWM at their upstream ends. Drainages 4 and 5 are channelized until they reach a broad, relatively flat area above the median lake level. At this point, it appears that water sheet flows across the area and indicators of OHWM are lacking. Drainage 8 is channelized until it reaches the edge of riparian vegetation along Santiago Creek. At that point, the drainage broadens and is not confined to a channel. Drainage 9 ends at a slightly depressional area at the edge of an access road. There are no indicators of OHWM beyond this point. While the upstream ends of Drainages 12 and 15 are channelized, the downstream ends do not appear to have a defined bed, bank, or channel. The drainages are also disrupted by the presence of above-grade access roads. Water appears to sheet flow across the area and many potential indicators of OHWM are lacking (e.g., leaf litter is dense under the riparian canopy of Drainage 12 and has not been washed away, there is no hydrophytic herbaceous vegetation in Drainage 12, vegetation in Drainage 15 is predominantly facultative, and there is no evidence of scour). In addition, while periodic inundation of these areas occurs during high reservoir levels, the elevation is above the median reservoir level. Like Drainage 8, Drainage 14 is channelized until it reaches the edge of the riparian canopy surrounding Drainage 12. Therefore, only the upstream, channelized portions of Drainages 4, 5, 8, 9, 12, 14, and 15 are considered to have an OHWM and would be considered waters of the State.

Based on an assessment of jurisdictional waters, a total of 435.205 acres of non-wetland waters of the State under the regulatory authority of the RWQCB occur in the survey area (Table 4; Exhibit 8).

Wetlands Determination

Sampling Point 2 (Exhibit 8; Attachment D) was assessed at the downstream end of Drainage 9 in order to determine if it was an isolated or adjacent wetland. This area contained surface water and hydrophytic vegetation (primarily tall flatsedge [*Cyperus cf. eragrostis*; facultative wetland]). This area did not have indicators of hydric soil and would not be considered an isolated or adjacent wetland.

The remaining drainages (Drainages 2 through 15) were dominated by facultative, facultative upland, upland vegetation or were unvegetated, and so did not meet the hydrophytic vegetation criterion for wetlands.

Therefore, wetland waters of the State are the same as those under USACE regulatory authority. Based on an assessment of jurisdictional waters, a total of 101.706 acres of wetland waters of the State under the authority of the RWQCB occur in the survey area (Table 4; Exhibit 8).

3.2.3 California Department of Fish and Wildlife Jurisdiction

The top of the existing spillway with the flashboards installed, which is at an elevation of approximately 795.9 feet above msl, is generally considered the top of bank for Irvine Lake. This limit of CDFW jurisdiction was confirmed during the field visit and corresponded to a break in slope and/or the upper extent of riparian vegetation around the edge of the reservoir. The spillway is also included as part of Irvine Lake/Santiago Creek. The 795.9-foot elevation contour extends up Santiago Creek and various drainages in the survey area; however, on-site conditions do not support extending CDFW jurisdiction to that elevation for all these features. Santiago Creek is confined to steep, almost vertical banks where it discharges into Irvine Lake; in this case, CDFW jurisdiction was limited to the area between those banks instead of the 795.9-foot elevation contour. Similarly, CDFW extent was mapped along the outer edge of riparian vegetation where Drainage 12 discharges into Irvine Lake. The existing parking lot and ornamental planting areas where Drainage 12 discharges into Irvine Lake were also excluded from CDFW jurisdiction.

Santiago Creek and Drainages 1 through 15 have defined beds and banks over most of their length; a riparian canopy occurs along portions of these drainages. These features would be under the regulatory authority of the CDFW.

Based on an assessment of jurisdictional waters, a total of 669.630 acres of waters under the regulatory authority of the CDFW occur in the survey area (Table 4; Exhibit 9).

4.0 IMPACT ANALYSIS

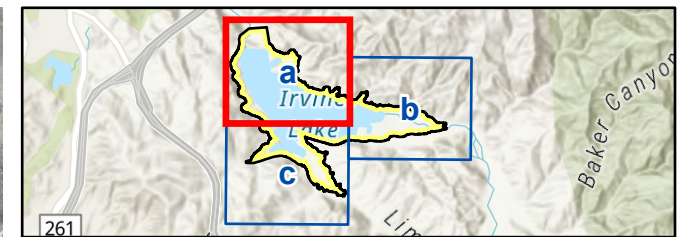
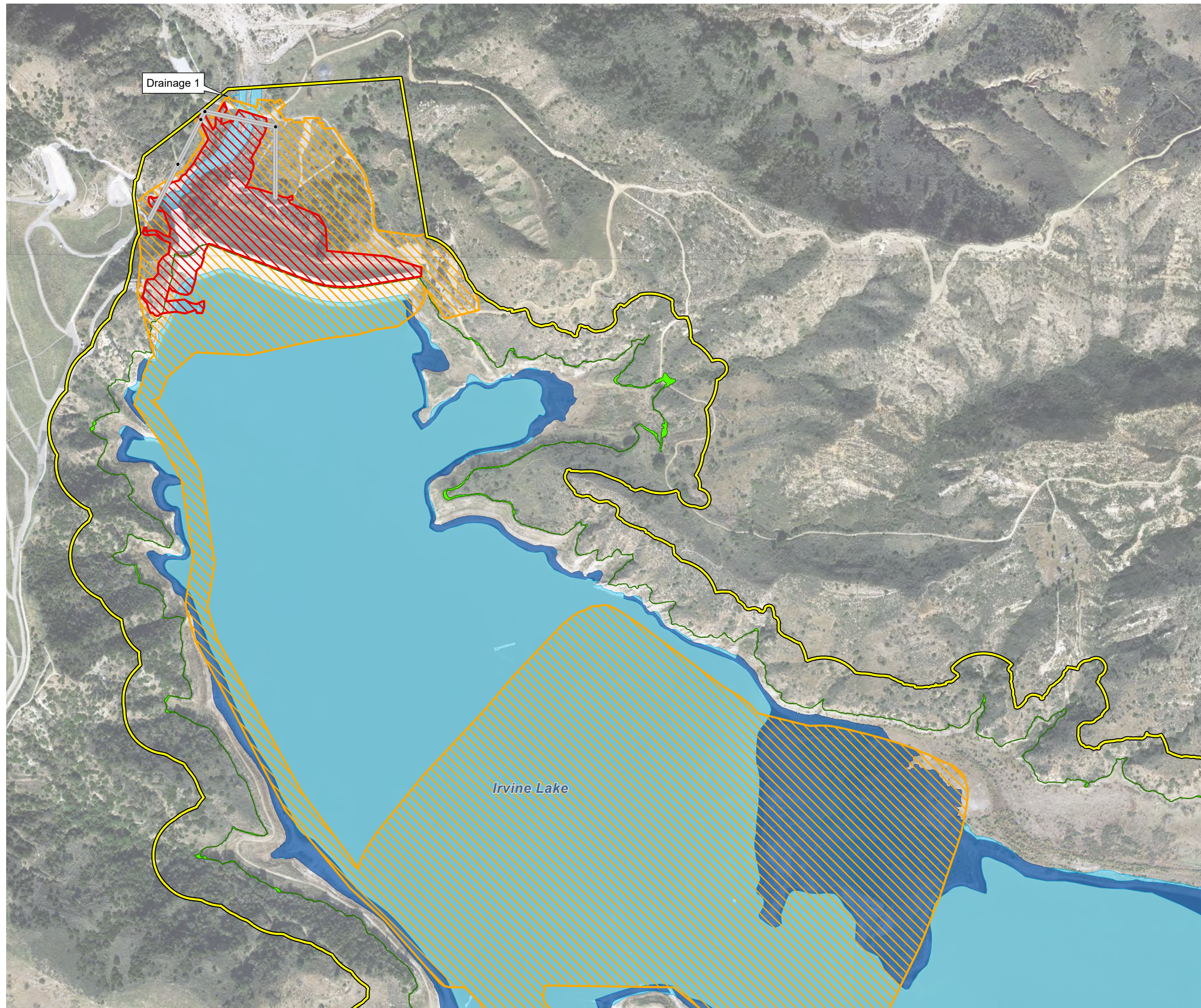
Project impacts include permanent structural impacts in the vicinity of the dam and spillway. Temporary impacts include construction access, staging areas, etc. that will occur during construction activities. It should be noted that Irvine Lake will be partially or completely dewatered prior to construction of the access road on the lake bottom. A portion of the lake bottom would be used as a borrow site. The proposed Project would consist of structural improvements to the dam and spillway, replacement of the outlet tower, and raising the spillway by six feet to the 797.9-foot elevation. Jurisdictional resources that would be permanently or temporarily impacted by the Project include Irvine Lake, Santiago Creek, Drainage 1, Drainage 2, and Drainage 3.

The proposed Project also includes increasing the spillway height two feet above the current maximum water level (with flashboards installed) to 797.9 feet. This would lead to infrequent inundation of the area between the 795.9-foot elevation contour and the 797.9-foot elevation around the perimeter of Irvine Lake (referred to as “additional inundation area”) for an approximate maximum up to 45 days, but typically would be inundated for less time, and in some years not at all. In the last 20 years, Irvine Lake has been four times at the maximum capacity with the flashboards installed of 795.9-foot elevation. Approximately the same frequency would be expected following implementation of the proposed Project, depending on the frequency of future large storms and depending on the operations of the lake. With this frequency and duration of inundation, the vegetation within the “additional inundation area” is not expected to type convert. While the OHWM may change following the implementation of the proposed Project, creating some additional jurisdiction, riparian vegetation and hydric soils are not expected to be created where they do not currently occur based on the infrequent additional inundation. Portions of some mapped drainages fall within the additional inundation area (i.e., Irvine Lake, Santiago Creek, Drainage 4–7, Drainage 9, Drainage 12, and Drainage 15).

Based on the preliminary Project design, a total of 203.570 acres of WOTUS under the regulatory authority of the USACE would be impacted by the proposed Project (wetland: 0.000 acre permanent, 63.915 acres temporary; non-wetland: 1.798 acres permanent, 137.857 acres temporary) (Tables 5 and 8; Exhibit 10). This represents impacts to WOTUS in Irvine Lake, Santiago Creek, and Drainage 1. The proposed Project would inundate an additional 0.673 acre of wetland WOTUS within the additional inundation area (Table 5; Exhibit 10). As mentioned above, the inundation of these areas would be infrequent and limited in duration. Additionally, these areas are already within the OHWM; additional inundation of areas under the jurisdiction of USACE would not be considered a substantial change.

Based on the preliminary Project design, a total of 203.641 acres of waters of the State under the regulatory authority of the RWQCB would be impacted by the proposed Project (wetland: 0.000 acre permanent, 63.915 acres temporary; non-wetland 1.861 acres permanent, 137.865 acres temporary) (Table 6 and 8; Exhibit 11). This represents impacts to waters of the State in Irvine Lake, Santiago Creek, Drainage 1, Drainage 2, and Drainage 3. The proposed Project would impact an additional 0.711 acre of waters of the State (0.673 acre wetland, 0.038 acre non-wetland) with the additional inundation area (Table 6; Exhibit 11).

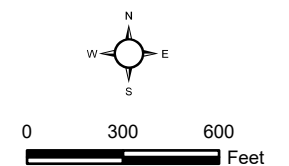
D:\Projects\JRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx ID_USACE_Impacts



- Survey Area
- Project Impacts**
 - Permanent Impacts
 - Temporary Impacts*
 - Additional Inundation Area
- SCE Realignment**
 - Permanent Impacts
 - Temporary Impacts**
- Waters of the United States**
 - Wetland
 - Non-Wetland

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*



Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

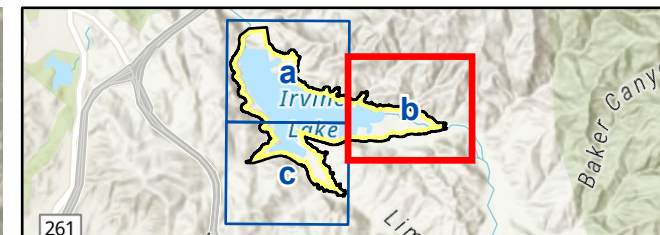
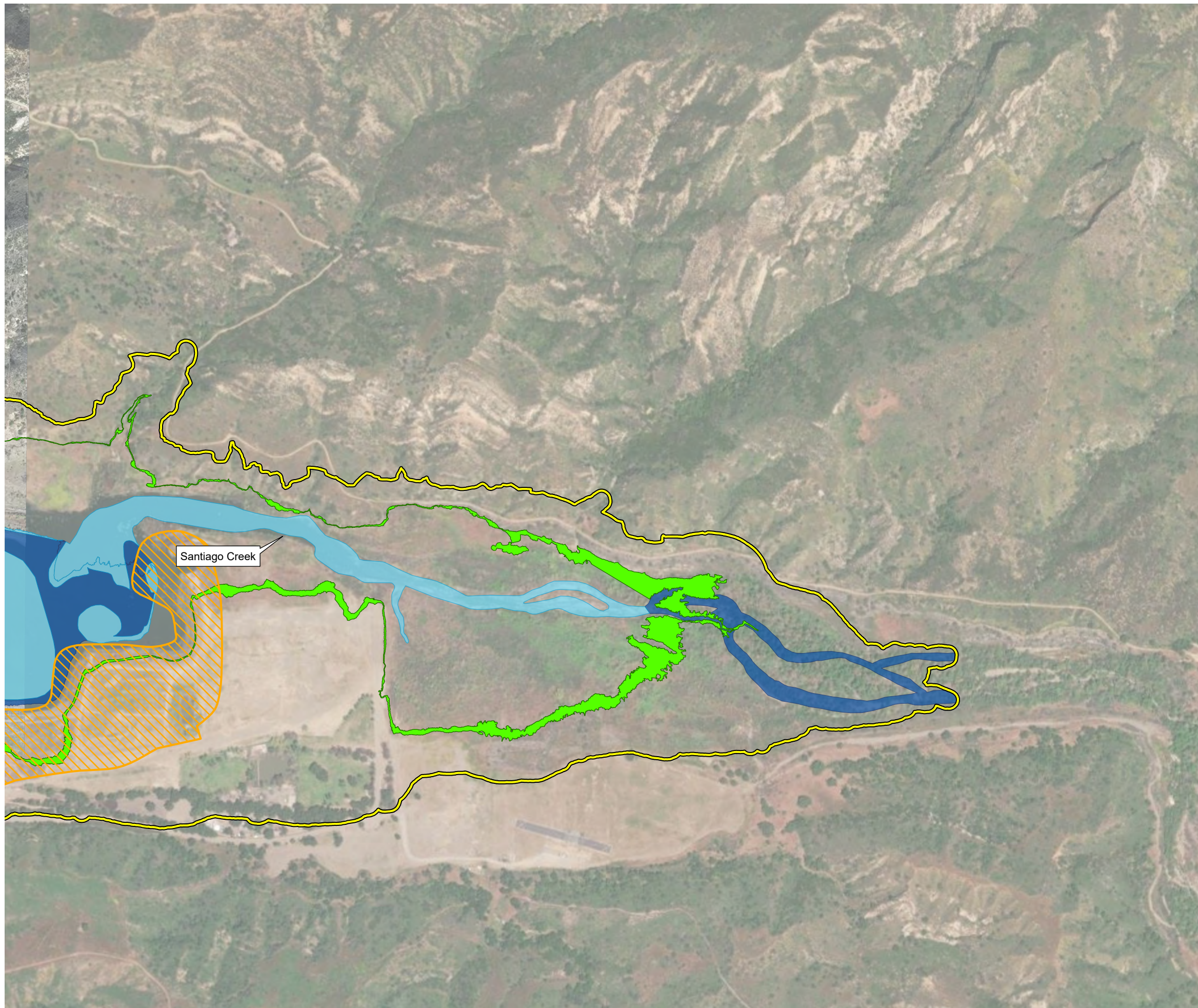
Project Impacts
USACE Waters of the United States
*Santiago Creek Dam
Improvement Project*

Exhibit 10a



(Rev. 04/11/2025 JVR) R:\Projects\JRW_IRWD\3IRW010205\Graphics\JRW_ID_USACE.pdf

D:\Projects\JRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_ID_USACE_Impacts



- Survey Area
- Project Impacts**
 - Permanent Impacts
 - Temporary Impacts*
 - Additional Inundation Area
- SCE Realignment**
 - Permanent Impacts
 - Temporary Impacts**
- Waters of the United States**
 - Wetland
 - Non-Wetland

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

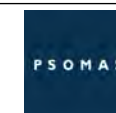


0 300 600
Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

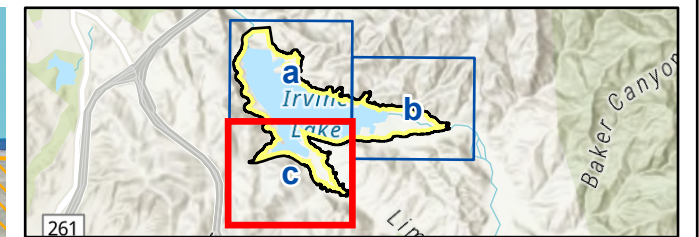
Project Impacts
USACE Waters of the United States
**Santiago Creek Dam
Improvement Project**

Exhibit 10b



(Rev. 04/11/2025 JVR) R:\Projects\JRW_IRWD\3\IRWD10205\Graphics\ID\ex_ID_USACE.pdf

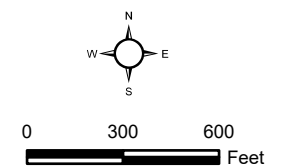
D:\Projects\IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx ID_USACE_Impacts



- Survey Area
- Project Impacts**
- Permanent Impacts
- Temporary Impacts*
- Additional Inundation Area
- SCE Realignment**
- Permanent Impacts
- Temporary Impacts**
- Waters of the United States**
- Wetland
- Non-Wetland

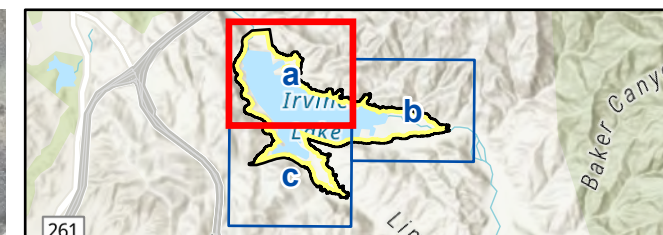
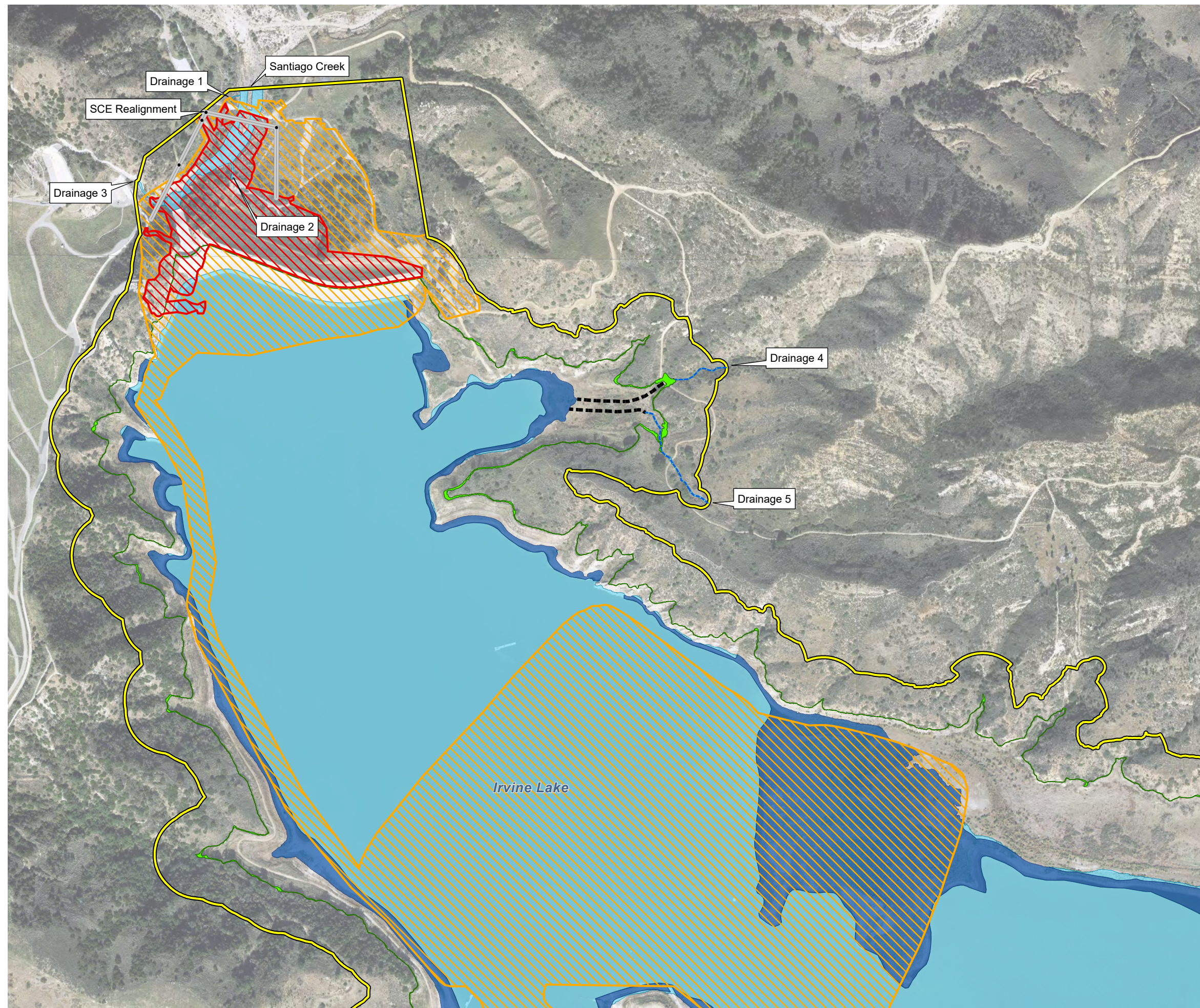
**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*



Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

D:\Projects\IIRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx ID: RWQCB_Impacts



- Survey Area**
- Survey Area
- Sheet Flow (non-jurisdictional)**
- Sheet Flow (non-jurisdictional)
- Impact Type**
- Permanent Impacts
 - Temporary Impacts*
 - Additional Inundation Area
- SCE Realignment**
- Permanent Impacts
 - Temporary Impacts**
- Waters of the State**
- Wetland
 - Non-Wetland
 - Non-Wetland Drainage Centerline

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

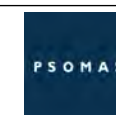


0 300 600 Feet

Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

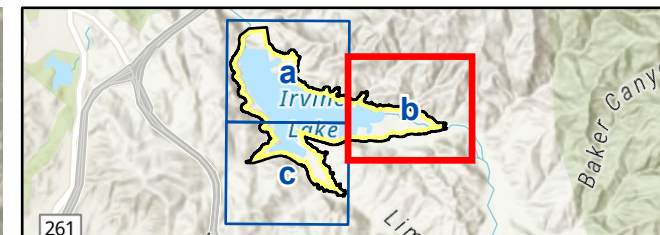
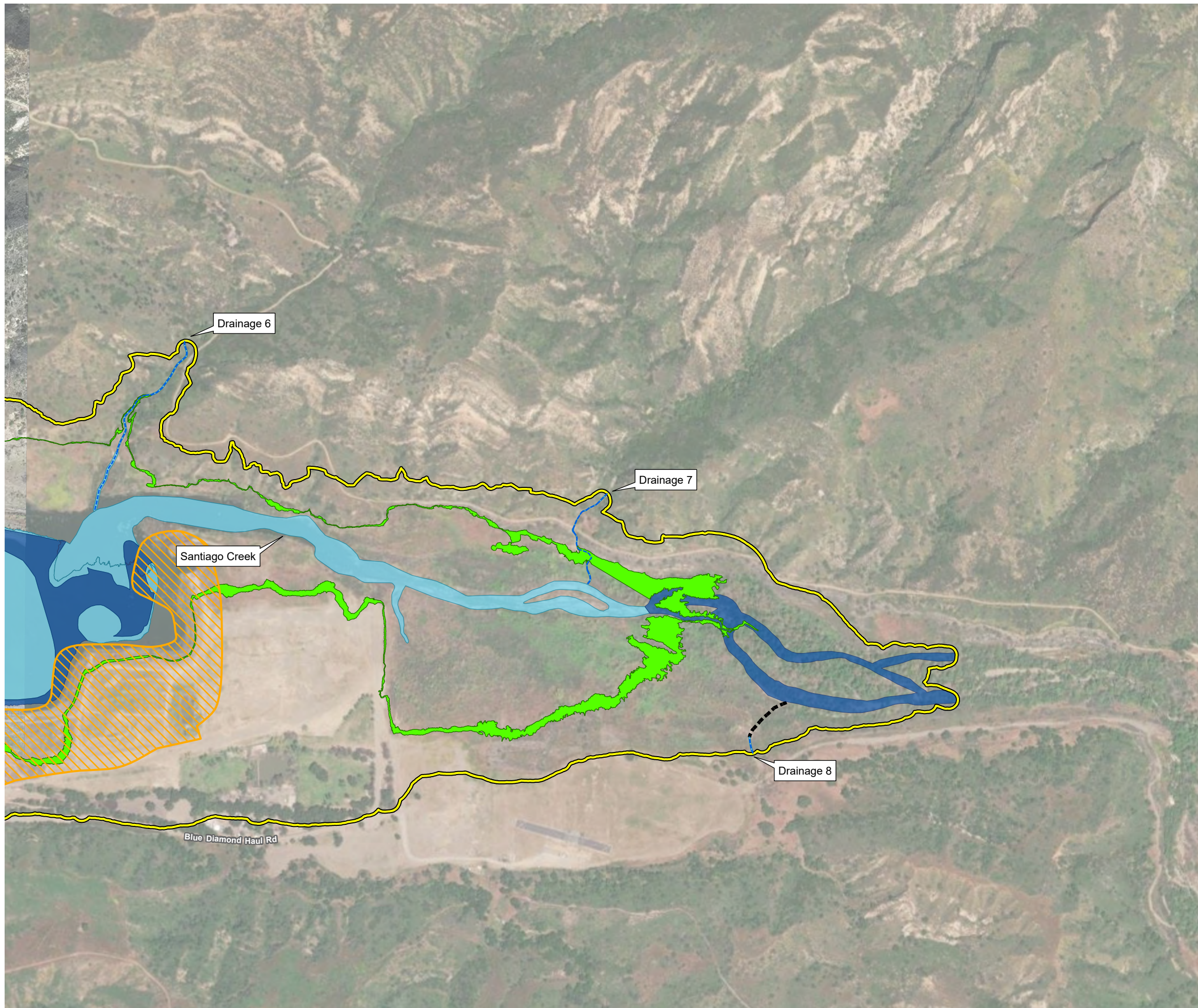
Project Impacts
RWQCB Waters of the State
Santiago Creek Dam
Improvement Project

Exhibit 11a



(Rev: 04/11/2025 JVR) R:\Projects\IIRW\IIRW\IIRW010205\Graphics\IDex_ID_CDFW.pdf

D:\Projects\IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_ID_RWQCB_Impacts



- Survey Area
- Sheet Flow (non-jurisdictional)
- Impact Type**
 - Permanent Impacts
 - Temporary Impacts*
 - Additional Inundation Area
- SCE Realignment**
 - Permanent Impacts
 - Temporary Impacts**
- Waters of the State**
 - Wetland
 - Non-Wetland
 - Non-Wetland Drainage Centerline

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

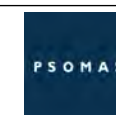


0 300 600
Feet

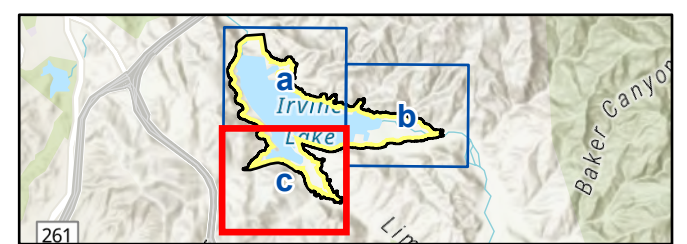
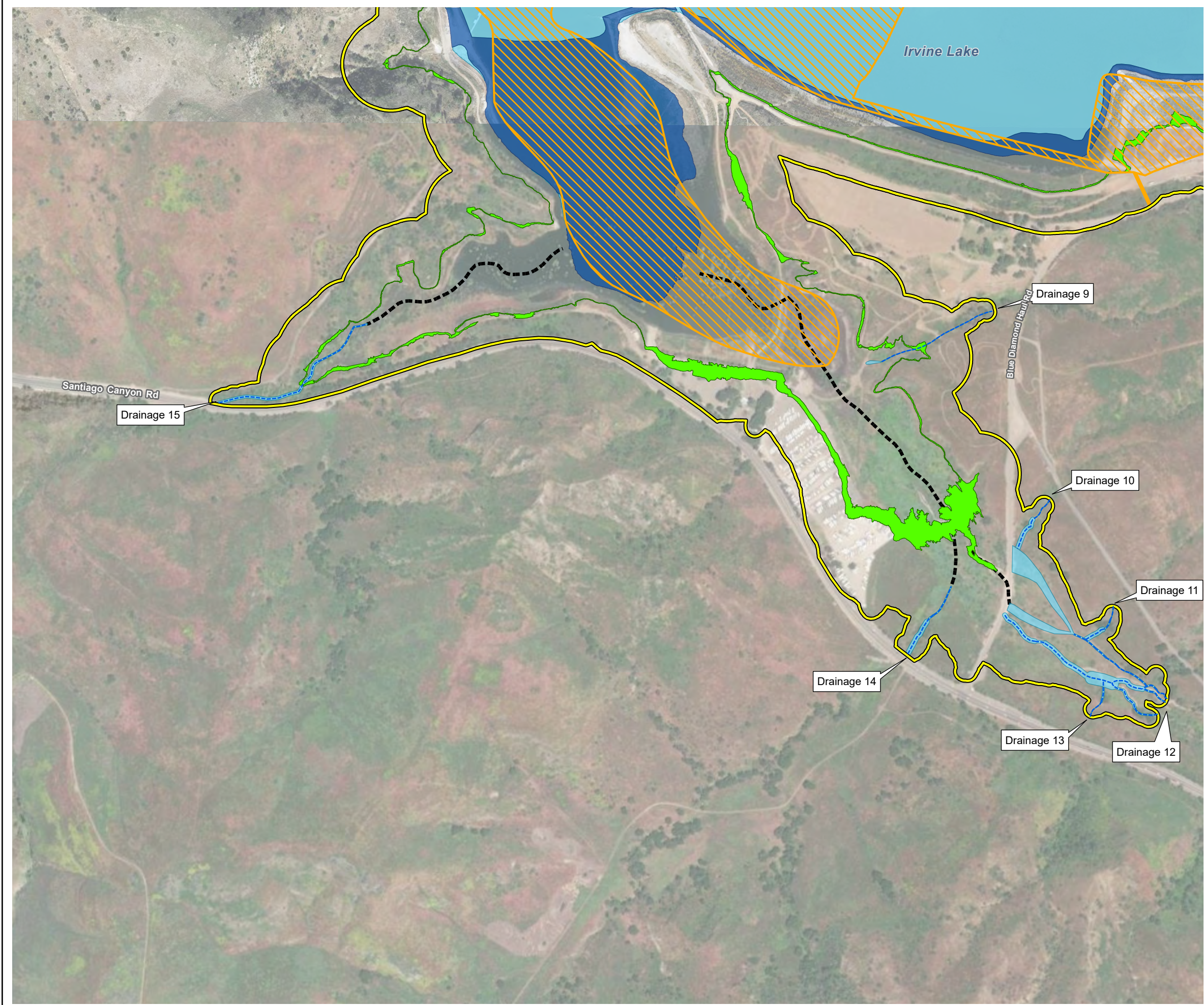
Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
RWQCB Waters of the State
Santiago Creek Dam
Improvement Project

Exhibit 11b



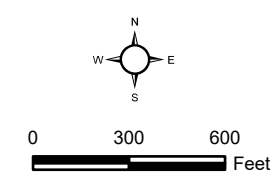
(Rev: 04/11/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\UD\ex_ID_CDFW.pdf



- Survey Area
- Sheet Flow (non-jurisdictional)
- Impact Type**
- Permanent Impacts
- Temporary Impacts*
- Additional Inundation Area
- SCE Realignment**
- Permanent Impacts
- Temporary Impacts**
- Waters of the State**
- Wetland
- Non-Wetland
- Non-Wetland Drainage Centerline

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*

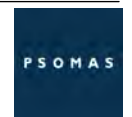


Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
RWQCB Waters of the State

Santiago Creek Dam Improvement Project

Exhibit 11c

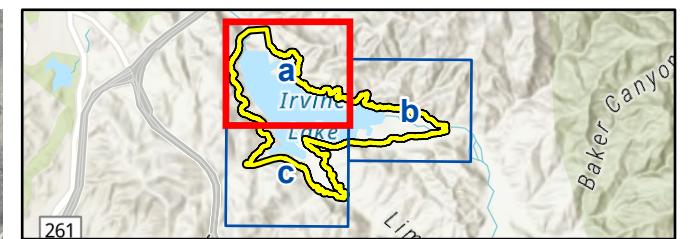
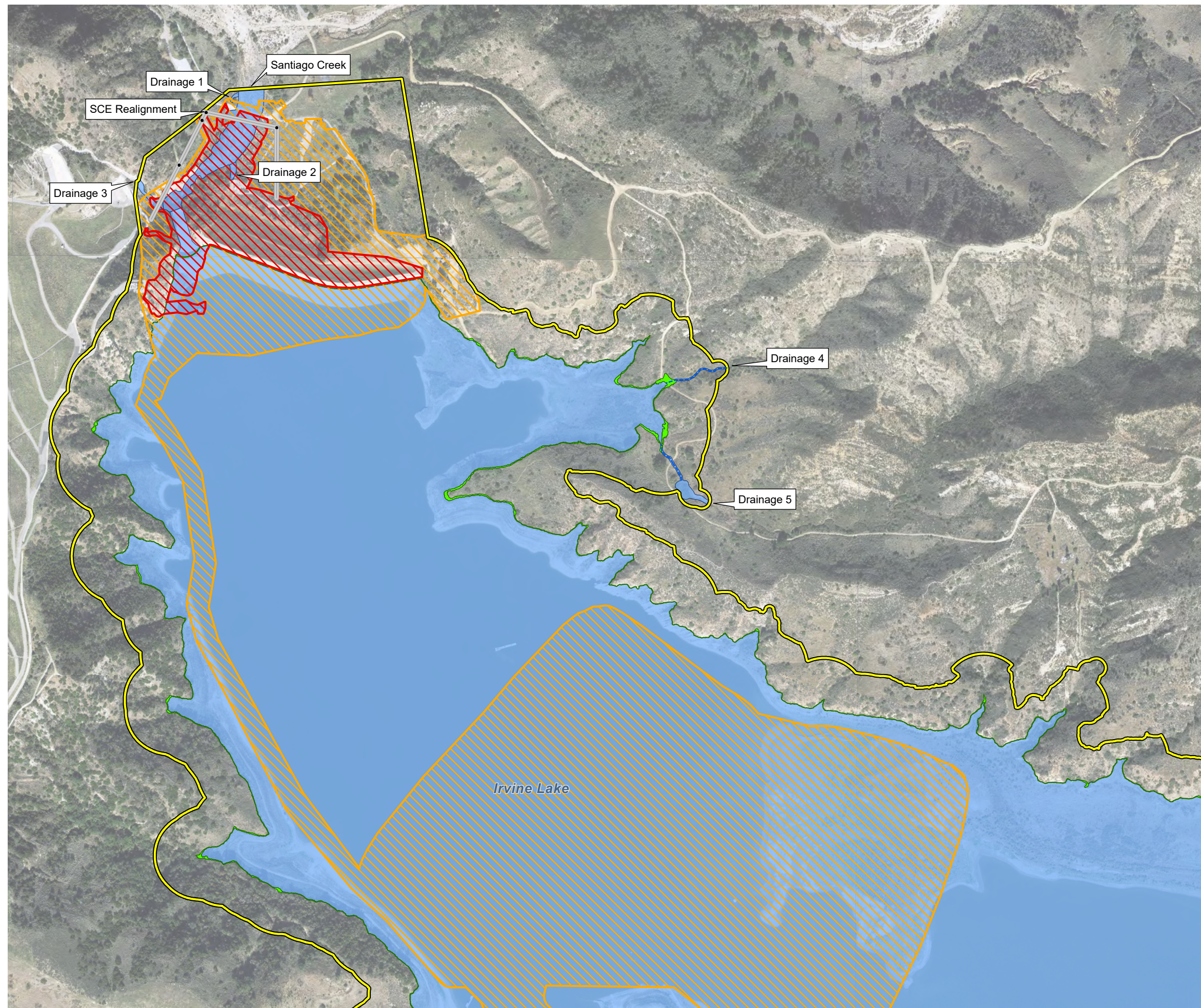


(Rev: 04/11/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\UD\ex_ID_CDFW.pdf

As mentioned above, the inundation of these areas would be infrequent and limited in duration. Additionally, these areas are already within the OHWM, subject to existing water flow, and/or are riparian in nature; additional inundation of areas under the jurisdiction of RWQCB would not be considered a substantial change.

Based on the preliminary Project design, a total of 233.774 acres of waters under the regulatory authority of the CDFW would be impacted by the proposed Project (3.924 acres permanent; 229.850 acres temporary (Tables 7 and 8; Exhibit 12). This represents impacts to waters under the authority of the CDFW in Irvine Lake, Santiago Creek, Drainage 1, Drainage 2, and Drainage 3. The proposed Project would impact an additional 8.980 acres of waters under the authority of the CDFW with the additional inundation area (Table 7; Exhibit 12). As mentioned above, the inundation of these areas would be infrequent and limited in duration. Additionally, these areas are already within the existing bed and bank, subject to existing water flow, and/or are riparian in nature; additional inundation of areas under the jurisdiction of CDFW would not be considered a substantial change.

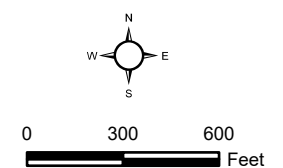
D:\Projects\3\IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\ex_ID_CDFW_Impacts



- Biological Study Area
- Impact Type**
 - Permanent Impacts
 - Temporary Impacts*
 - Additional Inundation Area
- SCE Realignment**
 - Permanent Impacts
 - Temporary Impacts**
- CDFW Jurisdictional Waters**
 - CDFW
 - Drainage Centerline

*Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.

**Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.



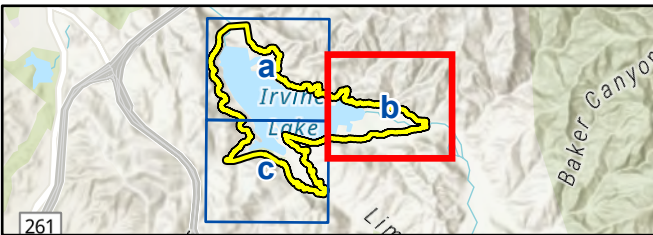
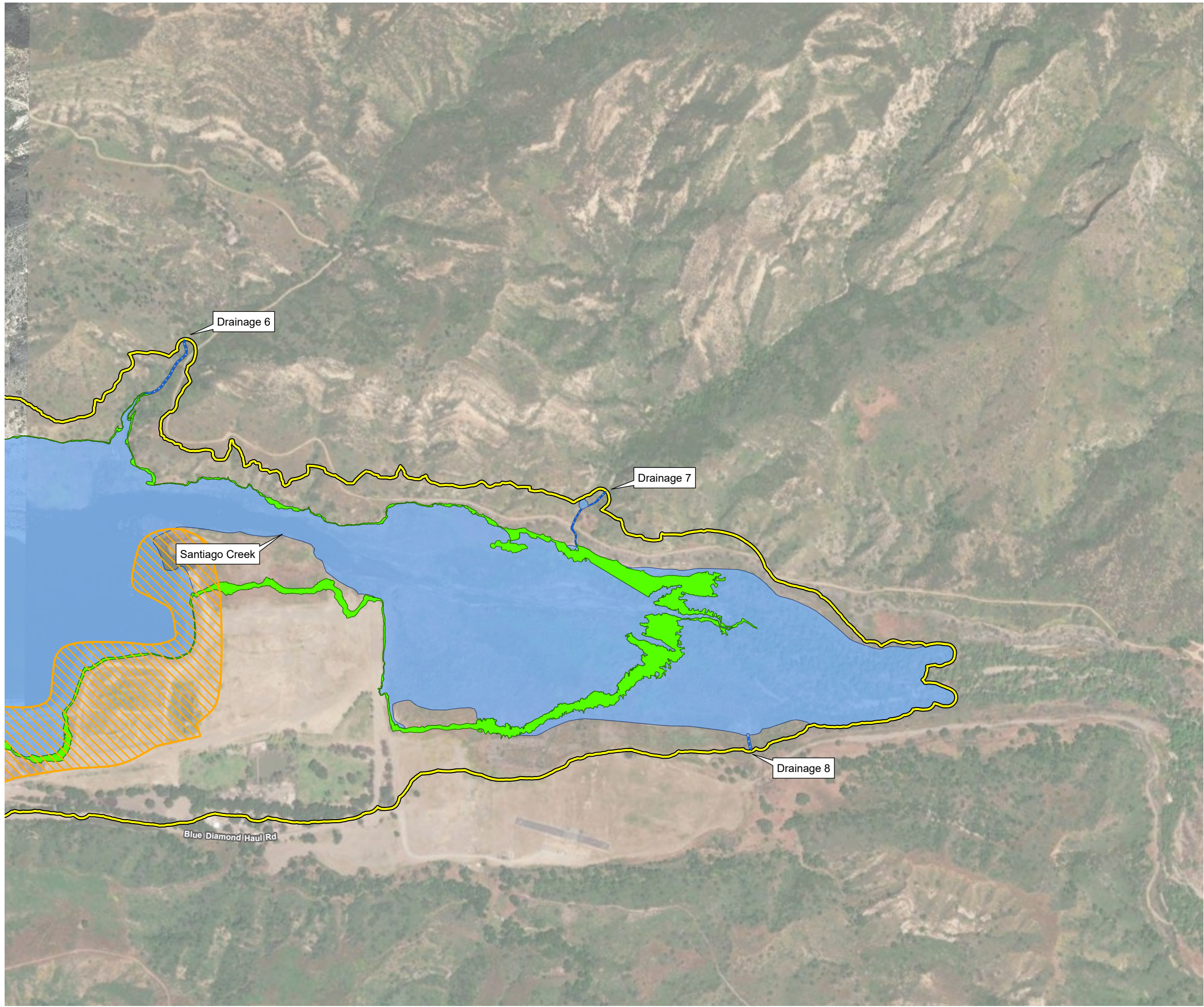
Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
CDFW Jurisdictional Waters
Santiago Creek Dam
Improvement Project

Exhibit 12a



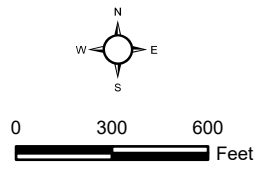
(Rev: 04/11/2025 JVR) R:\Projects\IRW_IRWD\3\IRW010205\Graphics\ID\ex_ID_CDFW.pdf



- Biological Study Area
- Impact Type**
 - Temporary Impacts*
 - Additional Inundation Area
- SCE Realignment**
 - Permanent Impacts
 - Temporary Impacts**
- CDFW Jurisdictional Waters**
 - CDFW
 - Drainage Centerline

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*



Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

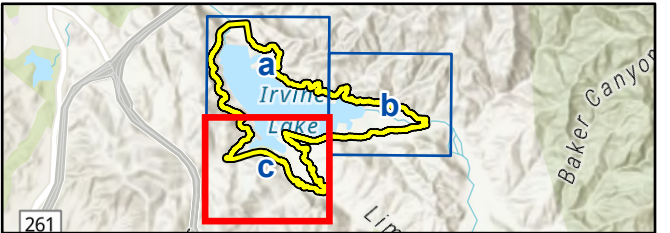
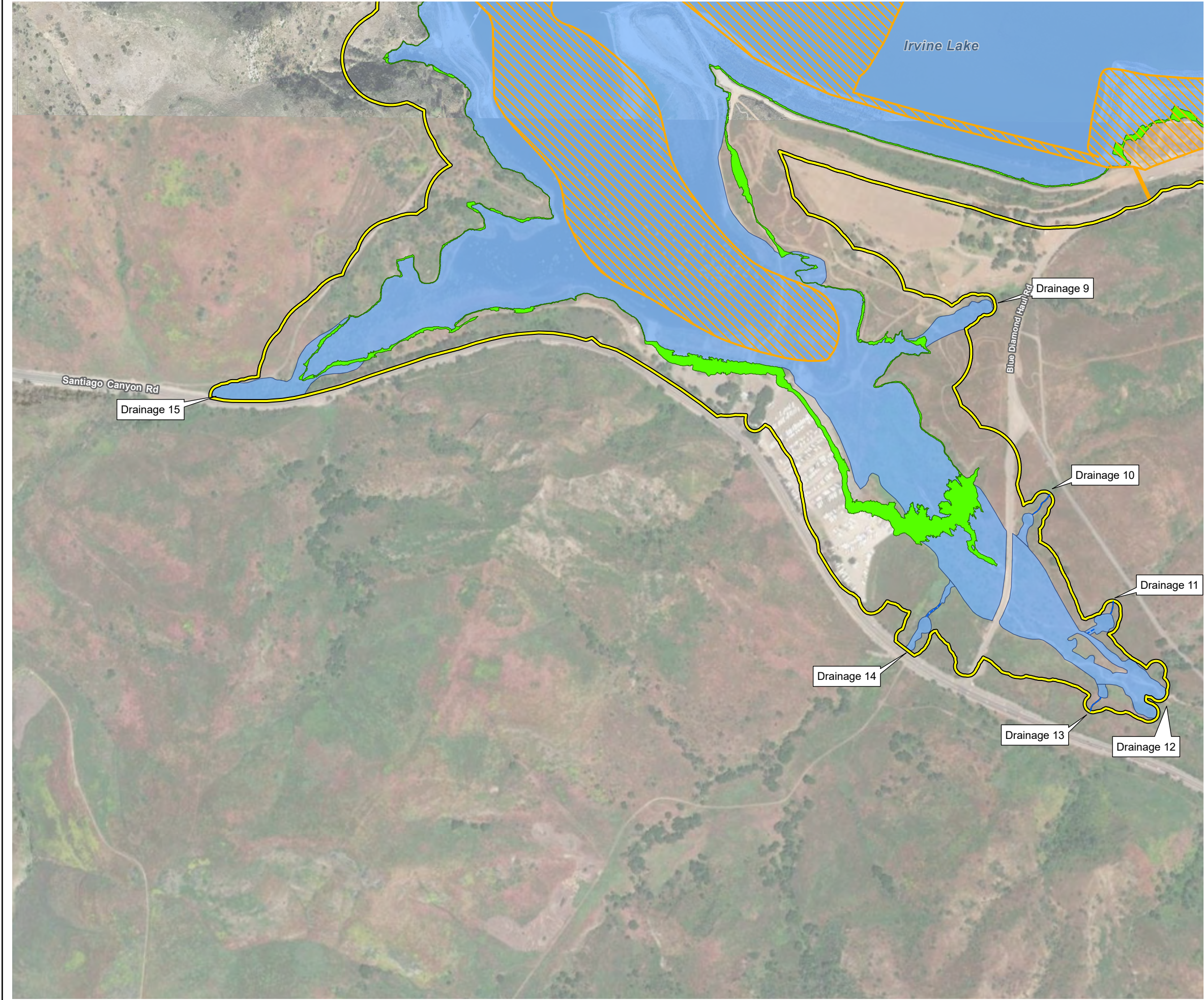
Project Impacts
CDFW Jurisdictional Waters

*Santiago Creek Dam
Improvement Project*

(Rev: 04/11/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\UDex_ID_CDFW.pdf

Exhibit 12b

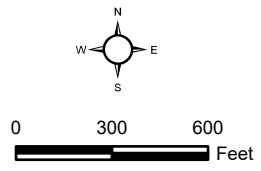
D:\Projects\IRW\SanDiegoCreek\PRO\SCD\SCD_Project\aprx\ex_ID_CDFW_Impacts



- Biological Study Area
- Impact Type**
 - Temporary Impacts*
 - Additional Inundation Area
- SCE Realignment**
 - Permanent Impacts
 - Temporary Impacts**
- CDFW Jurisdictional Waters**
 - CDFW
 - Drainage Centerline

**Irvine Lake would be partially or fully dewatered prior to construction of the access road across the dry lake bottom.*

***Outside of the Project's permanent and temporary impact boundary, only trees/branches under the powerlines would be removed; other vegetation would not be removed but may be temporarily disturbed by access and movement of construction materials through the area.*




Aerial Source: Hexagon Geosystems 2017; Esri, Maxar 2023

Project Impacts
CDFW Jurisdictional Waters

Santiago Creek Dam Improvement Project

Exhibit 12c



(Rev: 04/11/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\UD\ex_ID_CDFW.pdf

TABLE 5
PROJECT IMPACTS ON USACE JURISDICTIONAL RESOURCES IN THE SURVEY AREA*

Feature	Existing (acres)			Permanent Impact (acres)			Temporary Impact (acres)			Total Permanent/Temporary Impact (acres)			Additional Inundation Area** (acres)		
	Wetland	Non-wetland	Total	Wetland	Non-wetland	Total	Wetland	Non-wetland	Total	Wetland	Non-wetland	Total	Wetland	Non-wetland	Total
Irvine Lake	94.582	312.959	407.541	—	0.450	0.450	63.708	137.639	201.347	63.708	138.089	201.797	—	—	—
Santiago Creek	7.124	13.803	20.927	—	1.348	1.348	0.207	0.216	0.423	0.207	1.564	1.771	0.673	—	0.673
Drainage 1	—	0.008	0.008	—	—	—	—	0.002	0.002	—	0.002	0.002	—	—	—
Drainage 2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 6	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 11	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 12	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 13	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 14	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 15	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	101.706	326.770	428.476	0.000	1.798	1.798	63.915	137.857	201.772	63.915	139.655	203.570	0.673	0.000	0.673
* The impact by landowner (i.e., IRWD or County of Orange) is included in Attachment H.															
** Portions of the Permanent and Temporary impact boundaries overlap the “Additional Inundation Area”. This overlap is not being excluded because the Additional Inundation Area represents a long-term, periodic change in maximum lake level as opposed to a permanent structural impact or temporary construction impact.															

TABLE 6
PROJECT IMPACTS ON RWQCB JURISDICTIONAL RESOURCES IN THE SURVEY AREA*

Feature	Existing (acres)			Permanent Impact (acres)			Temporary Impact (acres)			Total Permanent/Temporary Impact (acres)			Additional Inundation Area** (acres)		
	Wetland	Non-wetland	Total	Wetland	Non-wetland	Total	Wetland	Non-wetland	Total	Wetland	Non-wetland	Total	Wetland	Non-wetland	Total
Irvine Lake	94.582	312.959	407.541	—	0.450	0.450	63.708	137.639	201.347	63.708	138.089	201.797	—	—	—
Santiago Creek	7.124	13.803	20.927	—	1.348	1.348	0.207	0.216	0.423	0.207	1.564	1.771	0.673	—	0.673
Drainage 1	—	0.008	0.008	—	—	—	—	0.002	0.002	—	0.002	0.002	—	—	—
Drainage 2	—	0.025	0.025	—	0.025	0.025	—	—	—	—	0.025	0.025	—	—	—
Drainage 3	—	0.071	0.071	—	0.038	0.038	—	0.008	0.008	—	0.046	0.046	—	—	—
Drainage 4	—	0.048	0.048	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 5	—	0.144	0.144	—	—	—	—	—	—	—	—	—	—	0.006	0.006
Drainage 6	—	0.369	0.369	—	—	—	—	—	—	—	—	—	—	0.010	0.010
Drainage 7	—	0.100	0.100	—	—	—	—	—	—	—	—	—	—	0.014	0.014
Drainage 8	—	0.024	0.024	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 9	—	0.066	0.066	—	—	—	—	—	—	—	—	—	—	0.004	0.004
Drainage 10	—	0.167	0.167	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 11	—	0.114	0.114	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 12	—	4.894	4.894	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 13	—	0.039	0.039	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 14	—	0.235	0.235	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 15	—	0.433	0.433	—	—	—	—	—	—	—	—	—	—	0.004	0.004
Total	101.706	333.499	435.205	0.000	1.861	1.861	63.915	137.865	201.780	63.915	139.726	203.641	0.673	0.038	0.711
* The impact by landowner (i.e., IRWD or County of Orange) is included in Attachment H.															
** Portions of the Permanent and Temporary impact boundaries overlap the “Additional Inundation Area”. This overlap is not being excluded because the Additional Inundation Area represents a long-term, periodic change in maximum lake level as opposed to a permanent structural impact or temporary construction impact.															

TABLE 7
PROJECT IMPACTS ON CDFW JURISDICTIONAL RESOURCES
IN THE SURVEY AREA*

Feature	Existing (acres)	Permanent Impact (acres)	Temporary Impact (acres)	Total Permanent/ Temporary Impact (acres)	Additional Inundation Area** (acres)
Irvine Lake	614.135	1.843	229.517	231.360	0.775
Santiago Creek	36.024	1.924	0.305	2.229	5.433
Drainage 1	0.027	—	0.005	0.005	—
Drainage 2	0.074	0.074	—	0.074	—
Drainage 3	0.168	0.083	0.023	0.106	—
Drainage 4	0.094	—	—	—	0.014
Drainage 5	0.359	—	—	—	0.011
Drainage 6	0.149	—	—	—	0.008
Drainage 7	0.148	—	—	—	0.003
Drainage 8	0.042	—	—	—	—
Drainage 9	1.237	—	—	—	0.088
Drainage 10	0.245	—	—	—	—
Drainage 11	0.318	—	—	—	—
Drainage 12	13.517	—	—	—	2.370
Drainage 13	0.114	—	—	—	—
Drainage 14	0.416	—	—	—	—
Drainage 15	2.563	—	—	—	0.278
Total	669.630	3.924	229.850	233.774	8.980
<p>* The impact by landowner (i.e., IRWD or County of Orange) is included in Attachment H.</p> <p>** Portions of the Permanent and Temporary impact boundaries overlap the “Additional Inundation Area”. This overlap is not being excluded because the Additional Inundation Area represents a long-term, periodic change in maximum lake level as opposed to a permanent structural impact or temporary construction impact.</p>					

TABLE 8
SUMMARY OF PROJECT IMPACTS ON JURISDICTIONAL RESOURCES
IN THE SURVEY AREA*

Jurisdiction	Amount of Jurisdictional Water Resource (acres)				
	Existing	Permanent	Temporary	Total Permanent/ Temporary Impact	Additional Inundation Area**
USACE WOTUS	428.476	1.798	201.772	203.570	0.673
RWCQB Waters of the State	435.205	1.861	201.780	203.641	0.711
CDFW Jurisdictional Resources	669.630	3.924	229.850	233.774	8.980
USACE: U.S. Army Corps of Engineers; WOTUS: waters of the United States; RWQCB: Regional Water Quality Control Board; CDFW: California Department of Fish and Wildlife; “-”: not present * The impact by landowner (i.e., IRWD or County of Orange) is included in Attachment H. ** Portions of the Permanent and Temporary impact boundaries overlap the “Additional Inundation Area”. This overlap is not being excluded because the Additional Inundation Area represents a long-term, periodic change in maximum lake level as opposed to a permanent structural impact or temporary construction impact.					

5.0 REGULATORY APPROVAL PROCESS

5.1 REGULATORY PERMIT REQUIREMENTS

This section summarizes the various permits, agreements, and certifications that may be required prior to initiation of project activities that involve impacts to jurisdictional waters.

- USACE Section 404 Individual Permit
- RWQCB Waste Discharge Requirements
- CDFW Section 1602 Lake or Streambed Alteration Agreement

It should be noted that all regulatory permit applications can be processed concurrently. The USACE permit would be issued subject to the receipt of the RWQCB's Waste Discharge Requirements (WDRs).

5.1.1 U.S. Army Corps of Engineers

Prior to construction in WOTUS, a Section 404 permit from the USACE is required for impacts to WOTUS (i.e., Irvine Lake and Santiago Creek). Regulatory authorization in the form of a Nationwide Permit (NWP) or regional permit is provided for certain categories of activities. If the NWP conditions cannot be met, an Individual Permit (IP) will be required. It is expected that the Project would require an IP. It should be noted that the definition of WOTUS is currently in flux, and the USACE will make the final determination of jurisdictional boundaries during the permit consultation process.

Issuance of the USACE Section 404 permit would be contingent upon the approval of a permit from the Santa Ana RWQCB. The RWQCB requires certification of the project's California Environmental Quality Act (CEQA) documentation before it will approve the WDRs. The RWQCB, as a responsible agency, will use the project's CEQA document to satisfy its own CEQA compliance requirements.

On August 11, 2023, staff from IRWD, SWD, Psomas, USACE, USEPA, and U.S. Fish and Wildlife Service (USFWS) attended an online pre-application filing meeting. IRWD described the proposed Project and Psomas discussed biological surveys conducted and resources that are present in the BSA. The meeting discussed that the Project would need an Individual Permit from the USACE and a formal Section 7 Consultation with the USFWS. The purpose of this meeting was to provide the attending agencies with a briefing on the project's scope and potential resource issues in advance of filing the 404 permit application.

5.1.2 Regional Water Quality Control Board

When a project involves impacts to both federal WOTUS and non-federal waters of the State, the RWQCB would authorize all impacts under Waste Discharge Requirements (WDRs). The application for discharges of dredged or fill material would include both WOTUS and ephemeral waters of the State.

The RWQCB requires the Applicant to address urban storm water runoff during and after construction in the form of Best Management Practices (BMPs). These BMPs are intended to address the treatment of pollutants carried by storm water runoff and are required in all complete applications. The WDRs must also address compliance with the Basin Plan. The application would also require the payment of an application fee, which would be based on project impacts.

Staff from IRWD, Psomas, CDFW, RWQCB, and U.S. Fish and Wildlife (USFWS) attended a pre-application field meeting for the Project on July 12, 2023. During the field meeting, IRWD described the proposed Project and Psomas discussed biological surveys conducted and resources that are present in the BSA. The meeting attendees visited the dam crest, spillway and also the staging area at the upstream end of Irvine Lake.

On August 16, 2023, the RWQCB hosted the required pre-filing meeting. This meeting is required to be conducted at least 30 days prior to the filing of a 401 water quality certification request with the RWQCB and the USACE.

5.1.3 California Department of Fish and Wildlife

Prior to construction, a Notification of Lake or Streambed Alteration (LSA) must be submitted to the CDFW that describes any proposed streambed alteration contemplated by a project. If an LSA Agreement is required, the CDFW may want to conduct an on-site inspection.

In addition to the formal application materials and the fee, a copy of the appropriate environmental document should be included in the submittal, consistent with CEQA requirements. The CDFW will not deem the application to be complete until the application fees have been paid and the agency is provided with a certified CEQA document and a signed copy of the receipt of County Clerk filing fees for the Notice of Determination.

Staff from IRWD, Psomas, CDFW, RWQCB, and USFWS attended a pre-application field meeting for the Project on July 12, 2023. During the field meeting, IRWD described the proposed Project and Psomas discussed biological surveys conducted and resources that are present in the BSA. The meeting attendees visited the dam crest, spillway and also the staging area at the upstream end of Irvine Lake.

6.0 RECOMMENDATIONS

Based on the conclusions of this Jurisdictional Delineation Report, the following recommendations have been identified:

1. The appropriate permits, agreements, and certifications, as discussed in Section 5, should be prepared and submitted for projects impacting jurisdictional waters. Avoidance, minimization, and/or mitigation measures may be required by the regulatory agencies.

7.0 DISCLAIMER STATEMENT

This report represents Psomas' summary of the jurisdictional resources delineated in the survey area. The descriptions and maps provided are Psomas' jurisdictional recommendation based on the field evidence, regulations, and environmental information available. Only the regulatory agencies can make the final determination on whether the features present are subject to USACE, RWQCB, and/or CDFW regulatory authority.

8.0 REFERENCES

- Curtis, K.E. and R.W. Lichvar. 2010 (July). *Updated Datasheet for the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States*. Hanover, NH: USACE, Engineer Research and Development Center, Cold Regions Research and Engineering Laboratory.
- Environmental Laboratory. 1987. *Corps of Engineers Wetlands Delineation Manual* (Technical Report Y-87-1). Vicksburg, MS: U.S. Army Engineer Waterways Experiment Station.
- Federal Geographic Data Committee (FGDC). 2013. *Classification of Wetlands and Deepwater Habitats of the United States* (FGDC-STD-004-2013, 2nd Ed.). Washington, D.C.: FGDC and U.S. Fish and Wildlife Service. https://www.fgdc.gov/standards/projects/wetlands/index_html.
- Irvine Ranch Water District (IRWD). 2020a (April 16, date accessed). About Irvine Lake. Irvine, CA: IRWD. <https://www.irwd.com/construction/irvine-lake>.
- .2020b (April 16). Personal communication regarding water release in Drainage 2. Email conversation between IRWD and Psomas.
- .2020c (October 5). Personal communication regarding the use of the spillway. Email conversation between IRWD and Psomas.
- .2020d (November 16). Personal communication regarding the permanent/temporary impacts and construction timing. Email conversation between IRWD and Psomas.
- .2020e (November 18). Personal communication regarding the reservoir levels from 2002 to 2020. Email conversation between IRWD and Psomas.
- .2020f (November 19). Personal communication regarding length of time water would be held at the maximum following implementation of raising the spillway. Phone conversation between IRWD and Psomas.
- Lichvar, R.W. and S.M. McColley. 2008 (August). *A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States, A Delineation Manual*. Hanover, NH: USACE, Engineer Research and Development Center, Cold Regions Research and Engineering Laboratory.
- Santa Ana Regional Water Quality Control Board (Santa Ana RWQCB). 1995 (updated 2008). *Water Quality Control Plan: Santa Ana River Basin (8)*. Riverside, CA: Santa Ana RWQCB.
- State Water Resources Control Board (SWRCB). 2019 (April 2). *State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State*.

https://www.waterboards.ca.gov/water_issues/programs/cwa401/docs/procedures_conformed.pdf.

URS Corporation (URS). 2015 (July). *Santiago Creek Dam Outlet Tower Seismic Evaluation Structural Engineering Services*. Oakland, CA: URS.

U.S. Army Corps of Engineers (USACE). 2008. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (Version 2.0). (J.S. Wakeley, R.W. Lichvar, and C.V. Noble, Eds.). Vicksburg, MS: U.S. Army Engineer Research and Development Center.

———. 2007 (January 31). Memorandum: Interim Guidance for Amendments to the National Historic Preservation Act and the Advisory Council on Historic Preservation (ACHP) Implementing Regulations. Washington, D.C.: USACE.

———. 2005 (December 7). Regulatory Guidance Letter. Ordinary High Water Mark Identification. Washington, D.C.: USACE.

———. 2001. *Memorandum No. 2 regarding SWANCC decision*.

U.S. Army Corps of Engineers and Environmental Protection Agency (USACE and USEPA). 2023a (January 18). Revised Definition of “Waters of the United States”. *Federal Register* 88(11):3004–3144. Washington, D.C.: USACE and USEPA.

———. 2023b (September 8). Revised Definition of “Waters of the United States”; Conforming. *Federal Register* 88(173):61964–61969. Washington, D.C.: USACE and USEPA.

U.S. Department of Agriculture, Natural Resources Conservation Service (USDA NRCS). 2020 (April 16, date accessed). State Soil Data Access Hydric Soils List. Washington, D.C.: USDA, NRCS. <http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/use/hydric/>.

U.S. Fish and Wildlife Service (USFWS). 2020 (April 16, date accessed). Wetlands Mapper [Information for the Survey Area]. Washington D.C.: USFWS, National Wetlands Inventory. <http://www.fws.gov/wetlands/Data/Mapper.html>.

U.S. Geological Survey (USGS). 2020a (April 16, date accessed). National Water Information System Mapper. Stream Site Data for USGS 11075800 Santiago C A Modjeska CA. https://waterdata.usgs.gov/nwis/inventory?agency_code=USGS&site_no=11075800.

———. 2020b (April 16, date accessed). StreamStats (v4.3.11). Drainage Area Data for Santiago Creek at 33.78817°, -117.72679°. Reston, VA: USGS. <https://streamstats.usgs.gov/ss/>.

ATTACHMENT A
SUMMARY OF REGULATORY AUTHORITY

REGULATORY AUTHORITY

This attachment summarizes the regulatory authority of the U.S. Army Corps of Engineers (USACE), the Regional Water Quality Control Board (RWQCB), and the California Department of Fish and Wildlife (CDFW) over activities that have potential to impact jurisdictional resources.

U.S. Army Corps of Engineers

The USACE Regulatory Branch regulates activities that discharge dredged or fill materials into waters of the United States (WOTUS) under Section 404 of the Federal Clean Water Act (CWA) and Section 10 of the Rivers and Harbors Act. This permitting authority applies to all WOTUS where the material (1) replaces any portion of WOTUS with dry land or (2) changes the bottom elevation of any portion of any WOTUS. These fill materials would include sand, rock, clay, construction debris, wood chips, and materials used to create any structure or infrastructure in these waters.

Waters of the United States

The definition of WOTUS has been subject to shifting regulations over the years, with the U.S. Supreme Court issuing multiple decisions that provide context and guidance in determining the appropriate scope of WOTUS. The following provides a brief summary of the historical interpretations of WOTUS.

In *United States v. Riverside Bayview Homes*,¹ the Court upheld the inclusion of adjacent wetlands in the regulatory definition of WOTUS. In *Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Engineers* (SWANCC),² the Court held that the use of “isolated” non-navigable intrastate ponds by migratory birds was not, by itself, sufficient basis for the exercise of federal regulatory authority under the CWA. In *Rapanos v. United States* (Rapanos),³ a majority of the U.S. Supreme Court overturned two Sixth Circuit Court of Appeals decisions, finding that certain wetlands constituted WOTUS under the CWA. In his plurality opinion, Justice Scalia argued that WOTUS should not include channels through which water flows intermittently or ephemerally or channels that periodically provide drainage for rainfall. He also stated that a wetland may not be considered “adjacent to” remote WOTUS based on a mere hydrologic connection. Justice Kennedy authored a separate concurring opinion concluding that wetlands are WOTUS if they, either alone or in combination with similarly situated lands in the region, significantly affect the chemical, physical, and biological integrity of other covered waters more readily understood as “navigable”. Lacking a majority opinion, regulatory jurisdiction under the CWA exists over a water body if either the plurality’s or Justice Kennedy’s “significant nexus” standard is satisfied.

¹ *United States v. Riverside Bayview Homes, Inc.*, 474 U.S. 121 (1985)

² *Solid Waste Agency of Northern Cook Cty. v. Army Corps of Engineers*, 531 U.S. 159 (2001)

³ Consolidated cases: *Rapanos v. United States* and *Carabell v. United States* (126 S. Ct. 2208 2006) refer to the U.S. Supreme Court’s decision concerning USACE jurisdiction over waters of the United States under the CWA.

In 2015, the USACE and the U.S. Environmental Protection Agency (USEPA) published a final rule (2015 Rule) clarifying the scope of WOTUS protected under the CWA. One of the major changes was to make all tributaries and adjacent waters jurisdictional, by rule.

In December 2018, the USEPA and the Department of the Army (DOA) proposed a new definition of WOTUS that clarified federal authority under the federal CWA consistent with the February 2017 Presidential Executive Order entitled “Restoring the Rule of Law, Federalism, and Economic Growth by Reviewing the ‘Waters of the United States’ Rule”. On September 12, 2019, the USEPA and DOA signed a final “Step One Rule” to repeal the 2015 Rule and re-codify the regulatory text defining WOTUS that existed prior to the 2015 Rule. The new regulations went into effect on December 23, 2019.⁴ With this new final rule, the regulations defining the scope of federal CWA jurisdiction are those portions of the Code of Federal Regulations (CFR) as they existed before the amendments promulgated in the 2015 rule.

The Step One Rule was replaced by the Navigable Waters Protection Rule (NWPR, Step Two Rule). On January 23, 2020, the USEPA and DOA finalized the Step Two Rule defining WOTUS. This rule was published in the *Federal Register* on April 21, 2020, and went into effect 60 days following publication (i.e., on June 22, 2020). The NWPR changed the definition of WOTUS. Major changes implemented by this rule were that ephemeral features would not be considered jurisdictional, the “significant nexus” process was eliminated, and wetlands must either abut jurisdictional waters or have a direct hydrological surface connection to jurisdictional waters.

On June 9, 2021, the USEPA and DOA announced their intent to revise the definition of WOTUS to better protect our nation’s vital water resources that support public health, environmental protection, agricultural activity, and economic growth. On August 30, 2021, the U.S. District Court for the District of Arizona vacated and remanded the NWPR for reconsideration to the USEPA and the USACE.⁵ In light of this order, the agencies halted implementation of the NWPR and interpreted WOTUS consistent with the pre-2015 regulatory regime.

On January 18, 2023, the USEPA and the USACE published in the *Federal Register* a new Water Rule (2023 Rule) which provided an updated definition of WOTUS (USACE 2023a). This 2023 Rule became effective on March 20, 2023. The 2023 Rule used the pre-2015 regulations as the basis for the definition of WOTUS, while incorporating the Supreme Court’s ruling from the case of *Rapanos v. United States* (“Rapanos” 2006)⁶. The 2023 Water Rule defined WOTUS per the following categories:

1. Waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide; the territorial seas; or interstate waters, including interstate wetlands (“paragraph (a)(1) waters”);

⁴ 40 CFR 230.3(s).

⁵ *Pasqua Yaqui Tribe, et al. v. U.S. Environmental Protection Agency, et al.*

⁶ Consolidated cases: *Rapanos v. United States* and *Carabell v. United States* refer to the U.S. Supreme Court’s decision concerning USACE jurisdiction over “waters of the U.S.” under the CWA.

2. Impoundments of waters otherwise defined as WOTUS under this definition, other than impoundments of waters identified under paragraph (a)(5) of this section (“paragraph (a)(2) waters”);
3. Tributaries of waters identified in paragraph (a)(1) or (2) of this section: that are relatively permanent, standing, or continuously flowing bodies of water; or that either alone or in combination with similarly situated waters in the region, significantly affect the chemical, physical, or biological integrity of waters identified in paragraph (a)(1) of this section (“paragraph (a)(3) waters”);
4. Wetlands adjacent to the following waters: waters identified in paragraph (a)(1) of this section; or relatively permanent, standing or continuously flowing bodies of water identified in paragraph (a)(2) or (a)(3)(i) of this section and with a continuous surface connection to those waters; or waters identified in paragraph (a)(2) or (3) of this section when the wetlands either alone or in combination with similarly situated waters in the region, significantly affect the chemical, physical, or biological integrity of waters identified in paragraph (a)(1) of this section (“paragraph (a)(4) waters”);
5. Intrastate lakes and ponds, streams, or wetlands not identified in paragraphs (a)(1) through (4) of this section that are relatively permanent, standing or continuously flowing bodies of water with a continuous surface connection to the waters identified in paragraph (a)(1) or (a)(3)(i) of this section; or that either alone or in combination with similarly situated waters in the region, significantly affect the chemical, physical, or biological integrity of waters identified in paragraph (a)(1) of this section (“paragraph (a)(5) waters”).

The 2023 Rule also excluded certain waters from being WOTUS:

1. Waste treatment systems, including treatment ponds or lagoons, designed to meet the requirements of the CWA;
2. Prior converted cropland designated by the Secretary of Agriculture. The exclusion would cease upon a change of use, which means that the area is no longer available for the production of agricultural commodities. Notwithstanding the determination of an area’s status as prior converted cropland by any other Federal Agency, for the purposes of the CWA, the final authority regarding CWA jurisdiction remains with the USEPA;
3. Ditches (including roadside ditches) excavated wholly in and draining only dry land and that do not carry a relatively permanent flow of water;
4. Artificially irrigated areas that would revert to dry land if the irrigation ceased;
5. Artificial lakes or ponds created by excavating or diking dry land to collect and retain water and which are used exclusively for such purposes as stock watering, irrigation, settling basins, or rice growing;
6. Artificial reflecting or swimming pools or other small ornamental bodies of water created by excavating or diking dry land to retain water for primarily aesthetic reasons;
7. Waterfilled depressions created in dry land incidental to construction activity and pits excavated in dry land for the purpose of obtaining fill, sand, or gravel unless and

until the construction or excavation operation is abandoned and the resulting body of water meets the definition of WOTUS; and

8. Swales and erosional features (e.g., gullies, small washes) characterized by low volume, infrequent, or short duration flow.

In response to the May 25, 2023, Supreme Court decision in the case of *Sackett v. USEPA*, the USEPA issued a pre-published rule regarding the definition of WOTUS on August 29, 2023 (USACE 2023b). On September 8, 2023, the USEPA and the DOA amended the CFR to conform the definition of WOTUS to the Supreme Court decision. This conforming rule amends the provisions of the agencies' definition of WOTUS that are invalid under the Supreme Court's interpretation of the CWA; the final rule went into effect on September 8, 2023. The sole purpose of this rule is to amend specific provisions of the 2023 rule that are considered invalid under *Sackett*. The Amended 2023 Rule made the following changes:

1. "Interstate wetlands" were removed from paragraph (a)(1) waters;
2. The significant nexus standard for tributaries (paragraph (a)(3) waters), adjacent wetlands (paragraph (a)(4) waters), and intrastate lakes and ponds (paragraph (a)(5) waters) was removed;
3. "Streams" and "wetlands" were removed from paragraph (a)(5) waters;
4. "Adjacent" was revised to mean "having a continuous surface connection" instead of "bordering, contiguous, or neighboring". Wetlands separated from other WOTUS by man-made dikes or barriers, natural river berms, beach dunes, and the like are no longer considered "adjacent wetlands".

No changes have been made to waters excluded by the 2023 Rule.

Ordinary High Water Mark

The landward limit of tidal WOTUS is the high-tide line. In non-tidal waters where adjacent wetlands are absent, the lateral limits of USACE jurisdiction extend to the ordinary high water mark (OHWM).⁷ The OHWM is defined as "that line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of the soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas".⁸ When wetlands are present, the lateral limits of USACE jurisdiction extend beyond the OHWM to the limits of the adjacent wetlands.⁹

Wetlands

A wetland is a subset of jurisdictional waters and is defined by the USACE and the USEPA as "those areas that are inundated or saturated by surface or groundwater at a frequency and

⁷ U.S. Army Corps of Engineers (USACE). 2005 (December 7). Regulatory Guidance Letter. Ordinary High Water Mark Identification. Washington, D.C.: USACE.

⁸ *Code of Federal Regulations* (CFR), Title 33, §328.3(e)

⁹ USACE 2005

duration sufficient to support, and under normal circumstances, do support a prevalence of vegetation typically adapted for life in saturated soil conditions”.¹⁰ Wetlands generally include swamps, marshes, bogs, and areas containing similar features.

The definition and methods for identifying wetland resources can be found in the USACE’s *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region*,¹¹ a supplement to the 1987 *Corps of Engineers Wetlands Delineation Manual*.¹² Both the 1987 Wetlands Manual and the 2008 Arid West Supplement to the manual provide technical methods and guidelines for determining the presence of wetland WOTUS. Pursuant to these manuals, a three-parameter approach is used to identify wetlands and requires evidence of wetland hydrology, hydrophytic vegetation, and hydric soils. In order to be considered a wetland, an area must figure one or more indicators of all three of these parameters. However, problem areas may periodically or permanently lack certain indicators for reasons such as seasonal or annual variability of rainfall, vegetation, and other factors. Atypical wetlands lack certain indicators due to recent human activities or natural events. Guidance for determining the presence of wetlands in these situations is presented in the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region*.

Section 404 Permit

Except as specified in Section 323.4 of the CFR, impacts to WOTUS require a Section 404 Permit. Permit authorization which may be in the form of (1) a “general permit” authorizing a category of activities in a specific geographical region or nationwide or (2) an “individual permit” (IP) following a review of an individual application form (to be obtained from the district office having jurisdiction over the waters in which the activity is proposed to be located).

Regulatory authorization in the form of a Nationwide Permit (NWP) is provided for certain categories of activities such as repair, rehabilitation, or replacement of a structure or fill which was previously authorized; utility line placement; or bank stabilization. NWPs authorize only those activities with minimal adverse effects on the aquatic environment and are valid only if the conditions applicable to the permits are met or waivers to these conditions are provided in writing from the USACE. Waivers may require consultation with affected federal and State agencies, which can be a lengthy process with no mandated processing time frames. Certain activities do not require submission of an application form, but may require a separate notification. If the NWP conditions cannot be met, an IP will be required. WOTUS temporarily filled, flooded, excavated, or drained but restored to pre-construction contours and elevations after construction are not included in the measurement of loss of WOTUS. The appropriate permit authorization will be based on the

¹⁰ 33 CFR §328.3(b)

¹¹ USACE. 2008a. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0)*. (J.S. Wakeley, R.W. Lichvar, and C.V. Noble, Eds.). Vicksburg, MS: U.S. Army Engineer Research and Development Center.

¹² Environmental Laboratory. 1987. *Corps of Engineers Wetlands Delineation Manual (Technical Report Y-87-1)*. Vicksburg, MS: U.S. Army Engineer Waterways Experiment Station.

amount of impacts to WOTUS, as determined by the USACE. There is no filing fee for the Section 404 Permit.

Approximately three or four months are typically required to process a routine permit application; large or complex activities may take longer to process. When a permit application is received, it will be assigned an identification number and reviewed for completeness by the District Engineer. If an application is incomplete, additional information will be requested within 15 days of receipt of the application. If an application is complete, the District Engineer will issue a public notice within 15 days unless specifically exempted by provisions of the CFR. Public comments will be accepted no more than 30 days but not less than 15 days from the date of public notice; these will become part of the administrative record of the application. Generally, the District Engineer will decide on the application no later than 60 days after receipt of the completed application. Additional permit situations may increase the permit processing time (e.g., projects involving a Section 401 Water Quality Certification, a coastal zone management consistency analysis, historic properties, a federal agency, and/or Endangered species). The Project Applicant will be given time, not to exceed 30 days, to respond to requests of the District Engineer.

On January 31, 2007, the USACE published a memorandum clarifying the Interim Guidance for Amendments to the National Historic Preservation Act and the Advisory Council on Historic Preservation (ACHP) implementing regulations.¹³ The Interim Guidance applies to all Department of the Army requests for authorization/verification, including Individual Permits (IPs, i.e., standard permits and letters of permission) and all Regional General Permits (RGPs) and Nationwide Permits (NWP). The State or Tribal Historic Preservation Officer (SHPO/THPO) has 30 days to respond to a determination that a proposed activity, which otherwise qualifies for an NWP or an RGP, has no effect or no adverse effect on a historic property. If the SHPO/THPO does not respond within 30 days of notification, the Los Angeles District may proceed with verification. If the SHPO/THPO disagrees with the District's determination, the District may work with the SHPO/THPO to resolve the disagreement or request an opinion from the ACHP. The USACE will submit the Draft Jurisdictional Delineation Report to the SHPO/THPO for review prior to initiating the actual regulatory process.

If the USACE determines that the drainages/waterbodies are jurisdictional and would be impacted by project implementation, the Applicant will be required to obtain a CWA Section 401 Water Quality Certification from the RWQCB before the USACE will issue the Section 404 Permit. If the USACE determines that the impacted drainage/waterbody is not jurisdictional, the Applicant will be required to obtain RWQCB authorization under the provisions of a Report of Waste Discharge (ROWD).

Jurisdictional Determinations

Pursuant to USACE Regulatory Guidance Letter (RGL) 16-01 (dated October 2016), the USACE can issue two types of jurisdictional determinations to implement Section 404 of the CWA: Approved Jurisdictional Determinations (AJD) and Preliminary Jurisdictional Determinations (PJD).¹⁴ An AJD is an official USACE determination that jurisdictional aquatic

¹³ USACE. 2007 (January 31). Memorandum: Interim Guidance for Amendments to the National Historic Preservation Act and the Advisory Council on Historic Preservation (ACHP) Implementing Regulations. Washington, D.C.: USACE.

¹⁴ USACE. 2008b (June 26). Regulatory Guidance Letter. Jurisdictional Determinations. Washington, D.C.: USACE.

resources (e.g., WOTUS) are either present or absent on a site. An AJD also identifies the precise limits of jurisdictional waters on a Project site.

AJDs may be either “stand-alone” AJDs or AJDs associated with permit actions. Some “stand-alone” AJDs may later be associated with permit actions, but at time of issuance are not related to a permit application. A “stand-alone” AJD may be requested so that impacts to jurisdictional aquatic resources may be avoided or minimized during the planning stages of a project, or it may be requested in order to fulfill a local/state authorization requirement.

The USACE will provide an AJD when (1) an Applicant requests an official jurisdictional determination; (2) an Applicant contests jurisdiction over a particular water body or wetland; or (3) when the USACE determines that jurisdiction does not exist over a particular water body or wetland. The AJD then becomes the USACE’s official determination that can then be relied upon over a five-year period to request regulatory authorization as part of the permit application. In addition, an Applicant may decline to request an AJD and instead obtain a USACE IP or General Permit Authorization based on a Preliminary Jurisdictional Determination (PJD) or, in certain circumstances (e.g., authorizations by nonreporting nationwide general permits), with no Jurisdictional Determination.

PJDs are nonbinding, advisory in nature, and may not be appealed. They indicate that WOTUS may occur on a Project site. An Applicant may elect to use a PJD to voluntarily waive or set aside questions regarding CWA jurisdiction over a site, usually in the interest of expediting the permitting process. The USACE will determine what form of Jurisdictional Determination is appropriate for a particular Project site.

The USACE will coordinate with the USEPA per applicable memoranda. The USACE will continue to post final AJDs until they expire (generally five years). PJDs will not be coordinated with the USEPA or posted on USACE websites.

Regional Water Quality Control Board

The RWQCB is the primary agency responsible for protecting water quality in California through the regulation of discharges to surface waters under the CWA and the California Porter-Cologne Water Quality Control Act (Porter-Cologne Act). The RWQCB’s jurisdiction extends to all waters of the State and to all WOTUS, including wetlands (isolated and non-isolated).

Section 401 of the CWA provides the RWQCB with the authority to regulate, through a Water Quality Certification, any proposed, federally permitted activity that may affect water quality. Among such activities are discharges of dredged or fill material permitted by the USACE pursuant to Section 404 of the CWA. Section 401 requires the RWQCB to provide certification that there is reasonable assurance that an activity which may result in discharge to navigable waters will not violate water quality standards. Water Quality Certification must be based on a finding that the proposed discharge will comply with water quality standards, which contain numeric and narrative objectives that can be found in each of the nine RWQCBs’ Basin Plans.

The Porter-Cologne Act provides the State with very broad authority to regulate waters of the State (which are defined as any surface water or groundwater, including saline waters). The Porter-Cologne Act has become an important tool in the post-SWANCC (*Solid Waste Agency of Northern Cook Counties vs. United States Army Corps of Engineers*) and Rapanos era with respect to the State's authority over isolated waters. Generally, any person proposing to discharge waste into a water body that could affect its water quality must file an ROWD when there is no federal nexus, such as under Section 404(b)(1) of the CWA. Although "waste" is partially defined as any waste substance associated with human habitation, the RWQCB interprets this to include fill discharge into water bodies.

On April 2, 2019, the State Water Resources Control Board (SWRCB) adopted the State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State. The procedures went into effect on May 28, 2020. Under these regulations, the SWRCB and its nine RWQCBs assert jurisdiction over all existing WOTUS and all waters that would have been considered WOTUS under the 2015 Rule. Thus, the WOTUS that are no longer under USACE jurisdiction would be under SWRCB jurisdiction.

Wetlands

In 2019, the SWRCB adopted rules to provide a common, statewide definition of what constitutes a wetland and to provide consistency in the way they and the RWQCBs regulate activities to protect wetlands and other waterways. The SWRCB defines an area as wetlands "if, under normal circumstances, (1) the area has continuous or recurrent saturation of the upper substrate caused by groundwater, or shallow surface water, or both; (2) the duration of such saturation is sufficient to cause anaerobic conditions in the upper substrate; and (3) the area's vegetation is dominated by hydrophytes or the area lacks vegetation".¹⁵ The following wetlands are waters of the State:

1. Natural wetlands,
2. Wetlands created by modification of a surface water of the State, and
3. Artificial wetlands that meet any of the following criteria:
 - a. Approved by an agency as compensatory mitigation for impacts to other waters of the State, except where the approving agency explicitly identifies the mitigation as being of limited duration;
 - b. Specifically identified in a water quality control plan as a wetland or other water of the State;
 - c. Resulted from historic human activity, is not subject to ongoing operation and maintenance, and has become a relatively permanent part of the natural landscape; or
 - d. Greater than or equal to one acre in size, unless the artificial wetland was constructed, and is currently used and maintained, primarily for one or more

¹⁵ State Water Resources Control Board (SWRCB). 2019 (March 22). State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State.

of the following purposes (e.g., the following artificial wetlands are not waters of the State unless they also satisfy the criteria set forth in 2, 3a, or 3b):

- i. Industrial or municipal wastewater treatment or disposal,
- ii. Settling of sediment,
- iii. Detention, retention, infiltration, or treatment of stormwater runoff and other pollutants or runoff subject to regulation under a municipal, construction, or industrial stormwater permitting program,
- iv. Treatment of surface waters,
- v. Agricultural crop irrigation or stock watering,
- vi. Fire suppression,
- vii. Industrial processing or cooling,
- viii. Active surface mining – even if the site is managed for interim wetlands functions and values,
- ix. Log storage,
- x. Treatment, storage, or distribution of recycled water, or
- xi. Maximizing groundwater recharge (this does not include wetlands that have incidental groundwater recharge benefits); or
- xii. Fields flooded for rice growing.

All artificial wetlands that are less than an acre in size and do not satisfy the criteria set forth in 2, 3.a, 3.b, or 3.c are not waters of the State.

Section 401 Water Quality Certification

Issuance of the USACE Section 404 Permit would be contingent upon the approval of a Section 401 Water Quality Certification from the RWQCB. Also, the RWQCB requires certification of the project's California Environmental Quality Act (CEQA) documentation before it will approve the Section 401 Water Quality Certification or ROWD. The RWQCB, as a responsible agency, will use the project's CEQA document to satisfy its own CEQA-compliance requirements.

On June 1, 2020, the USEPA finalized the "Clean Water Act Section 401 Certification Rule" to implement the water quality certification process consistent with the text and structure of the CWA. The final rule establishes procedures that promote consistent implementation of CWA section 401 and regulatory certainty in the federal licensing and permitting process. The new regulation includes reviews and approvals by the USACE prior to the RWQCB issuing a 401 Certification and reviews and approvals by the USEPA prior to the USACE issuing a 404. The new 401 rule went into effect on September 11, 2020.

The new certification rule defines a discharge subject to 401 Certification as a discharge from a point source into a WOTUS. The new rule also states that States with additional water quality regulations cannot use these to expand the certification request.

The new rule requires all project proponents to request a pre-filing meeting with the RWQCB at least 30 days prior to filing a 401 “Certification Request”. The filing procedure has been simplified to require the filing of a “Certification Request”, rather than the acceptance of a “complete application”. The certification request has nine mandatory components:

1. identify the project proponent(s) and a point of contact;
2. identify the proposed project;
3. identify the applicable federal license or permit;
4. identify the location and nature of any potential discharge that may result from the proposed project and the location of receiving waters;
5. include a description of any methods and means proposed to monitor the discharge and the equipment or measures planned to treat, control, or manage the discharge;
6. include a list of all other federal, interstate, tribal, state, territorial, or local agency authorizations required for the proposed project, including all approvals or denials already received;
7. include documentation that a pre-filing meeting request was submitted to the certifying authority at least 30 days prior to submitting the certification request;
8. contain the following statement: ‘The project proponent hereby certifies that all information contained herein is true, accurate, and complete, to the best of my knowledge and belief; and
9. contain the following statement: ‘The project proponent hereby requests that the certifying authority review and take action on this CWA 401 certification request within the applicable reasonable period of time.’

There is a mandatory 30 day wait period between a pre-filing meeting request and the filing of a Certification Request. A Certification Request must be filed with the RWQCB and the USACE concurrently. USACE reviews the Certification Request for the nine required components. The USACE has 15 days to review the Certification Request. The USACE then notifies the RWQCB that request is complete. And concurrently notifies the RWQCB of the reasonable time period to act on the Certification Request. The reasonable time period is not to exceed 1 year. Within 15 days of receipt of the Certification Request, the RWQCB must provide the applicant with the following: 1) date of receipt; 2) applicable reasonable period of time to act on the Certification Request; and 3) date upon which waiver will occur if the certifying authority fails or refuses to act on the Certification Request.

Once the RWQCB issues the 401 Certification, the USACE has 5 days to notify the USEPA that the 401 Certification has been issued. The USEPA then has 30 days to notify neighboring jurisdictions of the 401 Certification. Neighboring jurisdictions have 60 days to respond. If there are no objections to the 401 Certification, then the USACE would issue the 404 permit.

On June 2, 2021, the USEPA published a notice of intention to reconsider and revise the Clean Water Act Section 401 Certification Rule. On September 14, 2023, the USEPA announced the final 2023 Clean Water Act Section 401 Water Quality Certification Improvement Rule. This rule restores the fundamental authority granted by Congress to states, territories, and tribes

to protect water resources from adverse impacts that could result from federally licensed or permitted projects. The 2020 rule is currently in effect. This new, 2023 rule becomes effective 60 days after it is published in the federal register (i.e., November 14, 2023). Key components of the new rule include the following:

1. Pre-filing meeting request: The project proponent must request a pre-filing meeting at least 30 days prior to requesting certification (unless waived by the certifying authority).
2. Request for certification: The project proponent submits a request for certification to the certifying authority.
3. Setting reasonable period of time (RPT): The certifying authority and federal agency collaboratively determine how much time the certifying authority will have to review the request (up to one year), otherwise the review period defaults to six months unless an automatic extension applies.
4. Analysis: The certifying authority analyzes whether the activity will comply with their water quality requirements.
5. Certification Decision: The certifying authority determines whether to (1) grant certification, (2) grant certification with conditions, (3) deny certification, or (4) expressively waive certification.

The RWQCB is required under the *California Code of Regulations* (CCR) to have a “minimum 21-day public comment period” before any action can be taken on the Section 401 application.¹⁶ This period closes when the RWQCB acts on the application. Since projects often change or are revised during the Section 401 permit process, the comment period can remain open. The public comment period starts as soon as an application has been received. Generally, the RWQCB Section 401, USACE Section 404, and CDFW Section 1602 permit applications are submitted at the same time.

The RWQCB requires the Applicant to address urban storm water runoff during and after construction in the form of Best Management Practices (BMPs). These BMPs are intended to address the treatment of pollutants carried by storm water runoff and are required in all complete applications. The notification/application for a CWA Section 401 Water Quality Certification must also address compliance with the Basin Plan. Please note that filing an application would also require the payment of an application fee which would be based on project impacts. The fee schedule calculator is available at https://www.waterboards.ca.gov/resources/fees/water_quality/docs/dredgefillcalculator.xlsm.

Waste Discharge Requirements

If no USACE Section 404 Permit is required, then the RWQCB issues Waste Discharge Requirements (WDRs) instead of a Section 401 Water Quality Certification. The RWQCB requires certification of the project’s CEQA documentation before it will issue WDRs.

¹⁶ 23 CCR §3858(a)

If operation or discharges from a Project affects California's surface, coastal, or groundwater, an application may need to obtain a permit to discharge waste from the appropriate RWQCB. For discharging, or proposing to discharge, pollutants into surface waters, an applicant must file completed federal National Pollutant Discharge Elimination System (NPDES) permit application forms with the appropriate RWQCB. For other types of discharges, such as those affecting groundwater or in a diffused manner (e.g., erosion from soil disturbance or waste discharge to land), an applicant must file a Report of Waste Discharge with the appropriate RWQCB to obtain WDRs. For specific situations, the RWQCB may waive the requirement to obtain a WDR for discharges to land or may determine that a proposed discharge can be permitted more effectively through enrollment in a general NPDES permit or general WDR.

To obtain WDRs, file the ROWD Form 200 with the necessary supplemental information with the RWQCB at least 120 days before beginning to discharge waste. The RWQCB reviews the application for completeness and may request additional information. Once the application is complete, the RWQCB determines whether they should adopt WDRs, prohibit the discharge, or waive the WDRs. If WDRs should be issued, the RWQCB prepares proposed WDRs and distributes them to persons and public agencies with known interest in the project for a minimum 30-day comment period. RWQCB staff members may modify the proposed WDRs based on comments received from the discharger and interested parties. The RWQCB holds a public hearing with at least a 30-day public notification. The RWQCB may adopt the proposed WDRs or modify and adopt them at the public hearing by majority vote. The entire process for developing and adopting the requirements normally takes about three months. WDRs are in effect until such time as the discharge is terminated or until revoked by the RWQCB. NPDES permits expire after five years and must be reissued.

There is no application fee for Form 200 (except for dairies). Instead, there is an annual fee that will be paid to the RWQCB.

California Department of Fish and Wildlife

The CDFW has jurisdictional authority over wetland resources associated with rivers, streams, and lakes pursuant to the *California Fish and Game Code*.¹⁷ Activities of any person, State or local governmental agency, or public utility that are project proponents are regulated by the CDFW under Section 1602 of the *California Fish and Game Code*. This section regulates any work that will (1) substantially divert or obstruct the natural flow of any river, stream, or lake; (2) substantially change or use any material from the bed, channel, or bank of any river, stream, or lake; or (3) deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it may pass into any river, stream, or lake. Section 1602 of the *California Fish and Game Code* applies to all perennial, intermittent, and ephemeral rivers, streams, and lakes in the State.

The CDFW jurisdictional limits are not as clearly defined by regulation as those of the USACE. While they closely resemble the limits described by USACE regulations, they include riparian habitat supported by a river, stream, or lake regardless of the presence or absence of hydric and saturated soils conditions. In general, the CDFW takes jurisdiction from the top of a stream bank or to the outer limits of the adjacent riparian vegetation (outer drip line),

¹⁷ See §§1600–1616.

whichever is greater. Notification is generally required for any project that will take place within or in the vicinity of a river, stream, lake or within or in the vicinity of tributaries to a river, stream, or lake. This includes rivers or streams that flow at least periodically or permanently through a bed or channel with banks that support fish and other aquatic plant and/or wildlife species. It also includes watercourses that have a surface or subsurface flow that support or have supported riparian vegetation.

Section 1602 Lake or Streambed Alteration Agreement

The CDFW enters into a Lake or Streambed Alteration (LSA) Agreement with a project proponent in order to ensure protection of wildlife and habitat values and acreages.

Prior to construction, a Notification of an LSA must be submitted to the CDFW that describes any proposed lake or streambed alteration that would occur with implementation of a project. The Notification of an LSA must address the initial construction and long-term operation and maintenance of any structures (such as a culvert or a desilting basin) included in the project design that are located within any river, stream, or lake and that may require periodic maintenance. In addition to the formal application materials and the fee, a copy of the appropriate environmental document (e.g., a Mitigated Negative Declaration) should be included in the submittal, consistent with CEQA requirements. The complete notification package must be submitted to the CDFW regional office that services the county where the activity will take place. This notification will serve as the basis for the CDFW's issuance of a Section 1602 LSA Agreement. Note that notification is not required before beginning emergency work, but the CDFW must be notified in writing within 14 days after beginning the work.

After receiving Notification of an LSA Agreement, the CDFW will determine whether an LSA Agreement will be required for the proposed activity. An LSA Agreement will be required if the activity could substantially adversely affect an existing fish and wildlife resource. If an LSA Agreement is required, the CDFW may want to conduct an on-site inspection.

If the CDFW does not respond in writing concerning the completeness of the Notification within 30 days of its submittal, the Notification automatically becomes complete. If the CDFW does not submit a draft LSA Agreement to the Applicant within 60 days of the determination of a completed Notification package, the CDFW will issue a letter that either (1) identifies the final date to transmit a draft LSA Agreement or (2) indicates that an LSA Agreement was not required. The CDFW will also indicate that it was unable to meet this mandated compliance date and that, by law, the Applicant is authorized to complete the project without an LSA Agreement as long as the Applicant constructs the project as proposed and complies with all avoidance, minimization, and mitigation measures described in the submitted Notification package. If the project requires revisions to the design or project construction, the CDFW may require submittal of a new Notification/application with an additional 90-day permit process.

If determined to be necessary, the CDFW will prepare a draft LSA Agreement, which will include standard measures to protect fish and wildlife resources during project construction and during ongoing operation and maintenance of any project element that occurs within a CDFW jurisdictional area. The draft Agreement must be transmitted to the Applicant within

60 calendar days of the CDFW's determination that the notification is complete. It should be noted that the 60-day timeframe might not apply to long-range agreements.

Following receipt of a draft LSA Agreement from the CDFW, the Applicant has 30 calendar days to notify the CDFW concerning the acceptability of the proposed terms, conditions, and measures. If the Applicant agrees with these terms, conditions and measures, the Agreement must be signed and returned to the CDFW. The Agreement becomes final once the CDFW executes it and an LSA Agreement is issued. All application fees must be paid and the final certified CEQA documentation must be provided prior to the CDFW's execution of the Agreement.

ATTACHMENT B

NATIONAL WETLAND INVENTORY DEFINITIONS

NATIONAL WETLANDS INVENTORY

The descriptions for resources mapped by the National Wetlands Inventory in the survey area (see Exhibit 6) are provided below.

Lacustrine Features: L1UBHh, L2ABFh, L2EM2Fh, L2UBFh, L2USAh, L2USCh

- **L: System LACUSTRINE.** The Lacustrine System includes wetlands and deepwater habitats with all of the following characteristics: (1) situated in a topographic depression or a dammed river channel; (2) lacking trees, shrubs, persistent emergents, and emergent mosses or lichens with 30 percent or greater areal coverage; and (3) total area of at least 8 hectares (ha) (20 acres). Similar wetlands and deepwater habitats totaling less than 8 ha are also included in the Lacustrine System if an active wave-formed or bedrock shoreline feature makes up all or part of the boundary, or if the water depth in the deepest part of the basin equals or exceeds 2.5 meters (8.2 feet) at low water. Lacustrine waters may be tidal or nontidal, but ocean-derived salinity is always less than 0.5 part per trillion (ppt).
 - **1: Subsystem LIMNETIC.** This Subsystem includes all deepwater habitats (i.e., areas > 2.5 meters [8.2 feet] deep below low water) in the Lacustrine System. Many small Lacustrine Systems have no Limnetic Subsystem.
 - **2: Subsystem LITTORAL.** This Subsystem includes all wetland habitats in the Lacustrine System. It extends from the shoreward boundary of the System to a depth of 2.5 meters (8.2 feet) below low water, or to the maximum extent of nonpersistent emergents if these grow at depths greater than 2.5 meters.
 - **AB: Class AQUATIC BED.** Includes wetlands and deepwater habitats dominated by plants that grow principally on or below the surface of the water for most of the growing season in most years.
 - **EM: Class EMERGENT.** Characterized by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens. This vegetation is present for most of the growing season in most years. These wetlands are usually dominated by perennial plants.
 - **UB: Class UNCONSOLIDATED BOTTOM.** Includes all wetlands and deepwater habitats with at least 25% cover of particles smaller than stones (less than 6-7 centimeters), and a vegetative cover less than 30%.
 - **US: Class UNCONSOLIDATED SHORE.** Includes all wetland habitats having two characteristics: (1) unconsolidated substrates with less than 75 percent areal cover or stones, boulders, or bedrock and (2) less than 30 percent areal cover of vegetation. Landforms such as beaches, bars, and flats are included in the Unconsolidated Shore class.
 - **2: Subclass NON-PERSISTENT.** Wetlands in this subclass are dominated by plants which fall to the surface of the substrate or below the surface of the water at the end of the growing season so that, at certain seasons of the year, there is no obvious sign of emergent vegetation.

- **A: Water Regime TEMPORARY FLOODED.** Surface water is present for brief periods (from a few days to a few weeks) during the growing season, but the water table usually lies well below the ground surface for most of the season.
- **C: Water Regime SEASONALLY FLOODED.** Surface water is present for extended periods especially early in the growing season, but is absent by the end of the growing season in most years. The water table after flooding ceases is variable, extending from saturated to the surface to a water table well below the ground surface.
- **F: Water Regime SEMIPERMANENTLY FLOODED.** Surface water persists throughout the growing season in most years. When surface water is absent, the water table is usually at or very near the land surface.
- **H: Water Regime PERMANENTLY FLOODED.** Water covers the substrate throughout the year in all years.
 - **h: Special Modifier DIKED/IMPOUNDED.** These wetlands have been created or modified by a man-made barrier or dam that obstructs the inflow or outflow of water.

Riverine Features: R2UBF, R2USC, R4SBA, R4SBAr, R4SBC, and R4SBCr

- **R: System RIVERINE.** The Riverine System includes all wetlands and deepwater habitats contained within a channel, with two exceptions: (1) wetlands dominated by trees, shrubs, persistent emergents, emergent mosses, or lichens and (2) habitats with water containing ocean-derived salts of 0.5 ppt or greater. A channel is an open conduit either naturally or artificially created which periodically or continuously contains moving water, or which forms a connecting link between two bodies of standing water.
 - **2: Subsystem LOWER PERENNIAL.** This Subsystem is characterized by a low gradient. There is no tidal influence and some water flows all year, except during years of extreme drought. This substrate consists mainly of sand and mud. Oxygen deficits may sometimes occur. The fauna is composed mostly of species that reach their maximum abundance in still water and true planktonic organisms are common. The gradient is lower than that of the Upper Perennial Subsystem and the floodplain is well developed.
 - **4: Subsystem INTERMITTENT.** This Subsystem includes channels that contain flowing water only part of the year. When the water is not flowing, it may remain in isolated pools or surface water may be absent.
 - **SB: Class STREAMBED.** Includes all wetlands contained within the Intermittent Subsystem of the Riverine System and all channels of the

Estuarine System or of the Tidal Subsystem of the Riverine System that are completely dewatered at low tide.

- **UB: Class UNCONSOLIDATED BOTTOM.** Includes all wetlands and deepwater habitats with at least 25% cover of particles smaller than stones (less than 6-7 centimeters), and a vegetative cover less than 30%.
- **US: Class UNCONSOLIDATED SHORE.** Includes all wetland habitats having two characteristics: (1) unconsolidated substrates with less than 75 percent areal cover or stones, boulders, or bedrock and (2) less than 30 percent areal cover of vegetation. Landforms such as beaches, bars, and flats are included in the Unconsolidated Shore class.
 - **A: Water Regime TEMPORARY FLOODED.** Surface water is present for brief periods (from a few days to a few weeks) during the growing season, but the water table usually lies well below the ground surface for most of the season.
 - **C: Water Regime SEASONALLY FLOODED.** Surface water is present for extended periods, especially early in the growing season, but is absent by the end of the growing season in most years. The water table after flooding ceases is variable, extending from saturated to the surface to a water table well below the ground surface.
 - **F: Water Regime SEMIPERMANENTLY FLOODED.** Surface water persists throughout the growing season in most years. When surface water is absent, the water table is usually at or very near the land surface.
 - **r: Special Modifier ARTIFICIAL SUBSTRATE.** This Modifier describes concrete-lined drainage ways, as well as Rock Bottom, Unconsolidated Bottom, Rocky Shore, and Unconsolidated Shore where the substrate material has been emplaced by humans. Jetties and breakwaters are examples of Artificial Rocky Shores.

Palustrine Features: PEM1C, PFOC, PFOCh, PFO/EM1Ch, PFO/SSA PSSA, PSSC, PSS/EM1C

- **P: System PALUSTRINE.** The Palustrine System includes all nontidal wetlands dominated by trees, shrubs, emergents, mosses, or lichens and all such wetlands that occur in tidal areas where salinity due to ocean-derived salts is below 0.5 part per trillion (ppt). It also includes wetlands lacking such vegetation but with all of the following four characteristics: (1) area less than 8 ha (20 acres), (2) active wave-formed or bedrock shoreline features lacking, (3) water depth in the deepest part of the basin less than 2.5 meters (8.2 feet) at low water, and (4) salinity due to ocean-derived salts less than 0.5 ppt.

- **EM: Class EMERGENT.** Characterized by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens. This vegetation is present for most of the growing season in most years. These wetlands are usually dominated by perennial plants.
- **FO: Class FORESTED.** Characterized by woody vegetation that is 6 meters tall or taller.
- **SS: Class SCRUB-SHRUB.** Includes areas dominated by woody vegetation less than 6 meters (20 feet) tall. The species include true shrubs, young trees (saplings), and trees or shrubs that are small or stunted because of environmental conditions.
 - **1: Subclass PERSISTENT.** This subclass is dominated by species that normally remain standing at least until the beginning of the next growing season. This subclass is found only in the Estuarine and Palustrine systems.
 - **A: Water Regime TEMPORARY FLOODED.** Surface water is present for brief periods (from a few days to a few weeks) during the growing season, but the water table usually lies well below the ground surface for most of the season.
 - **C: Water Regime SEASONALLY FLOODED.** Surface water is present for extended periods especially early in the growing season, but is absent by the end of the growing season in most years. The water table after flooding ceases is variable, extending from saturated to the surface to a water table well below the ground surface.
 - **h: Special Modifier DIKED/IMPOUNDED.** These wetlands have been created or modified by a man-made barrier or dam that obstructs the inflow or outflow of water.

ATTACHMENT C
REPRESENTATIVE PHOTOGRAPHS

D:\Projects\3IRW\SantiagoCreek\Graphics\UD\Att_SP1.ai



Photo 1: Santiago Creek Dam and Irvine Lake. October 14, 2020.



Photo 2: Overview of Irvine Lake from Santiago Dam. October 21, 2020.



Photo 3: Top of existing spillway channel. February 25, 2020.



Photo 4: Existing dam embankment and Irvine Lake. February 25, 2020.



Photo 5: Santiago Creek channel upstream of Irvine Lake. October 20, 2020.



Photo 6: Santiago Creek discharging into Irvine Lake. October 21, 2020.

D:\Projects\3IRW\SantiagoCreek\Graphics\JD\Att_SP2.ai



Photo 7: Santiago Creek below spillway channel. February 25, 2020.



Photo 8: Santiago Creek at existing Irvine Lake Pipeline. February 25, 2020.



Photo 9: Downstream end of Santiago Creek. March 24, 2020.



Photo 10: Pipe culvert leading into Drainage 1. March 24, 2020.



Photo 11: Drainage 3, a concrete- and riprap-lined tributary to Santiago Creek. February 25, 2020.



Photo 12: Drainage 4 at access road. October 21, 2020.



Photo 13: Drainage 5. October 21, 2020.



Photo 14: Drainage 6. October 21, 2020.



Photo 15: Drainage 7. October 21, 2020.



Photo 16: Drainage 8. October 20, 2020.



Photo 17: Drainage 9. October 14, 2020.



Photo 18: Drainage 10. October 14, 2020.

D:\Projects\3\IRW\SantiagoCreek\Graphics\JD\Att_SP4.ai



Photo 19: Drainage 11. October 14, 2020.



Photo 20: Drainage 12. October 14, 2020.



Photo 21: Drainage 13. October 14, 2020.



Photo 22: Drainage 14. October 14, 2020.



Photo 23: Downstream end of Drainage 15. October 14, 2020.



Photo 24: Ordinary High Water Mark is indicated by staining on the existing dam embankment. October 21, 2020.

Representative Photographs

Santiago Creek Dam Improvement Project

Attachment C-4



D:\Projects\3IRW\SantiagoCreek\Graphics\JD\Att_SP5.ai



Photo 25: Ordinary High Water Mark is indicated by drift deposits around Irvine Lake. October 14, 2020.



Photo 26: Sampling Point 1 in Santiago Creek downstream of the dam. March 24, 2020.



Photo 27: Sampling Point 2 at the downstream end of Drainage 9. October 14, 2020.



Photo 28: Sampling Point 3 on the western edge of Irvine Lake. October 14, 2020.



Photo 29: Sampling Point 4 on the western edge of Irvine Lake. October 14, 2020.



Photo 30: Sampling Point 5 on the western edge of Irvine Lake just above the Ordinary High Water Mark. October 14, 2020.

Representative Photographs

Santiago Creek Dam Improvement Project

Attachment C-5



ATTACHMENT D

RWQCB AND CDFW JURISDICTIONAL RESOURCES DETAIL

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprxAtt_JD_Drainage_Detail_CDFW



CDFW Jurisdictional Waters Detail – Drainages 4, 5

Attachment D-2a

Santiago Creek Dam Improvement Project

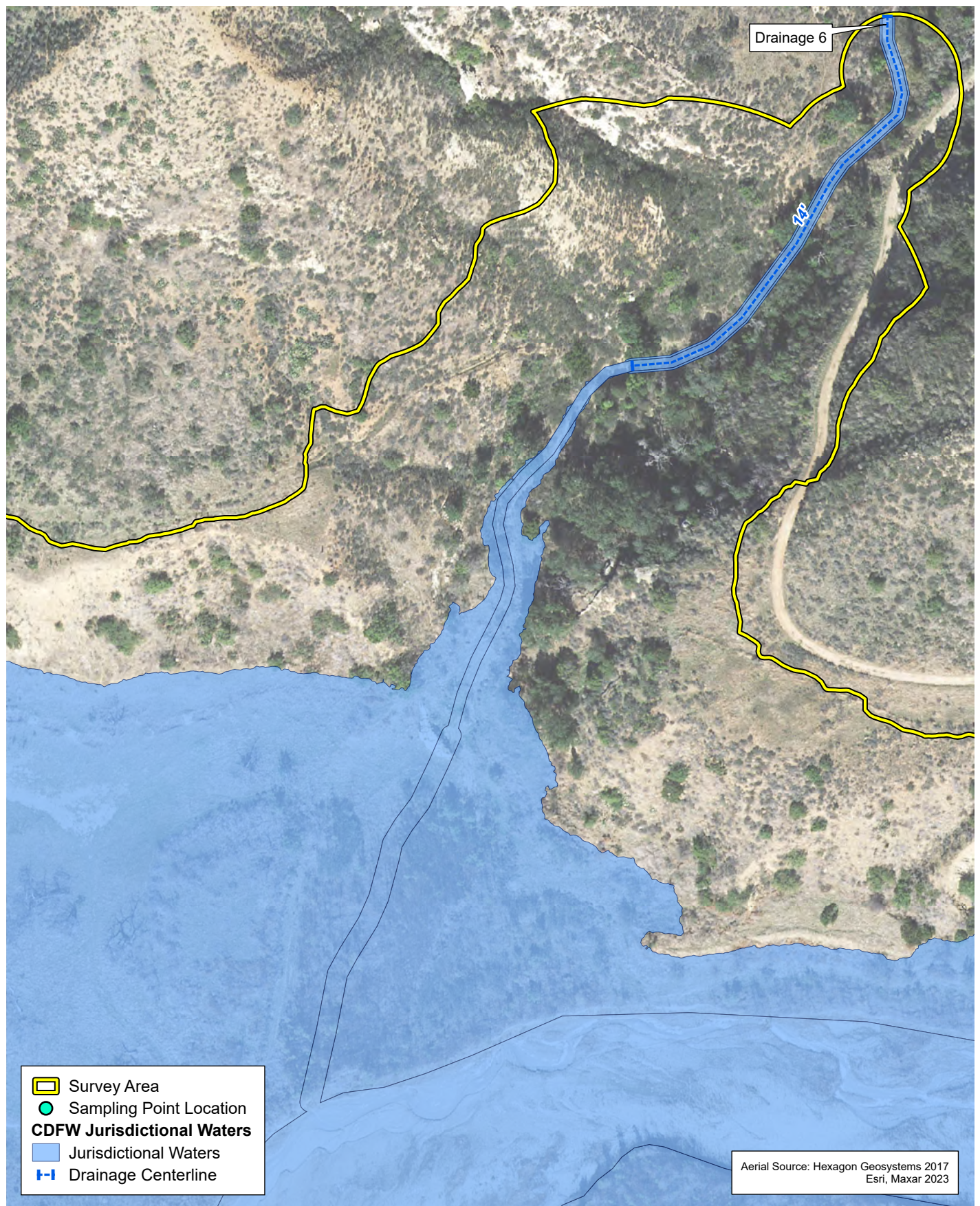


0 50 100
Feet



(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\Att_JD_Drainage_Detail_CDFW.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprxAtt_JD_Drainage_Detail_CDFW



CDFW Jurisdictional Waters Detail – Drainage 6

Attachment D-2b

Santiago Creek Dam Improvement Project



0 50 100
Feet



(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\Att_JD_Drainage_Detail_CDFW.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprxAtt_JD_Drainage_Detail_CDFW



CDFW Jurisdictional Waters Detail – Drainage 7

Attachment D-2c

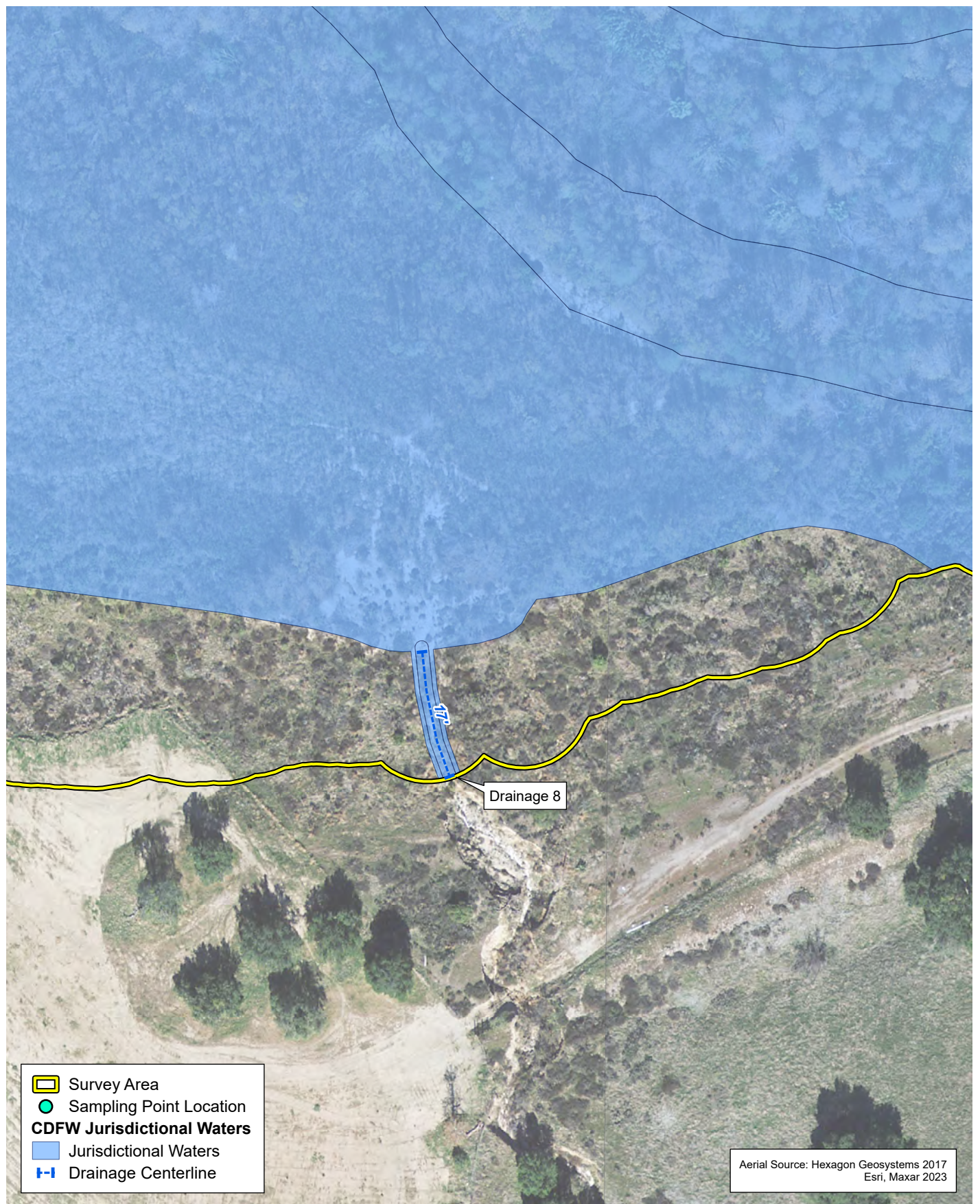
Santiago Creek Dam Improvement Project



0 50 100
Feet



D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprxAtt_JD_Drainage_Detail_CDFW



CDFW Jurisdictional Waters Detail – Drainage 8

Attachment D-2d

Santiago Creek Dam Improvement Project



0 50 100
Feet



(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\Att_JD_Drainage_Detail_CDFW.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprxAtt_JD_Drainage_Detail_CDFW



CDFW Jurisdictional Waters Detail – Drainage 9

Attachment D-2e

Santiago Creek Dam Improvement Project

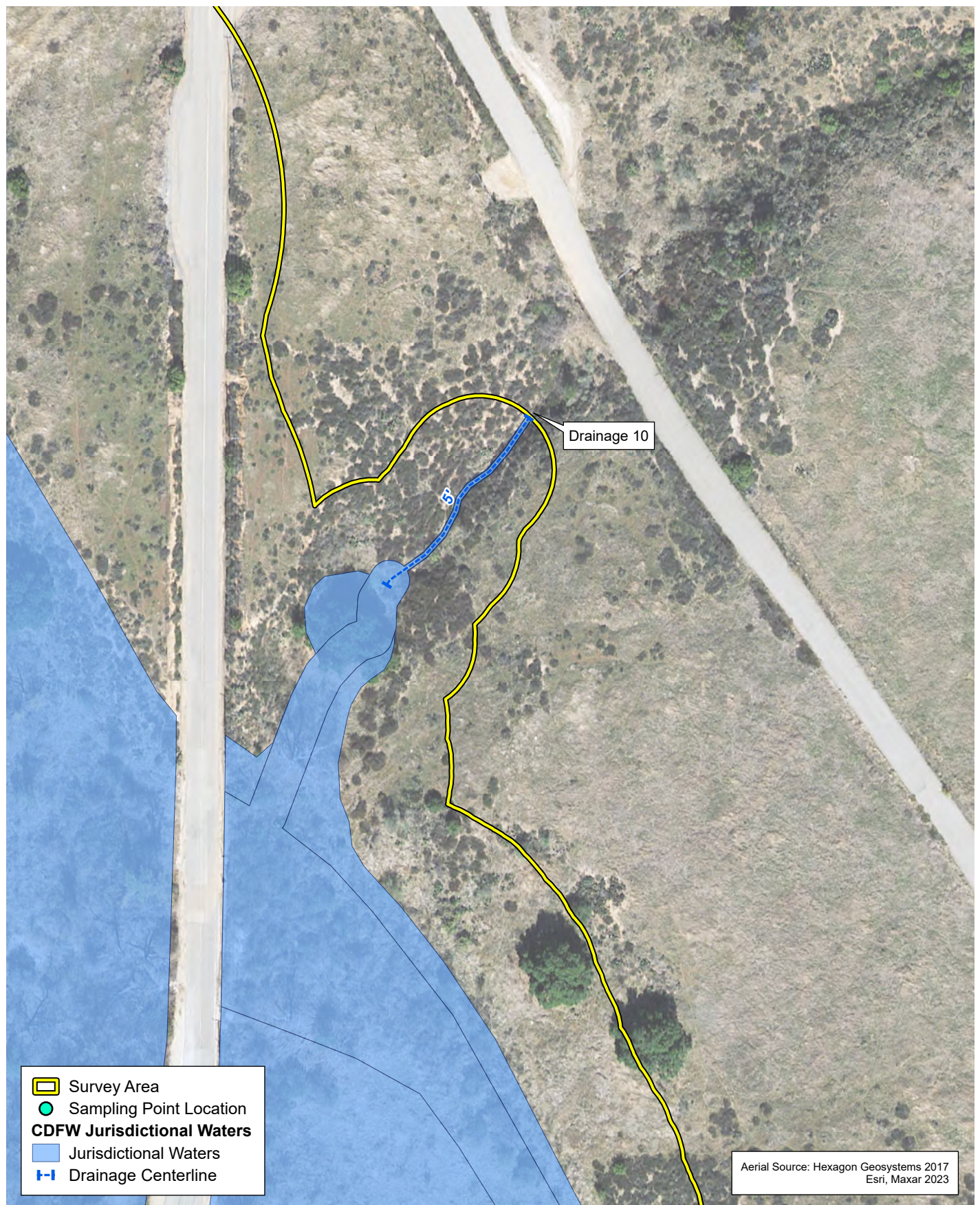


0 50 100
Feet



(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\Att_JD_Drainage_Detail_CDFW.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\Att_JD_Drainage_Detail_CDFW



CDFW Jurisdictional Waters Detail – Drainage 10

Attachment D-2f

Santiago Creek Dam Improvement Project

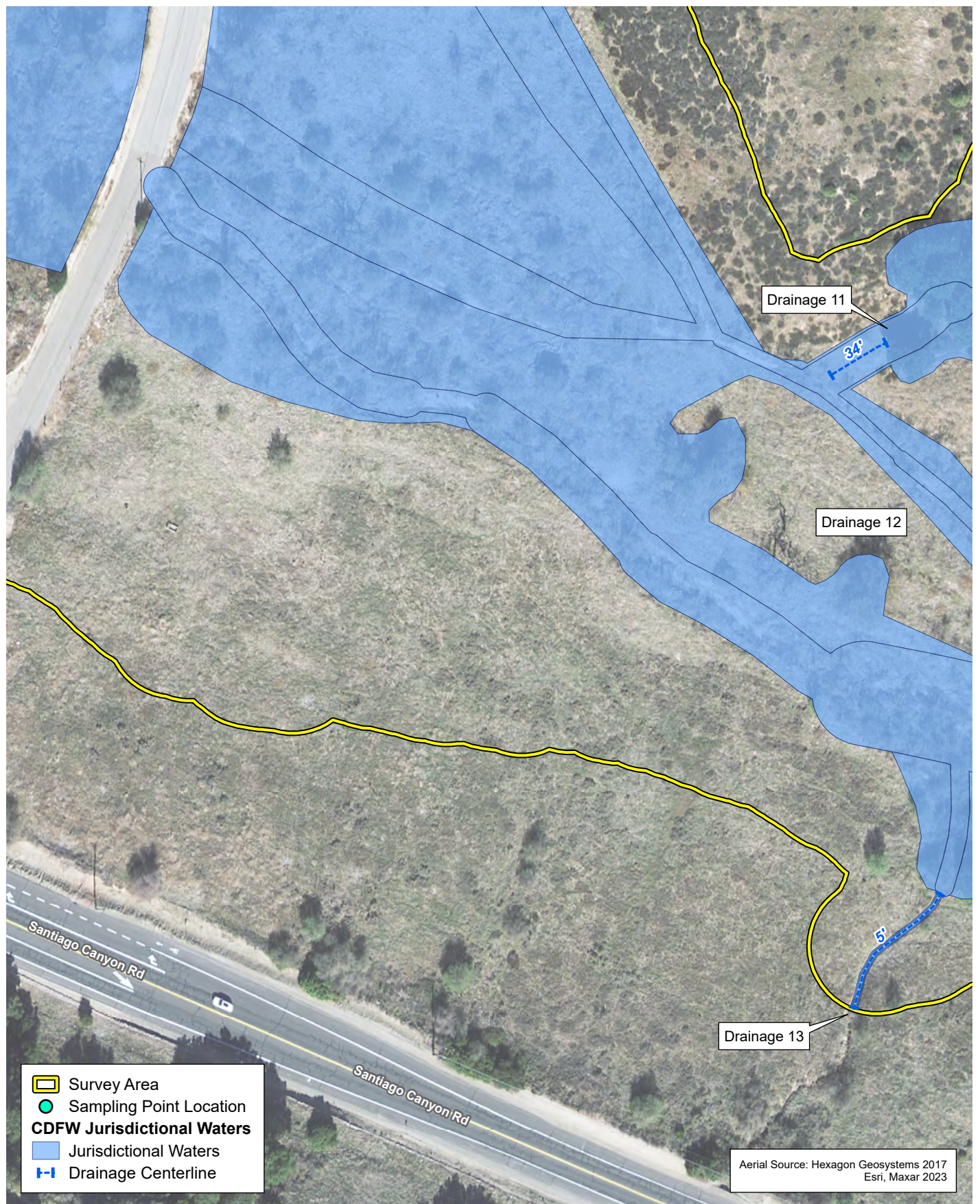


0 50 100
Feet



(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\Att_JD_Drainage_Detail_CDFW.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\Att_JD_Drainage_Detail_CDFW



CDFW Jurisdictional Waters Detail – Drainages 11, 12, 13

Attachment D-2g

Santiago Creek Dam Improvement Project

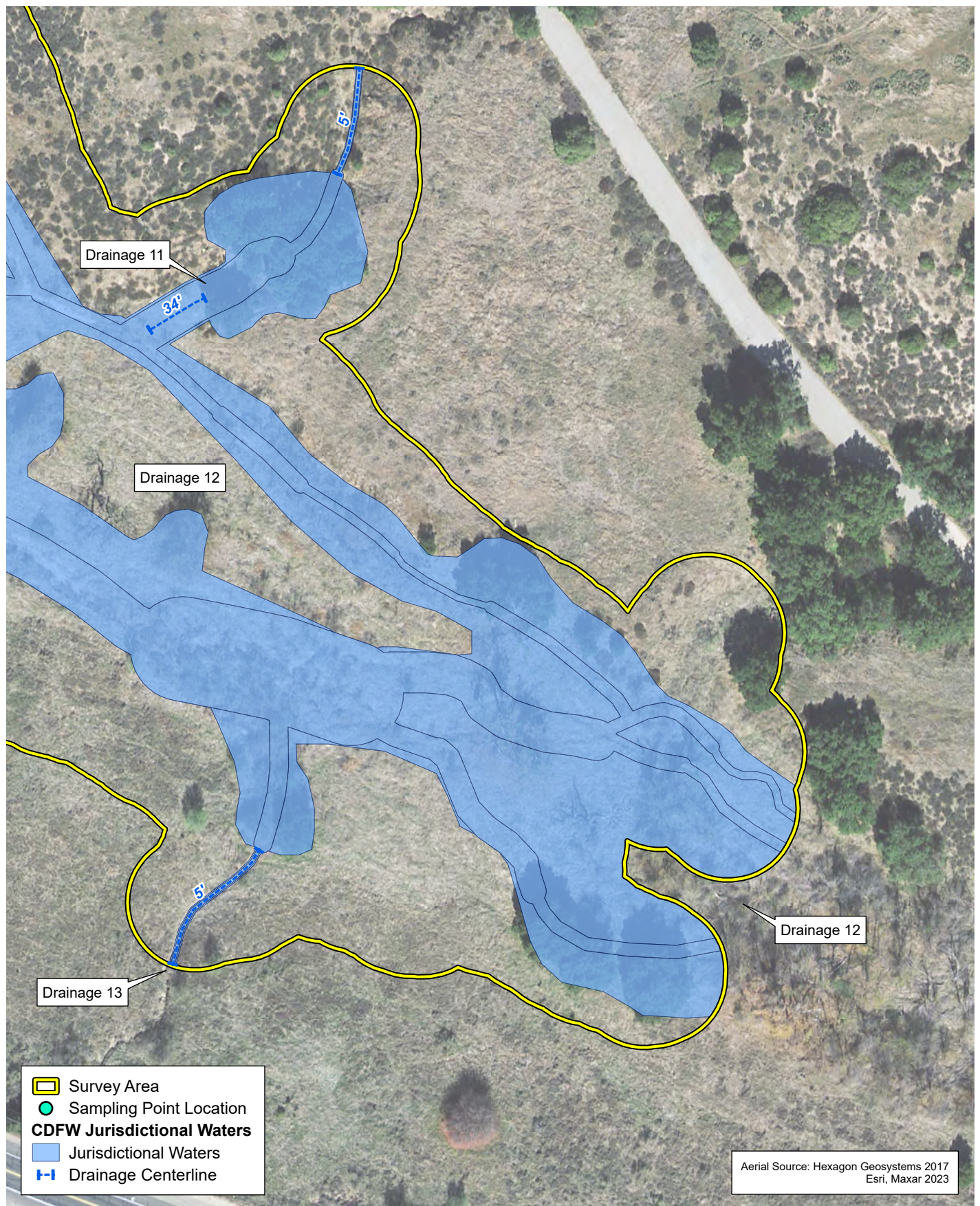


0 50 100
Feet



(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\Att_JD_Drainage_Detail_CDFW.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprxAtt_JD_Drainage_Detail_CDFW



CDFW Jurisdictional Waters Detail – Drainages 11, 12, 13

Attachment D-2h

Santiago Creek Dam Improvement Project



0 50 100
Feet



(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\Att_JD_Drainage_Detail_CDFW.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\Att_JD_Drainage_Detail_CDFW



CDFW Jurisdictional Waters Detail – Drainage 14

Attachment D-2i

Santiago Creek Dam Improvement Project

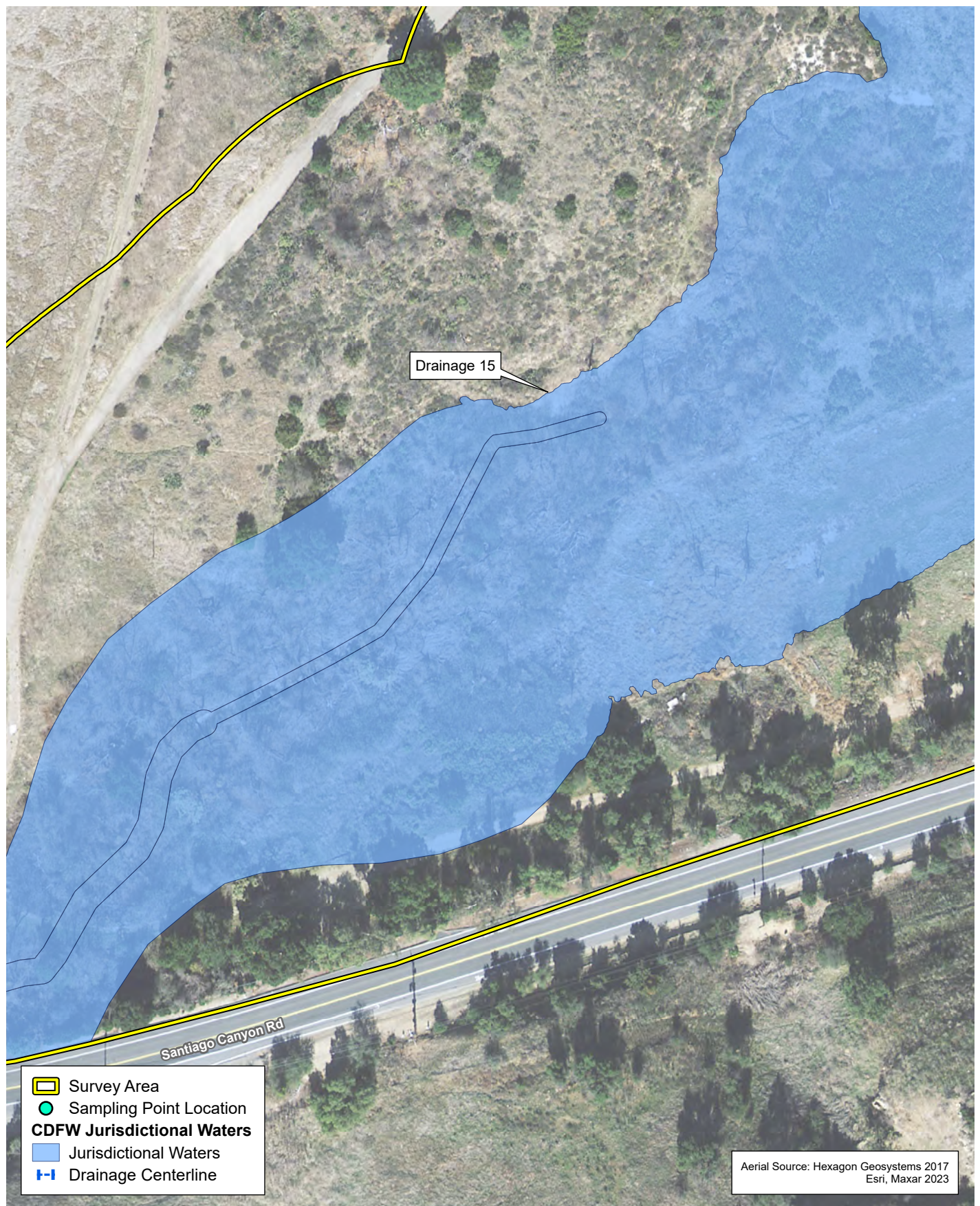


0 50 100
Feet



(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\Att_JD_Drainage_Detail_CDFW.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprxAtt_JD_Drainage_Detail_CDFW



CDFW Jurisdictional Waters Detail – Drainage 15

Attachment D-2j

Santiago Creek Dam Improvement Project



0 50 100
Feet



(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\Att_JD_Drainage_Detail_CDFW.pdf

D:\Projects\3IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\Att_JD_Drainage_Detail_CDFW



CDFW Jurisdictional Waters Detail – Drainage 15

Attachment D-2k

Santiago Creek Dam Improvement Project

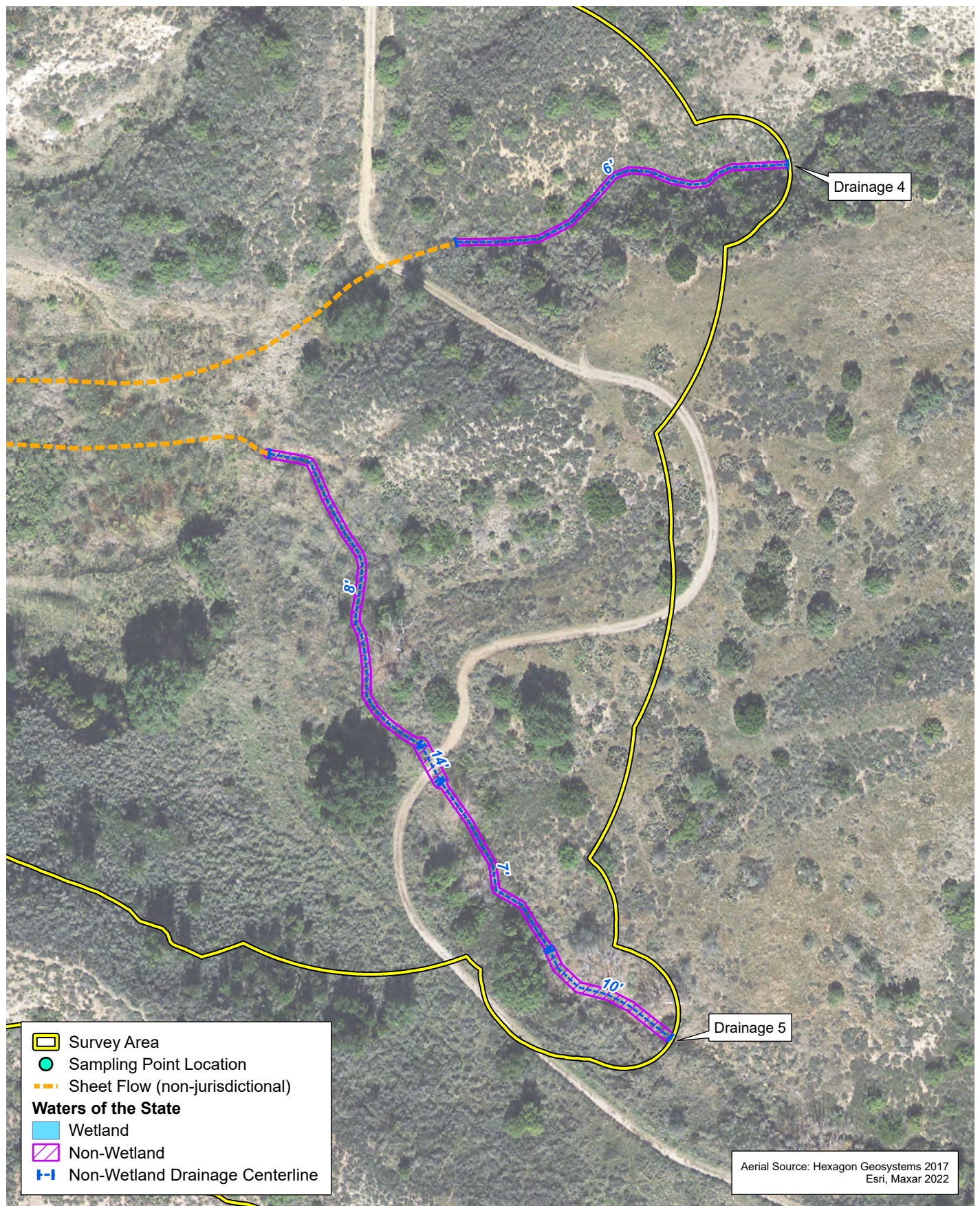


0 50 100
Feet



(Rev: 02/27/2025 JVR) R:\Projects\IRW_IRWD\3IRW010205\Graphics\JD\Att_JD_Drainage_Detail_CDFW.pdf

D:\Projects\3\RW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\Att_JD_Drainage_Detail_RWQCB



RWQCB Waters of the State Detail – Drainages 4, 5

Attachment D-1a

Santiago Creek Dam Improvement Project

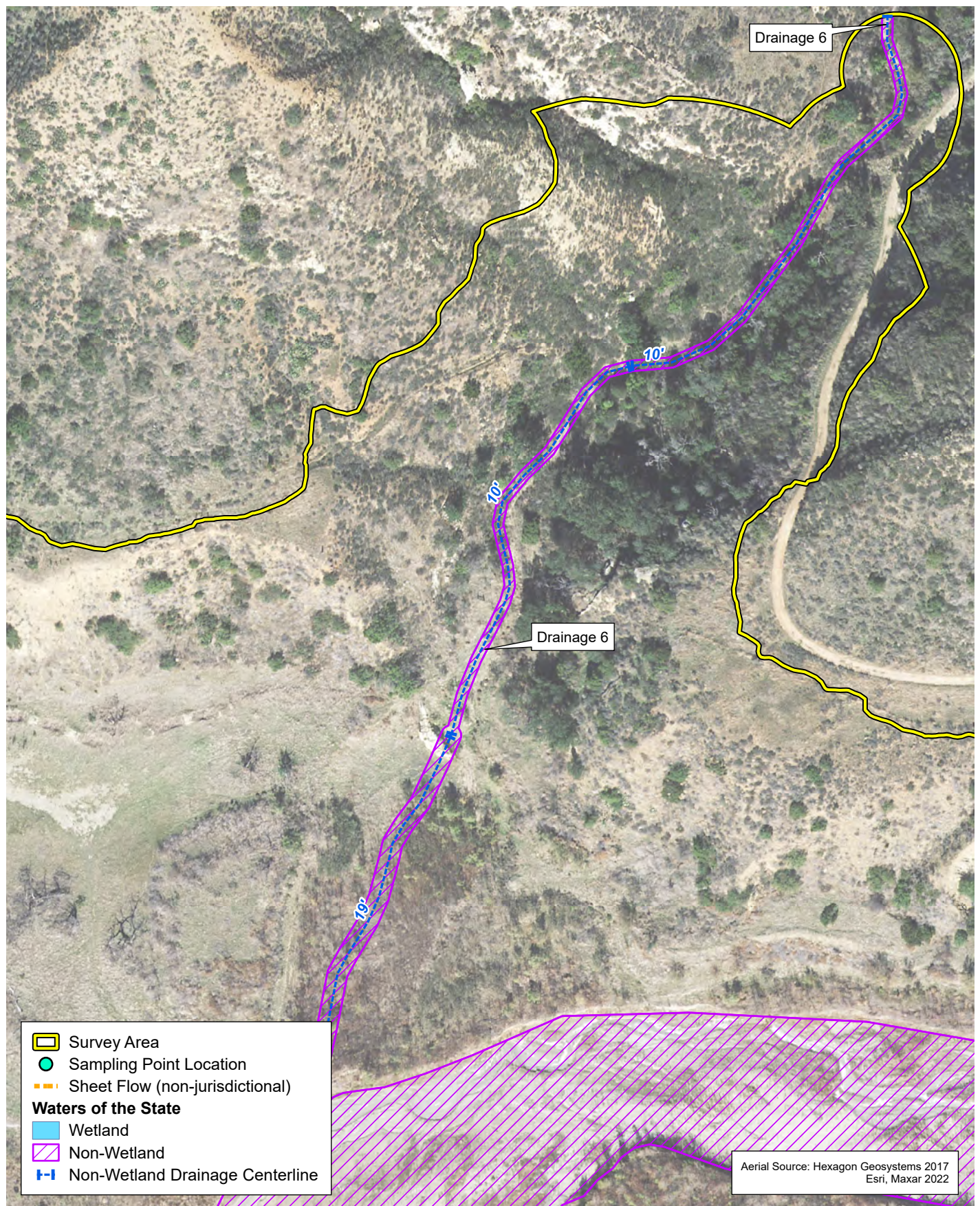


0 50 100
Feet



(Rev: 2-27-2025 JVR) R:\Projects\IRW\IRWD\3\RW010205\Graphics\JD\Att_JD_Drainage_Detail_RWQCB.pdf

D:\Projects\3\IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprxAtt_JD_Drainage_Detail_RWQCB



RWQCB Waters of the State Detail – Drainage 6

Attachment D-1b

Santiago Creek Dam Improvement Project

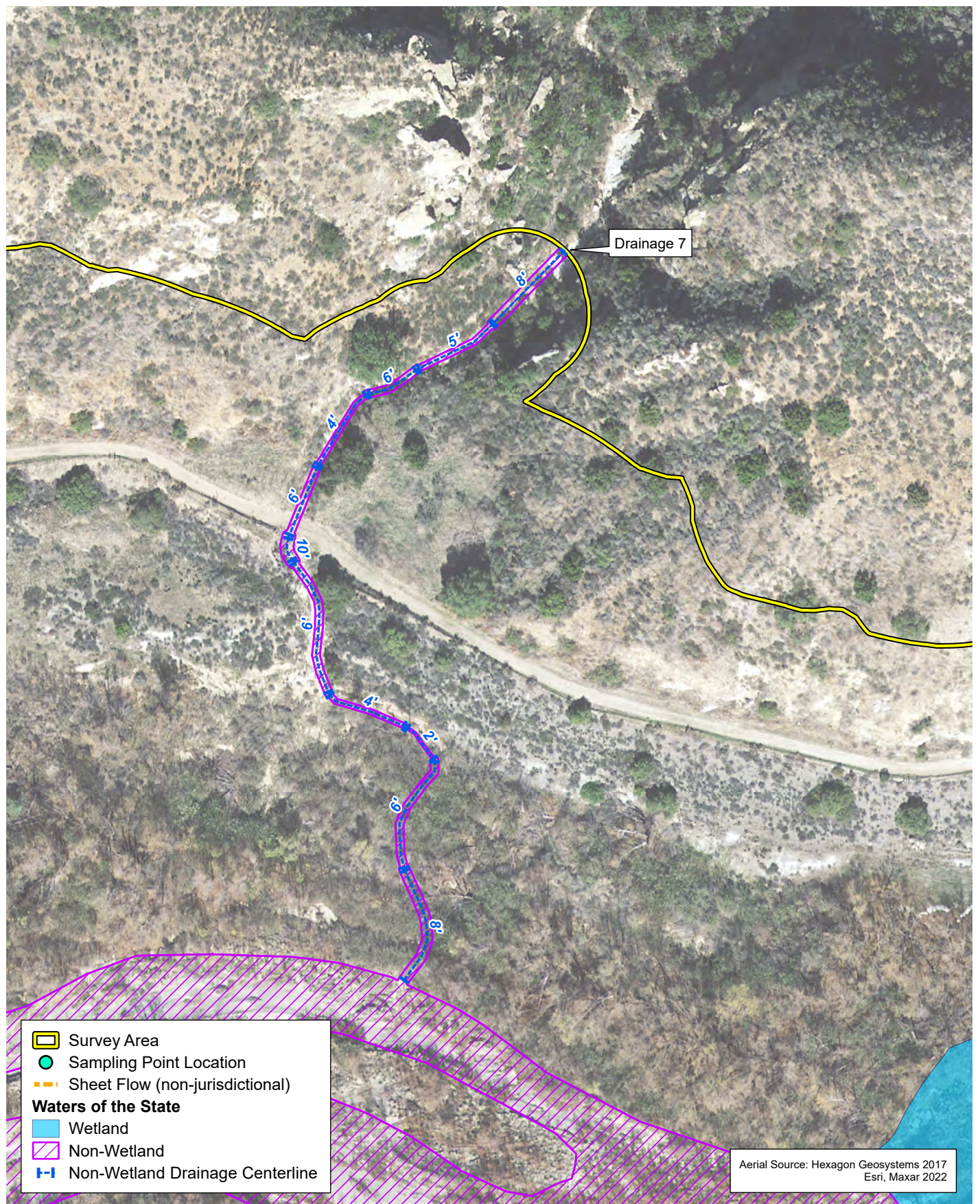


0 50 100
Feet



(Rev: 2-27-2025 JVR) R:\Projects\IRW\IRWD\3\IRW010205\Graphics\JD\Att_JD_Drainage_Detail_RWQCB.pdf

D:\Projects\3\RW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\Att_JD_Drainage_Detail_RWQCB



RWQCB Waters of the State Detail – Drainage 7

Attachment D-1c

Santiago Creek Dam Improvement Project

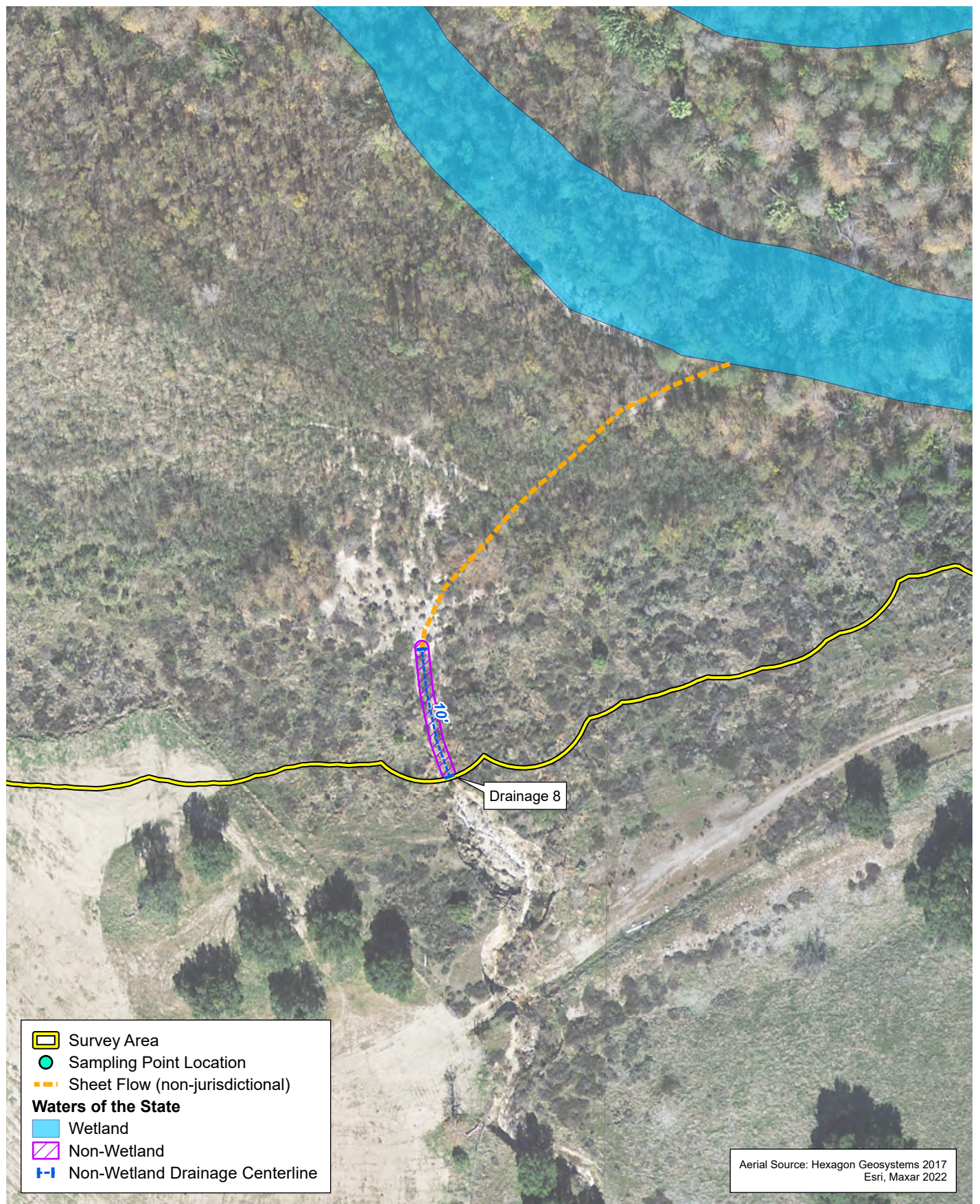


0 50 100
Feet



(Rev: 2-27-2025 JVR) R:\Projects\IRW IRWD\3\RW010205\Graphics\JD\Att_JD_Drainage_Detail_RWQCB.pdf

D:\Projects\3\RW\SantiagoCreek\PRO\SCD\SCD_Project.aprxAtt_JD_Drainage_Detail_RWQCB



RWQCB Waters of the State Detail – Drainage 8

Attachment D-1d

Santiago Creek Dam Improvement Project

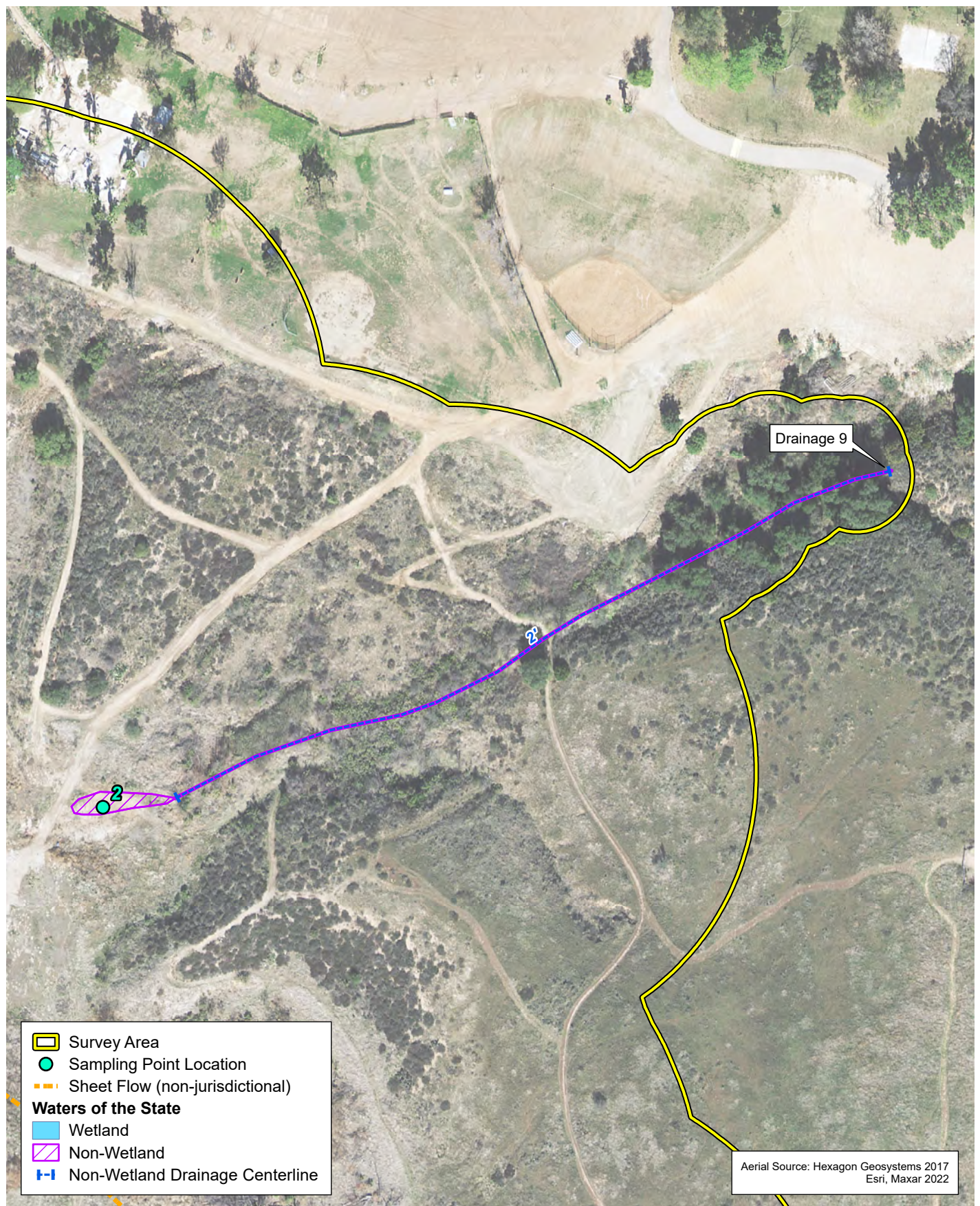


0 50 100
Feet



(Rev: 2-27-2025 JVR) R:\Projects\IRW\IRWD\3\RW010205\Graphics\JD\Att_JD_Drainage_Detail_RWQCB.pdf

D:\Projects\3\RW\SantiagoCreek\PRO\SCD\SCD_Project.aprxAtt_JD_Drainage_Detail_RWQCB



RWQCB Waters of the State Detail – Drainage 9

Attachment D-1e

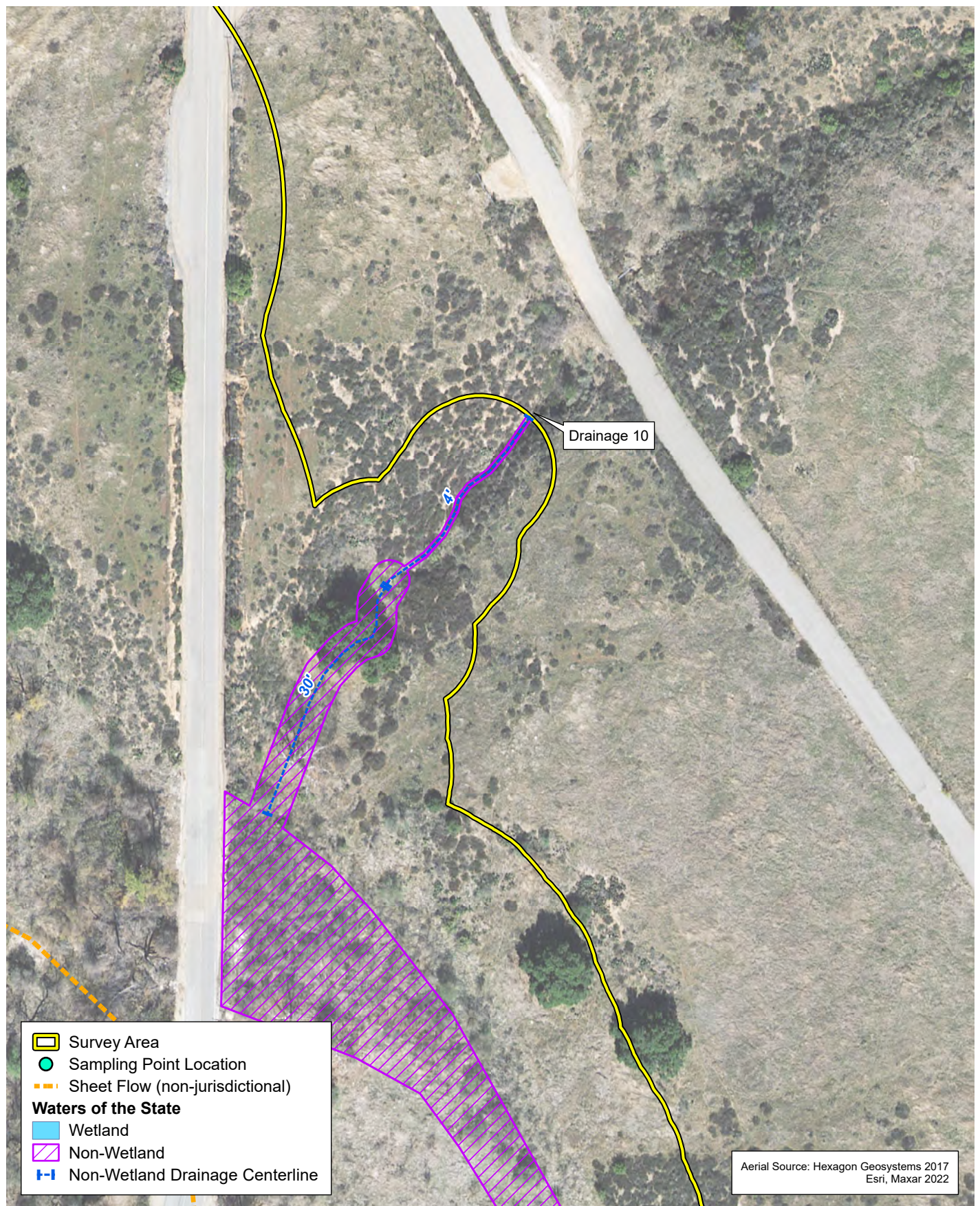
Santiago Creek Dam Improvement Project



0 50 100
Feet



D:\Projects\3\RW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\Att_JD_Drainage_Detail_RWQCB



RWQCB Waters of the State Detail – Drainage 10

Attachment D-1f

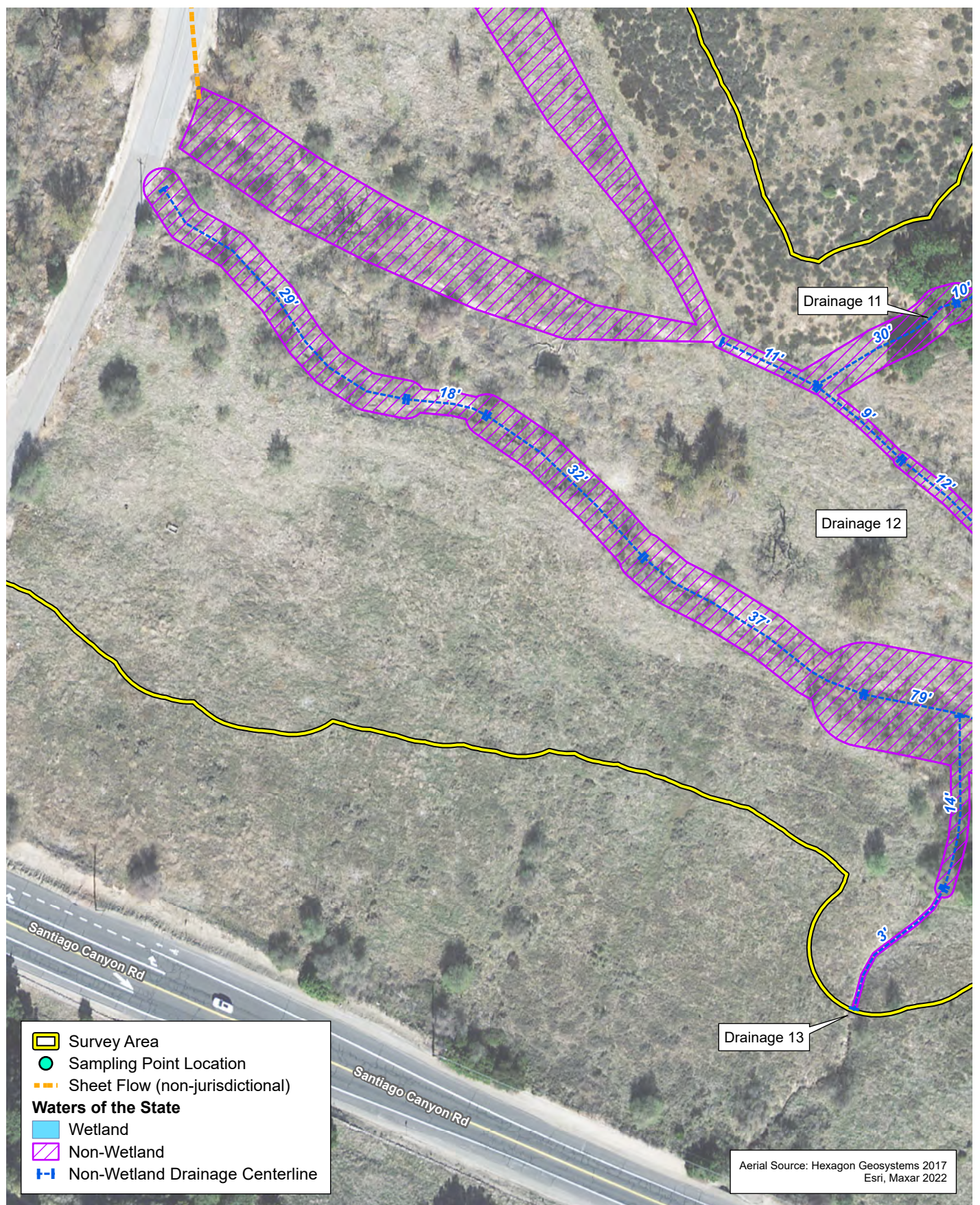
Santiago Creek Dam Improvement Project



0 50 100
Feet



D:\Projects\3\RW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\Att_JD_Drainage_Detail_RWQCB



RWQCB Waters of the State Detail – Drainages 11, 12, 13

Attachment D-1g

Santiago Creek Dam Improvement Project

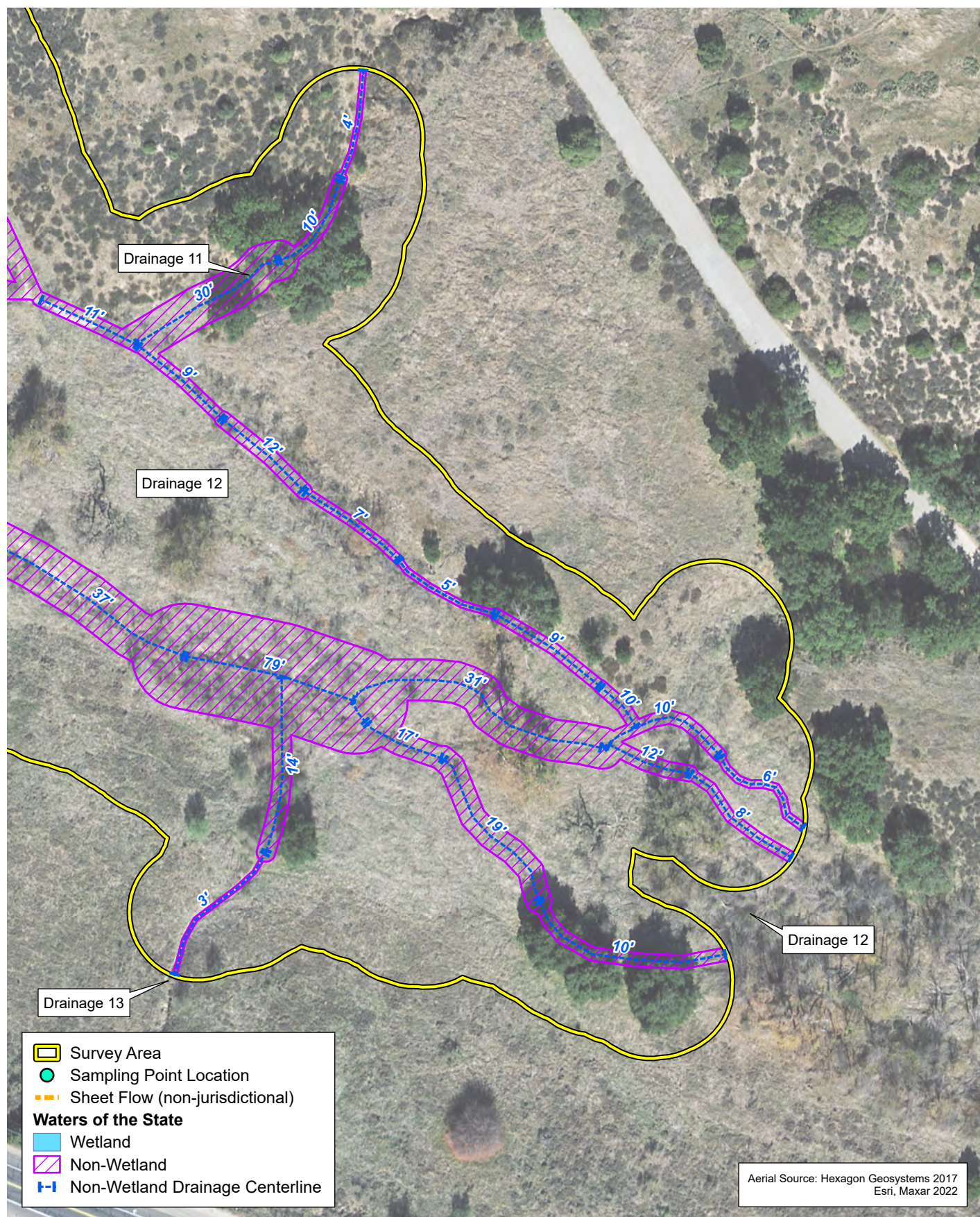


0 50 100
Feet



(Rev: 2-27-2025 JVR) R:\Projects\IRW\IRWD\3\RW010205\Graphics\JD\Att_JD_Drainage_Detail_RWQCB.pdf

D:\Projects\3\RW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\Att_JD_Drainage_Detail_RWQCB



RWQCB Waters of the State Detail – Drainages 11, 12, 13

Attachment D-1h

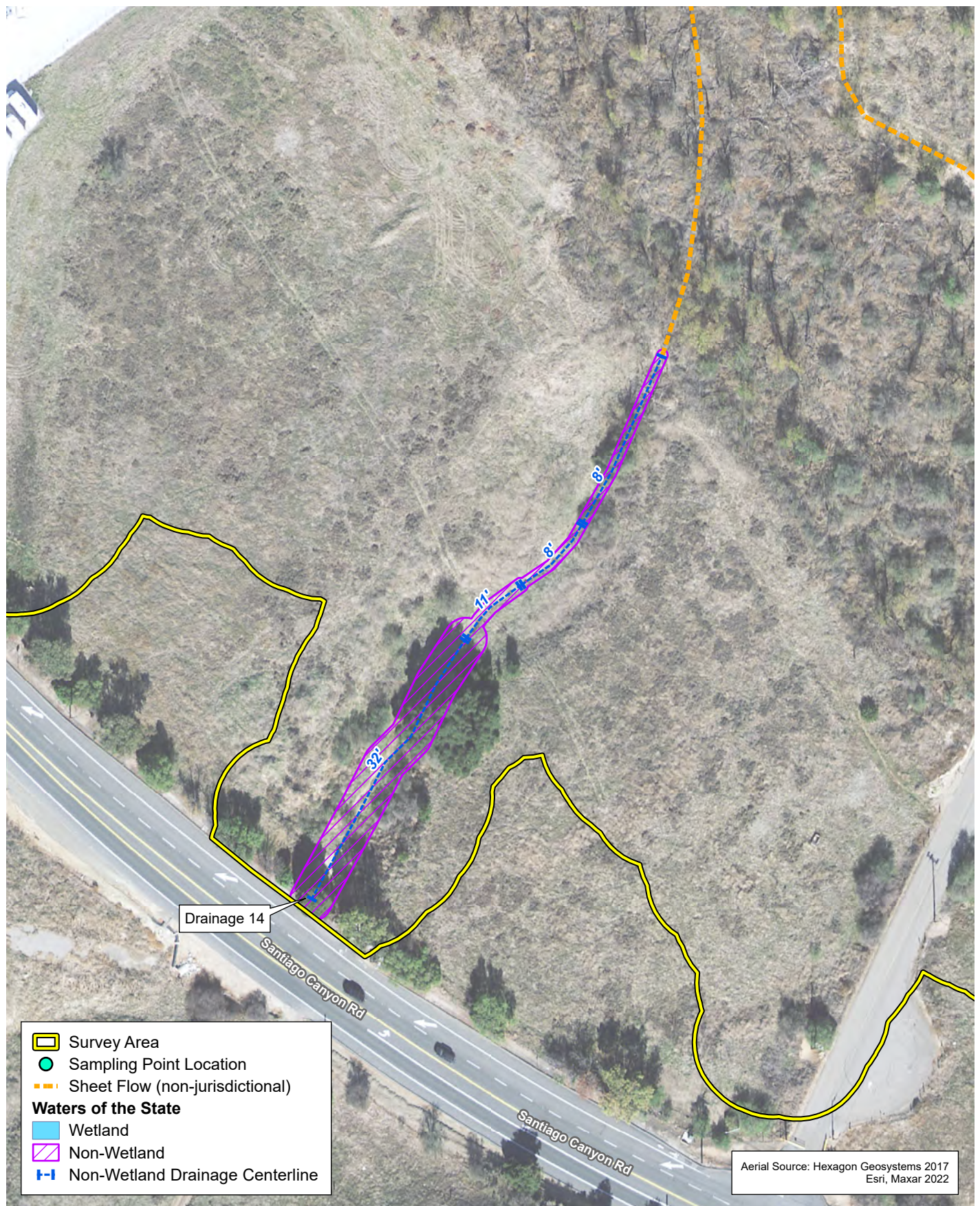
Santiago Creek Dam Improvement Project



0 50 100
Feet

PSOMAS

D:\Projects\3\IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\Att_JD_Drainage_Detail_RWQCB



RWQCB Waters of the State Detail – Drainage 14

Attachment D-1i

Santiago Creek Dam Improvement Project

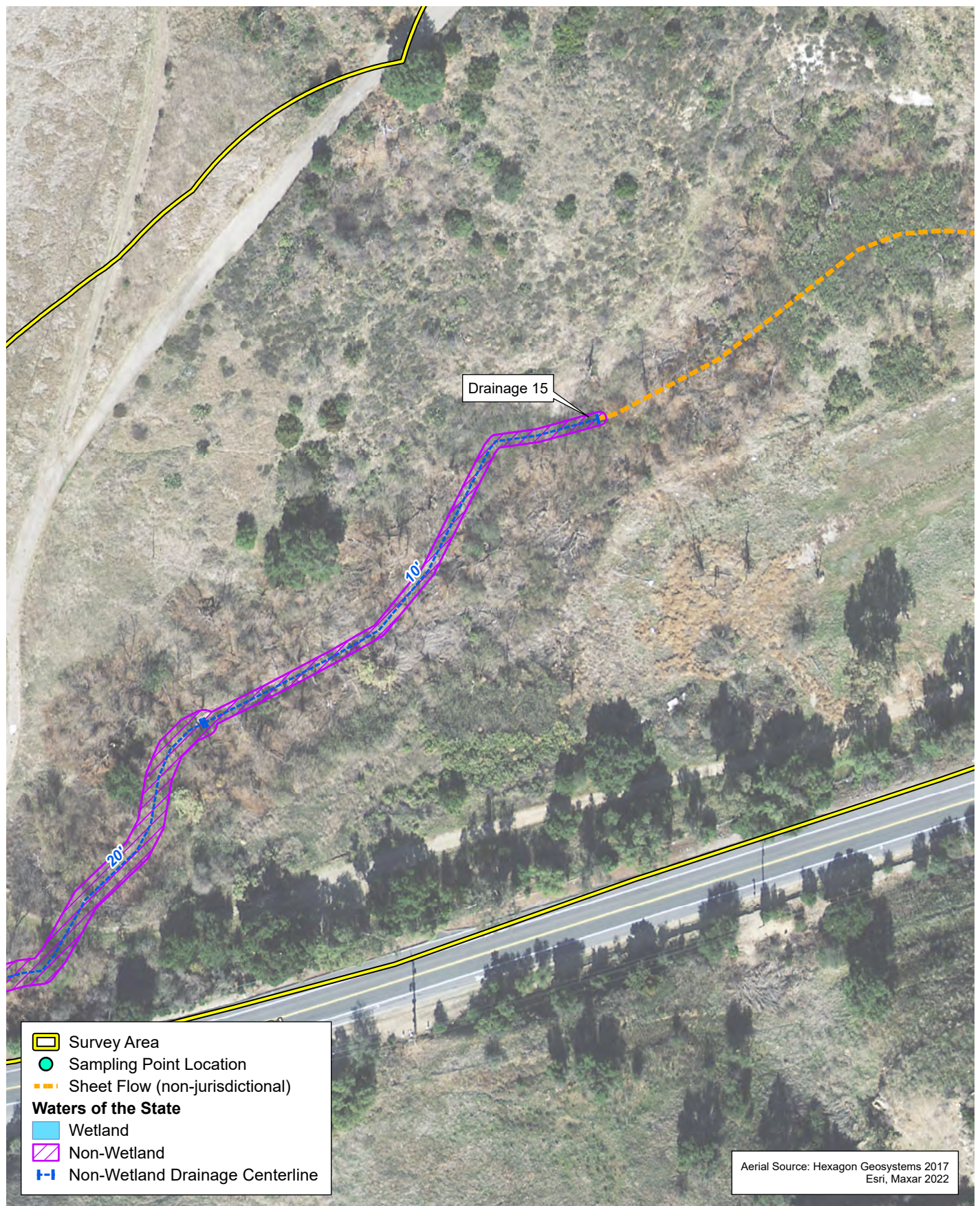


0 50 100
Feet



(Rev: 2-27-2025 JVR) R:\Projects\IRW\IRWD\3\IRW010205\Graphics\JD\Att_JD_Drainage_Detail_RWQCB.pdf

D:\Projects\3\RW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\Att_JD_Drainage_Detail_RWQCB



RWQCB Waters of the State Detail – Drainage 15

Attachment D-1j

Santiago Creek Dam Improvement Project

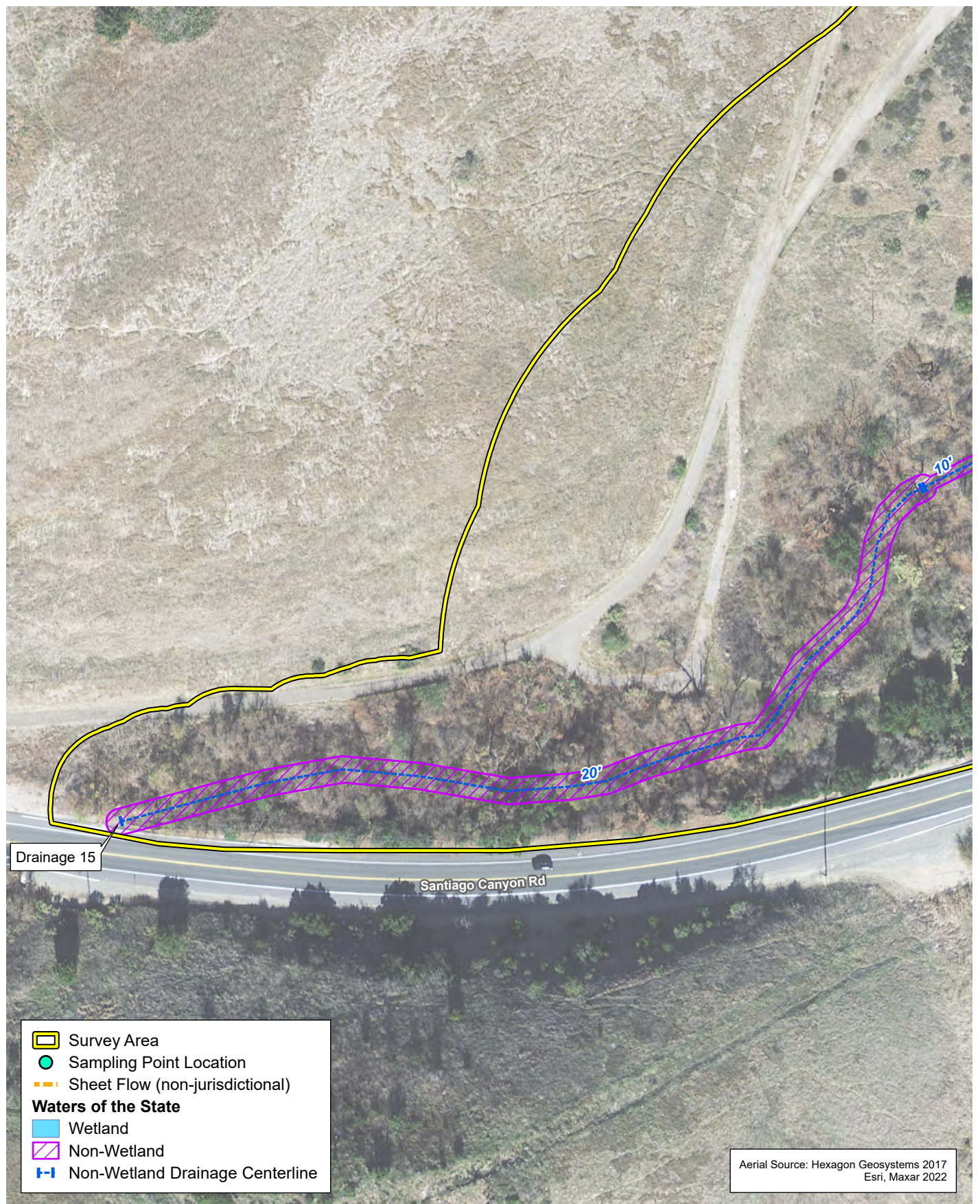


0 50 100
Feet



(Rev: 2-27-2025 JVR) R:\Projects\IRW\IRWD\3\RW010205\Graphics\JD\Att_JD_Drainage_Detail_RWQCB.pdf

D:\Projects\3\IRW\SantiagoCreek\PRO\SCD\SCD_Project.aprx\Att_JD_Drainage_Detail_RWQCB



RWQCB Waters of the State Detail – Drainage 15

Attachment D-1k

Santiago Creek Dam Improvement Project



0 50 100
Feet



(Rev: 2-27-2025 JVR) R:\Projects\IRW\IRWD\3\IRW010205\Graphics\JD\Att_JD_Drainage_Detail_RWQCB.pdf

ATTACHMENT E
DATASHEETS

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Santiago Creek Dam City/County: unincorporated Orange Co. Sampling Date: 3/24/2020
 Applicant/Owner: IRWD State: CA Sampling Point: 1
 Investigator(s): ARudaknige Section, Township, Range: 28, T04S, R08W
 Landform (hillslope, terrace, etc.): canyon Local relief (concave, convex, none): concave Slope (%): 1
 Subregion (LRR): California Lat: 33.78804° Long: -117.72701° Datum: NAD 83
 Soil Map Unit Name: Anaheim clay loam, 50-75% slopes NWI classification: R4SBC

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)
 Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐
 Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ☒ No ☐
 Hydric Soil Present? Yes ☐ No ☒
 Wetland Hydrology Present? Yes ☒ No ☐

Is the Sampled Area
within a Wetland?

Yes ☐ No ☒

Remarks: Sampling point is in a steep canyon below the Santiago Dam spillway

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30')
 1. Salix gooddingii Absolute % Cover: 40 Dominant Species? Y Indicator Status: FACW
 2. Populus fremontii Absolute % Cover: 5 Dominant Species? N Indicator Status: UPL
 3.
 4.
45 = Total Cover

Sapling/Shrub Stratum (Plot size: 5')
 1. Baccharis salicifolia ssp. S. Absolute % Cover: 1 Dominant Species? N Indicator Status: FAC
 2.
 3.
 4.
 5.
1 = Total Cover

Herb Stratum (Plot size: 5')
 1. Typha sp. * Absolute % Cover: 5 Dominant Species? N Indicator Status: OBL
 2. Bromus rubens Absolute % Cover: 10 Dominant Species? Y Indicator Status: UPL
 3. Pulicaria paludosa Absolute % Cover: 20 Dominant Species? Y Indicator Status: FAC
 4. Melilotus albus Absolute % Cover: 1 Dominant Species? N Indicator Status: UPL
 5.
 6.
 7.
 8.
36 = Total Cover

Woody Vine Stratum (Plot size: 30')
 1.
 2.
0 = Total Cover

% Bare Ground in Herb Stratum 64 % Cover of Biotic Crust 0

Remarks:

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 66.6% (A/B)

Prevalence Index worksheet:

Total % Cover of: Multiply by:
 OBL species ☐ x 1 = ☐
 FACW species ☐ x 2 = ☐
 FAC species ☐ x 3 = ☐
 FACU species ☐ x 4 = ☐
 UPL species ☐ x 5 = ☐
 Column Totals: (A) ☐ (B) ☐

Prevalence Index = B/A = ☐

Hydrophytic Vegetation Indicators:

☒ Dominance Test is >50%
☐ Prevalence Index is ≤3.0¹
☐ Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)
☐ Problematic Hydrophytic Vegetation¹ (Explain)

¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic
Vegetation
Present?

Yes ☒ No ☐

SOIL

Sampling Point: 1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features			Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹		
0-2	10YR 4/2	100				loamy clay	
2-12	10YR 4/4	100				loamy clay	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains.²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

Indicators for Problematic Hydric Soils³:

- ☐ Histosol (A1)
☐ Histic Epipedon (A2)
☐ Black Histic (A3)
☐ Hydrogen Sulfide (A4)
☐ Stratified Layers (A5) (LRR C)
☐ 1 cm Muck (A9) (LRR D)
☐ Depleted Below Dark Surface (A11)
☐ Thick Dark Surface (A12)
☐ Sandy Mucky Mineral (S1)
☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
☐ Stripped Matrix (S6)
☐ Loamy Mucky Mineral (F1)
☐ Loamy Gleyed Matrix (F2)
☐ Depleted Matrix (F3)
☐ Redox Dark Surface (F6)
☐ Depleted Dark Surface (F7)
☐ Redox Depressions (F8)
☐ Vernal Pools (F9)

- ☐ 1 cm Muck (A9) (LRR C)
☐ 2 cm Muck (A10) (LRR B)
☐ Reduced Vertic (F18)
☐ Red Parent Material (TF2)
☐ Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

 Type: rock & roots
 Depth (inches): 12
Hydric Soil Present? Yes ☐ No ☒

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☒ Surface Water (A1)
☒ High Water Table (A2)
☒ Saturation (A3)
☐ Water Marks (B1) (Nonriverine)
☐ Sediment Deposits (B2) (Nonriverine)
☐ Drift Deposits (B3) (Nonriverine)
☐ Surface Soil Cracks (B6)
☐ Inundation Visible on Aerial Imagery (B7)
☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
☐ Biotic Crust (B12)
☐ Aquatic Invertebrates (B13)
☐ Hydrogen Sulfide Odor (C1)
☐ Oxidized Rhizospheres along Living Roots (C3)
☐ Presence of Reduced Iron (C4)
☐ Recent Iron Reduction in Tilled Soils (C6)
☐ Thin Muck Surface (C7)
☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (Riverine)
☒ Sediment Deposits (B2) (Riverine)
☐ Drift Deposits (B3) (Riverine)
☐ Drainage Patterns (B10)
☐ Dry-Season Water Table (C2)
☐ Crayfish Burrows (C8)
☐ Saturation Visible on Aerial Imagery (C9)
☐ Shallow Aquitard (D3)
☐ FAC-Neutral Test (D5)

Field Observations:

 Surface Water Present? Yes ☒ No ☐ Depth (inches): 6"
 Water Table Present? Yes ☒ No ☐ Depth (inches): 4"
 Saturation Present? Yes ☒ No ☐ Depth (inches): 1"
 (includes capillary fringe)
Wetland Hydrology Present? Yes ☒ No ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

sampled following a rain event.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Santiago Creek Dam City/County: unincorporated Orange Sampling Date: 10/14/2020
 Applicant/Owner: IRWD State: CA Sampling Point: 2
 Investigator(s): ARudalenige, J Agnayo Section, Township, Range: 804, T05S, R08W
 Landform (hillslope, terrace, etc.): toe of slope Local relief (concave, convex, none): concave Slope (%): <1%
 Subregion (LRR): California Lat: 33.768437° Long: -117.713390° Datum: NAD 83
 Soil Map Unit Name: Riverwash NWI classification: L2UBFh

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)

Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes X No

Are Vegetation , Soil , or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <u>Y</u>	No <u> </u>	Is the Sampled Area within a Wetland?	Yes <u> </u>	No <u>Y</u>
Hydric Soil Present?	Yes <u> </u>	No <u>Y</u>			
Wetland Hydrology Present?	Yes <u>Y</u>	No <u> </u>			
Remarks: <u>Sampling point is at downstream end of drainage south of Irvine Lake.</u>					

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>1</u> (A) Total Number of Dominant Species Across All Strata: <u>1</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100%</u> (A/B)
1. <u> </u>				
2. <u> </u>				
3. <u> </u>				
4. <u> </u>				
<u>0</u> = Total Cover				Prevalence Index worksheet: Total % Cover of: <u> </u> Multiply by: OBL species <u> </u> x 1 = <u> </u> FACW species <u> </u> x 2 = <u> </u> FAC species <u> </u> x 3 = <u> </u> FACU species <u> </u> x 4 = <u> </u> UPL species <u> </u> x 5 = <u> </u> Column Totals: <u> </u> (A) <u> </u> (B) Prevalence Index = B/A = <u> </u>
Sapling/Shrub Stratum (Plot size: <u>5'</u>)				
1. <u> </u>				
2. <u> </u>				
3. <u> </u>				
<u>0</u> = Total Cover				
Herb Stratum (Plot size: <u>5'</u>)				Hydrophytic Vegetation Indicators: <u>X</u> Dominance Test is >50% <u> </u> Prevalence Index is ≤3.0 ¹ <u> </u> Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <u> </u> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
1. <u>Cyperus cf. eragrostis</u>	<u>40</u>	<u>Y</u>	<u>FACW</u>	
2. <u>Rumex crispus</u>	<u>2</u>	<u>N</u>	<u>FAC</u>	
3. <u>Heliotropium curassavicum</u>	<u>2</u>	<u>N</u>	<u>FACU</u>	
4. <u> var. oculatum</u>				
5. <u>Epilobium ciliatum</u>	<u>1</u>	<u>N</u>	<u>FACW</u>	
6. <u> </u>				
7. <u> </u>				
8. <u> </u>				
<u>45</u> = Total Cover				
Woody Vine Stratum (Plot size: <u>30'</u>)				
1. <u> </u>				
2. <u> </u>				
<u>0</u> = Total Cover				
% Bare Ground in Herb Stratum <u>55</u>	% Cover of Biotic Crust <u>0</u>	Hydrophytic Vegetation Present? Yes <u>X</u> No <u> </u>		
Remarks:				

SOIL

Sampling Point: 2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features		Type ¹	Loc ²	Texture	Remarks
	Color (moist)	%	Color (moist)	%				
0-19	5YR 4/3	95%	10BG 2.5/1	5%		M	clay	red parent material but no redox depletions or concentrations.

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains.²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

Indicators for Problematic Hydric Soils³:

- ☐ Histosol (A1)
☐ Histic Epipedon (A2)
☐ Black Histic (A3)
☐ Hydrogen Sulfide (A4)
☐ Stratified Layers (A5) (LRR C)
☐ 1 cm Muck (A9) (LRR D)
☐ Depleted Below Dark Surface (A11)
☐ Thick Dark Surface (A12)
☐ Sandy Mucky Mineral (S1)
☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
☐ Stripped Matrix (S6)
☐ Loamy Mucky Mineral (F1)
☐ Loamy Gleyed Matrix (F2)
☐ Depleted Matrix (F3)
☐ Redox Dark Surface (F6)
☐ Depleted Dark Surface (F7)
☐ Redox Depressions (F8)
☐ Vernal Pools (F9)

- ☐ 1 cm Muck (A9) (LRR C)
☐ 2 cm Muck (A10) (LRR B)
☐ Reduced Vertic (F18)
☐ Red Parent Material (TF2)
☐ Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

 Type: _____
 Depth (inches): _____
Hydric Soil Present? Yes _____ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☒ Surface Water (A1)
☐ High Water Table (A2)
☒ Saturation (A3)
☐ Water Marks (B1) (Nonriverine)
☐ Sediment Deposits (B2) (Nonriverine)
☐ Drift Deposits (B3) (Nonriverine)
☐ Surface Soil Cracks (B6)
☐ Inundation Visible on Aerial Imagery (B7)
☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
☐ Biotic Crust (B12)
☐ Aquatic Invertebrates (B13)
☐ Hydrogen Sulfide Odor (C1)
☐ Oxidized Rhizospheres along Living Roots (C3)
☐ Presence of Reduced Iron (C4)
☐ Recent Iron Reduction in Tilled Soils (C6)
☐ Thin Muck Surface (C7)
☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (Riverine)
☐ Sediment Deposits (B2) (Riverine)
☐ Drift Deposits (B3) (Riverine)
☐ Drainage Patterns (B10)
☐ Dry-Season Water Table (C2)
☐ Crayfish Burrows (C8)
☐ Saturation Visible on Aerial Imagery (C9)
☐ Shallow Aquitard (D3)
☐ FAC-Neutral Test (D5)

Field Observations:

 Surface Water Present? Yes X No _____ Depth (inches): <1
 Water Table Present? Yes X No _____ Depth (inches): 13
 Saturation Present? Yes X No _____ Depth (inches): 0
 (includes capillary fringe)
Wetland Hydrology Present? Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Santiago Creek Dam City/County: unincorporated Orange Co Sampling Date: 10/14/2020
 Applicant/Owner: IRWD State: CA Sampling Point: 3
 Investigator(s): ARudalevige, J Agnayo Section, Township, Range: S 33 T04S R08W
 Landform (hillslope, terrace, etc.): lakebed Local relief (concave, convex, none): concave Slope (%): 0
 Subregion (LRR): California Lat: 33.773677 Long: -117.721168 Datum: NAD83
 Soil Map Unit Name: Water NWI classification: L1UBHh

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
 Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes X No
 Are Vegetation X, Soil , or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <u>X</u> No <u> </u>	Is the Sampled Area within a Wetland? Yes <u>X</u> No <u> </u>
Hydric Soil Present?	Yes <u>X</u> No <u> </u>	
Wetland Hydrology Present?	Yes <u>X</u> No <u> </u>	
Remarks: <u>Sampling point is below OTHWM in Irvine lake above water line.</u>		

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>1</u> (A) Total Number of Dominant Species Across All Strata: <u>1</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100%</u> (A/B)
1. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
2. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
3. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
4. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
Sapling/Shrub Stratum (Plot size: <u>5'</u>)				
1. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
2. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
3. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
Herb Stratum (Plot size: <u>5'</u>)				Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Hydrophytic Vegetation Present? Yes <u> </u> No <u> </u>
1. <u>Crypsis schoenoides</u>	<u>100</u>	<u>y</u>	<u>FACW</u>	
2. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
3. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
4. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
5. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
6. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
7. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
Woody Vine Stratum (Plot size: <u>30'</u>)				
1. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
2. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
% Bare Ground in Herb Stratum <u>40</u> % Cover of Biotic Crust <u>0</u>				

SOIL

Sampling Point: 3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

[illegible]

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains.

²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

Indicators for Problematic Hydric Soils³:

- | | |
|--|--|
| <input type="checkbox"/> Histosol (A1) | <input type="checkbox"/> Sandy Redox (S5) |
| <input type="checkbox"/> Histic Epipedon (A2) | <input type="checkbox"/> Stripped Matrix (S6) |
| <input type="checkbox"/> Black Histic (A3) | <input type="checkbox"/> Loamy Mucky Mineral (F1) |
| <input type="checkbox"/> Hydrogen Sulfide (A4) | <input type="checkbox"/> Loamy Gleyed Matrix (F2) |
| <input type="checkbox"/> Stratified Layers (A5) (LRR C) | <input type="checkbox"/> Depleted Matrix (F3) |
| <input type="checkbox"/> 1 cm Muck (A9) (LRR D) | <input type="checkbox"/> Redox Dark Surface (F6) |
| <input type="checkbox"/> Depleted Below Dark Surface (A11) | <input type="checkbox"/> Depleted Dark Surface (F7) |
| <input type="checkbox"/> Thick Dark Surface (A12) | <input checked="" type="checkbox"/> Redox Depressions (F8) |
| <input type="checkbox"/> Sandy Mucky Mineral (S1) | <input type="checkbox"/> Vernal Pools (F9) |
| <input type="checkbox"/> Sandy Gleyed Matrix (S4) | |

- ☐ 1 cm Muck (A9) (**LRR C**)
☐ 2 cm Muck (A10) (**LRR B**)
☐ Reduced Vertic (F18)
☐ Red Parent Material (TF2)
☐ Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

Secondary Indicators (2 or more required)

- | | | |
|---|--|---|
| <input type="checkbox"/> Surface Water (A1) | <input type="checkbox"/> Salt Crust (B11) | <input type="checkbox"/> Water Marks (B1) (Riverine) |
| <input type="checkbox"/> High Water Table (A2) | <input type="checkbox"/> Biotic Crust (B12) | <input type="checkbox"/> Sediment Deposits (B2) (Riverine) |
| <input type="checkbox"/> Saturation (A3) | <input checked="" type="checkbox"/> Aquatic Invertebrates (B13) | <input type="checkbox"/> Drift Deposits (B3) (Riverine) |
| <input type="checkbox"/> Water Marks (B1) (Nonriverine) | <input type="checkbox"/> Hydrogen Sulfide Odor (C1) | <input type="checkbox"/> Drainage Patterns (B10) |
| <input type="checkbox"/> Sediment Deposits (B2) (Nonriverine) | <input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3) | <input type="checkbox"/> Dry-Season Water Table (C2) |
| <input type="checkbox"/> Drift Deposits (B3) (Nonriverine) | <input type="checkbox"/> Presence of Reduced Iron (C4) | <input type="checkbox"/> Crayfish Burrows (C8) |
| <input type="checkbox"/> Surface Soil Cracks (B6) | <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) | <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) |
| <input checked="" type="checkbox"/> Inundation Visible on Aerial Imagery (B7) | <input type="checkbox"/> Thin Muck Surface (C7) | <input type="checkbox"/> Shallow Aquitard (D3) |
| <input type="checkbox"/> Water-Stained Leaves (B9) | <input type="checkbox"/> Other (Explain in Remarks) | <input checked="" type="checkbox"/> FAC-Neutral Test (D5) |

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No X Depth (inches): _____

Saturation Present? Yes ☐ No ☒ Depth (inches):
(includes capillary fringe)

Wetland Hydrology Present? Yes *f* No

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

^{S:} B13 - freshwater bivalves present.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Santiago Creek Dam City/County: unincorporated Orange Sampling Date: 10/14/2020
 Applicant/Owner: IRWD State: CA Sampling Point: 4
 Investigator(s): ARudolven, J Aguayo Section, Township, Range: S33, T04S, R08W
 Landform (hillslope, terrace, etc.): lakebed Local relief (concave, convex, none): concave Slope (%): <1%
 Subregion (LRR): California Lat: 33.773601 Long: -117.721428 Datum: NAD83
 Soil Map Unit Name: water NWI classification: L1UBHh

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No (If no, explain in Remarks.)
 Are Vegetation , Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No
 Are Vegetation ✓, Soil , or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <u>✓</u>	No <u> </u>	Is the Sampled Area within a Wetland?	Yes <u>✓</u>	No <u> </u>
Hydric Soil Present?	Yes <u>✓</u>	No <u> </u>			
Wetland Hydrology Present?	Yes <u>✓</u>	No <u> </u>			
Remarks: <u>Sampling point in on lower bank of Irvine Lake below OHWM and above waterline.</u>					

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:	
1. <u> </u>	<u> </u>	<u> </u>	<u> </u>	Number of Dominant Species That Are OBL, FACW, or FAC:	<u>1</u> (A)
2. <u> </u>	<u> </u>	<u> </u>	<u> </u>	Total Number of Dominant Species Across All Strata:	<u>1</u> (B)
3. <u> </u>	<u> </u>	<u> </u>	<u> </u>	Percent of Dominant Species That Are OBL, FACW, or FAC:	<u>100%</u> (A/B)
4. <u> </u>	<u> </u>	<u> </u>	<u> </u>		
				<u>0</u> = Total Cover	
Sapling/Shrub Stratum (Plot size: <u>5'</u>)	Absolute % Cover	Dominant Species?	Indicator Status	Prevalence Index worksheet:	
1. <u> </u>	<u> </u>	<u> </u>	<u> </u>	Total % Cover of:	Multiply by:
2. <u> </u>	<u> </u>	<u> </u>	<u> </u>	OBL species <u> </u>	x 1 = <u> </u>
3. <u> </u>	<u> </u>	<u> </u>	<u> </u>	FACW species <u> </u>	x 2 = <u> </u>
4. <u> </u>	<u> </u>	<u> </u>	<u> </u>	FAC species <u> </u>	x 3 = <u> </u>
5. <u> </u>	<u> </u>	<u> </u>	<u> </u>	FACU species <u> </u>	x 4 = <u> </u>
				UPL species <u> </u>	x 5 = <u> </u>
				Column Totals:	(A) <u> </u> (B) <u> </u>
				Prevalence Index = B/A = <u> </u>	
Herb Stratum (Plot size: <u>5'</u>)	Absolute % Cover	Dominant Species?	Indicator Status	Hydrophytic Vegetation Indicators:	
1. <u>Cyperis schoenoides</u>	<u>40</u>	<u>Y</u>	<u>FACW</u>	<u>✓</u> Dominance Test is >50%	
2. <u>Xanthium strumarium</u>	<u>10</u>	<u>n</u>	<u>FAC</u>	<u> </u> Prevalence Index is ≤3.0 ¹	
3. <u>Melilotus albus</u>	<u>10</u>	<u>n</u>	<u>UPL</u>	<u> </u> Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet)	
4. <u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u> Problematic Hydrophytic Vegetation ¹ (Explain)	
5. <u> </u>	<u> </u>	<u> </u>	<u> </u>		
6. <u> </u>	<u> </u>	<u> </u>	<u> </u>		
7. <u> </u>	<u> </u>	<u> </u>	<u> </u>		
8. <u> </u>	<u> </u>	<u> </u>	<u> </u>		
				<u>60</u> = Total Cover	
Woody Vine Stratum (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status	¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.	
1. <u> </u>	<u> </u>	<u> </u>	<u> </u>		
2. <u> </u>	<u> </u>	<u> </u>	<u> </u>		
				<u>0</u> = Total Cover	
% Bare Ground in Herb Stratum <u>40</u> % Cover of Biotic Crust <u>0</u>				Hydrophytic Vegetation Present? Yes <u> </u> No <u> </u>	
Remarks: <u>Vegetation in lakebed varies based on water level, which is affected by inflow, precipitation, and releases from the dam, leading to temporal shifts in vegetation.</u>					

SOIL

Sampling Point: 4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features		Type ¹	Loc ²	Texture	Remarks
	Color (moist)	%	Color (moist)	%				
0-15	7.5YR 4/2	92	2.5YR 3/6	8	C	PL, M	clay loam	prominent mottles
15-16	10YR 3/2	97	2.5YR 3/6	3	C	PL, M	sandy clay loam	prominent mottles

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- | | |
|--|--|
| <input type="checkbox"/> Histosol (A1) | <input type="checkbox"/> Sandy Redox (S5) |
| <input type="checkbox"/> Histic Epipedon (A2) | <input type="checkbox"/> Stripped Matrix (S6) |
| <input type="checkbox"/> Black Histic (A3) | <input type="checkbox"/> Loamy Mucky Mineral (F1) |
| <input type="checkbox"/> Hydrogen Sulfide (A4) | <input type="checkbox"/> Loamy Gleyed Matrix (F2) |
| <input type="checkbox"/> Stratified Layers (A5) (LRR C) | <input checked="" type="checkbox"/> Depleted Matrix (F3) |
| <input type="checkbox"/> 1 cm Muck (A9) (LRR D) | <input type="checkbox"/> Redox Dark Surface (F6) |
| <input type="checkbox"/> Depleted Below Dark Surface (A11) | <input checked="" type="checkbox"/> Depleted Dark Surface (F7) |
| <input type="checkbox"/> Thick Dark Surface (A12) | <input checked="" type="checkbox"/> Redox Depressions (F8) |
| <input type="checkbox"/> Sandy Mucky Mineral (S1) | <input type="checkbox"/> Vernal Pools (F9) |
| <input type="checkbox"/> Sandy Gleyed Matrix (S4) | |

Indicators for Problematic Hydric Soils³:

- ☐ 1 cm Muck (A9) (LRR C)
☐ 2 cm Muck (A10) (LRR B)
☐ Reduced Vertic (F18)
☐ Red Parent Material (TF2)
☐ Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ☒ No ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- | | |
|---|--|
| <input type="checkbox"/> Surface Water (A1) | <input type="checkbox"/> Salt Crust (B11) |
| <input type="checkbox"/> High Water Table (A2) | <input type="checkbox"/> Biotic Crust (B12) |
| <input type="checkbox"/> Saturation (A3) | <input checked="" type="checkbox"/> Aquatic Invertebrates (B13) |
| <input type="checkbox"/> Water Marks (B1) (Nonriverine) | <input type="checkbox"/> Hydrogen Sulfide Odor (C1) |
| <input type="checkbox"/> Sediment Deposits (B2) (Nonriverine) | <input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3) |
| <input type="checkbox"/> Drift Deposits (B3) (Nonriverine) | <input type="checkbox"/> Presence of Reduced Iron (C4) |
| <input type="checkbox"/> Surface Soil Cracks (B6) | <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) |
| <input checked="" type="checkbox"/> Inundation Visible on Aerial Imagery (B7) | <input type="checkbox"/> Thin Muck Surface (C7) |
| <input type="checkbox"/> Water-Stained Leaves (B9) | <input type="checkbox"/> Other (Explain in Remarks) |

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1) (Riverine)
☐ Sediment Deposits (B2) (Riverine)
☐ Drift Deposits (B3) (Riverine)
☐ Drainage Patterns (B10)
☐ Dry-Season Water Table (C2)
☐ Crayfish Burrows (C8)
☐ Saturation Visible on Aerial Imagery (C9)
☐ Shallow Aquitard (D3)
☒ FAC-Neutral Test (D5)

Field Observations:

- Surface Water Present? Yes ☐ No ☒ Depth (inches): _____
Water Table Present? Yes ☐ No ☒ Depth (inches): _____
Saturation Present? Yes ☐ No ☒ Depth (inches): _____
(includes capillary fringe)

Wetland Hydrology Present? Yes ☒ No ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

B13 - freshwater bivalves present

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Santiago Creek Dam City/County: unincorporated Orange Co Sampling Date: 10/14/2020
 Applicant/Owner: IRWD State: CA Sampling Point: 5
 Investigator(s): ARudalenise, J Agnayo Section, Township, Range: S 33 T04S R 08W
 Landform (hillslope, terrace, etc.): lake edge Local relief (concave, convex, none): concave Slope (%): 1%
 Subregion (LRR): California Lat: 33.773466 Long: -117.721826 Datum: NAD83
 Soil Map Unit Name: water NWI classification: L2UBFH

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☐ No ☐ (If no, explain in Remarks.)
 Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☐ No ☐
 Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Hydric Soil Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
Wetland Hydrology Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
Remarks: <u>Sampling point is above OHWM in Irvine Lake</u>	

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: <u>30'</u>)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>0</u> (A) Total Number of Dominant Species Across All Strata: <u>1</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>0</u> (A/B)
1. _____				
2. _____				
3. _____				
4. _____				
Sapling/Shrub Stratum (Plot size: <u>5'</u>)				
1. _____				Hydrophytic Vegetation Indicators: ___ Dominance Test is >50% ___ Prevalence Index is ≤3.0 ¹ ___ Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) ___ Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
2. _____				
3. _____				
4. _____				
Herb Stratum (Plot size: <u>5'</u>)				
1. <u>C. Cardionema ramosissimum</u>	<u>5</u>	<u>Y</u>	<u>UPL</u>	Hydrophytic Vegetation Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
2. _____				
3. _____				
4. _____				
Woody Vine Stratum (Plot size: <u>30'</u>)				
1. _____				Remarks:
2. _____				
% Bare Ground in Herb Stratum <u>95</u> % Cover of Biotic Crust <u>0</u>				

SOIL

Sampling Point: 5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-16	7.5YR 4/2	100	—	—	—	—	sandy loam	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains.²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

Indicators for Problematic Hydric Soils³:

<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> 1 cm Muck (A9) (LRR C)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> 2 cm Muck (A10) (LRR B)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Loamy Mucky Mineral (F1)	<input type="checkbox"/> Reduced Vertic (F18)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Red Parent Material (TF2)
<input type="checkbox"/> Stratified Layers (A5) (LRR C)	<input type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> 1 cm Muck (A9) (LRR D)	<input type="checkbox"/> Redox Dark Surface (F6)	
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)	
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Depressions (F8)	
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Vernal Pools (F9)	
<input type="checkbox"/> Sandy Gleyed Matrix (S4)		

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

Secondary Indicators (2 or more required)

<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Salt Crust (B11)	<input type="checkbox"/> Water Marks (B1) (Riverine)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Biotic Crust (B12)	<input type="checkbox"/> Sediment Deposits (B2) (Riverine)
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Aquatic Invertebrates (B13)	<input type="checkbox"/> Drift Deposits (B3) (Riverine)
<input type="checkbox"/> Water Marks (B1) (Nonriverine)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	<input type="checkbox"/> Drainage Patterns (B10)
<input type="checkbox"/> Sediment Deposits (B2) (Nonriverine)	<input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3)	<input type="checkbox"/> Dry-Season Water Table (C2)
<input type="checkbox"/> Drift Deposits (B3) (Nonriverine)	<input type="checkbox"/> Presence of Reduced Iron (C4)	<input type="checkbox"/> Crayfish Burrows (C8)
<input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)	<input type="checkbox"/> Thin Muck Surface (C7)	<input type="checkbox"/> Shallow Aquitard (D3)
<input type="checkbox"/> Water-Stained Leaves (B9)	<input type="checkbox"/> Other (Explain in Remarks)	<input type="checkbox"/> FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No X Depth (inches): _____Water Table Present? Yes _____ No X Depth (inches): _____Saturation Present? Yes _____ No X Depth (inches): _____
(includes capillary fringe)Wetland Hydrology Present? Yes _____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Above OHWM

Arid West Ephemeral and Intermittent Streams OHWM Datasheet

Project: *Santiago Creek Dam Outlet Tower & Spillway Improvement* **Date:** *3/24/2020* **Time:** *10:00*
Project Number: *31RW000904* **Town:** *uninc. Orange Co* **State:** *CA*
Stream: *Santiago Creek* **Photo begin file#:** **Photo end file#:**
Investigator(s): *A. Rudalewige*

Y ☒ / N ☐ Do normal circumstances exist on the site?

Location Details: *Below Irvine Lake spillway at canyon mouth*

Y ☐ / N ☒ Is the site significantly disturbed?

Projection: **Datum:**
Coordinates: *33° 47.353' -117° 43.565'*

Potential anthropogenic influences on the channel system:

Santiago Dam (impoundment) and controlled releases of flow. Access road with Arizona Crossing.

Brief site description: *Floodplain of Santiago Creek downstream of Irvine Lake.*

Checklist of resources (if available):

☒ Aerial photography

Dates: *2018*

☒ Topographic maps

☐ Geologic maps

☒ Vegetation maps

☒ Soils maps

☐ Rainfall/precipitation maps

☐ Existing delineation(s) for site

☐ Global positioning system (GPS)

☐ Other studies

☒ Stream gage data

Gage number: *11075800 (upstream of dam)*

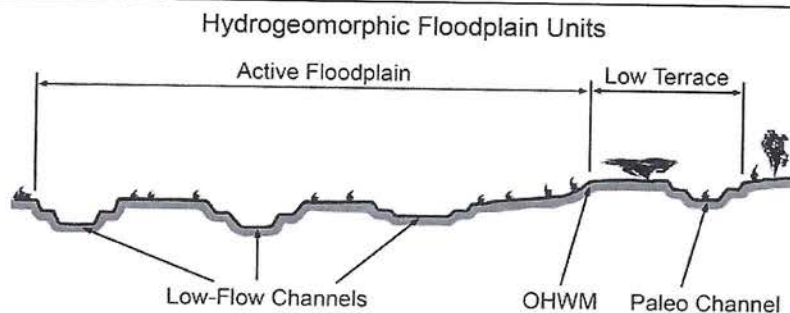
Period of record:

☐ History of recent effective discharges

☐ Results of flood frequency analysis

☐ Most recent shift-adjusted rating

☐ Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event



Procedure for identifying and characterizing the floodplain units to assist in identifying the OHWM:

1. Walk the channel and floodplain within the study area to get an impression of the geomorphology and vegetation present at the site.
2. Select a representative cross section across the channel. Draw the cross section and label the floodplain units.
3. Determine a point on the cross section that is characteristic of one of the hydrogeomorphic floodplain units.
 - a) Record the floodplain unit and GPS position.
 - b) Describe the sediment texture (using the Wentworth class size) and the vegetation characteristics of the floodplain unit.
 - c) Identify any indicators present at the location.
4. Repeat for other points in different hydrogeomorphic floodplain units across the cross section.
5. Identify the OHWM and record the indicators. Record the OHWM position via:

☒ Mapping on aerial photograph

☐ Digitized on computer

☐ GPS

☐ Other:

Wentworth Size Classes

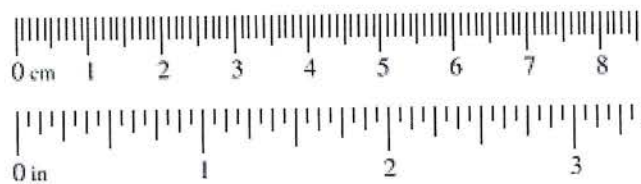
Inches (in)	Millimeters (mm)	Wentworth size class
10.08	256	Boulder
2.56	64	Cobble
0.157	4	Pebble
0.079	2.00	Granule
0.039	1.00	Very coarse sand
0.020	0.50	Coarse sand
1/2 0.0098	0.25	Medium sand
1/4 0.005	0.125	Fine sand
1/8 0.0025	0.0625	Very fine sand
1/16 0.0012	0.031	Coarse silt
1/32 0.00061	0.0156	Medium silt
1/64 0.00031	0.0078	Fine silt
1/128 0.00015	0.0039	Very fine silt
		Clay

Gravel

Sand

Silt

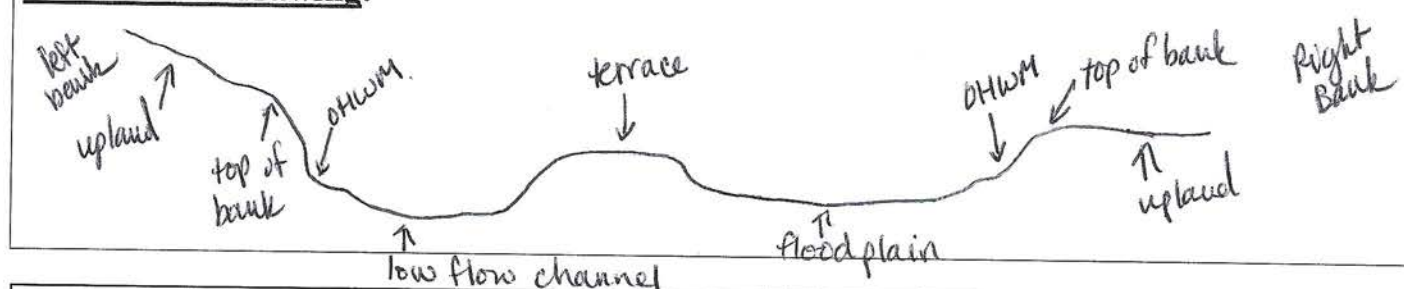
Mud



Project ID: 31RW000904 Cross section ID: 1

Date: 3/24/2020 Time: 1000

Cross section drawing:



OHWM

GPS point: $33^{\circ}47.353'$, $-117^{\circ}43.565'$

Indicators:

- ☒ Change in average sediment texture
- ☒ Change in vegetation species
- ☒ Change in vegetation cover

- ☒ Break in bank slope
- ☒ Other: sediment deposits on cobbles
- ☒ Other: drift deposits

Comments:

Floodplain unit: ☒ Low-Flow Channel

☐ Active Floodplain

☐ Low Terrace

GPS point: $33^{\circ}47.353'$, $-117^{\circ}43.565'$

Characteristics of the floodplain unit:

Average sediment texture: cobbles

Total veg cover: 25 % Tree: 0 % Shrub: 5 % Herb: 20 %

Community successional stage:

- ☐ NA
- ☐ Early (herbaceous & seedlings)
- ☒ Mid (herbaceous, shrubs, saplings)
- ☐ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks
- ☐ Ripples
- ☒ Drift and/or debris
- ☒ Presence of bed and bank
- ☒ Benches
- ☐ Soil development
- ☐ Surface relief
- ☒ Other: sediment deposits
- ☐ Other: _____
- ☐ Other: _____

Comments:

Vegetation consists of mule fat (*Baccharis salicifolia* ssp. *salicifolia*) and fennel (*Foeniculum vulgare*) with annual herbs and grasses.

Project ID: 31RW000904 Cross section ID: 1

Date: 3/24/20 Time: 1000

Floodplain unit: ☐ Low-Flow Channel ☒ Active Floodplain ☐ Low Terrace

GPS point: 33° 47' 35.3" N, -117° 43.565" W

Characteristics of the floodplain unit:

Average sediment texture: cobbles & boulders

Total veg cover: 30 % Tree: 0 % Shrub: 10 % Herb: 20 %

Community successional stage:

- ☐ NA ☒ Mid (herbaceous, shrubs, saplings)
☐ Early (herbaceous & seedlings) ☐ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks ☐ Soil development
☐ Ripples ☐ Surface relief
☒ Drift and/or debris ☒ Other: sediment covering cobbles
☒ Presence of bed and bank ☐ Other: _____
☒ Benches ☐ Other: _____

Comments:

Vegetation composition similar to low flow channel.

Floodplain unit: ☐ Low-Flow Channel ☐ Active Floodplain ☒ Low Terrace

GPS point: 33° 47' 35.3" N, -117° 43.565" W

Characteristics of the floodplain unit:

Average sediment texture: cobbles & boulders

Total veg cover: 30 % Tree: 0 % Shrub: 10 % Herb: 20 %

Community successional stage:

- ☐ NA ☒ Mid (herbaceous, shrubs, saplings)
☐ Early (herbaceous & seedlings) ☐ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks ☐ Soil development
☐ Ripples ☐ Surface relief
☐ Drift and/or debris ☐ Other: _____
☒ Presence of bed and bank ☐ Other: _____
☐ Benches ☐ Other: _____

Comments:

upland vegetation. (e.g. California buckwheat [Eriogonum fasciculatum])
scattered in area.

Arid West Ephemeral and Intermittent Streams OHW M Datasheet

Project: Santiago Creek Dam Outlet Tower + Spillway Improvement
Project Number: 31RW000904
Stream: Santiago Creek
Investigator(s): ARudalevich, JAguiar

Date: 10/20/2020
Town: unincorporated OC
Photo begin file#:
Time: 0815
State: CA
Photo end file#:

Y ☒ / N ☐ Do normal circumstances exist on the site?

Y ☐ / N ☒ Is the site significantly disturbed?

Location Details: Near downstream end of Santiago Creek where enters Irvine Lake

Projection: **Datum:** NAD 83

Coordinates: 33.776649, -117.702460

Potential anthropogenic influences on the channel system:

Santiago Dam (impoundment) and controlled releases of flow

Brief site description:

Floodplain of Santiago Creek upstream of Irvine Lake

Checklist of resources (if available):

☐ Aerial photography

Dates: 2018

☒ Topographic maps

☐ Geologic maps

☒ Vegetation maps

☒ Soils maps

☐ Rainfall/precipitation maps

☐ Existing delineation(s) for site

☐ Global positioning system (GPS)

☐ Other studies

☒ Stream gage data

Gage number: 11075800 (upstream)

Period of record:

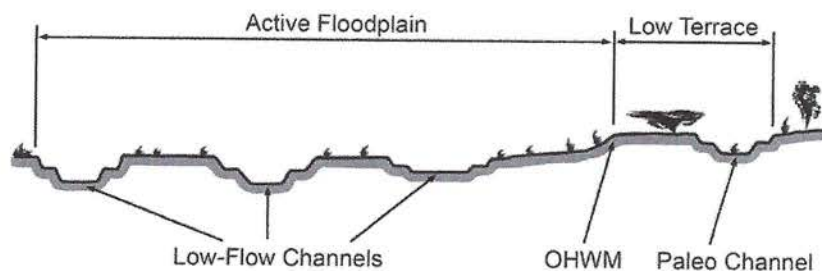
☐ History of recent effective discharges

☐ Results of flood frequency analysis

☐ Most recent shift-adjusted rating

☐ Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event

Hydrogeomorphic Floodplain Units



Procedure for identifying and characterizing the floodplain units to assist in identifying the OHWM:

1. Walk the channel and floodplain within the study area to get an impression of the geomorphology and vegetation present at the site.
2. Select a representative cross section across the channel. Draw the cross section and label the floodplain units.
3. Determine a point on the cross section that is characteristic of one of the hydrogeomorphic floodplain units.
 - a) Record the floodplain unit and GPS position.
 - b) Describe the sediment texture (using the Wentworth class size) and the vegetation characteristics of the floodplain unit.
 - c) Identify any indicators present at the location.
4. Repeat for other points in different hydrogeomorphic floodplain units across the cross section.
5. Identify the OHWM and record the indicators. Record the OHWM position via:

☒ Mapping on aerial photograph

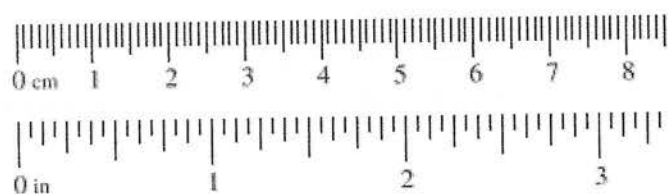
☐ Digitized on computer

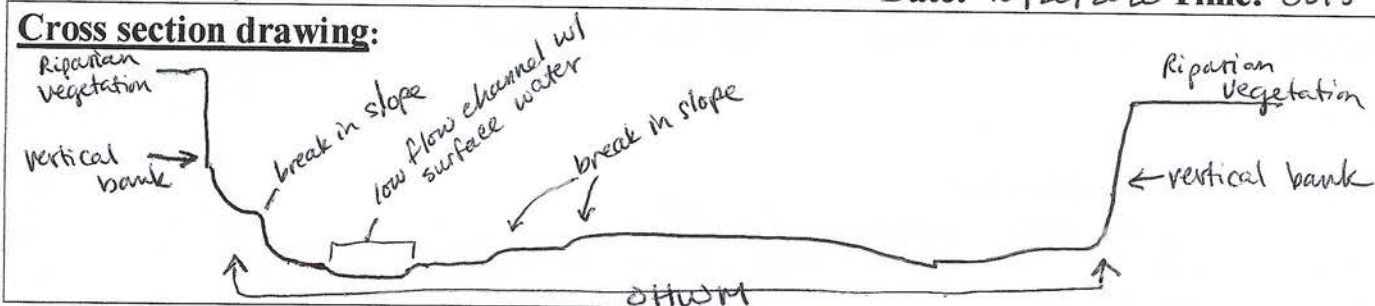
☐ GPS

☐ Other:

Wentworth Size Classes

Inches (in)	Millimeters (mm)	Wentworth size class	
10.08	256	Boulder	Gravel
2.56	64	Cobble	
0.157	4	Pebble	
		Granule	
0.079	2.00	Very coarse sand	Sand
0.039	1.00	Coarse sand	
0.020	0.50	Medium sand	
1/2 0.0098	0.25	Fine sand	
1/4 0.005	0.125	Very fine sand	
1/8 0.0025	0.0625		
1/16 0.0012	0.031	Coarse silt	Silt
1/32 0.00061	0.0156	Medium silt	
1/64 0.00031	0.0078	Fine silt	
1/128 0.00015	0.0039	Very fine silt	
		Clay	Mud



Cross section drawing:**OHWM**

GPS point: 33.776649, -117.702460 C.

Indicators:

- | | |
|--|---|
| <input checked="" type="checkbox"/> Change in average sediment texture | <input checked="" type="checkbox"/> Break in bank slope |
| <input checked="" type="checkbox"/> Change in vegetation species | <input checked="" type="checkbox"/> Other: <u>Sediment deposits</u> |
| <input checked="" type="checkbox"/> Change in vegetation cover | <input type="checkbox"/> Other: _____ |

Comments:**Floodplain unit:**☒ Low-Flow Channel☐ Active Floodplain☐ Low Terrace

GPS point: _____

Characteristics of the floodplain unit:Average sediment texture: Cobble with siltTotal veg cover: 10 % Tree: 0 % Shrub: 0 % Herb: 10 %

Community successional stage:

- | | |
|--|--|
| <input type="checkbox"/> NA | <input type="checkbox"/> Mid (herbaceous, shrubs, saplings) |
| <input checked="" type="checkbox"/> Early (herbaceous & seedlings) | <input type="checkbox"/> Late (herbaceous, shrubs, mature trees) |

Indicators:

- | | |
|--|---|
| <input type="checkbox"/> Mudcracks | <input type="checkbox"/> Soil development |
| <input checked="" type="checkbox"/> Ripples | <input type="checkbox"/> Surface relief |
| <input type="checkbox"/> Drift and/or debris | <input checked="" type="checkbox"/> Other: <u>Sediment deposits on rock</u> |
| <input checked="" type="checkbox"/> Presence of bed and bank | <input type="checkbox"/> Other: _____ |
| <input checked="" type="checkbox"/> Benches | <input type="checkbox"/> Other: _____ |

Comments:

Project ID: 31RW000904 Cross section ID: 2

Date: 10/20/2020 Time: 0815

Floodplain unit: ☐ Low-Flow Channel ☒ Active Floodplain ☐ Low Terrace

GPS point: _____

Characteristics of the floodplain unit:

Average sediment texture: cobbles, pebbles, sand, & silt

Total veg cover: 25 % Tree: 0 % Shrub: 5 % Herb: 20 %

Community successional stage:

- ☐ NA ☒ Mid (herbaceous, shrubs, saplings)
☐ Early (herbaceous & seedlings) ☐ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☒ Mudcracks ☐ Soil development
☐ Ripples ☐ Surface relief
☐ Drift and/or debris ☐ Other: _____
☒ Presence of bed and bank ☐ Other: _____
☒ Benches ☐ Other: _____

Comments:

Floodplain unit: ☐ Low-Flow Channel ☐ Active Floodplain ☒ Low Terrace

GPS point: _____

Characteristics of the floodplain unit:

Average sediment texture: _____

Total veg cover: _____ % Tree: _____ % Shrub: _____ % Herb: _____ %

Community successional stage:

- ☐ NA ☐ Mid (herbaceous, shrubs, saplings)
☐ Early (herbaceous & seedlings) ☐ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks ☐ Soil development
☐ Ripples ☐ Surface relief
☐ Drift and/or debris ☐ Other: _____
☐ Presence of bed and bank ☐ Other: _____
☐ Benches ☐ Other: _____

Comments:

No low terrace; active floodplain extends to vertical banks.

Arid West Ephemeral and Intermittent Streams OTHM Datasheet

Project: Santiago Creek Dam outlet Tower + Date: 10/14/2020 Time: 11:20 AM
 Project Number: 31R0000904 Spillway Improvement Town: unincorporated OC State: CA
 Stream: unnamed (Drainage 12) Photo begin file#: Photo end file#:
 Investigator(s): Ardale W. J. Aguayo

Y ☒ / N ☐ Do normal circumstances exist on the site?

Location Details: representative section of Drainage 12

Y ☐ / N ☒ Is the site significantly disturbed?

Projection: Datum: NAD 83

Coordinates: 33.763575, -117.708999

Potential anthropogenic influences on the channel system:

Above grade road crosses drainage downstream of sampling point.

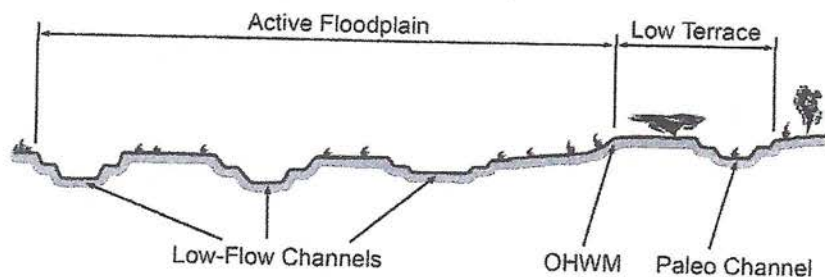
Brief site description:

Braided drainage that discharges into Irvine Lake

Checklist of resources (if available):

- | | |
|---|--|
| <input checked="" type="checkbox"/> Aerial photography
Dates: 2018 | <input type="checkbox"/> Stream gage data
Gage number:
Period of record: |
| <input checked="" type="checkbox"/> Topographic maps | <input type="checkbox"/> History of recent effective discharges |
| <input type="checkbox"/> Geologic maps | <input type="checkbox"/> Results of flood frequency analysis |
| <input checked="" type="checkbox"/> Vegetation maps | <input type="checkbox"/> Most recent shift-adjusted rating |
| <input checked="" type="checkbox"/> Soils maps | <input type="checkbox"/> Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event |
| <input type="checkbox"/> Rainfall/precipitation maps | |
| <input type="checkbox"/> Existing delineation(s) for site | |
| <input type="checkbox"/> Global positioning system (GPS) | |
| <input type="checkbox"/> Other studies | |

Hydrogeomorphic Floodplain Units



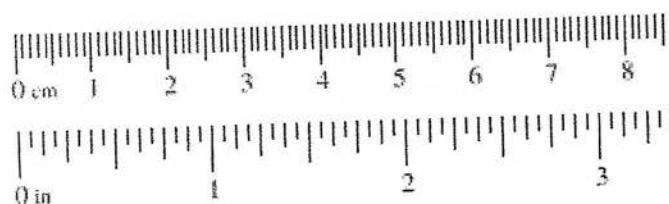
Procedure for identifying and characterizing the floodplain units to assist in identifying the OHWM:

1. Walk the channel and floodplain within the study area to get an impression of the geomorphology and vegetation present at the site.
2. Select a representative cross section across the channel. Draw the cross section and label the floodplain units.
3. Determine a point on the cross section that is characteristic of one of the hydrogeomorphic floodplain units.
 - a) Record the floodplain unit and GPS position.
 - b) Describe the sediment texture (using the Wentworth class size) and the vegetation characteristics of the floodplain unit.
 - c) Identify any indicators present at the location.
4. Repeat for other points in different hydrogeomorphic floodplain units across the cross section.
5. Identify the OHWM and record the indicators. Record the OHWM position via:

- | | |
|---|---------------------------------|
| <input type="checkbox"/> Mapping on aerial photograph | <input type="checkbox"/> GPS |
| <input type="checkbox"/> Digitized on computer | <input type="checkbox"/> Other: |

Wentworth Size Classes

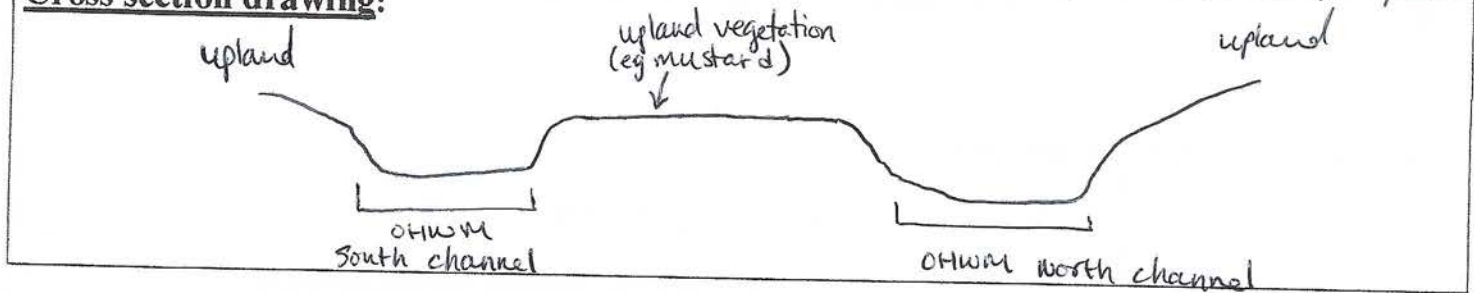
Inches (in)	Millimeters (mm)	Wentworth size class
10.08	256	Boulder
2.56	64	Cobble
0.157	4	Pebble
		Granule
0.079	2.00	Very coarse sand
0.039	1.00	Coarse sand
0.020	0.50	Medium sand
1/2 0.0098	0.25	Fine sand
1/4 0.005	0.125	Very fine sand
1/8 0.0025	0.0625	Coarse silt
1/16 0.0012	0.031	Medium silt
1/32 0.00061	0.0156	Fine silt
1/64 0.00031	0.0078	Very fine silt
1/128 0.00015	0.0039	Clay



Project ID: 31RW000904 Cross section ID: 3

Date: 10/14/2020 Time: 11:20 AM

Cross section drawing:



OHWM

GPS point: _____

Indicators:

- ☒ Change in average sediment texture
☒ Change in vegetation species
☒ Change in vegetation cover

☒ Break in bank slope

☐ Other: _____
☐ Other: _____

Comments:

Channel is braided with terrace between areas of OHWM.

Floodplain unit:

☒ Low-Flow Channel

☐ Active Floodplain

☐ Low Terrace

GPS point: _____

Characteristics of the floodplain unit:

Average sediment texture: Coarse Sand

Total veg cover: _____ % Tree: 0 % Shrub: 2 % Herb: _____ %

Community successional stage:

☐ NA

☒ Early (herbaceous & seedlings)

☐ Mid (herbaceous, shrubs, saplings)

☐ Late (herbaceous, shrubs, mature trees)

Indicators:

☐ Mudcracks

☐ Ripples

☒ Drift and/or debris

☒ Presence of bed and bank

☐ Benches

☐ Soil development

☐ Surface relief

☐ Other: _____

☐ Other: _____

☐ Other: _____

Comments:

Project ID: 31RW000909 Cross section ID: 3

Date: 10/14/2020 Time: 11:20 AM

Floodplain unit: ☐ Low-Flow Channel ☒ Active Floodplain ☐ Low Terrace

GPS point: _____

Characteristics of the floodplain unit:

Average sediment texture: _____

Total veg cover: _____ % Tree: _____ % Shrub: _____ % Herb: _____ %

Community successional stage:

- ☐ NA
☐ Early (herbaceous & seedlings)

- ☐ Mid (herbaceous, shrubs, saplings)
☐ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks
☐ Ripples
☐ Drift and/or debris
☐ Presence of bed and bank
☐ Benches

- ☐ Soil development
☐ Surface relief
☐ Other: _____
☐ Other: _____
☐ Other: _____

Comments:

Most portions of the channel lack active floodplain.

Floodplain unit: ☐ Low-Flow Channel

☐ Active Floodplain

☒ Low Terrace

GPS point: 33.763575, -117.708999

Characteristics of the floodplain unit:

Average sediment texture: sandy loam

Total veg cover: 90 % Tree: 5 % Shrub: 10 % Herb: 80 %

Community successional stage:

- ☐ NA
☐ Early (herbaceous & seedlings)

- ☐ Mid (herbaceous, shrubs, saplings)
☒ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks
☐ Ripples
☐ Drift and/or debris
☐ Presence of bed and bank
☐ Benches

- ☐ Soil development
☐ Surface relief
☐ Other: _____
☐ Other: _____
☐ Other: _____

Comments:

herbaceous vegetation dominated by upland species (e.g. mustard) with scattered coast live oaks and other trees/shrubs.

Arid West Ephemeral and Intermittent Streams OHWM Datasheet

Project: Santiago Creek Dam Outlet Tower & Spillway Improvement Project Number: 31RW000904 Stream: unnamed (Drainage 7) Investigator(s): Aludalenice, L. Messett	Date: 10/21/2020 Town: unincorporated OC Photo begin file#: Time: 12:05 PM State: CA Photo end file#:
---	--

Y <input checked="" type="checkbox"/> / N <input type="checkbox"/> Do normal circumstances exist on the site? Y <input type="checkbox"/> / N <input checked="" type="checkbox"/> Is the site significantly disturbed?	Location Details: Drainage 7 Projection: Datum: NAD83 Coordinates: 33.776931, -117.695032
--	--

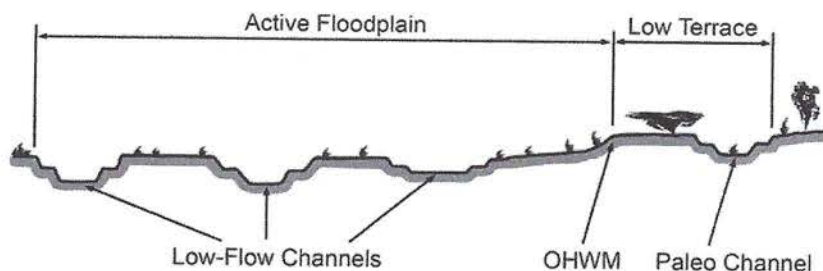
Potential anthropogenic influences on the channel system:
 Access road crosses drainage downstream of assessed location; this is true of multiple small drainages in the survey area.

Brief site description:
 Representative cross section of smaller drainages in the survey area that discharge into Santiago Creek or Irvine Lake.

Checklist of resources (if available):

<input checked="" type="checkbox"/> Aerial photography Dates: 2018 <input checked="" type="checkbox"/> Topographic maps <input type="checkbox"/> Geologic maps <input checked="" type="checkbox"/> Vegetation maps <input checked="" type="checkbox"/> Soils maps <input type="checkbox"/> Rainfall/precipitation maps <input type="checkbox"/> Existing delineation(s) for site <input type="checkbox"/> Global positioning system (GPS) <input type="checkbox"/> Other studies	<input type="checkbox"/> Stream gage data Gage number: Period of record: <input type="checkbox"/> History of recent effective discharges <input type="checkbox"/> Results of flood frequency analysis <input type="checkbox"/> Most recent shift-adjusted rating <input type="checkbox"/> Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event
---	---

Hydrogeomorphic Floodplain Units



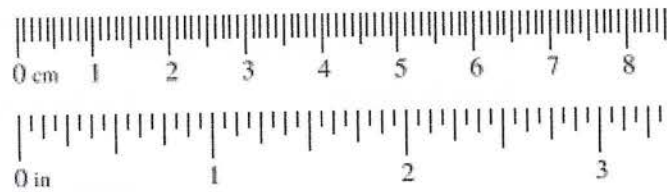
Procedure for identifying and characterizing the floodplain units to assist in identifying the OHWM:

1. Walk the channel and floodplain within the study area to get an impression of the geomorphology and vegetation present at the site.
2. Select a representative cross section across the channel. Draw the cross section and label the floodplain units.
3. Determine a point on the cross section that is characteristic of one of the hydrogeomorphic floodplain units.
 - a) Record the floodplain unit and GPS position.
 - b) Describe the sediment texture (using the Wentworth class size) and the vegetation characteristics of the floodplain unit.
 - c) Identify any indicators present at the location.
4. Repeat for other points in different hydrogeomorphic floodplain units across the cross section.
5. Identify the OHWM and record the indicators. Record the OHWM position via:

<input checked="" type="checkbox"/> Mapping on aerial photograph	<input type="checkbox"/> GPS
<input type="checkbox"/> Digitized on computer	<input type="checkbox"/> Other:

Wentworth Size Classes

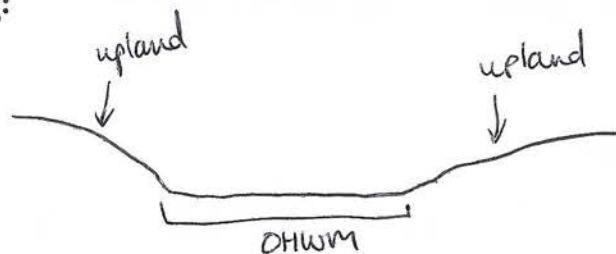
Inches (in)	Millimeters (mm)	Wentworth size class	
10.08	256	Boulder	Gravel
2.56	64	Cobble	
0.157	4	Pebble	
		Granule	
0.079	2.00	Very coarse sand	Sand
0.039	1.00	Coarse sand	
0.020	0.50	Medium sand	
1/2 0.0098	0.25	Fine sand	
1/4 0.005	0.125	Very fine sand	
1/8 0.0025	0.0625		
1/16 0.0012	0.031	Coarse silt	Silt
1/32 0.00061	0.0156	Medium silt	
1/64 0.00031	0.0078	Fine silt	
1/128 0.00015	0.0039	Very fine silt	
		Clay	Mud



Project ID: 31RW000904 Cross section ID: 4

Date: 10/21/2020 Time: 12:05 PM

Cross section drawing:



OHWM

GPS point: _____

Indicators:

- ☒ Change in average sediment texture
☒ Change in vegetation species
☒ Change in vegetation cover

- ☒ Break in bank slope
☐ Other: _____
☐ Other: _____

Comments:

Floodplain unit:

☒ Low-Flow Channel

☐ Active Floodplain

☐ Low Terrace

GPS point: _____

Characteristics of the floodplain unit:

Average sediment texture: coarse sand (some boulders & cobbles)

Total veg cover: 5 % Tree: 0 % Shrub: 0 % Herb: 5 %

Community successional stage:

- ☐ NA
☒ Early (herbaceous & seedlings)
☐ Mid (herbaceous, shrubs, saplings)
☐ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks
☐ Ripples
☒ Drift and/or debris
☒ Presence of bed and bank
☐ Benches
☐ Soil development
☐ Surface relief
☒ Other: sediment deposits on rock
☐ Other: _____
☐ Other: _____

Comments:

Upland surrounding low flow channel has clayey / loamy clay soil with total vegetation cover ~80% consisting of herbs + shrubs.

Project ID: 31RW000904 Cross section ID: 4

Date: 10/21/2020 Time: 12:05PM

Floodplain unit: ☐ Low-Flow Channel

☒ Active Floodplain

☐ Low Terrace

GPS point: _____

Characteristics of the floodplain unit:

Average sediment texture: _____

Total veg cover: _____% Tree: _____% Shrub: _____% Herb: _____%

Community successional stage:

☐ NA

☐ Early (herbaceous & seedlings)

☐ Mid (herbaceous, shrubs, saplings)

☐ Late (herbaceous, shrubs, mature trees)

Indicators:

☐ Mudcracks

☐ Ripples

☐ Drift and/or debris

☐ Presence of bed and bank

☐ Benches

☐ Soil development

☐ Surface relief

☐ Other: _____

☐ Other: _____

☐ Other: _____

Comments: No active floodplain present

Floodplain unit: ☐ Low-Flow Channel

☐ Active Floodplain

☒ Low Terrace

GPS point: _____

Characteristics of the floodplain unit:

Average sediment texture: _____

Total veg cover: _____% Tree: _____% Shrub: _____% Herb: _____%

Community successional stage:

☐ NA

☐ Early (herbaceous & seedlings)

☐ Mid (herbaceous, shrubs, saplings)

☐ Late (herbaceous, shrubs, mature trees)

Indicators:

☐ Mudcracks

☐ Ripples

☐ Drift and/or debris

☐ Presence of bed and bank

☐ Benches

☐ Soil development

☐ Surface relief

☐ Other: _____

☐ Other: _____

☐ Other: _____

Comments:

No low terrace present.

ATTACHMENT F
LITERATURE REVIEW DETAILS – SOILS

This attachment provides detailed results of the literature review regarding soils mapped in the survey area.

SOIL SERIES

The below text is the detailed soil information obtained from the Map Unit Description found in the legend of the USDA NRCS website.²⁴

104—Alo variant clay, 15 to 30 percent slopes

Map Unit Setting

- *National map unit symbol:* hclc
- *Elevation:* 200 to 1,590 feet
- *Mean annual precipitation:* 14 to 15 inches
- *Mean annual air temperature:* 64 to 66 degrees Fahrenheit (F)
- *Frost-free period:* 365 days
- *Farmland classification:* Not prime farmland

Map Unit Composition

- *Alo variant and similar soils:* 70 percent
- *Alo variant, calcareous, and similar soils:* 20 percent
- *Minor components:* 10 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Alo Variant

Setting

- *Landform:* Hills
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Parent material:* Residuum weathered from sedimentary rock

Typical profile

- *H1 - 0 to 25 inches:* clay
- *H2 - 25 to 38 inches:* clay
- *H3 - 38 to 59 inches:* weathered bedrock

Properties and qualities

- *Slope:* 15 to 30 percent
- *Depth to restrictive feature:* 20 to 40 inches to paralithic bedrock
- *Drainage class:* Well drained

²⁴ U.S. Department of Agriculture, Natural Resources Conservation Service (USDA NRCS). 2019. Web Soil Survey. Records for the Survey Area, as Area of Interest. Further information about Soil Map Units. Lincoln, NE: USDA NRCS <https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx>.

- *Capacity of the most limiting layer to transmit water (Ksat):* Moderately low to moderately high (0.06 to 0.20 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Calcium carbonate, maximum content:* 5 percent
- *Maximum salinity:* Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
- *Available water capacity:* Moderate (about 6.1 inches)

Interpretive groups

- *Land capability classification (irrigated):* 4e
- *Land capability classification (nonirrigated):* 4e
- *Hydrologic Soil Group:* D
- *Ecological site:* R019XD001CA
- *Hydric soil rating:* No

Description of Alo Variant, Calcareous

Setting

- *Landform:* Hills
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex

Properties and qualities

- *Depth to restrictive feature:* More than 80 inches
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None

Minor Components

Bosanko, clay

- *Percent of map unit:* 5 percent
- *Hydric soil rating:* No

Myford, sandy loam

- *Percent of map unit:* 3 percent
- *Hydric soil rating:* No

Anaheim, clay loam

- *Percent of map unit:* 2 percent
- *Hydric soil rating:* No

105—Alo variant clay, 30 to 50 percent slopes

Map Unit Setting

- *National map unit symbol:* hcl
- *Elevation:* 210 to 1,740 feet
- *Mean annual precipitation:* 14 to 15 inches
- *Mean annual air temperature:* 64 to 66 degrees F
- *Frost-free period:* 365 days
- *Farmland classification:* Not prime farmland

Map Unit Composition

- *Alo variant and similar soils:* 70 percent
- *Alo variant, calcareous, and similar soils:* 20 percent
- *Minor components:* 10 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Alo Variant

Setting

- *Landform:* Hills
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Parent material:* Residuum weathered from sedimentary rock

Typical profile

- *H1 - 0 to 25 inches:* clay
- *H2 - 25 to 38 inches:* clay
- *H3 - 38 to 59 inches:* weathered bedrock

Properties and qualities

- *Slope:* 30 to 50 percent
- *Depth to restrictive feature:* 20 to 40 inches to paralithic bedrock
- *Drainage class:* Well drained
- *Capacity of the most limiting layer to transmit water (Ksat):* Moderately low to moderately high (0.06 to 0.20 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Calcium carbonate, maximum content:* 5 percent
- *Maximum salinity:* Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
- *Available water capacity:* Moderate (about 6.1 inches)

Interpretive groups

- *Land capability classification (irrigated):* None specified
- *Land capability classification (nonirrigated):* 6e

- *Hydrologic Soil Group:* D
- *Ecological site:* R019XD001CA
- *Hydric soil rating:* No

Description of Alo Variant, Calcareous

Setting

- *Landform:* Hills
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex

Properties and qualities

- *Depth to restrictive feature:* More than 80 inches
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None

Minor Components

Bosanko, clay

- *Percent of map unit:* 5 percent
- *Hydric soil rating:* No

Calleguas, clay loam

- *Percent of map unit:* 5 percent
- *Hydric soil rating:* No

106—Anaheim loam, 15 to 30 percent slopes

Map Unit Setting

- *National map unit symbol:* hclf
- *Elevation:* 100 to 1,930 feet
- *Mean annual precipitation:* 12 to 20 inches
- *Mean annual air temperature:* 63 to 65 degrees F
- *Frost-free period:* 320 to 365 days
- *Farmland classification:* Not prime farmland

Map Unit Composition

- *Anaheim and similar soils:* 85 percent
- *Minor components:* 15 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Anaheim

Setting

- *Landform:* Hillslopes
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Parent material:* Fine grained residuum weathered from sandstone and shale

Typical profile

- *A1 - 0 to 9 inches:* loam
- *A2 - 9 to 17 inches:* loam
- *A3 - 17 to 26 inches:* loam
- *Cr - 26 to 54 inches:* bedrock

Properties and qualities

- *Slope:* 15 to 30 percent
- *Depth to restrictive feature:* 20 to 39 inches to paralithic bedrock
- *Drainage class:* Well drained
- *Runoff class:* High
- *Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately low (0.00 to 0.06 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Available water capacity:* Low (about 4.7 inches)

Interpretive groups

- *Land capability classification (irrigated):* None specified
- *Land capability classification (nonirrigated):* 4e
- *Hydrologic Soil Group:* C
- *Ecological site:* R019XD029CA
- *Hydric soil rating:* No

Minor Components

Anaheim, clay loam

- *Percent of map unit:* 7 percent
- *Landform:* Hillslopes
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Ecological site:* R019XD001CA
- *Hydric soil rating:* No

Nacimiento, clay loam

- *Percent of map unit:* 5 percent
- *Landform:* Hillslopes
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Ecological site:* R019XD001CA
- *Hydric soil rating:* No

Cieneba, sandy loam

- *Percent of map unit:* 3 percent
- *Landform:* Hillslopes
- *Landform position (two-dimensional):* Summit
- *Landform position (three-dimensional):* Crest
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Ecological site:* R019XD060CA - SHALLOW LOAMY (1975)
- *Hydric soil rating:* No

107—Anaheim loam, 30 to 50 percent slopes

Map Unit Setting

- *National map unit symbol:* hclg
- *Elevation:* 40 to 2,060 feet
- *Mean annual precipitation:* 11 to 19 inches
- *Mean annual air temperature:* 62 to 65 degrees F
- *Frost-free period:* 320 to 365 days
- *Farmland classification:* Not prime farmland

Map Unit Composition

- *Anaheim and similar soils:* 85 percent
- *Minor components:* 15 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Anaheim

Setting

- *Landform:* Hillslopes
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Parent material:* Fine grained residuum weathered from sandstone and shale

Typical profile

- *A1 - 0 to 9 inches: loam*
- *A2 - 9 to 17 inches: loam*
- *A3 - 17 to 26 inches: loam*
- *Cr - 26 to 54 inches: bedrock*

Properties and qualities

- *Slope: 30 to 50 percent*
- *Depth to restrictive feature: 20 to 39 inches to paralithic bedrock*
- *Drainage class: Well drained*
- *Runoff class: High*
- *Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)*
- *Depth to water table: More than 80 inches*
- *Frequency of flooding: None*
- *Frequency of ponding: None*
- *Available water capacity: Low (about 4.7 inches)*

Interpretive groups

- *Land capability classification (irrigated): None specified*
- *Land capability classification (nonirrigated): 6e*
- *Hydrologic Soil Group: C*
- *Ecological site: R019XD029CA*
- *Hydric soil rating: No*

Minor Components

Anaheim, clay loam

- *Percent of map unit: 7 percent*
- *Landform: Hillslopes*
- *Landform position (two-dimensional): Backslope*
- *Landform position (three-dimensional): Side slope*
- *Down-slope shape: Convex*
- *Across-slope shape: Convex*
- *Ecological site: R019XD001CA*
- *Hydric soil rating: No*

Cieneba, sandy loam

- *Percent of map unit: 4 percent*
- *Landform: Hillslopes*
- *Landform position (two-dimensional): Summit*
- *Landform position (three-dimensional): Crest*
- *Down-slope shape: Convex*
- *Across-slope shape: Convex*
- *Ecological site: R019XD060CA - SHALLOW LOAMY (1975)*
- *Hydric soil rating: No*

Nacimiento, clay loam

- *Percent of map unit:* 4 percent
- *Landform:* Hillslopes
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Ecological site:* R019XD001CA
- *Hydric soil rating:* No

109—Anaheim clay loam, 30 to 50 percent slopes

Map Unit Setting

- *National map unit symbol:* hclj
- *Elevation:* 20 to 2,710 feet
- *Mean annual precipitation:* 11 to 19 inches
- *Mean annual air temperature:* 62 to 65 degrees F
- *Frost-free period:* 320 to 365 days
- *Farmland classification:* Not prime farmland

Map Unit Composition

- *Anaheim and similar soils:* 85 percent
- *Minor components:* 15 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Anaheim

Setting

- *Landform:* Hillslopes
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Parent material:* Fine grained residuum weathered from sandstone and shale

Typical profile

- *A1 - 0 to 9 inches:* clay loam
- *A2 - 9 to 17 inches:* clay loam
- *A3 - 17 to 26 inches:* clay loam
- *Cr - 26 to 59 inches:* bedrock

Properties and qualities

- *Slope:* 30 to 50 percent
- *Depth to restrictive feature:* 20 to 39 inches to paralithic bedrock
- *Drainage class:* Well drained
- *Runoff class:* Very high
- *Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately low (0.00 to 0.06 in/hr)

- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Available water capacity:* Low (about 4.4 inches)

Interpretive groups

- *Land capability classification (irrigated):* None specified
- *Land capability classification (nonirrigated):* 6e
- *Hydrologic Soil Group:* C
- *Ecological site:* R019XD001CA
- *Hydric soil rating:* No

Minor Components

Nacimiento, clay loam

- *Percent of map unit:* 5 percent
- *Landform:* Hillslopes
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Ecological site:* R019XD001CA
- *Hydric soil rating:* No

Alo

- *Percent of map unit:* 5 percent
- *Landform:* Hillslopes
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Ecological site:* R019XD001CA
- *Hydric soil rating:* No

Calleguas

- *Percent of map unit:* 3 percent
- *Landform:* Hillslopes
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Ecological site:* R019XD071CA - SHALLOW CLAYEY (1975)
- *Hydric soil rating:* No

Cieneba, sandy loam

- *Percent of map unit:* 2 percent
- *Landform:* Hillslopes
- *Landform position (two-dimensional):* Summit, shoulder
- *Landform position (three-dimensional):* Crest

- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Ecological site:* R019XD060CA - SHALLOW LOAMY (1975)
- *Hydric soil rating:* No

110—Anaheim clay loam, 50 to 75 percent slopes

Map Unit Setting

- *National map unit symbol:* hclk
- *Elevation:* 100 to 2,500 feet
- *Mean annual precipitation:* 12 to 20 inches
- *Mean annual air temperature:* 61 to 63 degrees F
- *Frost-free period:* 300 to 350 days
- *Farmland classification:* Not prime farmland

Map Unit Composition

- *Anaheim and similar soils:* 90 percent
- *Minor components:* 10 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Anaheim

Setting

- *Landform:* Hills
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Parent material:* Fine grained residuum weathered from sandstone and shale

Typical profile

- *H1 - 0 to 21 inches:* clay loam
- *H2 - 21 to 59 inches:* weathered bedrock

Properties and qualities

- *Slope:* 50 to 75 percent
- *Depth to restrictive feature:* 20 to 36 inches to paralithic bedrock
- *Natural drainage class:* Well drained
- *Capacity of the most limiting layer to transmit water (Ksat):* Moderately high (0.20 to 0.57 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Available water storage in profile:* Low (about 3.8 inches)

Interpretive groups

- *Land capability classification (irrigated):* None specified
- *Land capability classification (nonirrigated):* 7e
- *Hydrologic Soil Group:* C
- *Ecological site:* CLAYEY (1975) (R019XD001CA)
- *Hydric soil rating:* No

Minor Components

Cieneba, sandy loam

- *Percent of map unit:* 5 percent
- *Hydric soil rating:* No

Calleguas, clay loam

- *Percent of map unit:* 5 percent
- *Hydric soil rating:* No

114—Balcom-Rock outcrop complex, 15 to 50 percent slopes

Map Unit Setting

- *National map unit symbol:* hclp
- *Elevation:* 130 to 4,000 feet
- *Mean annual precipitation:* 8 to 15 inches
- *Mean annual air temperature:* 45 to 63 degrees F
- *Frost-free period:* 110 to 320 days
- *Farmland classification:* Not prime farmland

Map Unit Composition

- *Balcom and similar soils:* 75 percent
- *Minor components:* 25 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Balcom

Setting

- *Landform:* Hills
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Parent material:* Calcareous residuum weathered from sandstone and shale

Typical profile

- *H1 - 0 to 27 inches:* clay loam
- *H2 - 27 to 59 inches:* weathered bedrock

Properties and qualities

- *Slope*: 15 to 50 percent
- *Depth to restrictive feature*: 24 to 36 inches to paralithic bedrock
- *Drainage class*: Well drained
- *Capacity of the most limiting layer to transmit water (Ksat)*: Moderately high (0.20 to 0.57 in/hr)
- *Depth to water table*: More than 80 inches
- *Frequency of flooding*: None
- *Frequency of ponding*: None
- *Calcium carbonate, maximum content*: 5 percent
- *Maximum salinity*: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
- *Available water capacity*: Low (about 4.3 inches)

Interpretive groups

- *Land capability classification (irrigated)*: None specified
- *Land capability classification (nonirrigated)*: 6e
- *Hydrologic Soil Group*: C
- *Ecological site*: R019XD001CA
- *Hydric soil rating*: No

Minor Components

Rock outcrop

- *Percent of map unit*: 10 percent
- *Hydric soil rating*: No

Calleguas, clay loam

- *Percent of map unit*: 10 percent
- *Hydric soil rating*: No

Cieneba, sandy loam

- *Percent of map unit*: 5 percent
- *Hydric soil rating*: No

115—Beaches

Map Unit Setting

- *National map unit symbol*: hclq
- *Elevation*: 0 to 10 feet
- *Mean annual precipitation*: 42 to 48 inches
- *Mean annual air temperature*: 52 to 57 degrees F
- *Frost-free period*: 190 to 210 days
- *Farmland classification*: Not prime farmland

Map Unit Composition

- *Beaches*: 100 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Beaches

Setting

- *Landform:* Beaches

Typical profile

- *H1 - 0 to 6 inches:* sand
- *H2 - 6 to 60 inches:* coarse sand, sand, fine sand
- *H2 - 6 to 60 inches:*
- *H2 - 6 to 60 inches:*

Properties and qualities

- *Slope:* 0 to 5 percent
- *Drainage class:* Poorly drained
- *Capacity of the most limiting layer to transmit water (Ksat):* High to very high (5.95 to 19.98 in/hr)
- *Depth to water table:* About 0 to 72 inches
- *Frequency of flooding:* Frequent
- *Maximum salinity:* Slightly saline to strongly saline (4.0 to 16.0 mmhos/cm)
- *Available water capacity:* Moderate (about 6.7 inches)

Interpretive groups

- *Land capability classification (irrigated):* None specified
- *Land capability classification (nonirrigated):* 8w
- *Hydric soil rating:* Yes

126—Bosanko clay, 9 to 15 percent slopes

Map Unit Setting

- *National map unit symbol:* 2xm61
- *Elevation:* 100 to 2,040 feet
- *Mean annual precipitation:* 9 to 16 inches
- *Mean annual air temperature:* 63 to 65 degrees F
- *Frost-free period:* 321 to 365 days
- *Farmland classification:* Not prime farmland

Map Unit Composition

- *Bosanko and similar soils:* 85 percent
- *Minor components:* 15 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Bosanko

Setting

- *Landform:* Hills, hillslopes
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope

- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Parent material:* Residuum weathered from granite

Typical profile

- *Ap - 0 to 5 inches:* clay
- *Bss - 5 to 25 inches:* clay
- *Bk - 25 to 37 inches:* clay
- *Cr - 37 to 79 inches:* bedrock

Properties and qualities

- *Slope:* 9 to 15 percent
- *Depth to restrictive feature:* 26 to 38 inches to paralithic bedrock
- *Drainage class:* Well drained
- *Runoff class:* Very high
- *Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately low (0.00 to 0.06 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Calcium carbonate, maximum content:* 5 percent
- *Available water capacity:* Low (about 5.8 inches)

Interpretive groups

- *Land capability classification (irrigated):* 3e
- *Land capability classification (nonirrigated):* 3e
- *Hydrologic Soil Group:* D
- *Ecological site:* R019XD001CA
- *Hydric soil rating:* No

Minor Components

Balcom

- *Percent of map unit:* 3 percent
- *Landform:* Hills
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Hydric soil rating:* No

Alo

- *Percent of map unit:* 3 percent
- *Landform:* Hills
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex

- *Hydric soil rating:* No

Fallbrook

- *Percent of map unit:* 3 percent
- *Landform:* Hills
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Hydric soil rating:* No

Bonsall

- *Percent of map unit:* 3 percent
- *Landform:* Hillslopes
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Hydric soil rating:* No

Vista

- *Percent of map unit:* 3 percent
- *Landform:* Hills
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Hydric soil rating:* No

127—Bosanko clay, 15 to 30 percent slopes

Map Unit Setting

- *National map unit symbol:* 2xm5y
- *Elevation:* 120 to 1,080 feet
- *Mean annual precipitation:* 12 to 15 inches
- *Mean annual air temperature:* 63 to 65 degrees F
- *Frost-free period:* 353 to 365 days
- *Farmland classification:* Not prime farmland

Map Unit Composition

- *Bosanko and similar soils:* 85 percent
- *Minor components:* 15 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Bosanko

Setting

- *Landform*: Hillslopes
- *Landform position (two-dimensional)*: Backslope
- *Landform position (three-dimensional)*: Side slope
- *Down-slope shape*: Convex
- *Across-slope shape*: Convex
- *Parent material*: Acid residuum weathered from igneous rock

Typical profile

- *Ap* - 0 to 5 inches: clay
- *Bss* - 5 to 25 inches: clay
- *Bk* - 25 to 35 inches: clay
- *Cr* - 35 to 79 inches: bedrock

Properties and qualities

- *Slope*: 15 to 30 percent
- *Depth to restrictive feature*: 26 to 36 inches to paralithic bedrock
- *Drainage class*: Well drained
- *Runoff class*: Very high
- *Capacity of the most limiting layer to transmit water (Ksat)*: Very low to moderately low (0.00 to 0.06 in/hr)
- *Depth to water table*: More than 80 inches
- *Frequency of flooding*: None
- *Frequency of ponding*: None
- *Calcium carbonate, maximum content*: 5 percent
- *Maximum salinity*: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
- *Available water capacity*: Low (about 5.5 inches)

Interpretive groups

- *Land capability classification (irrigated)*: 4e
- *Land capability classification (nonirrigated)*: 4e
- *Hydrologic Soil Group*: D
- *Ecological site*: R019XD001CA
- *Hydric soil rating*: No

Minor Components

Balcom

- *Percent of map unit*: 6 percent
- *Landform*: Hills
- *Landform position (two-dimensional)*: Backslope
- *Landform position (three-dimensional)*: Side slope
- *Down-slope shape*: Convex
- *Across-slope shape*: Convex
- *Hydric soil rating*: No

Alo

- *Percent of map unit:* 6 percent
- *Landform:* Hills
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Hydric soil rating:* No

Vista

- *Percent of map unit:* 1 percent
- *Landform:* Hills
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Hydric soil rating:* No

Bonsall

- *Percent of map unit:* 1 percent
- *Landform:* Hillslopes
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Hydric soil rating:* No

Fallbrook

- *Percent of map unit:* 1 percent
- *Landform:* Hills
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Hydric soil rating:* No

131—Botella loam, 2 to 9 percent slopes, warm MAAT, lower MAP, MLRA 19

Map Unit Setting

- *National map unit symbol:* 2tyzb
- *Elevation:* 20 to 2,180 feet
- *Mean annual precipitation:* 14 to 17 inches
- *Mean annual air temperature:* 64 to 65 degrees F
- *Frost-free period:* 271 to 365 days
- *Farmland classification:* Farmland of statewide importance

Map Unit Composition

- *Botella and similar soils: 85 percent*
- *Minor components: 15 percent*
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Botella

Setting

- *Landform: Alluvial fans*
- *Landform position (two-dimensional): Toeslope*
- *Landform position (three-dimensional): Riser*
- *Down-slope shape: Linear*
- *Across-slope shape: Convex*
- *Parent material: Alluvium derived from sedimentary rock*

Typical profile

- *H1 - 0 to 8 inches: loam*
- *H2 - 8 to 35 inches: silty clay loam*
- *H3 - 35 to 66 inches: clay loam*

Properties and qualities

- *Slope: 2 to 9 percent*
- *Depth to restrictive feature: More than 80 inches*
- *Drainage class: Well drained*
- *Runoff class: Medium*
- *Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)*
- *Depth to water table: More than 80 inches*
- *Frequency of flooding: None*
- *Frequency of ponding: None*
- *Available water capacity: High (about 9.9 inches)*

Interpretive groups

- *Land capability classification (irrigated): 2e*
- *Land capability classification (nonirrigated): 3e*
- *Hydrologic Soil Group: C*
- *Ecological site: R019XD029CA*
- *Hydric soil rating: No*

Minor Components

Capistrano

- *Percent of map unit: 5 percent*
- *Landform: Alluvial fans*
- *Landform position (two-dimensional): Toeslope*
- *Landform position (three-dimensional): Riser*
- *Down-slope shape: Linear*
- *Across-slope shape: Convex*

- *Hydric soil rating:* No

Sorrento

- *Percent of map unit:* 5 percent
- *Landform:* Alluvial fans
- *Landform position (two-dimensional):* Toeslope
- *Landform position (three-dimensional):* Riser
- *Down-slope shape:* Linear
- *Across-slope shape:* Convex
- *Hydric soil rating:* No

Botella, clay loam

- *Percent of map unit:* 5 percent
- *Landform:* Alluvial fans
- *Landform position (two-dimensional):* Toeslope
- *Landform position (three-dimensional):* Riser
- *Down-slope shape:* Linear
- *Across-slope shape:* Convex
- *Hydric soil rating:* No

132—Botella clay loam, 2 to 9 percent slopes, warm MAAT, MLRA 19

Map Unit Setting

- *National map unit symbol:* 2tyz8
- *Elevation:* 80 to 1,450 feet
- *Mean annual precipitation:* 14 to 16 inches
- *Mean annual air temperature:* 64 to 65 degrees F
- *Frost-free period:* 330 to 360 days
- *Farmland classification:* Prime farmland if irrigated

Map Unit Composition

- *Botella and similar soils:* 90 percent
- *Minor components:* 10 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Botella

Setting

- *Landform:* Alluvial fans
- *Landform position (two-dimensional):* Toeslope
- *Landform position (three-dimensional):* Riser, flat
- *Down-slope shape:* Linear
- *Across-slope shape:* Convex
- *Parent material:* Alluvium derived from sedimentary rock

Typical profile

- *A - 0 to 8 inches:* clay loam

- *2Bt - 8 to 35 inches:* silty clay loam
- *2C - 35 to 66 inches:* clay loam

Properties and qualities

- *Slope:* 2 to 9 percent
- *Depth to restrictive feature:* More than 80 inches
- *Drainage class:* Well drained
- *Runoff class:* Medium
- *Capacity of the most limiting layer to transmit water (Ksat):* Moderately high (0.20 to 0.60 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Available water capacity:* High (about 10.0 inches)

Interpretive groups

- *Land capability classification (irrigated):* 2e
- *Land capability classification (nonirrigated):* 3e
- *Hydrologic Soil Group:* C
- *Ecological site:* R019XD001CA
- *Hydric soil rating:* No

Minor Components

Sorrento

- *Percent of map unit:* 6 percent
- *Landform:* Alluvial fans
- *Landform position (two-dimensional):* Footslope
- *Down-slope shape:* Linear
- *Across-slope shape:* Linear
- *Hydric soil rating:* No

Mocho

- *Percent of map unit:* 4 percent
- *Landform:* Alluvial fans
- *Landform position (two-dimensional):* Footslope
- *Landform position (three-dimensional):* Tread
- *Down-slope shape:* Linear
- *Across-slope shape:* Linear
- *Hydric soil rating:* No

134—Calleguas clay loam, 50 to 75 percent slopes, eroded

Map Unit Setting

- *National map unit symbol:* 2xm62
- *Elevation:* 220 to 2,110 feet
- *Mean annual precipitation:* 13 to 18 inches
- *Mean annual air temperature:* 64 to 65 degrees F
- *Frost-free period:* 353 to 365 days

- *Farmland classification:* Not prime farmland

Map Unit Composition

- *Calleguas and similar soils:* 85 percent
- *Minor components:* 15 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Calleguas

Setting

- *Landform:* Hillslopes
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Parent material:* Residuum weathered from calcareous shale

Typical profile

- *A1 - 0 to 7 inches:* clay loam
- *A2 - 7 to 11 inches:* clay loam
- *A3 - 11 to 15 inches:* very channery clay loam
- *Cr - 15 to 59 inches:* bedrock

Properties and qualities

- *Slope:* 50 to 75 percent
- *Depth to restrictive feature:* 10 to 20 inches to paralithic bedrock
- *Drainage class:* Well drained
- *Runoff class:* Very high
- *Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately low (0.00 to 0.06 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Calcium carbonate, maximum content:* 5 percent
- *Maximum salinity:* Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
- *Available water capacity:* Very low (about 2.2 inches)

Interpretive groups

- *Land capability classification (irrigated):* None specified
- *Land capability classification (nonirrigated):* 7e
- *Hydrologic Soil Group:* D
- *Ecological site:* R019XD071CA - SHALLOW CLAYEY (1975)
- *Hydric soil rating:* No

Minor Components

Cieneba

- *Percent of map unit:* 5 percent
- *Landform:* Hillslopes
- *Landform position (two-dimensional):* Summit
- *Landform position (three-dimensional):* Crest
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Hydric soil rating:* No

Anaheim

- *Percent of map unit:* 5 percent
- *Landform:* Hillslopes
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Hydric soil rating:* No

Balcom

- *Percent of map unit:* 5 percent
- *Landform:* Hillslopes
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Hydric soil rating:* No

135—Capistrano sandy loam, 2 to 9 percent slopes

Map Unit Setting

- *National map unit symbol:* hcmc
- *Elevation:* 0 to 2,500 feet
- *Mean annual precipitation:* 14 to 25 inches
- *Mean annual air temperature:* 61 to 63 degrees F
- *Frost-free period:* 240 to 365 days
- *Farmland classification:* Prime farmland if irrigated

Map Unit Composition

- *Capistrano and similar soils:* 80 percent
- *Minor components:* 20 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Capistrano

Setting

- *Landform*: Alluvial fans
- *Landform position (two-dimensional)*: Toeslope
- *Landform position (three-dimensional)*: Riser, flat
- *Down-slope shape*: Concave
- *Across-slope shape*: Convex
- *Parent material*: Alluvium derived from granite

Typical profile

- *H1 - 0 to 27 inches*: sandy loam
- *H2 - 27 to 65 inches*: fine sandy loam

Properties and qualities

- *Slope*: 2 to 9 percent
- *Depth to restrictive feature*: More than 80 inches
- *Drainage class*: Well drained
- *Runoff class*: Low
- *Capacity of the most limiting layer to transmit water (Ksat)*: High (1.98 to 5.95 in/hr)
- *Depth to water table*: More than 80 inches
- *Frequency of flooding*: None
- *Frequency of ponding*: None
- *Available water capacity*: Moderate (about 6.6 inches)

Interpretive groups

- *Land capability classification (irrigated)*: 2e
- *Land capability classification (nonirrigated)*: 3e
- *Hydrologic Soil Group*: A
- *Ecological site*: R019XD029CA
- *Hydric soil rating*: No

Minor Components

Corralitos, loamy sand

- *Percent of map unit*: 5 percent
- *Hydric soil rating*: No

Capistrano, gravelly

- *Percent of map unit*: 5 percent
- *Hydric soil rating*: No

Hanford

- *Percent of map unit*: 5 percent
- *Hydric soil rating*: No

Myford, sandy loam

- *Percent of map unit:* 3 percent
- *Hydric soil rating:* No

Ramona, fine sandy loam

- *Percent of map unit:* 2 percent
- *Hydric soil rating:* No

136—Capistrano sandy loam, 9 to 15 percent slopes

Map Unit Setting

- *National map unit symbol:* hcnd
- *Elevation:* 0 to 2,500 feet
- *Mean annual precipitation:* 14 to 25 inches
- *Mean annual air temperature:* 61 to 63 degrees F
- *Frost-free period:* 240 to 365 days
- *Farmland classification:* Farmland of statewide importance

Map Unit Composition

- *Capistrano and similar soils:* 85 percent
- *Minor components:* 15 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Capistrano

Setting

- *Landform:* Alluvial fans
- *Landform position (two-dimensional):* Toeslope
- *Landform position (three-dimensional):* Riser, flat
- *Down-slope shape:* Linear
- *Across-slope shape:* Convex
- *Parent material:* Alluvium derived from igneous and sedimentary rock

Typical profile

- *H1 - 0 to 27 inches:* sandy loam
- *H2 - 27 to 65 inches:* fine sandy loam

Properties and qualities

- *Slope:* 9 to 15 percent
- *Depth to restrictive feature:* More than 80 inches
- *Drainage class:* Well drained
- *Capacity of the most limiting layer to transmit water (Ksat):* High (1.98 to 5.95 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Available water capacity:* Moderate (about 6.6 inches)

Interpretive groups

- *Land capability classification (irrigated): 3e*
- *Land capability classification (nonirrigated): 3e*
- *Hydrologic Soil Group: A*
- *Ecological site: R019XD029CA*
- *Hydric soil rating: No*

Minor Components

San andreas, sandy loam

- *Percent of map unit: 5 percent*
- *Hydric soil rating: No*

Unnamed

- *Percent of map unit: 5 percent*
- *Hydric soil rating: No*

Myford, sandy loam

- *Percent of map unit: 3 percent*
- *Hydric soil rating: No*

Unnamed

- *Percent of map unit: 2 percent*
- *Hydric soil rating: No*

141—Cieneba sandy loam, 15 to 30 percent slopes

Map Unit Setting

- *National map unit symbol: hcmk*
- *Elevation: 500 to 4,000 feet*
- *Mean annual precipitation: 12 to 35 inches*
- *Mean annual air temperature: 57 to 64 degrees F*
- *Frost-free period: 200 to 300 days*
- *Farmland classification: Not prime farmland*

Map Unit Composition

- *Cieneba and similar soils: 85 percent*
- *Minor components: 15 percent*
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Cieneba

Setting

- *Landform: Hills*
- *Landform position (two-dimensional): Backslope*

- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Parent material:* Residuum weathered from granite

Typical profile

- *H1 - 0 to 17 inches:* sandy loam
- *H2 - 17 to 59 inches:* weathered bedrock

Properties and qualities

- *Slope:* 15 to 30 percent
- *Depth to restrictive feature:* 4 to 20 inches to paralithic bedrock
- *Drainage class:* Somewhat excessively drained
- *Capacity of the most limiting layer to transmit water (Ksat):* High (1.98 to 5.95 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Available water capacity:* Very low (about 2.5 inches)

Interpretive groups

- *Land capability classification (irrigated):* 4e
- *Land capability classification (nonirrigated):* 4e
- *Hydrologic Soil Group:* D
- *Ecological site:* R019XD060CA - SHALLOW LOAMY (1975)
- *Hydric soil rating:* No

Minor Components

San andreas, sandy loam

- *Percent of map unit:* 5 percent
- *Hydric soil rating:* No

Soper, gravelly loam

- *Percent of map unit:* 5 percent
- *Hydric soil rating:* No

Anaheim, loam

- *Percent of map unit:* 5 percent
- *Hydric soil rating:* No

142—Cieneba sandy loam, 30 to 75 percent slopes, eroded

Map Unit Setting

- *National map unit symbol:* hcml
- *Elevation:* 500 to 4,000 feet
- *Mean annual precipitation:* 12 to 35 inches

- *Mean annual air temperature:* 57 to 64 degrees F
- *Frost-free period:* 200 to 300 days
- *Farmland classification:* Not prime farmland

Map Unit Composition

- *Cieneba and similar soils:* 65 percent
- *Minor components:* 35 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Cieneba

Setting

- *Landform:* Hills
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Concave, convex
- *Across-slope shape:* Convex
- *Parent material:* Residuum weathered from granite

Typical profile

- *H1 - 0 to 7 inches:* sandy loam
- *H2 - 7 to 59 inches:* weathered bedrock

Properties and qualities

- *Slope:* 30 to 75 percent
- *Depth to restrictive feature:* 4 to 20 inches to paralithic bedrock
- *Drainage class:* Somewhat excessively drained
- *Runoff class:* Medium
- *Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately low (0.00 to 0.06 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Available water capacity:* Very low (about 1.1 inches)

Interpretive groups

- *Land capability classification (irrigated):* None specified
- *Land capability classification (nonirrigated):* 7e
- *Hydrologic Soil Group:* D
- *Ecological site:* R019XD060CA - SHALLOW LOAMY (1975)
- *Hydric soil rating:* No

Minor Components

Cieneba, uneroded

- *Percent of map unit:* 10 percent
- *Hydric soil rating:* No

Vista, sandy loam

- *Percent of map unit:* 5 percent
- *Hydric soil rating:* No

Soper, cobbly loam

- *Percent of map unit:* 5 percent
- *Hydric soil rating:* No

Calleguas, clay loam

- *Percent of map unit:* 5 percent
- *Hydric soil rating:* No

San andreas, sandy loam

- *Percent of map unit:* 5 percent
- *Hydric soil rating:* No

Rock outcrop

- *Percent of map unit:* 2 percent
- *Hydric soil rating:* No

Tollhouse

- *Percent of map unit:* 2 percent
- *Hydric soil rating:* No

Blasingame, loam

- *Percent of map unit:* 1 percent
- *Hydric soil rating:* No

145—Cieneba-rock outcrop complex, 30 to 75 percent slopes

Map Unit Setting

- *National map unit symbol:* hcmp
- *Elevation:* 500 to 4,000 feet
- *Mean annual precipitation:* 8 to 35 inches
- *Mean annual air temperature:* 45 to 64 degrees F
- *Frost-free period:* 110 to 300 days
- *Farmland classification:* Not prime farmland

Map Unit Composition

- *Cieneba and similar soils:* 60 percent
- *Rock outcrop:* 30 percent
- *Minor components:* 10 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Cieneba

Setting

- *Landform*: Hills
- *Landform position (two-dimensional)*: Backslope
- *Landform position (three-dimensional)*: Side slope
- *Down-slope shape*: Concave, convex
- *Across-slope shape*: Convex
- *Parent material*: Residuum weathered from granite

Typical profile

- *H1 - 0 to 7 inches*: sandy loam
- *H2 - 7 to 59 inches*: weathered bedrock

Properties and qualities

- *Slope*: 30 to 75 percent
- *Depth to restrictive feature*: 7 to 20 inches to paralithic bedrock
- *Natural drainage class*: Somewhat excessively drained
- *Runoff class*: Medium
- *Capacity of the most limiting layer to transmit water (Ksat)*: Very low to moderately low (0.00 to 0.06 in/hr)
- *Depth to water table*: More than 80 inches
- *Frequency of flooding*: None
- *Frequency of ponding*: None
- *Available water storage in profile*: Very low (about 1.1 inches)

Interpretive groups

- *Land capability classification (irrigated)*: None specified
- *Land capability classification (nonirrigated)*: 7e
- *Hydrologic Soil Group*: D
- *Ecological site*: SHALLOW LOAMY - ROCK OUTCROP COMPLEX (R019XD073CA)
- *Hydric soil rating*: No

Description of Rock Outcrop

Setting

- *Landform*: Hills
- *Landform position (two-dimensional)*: Backslope
- *Landform position (three-dimensional)*: Side slope
- *Down-slope shape*: Convex
- *Across-slope shape*: Convex
- *Parent material*: Residuum weathered from granite

Typical profile

- *H1 - 0 to 4 inches*: unweathered bedrock

Interpretive groups

- *Land capability classification (irrigated):* None specified
- *Land capability classification (nonirrigated):* 8s
- *Hydric soil rating:* No

Minor Components

Anaheim, loam

- *Percent of map unit:* 5 percent
- *Hydric soil rating:* No

San Andreas, sandy loam

- *Percent of map unit:* 2 percent
- *Hydric soil rating:* No

Tollhouse, soils

- *Percent of map unit:* 2 percent
- *Hydric soil rating:* No

Vista, coarse sandy loam

- *Percent of map unit:* 1 percent
- *Hydric soil rating:* No

146—Corralitos loamy sand

Map Unit Setting

- *National map unit symbol:* hcmq
- *Elevation:* 30 to 1,000 feet
- *Mean annual precipitation:* 12 to 30 inches
- *Mean annual air temperature:* 57 to 61 degrees F
- *Frost-free period:* 230 to 300 days
- *Farmland classification:* Prime farmland if irrigated

Map Unit Composition

- *Corralitos and similar soils:* 65 percent
- *Minor components:* 35 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Corralitos

Setting

- *Landform:* Alluvial fans
- *Landform position (two-dimensional):* Toeslope
- *Landform position (three-dimensional):* Riser, flat

- *Down-slope shape*: Linear
- *Across-slope shape*: Linear
- *Parent material*: Alluvium derived from mixed

Typical profile

- *H1 - 0 to 9 inches*: loamy sand
- *H2 - 9 to 60 inches*: stratified sand to loamy sand

Properties and qualities

- *Slope*: 0 to 5 percent
- *Depth to restrictive feature*: More than 80 inches
- *Drainage class*: Somewhat excessively drained
- *Runoff class*: Negligible
- *Capacity of the most limiting layer to transmit water (Ksat)*: High to very high (5.95 to 19.98 in/hr)
- *Depth to water table*: More than 80 inches
- *Frequency of flooding*: None
- *Frequency of ponding*: None
- *Available water capacity*: Low (about 4.8 inches)

Interpretive groups

- *Land capability classification (irrigated)*: 3s
- *Land capability classification (nonirrigated)*: 3e
- *Hydrologic Soil Group*: A
- *Ecological site*: R019XD035CA
- *Hydric soil rating*: No

Minor Components

Unnamed

- *Percent of map unit*: 20 percent
- *Hydric soil rating*: No

Riverwash

- *Percent of map unit*: 5 percent
- *Landform*: Fans
- *Hydric soil rating*: Yes

Metz, loamy sand

- *Percent of map unit*: 5 percent
- *Hydric soil rating*: No

Soboba, gravelly loamy sand

- *Percent of map unit*: 3 percent
- *Hydric soil rating*: No

Capistrano, sandy loam

- *Percent of map unit:* 2 percent
- *Hydric soil rating:* No

173—Myford sandy loam, 2 to 9 percent slopes

Map Unit Setting

- *National map unit symbol:* hcnl
- *Elevation:* 0 to 1,560 feet
- *Mean annual precipitation:* 11 to 18 inches
- *Mean annual air temperature:* 62 to 65 degrees F
- *Frost-free period:* 320 to 365 days
- *Farmland classification:* Not prime farmland

Map Unit Composition

- *Myford and similar soils:* 75 percent
- *Minor components:* 25 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Myford

Setting

- *Landform:* Terraces
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Tread
- *Down-slope shape:* Linear
- *Across-slope shape:* Linear
- *Parent material:* Alluvium derived from sandstone

Typical profile

- *A1 - 0 to 1 inches:* sandy loam
- *A2 - 1 to 4 inches:* sandy loam
- *A3 - 4 to 12 inches:* sandy loam
- *Bt1 - 12 to 18 inches:* sandy clay
- *Bt2 - 18 to 28 inches:* sandy clay loam
- *Btk1 - 28 to 35 inches:* sandy clay loam
- *Btk2 - 35 to 41 inches:* sandy clay loam
- *B't1 - 41 to 49 inches:* sandy clay loam
- *B't2 - 49 to 61 inches:* sandy clay loam
- *Bt3 - 61 to 71 inches:* sandy clay loam
- *C - 71 to 79 inches:* sandy loam

Properties and qualities

- *Slope:* 2 to 9 percent
- *Depth to restrictive feature:* 8 to 20 inches to abrupt textural change
- *Drainage class:* Moderately well drained
- *Runoff class:* High

- *Capacity of the most limiting layer to transmit water (Ksat):* Moderately high (0.20 to 0.60 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Calcium carbonate, maximum content:* 5 percent
- *Maximum salinity:* Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
- *Available water capacity:* Very low (about 1.5 inches)

Interpretive groups

- *Land capability classification (irrigated):* None specified
- *Land capability classification (nonirrigated):* 3e
- *Hydrologic Soil Group:* C
- *Ecological site:* R019XD061CA
- *Hydric soil rating:* No

Minor Components

Myford, thick surface

- *Percent of map unit:* 10 percent
- *Landform:* Terraces
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Tread
- *Down-slope shape:* Linear
- *Across-slope shape:* Linear
- *Ecological site:* R019XD061CA
- *Hydric soil rating:* No

Yorba, gravelly sandy loam

- *Percent of map unit:* 5 percent
- *Landform:* Terraces
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Tread
- *Down-slope shape:* Linear
- *Across-slope shape:* Linear
- *Ecological site:* R019XD061CA
- *Hydric soil rating:* No

Capistrano

- *Percent of map unit:* 5 percent
- *Landform:* Terraces
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Tread
- *Down-slope shape:* Linear
- *Across-slope shape:* Linear
- *Ecological site:* R019XD029CA
- *Hydric soil rating:* No

Chesterton, loamy sand

- *Percent of map unit:* 3 percent
- *Landform:* Terraces
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Tread
- *Down-slope shape:* Linear
- *Across-slope shape:* Linear
- *Ecological site:* R019XD061CA
- *Hydric soil rating:* No

Water

- *Percent of map unit:* 2 percent
- *Landform:* Depressions

175—Myford sandy loam, 9 to 15 percent slopes

Map Unit Setting

- *National map unit symbol:* hcnn
- *Elevation:* 1,500 feet
- *Mean annual precipitation:* 12 to 20 inches
- *Mean annual air temperature:* 63 degrees F
- *Frost-free period:* 270 to 350 days
- *Farmland classification:* Not prime farmland

Map Unit Composition

- *Myford and similar soils:* 85 percent
- *Minor components:* 15 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Myford

Setting

- *Landform:* Terraces
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Riser
- *Down-slope shape:* Concave
- *Across-slope shape:* Linear
- *Parent material:* Alluvium derived from mixed

Typical profile

- *H1 - 0 to 12 inches:* sandy loam
- *H2 - 12 to 18 inches:* sandy clay
- *H3 - 18 to 28 inches:* sandy clay loam
- *H4 - 28 to 71 inches:* sandy clay loam
- *H5 - 71 to 79 inches:* sandy loam

Properties and qualities

- *Slope*: 9 to 15 percent
- *Depth to restrictive feature*: More than 80 inches
- *Drainage class*: Moderately well drained
- *Runoff class*: Very high
- *Capacity of the most limiting layer to transmit water (Ksat)*: Very low to moderately low (0.00 to 0.06 in/hr)
- *Depth to water table*: More than 80 inches
- *Frequency of flooding*: None
- *Frequency of ponding*: None
- *Calcium carbonate, maximum content*: 5 percent
- *Maximum salinity*: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
- *Available water capacity*: Very low (about 1.4 inches)

Interpretive groups

- *Land capability classification (irrigated)*: 4e
- *Land capability classification (nonirrigated)*: 4e
- *Hydrologic Soil Group*: D
- *Ecological site*: R019XD061CA
- *Hydric soil rating*: No

Minor Components

Myford, sandy loam, eroded

- *Percent of map unit*: 5 percent
- *Hydric soil rating*: No

Capistrano, sandy loam

- *Percent of map unit*: 5 percent
- *Hydric soil rating*: No

Yorba, gravelly sandy loam

- *Percent of map unit*: 3 percent
- *Hydric soil rating*: No

San andreas, sandy loam

- *Percent of map unit*: 2 percent
- *Hydric soil rating*: No

177—Myford sandy loam, 9 to 30 percent slopes, eroded

Map Unit Setting

- *National map unit symbol*: hcnq
- *Elevation*: 0 to 2,100 feet
- *Mean annual precipitation*: 11 to 18 inches
- *Mean annual air temperature*: 62 to 65 degrees F

- *Frost-free period:* 290 to 365 days
- *Farmland classification:* Not prime farmland

Map Unit Composition

- *Myford and similar soils:* 85 percent
- *Minor components:* 15 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Myford

Setting

- *Landform:* Terraces
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Riser
- *Down-slope shape:* Linear
- *Across-slope shape:* Linear
- *Parent material:* Alluvium derived from sandstone

Typical profile

- *A - 0 to 7 inches:* sandy loam
- *Bt - 7 to 11 inches:* sandy clay
- *Btk - 11 to 21 inches:* sandy clay loam
- *B't - 21 to 64 inches:* sandy clay loam
- *C - 64 to 79 inches:* sandy loam

Properties and qualities

- *Slope:* 9 to 30 percent
- *Depth to restrictive feature:* 4 to 10 inches to abrupt textural change
- *Drainage class:* Moderately well drained
- *Runoff class:* High
- *Capacity of the most limiting layer to transmit water (Ksat):* Moderately high (0.20 to 0.60 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Calcium carbonate, maximum content:* 5 percent
- *Maximum salinity:* Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
- *Available water capacity:* Very low (about 0.9 inches)

Interpretive groups

- *Land capability classification (irrigated):* None specified
- *Land capability classification (nonirrigated):* 4e
- *Hydrologic Soil Group:* C
- *Ecological site:* R019XD061CA
- *Hydric soil rating:* No

Minor Components

Myford, sandy loam

- *Percent of map unit:* 10 percent
- *Landform:* Terraces
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Riser
- *Down-slope shape:* Linear
- *Across-slope shape:* Linear
- *Ecological site:* R019XD061CA
- *Hydric soil rating:* No

Cieneba, sandy loam

- *Percent of map unit:* 3 percent
- *Landform:* Ridges
- *Landform position (two-dimensional):* Summit
- *Landform position (three-dimensional):* Crest
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Ecological site:* R019XD060CA - SHALLOW LOAMY (1975)
- *Hydric soil rating:* No

Yorba, cobbly sandy loam

- *Percent of map unit:* 2 percent
- *Landform:* Terraces
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Riser
- *Down-slope shape:* Linear
- *Across-slope shape:* Linear
- *Ecological site:* R019XD061CA
- *Hydric soil rating:* No

185—Pits

Map Unit Composition

- *Pits*: 95 percent
- *Minor components*: 5 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Pits

Setting

- *Down-slope shape*: Concave
- *Across-slope shape*: Concave
- *Parent material*: Igneous, metamorphic, and sedimentary rock

Typical profile

- *H1 - 0 to 6 inches*: extremely gravelly coarse sand
- *H2 - 6 to 60 inches*: extremely gravelly sand, extremely gravelly coarse sand, very gravelly coarse sand
- *H2 - 6 to 60 inches*
- *H2 - 6 to 60 inches*

Interpretive groups

- *Land capability classification (irrigated)*: None specified
- *Land capability classification (nonirrigated)*: 8s
- *Hydric soil rating*: No

Minor Components

Unnamed

- *Percent of map unit*: 5 percent
- *Landform*: Depressions
- *Hydric soil rating*: Yes

Riverwash

Map Unit Composition

- *Riverwash*: 100 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Riverwash

Setting

- *Landform*: Fans
- *Parent material*: Sandy and gravelly alluvium

Typical profile

- C1 - 0 to 6 inches: gravelly sand
- C2 - 6 to 60 inches: stratified gravelly coarse sand to sandy loam

Properties and qualities

- Slope: 0 to 5 percent
- Runoff class: Negligible
- Capacity of the most limiting layer to transmit water (*K_{sat}*): High to very high (5.95 to 19.98 in/hr)
- Depth to water table: About 0 to 24 inches
- Frequency of flooding: Frequent
- Available water storage in profile: Very low (about 2.9 inches)

Interpretive groups

- Land capability classification (irrigated): None specified
- Land capability classification (nonirrigated): 8w
- Hydric soil rating: Yes

192—Rock outcrop–Cieneba complex, 30 to 75 percent slopes

Map Unit Setting

- National map unit symbol: hcp6
- Elevation: 500 to 4,000 feet
- Mean annual precipitation: 8 to 35 inches
- Mean annual air temperature: 45 to 64 degrees F
- Frost-free period: 110 to 300 days
- Farmland classification: Not prime farmland

Map Unit Composition

- Rock outcrop: 50 percent
- Cieneba and similar soils: 40 percent
- Minor components: 10 percent
- Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rock Outcrop

Setting

- Landform: Hills
- Landform position (two-dimensional): Backslope
- Landform position (three-dimensional): Side slope
- Down-slope shape: Concave
- Across-slope shape: Convex
- Parent material: Residuum weathered from granite

Interpretive groups

- Land capability classification (irrigated): None specified
- Land capability classification (nonirrigated): 8s

- *Hydric soil rating:* No

Description of Cieneba

Setting

- *Landform:* Hills
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Parent material:* Residuum weathered from granite

Typical profile

- *H1 - 0 to 7 inches:* sandy loam
- *H2 - 7 to 59 inches:* weathered bedrock

Properties and qualities

- *Slope:* 30 to 75 percent
- *Depth to restrictive feature:* 4 to 20 inches to paralithic bedrock
- *Natural drainage class:* Somewhat excessively drained
- *Runoff class:* Medium
- *Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately low (0.00 to 0.06 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Available water storage in profile:* Very low (about 1.1 inches)

Interpretive groups

- *Land capability classification (irrigated):* None specified
- *Land capability classification (nonirrigated):* 7e
- *Hydrologic Soil Group:* D
- *Ecological site:* SHALLOW LOAMY - ROCK OUTCROP COMPLEX (R019XD073CA)
- *Hydric soil rating:* No

Minor Components

Vista

- *Percent of map unit:* 3 percent
- *Hydric soil rating:* No

Soper, cobbly loam

- *Percent of map unit:* 3 percent
- *Hydric soil rating:* No

Anaheim, loam

- *Percent of map unit:* 3 percent

- *Hydric soil rating:* No

Tollhouse

- *Percent of map unit:* 1 percent
- *Hydric soil rating:* No

197—Soboba gravelly loamy sand, 0 to 5 percent slopes

Map Unit Setting

- *National map unit symbol:* hcpc
- *Elevation:* 30 to 4,200 feet
- *Mean annual precipitation:* 10 to 20 inches
- *Mean annual air temperature:* 61 to 63 degrees F
- *Frost-free period:* 175 to 250 days
- *Farmland classification:* Not prime farmland

Map Unit Composition

- *Soboba and similar soils:* 75 percent
- *Minor components:* 25 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Soboba

Setting

- *Landform:* Alluvial fans
- *Landform position (two-dimensional):* Toeslope
- *Landform position (three-dimensional):* Riser, flat
- *Down-slope shape:* Linear
- *Across-slope shape:* Linear
- *Parent material:* Sandy and gravelly alluvium derived from mixed

Typical profile

- *H1 - 0 to 10 inches:* gravelly loamy sand
- *H2 - 10 to 60 inches:* very gravelly sand

Properties and qualities

- *Slope:* 0 to 5 percent
- *Depth to restrictive feature:* More than 80 inches
- *Natural drainage class:* Excessively drained
- *Runoff class:* Negligible
- *Capacity of the most limiting layer to transmit water (Ksat):* Very high (19.98 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Available water storage in profile:* Very low (about 1.8 inches)

Interpretive groups

- *Land capability classification (irrigated): 4e*
- *Land capability classification (nonirrigated): 4e*
- *Hydrologic Soil Group: A*
- *Ecological site: SANDY (1975) (R019XD035CA)*
- *Hydric soil rating: No*

Minor Components

Unnamed

- *Percent of map unit: 10 percent*
- *Hydric soil rating: No*

Soboba, gravelly loamy sand

- *Percent of map unit: 5 percent*
- *Hydric soil rating: No*

Corralitos, loamy sand

- *Percent of map unit: 5 percent*
- *Hydric soil rating: No*

Riverwash

- *Percent of map unit: 5 percent*
- *Landform: Fans*
- *Hydric soil rating: Yes*

200—Soper loam, 30 to 50 percent slopes

Map Unit Setting

- *National map unit symbol: hcpg*
- *Elevation: 100 to 2,500 feet*
- *Mean annual precipitation: 12 to 25 inches*
- *Mean annual air temperature: 61 to 63 degrees F*
- *Frost-free period: 250 to 350 days*
- *Farmland classification: Not prime farmland*

Map Unit Composition

- *Soper and similar soils: 65 percent*
- *Minor components: 35 percent*
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Soper

Setting

- *Landform: Hills*

- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Parent material:* Residuum weathered from sandstone

Typical profile

- *H1 - 0 to 9 inches:* loam
- *H2 - 9 to 30 inches:* gravelly clay loam
- *H3 - 30 to 59 inches:* weathered bedrock

Properties and qualities

- *Slope:* 30 to 50 percent
- *Depth to restrictive feature:* 20 to 36 inches to paralithic bedrock
- *Drainage class:* Well drained
- *Capacity of the most limiting layer to transmit water (Ksat):* Moderately high (0.20 to 0.57 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Available water capacity:* Low (about 4.2 inches)

Interpretive groups

- *Land capability classification (irrigated):* 6e
- *Land capability classification (nonirrigated):* 6e
- *Hydrologic Soil Group:* C
- *Ecological site:* R019XD029CA
- *Hydric soil rating:* No

Minor Components

Soper, low sloping or steeper loams

- *Percent of map unit:* 10 percent
- *Hydric soil rating:* No

Severely eroded areas

- *Percent of map unit:* 10 percent
- *Hydric soil rating:* No

Alo, clay

- *Percent of map unit:* 5 percent
- *Hydric soil rating:* No

Anaheim, loam

- *Percent of map unit:* 5 percent
- *Hydric soil rating:* No

Cieneba, sandy loam

- *Percent of map unit:* 5 percent
- *Hydric soil rating:* No

202—Soper gravelly loam, 30 to 50 percent slopes, MLRA 20

Map Unit Setting

- *National map unit symbol:* 2wv8f
- *Elevation:* 10 to 2,010 feet
- *Mean annual precipitation:* 13 to 18 inches
- *Mean annual air temperature:* 63 to 65 degrees F
- *Frost-free period:* 271 to 365 days
- *Farmland classification:* Not prime farmland

Map Unit Composition

- *Soper and similar soils:* 85 percent
- *Minor components:* 15 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Soper

Setting

- *Landform:* Hills
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Parent material:* Residuum weathered from sandstone

Typical profile

- *A - 0 to 8 inches:* gravelly loam
- *Bt - 8 to 29 inches:* gravelly clay loam
- *Cr - 29 to 79 inches:* bedrock

Properties and qualities

- *Slope:* 30 to 50 percent
- *Depth to restrictive feature:* 22 to 36 inches to paralithic bedrock
- *Drainage class:* Well drained
- *Runoff class:* High
- *Capacity of the most limiting layer to transmit water (Ksat):* Moderately low to moderately high (0.06 to 0.20 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Available water capacity:* Low (about 3.9 inches)

Interpretive groups

- *Land capability classification (irrigated)*: None specified
- *Land capability classification (nonirrigated)*: 7e
- *Hydrologic Soil Group*: C
- *Ecological site*: R019XD029CA
- *Hydric soil rating*: No

Minor Components

Cieneba

- *Percent of map unit*: 5 percent
- *Landform*: Hills
- *Landform position (two-dimensional)*: Backslope
- *Landform position (three-dimensional)*: Side slope
- *Down-slope shape*: Convex
- *Across-slope shape*: Convex
- *Hydric soil rating*: No

Gabino

- *Percent of map unit*: 3 percent
- *Landform*: Hills
- *Landform position (two-dimensional)*: Backslope
- *Landform position (three-dimensional)*: Side slope
- *Down-slope shape*: Convex
- *Across-slope shape*: Convex
- *Hydric soil rating*: No

Yorba

- *Percent of map unit*: 3 percent
- *Landform*: Hills
- *Landform position (two-dimensional)*: Backslope
- *Landform position (three-dimensional)*: Side slope
- *Down-slope shape*: Convex
- *Across-slope shape*: Convex
- *Hydric soil rating*: No

Gaviota

- *Percent of map unit*: 2 percent
- *Landform*: Hills
- *Landform position (two-dimensional)*: Backslope
- *Landform position (three-dimensional)*: Side slope
- *Down-slope shape*: Convex
- *Across-slope shape*: Convex
- *Hydric soil rating*: No

Fontana

- *Percent of map unit:* 1 percent
- *Landform:* Hills
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Hydric soil rating:* No

Rock outcrop

- *Percent of map unit:* 1 percent
- *Landform:* Hills
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Hydric soil rating:* No

203—Soper cobbly loam, 15 to 50 percent slopes

Map Unit Setting

- *National map unit symbol:* hcpk
- *Elevation:* 100 to 2,500 feet
- *Mean annual precipitation:* 12 to 25 inches
- *Mean annual air temperature:* 64 to 66 degrees F
- *Frost-free period:* 250 to 350 days
- *Farmland classification:* Not prime farmland

Map Unit Composition

- *Soper and similar soils:* 85 percent
- *Minor components:* 15 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Soper

Setting

- *Landform:* Hills
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Parent material:* Residuum weathered from sandstone

Typical profile

- *H1 - 0 to 9 inches:* cobbly loam
- *H2 - 9 to 30 inches:* cobbly clay loam, cobbly sandy clay loam, cobbly loam
- *H2 - 9 to 30 inches:* weathered bedrock

- *H2 - 9 to 30 inches:*
- *H3 - 30 to 59 inches:*

Properties and qualities

- *Slope:* 15 to 50 percent
- *Depth to restrictive feature:* 20 to 36 inches to paralithic bedrock
- *Drainage class:* Well drained
- *Capacity of the most limiting layer to transmit water (Ksat):* Moderately high (0.20 to 0.57 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Available water capacity:* High (about 9.6 inches)

Interpretive groups

- *Land capability classification (irrigated):* 6e
- *Land capability classification (nonirrigated):* 6e
- *Hydrologic Soil Group:* C
- *Ecological site:* R019XD029CA
- *Hydric soil rating:* No

Minor Components

Yorba, cobbly sandy loam

- *Percent of map unit:* 5 percent
- *Hydric soil rating:* No

Soper, gravelly loam

- *Percent of map unit:* 5 percent
- *Hydric soil rating:* No

Gabino, gravelly clay loam

- *Percent of map unit:* 3 percent
- *Hydric soil rating:* No

Cieneba, sandy loam

- *Percent of map unit:* 1 percent
- *Hydric soil rating:* No

Cieneba, rock outcrop complex

- *Percent of map unit:* 1 percent
- *Hydric soil rating:* No

204—Soper-rock outcrop complex, 30 to 75 percent slopes

Map Unit Setting

- *National map unit symbol:* hcpl
- *Elevation:* 100 to 4,000 feet
- *Mean annual precipitation:* 8 to 25 inches
- *Mean annual air temperature:* 45 to 52 degrees F
- *Frost-free period:* 110 to 350 days
- *Farmland classification:* Not prime farmland

Map Unit Composition

- *Soper and similar soils:* 60 percent
- *Soper, cobbly loam, and similar soils:* 20 percent
- *Rock outcrop:* 15 percent
- *Minor components:* 5 percent
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Soper

Setting

- *Landform:* Hills
- *Landform position (two-dimensional):* Backslope
- *Landform position (three-dimensional):* Side slope
- *Down-slope shape:* Convex
- *Across-slope shape:* Convex
- *Parent material:* Residuum weathered from sandstone

Typical profile

- *H1 - 0 to 4 inches:* gravelly loam
- *H2 - 4 to 20 inches:* gravelly clay loam, gravelly sandy clay loam, gravelly loam
- *H2 - 4 to 20 inches:* weathered bedrock
- *H2 - 4 to 20 inches*
- *H3 - 20 to 59 inches*

Properties and qualities

- *Slope:* 30 to 75 percent
- *Depth to restrictive feature:* 20 to 24 inches to paralithic bedrock
- *Natural drainage class:* Well drained
- *Capacity of the most limiting layer to transmit water (Ksat):* Moderately high (0.20 to 0.57 in/hr)
- *Depth to water table:* More than 80 inches
- *Frequency of flooding:* None
- *Frequency of ponding:* None
- *Available water storage in profile:* Moderate (about 6.9 inches)

Interpretive groups

- *Land capability classification (irrigated)*: None specified
- *Land capability classification (nonirrigated)*: 7e
- *Hydrologic Soil Group*: C
- *Ecological site*: SHALLOW LOAMY - ROCK OUTCROP COMPLEX (R019XD073CA)
- *Hydric soil rating*: No

Description of Soper, Cobbly Loam

Setting

- *Landform*: Hills
- *Landform position (two-dimensional)*: Backslope
- *Landform position (three-dimensional)*: Side slope
- *Down-slope shape*: Convex
- *Across-slope shape*: Convex
- *Parent material*: Residuum weathered from sandstone

Typical profile

- *H1 - 0 to 4 inches*: gravelly loam

Properties and qualities

- *Slope*: 30 to 75 percent
- *Depth to restrictive feature*: More than 80 inches
- *Natural drainage class*: Well drained
- *Capacity of the most limiting layer to transmit water (Ksat)*: Moderately high to high (0.57 to 1.98 in/hr)
- *Depth to water table*: More than 80 inches
- *Frequency of flooding*: None
- *Frequency of ponding*: None
- *Available water storage in profile*: Very low (about 0.6 inches)

Interpretive groups

- *Land capability classification (irrigated)*: None specified
- *Land capability classification (nonirrigated)*: 7e
- *Hydrologic Soil Group*: B
- *Hydric soil rating*: No

Description of Rock Outcrop

Setting

- *Landform*: Hills
- *Landform position (two-dimensional)*: Backslope
- *Landform position (three-dimensional)*: Side slope
- *Down-slope shape*: Convex
- *Across-slope shape*: Convex
- *Parent material*: Residuum weathered from sandstone

Typical profile

- *H1 - 0 to 60 inches: unweathered bedrock*

Properties and qualities

- *Slope: 30 to 75 percent*
- *Depth to restrictive feature: 0 inches to lithic bedrock*

Interpretive groups

- *Land capability classification (irrigated): None specified*
- *Land capability classification (nonirrigated): 8s*
- *Hydric soil rating: No*

Minor Components

Cieneba, sandy loam

- *Percent of map unit: 3 percent*
- *Hydric soil rating: No*

Anaheim, loam

- *Percent of map unit: 2 percent*
- *Hydric soil rating: No*

207—Sorrento loam, 2 to 9 percent slopes, warm MAAT, MLRA 19

Map Unit Setting

- *National map unit symbol: 2tz0c*
- *Elevation: 0 to 1,340 feet*
- *Mean annual precipitation: 12 to 18 inches*
- *Mean annual air temperature: 62 to 66 degrees F*
- *Frost-free period: 320 to 365 days*
- *Farmland classification: Prime farmland if irrigated*

Map Unit Composition

- *Sorrento and similar soils: 85 percent*
- *Minor components: 15 percent*
- *Estimates are based on observations, descriptions, and transects of the mapunit.*

Description of Sorrento

Setting

- *Landform: Alluvial fans*
- *Landform position (two-dimensional): Toeslope*
- *Landform position (three-dimensional): Base slope*

- *Down-slope shape*: Linear
- *Across-slope shape*: Linear
- *Parent material*: Alluvium derived from sedimentary rock

Typical profile

- *A - 0 to 12 inches*: loam
- *AB - 12 to 37 inches*: silty clay loam
- *Bk - 37 to 62 inches*: silty clay loam
- *2C - 62 to 72 inches*: sandy loam

Properties and qualities

- *Slope*: 2 to 9 percent
- *Depth to restrictive feature*: More than 80 inches
- *Natural drainage class*: Well drained
- *Runoff class*: Medium
- *Capacity of the most limiting layer to transmit water (Ksat)*: Moderately high (0.20 to 0.60 in/hr)
- *Depth to water table*: More than 80 inches
- *Frequency of flooding*: None
- *Frequency of ponding*: None
- *Calcium carbonate, maximum in profile*: 5 percent
- *Salinity, maximum in profile*: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
- *Available water storage in profile*: High (about 11.6 inches)

Interpretive groups

- *Land capability classification (irrigated)*: None specified
- *Land capability classification (nonirrigated)*: 3e
- *Hydrologic Soil Group*: C
- *Ecological site*: LOAMY (1975) (R019XD029CA)
- *Hydric soil rating*: No

Minor Components

Mocho

- *Percent of map unit*: 7 percent
- *Landform*: Alluvial fans
- *Landform position (two-dimensional)*: Toeslope
- *Landform position (three-dimensional)*: Base slope
- *Down-slope shape*: Linear
- *Across-slope shape*: Linear
- *Hydric soil rating*: No

Botella

- *Percent of map unit*: 2 percent
- *Landform*: Alluvial fans
- *Landform position (two-dimensional)*: Toeslope
- *Landform position (three-dimensional)*: Base slope
- *Down-slope shape*: Linear
- *Across-slope shape*: Linear

- *Ecological site:* LOAMY (1975) (R019XD029CA)
- *Hydric soil rating:* No

Pico

- *Percent of map unit:* 2 percent
- *Landform:* Alluvial fans
- *Landform position (two-dimensional):* Toeslope
- *Landform position (three-dimensional):* Base slope
- *Down-slope shape:* Linear
- *Across-slope shape:* Linear
- *Hydric soil rating:* No

Garretson

- *Percent of map unit:* 2 percent
- *Landform:* Alluvial fans
- *Landform position (two-dimensional):* Toeslope
- *Landform position (three-dimensional):* Base slope
- *Down-slope shape:* Linear
- *Across-slope shape:* Linear
- *Hydric soil rating:* No

Anacapa

- *Percent of map unit:* 2 percent
- *Landform:* Alluvial fans
- *Landform position (two-dimensional):* Toeslope
- *Landform position (three-dimensional):* Base slope
- *Down-slope shape:* Linear
- *Across-slope shape:* Linear
- *Hydric soil rating:* No

Botella

- *Percent of map unit:* 2 percent
- *Landform:* Alluvial fans
- *Landform position (two-dimensional):* Toeslope
- *Landform position (three-dimensional):* Base slope
- *Down-slope shape:* Linear
- *Across-slope shape:* Linear
- *Ecological site:* R019XD029CA
- *Hydric soil rating:* No

ATTACHMENT G

LITERATURE REVIEW DETAILS – BASIN PLAN BENEFICIAL USES

BASIN PLAN BENEFICIAL USES

Beneficial uses are defined in the Porter-Cologne Act as those uses of water that are necessary for tangible and intangible economic, social, and environmental benefits. The *Water Quality Control Plan: Santa Ana River Basin (8)* (Basin Plan) identifies a number of beneficial uses for Reach 1 of Santiago Creek and Irvine Lake: Municipal and Domestic Water Supply (MUN) waters, Agricultural Supply (AGR) waters, Groundwater Recharge (GRW) waters, Water Contact Recreation (REC-1) waters, Non-contact Water Recreation (REC-2) waters, Warm Fresh Water Habitat (WARM) waters, Cold Freshwater Habitat (COLD) waters, and Wildlife Habitat (WILD) waters (Santa Ana RWQCB 1995).

- MUN waters support community, military, or individual water supply systems including, but not limited to, drinking water supply.
- AGR waters are used for farming, horticulture, or ranching. These uses may include, but are not limited to, irrigation, stock watering, and support of vegetation for range grazing.
- GRW waters are used for natural or artificial recharge of groundwater for purposes that may include, but are not limited to, future extraction, maintaining water quality, or halting saltwater intrusion into freshwater aquifers.
- REC-1 waters are used for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, white water activities, fishing, or use of natural hot springs.
- REC-2 waters are used for recreational activities involving proximity to water but not normally involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.
- WARM waters support warm water ecosystems that may include, but are not limited to, preservation and enhancement of aquatic habitats, vegetation, fish, and wildlife (including invertebrates).
- COLD waters support cold water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife (including invertebrates).
- WILD waters support wildlife habitats that may include, but are not limited to, the preservation and enhancement of vegetation and prey species used by waterfowl and other wildlife

ATTACHMENT H

PROJECT IMPACTS BY LANDOWNERSHIP

TABLE H-1
PROJECT IMPACTS ON USACE JURISDICTIONAL RESOURCES IN THE SURVEY AREA BY LANDOWNER

Feature	Existing (acres)			Permanent Impact (acres)						Temporary Impact (acres)						Total Permanent/Temporary Impact (acres)						Additional Inundation Area** (acres)					
	Wetland	Non-wetland	Total	Wetland (IRWD)	Wetland (County)	Non-wetland (IRWD)	Non-wetland (County)	Total (IRWD)	Total (County)	Wetland (IRWD)	Wetland (County)	Non-wetland (IRWD)	Non-wetland (County)	Total (IRWD)	Total (County)	Wetland (IRWD)	Wetland (County)	Non-wetland (IRWD)	Non-wetland (County)	Total (IRWD)	Total (County)	Wetland (IRWD)	Wetland (County)	Non-wetland (IRWD)	Non-wetland (County)	Total (IRWD)	Total (County)
Irvine Lake	94.582	312.959	407.541	—	—	0.450	—	0.450	—	63.708	—	137.639	—	201.347	—	63.708	—	138.089	—	201.797	—	—	—	—	—	—	—
Santiago Creek	7.124	13.803	20.927	—	—	0.707	0.641	0.707	0.641	0.207	—	0.047	0.169	0.254	0.169	0.207	—	0.754	0.810	0.961	0.810	—	0.673	—	—	—	0.673
Drainage 1	—	0.008	0.008	—	—	—	—	—	—	—	—	—	0.002	—	0.002	—	—	—	0.002	—	0.002	—	—	—	—	—	—
Drainage 2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 6	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 11	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 12	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 13	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 14	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 15	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	101.706	314.770	428.476	0.000	0.000	1.157	0.641	1.157	0.641	63.915	0.000	137.686	0.171	201.601	0.171	63.915	0.000	138.843	0.812	202.758	0.812	0.000	0.673	0.000	0.000	0.000	0.673
** Portions of the Permanent and Temporary impact boundaries overlap the “Additional Inundation Area”. This overlap is not being excluded because the Additional Inundation Area represents a long-term, periodic change in maximum lake level as opposed to a permanent structural impact or temporary construction impact.																											

TABLE H-2
PROJECT IMPACTS ON RWQCB JURISDICTIONAL RESOURCES IN THE SURVEY AREA BY LANDOWNER

Feature	Existing (acres)			Permanent Impact (acres)						Temporary Impact (acres)						Total Permanent/Temporary Impact (acres)						Additional Inundation Area** (acres)					
	Wetland	Non-wetland	Total	Wetland (IRWD)	Wetland (County)	Non-wetland (IRWD)	Non-wetland (County)	Total (IRWD)	Total (County)	Wetland (IRWD)	Wetland (County)	Non-wetland (IRWD)	Non-wetland (County)	Total (IRWD)	Total (County)	Wetland (IRWD)	Wetland (County)	Non-wetland (IRWD)	Non-wetland (County)	Total (IRWD)	Total (County)	Wetland (IRWD)	Wetland (County)	Non-wetland (IRWD)	Non-wetland (County)	Total (IRWD)	Total (County)
Irvine Lake	94.582	312.959	407.541	—	—	0.450	—	0.450	—	63.708	—	137.639	—	201.347	—	63.708	—	138.089	—	201.797	—	—	—	—	—	—	—
Santiago Creek	7.124	13.803	20.927	—	—	0.707	0.641	0.707	0.641	0.207	—	0.047	0.169	0.254	0.169	0.207	—	0.754	0.810	0.961	0.810	—	0.673	—	—	—	0.673
Drainage 1	—	0.008	0.008	—	—	—	—	—	—	—	—	—	0.002	—	0.002	—	—	—	0.002	—	0.002	—	—	—	—	—	—
Drainage 2	—	0.025	0.025	—	—	0.025	—	0.025	—	—	—	—	—	—	—	—	—	0.025	—	0.025	—	—	—	—	—	—	—
Drainage 3	—	0.071	0.071	—	—	0.007	0.031	0.007	0.031	—	—	—	0.008	—	0.008	—	—	0.007	0.039	0.007	0.039	—	—	—	—	—	—
Drainage 4	—	0.048	0.048	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 5	—	0.144	0.144	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.004	0.002	0.004	0.002
Drainage 6	—	0.369	0.369	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.010	—	0.010
Drainage 7	—	0.100	0.100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.014	—	0.014
Drainage 8	—	0.024	0.024	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 9	—	0.066	0.066	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.004	—	0.004	—
Drainage 10	—	0.167	0.167	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 11	—	0.114	0.114	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 12	—	4.894	4.894	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 13	—	0.039	0.039	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 14	—	0.235	0.235	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 15	—	0.433	0.433	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.004	—	0.004	—
Total	101.706	333.499	435.205	0.000	0.00	1.189	0.672	1.189	0.672	63.915	0.00	137.686	0.179	201.601	0.179	63.915	0.00	138.875	0.851	202.790	0.851	0.00	0.673	0.012	0.026	0.012	0.699
** Portions of the Permanent and Temporary impact boundaries overlap the “Additional Inundation Area”. This overlap is not being excluded because the Additional Inundation Area represents a long-term, periodic change in maximum lake level as opposed to a permanent structural impact or temporary construction impact.																											

TABLE H-3
PROJECT IMPACTS ON CDFW JURISDICTIONAL RESOURCES
IN THE SURVEY AREA BY LANDOWNER

Feature	Existing (acres)	Permanent Impact (acres)		Temporary Impact (acres)		Total Permanent/ Temporary Impact (acres)		Additional Inundation Area** (acres)	
		IRWD	County	IRWD	County	IRWD	County	IRWD	County
Irvine Lake	614.135	1.843	—	229.517	—	231.360	—	0.097	0.678
Santiago Creek	36.024	0.859	1.065	—	0.305	0.859	1.370	—	5.433
Drainage 1	0.027	—	—	—	0.005	—	0.005	—	—
Drainage 2	0.074	0.074	—	—	—	0.074	—	—	—
Drainage 3	0.168	0.004	0.079	—	0.023	0.004	0.102	—	—
Drainage 4	0.094	—	—	—	—	—	—	0.014	—
Drainage 5	0.359	—	—	—	—	—	—	0.007	0.004
Drainage 6	0.149	—	—	—	—	—	—	—	0.008
Drainage 7	0.148	—	—	—	—	—	—	—	0.003
Drainage 8	0.042	—	—	—	—	—	—	—	—
Drainage 9	1.237	—	—	—	—	—	—	0.088	—
Drainage 10	0.245	—	—	—	—	—	—	—	—
Drainage 11	0.318	—	—	—	—	—	—	—	—
Drainage 12	13.517	—	—	—	—	—	—	2.370	—
Drainage 13	0.114	—	—	—	—	—	—	—	—
Drainage 14	0.416	—	—	—	—	—	—	—	—
Drainage 15	2.563	—	—	—	—	—	—	0.278	—
Total	669.630	2.780	1.144	229.517	0.333	232.297	1.477	2.854	6.126
** Portions of the Permanent and Temporary impact boundaries overlap the "Additional Inundation Area". This overlap is not being excluded because the Additional Inundation Area represents a long-term, periodic change in maximum lake level as opposed to a permanent structural impact or temporary construction impact.									

TABLE H-4
SUMMARY OF PROJECT IMPACTS ON JURISDICTIONAL RESOURCES
IN THE SURVEY AREA BY LANDOWNER

Jurisdiction	Amount of Jurisdictional Water Resource (acres)								
	Existing	Permanent (IRWD)	Permanent (County)	Temporary (IRWD)	Temporary (County)	Total Impact (IRWD)	Total Impact (County)	Additional Inundation Area** (IRWD)	Additional Inundation Area** (County)
USACE WOTUS	428.476	1.157	0.641	201.601	0.171	202.758	0.812	0.000	0.673
RWCQB Waters of the State	435.205	1.189	0.672	201.601	0.179	202.790	0.851	0.012	0.699
CDFW Jurisdictional Resources	669.630	2.780	1.144	229.517	0.333	232.297	1.477	2.854	6.126
USACE: U.S. Army Corps of Engineers; WOTUS: waters of the United States; RWQCB: Regional Water Quality Control Board; CDFW: California Department of Fish and Wildlife; “-”: not present									
** Portions of the Permanent and Temporary impact boundaries overlap the “Additional Inundation Area”. This overlap is not being excluded because the Additional Inundation Area represents a long-term, periodic change in maximum lake level as opposed to a permanent structural impact or temporary construction impact.									

APPENDIX N

PROJECT IMPACTS BY LANDOWNER

TABLE N-1
VEGETATION ACREAGE IMPACTS OF THE PROJECT

Vegetation Types and Other Areas	Gray and Bramlet Vegetation Code	Existing (acres)	Permanent Impact (acres)		Temporary Impact (acres)		SCE Alignment Temporary Impact (acres)		Total Permanent/ Temporary Impact (acres)		Additional Inundation Area ^a (acres)	
			IRWD	County	IRWD	County	IRWD	County	IRWD	County	IRWD	County
Coastal Sage Scrub												
Sagebrush Scrub	2.3.6	115.81	1.41	0.98	0.69	2.74	—	0.07	2.10	3.79	1.48	0.76
Disturbed Sagebrush Scrub	2.3.6	20.11	0.48	0.88	0.17	0.66	—	—	0.65	1.54	0.42	0.16
Sagebrush – Coyote Brush Scrub	2.3.12	10.59	—	—	—	0.03	—	—	—	0.03	0.04	0.02
Southern Cactus Scrub	2.4	17.48	—	—	—	—	—	—	—	—	0.19	—
Disturbed Southern Cactus Scrub	2.4	10.63	—	—	—	—	—	—	—	—	0.29	—
Disturbed Floodplain Sage Scrub	2.6	0.48	0.12	0.08	—	0.10	—	—	0.12	0.18	—	—
Subtotal Coastal Sage Scrub		175.10	2.01	1.94	0.86	3.53	—	0.07	2.87	5.54	2.44	0.94
Chaparral												
Toyon – Sumac Chaparral	3.12	30.35	1.99	0.53	0.14	2.04	—	—	2.13	2.57	0.15	0.03
Subtotal Chaparral		30.35	1.99	0.53	0.14	2.04	—	—	2.13	2.57	0.15	0.03
Grassland												
Annual Grassland	4.1	15.59	5.54	0.13	0.03	3.06	—	0.01	5.57	3.20	0.16	—
Ruderal	4.6	92.38	0.25	—	25.72	—	—	—	25.97	—	2.56	0.51
Subtotal Grassland		107.97	5.79	0.13	25.75	3.06	—	0.01	31.54	3.20	2.72	0.51
Riparian												
Riparian Herb	7.1	13.15	—	—	1.09	—	—	—	1.09	—	—	—
Southern Willow Scrub	7.2	0.43	0.43	—	—	—	—	—	0.43	—	—	—
Mulefat Scrub	7.3	1.50	0.24	0.78	0.15	0.18	—	—	0.39	0.96	—	—
Disturbed Mulefat Scrub	7.3	26.67	—	—	4.40	—	—	—	4.40	—	0.25	0.35
Southern Sycamore Riparian Woodland	7.4	20.48	—	—	—	—	—	—	—	—	—	0.96
Southern Sycamore Riparian Woodland/Coast Live Oak Riparian Forest	7.4/7.5	5.46	—	—	—	—	—	—	—	—	—	—

TABLE N-1
VEGETATION ACREAGE IMPACTS OF THE PROJECT

Vegetation Types and Other Areas	Gray and Bramlet Vegetation Code	Existing (acres)	Permanent Impact (acres)		Temporary Impact (acres)		SCE Alignment Temporary Impact (acres)		Total Permanent/ Temporary Impact (acres)		Additional Inundation Area ^a (acres)	
			IRWD	County	IRWD	County	IRWD	County	IRWD	County	IRWD	County
Southern Black Willow Forest	7.7	83.61	—	—	6.57	—	—	—	6.57	—	2.79	5.03
Disturbed Southern Black Willow Forest	7.7	35.34	—	—	0.73	—	—	—	0.73	—	0.28	—
Southern Black Willow Forest/Riparian Herb	7.7/7.1	26.01	—	—	22.16	—	—	—	22.16	—	—	—
<i>Subtotal Riparian</i>		<i>212.65</i>	<i>0.67</i>	<i>0.78</i>	<i>35.10</i>	<i>0.18</i>	—	—	<i>35.77</i>	<i>0.96</i>	<i>3.32</i>	<i>6.34</i>
Woodland												
Coast Live Oak Woodland	8.1	31.09	0.19	0.29	0.01	2.77	—	0.05	0.20	3.11	0.41	0.09
Western Sycamore	8.x	0.36	0.05	—	—	0.21	—	—	0.05	0.21	—	—
<i>Subtotal Woodland</i>		<i>31.45</i>	<i>0.24</i>	<i>0.29</i>	<i>0.01</i>	<i>2.98</i>	—	<i>0.05</i>	<i>0.25</i>	<i>3.32</i>	<i>0.41</i>	<i>0.09</i>
Cliff and Rock												
Cliff	10.0	1.63	0.26	0.04	0.09	0.12	—	0.01	0.35	0.17	0.01	—
<i>Subtotal Cliff and Rock</i>		<i>1.63</i>	<i>0.26</i>	<i>0.04</i>	<i>0.09</i>	<i>0.12</i>	—	<i>0.01</i>	<i>0.35</i>	<i>0.17</i>	<i>0.01</i>	—
Lakes, Reservoirs, and Basins												
Open Water	12.1	312.11	0.33	—	139.08	—	—	—	139.41	—	—	—
Fluctuating Shoreline	12.2	26.31	—	—	13.04	—	—	—	13.04	—	—	—
Vegetated Fluctuating Shoreline	12.2	45.13	—	—	31.08	—	—	—	31.08	—	—	—
<i>Subtotal Lakes, Reservoirs, and Basins</i>		<i>383.55</i>	<i>0.33</i>	—	<i>183.20</i>	—	—	—	<i>183.53</i>	—	—	—
Watercourses												
Perennial Stream	13.1	6.97	—	—	—	—	—	—	—	—	—	—
<i>Subtotal Watercourses</i>		<i>6.97</i>	—	—	—	—	—	—	—	—	—	—
Developed Areas												
Ornamental	15.5	20.77	—	0.03	1.14	0.07	—	—	1.14	0.10	0.16	0.31
Developed	15.6	20.98	2.39	0.05	1.80	0.79	—	—	4.19	0.84	1.57	0.23
<i>Subtotal Developed Areas</i>		<i>41.75</i>	<i>2.39</i>	<i>0.08</i>	<i>2.94</i>	<i>0.86</i>	—	—	<i>5.33</i>	<i>0.94</i>	<i>1.75</i>	<i>0.54</i>

TABLE N-1
VEGETATION ACREAGE IMPACTS OF THE PROJECT

Vegetation Types and Other Areas	Gray and Bramlet Vegetation Code	Existing (acres)	Permanent Impact (acres)		Temporary Impact (acres)		SCE Alignment Temporary Impact (acres)		Total Permanent/ Temporary Impact (acres)		Additional Inundation Area ^a (acres)	
			IRWD	County	IRWD	County	IRWD	County	IRWD	County	IRWD	County
Disturbed Areas												
Disturbed	16.1	25.42	0.03	—	3.29	0.66	—	—	3.32	0.66	0.60	0.23
Subtotal Disturbed Areas		25.42	0.03	—	3.29	0.66	—	—	3.32	0.66	0.60	0.23
Total		1,016.85	13.71	3.79	251.38	13.43	—	0.14	265.09	17.36	11.40	8.68
^a Portions of the Permanent and Temporary impact boundaries overlap the “Additional Inundation Area”. The overlap with the permanent impact is being excluded since the vegetation would no longer be present after implementation of the Project. However, the overlap with the temporary impact is not being excluded because it is assumed these areas will be revegetated following the Project and the Additional Inundation Area represents a long-term, periodic change in maximum lake level.												

TABLE N-2
PROJECT IMPACTS ON USACE JURISDICTIONAL RESOURCES IN THE SURVEY AREA BY LANDOWNER

Feature	Existing (acres)			Permanent Impact (acres)						Temporary Impact (acres)						Total Permanent/Temporary Impact (acres)						Additional Inundation Area ^a (acres)					
	Wetland	Non-wetland	Total	Wetland (IRWD)	Wetland (County)	Non-wetland (IRWD)	Non-wetland (County)	Total (IRWD)	Total (County)	Wetland (IRWD)	Wetland (County)	Non-wetland (IRWD)	Non-wetland (County)	Total (IRWD)	Total (County)	Wetland (IRWD)	Wetland (County)	Non-wetland (IRWD)	Non-wetland (County)	Total (IRWD)	Total (County)	Wetland (IRWD)	Wetland (County)	Non-wetland (IRWD)	Non-wetland (County)	Total (IRWD)	Total (County)
Irvine Lake	94.582	312.959	407.541	—	—	0.450	—	0.450	—	63.708	—	137.639	—	201.347	—	63.708	—	138.089	—	201.797	—	—	—	—	—	—	—
Santiago Creek	7.124	13.803	20.927	—	—	0.707	0.641	0.707	0.641	0.207	—	0.047	0.169	0.254	0.169	0.207	—	0.754	0.810	0.961	0.810	—	0.673	—	—	—	0.673
Drainage 1	—	0.008	0.008	—	—	—	—	—	—	—	—	—	0.002	—	0.002	—	—	—	0.002	—	0.002	—	—	—	—	—	—
Drainage 2	—	0.025	0.025	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 3	—	0.071	0.071	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 4	—	0.048	0.048	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 5	—	0.144	0.144	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 6	—	0.369	0.369	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 7	—	0.100	0.100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 8	—	0.024	0.024	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 9	—	0.066	0.066	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 10	—	0.167	0.167	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 11	—	0.114	0.114	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 12	—	4.894	4.894	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 13	—	0.039	0.039	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 14	—	0.235	0.235	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 15	—	0.433	0.433	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	101.706	333.499	435.205	0.000	0.00	1.157	0.642	1.157	0.641	63.915	0.00	137.686	0.171	201.601	0.171	63.915	0.00	138.843	0.812	202.758	0.812	0.00	0.673	0.000	0.000	0.000	0.673
^a Portions of the Permanent and Temporary impact boundaries overlap the “Additional Inundation Area”. This overlap is not being excluded because the Additional Inundation Area represents a long-term, periodic change in maximum lake level as opposed to a permanent structural impact or temporary construction impact.																											

TABLE N-3
PROJECT IMPACTS ON RWQCB JURISDICTIONAL RESOURCES IN THE SURVEY AREA BY LANDOWNER

Feature	Existing (acres)			Permanent Impact (acres)						Temporary Impact (acres)						Total Permanent/Temporary Impact (acres)						Additional Inundation Area ^a (acres)					
	Wetland	Non-wetland	Total	Wetland (IRWD)	Wetland (County)	Non-wetland (IRWD)	Non-wetland (County)	Total (IRWD)	Total (County)	Wetland (IRWD)	Wetland (County)	Non-wetland (IRWD)	Non-wetland (County)	Total (IRWD)	Total (County)	Wetland (IRWD)	Wetland (County)	Non-wetland (IRWD)	Non-wetland (County)	Total (IRWD)	Total (County)	Wetland (IRWD)	Wetland (County)	Non-wetland (IRWD)	Non-wetland (County)	Total (IRWD)	Total (County)
Irvine Lake	94.582	312.959	407.541	—	—	0.450	—	0.450	—	63.708	—	137.639	—	201.347	—	63.708	—	138.089	—	201.797	—	—	—	—	—	—	—
Santiago Creek	7.124	13.803	20.927	—	—	0.707	0.641	0.707	0.641	0.207	—	0.047	0.169	0.254	0.169	0.207	—	0.754	0.810	0.961	0.810	—	0.673	—	—	—	0.673
Drainage 1	—	0.008	0.008	—	—	—	—	—	—	—	—	—	0.002	—	0.002	—	—	—	0.002	—	0.002	—	—	—	—	—	—
Drainage 2	—	0.025	0.025	—	—	0.025	—	0.025	—	—	—	—	—	—	—	—	—	0.025	—	0.025	—	—	—	—	—	—	—
Drainage 3	—	0.071	0.071	—	—	0.007	0.031	0.007	0.031	—	—	—	0.008	—	0.008	—	—	0.007	0.039	0.007	0.039	—	—	—	—	—	—
Drainage 4	—	0.048	0.048	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 5	—	0.144	0.144	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.004	0.002	0.004	0.002
Drainage 6	—	0.369	0.369	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.010	—	0.010
Drainage 7	—	0.100	0.100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.014	—	0.014
Drainage 8	—	0.024	0.024	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 9	—	0.066	0.066	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.004	—	0.004	—
Drainage 10	—	0.167	0.167	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 11	—	0.114	0.114	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 12	—	4.894	4.894	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 13	—	0.039	0.039	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 14	—	0.235	0.235	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Drainage 15	—	0.433	0.433	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.004	—	0.004	—
Total	101.706	333.499	435.205	0.000	0.00	1.189	0.672	1.189	0.672	63.915	0.00	137.686	0.179	201.601	0.179	63.915	0.00	202.790	0.851	202.790	0.851	0.00	0.673	0.012	0.026	0.012	0.699
^a Portions of the Permanent and Temporary impact boundaries overlap the “Additional Inundation Area”. This overlap is not being excluded because the Additional Inundation Area represents a long-term, periodic change in maximum lake level as opposed to a permanent structural impact or temporary construction impact.																											

TABLE N-4
PROJECT IMPACTS ON CDFW JURISDICTIONAL RESOURCES
IN THE SURVEY AREA BY LANDOWNER

Feature	Existing (acres)	Permanent Impact (acres)		Temporary Impact (acres)		Total Permanent/Temporary Impact (acres)		Additional Inundation Area ^a (acres)	
		IRWD	County	IRWD	County	IRWD	County	IRWD	County
Irvine Lake	614.135	1.843	—	229.517	—	231.360	—	0.097	0.678
Santiago Creek	36.024	0.859	1.065	—	0.305	0.859	1.370	—	5.433
Drainage 1	0.027	—	—	—	0.005	—	0.005	—	—
Drainage 2	0.074	0.074	—	—	—	0.074	—	—	—
Drainage 3	0.168	0.004	0.079	—	0.023	0.004	0.102	—	—
Drainage 4	0.094	—	—	—	—	—	—	0.014	—
Drainage 5	0.359	—	—	—	—	—	—	0.007	0.004
Drainage 6	0.149	—	—	—	—	—	—	—	0.008
Drainage 7	0.148	—	—	—	—	—	—	—	0.003
Drainage 8	0.042	—	—	—	—	—	—	—	—
Drainage 9	1.237	—	—	—	—	—	—	0.088	—
Drainage 10	0.245	—	—	—	—	—	—	—	—
Drainage 11	0.318	—	—	—	—	—	—	—	—
Drainage 12	13.517	—	—	—	—	—	—	2.370	—
Drainage 13	0.114	—	—	—	—	—	—	—	—
Drainage 14	0.416	—	—	—	—	—	—	—	—
Drainage 15	2.563	—	—	—	—	—	—	0.278	—
Total	669.630	2.780	1.144	229.517	0.333	232.297	1.477	2.854	6.126
^a Portions of the Permanent and Temporary impact boundaries overlap the “Additional Inundation Area”. This overlap is not being excluded because the Additional Inundation Area represents a long-term, periodic change in maximum lake level as opposed to a permanent structural impact or temporary construction impact.									

TABLE N-5
SUMMARY OF PROJECT IMPACTS ON JURISDICTIONAL RESOURCES
IN THE SURVEY AREA BY LANDOWNER

Jurisdiction	Amount of Jurisdictional Water Resource (acres)								
	Existing	Permanent (IRWD)	Permanent (County)	Temporary (IRWD)	Temporary (County)	Total Impact (IRWD)	Total Impact (County)	Additional Inundation Area ^a (IRWD)	Additional Inundation Area ^a (County)
USACE WOTUS	428.476	1.157	0.641	201.601	0.171	202.758	0.812	0.000	0.673
RWCQB Waters of the State	435.205	1.189	0.672	201.601	0.179	202.790	0.851	0.012	0.699
CDFW Jurisdictional Resources	669.630	2.780	1.144	229.517	0.333	232.297	1.477	2.854	6.126
USACE: U.S. Army Corps of Engineers; WOTUS: waters of the United States; RWQCB: Regional Water Quality Control Board; CDFW: California Department of Fish and Wildlife; “-”: not present									
^a Portions of the Permanent and Temporary impact boundaries overlap the “Additional Inundation Area”. This overlap is not being excluded because the Additional Inundation Area represents a long-term, periodic change in maximum lake level as opposed to a permanent structural impact or temporary construction impact.									