

Los Osos Habitat Conservation Plan

Draft Environmental Impact Report

SCH# 2013091071

Appendices A and B

prepared by

County of San Luis Obispo
Planning and Building Department
976 Osos Street
San Luis Obispo, California 93408

prepared with the assistance of

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September 2019

RINCON CONSULTANTS, INC.
Environmental Scientists | Planners | Engineers
rinconconsultants.com

Appendix A

Notice of Preparation and Comments Received During Public Scoping Period

NOTICE OF PREPARATION – Draft Environmental Impact Report/NEPA Document & Scoping Meeting Notice

SAN LUIS OBISPO COUNTY DEPARTMENT OF PLANNING AND BUILDING
976 OSOS STREET • ROOM 200 • SAN LUIS OBISPO • CALIFORNIA 93408 • (805) 781-5600
Promoting the Wise Use of Land • Helping to Build Great Communities

DATE: 9/20/13

TO: Responsible Agencies, Trustee Agencies and Interested Parties

FROM: Department of Planning & Building 976 Osos St., Room 300 San Luis Obispo, CA 93408-2040

PROJECT TITLE: Notice of Preparation (NOP) of an integrated Draft Environmental Impact Report and National Environmental Policy Act documentation for the Los Osos Community-Wide Habitat Conservation Plan and Implementing Agreement (the proposed project) and Notice of Scoping Meeting ED13-061

PROJECT APPLICANT: County of San Luis Obispo

NOP/NOI RESPONSES DUE BY: 11/20/13

SCOPING MEETING DATE: Two Meetings as follows: October 8, 2013 between 3:30PM and 5:30PM and 7:00PM and 9:00PM

An integrated Draft Environmental Impact Report (EIR) and National Environmental Policy Act (NEPA) document is proposed to evaluate the environmental effects from the draft Los Osos Community-Wide Habitat Conservation Plan (HCP) and Implementing Agreement (IA).

This notice: (1) provides an overview of the proposed action and possible alternatives; (2) is soliciting comments from Responsible and Trustee Federal, State and local agencies on the County's intent to prepare a Draft EIR/NEPA document; (3) is soliciting public participation in and notification of a Public Scoping Meeting and the initiation of a 60 day public scoping period relating to the scope of environmental issues and alternatives to be included in the Draft EIR/ NEPA document.

NOTICE OF PREPARATION - ENVIRONMENTAL DOCUMENTS

The County of San Luis Obispo will be the California Environmental Quality Act (CEQA) Lead Agency and will be preparing an integrated Draft Environmental Impact Report (EIR) and National Environmental Policy Act (NEPA) document for the proposed project (see Project Element description below). The U.S. Fish and Wildlife Service (Service) will be the lead agency under NEPA and will be recommending either the preparation of an Environmental Assessment (EA) or an Environmental Impact Statement (EIS) for the proposed project. The Service is concurrently publishing a Notice of Intent (NOI) in the Federal Register for the preparation of the NEPA portion of the document. This integrated EIR/ NEPA document will meet the requirements of CEQA and NEPA.

Contact Information. For Responsible and Trustee Federal, State and local agencies, please provide your comments, questions and responses by the NOP/NOI date specified above and address all inquiries to:

John McKenzie
County of San Luis Obispo
Planning and Building Department
976 Osos Street, Room 200
San Luis Obispo, CA 93408
e-mail: jdmckenzie@co.slo.ca.us

The County requests the views of your agency as to the scope and content of the environmental information which is relevant to your agency's statutory responsibilities in connection with the proposed project. Your agency will need to use the EIR/NEPA document prepared by the County when considering your permit or other approval(s) for the project.

Please provide the following information at your earliest convenience, but not later than the comment period due date specified above.

1. NAME OF CONTACT PERSON. (Please include address, e-mail and telephone number)
2. PERMIT(S) or APPROVAL(S) AUTHORITY. Please provide a summary description of these and send a copy of the relevant sections of legislation, regulatory guidance, etc.
3. ENVIRONMENTAL INFORMATION. What environmental information must be addressed in the EIR/NEPA document to enable your agency to use this documentation as a basis for your permit issuance or approval?
4. PERMIT STIPULATIONS/CONDITIONS. Please provide a list and description of standard stipulations (conditions) that your agency will apply to features of this project. Are there other conditions that have a high likelihood of application to a permit or approval for this project? If so, please list and describe.
5. ALTERNATIVES. What alternatives does your agency recommend be analyzed in the EIR?
6. REASONABLY FORESEEABLE PROJECTS, PROGRAMS or PLANS. Please name any future project, programs or plans that you think may have an overlapping influence with the project as proposed.
7. RELEVANT INFORMATION. Please provide references for any available, appropriate documentation you believe may be useful to the County in preparing the EIR/NEPA document. Reference to and/or inclusion of such documents in an electronic format would be appreciated.
8. FURTHER COMMENTS. Please provide any further comments or information that will help the County to scope the document and determine the appropriate level of environmental assessment.

The general project description, location, and the probable environmental effects are contained in the following materials.

Due to the time limits mandated by State law, your response must be sent at the earliest possible date, **but not later than the due date specified above**.

SCOPING MEETINGS

Two public scoping meetings on the Draft EIR/NEPA document will be held on **October 8, 2013** with the first between **3:30PM and 5:30PM** and and the second between **7:00PM and 9:00PM** at the South Bay Community Center located at 2180 Palisades Avenue, Los Osos, California. The purpose of the public scoping meetings are to solicit the views of interested parties, responsible agencies, agencies with jurisdiction by law, trustee agencies and involved federal agencies, as to the appropriate scope and content of the Draft EIR/NEPA document. Representatives from the County and the U.S. Fish and Wildlife Service will be present to offer a summary of and answer questions regarding the proposed project. All inquiries about this process or written comments submitted should be made to Trevor Keith (see contact information above). **Written public comments will be due no later than 11/20/13**.

PROJECT – RELATED ELEMENTS/CONTRIBUTING FACTORS

The following factors have contributed to the preparation of the Los Osos Communitywide HCP: local, state and federal regulations that have focused on the protection of sensitive plant and wildlife species; unique characteristics within the coastal community of Los Osos that support several threatened or endangered species; and Regional Water Quality Control Board (RWQCB) establishing a Prohibition Area (and subsequent construction of the Los Osos sewer, which was predicated on the completion and implementation of a communitywide HCP). Approval and implementation of the HCP will establish a process to allow future development while providing adequate measures to ensure protection of the listed species evaluated under the HCP. The EIR/ NEPA document will evaluate the environmental impacts associated with implementation of the HCP and IA. Additional details regarding these factors are described in the following sections.

Regulatory Background-Sensitive Species

Federal Endangered Species Act. Section 9 of the Endangered Species Act of 1973, as amended (Act) (16 U.S.C. 1531 *et seq*.) and its implementing regulations prohibit the take of animal species listed as endangered or threatened. The term "take" is defined under the Act as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, listed wildlife species, or to attempt to engage in any such conduct. "Harm" is defined by Service regulation (50 CFR 17.3) to include significant habitat modifications or degradation where it actually kills or injures wildlife by significantly impairing essential behavior patterns, including breeding, feeding, or sheltering. For certain circumstances, under section 10(a)(1)(B) of the Act, the Service may issue permits to authorize "incidental take" of listed wildlife species. "Incidental take" is defined by the Act as take that is incidental to, and not the purpose of, carrying out an otherwise lawful activity. Regulations governing permits for endangered and threatened species are at 50 CFR 17.22 and 50 CFR 17.32.

Individuals and State and local agencies proposing an action that is expected to result in the take of federally listed species are encouraged to apply for an incidental take permit under section 10(a)(1)(B) of the Act to be in compliance with the law. Such permits are issued by the Service when take is not the intention of and is incidental to otherwise legal activities. An application for an incidental take permit must be accompanied by a habitat conservation plan, commonly referred to as an HCP. The regulatory standard under section 10(a)(1)(B) of the Act is that the effects of authorized incidental take must be minimized and mitigated to the maximum extent practicable. Under section 10(a)(1)(B) of the Act, a proposed project also must not appreciably

reduce the likelihood of the survival and recovery of the species in the wild, and adequate funding for a plan to minimize and mitigate impacts must be ensured.

California Endangered Species Act. The California Endangered Species Act (CESA) prohibits take of species listed as threatened or endangered by the California Fish and Game Commission, including birds, mammals, fish, amphibians, reptiles, and plants; invertebrates cannot be designated as threatened or endangered (CESA Section 2080). In CESA, take is defined as any action or attempt to hunt, pursue, catch, capture, or kill a listed species; take does not include loss or degradation of habitat alone or the impacts of the taking.

Like the Act, CESA allows exceptions to the prohibition for take that occurs during otherwise lawful activities. As described in Section 2081 of the California Fish and Game Code, incidental take of state-listed species may be authorized if an applicant submits an approved plan that minimizes and fully mitigates the impacts of take.

Los Osos

Los Osos is an unincorporated community ten miles northwest of the City of San Luis Obispo and five miles south of the City of Morro Bay in San Luis Obispo County, California. Los Osos is situated on an ancient dune complex. The sandy soil, known as the Baywood Fine Sands, combine with the region's maritime climate to create a mosaic of natural communities including coastal scrub, maritime chaparral, and coast live oak woodland, that support unique and diverse assemblages of plants and animals, including four endemic species with limited distribution.

- Morro Bay kangaroo rat (*Dipodomys heermanni morroensis*);
- Morro shoulderband snail (*Helminthoglypta walkeriana*);
- Morro Manzanita (*Arctostaphylos morroensis*); and
- Indian Knob mountainbalm (*Eriodictyon altissimum*).

Due to their small geographic range, narrow habitat parameters, and small and declining populations, these four species have been listed as either threatened or endangered under the federal Endangered Species Act and/or California Endangered Species Act. In order to comply with these laws, landowners and others seeking to conduct projects that would impact these species or their habitats must receive an incidental take permit, as described previously.

The proposed project is part of an application by the County to obtain programmatic incidental take permits from the Service and the California Department of Fish and Wildlife (Department); the agencies that implement the respective federal and state endangered species acts. The County, as the applicant, is requesting a permit term of 25 years to authorize take of covered species associated with covered activities in the Habitat Conservation Plan area, which is approximately 3,560 acres bounded by the Los Osos Urban Reserve Line. As the permittee, the County will have the ability to issue certificates of inclusion to confer incidental take coverage to landowners and other entities as long as their activities are included on the incidental take permit(s).

The Habitat Conservation Plan component of the proposed project identifies the suite of activities that will be covered by the permit (covered activities), their anticipated impacts to the listed species covered by the permit (covered species), and the steps that the County and other plan participants will take to avoid, minimize, and mitigate the impacts of the covered activities

on the covered species (the conservation strategy). Covered activities included in the Habitat Conservation Plan are:

- Commercial and residential development and redevelopment on privately-owned parcels;
- Public entity and private utility company facility and infrastructure development projects;
- Public entity and private utility company activities to operate and maintain, including repair and replace, existing facilities; and
- Activities conducted to implement the Habitat Conservation Plan conservation strategy.

The purpose of issuing a programmatic incidental take permit is to allow the County to authorize the covered activities while conserving the covered species and their habitats. Implementation of a programmatic, multi-species Habitat Conservation Plan, rather than a species-by-species or project-by-project approach, will maximize the benefits of conservation measures for covered species and eliminate potentially expensive and time-consuming efforts associated with processing individual incidental take permits for each project within the proposed Habitat Conservation Plan area. It is important to note that completion of the Los Osos wastewater treatment plant, rather than adoption of the Habitat Conservation Plan and issuance of the incidental take permit(s) to the County, is the action that will trigger lifting of the moratorium and allow new or expanded development to proceed subject to receipt of the required permits. Adoption of the Habitat Conservation Plan and issuance of the incidental take permit(s) would facilitate a streamlined permitting process and also provide a cohesive conservation strategy managed by one entity with a single funding source, but is not a requirement for activities covered in the Habitat Conservation Plan to proceed.

Project Location

The study area for the Draft EIR/NEPA document will be the unincorporated community of Los Osos, which is located on the central coast of California in San Luis Obispo County, approximately ten miles west of San Luis Obispo and five miles south of Morro Bay (see Figure 1). The study area borders the Morro Bay Estuary to the west, Morro Bay State Park to the north, Los Osos Creek to the east, and Montana de Oro State Park to the south. The study area coincides with the Urban Reserve Line for Los Osos.

Los Osos Sewer/RWQCB Prohibition Area

In 1983, the RWQCB adopted a Discharge Prohibition Area for large portions of the Los Osos/ Baywood Park community to reduce water quality pollution in the Los Osos area. This Prohibition Area has severely limited the County from issuing permits for new sources of sewage discharge or increases in the volume from existing sources. Subsequently, the County Board of Supervisors identified Los Osos as having a 'Level of Severity III' for inadequate sewage capacity, further restricting new development.

The solution to reduce this water quality problem was the construction of a public sewer system, which is now currently underway outside of Los Osos on Turri Road. Once operational, the wastewater treatment facility will provide service to 5,147 parcels within the 1,584-acre wastewater service area, including lots that are currently vacant (approximately 577 lots) (see Figure 2). As the Prohibition Area did not cover the entire community, there are 866 parcels located outside of the sewer service area that will continue to utilize septic systems for on-site sewage treatment and disposal.

PROBABLE ENVIRONMENTAL EFFECT TOPICS

As required by CEQA and NEPA, the Draft EIR/NEPA document will identify and evaluate any potentially significant adverse impacts, whether direct or indirect, that may result from the proposed project. The Draft EIR/NEPA document will also determine whether mitigation measures and/or alternatives can be implemented that will mitigate those impacts to a level that is less than significant. The alternatives for analysis in the document may include, but not be limited to, variations in the covered activities and the footprint of the actions within the approximately 3,560-acre planning area. All impacts will be evaluated against existing conditions in the study area as of the date of the issuance of this NOP.

The Draft EIR/NEPA document will address the following environmental issues, including, but not limited to:

- Aesthetics
- Agricultural Resources
- Air Quality
- Biological Resources
- Cultural Resources
- Geology and Soils
- Greenhouse Gas Emissions
- Hazards and Hazardous Materials
- Hydrology and Water Quality
- Land Use and Zoning
- Mineral Resources
- Noise
- Population and Housing
- Public Services
- Socioeconomic and Environmental Justice
- Transportation and Circulation
- Utilities and Service Systems

Attachments

Figure 1 – HCP Study Area
Figure 2 – Wastewater Treatment Plant Service Area

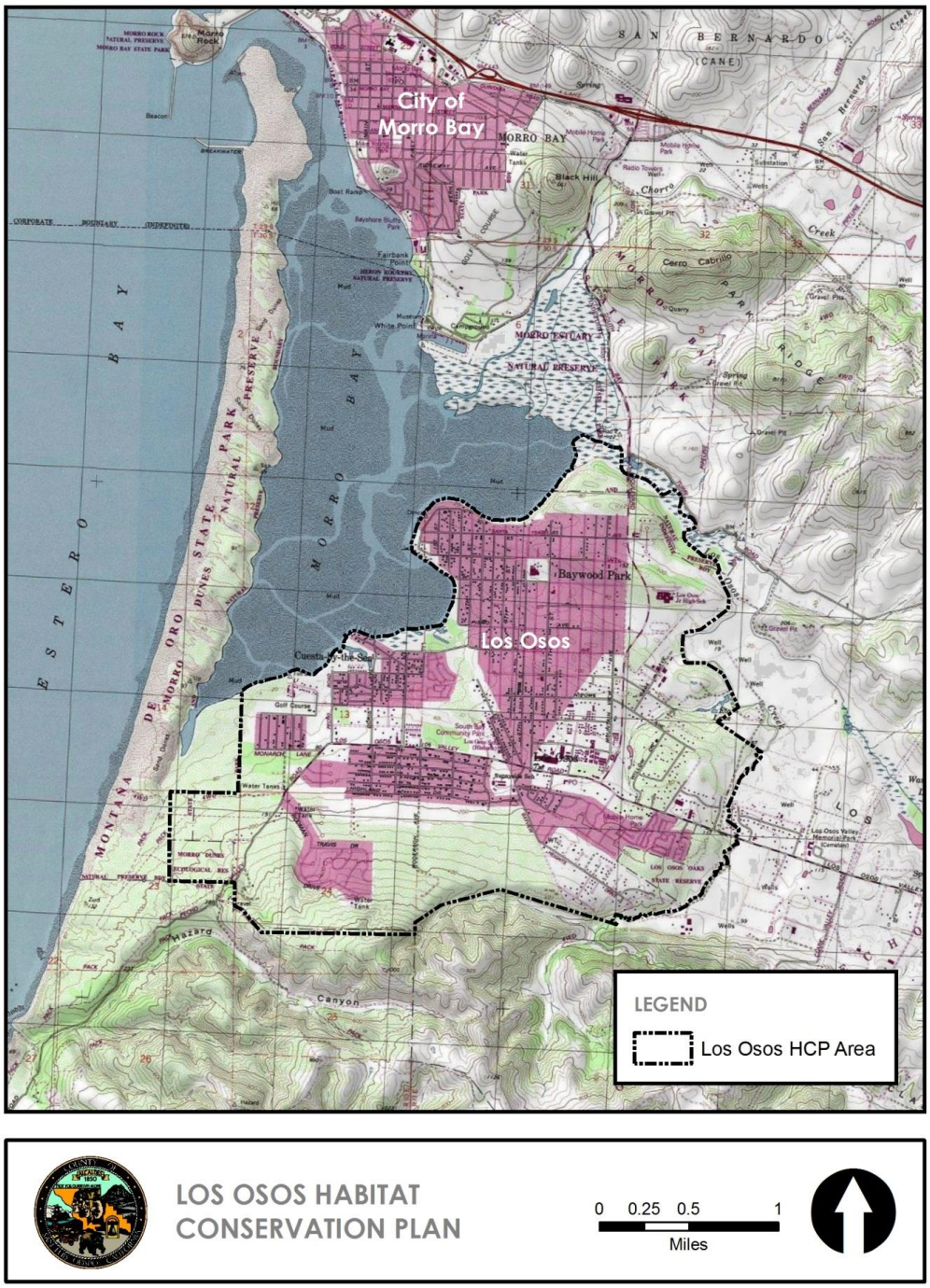

FIGURE 1 – HCP STUDY AREA

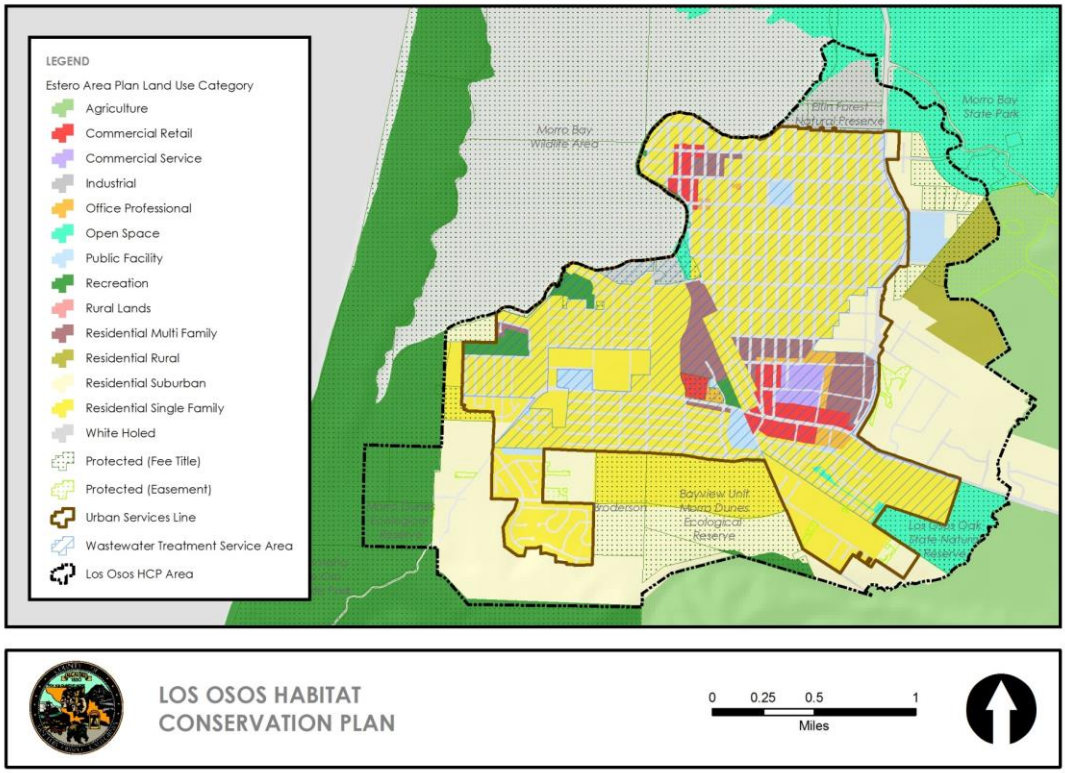

FIGURE 2 – LOS OSOS SEWER – SERVICE AREA

and Federal agencies and the public on the following permit requests.

Applicant

Permit No. TE–062121

Applicant: Ryan R. Young, Wrightwood, California.

The applicant requests a permit renewal to take (harass by survey and locate and monitor nests) the southwestern willow flycatcher (*Empidonax traillii extimus*) in conjunction with survey and population monitoring activities throughout the range of the species in California, Nevada, Arizona, New Mexico, Texas, Utah, and Colorado for the purpose of enhancing the species' survival.

Permit No. TE–205609

Applicant: Lawrence P. Kobernus, San Francisco, California.

The applicant requests a permit renewal and amendment to take (harass by survey, capture, handle, and release) the callippe silverspot butterfly (*Speyeria callippe callippe*) and California tiger salamander (Santa Barbara County DPS) (*Ambystoma californiense*) in conjunction with survey activities throughout the range of each species within the jurisdictional area of the Sacramento Field Office of the U.S. Fish and Wildlife Service in California for the purpose of enhancing the species' survival.

Permit No. TE–022183

Applicant: Los Angeles World Airports, Los Angeles, California.

The applicant requests a permit renewal to take (harass by survey and conduct maintenance, restoration, and habitat enhancement activities) the El Segundo blue butterfly (*Euphilotes battoides allyni*) in conjunction with restoration and habitat enhancement activities on lands owned and operated by the Los Angeles World Airport, Los Angeles County, California, for the purpose of enhancing the species' survival.

Permit No. TE–086267

Applicant: Channel Islands National Park, Ventura, California.

The applicant requests a permit renewal to take (survey, capture, handle, measure, determine sex, insert passive integrated transponder (PIT) tags, radio-collar, vaccinate, collect biological samples, conduct veterinary care, transport, and release to the wild) the San Miguel Island fox (*Urocyon littoralis littoralis*), Santa Rosa Island fox (*Urocyon littoralis santarosae*), and Santa Cruz Island fox (*Urocyon littoralis santacruzae*) in conjunction with surveys, population monitoring, and scientific research on San Miguel Island, Santa Rosa Island, and Santa Cruz Island, Ventura County, California, for the purpose of enhancing the species' survival.

Permit No. TE–815537

Applicant: Swaim Biological, Incorporated, San Francisco, California.

The applicant requests a permit renewal to take (harass by survey, capture, handle, mark, collect tissue, insert passive integrated transponder (PIT) tags, and release) the San Francisco garter snake (*Thamnophis sirtalis tetrataenia*) and take (harass by survey, capture, handle, and release) the California tiger salamander (Santa Barbara County DPS and Sonoma County DPS) (*Ambystoma californiense*) in conjunction with survey activities and scientific research throughout the range of each species in California for the purpose of enhancing the species' survival.

Permit No. TE–075898

Applicant: Sue Orloff, San Rafael, California.

The applicant requests a permit renewal to take (harass by survey, capture, handle, mark, and release) the California tiger salamander (Santa Barbara County DPS and Sonoma County DPS) (*Ambystoma californiense*) in conjunction with survey activities throughout the range of the species in California for the purpose of enhancing the species' survival.

Permit No. TE–053598–4

Applicant: Nicole M. Kimball, Spring Valley, California.

The applicant requests a permit renewal to take (survey by pursuit) the Quino checkerspot butterfly (*Euphydryas editha quino*) and take (capture, collect, and collect vouchers) the Conservancy fairy shrimp (*Branchinecta conservatio*), longhorn fairy shrimp (*Branchinecta longiantenna*), Riverside fairy shrimp (*Streptocephalus woottoni*), San Diego fairy shrimp (*Branchinecta sandiegonensis*), and vernal pool tadpole shrimp (*Lepidurus packardi*) in conjunction with survey activities throughout the range of each species in California for the purpose of enhancing the species' survival.

Public Comments

We invite public review and comment on each of these recovery permit applications. Comments and materials we receive will be available for public inspection, by appointment, during normal business hours at the address listed in the **ADDRESSES** section of this notice.

Before including your address, phone number, email address, or other personal identifying information in your comment, you should be aware that your entire comment—including your personal identifying information—may be made publicly available at any time. While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

Dated: September 13, 2013.

Larry Rabin,

Acting Regional Director, Pacific Southwest Region, Sacramento, California.

[FR Doc. 2013–22776 Filed 9–18–13; 8:45 am]

BILLING CODE 4310–55–P

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

[FWS–R8–ES–2013–N167; FF08ESMF–FXES11120800000–134]

Habitat Conservation Plan for the Community of Los Osos, San Luis Obispo County, CA; Notice of Intent

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Notice of intent; notice of public scoping meeting; request for comments.

SUMMARY: We, the U.S. Fish and Wildlife Service, intend to prepare either an Environmental Assessment (EA) or an Environmental Impact Statement (EIS) under the National Environmental Policy Act, as amended (NEPA), for the proposed Los Osos Community-wide Habitat Conservation Plan (LOHCP or plan). The LOHCP is being prepared by the County of San Luis Obispo (County or applicant) in support of its application for an incidental take permit under the Endangered Species Act of 1973, as amended (Act). The decision to prepare an EA or EIS will be, in part, contingent on the complexity of issues identified during, and following, the scoping phase of the NEPA process. The proposed permit would authorize the incidental take of threatened and endangered wildlife species that could result from the activities covered under the LOHCP and would include conservation measures to an endangered plant species that would also be covered under the plan. We announce meetings and invite comments from other agencies, Tribes, and the public.

DATES: To ensure consideration of any written comments, please send by

November 4, 2013. Two public scoping meetings will be held on Tuesday, October 8, 2013; the first from 3:30 to 5:30 p.m., and the second from 7 to 9 p.m. For the public meeting address, see *''Scoping Meetings''* below.

ADDRESSES: To request further information or submit written comments, please use one of the following methods and note that your information request or comment is in reference to the Los Osos Community-wide Habitat Conservation Plan.

• *U.S. Mail:* U.S. Fish and Wildlife Service, Ventura Fish and Wildlife Office, 2493 Portola Road, Suite B, Ventura, CA 93003.

• *In Person Drop-off, Viewing, or Pick-Up:* Call 805–644–1766 to make an appointment during regular business hours to drop off comments or view received comments at the U.S. mail address above.

• *Facsimile:* U.S. Fish and Wildlife Service, 805–644–3958, Attn: Julie M. Vanderwier.

FOR FURTHER INFORMATION CONTACT: Julie M. Vanderwier, Senior Fish and Wildlife Biologist, or Douglass M. Cooper, Deputy Assistant Field Supervisor, by phone at 805–644–1766 or by U.S. mail at the above address. If you use a telecommunications device for the deaf, please call the Federal Information Relay Service at 800–977–8339.

SUPPLEMENTARY INFORMATION: We, the U.S. Fish and Wildlife Service (Service), publish this notice under the National Environmental Policy Act of 1969, as amended (42 U.S.C. 4321 *et seq.;* NEPA), and its implementing regulations in the Code of Federal Regulations (CFR) at 40 CFR 1506.6, as well as in compliance with section 10(c) of the Act. We intend to prepare either a draft EA or EIS, hereafter referred to as the NEPA document, to evaluate the impacts of several alternatives related to the potential issuance of an incidental take permit (ITP) to the applicant, as well as impacts of the proposed Los Osos Community-wide Habitat Conservation Plan.

The LOHCP is a comprehensive plan designed to provide long-term conservation and management of sensitive species and the habitats upon which those species depend within the Los Osos plan area, while accommodating other important land uses.

Background

Section 9 of the Act (16 U.S.C. 1531 *et seq.*) and its implementing regulations prohibit the ''take'' of wildlife species listed as endangered or threatened. The Act defines the term ''take'' as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect listed wildlife species, or to attempt to engage in any such conduct. Harm includes significant habitat modifications or degradation where it actually kills or injures wildlife by significantly impairing essential behavior patterns, including breeding, feeding, or sheltering (50 CFR 17.3(c)). Pursuant to section 10(a)(1)(B) of the Act, we may issue permits to authorize ''incidental take'' of listed wildlife species. ''Incidental take'' is defined by the Act as take that is incidental to, and not the purpose of, carrying out an otherwise lawful activity. Service regulations governing permits for endangered and threatened species are promulgated at 50 CFR 17.22 and 50 CFR 17.32, respectively.

Section 10(a)(1)(B) of the Act contains provisions for issuing such ITPs to non-Federal entities for the take of endangered and threatened wildlife species, provided the following criteria are met:

• The taking will be incidental to an otherwise lawful activity;

• The applicant will, to the maximum extent practicable, minimize and mitigate the impact of such taking;

• The applicant will develop a proposed habitat conservation plan (HCP) and ensure that adequate funding for the plan is provided;

• The taking will not appreciably reduce the likelihood of the survival and recovery of the species in the wild; and

• The applicant will carry out any other measures that the Service may deem necessary or appropriate for purposes of implementing the HCP.

Thus, the purpose of the proposed ITP is to authorize the County of San Luis Obispo to incidentally take covered wildlife species associated with development and other covered activities within the Los Osos plan area provided such take is minimized and mitigated through an HCP (the LOHCP) that meets the requirements of the Act. Implementation of an HCP for multiple species can maximize the benefits of conservation measures and eliminate expensive and time-consuming efforts associated with processing of individual species ITPs. The Service expects the County will request a permit term of 25 years.

Plan Area

The LOHCP plan area includes approximately 3,560 acres in the unincorporated community of Los Osos. It is largely coterminous with the Los Osos Urban Reserve Line—the boundary separating suburban and rural land uses in the region, within which land use is guided by the Estero Area Plan. The plan area borders the Morro Bay Estuary to the west, Morro Bay State Park to the north, Los Osos Creek to the east, and Montana de Oro State Park to the south. This area includes suitable habitat for the covered species that is anticipated to be impacted by the activities covered in the LOHCP.

Covered Activities

Four main categories of covered activities were identified through the outreach conducted by the County to prepare the LOHCP:

• *Private development:* Commercial and residential development and redevelopment (including remodels) on privately owned parcels;

• *Capital Projects:* Public and private utility company facility and infrastructure development projects, such as building or expanding roads, libraries, and parks;

• *Facilities Operations and Maintenance:* Public and private utility company activities to operate and maintain, including repair and replace, existing facilities, such as roads, drainage basins, and water systems; and

• *Conservation Strategy Implementation:* Activities conducted to implement the LOHCP conservation strategy, including restoration, management, maintenance, and monitoring of conservation lands used to mitigate the effects of the other covered activities.

As the permittee, the County would have the ability to issue certificates of inclusion to confer take coverage to landowners and other entities for covered species and activities.

The LOHCP will include measures necessary to avoid, minimize, and mitigate the effects of the taking for three wildlife species covered by the plan that result from private development, capital projects, facilities operation and maintenance, and implementation of the conservation strategy within plan area. The LOHCP will also include measures to conserve one endangered plant species covered by the plan.

Covered Species

We anticipate that four federally listed species will be included as covered species in the proposed LOHCP: Morro Bay kangaroo rat (*Dipodomys heermanni morroensis;* federally endangered), Morro shoulderband snail (*Helminthoglypta walkeriana;* federally endangered), Indian Knob mountainbalm (*Eriodictyon altissimum;* federally endangered), and

Morro manzanita (*Arctostaphylos morroensis;* federally threatened).

''Take'' under the Act does not apply to listed plant species. Consequently, the Act does not prohibit take of listed plant species, and take of listed plant species cannot be authorized under an ITP. The LOCHP proposes to include a listed plant species on the permit in recognition of the conservation benefits provided for them under the LOHCP. Additionally, inclusion of protections for federally listed plant species in an HCP assists us in meeting our regulatory obligations under section 7(a)(2) of the Act.

The applicant would receive assurances under the Service's ''No Surprises'' regulations found in 50 CFR 17.22(b)(5) and 17.32(b)(5) for all species included on the ITP.

Environmental Assessment or Environmental Impact Statement

Before deciding whether or not to issue the requested ITP, the Service will prepare a draft NEPA document to analyze the environmental impacts associated with issuance of this permit. In this document, we will consider the following alternatives: (1) The proposed action, which includes the issuance of take authorizations consistent with the proposed LOHCP under section 10(a)(1)(B) of the Act; (2) no-action (no permit issuance); and (3) a reasonable range of alternatives that could include variations in impacts, conservation, permit duration, covered species, covered activities, permit area, or a combination of these elements.

The NEPA document will identify and analyze potentially significant direct, indirect, and cumulative impacts of permit issuance and the implementation of the proposed LOHCP on biological resources, land uses, utilities, air quality, water resources, cultural resources, socioeconomics and environmental justice, recreation, aesthetics, climate change and greenhouse gases, and other environmental issues that could occur with the implementation of each alternative. The Service will also identify measures to avoid or minimize any significant effects of the proposed action on the quality of the human environment.

Following completion of the environmental review, the Service will publish a notice of availability and a request for comment on the draft NEPA document and the applicant's permit application (which will include the proposed LOHCP.)

Public Comments

We request data, comments, new information, and suggestions from the public, other concerned governmental agencies, the scientific community, Tribes, industry, or any other party on this notice. We will consider these comments in developing a draft NEPA document and in the development of the LOCHP and ITP. We particularly seek comments on the following:

1. Biological information concerning the species proposed to be covered in the LOHCP, including information on range, distribution, population sizes, and population trends;

2. Relevant information concerning impacts of proposed covered activities on these species;

3. Information on other current or planned activities in the plan area and their possible impacts on the species;

4. The presence of archaeological sites, buildings and structures, historic events, sacred and traditional areas, and other historic preservation concerns, which must be considered in project planning by the National Historic Preservation Act;

5. A range of alternatives to be included in the NEPA document; and

6. Any other environmental issues that should be considered with regard to the proposed development and permit action.

You may submit your comments and materials by any one of the methods listed in the **ADDRESSES** section.

Comments and materials we receive, as well as supporting documentation we use in preparing the draft NEPA document, will be available for public inspection by appointment, during normal business hours (Monday through Friday, 8 a.m. to 4 p.m.) at the Service's Ventura address (see **ADDRESSES**). Please note that all comments and materials we receive, including names and addresses, will become part of the administrative record and may be released to the public. Before including your address, phone number, email address, or other personal identifying information in your comment, you should be aware that your entire comment—including your personal identifying information—may be made publicly available at any time. While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

Scoping Meetings

The scoping meeting will be held at the South Bay Community Center, located at 2180 Palisades Avenue, Los Osos, CA; see **DATES** for the dates and times of the meetings. The purpose of scoping meetings is to provide the public with a general understanding of the background of the proposed LOHCP and activities it would cover, alternative proposals under consideration for the draft EA or EIS, and the Service's role and steps to be taken to develop the draft NEPA document for the proposed LOHCP; and also to solicit suggestions and information on the scope of issues and alternatives for the Service to consider when drafting the EA or EIS. Written comments will be accepted at the meetings. Comments can also be submitted by the methods listed in the **ADDRESSES** section. Once the draft NEPA document and proposed LOCHP are complete and made available for public review, there will be additional opportunity for public comments on the content of these documents.

Scoping Meetings Location Accommodations

Persons needing reasonable accommodation in order to attend and participate in the public meetings should contact Julie M. Vanderwier at 805–664–1766 as soon as possible. In order to allow sufficient time to process requests, a request should be submitted no later than 1 week before the public meetings.

Authority

We provide this notice under section 10(c) of the Act (16 U.S.C. 1531 *et seq.*) and NEPA implementing regulations (40 CFR 1501.7, 40 CFR 1506.6, and 40 CFR 1508.22).

Dated: September 13, 2013.

Alexandra Pitts,

Deputy Regional Director, Pacific Southwest Region, Sacramento, CA.

[FR Doc. 2013–22778 Filed 9–18–13; 8:45 am]

BILLING CODE 4310–55–P

DEPARTMENT OF THE INTERIOR

Geological Survey

[GX13LR000F60100]

Agency Information Collection Activities: Comment Request for the Comprehensive Test Ban Treaty (1 Form)

AGENCY: U.S. Geological Survey (USGS), Interior.

ACTION: Notice of an extension of a currently approved information collection (1028–0059).

SUMMARY: We (the USGS) will ask the Office of Management and Budget (OMB) to approve the information collection request (ICR) described

President
Leonard A. Moothart

Vice President
Craig V. Baltimore

Directors
David S. Vogel
Marshall E. Ochylski
R. Michael Wright

General Manager
Kathy Kivley

District Accountant
Amparo Haber

Fire Chief
Robert Lewin

Battalion Chief
Phill Veneris

Mailing Address:
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Los Osos, CA 93402

Phone: 805/528-9370
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www.locsd.org

November 1, 2013

County of San Luis Obispo
Planning & Building Department
Attention: John McKenzie
976 Osos Street, Room 200
San Luis Obispo, CA 93408

RE: Comments - Los Osos Community-Wide HCP

Dear Mr. McKenzie

In response to your public notice letter dated 9/20/13 (http://www.slocounty.ca.gov/Assets/PL/environmental/Los+Osos+Communitywide+Habitat+Conservation+Plan/NOP.pdf), this letter is to provide comments related to required Fire Department activities that should be included in the analysis of this EIR/NEPA document. These are routine activities that may fall under facilities use that should be addressed under the HCP and authorized under the terms of the eventual Incidental Take Permit. Please see responses below to the eight informational items requested:

1. NAME OF CONTACT PERSON. (Please include address, e-mail and telephone number)

Battalion Chief Phill Veneris
South Bay Fire Station
2315 Bayview Heights Drive, Los Osos CA 93402
Phil.Veneris@fire.ca.gov, 528-1053

2. PERMIT(S) or APPROVAL(S) AUTHORITY. Please provide a summary description of these and send a copy of the relevant sections of legislation, regulatory guidance, etc.

- Title 4 - LOCSD Fire Code
- CCR Title 19, Division 1, §3.07(b)
- PRC 4291

3. ENVIRONMENTAL INFORMATION. What environmental information must be addressed in the EIR/NEPA document to enable your agency to use this documentation as a basis for your permit issuance or approval?

Potential impacts to listed species from the activities described in #4 below.

4. PERMIT STIPULATIONS/CONDITIONS. Please provide a list and description of standard stipulations (conditions) that your agency will apply to features of this project. Are there other conditions that have a high likelihood of application to a permit or approval for this project? If so, please list and describe.
   Routine Fire Department activities include:
   1. Hydrant maintenance involving flushing of large quantities of water
   2. Vegetation clearance around hydrants
   3. Enforcement of the local weed abatement ordinance which requires residents to maintain defensible space around structures by removing excess vegetation.
   4. Enforcement of local hazard abatement, which requires landowners to abate fire hazards on unimproved parcels.
   5. Complete large scale hazard abatement projects contained within the Los Osos Community Wildfire Protection Plan.

5. ALTERNATIVES. What alternatives does your agency recommend be analyzed in the EIR?
   None

6. REASONABLY FORESEEABLE PROJECTS, PROGRAMS or PLANS. Please name any future project, programs or plans that you think may have an overlapping influence with the project as proposed.
   None

7. RELEVANT INFORMATION. Please provide references for any available, appropriate documentation you believe may be useful to the County in preparing the EIR/NEPA document. Reference to and/or inclusion of such documents in an electronic format would be appreciated.
   None

8. FURTHER COMMENTS. Please provide any further comments or information that will help the County to scope the document and determine the appropriate level of environmental assessment.

Thank you for consideration of these comments. Inclusion of these activities in the HCP will improve our ability to continue to serve the community while providing necessary environmental protections for these species.

Respectfully,

Kathy Kivley

Kathy Kivley
General Manager
Los Osos Community Services District

J. H. EDWARDS COMPANY
A REAL PROPERTY CONCERN

November 14, 2013

San Luis Obispo County Planning and Building Department
County Government Center, Room 200
San Luis Obispo, CA 93408

RE: (FWS-R8-ES-2013-N167; FF08ESMF – FXES11120800000-134)
Habitat Conservation Plan for the Community of Los Osos, San Luis Obispo County, California. Environmental Impact Report/Environmental Assessment

Attention: John McKenzie

Dear Mr. KcKenzie

Please include these comments on the project listed above.

With regard to the Morro shoulderband snail (MSS), the Los Osos Waste Water Project (LOWWP) monitoring data should be included in the Habitat Conservation Plan (HCP). Recent surveys suggest that MSS presence reaches considerably further east of original surveys done on the Morro Bay sandspit. Personal observations include finding MSS as far east as Turri Road. Its distribution may extend throughout the Morro Bay watershed.

The MSS was downlisted in 2006 to "Threatened." With the new data indicating its abundance and broad distribution, it begs the question, as to whether or not it is indeed threatened or endangered. Perhaps the MSS should be delisted altogether.

The Morro kangaroo rat should be a covered species in the HCP. At a minimum, it should be a covered species within the Urban Services Line. The basis for this is the historical trapping both in the urban area as well as the rural areas.

The covered activities as presented include Capital Projects. The activities should expressly include those water resource development and distribution projects as identified in the Los Osos Basin Plan action programs. (http://www.slocountywater.org/site/Water%20Resources/Reports/pdf/Basin%20Plan%20Public%20Review%20Draft%208.1.2013.pdf)

It should also include the potential for surface water discharge (NPDES permit) in Los Osos Creek as it relates to groundwater basin recharge and management by the Los Osos Community Services District and Golden State Water Company.

The HCP discusses invasive plant species and the management of them. One invasive that is not included in the HCP is devastating in its effects on the Coast Live oak

woodland habitats and requires attention. The invasive is *Asparagus asparagoides*, commonly known as Bridal creeper, Bridal-veil creeper, Gnarboola, Smilax or Smilax asparagus Bridal creeper is a herbaceous climbing plant of the family Asparagaceae and is native to tropical and southern Africa. This plant is choking out the root systems of the pygmy oaks in and around the Elfin Forest as an example. Please see the attached photograph of Bridal creeper. Oak woodlands are a key component of the Los Osos Greenbelt. Please incorporate the 2005 Los Osos Greenbelt study prepared by the San Luis Obispo Land Conservancy into the HCP.

The growth inducement section including Housing and Population should reflect the limitations associated with water availability in Los Osos. It is uncertain if any of the suggested Programs in the Los Osos Basin Plan will be implemented. The first tier of Programs would allow for about 850 new dwelling units over a twenty year time horizon. This equates to an increase in population of just over 2,000 people. Additional Programs would require implementation to produce additional water resources to accommodate further development.

Finally, the term of the Section 10(a)(1)(B) permit should be 30 years which may be a better reflection of the time horizon needed for the buildout of the community.

Sincerely,

Jeff Edwards

Jeff Edwards

From the Desk of Julie Tacker

November 14, 2013

San Luis Obispo County Planning and Building Department
County Government Center, Room 200
San Luis Obispo, CA 93408

RE: (FWS-R8-ES-2013-N167; FF08ESMF – FXES11120800000-134)
Habitat Conservation Plan for the Community of Los Osos, San Luis Obispo County, California. Environmental Impact Report/Environmental Assessment

Attention: John McKenzie

Dear Mr. KcKenzie

As the communitywide Habitat Conservation Plan works its way through the process, it occurs to me that the Los Osos Community Services District and Los Osos Fire Safe Council Focus Group should be included in a companion Section 7.

Section 7(a)(1) requires Federal agencies to use their authority to further the conservation of listed species. Section 7(a)(2) requires Federal agencies to consult with the Service to ensure that they are not undertaking, funding, permitting, or authorizing actions likely to jeopardize the continued existence of listed species or destroy or adversely modify designated critical habitat. Other paragraphs of this section establish the requirement to conduct conferences on proposed species; allow applicants to initiate early consultation; require FWS and NMFS to prepare biological opinions and issue incidental take statements.

Section 7 also establishes procedures for seeking exemptions from the requirements of section 7(a)(2) from the Endangered Species Committee. [ESA §7]

The County's preparation of the Communitywide Habitat Conservation Plan under Section 10 of the Endangered Species Act will cover much of the same areas and similar activities. The work of fuel reduction crews are 'not likely to adversely affect' determinations. I respectfully request informal consultation under Section 7 of the ESA for the Los Osos Community Services district to commission thinning of vegetation in an effort to protect the community from the devastating effect of wildland fire.

Thank you for your consideration.

Sincerely,

Julie Tacker

P.O. Box 6070, Los Osos, CA 93402
julietacker@charter.net 805-528-3569

CALIFORNIA COASTAL COMMISSION
725 FRONT STREET, SUITE 300
SANTA CRUZ, CA 95060
VOICE AND TDD (831) 427-4863
FAX (831) 427-4877

November 20, 2013

John McKenzie
County of San Luis Obispo
Planning and Building Department
976 Osos Street, Room 200
San Luis Obispo, CA 93408

Re: **Notice of Preparation (NOP) of an Environmental Impact Report for the Los Osos Community-Wide Habitat Conservation Plan**

Dear Mr. McKenzie:

Thank you for soliciting input from the California Coastal Commission (Commission) on the preparation of an Environmental Impact Report (EIR) for the proposed Los Osos Community–Wide Habitat Conservation Plan (HCP). The HCP would cover activities and actions within an approximately 3,560-acre planning area, bounded by the Morro Bay Estuary to the west, Morro Bay State Park to the north, Los Osos Creek to the east, and Montana de Oro State Park to the south. The HCP is one component of a three part process (along with a Local Coastal Plan Amendment) necessary to allow future development and provide wastewater treatment service to undeveloped parcels within Los Osos.

It is imperative that the EIR evaluates the HCP boundaries as they would be amended through the eventual Local Coastal Plan Amendment. This analysis will help to ensure infill boundaries correspond with the wastewater treatment service areas and other applicable boundaries for planning, like the Urban Services Line (USL) and the greenbelt area lines within the URL, and that potential changes to the USL based in part on the HCP, will be described in detail. The project location on page 5 of the NOP indicates that the study area coincides with the Urban Reserve Line (URL) for Los Osos, yet, for example, certain areas of the "core," e.g., are outside the current USL. Please ensure such areas are clearly described and evaluated in terms of how and why the USL and/or the URL may be amended to include or exclude certain areas.

In addition, Condition 92 of the Los Osos Wastewater Treatment Plant (LOWWP) coastal development permit requires that the "HCP shall identify the habitat resources and the quality of those resources on the remaining vacant properties within the South Bay Urban Area and the Los Osos Greenbelt" (see full citation below). Commission staff looks forward to continuing to work in coordination with the County on this critical component of the HCP, and to ensure consistency with the existing conditions of the LOWWP.

The Notice of Preparation identifies 17 "environmental issues" to be evaluated in the EIR. These proposed impact topics generally cover the applicable Coastal Act issues raised by the proposed HCP. While we may have additional comments upon release of the EIR, we request that you specifically address the following in developing the EIR:

Biological Resources
The EIR/NEPA document should include a map and discussion of the physical characteristics of the study area including the topography, soil types, migration corridors, and overall climate and micro-climates of the HCP planning area. The document must include the results from a current biological assessment and wetland delineation of the Habitat Conservation Plan (HCP) Area. The following information should be included in the EIR/NEPA document:

- A list of sensitive species and habitats that are known to occur and that could occur in the HCP area. The California Natural Diversity Data Base, the California Native Plant Society, and other reliable source(s) should be queried to ensure that the list is as accurate as possible.
- Protocol-level survey results for those sensitive species likely to occur within the HCP area.
- Habitat maps (sensitive plant and animals species locations should be included on maps).
- Discussion of seed banks.
- Observed and estimated wildlife use of the HCP area.
- Nesting bird survey results including locations of rookeries/heronries. Protocol-level surveys must be conducted for sensitive species. If raptors occur in the HCP area, raptor protocol nesting and wintering surveys should be conducted.
- Location of trees suitable for nesting or roosting and location of significant foraging habitat.
- A wetland delineation (performed using Commission criteria) report and associated maps that show the boundaries of all delineated wetlands. Please include the wetland data sheets in the document.

In addition, the EIR/NEPA document should include an analysis of the frequency of wildfires, floods, or other natural disasters affecting the HCP area and the length of time since the last fire, flood, etc. The document should discuss how the HCP will avoid and minimize impacts to natural resources and should include appropriate mitigations for any impacts.

Lastly, the EIR/NEPA document should provide an analysis of the historical ecology of the HCP area that includes habitat maps (including the U.S Coast Survey "T-sheets" of the area, if available) that identify the types, locations, and patterns of habitat and where possible, and location of species through time. This historical ecology analysis, along with the current biological assessment and wetland delineation findings of the HCP area, will be invaluable for evaluating the efficacy of the proposed HCP.

LOWWP Condition #92
Condition #92 of the LOWWP is relevant to the HCP. Please ensure compliance with the requirements of this condition and ensure that the requirements are included within the scope of the EIR. The full text of the condition is shown below:

Prior to providing wastewater treatment service to undeveloped parcels, the County, in coordination with the California Department of Fish and Game (CDFG), the US Fish and Wildlife Service (USF&WS), San Luis Obispo County and the California Coastal Commission shall prepare and implement a Habitat Conservation Plan (HCP) for the long-term preservation of habitat remaining within *the Los Osos Greenbelt, including habitat remaining on individual vacant lots. The HCP shall:*

a. identify the habitat resources and the quality of those resources on the remaining vacant properties within the South Bay Urban Area and Los Osos Greenbelt;

b. specify measures to avoid and minimize impacts to ESHA from buildout of the Service area, and to mitigate unavoidable impacts through acquisition, protection, and/or restoration of equivalent habitat within the planning area; and

c. implement such measures through an amendment to the Estero Area Plan that integrates the HCP, as approved by the US Fish and Wildlife Service and Department and Fish and Game, with LCP standards for development in the South Bay Urban Area. This LCP amendment must become fully effective, and all permits required by state and federal Endangered Species Acts shall be issued, before County makes any final commitment to provide wastewater treatment service to undeveloped properties.

The range of potential conservation programs to be considered in the HCP shall include, but not be limited to the following:

a. New development programs and standards that maximize preservation of sensitive biological resources in the Los Osos area, such as:

i. Transfer of development credits
ii. Clustering Board of Supervisors – Adopted Findings and Conditions of Approval
iii. Avoidance of sensitive resources in site design
iv. Changes in density and land use
v. Incorporation of open space into the design
iv. Changes in density and land use
v. Incorporation of open space into the design of new development

b. Programs aimed at facilitating coordination among agencies and organizations involved in management and conservation/preservation of sensitive resources, including USF&WS, CDFG, California Coastal Commission, San Luis Obispo County, MBNEP, Land Conservancy of San Luis Obispo County, and others;

c. The creation of a land bank program to facilitate the purchase of properties with high quality habitat within the Greenbelt, to be repaid over time from fees on new building permits; and

d. Programs for the acquisition of properties within the Greenbelt that contain significant habitat resources.

Thank you for your consideration of the comments included above. If you have any questions, please feel free to call me (831) 427-4863.

Sincerely,



Daniel Robinson
Coastal Planner
Central Coast District Office

RECEIVED
NOV 22 2018
SLO CO PLAN & BLDG DEPT

MORRO BAY NATIONAL ESTUARY PROGRAM

November 20, 2012

John McKenzie
County of San Luis Obispo
Planning and Building Department
976 Osos Street, Room 200
San Luis Obispo, CA 93408

RE: Comments Submitted in Response to the Notice of Preparation Issued 9/20/13 Regarding Los Osos HCP EIR/NEPA Draft Document Preparation

1. Name of Contact Person – Lexie Bell, Assistant Director, Morro Bay National Estuary Program
   Address: 601 Embarcadero, Suite 11, Morro Bay CA 93402
   Email: lbell@mbnep.org
   Phone: 805-772-3834, ext. 16

2. Approval Authority – The Morro Bay National Estuary Program is required by the Federal Clean Water Act to have an up-to-date, approved (by the governor of the state of California and the U.S. EPA) Comprehensive Conservation and Management Plan (Plan). Section 320(b)(7) of the Clean Water Act requires that each National Estuary Program review federal programs, as consistent with Executive Order 12372, to assess whether those programs are consistent with the Plan. The requirement consists of two parts: (a) a one-time review of current federal activities or financial assistance for consistency with the Plan, and (b) the development of a process for continued, ongoing future review of future activities. The Morro Bay National Estuary Program conducted its initial review when drafting the first Plan in 2001. The Morro Bay National Estuary Program currently meets its federal consistency requirement by using the California Coastal Commission's existing federal consistency review process. The Coastal Commission has agreed to notify the Morro Bay National Estuary Program of any federal activities that may affect the coastal area in or near Morro Bay and its watershed.

   The Morro Bay National Estuary Program has no direct permitting or approval authorities.

   The regulations referenced are as follows:
   Federal Clean Water Act, Section 320 -
   http://water.epa.gov/type/oceb/nep/upload/2007_04_09_estuaries_nepprimeruments_srAppendixA.pdf
   Executive Order 12372 - http://www.fws.gov/policy/library/rgeo12372.pdf

3. Environmental Information – The Morro Bay National Estuary Program would expect that the EIR/NEPA documentation would meet all requirements of the California Coastal Commission.

4. Permit Stipulations/Conditions – None applicable.

5. Alternatives – No specific recommendations at this time.

6. Reasonably Foreseeable Projects, Programs or Plans – The Morro Bay National Estuary Program would expect to engage in a number of restoration and conservation projects related to our mission "to protect and restore Morro Bay for people and wildlife" in the Los Osos area in the future. Activities in the future might include land acquisitions and/or easements (as primary entity or supporting other nonprofit efforts), restoration to native habitats on property held by the Morro Bay National Estuary Program or our partners, work to bolster the use of Mutt Mitts in Los Osos, water quality monitoring in various locations, and education and outreach about Morro Bay and the surrounding environment. The Morro Bay National Estuary Program is also currently engaged in creating a restoration and conservation plan for the Morro Bay watershed to prioritize our efforts in the area. The plan will be complete by early 2015. The Morro Bay National Estuary Program does on occasion apply for environmental permits for restoration and monitoring work in and around the study area for the Los Osos Habitat Conservation Plan. Currently, our staff and volunteers monitor water quality in the wet season at two sites on Los Osos Valley Road that are within the HCP boundaries. Additionally, we sometimes complete dry season monitoring within Los Osos and are planning on monitoring freshwater seeps in Sweet Springs in the coming year. Bacteria monitoring data is shared with various local entities, including the Regional Water Board and the County of San Luis Obispo. Additional data may be shared as requested or seen in our data summary reports (see more information on these reports in question 7).

7. Relevant Information – The Characterization Report for the Morro Bay Estuary that was completed in preparation for the drafting of the 2001 Comprehensive Conservation and Management Plan may be useful. It can be obtained through our office at 601 Embarcadero, Suite 11, Morro Bay CA. Phone number – 805-772-3834. The final version only exists in hard copies. The characterization included a number of background studies on the Morro Bay estuary that are also available through our office. In addition, the Morro Bay National Estuary Program completes an annual or semiannual data summary report on all monitoring efforts throughout the watershed, including water quality, suspended sediment, and eelgrass. The most recent reports can be found on our website at http://mbnep.org/Library/data_summaries.html. Older reports can be obtained by contacting our office.

   The current version of our Comprehensive Conservation and Management Plan (referenced in question 2 above) can be found on our website at http://mbnep.org/Library/ccmp.html.

8. Further Comments – None at this time.

Sincerely,

Lexie Bell
Assistant Director

Appendix B

Los Osos Habitat Conservation Plan

Los Osos Habitat Conservation Plan



Prepared for:

County of San Luis Obispo

Planning and Building Department

976 Osos Street

San Luis Obispo, CA 93408

Prepared by:

Jodi McGraw Consulting

PO Box 221 ● Freedom, CA 95019

April 5, 2019

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List of Acronyms

Acronym	Definition
AMMP	adaptive management and monitoring plan
APN	assessor's parcel number
BLM	Bureau of Land Management
BO	Biological Opinion
CalIPC	California Invasive Pest Plant Council
CALFIRE	California Department of Forestry and Fire Protection
CASH	California Academy of Sciences Herbaria
CCH	California Consortium of Herbaria
CDFW	California Department of Fish and Wildlife (formerly California Department of Fish and Game)
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CMCA	Crawford, Multari, and Clark Associates
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
COI	certificate of inclusion
DPS	Distinct Population Segment
EA	Environmental Assessment
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
ESA	Federal Endangered Species Act
ESHA	Environmentally Sensitive Habitat Area
FC	Candidate to be Federally Listed
FD	Federally Delisted
FE	Federally Endangered
FGC	State Fish and Game Code
FP	State Fully Protected (CESA) and Fully Protected (CDFW)
FR	Federal Register
FT	Federally Threatened
GIS	Geographic Information System
GPS	Global Positioning System
GSW	Golden State Water Company
HCP	Habitat Conservation Plan
IBA	Important Bird Areas
IKM	Indian Knob mountainbalm
IPPC	Intergovernmental Panel on Climate Change
ITP	incidental take permit (federal)
JSA	Jones and Stokes Associates

Acronym	Definition
LOCSD	Los Osos Community Services District
LOHCP	Los Osos Habitat Conservation Plan
MBA	Michael Brandman Associates
MBKR	Morro Bay kangaroo rat
MCAS	Morro Coast Audubon Society
MDER	Morro Dunes Ecological Reserve
MM	Morro manzanita
MOU	Memorandum of Understanding
MSS	Morro shoulderband snail
NEPA	National Environmental Policy Act
NFWF	National Fish and Wildlife Foundation
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
OHV	Off-Highway Vehicle Use
OSUH	Oregon State University Herbarium
PAR	Property Analysis Report
PCA	Priority Conservation Area
PRISM	PRISM Climate Group
PT	Proposed for Federally Threatened Listing
S&T	S & T Mutual Water Company
SD	state delisted
SE	state endangered
SOD	Sudden Oak Death
SRA	Sensitive Resource Area
SSC	Species of Special Concern
ST	state threatened
SWAP	Small Wilderness Area Preservation
SWCA	SWCA Environmental Consultants
TP	Threatened Phenomenon
URL	Urban Reserve Line
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USL	Urban Services Line
WL	Watch List
WRCC	Western Regional Climate Center

Acknowledgements

This plan was prepared by Jodi McGraw, Ph.D., Principal Ecologist with Jodi McGraw Consulting, on behalf of the County of San Luis Obispo.

Assistance was provided by:

Justin Burks, Assistant Ecologist (Jodi McGraw Consulting);

Teifion Rice-Evans, Walker Toma, and Walter Kieser (Economic & Planning Systems Inc.) who conducted the financial analyses and assisted with development of the mitigation approach, funding program, and funding chapter;

Dwayne Oberhoff (Lisa Wise Consulting), who provided the plant and animal species summaries (Appendix A) and the Other Listed Species Profiles (Appendix C); and

Sean Skaggs (Ebbin, Moser, and Skaggs, LLP), who advised on legal matters and prepared the certificate of inclusion and conservation easement templates.

County of San Luis Obispo staff that assisted with the project includes:

Kerry Brown
Matthew Christen
Katie Drexhage
Rob Fitzroy
Matt Janssen
Jay Johnson
Trevor Keith
Jeff Legato
Megan Martin
John McKenzie
Tim McNulty
Nancy Orton
Benjamin Schuster

Additional information and guidance was provided by:

Julie Vanderwier, U.S. Fish and Wildlife Service (Ventura Fish and Wildlife Office);

Deborah Hillyard, California Department of Fish and Wildlife (Region 4); and

Robert Stafford, California Department of Fish and Wildlife (Region 4).

Preparation of this document was funded, in part, by the Cooperative Endangered Species Conservation Fund (Section 6) Planning Grants administered by the California Department of Fish and Wildlife through Agreements # F08AP00227 and F12AF70176.

Executive Summary

The County of San Luis Obispo is requesting a federal incidental take permit issued pursuant to Section 10(a)(1)(B) of the federal Endangered Species Act (ESA) to cover take[1] of four state and/or federally-listed species:

Covered Species	**Federal Status/State Status**
Morro shoulderband snail (*Helminthoglypta walkeriana*)	Endangered/None
Morro manzanita (*Arctostaphylos morroensis*)	Threatened/None
Morro Bay kangaroo rat (*Dipodomys heermanni morroensis*)	Endangered/Endangered, Fully Protected
Indian Knob mountainbalm (*Eriodictyon altissimum*)	Endangered/Endangered

The take/impacts would result from private development activities as well as public agency and private utility projects conducted during the 25-year permit term within the 3,644-acre Los Osos Habitat Conservation Plan Area, which is centered on the unincorporated community of Los Osos, in central coastal California (Figures 1-1 and 1-2). The Los Osos Habitat Conservation Plan (LOHCP or Plan) Area features the Baywood Fine Sands ecosystem—a unique biological system found only on ancient sand dunes in the Los Osos region, which provides habitat for numerous rare and unique plants and animals, including the four covered species.

Naturally rare due to their limited geographic range and narrow habitat specificity, the covered species have been impacted by habitat loss due to historic development in the region. The central and northern portions of the Plan Area (inside the Urban Services Line or USL) features dense residential and commercial development; the area outside of the USL features sparser residential development, limited agricultural use, and parks and reserves that contain important habitat areas.

Covered Activities

Since 1988, there has been a moratorium on new development throughout much of Los Osos as a result of water quality issues caused by the region's septic systems. However, completion of the Los Osos wastewater facility in 2016, along with the update to the Los Osos Community Plan, will enable development to resume within the 1,584-acre wastewater facility service area, which features 579 vacant parcels totaling 260 acres. Outside the wastewater treatment area, there are 122 additional vacant private parcels (445 acres), which are designated for single-family residential development. These vacant parcels will likely be developed during the 25-year permit term and are estimated to impact 253.8 acres of habitat: 150.7 acres of residential land and 103.1 acres of commercial land (Table 2-6). Additionally, redevelopment including remodels, additions, and other construction on 5,283 developed parcels, which total 1,476 acres, are estimated to impact 156 acres (Table 2-7).

[1] "Take" under the federal ESA does not apply to listed plant species. For purposes of the LOHCP and the federal permit, "take" when applied to the covered plant species refers to impacts to the species. The Plan features conservation measures to protect thethese species, which are included as covered species, so that the USFWS will extend "no surprises" assurances for them.

The take permit would also cover the impacts of capital improvement projects, as well as facilities operations and maintenance activities, conducted by the County, the Los Osos Community Services District, and two private water purveyors, S&T Mutual and Golden State Water Company. These projects, which include road and trail creation and maintenance, park expansion and creation, and water system upgrades, as well as facility maintenance activities, are estimated to impact 122.1 acres (Table 2-8).

To conduct these otherwise lawful activities in compliance with ESA, the County is requesting a federal incidental take permit, which would cover the impacts of all covered activities on Morro shoulderband snail and Morro manzanita. This federal permit will also cover impacts to unoccupied habitat of Indian Knob mountainbalm habitat and Morro Bay kangaroo rat resulting from implementation of the Plan's conservation program. Pre-project surveys conducted in suitable habitat for Morro Bay kangaroo rat and Indian Knob mountainbalm will be used to ensure projects avoid harm to individuals of these species, such that a take permit is not being requested for these state-listed endangered species under Section 2081 of the California Environmental Species Act (CESA).

Proponents of covered activities, including private landowners, agencies, and organizations that choose to participate in this voluntary[2] program, will receive take coverage via Certificates of Inclusion—legal documents that confer the County's federal take coverage to others who agree to the permit terms (Appendix H).

Habitat Impacts

Implementation of the covered activities will impact up to 532 acres of habitat within the 3,644-acre Plan Area, resulting in the loss, degradation, and fragmentation of habitat for the four covered species. Though the precise number, size, and location of the projects to be conducted in this programmatic[3] HCP are unknown, the acres of vegetation and other land cover types that are anticipated to be affected were estimated based on information from available projects (Table 4-1). This analysis estimated that the covered activities will impact 189 acres of coastal sage scrub, 18 acres of central maritime chaparral, and 33 acres of woodlands, including primarily coast live oak woodland (Table 4-3). Much of the remaining impacts (207 acres) will occur within existing developed areas, including the County rights-of-way.

In addition to directly affecting habitat and individuals, the covered activities will also impact the covered species indirectly (Section 4.1.2). Increasing the human population through development is likely to intensify recreational use of parks and reserves, which can degrade protected habitat (Section

[2] Participation in the LOHCP is voluntary; landowners who are not conducting activities that cause ground disturbance or otherwise impact the covered species need not participate in this plan. Moreover, proponents of projects causing ground disturbance may have other options for compliance with the local, state, and federal permitting.. However, the LOHCP was developed to reduce the timeline and costs for permitting, while also contributing to a more cohesive conservation strategy for the covered species. Moreover, the USFWS has indicated that the HCP is their preferred permitting mechanism for compliance with the federal Endangered Species Act.

[3] Unlike a project- or land-specific HCP, where all of the activities and/or affected areas are known, a programmatic HCP identifies a Plan area and project eligibility criteria used to identify eligible activities can be covered by the ITP issued to the Plan's sponsor (in this case, the County). Activities meeting these criteria can be covered provided that project proponents implement the Plan's avoidance, minimization, and mitigation measures and adhere to the associated Plan conditions identified in the certificate of inclusion issued to confer take coverage under the sponsor (i.e., the County's) ITP.

D.2). The covered activities, in addition to greater human habitation in the region, can also promote the invasion and spread of exotic plants, many of which are adapted to disturbance (Section D.1). Finally, the proximity of greater human population to remaining habitat will further complicate efforts to effectively manage fire in order to promote populations of the fire-dependent covered plants and retain the structure and species composition to which the covered animals are adapted (Section D.3).

The LOHCP permits will also cover fire hazard abatement activities conducted to implement the Los Osos Community Wildfire Protection Plan (SLOCCFSC 2009). Construction of fuel breaks at the wildlife urban interface is anticipated to impact 89.4 acres. Some of the treatments will promote the LOHCP biological goals and objectives, by reducing exotic plants and creating early-successional habitat conditions. The CWPP will be implemented using a suite of avoidance and minimization measures developed to substantially reduce take of Morro shoulderband snail in the form of injury and mortality and reduce the severity of impacts to Morro manzanita (Table 5-4), which will be largely temporary.

Conservation Program

To mitigate the effects of the covered activities on the covered species, the County will be responsible for implementation of the LOHCP conservation program—a comprehensive program designed to avoid, minimize, and mitigate the impacts of the covered activities to a level that is commensurate with the impacts of the taking, as summarized in Table 5-11. This conservation plan is also intended to contribute to recovery, by addressing threats to survival to ensure long-term persistence.

The LOHCP conservation program includes the following elements:

- **Biological Goals and Objectives:** the desired future conditions of the ecosystem, communities, and covered species (goals), and 23 targets for achieving them (objectives; Table 5-1).
- **Avoidance and Minimization Measures:** steps that will be taken during implementation of the covered activities to avoid or minimize their effects on covered species and the degradation of upland habitats (Table 5-2); a suite of measures to avoid impacts to other listed species not covered by the permits, which primarily occur in the wetland and riparian systems as these areas are not covered by the Plan (Table 5-3); and additional avoidance and minimization measures designed to minimize impacts from the community wildfire protection plan (Table 5-4);
- **Habitat Protection**: measures that will be taken to secure fee title or conservation easements from willing landowners to safeguard additional habitat, to expand and connect existing protected lands (Section 5.3.2);
- **Habitat Restoration:** projects to re-re-establish habitat conditions, including native plant community structure and species composition, where it has been substantially degraded by anthropogenic factors, such as erosion, dense infestations of exotic plants, and fire exclusion (Section 5.3.3);
- **Habitat Management:** ongoing efforts to maintain or enhance habitat conditions and promote the long-term population viability of the covered species, by addressing factors that negatively impact habitat, including incompatible recreational use, exotic plants, and fire outside of the natural disturbance regime (Section 5.3.3);
- **Monitoring:** long-term studies to track the status and trends of the covered species populations, and the condition of their habitat (Table 5-6), as well as project-specific monitoring to document

the effectiveness of restoration and management relative to the performance criteria that reflect their conservation value for the covered species; and

- **Adaptive Management:** the framework through which the six other elements will be implemented in order to enhance long-term effectiveness of the conservation program at achieving the biological goals and objectives (Section 5.5).

The conservation program of the LOHCP will be administered by an Implementing Entity— an existing or newly-created non-profit conservation organization (e.g., a land trust or conservancy), that will provide expertise in land conservation and management of endangered species. The Implementing Entity will be identified by the County and approved by CDFW and the USFWS prior to issuance of the permit (Table 6-1).

The Implementing Entity will establish and manage the LOHCP Preserve System—a network of existing protected lands (i.e., parks, open space, reserves already protected extensive development), as well as land protected through Plan implementation, as part of a coordinated strategy designed to achieve the LOHCP biological goals and objectives. Incorporation of existing protected lands eligible for management as part of the LOHCP Preserve System (Table 5-5) will ensure that the habitat of greatest long-term conservation value is restored and enhanced to promote persistence of the covered species.

The LOHCP Preserve System will be assembled during the 25-year permit period, through the acquisition, restoration, and management of native communities that provide habitat for the covered species and build upon the public and private conservation investments in the region over the past three decades. To provide the greatest long-term benefit for the covered species, these activities will primarily occur within the Priority Conservation Area (Figure 5-1). Located on the perimeter of the LOHCP Area, this area features large blocks of relatively intact habitat that was identified as important for long-term viability of the covered species in their respective recovery plans (USFWS 1998a, 1999).

The LOHCP Preserve System will be managed, restored, and monitored as outlined in the LOHCP Preserve System Adaptive Management and Monitoring Plan (AMMP; Section 5.3.3.2). The AMMP will be developed during the first three years of Plan implementation based on initial surveys and monitoring studies that will be used to establish baseline information about habitat conditions and covered species populations and to inform the development of restoration and management strategies and projects (Section 5.3.3.2). The AMMP will be developed based on the framework and information provided in this plan, including: 1) biological goals and objectives (Section 5.1); 2) information about the covered species ecology and conservation needs (Appendix B); 3) scientific information about the three main threats to the covered species—exotic plants, incompatible recreation, and fire exclusion—and approaches to their management (Appendix D); and 4) monitoring protocols for the covered species, communities, and habitat conditions (e.g. exotic plants; Appendix E). The AMMP, which will be subject to approval by the USFWS and CDFW, will establish performance criteria that habitat protection, restoration, and management actions must achieve to be credited as mitigation for the take of/impacts to the covered activities on the covered species through this Plan.

Mitigation Requirements

The conservation program elements will be implemented in coordination with the County and others who conduct covered activities under the Plan (project proponents) through measures required to mitigate the take/impacts of their permitted activities on the covered species. To receive take coverage

under this program, project proponents who elect to participate will be required to implement the applicable avoidance and minimization measures identified by the Implementing Entity during the application review process (Tables 5-2 to 5-4).

Project proponents will also be required to compensate for their project take/impacts by contributing to the protection, restoration, and long-term management of habitat within the LOHCP Preserve System. The type and level of compensatory mitigation reflects the amount and quality of habitat impacted, to ensure that the impacts to covered species are offset by the mitigation requirements (Table 5-7).

- Proponents of residential development projects inside the PCA will dedicate conservation easements to the Implementing Entity, which will protect habitat set-asides on-site at a ratio of 3:1 for the area of habitat impacts. This approach to on-site habitat protection reflects the generally high conservation value of habitat in these parcels.
- Proponents of activities located outside of the PCA will pay a fee that will be used by the Implementing Entity to acquire additional privately-held land from willing sellers that will be included in the LOHCP Preserve System. These activities will be mitigated at a ratio of 1:1; for every square foot of disturbance caused by the covered activity to soil not covered with impervious surfaces, proponents will pay a Habitat Protection Fee. This fee was calculated to cover the costs of protecting habitat within the PCA on a per-square-foot basis (Section 7.2.1). The ratio reflects the lower quality of habitat that will be impacted by these projects relative to the habitat that will be protected. The approach to off-site mitigation also reflects the low conservation value and/or reduced feasibility of on-site habitat set asides outside of the PCA.
- All proponents of project types identified in Table 5-7 will pay a fee to fund restoration of habitat in the LOHCP Preserve System, as compensation for the loss of habitat caused by the covered activities. This fee will also fund ongoing habitat management and monitoring, to ensure that the protected and restored habitat does not degrade in ways that would reduce its value for the covered species. Calculated based on the area disturbed by the covered activity, so that mitigation offsets the project impacts, this Plan Restoration/Management/Administration Fee, will also fund long-term monitoring of the Preserve System as well as Plan administration, in order that Plan implementation costs are completely funded by plan participants.

The mitigation fees were calculated based on both the anticipated land acquisition costs (Habitat Protection Fee), and the estimated costs to restore, manage, and monitor land within the LOHCP Preserve System, as well as administration of the Plan (Restoration/Management/Administration Fee; Section 7.2). The fees will be used, in part, to establish endowments to fund ongoing management and monitoring of the LOHCP Preserve System after expiration of the permits. The endowment will ensure the condition of habitat protected and restored within the LOHCP Preserve System is maintained in perpetuity. Calculated on a per-square-foot basis, the initial Habitat Protection Fee is approximately $0.14 while the initial Restoration/Management/Administration Fee is approximately $0.75 (Table 7-1)[4].

The Implementing Entity will work with the County to administer the LOHCP over the 25-year period of the plan, by permitting a suite of eligible covered activities, and assembling the LOHCP Preserve System by: 1) accepting conservation easements dedicated by landowners developing vacant land inside the PCA; 2) using Habitat Protection Fees collected from other project proponents identified in Table 5-7 to

[4] The fees will be calculated to the nearest hundredth of a cent (Table 7-8). The fees listed here are rounded to the nearest cent for simplicity.

acquire fee title or conservation easements from willing sellers of land inside the PCA; 3) using restoration, management, and administration fees collected from all project proponents identified in Table 5-7, to manage and restore the newly acquired land; and 4) using the restoration, management, and administration fees to manage and restore existing protected lands enrolled into the LOHCP Preserve System, and monitor the habitat and species populations to document achievement of the performance criteria established in the AMMP. In this programmatic plan, the land protection, restoration, and management actions will be phased in over time and keep pace with the covered activities, such that at any time during plan implementation, the benefits of the Preserve System for the covered species, as documented through achievement of the performance criteria specified in the AMMP, will exceed or at least match the impacts of the covered activities, such that the mitigation is commensurate with the impacts on the covered activities. The County will work with the Implementing Entity to conduct enhanced management on approximately 15 acres of degraded habitat within the Morro Dunes Ecological Reserve once this property is enrolled in the LOHCP Preserve System; this project will 'jump start' the mitigation and help ensure that it stays ahead of the project impacts (Section 6.2.4).

Habitat Benefits

Mitigation costs in this Plan were estimated based on the LOHCP Preserve System configuration scenario (Section 5.8.1)—a scenario for the final preserve system design, which identifies the acres of land that will be acquired, restored, and managed by the Implementing Entity to mitigate the impacts of the covered activities. As noted above, the LOHCP Preserve System will be assembled over time by the Implementing Entity, which will work with willing landowners to protect unprotected habitat as well as enroll existing protected lands of high conservation value to the covered species. The precise mix of new and existing protected land that will ultimately comprise the LOHCP Preserve System is unknown. However, a reasonable scenario for the LOHCP Preserve System was developed in order to estimate the land protection, restoration, management, and monitoring costs, in order to estimate the mitigation fees.

In this scenario, the LOHCP Preserve System would consist of 386 acres and would (Table 5-9):

- **Protect 107.5 acres** of currently unprotected land, of which 10 acres will be restored and then managed (the other 97.5 acres will be actively managed, as they do not require initial restoration);
- **Restore 35 acres** of degraded habitat within existing protected lands (parks or reserves that are already protected from development) to increase its ability to support the covered species; and
- **Actively manage 243.7 acres** of additional habitat within existing parks and reserves (e.g., the Morro Dunes Ecological Reserve), to meet the unmet management needs and that go above and beyond the existing management obligations of the landowner/land management agency and address factors that threaten long-term persistence of the covered species.

Mitigation crediting ratios were used to relate the value of habitat protection, restoration, and management to the impacts of the covered activities, or more appropriately, to not implementing them. The ratios are designed to express the relative value of the actions for the long-term recovery of the covered species (Section 5.7.2.3.1; Table 5-8). For example, the ratio if 1.5:1 is used to reflect the 50% higher benefit of restoring habitat that is degraded by dense infestations of exotic plants in an existing protected area (e.g., the Morro Dunes Ecological Reserve), for the conservation of the covered species,

relative to *not* implementing a typical covered activity, such as residential development on a 3,000-sf lot within the urban services line.

The ratios are generally greater than 1:1, reflecting the fact that the long-term benefits for the covered species populations of the mitigation actions will exceed the take of/impacts to the covered species resulting from the covered activities. This is because the conservation actions will be largely implemented in the PCA (Figure 5-1), which features larger, more contiguous areas of relatively intact habitat, whereas most of the covered activities will occur in areas not deemed essential for conservation of the species such as designated critical habitat or conservation planning units identified in a recovery plan. Instead, the covered activities will largely occur areas of existing high-density residential and commercial development, that are of low conservation value. While activities in these areas will impact the covered species and therefore require mitigation in order to meet the issuance criteria for an incidental take permit, the mitigation ratios reflect the greater value of the conservation actions for long-term conservation of the covered species (Section 5.7.2.3.1, Table 5-8).

These mitigation crediting ratios were used to assess the anticipated net benefits of the LOHCP Preserve System for the covered species by comparing the habitat impacts of the covered activities, which are analyzed in Section 4.2 based on the methods outlined in Section 4.1, to the anticipated benefits to habitat in the LOHCP Preserve System, which are described in Section 5.8 based on a similar methodology. In the scenario used for the final configuration of the LOHCP Preserve System, the 386-acre LOHCP Preserve System will benefit 533.1[5] acres of habitat, thus mitigating the maximum impacts of the covered activities on habitat at a ratio of 1:1 (Table 5-10). The mitigation equivalencies were multiplied by the acres of vegetation and other land cover types anticipated to be within the LOHCP Preserve System to calculate the acre equivalents of each type that would benefit from the LOHCP conservation program (Table 5-10). These were compared to the acreages anticipated to be impacted by the covered activities (Table 4-3). For each, a cross walk between vegetation types and other land cover was used to calculate the area of habitat potentially occupied by Morro shoulderband snail and Morro manzanita (Tables 4-4 and 4-5).

- **Morro Manzanita:** The Preserve System is anticipated to benefit 354-acre equivalents of Morro manzanita habitat (central maritime chaparral and native woodlands; Table 4-4), whereas the covered activities are anticipated to impact just 41 acres of habitat. This 8.6:1 ratio of benefits to impacts reflects the far greater proportion of central maritime chaparral on the perimeter of the Plan Area, where the Preserve System will be located, compared to the center of the Plan area where the covered activities will largely occur.
- **Indian Knob Mountainbalm:** The Preserve System is anticipated to benefit 156-acre equivalents of central maritime chaparral, while the covered activities will impact just 18 acres of these communities, which can provide habitat for this plant. This 8.5:1 ratio of habitat benefits to impacts for central maritime chaparral will greatly facilitate recovery of Indian Knob mountainbalm.
- **Morro Bay Kangaroo rat:** The covered activities are anticipated to impact 189 acres of coastal sage scrub and 18 acres of central maritime chaparral, which can be suitable for Morro Bay kangaroo rat if open habitat conditions are maintained. The Preserve System is anticipated to

[5] The LOHCP preserve system scenario includes 1.6 acre-credits more than needed to mitigate the 531.5 acres of impacts caused by the covered activities, to address estimation errors in this 25-year, programmatic plan.

benefit 475-acre equivalents of these communities, thus offsetting habitat impacts for this species at a ratio of more than 2:1.

- **Morro Shoulderband Snail:** The covered activities are anticipated to impact 189 acres of habitat, while the Preserve System will benefit 191-acre equivalents, resulting in a 1:1 ratio of benefits to impacts.

Based solely on habitat acreages, these ratios understate the anticipated net benefits of the Plan for the covered species. First, the habitat that will benefit from the Preserve System is of far greater long-term conservation value than the habitat that will be impacted by the covered activities (Section 4.2). Specifically, of the 207 acres of coastal sage scrub and central maritime chaparral anticipated to be impacted by the covered activities, 166 acres (80%) is anticipated to be inside the Urban Services Line (Table 4-3). Habitat within this already densely-developed portion of Los Osos is not included in designated critical habitat or identified as a conservation planning unit within a recovery plan for the covered species, and has lower long-term conservation value as it is more degraded and fragmented; as a result, it would be far more difficult to actively manage, than the larger, more intact habitat within the Priority Conservation Area. As illustrated in Table 5-10, the 386-acre Preserve System is anticipated to result in 475-acre equivalents of habitat benefits from protection, restoration, and/or management of 350 total acres of relatively intact coastal sage scrub and central maritime chaparral communities that occurs in larger, more contiguous habitat patches[6]. In addition, this Plan will result in net benefits for the covered species by funding, in perpetuity, the active habitat management of the upland habitat within the Baywood fine sands ecosystem. The funding is necessary to achieve the goals and objectives and can help promote recovery of the listed species.

Plan Implementation

The Plan will be implemented by the County and the Implementing Entity, to which the County intends to delegate many of the Plan implementation tasks. The USFWS will monitor compliance with the permit including by reviewing annual reports (Section 5.6). The following paragraphs outline their main roles and responsibilities:

1. **County:** As the sole permittee, the County will be responsible for implementation of the Plan and compliance with the permit terms. Specific roles include: establishing, contracting with, and overseeing the work of the Implementing Entity, and enforcing compliance with the terms of Certificates of Inclusion. The party selected to be the Implementing Entity will be approved by the USFWS and CDFW.
2. **USFWS:** Pursuant to their regulatory roles under the ESA, the USFWS will primarily be responsible for monitoring Plan implementation and notifying the County and Implementing Entity if Plan implementation is not proceeding in compliance with the permit. The USFWS will also review and approve land acquisition and conservation easement proposals, review and approve the LOHCP Preserve System AMMP, and review annual reports documenting plan implementation and monitoring. The USFWS may also, in their discretion, assist the County in securing federal funding to enhance the conservation program (e.g., Section 6 funds).

[6] The benefits to habitat exceed the acreages of habitat in the Preserve System, as a result of the mitigation equivalency ratios applied to each of the conservation actions to reflect their value for conservation of the covered species relative to the impacts of the typical covered activity, as described in detail in Section 5.7.2.3.1.

3. **Implementing Entity:** Under contract with the County, this organization will conduct most Plan implementation tasks, including the following: processing applications for participation; issuing Certificates of Inclusion and monitoring compliance with the permit terms and conditions; assembling, restoring, and managing the Preserve System; conducting all monitoring to track effective implementation of the Plan as well as evaluate its biological effectiveness including achievement of the performance criteria; and preparing all reports and recommending updates to the Plan to ensure its success.

This programmatic Plan will be implemented through an adaptive management framework, which will ensure its long-term effectiveness at achieving the biological goals and objectives (Table 5-1). The Preserve System AMMP, which will be developed early during Plan implementation (Years 0-3) and guide restoration and management of the Preserve System, will be updated as part of annual review cycles based on:

1. **Biological effectiveness monitoring results**, which will document achievement of the performance criteria as well as refine management strategies and techniques to promote long-term effectiveness;
2. **Implementation monitoring results**, which will identify additional or different avoidance and minimization protection measures;
3. **New scientific information,** which will inform effective conservation and management of the covered species and the communities in which they occur; and
4. **Changes in habitat conditions,** relative to baseline conditions, including threats to the covered species, such as invasion and spread of exotic plants or animals, fire, drought, or global climate change, which may necessitate additional or different management treatments (Section 6.5).

The mitigation costs will be tracked to update the financial analysis and mitigation fee schedule (Section 7.4). This adaptive financial management will ensure that the Plan is adequately funded, so that mitigation is assured, and the Plan is implemented as intended. In doing so, this coordinated conservation program will contribute to the recovery of the four covered species and help conserve other native plants and animals that comprise the endemic communities of the Baywood fine sands ecosystem.

1 Introduction and Background

1.1 Overview

Located in San Luis Obispo County in central coastal California, the unincorporated community of Los Osos is approximately ten miles northwest of the City of San Luis Obispo and five miles south of the City of Morro Bay (Figure 1-1). The community of Los Osos is situated on an ancient dune complex. The sandy soil, known as the Baywood fine sand, combine with the region's maritime climate to create a mosaic of natural communities including coastal sage scrub, central maritime chaparral, and coast live oak woodland, that support unique and diverse assemblages of plants and animals, including four narrowly endemic species:

- Morro Bay kangaroo rat (*Dipodomys heermanni morroensis*);
- Morro shoulderband snail (*Helminthoglypta walkeriana*);
- Morro Manzanita (*Arctostaphylos morroensis*); and
- Indian Knob mountainbalm (*Eriodictyon altissimum*).

Due to their small geographic range, narrow habitat specificity, and small and declining populations, these four species have been listed as either threatened or endangered under the federal Endangered Species Act (ESA) and/or California Endangered Species Act (CESA; Section 1.4). In order to comply with these laws, landowners and others seeking to conduct projects that would impact these species including their habitats must receive state and federal incidental take permit. These permits cover the impacts to the listed animal species, which is known as take, due to otherwise lawful activities.

This habitat conservation plan for the Los Osos area (LOHCP or Plan) area is part of an application by the County of San Luis Obispo (County) to obtain an incidental take permit (ITP) from the United States Fish and Wildlife Service (USFWS), which implement the federal Endangered Species Act. The County will avoid take, as defined under CESA, of the state-listed species; therefore, the County is not requesting an incidental take permit issued pursuant Section 2081 of CESA. As the permittee, the County can issue Certificates of Inclusion to landowners and other project proponents to confer take coverage for projects that impact one or more of the listed species.

The LOHCP identifies the suite of activities that will be covered by the permit (covered activities; Section 2.2), their anticipated impacts to the listed species covered by the permit (covered species; Chapter 4), and the steps that the County and other plan participants will take to avoid, minimize, and mitigate the impacts of the covered activities on the covered species (the conservation program; Chapter 5).

Participation in the LOHCP is voluntary; landowners who are not conducting activities that cause ground disturbance need not participate in the Plan. Moreover, landowners and other proponents of projects causing ground disturbance have other options for compliance with the local, state, and federal permitting requirements that are addressed through this plan. However, the LOHCP is designed to streamline the permitting process, reducing both the timeline and costs for permitting, while also contributing to a more cohesive conservation strategy for the covered species.

To mitigate the take of animals and impacts to plants from the covered activities, the County has developed a conservation program to: 1) avoid impacts of the projects on the covered species, where

possible, and 2) minimize and compensate for the impacts on the covered species, in cases where take/impacts cannot be avoided. The conservation program also includes measures to avoid impacts to other listed species in the Plan area, that are not covered under the ITP. These elements of the LOHCP Conservation Program build upon the history of conservation work in the region, which protected in state parks and ecological reserves habitat of the greatest conservation value. To leverage these prior public and private investments in conservation in the region, the LOHCP Preserve System will feature a mix of existing protected lands as well as new habitat acquired through the LOHCP, which will be restored, managed, and monitored through a comprehensive strategy designed to maximize effectiveness of the habitat mitigation fees collected through the plan (Chapter 5).

The LOHCP also outlines the specific measures that the County will take to implement the LOHCP with an Implementing Entity—a non-profit conservation organization approved by the USFWS and CDFW that, under contract to the County, will implement most components of the Plan including the conservation program (Chapter 6). Chapter 7 outlines the costs and funding approach to implement the elements of the Plan, while Chapter 8 identifies alternatives to the proposed taking and why they were not pursued by the County.

Implementation of this plan will help conserve the covered species and enhance the natural communities that support them as well as other native species, while allowing compatible growth and development consistent with applicable local, state, and federal laws.

1.2 Permit Holder/Permit Duration

The County is requesting to hold the incidental take permit issued pursuant to Section 10(a)(1)(B) of ESA. As the land use jurisdiction for the unincorporated area of Los Osos, the County can be responsible for implementing the Plan and ensuring compliance with the terms of the permit as it implements its general plan and associated land use policies and ordinances. As a landowner and provider of various services, including road and park maintenance, the County will also use the take authorization provided by the incidental take permit issued based on the Plan to cover impacts of its own capital improvement and facilities operations and maintenance projects.

The County will also coordinate plan implementation with other public entities, such as the Los Osos Community Services District (LOCSD), to cover take/impacts caused by covered activities that are outside of County jurisdiction. Working with the Implementing Entity, the County will confer take coverage to other proponents of projects that meet the Plan's eligibility criteria through its land use authority and through issuance of Certificates of Inclusion (Appendix H): legally binding contractual agreements between the County and the Plan participant as allowed under Title 50 of the Code of Federal Regulations Section 13.25 (e). The Implementing Entity will monitor the compliance of Plan participants to ensure compliance with the requisite conservation program measures. The County, as the permittee, has chosen to implement the Plan in part through the Implementing Entity; however, the County remains legally responsible for implementing the plan and complying with the incidental take permit, including all actions, and any failure to act, by the Implementing Entity.

The County has requested a 25-year permit term. This duration will allow the County sufficient time to implement the conservation program designed to attain the Plan's biological goals and objectives (Section 5.1). It will also enable implementation of the Los Osos Community Plan, the general plan and local coastal plan for the Los Osos Region (County of San Luis Obispo 2015). Prior to expiration of the permit, the County may apply to renew the permit (Section 6.9).

1.3 Permit Boundary

The 3,644-acre plan area for the LOHCP (Plan Area) identifies the contiguous area of habitat of the Baywood fine sands ecosystem in which all covered activities and all aspects of the Plan's conservation program will be implemented (Figure 1-1).

The Plan Area was delineated to incorporate the upland Baywood fine sands ecosystem that is the focus of the Plan. It was based largely upon the Los Osos Urban Reserve Line—the boundary separating urban and rural land uses in the region-- but was modified to better meet the Plan needs (Figure 1-1; Section 2.1.2). On the west, the Plan Area extends beyond the Los Osos Urban Reserve Line (URL) in order to incorporate the Baywood fine sands ecosystem located within the Morro Dunes Ecological Reserve and the Morro Dunes Natural Preserve (part of Montaña de Oro State Park) that is east of the Morro Sand Spit. The Plan Area was contracted on the northeast to exclude the wetland habitat within Morro Bay State Park. The Plan Area also excludes a small area inside the southern portion of the URL that is outside of the Baywood fine sands ecosystem.

Not all land within the Plan Area will be affected by the Plan's covered activities and conservation program. Notably, State Parks did not identify any activities for permit coverage; State Parks lands will not be managed as part of the Los Osos Preserve System at their request (Section 5.3.3).

1.4 Species to be Covered by the Permit

The LOHCP features four covered species: federal and/or state-listed threatened or endangered species for which the incidental take permit[7] are being requested, to provide coverage for the specified types of covered activities. The covered species were identified through a detailed analysis of the habitat, status, anticipated impacts, and available information for 141 rare species that occur within or near the LOHCP Area (Section 3.2.1).

Covered Species	**Federal Status/State Status**
Morro shoulderband snail (*Helminthoglypta walkeriana*)	Endangered/None
Morro manzanita (*Arctostaphylos morroensis*)	Threatened/None
Morro Bay kangaroo rat (*Dipodomys heermanni morroensis*)	Endangered/Endangered, Fully Protected
Indian Knob mountainbalm (*Eriodictyon altissimum*)	Endangered/Endangered

Coverage for Morro Bay kangaroo rat and Indian Knob mountainbalm is requested only for implementation of the conservation program; specifically, the permit for these species is requested to cover short-term impacts of management and restoration activities that are intended to promote population growth and restore the habitat of these species. Take/impacts of these species due to development and other covered activities will be avoided through implementation of a series of measures identified in the Plan (Section 5.2). Coverage for Morro Bay Kangaroo rat and Indian Knob mountainbalm is only requested for degradation or loss of unoccupied habitat; take of individuals of

[7] "Take" under the federal ESA does not apply to listed plant species. For purposes of the LOHCP and the federal permit, "take" when applied to the covered plant species refers to impacts to the species. In recognition of the conservation measures in the plan to protect the covered plant species, the USFWS will extend "no surprises" assurances to those species.

these two species will be avoided through the Plan's avoidance measures (Section 5.2).

Eight additional state and/or federally-listed species (listed below) that occur within the LOHCP Area are discussed within the Plan but will not be covered by the incidental take permit. These 'additional listed species' did not meet the criteria that were used to identify the Plan's covered species (Section 3.2.3). Most occur within wetland or riparian habitats and will not be affected by the covered activities.

Covered Species	**Federal Status/State Status**
California red-legged frog (*Rana draytonii*)	Threatened/None
California Black Rail (*Laterallus jamaicensis coturniculus*)	None/Threatened
California seablite (*Suaeda californica*)	Endangered/None
Salt marsh bird's beak (*Chloropyron maritimum* ssp*. maritimum*)	Endangered/Endangered
Marsh sandwort (*Arenaria paludicola*)	Endangered/Endangered
South Central CA Coast Steelhead (*Oncorhynchus mykiss irideus*)	Threatened/None
White-tailed kite (*Elanus leucurus*)	None/Fully Protected
Golden Eagle (*Aquila chrysaetos*)	None[8]/Fully Protected

As part of this plan, project proponents will implement measures to avoid impacting these species (Section 5.2.2). If a future project cannot avoid impacts to these or other listed species not covered by the LOHCP, the individual project proponent will be required to obtain permits through a separate process to address take/impacts of the LOHCP covered species permitted through this Plan (Section 6.3.1).

1.5 Regulatory Framework

Though developed primarily to comply with ESA and CESA, the LOHCP was designed to be consistent with other local, state, and federal laws and regulations, in order to streamline permitting and meet the criteria for issuance of the incidental take permit. This section describes consistency of the Plan with the following statutes:

Federal	State
Federal Endangered Species Act	California Endangered Species Act
National Environmental Policy Act	State Fish and Game Code
National Historic Preservation Act	California Environmental Quality Act
	California Coastal Act

[8] Though not listed under ESA, golden eagles receive federal protection through the Bald and Golden Eagle Protection Act.

1.5.1 Federal Regulations

1.5.1.1 Federal Endangered Species Act

Section 9 of the ESA and Federal regulation pursuant to Section 4(d) of the ESA prohibit the take of endangered and threatened animal species, respectively, without special exemption or authorization. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the USFWS to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the USFWS as intentional or negligent actions that create the likelihood of injury to listed species by annoying them to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity.

Pursuant to Section 11(a) and (b) of the ESA, any person who knowingly violates Section 9 of the ESA or any permit, certificate, or regulation related to Section 9, may be subject to civil penalties of up to $25,000 for each violation or criminal penalties up to $50,000 and/or imprisonment of up to one year.

Individuals and State and local agencies proposing an action that is expected to result in the take of federally-listed species are encouraged to apply for an incidental take permit under Section 10(a)(1)(B) of the ESA to be in compliance with the law. Such permits may be issued by the USFWS when take is not the intention of and is incidental to otherwise legal activities. An application for an incidental take permit must be accompanied by a habitat conservation plan, commonly referred to as an HCP. The regulatory standard under Section 10(a)(1)(B) of the ESA is that the effects of authorized incidental take must be minimized and mitigated to the maximum extent practicable. Under Section 10(a)(1)(B) of the ESA, a proposed project also must not appreciably reduce the likelihood of the survival and recovery of the species in the wild, and adequate funding for a plan to minimize and mitigate impacts must be ensured. Section 1.6.1.2 outlines the process of obtaining a Section 10(a)(1)(B) permit.

Section 7 of the ESA requires federal agencies to ensure that their actions, including issuing permits, do not jeopardize the continued existence of listed species or destroy or adversely modify listed species' critical habitat. "Jeopardize the continued existence of…" pursuant to 50 CFR 402.2, means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species. Issuance of an incidental take permit under Section 10(a)(1)(B) of the ESA by the USFWS is a Federal action subject to Section 7 of the ESA. As a federal agency issuing a discretionary permit, the USFWS is required to consult with itself (i.e., conduct an internal consultation). Delivery of the HCP and a Section 10(a)(1)(B) permit application initiates the Section 7 consultation process within the USFWS.

The requirements of Section 7 and Section 10 substantially overlap. Elements unique to Section 7 include analyses of impacts on designated critical habitat, and analyses of cumulative impacts on listed species. Cumulative effects are effects of future state, tribal, local or private actions that are reasonably certain to occur in the action area, pursuant to Section 7(a)(2) of the ESA. The action area is defined by the influence of direct and indirect impacts of covered activities. The action area may or may not be solely contained within the HCP boundary, though in the case of the LOHCP, the action area is the HCP

boundary. These additional analyses are included in this HCP to meet the requirements of Section 7 and to assist the USFWS with its internal consultation.

1.5.1.1.1 The Section 10(a)(1)(B) Process - Habitat Conservation Plan Requirements and Guidelines

The Section 10(a)(1)(B) process for obtaining an ITP has three primary phases: (1) the HCP development phase; (2) the formal permit processing phase; and (3) the post-permit-issuance phase.

During the HCP development phase, the project applicant works with the USFWS to prepare a plan that integrates the proposed project or activity with the protection of listed species. An HCP submitted in support of an ITP application must include the following information:

- Impacts likely to result from the proposed taking of the species for which permit coverage is requested;
- Measures that will be implemented to monitor, minimize, and mitigate impacts; funding that will be made available to undertake such measures; and procedures to deal with unforeseen circumstances;
- Alternative actions considered that would avoid or reduce take; and
- Additional measures the USFWS may require as necessary or appropriate for purposes of the plan.

The HCP development phase concludes, and the permit processing phase begins, when a complete application package is submitted to the appropriate permit-issuing office. A complete application package consists of 1) an HCP, 2) an Implementing Agreement (IA), if applicable, 3) a permit application, and 4) a $100 fee from the applicant, unless exempted under 50 CFR13. The USFWS must also publish a Notice of Availability of the HCP package in the Federal Register to allow for public comment. The USFWS also prepares an Intra-Service Section 7 consultation and a Set of Findings and Recommendations to evaluate the Section 10(a)(1)(B) permit application in the context of permit issuance criteria, which are described below.

The issuance of an ITP is a federal action that triggers USFWS compliance with NEPA. For the LOHCP, the USFWS has prepared an EA (Section 1.5.1.2).

A Section 10(a)(1)(B) incidental take permit is granted upon a determination by the USFWS that all criteria for permit issuance have been met. Statutory criteria for issuance of the permit specify that:

- The taking will be incidental;
- The applicant will, to the maximum extent practicable, minimize and mitigate the impacts of such taking;
- The applicant will ensure that adequate funding for the HCP and procedures to deal with unforeseen circumstances will be provided;
- The taking will not appreciably reduce the likelihood of survival and recovery of the species in the wild; and

- The applicant will ensure that other measures that the USFWS may require as being necessary or appropriate will be provided; and
- The USFWS has received assurances, as may be required, that the HCP will be implemented.

During the post-issuance phase, the Permittee and any other responsible entities implement the HCP, and the USFWS monitors compliance with the HCP as well as the long-term progress and success of the HCP.

1.5.1.2 National Environmental Policy Act

The purpose of the National Environmental Policy Act (NEPA) is two-fold: to ensure that federal agencies examine the environmental impacts of their actions and assess possible alternatives, and to solicit public input on this analysis through circulation of the appropriate NEPA document, which could be an EAS, an EA or an EIS.

Issuance of an incidental take permit under section 10(a)(1)(B) of the ESA constitutes a federal action requiring compliance with the National Environmental Policy Act (NEPA). In order to ensure NEPA compliance, the USFWS prepared an Environmental Assessment (EA) to address issuance of an incidental take permit associated with the LOHCP

1.5.1.3 National Historic Preservation Act

Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended (16 U.S.C. 470 et seq.), requires federal agencies to take into account the effects of their actions proposed on properties eligible for inclusion in the National Register of Historic Places. Properties include prehistoric and historic sites, buildings, and structures that are listed on, or meet the criteria for listing on, the National Register of Historic Places.

The issuance of an incidental take permit by the USFWS is an undertaking subject to Section 106 of the NHPA. The NHPA and the potential effects of implementation of the Plan on resources subject to the NHPA are discussed in the EA prepared for the LOHCP.

1.5.2 Regulations of the State of California

1.5.2.1 California Endangered Species Act

The California Endangered Species Act prohibits take of species listed as threatened, endangered or candidate by the California Fish and Game Commission, including birds, mammals, fish, amphibians, reptiles, and plants; invertebrates cannot be designated as threatened or endangered (CESA Section 2080). In CESA, take is defined as any action or attempt to hunt, pursue, catch, capture, or kill a listed species; take does not include loss or degradation of habitat alone or the impacts of the taking.

Like ESA, CESA allows exceptions to the prohibition for take that occurs during otherwise lawful activities. As described in Section 2081 of the California Fish and Game Code, incidental take of state-listed species may be authorized if an applicant submits an approved plan that minimizes and fully mitigates the impacts of take.

Morro shoulderband snail and Morro manzanita are not listed under CESA; however, Morro Bay kangaroo rat and the Indian Knob mountainbalm are state-listed species. The HCP requires pre-project surveys and other measures to avoid take of Morro Bay kangaroo rat and Indian Knob mountainbalm individuals (Section 5.2.1, Section F.1) and thus take as defined under CESA, which is not as inclusive as the definition under ESA; therefore, the County is not requesting a 2081 permit.

Should any restoration and management actions implemented as part of the conservation program to promote population growth of Indian Knob mountainbalm be determined to potentially cause take of individuals as defined under the state act, the County will first obtain a separate permit from the state, such as a state recovery permit issued pursuant Section 2081(a) of CESA. The USFWS would also need to reinitiate consultation on the ITP since the analysis based on the Plan would not have included these impacts. An amendment to the Plan might also be needed.

1.5.2.2 Other Regulations in the California Fish and Game Code

The California Fish and Game Code (FGC) contains additional regulations designed to protect native species.

1.5.2.2.1 California Fully Protected Species

Prior to the passage of CESA, the California legislature identified species to be protected under the FGC. These 37 fully-protected species are given protection under four separate sections for birds (Section 3511), fish (Section 5515), mammals (Section 4700), and reptiles and amphibian (Section 5050). Fully-protected species may not be taken or possessed at any time. Licenses or permits issued for their "take" are limited to collecting for necessary scientific research, including efforts to recover the species.

To comply with Section 4700 of the FGC, this Plan includes measures that must be implemented to avoid impacts to the Morro Bay kangaroo rat, a fully-protected species (Section 5.2).

1.5.2.2.2 Bird Nests

Section 3503 of the FGC also makes it unlawful to take, possess, or needlessly destroy the nests or eggs of any bird, except as permitted by the CDFW. This Plan contains measures to avoid take of bird nests (Section 5.2.3).

1.5.2.2.3 Birds of Prey

Section 3503.5 of the FGC prohibits take, possession, or destruction of birds of prey or their nests or eggs. The CDFW may issue permits authorizing such impacts. The Plan measures are designed to avoid take of birds of prey, including golden eagle and white-tailed kite, which are fully-protected species, as well as other birds of prey that occur in the region, including peregrine falcon (*Falco peregrinus anatum*) and Cooper's hawk (*Accipiter cooperii*).

1.5.2.3 California Environmental Quality Act

The California Environmental Quality Act (CEQA) (Public Resources Code §21000 et seq.) requires State and local government agencies to complete an environmental review of most projects that could impact environmental resources. It also requires that the environmental impacts identified be reduced to a less-

than-significant level through avoidance, minimization, and mitigation measures unless overriding considerations are identified that make it infeasible to mitigate the impacts or conduct an alternative project.

In adopting the Plan, the County is responsible for conducting the environmental review and ensuring compliance with CEQA. To comply with CEQA, the County acted as the lead agency and prepared an environmental impact report (EIR) and CDFW participated as the responsible agency.

The draft EIR is designed to provide programmatic compliance with CEQA for Plan covered activities. However, each development application must be considered separately for compliance with CEQA. The receipt of an incidental take permit does not in itself ensure compliance with CEQA, as there may be the potential for other significant environmental impacts related to other resources, depending on the size, type, and location of the proposal. If a discretionary project needs to complete an environmental document, as defined under CEQA, appropriate mitigation will need to be determined. The LOHCP may provide appropriate mitigation, but this will be decided on a case-by-case basis.

1.5.2.4 California Coastal Act of 1976

One of the primary objectives of the California Coastal Act is to preserve, protect, and enhance environmentally sensitive habitat areas (ESHA). Section 30107.5 of the Coastal Act defines an "Environmentally Sensitive Area" as:

> Any area in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and which could be easily disturbed or degraded by human activities and developments.

The following sections of the California Coastal Act provide guidance for resource protection:

- Section 30240 prohibits any significant disruption of habitat values, and limits development within ESHA to uses that are dependent on the resources. It also requires development adjacent to ESHA be sited and designed to prevent significant degradation and be compatible with the continuance of the habitat.
- Section 30250(a) directs new residential, commercial, or industrial development to existing developed areas. Where developed areas cannot accommodate new development, it is to be located in other areas where it will not have significant adverse effects, either individually or cumulatively, on coastal resources.

The presence of underlying Baywood fine sand substrate alone does not make all of Los Osos an ESHA (County of San Luis Obispo 2015). Instead, the draft Los Osos Community Plan identifies land between the Los Osos Urban Services Line (USL) and the Urban Reserve Line (URL) as ESHA (County of San Luis Obispo 2015). Although the area within the USL may contain Baywood fine sand and may contain individual endangered species, it does not meet the key elements of the definition of ESHA: the area is generally disturbed and degraded (not pristine), remaining habitat is greatly fragmented, and thus the area is not especially valuable for species persistence (County of San Luis Obispo 2015). In contrast, the area outside of the USL is largely intact, significantly less degraded, and it contains habitat that is especially valuable for long-term persistence.

The LOHCP goals and objectives are consistent with the Coastal Act and the San Luis Obispo County LCP, which implements the Coastal Act for Los Osos. The Plan contains avoidance, minimization, and mitigation measures that will protect the sensitive species and their habitats including ESHA (Section 5.2). Any updates to the LCP will ensure that it is consistent with the LOHCP.

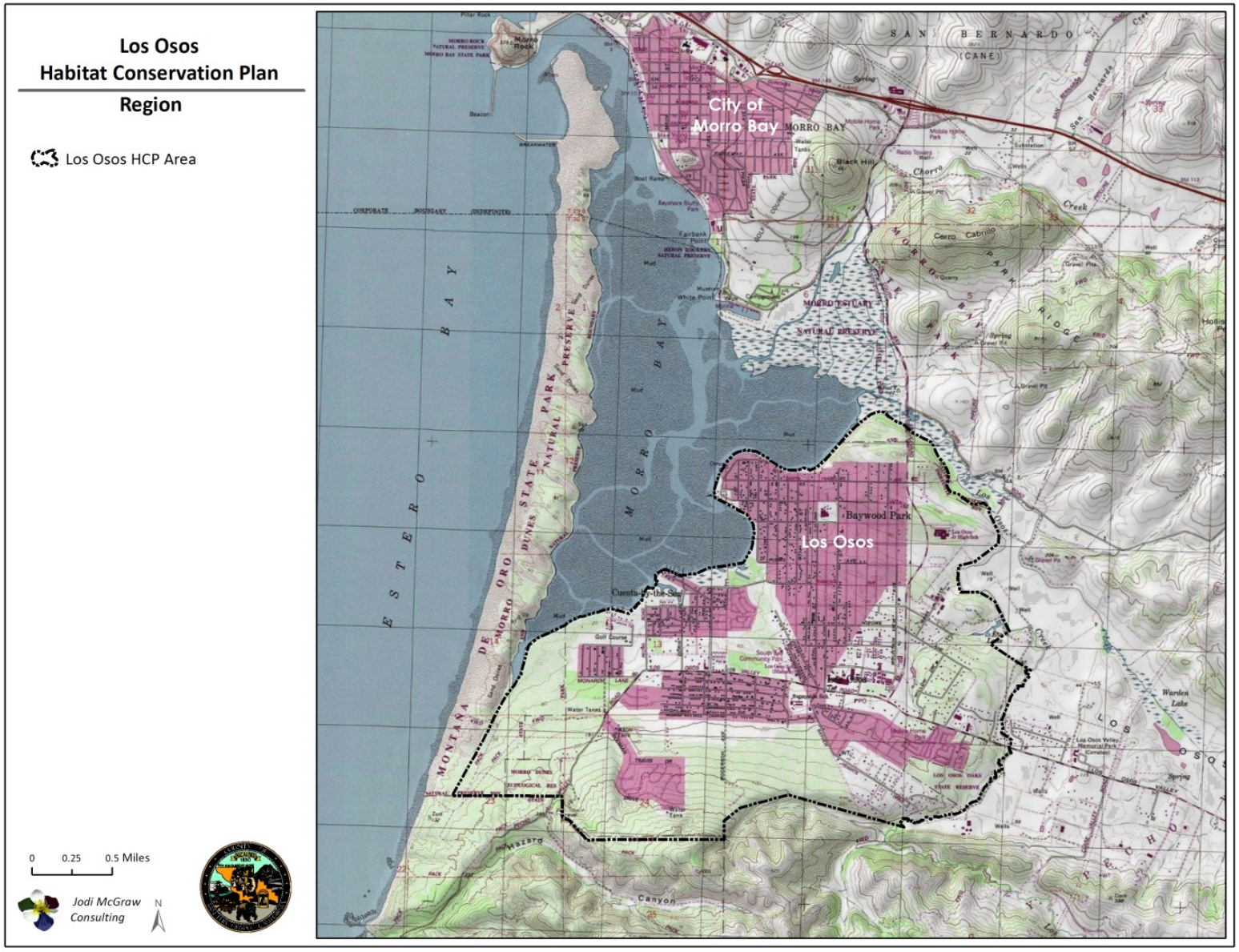

Figure 1-1: Plan Region



Figure 1-2: Los Osos HCP Plan Area

2 Land Use and Covered Activities

This chapter describes land use in the LOHCP area, including the existing development (Section 2.1.1) as well as current policies under the Estero Area Plan (Section 2.1.2). It then describes the conservation lands, including parks, reserves, and easements, and their current management (Section 2.1.3). This information provides the context for the activities that will be covered under the incidental take permit (Section 2.2). The impacts of these covered activities on the covered species are described in Chapter 4.

2.1 Land Use and Conservation

The LOHCP features a mix of land uses that include relatively dense residential and commercial development in the center and northern portion of the Plan Area, with sparse residential development, limited agricultural use, and conservation lands on the perimeter of the community. The existing and planned land use patterns informed development of the Plan's conservation program, specifically the design of the Preserve System (Section 5.3), provided the basis for identifying the Plan's covered activities.

2.1.1 Existing Land Use

Los Osos is an unincorporated community of nearly 15,000 people. It has been characterized as a 'bedroom community'' as 75% of those who live there are employed elsewhere (County of San Luis Obispo 2015).

A large portion of Los Osos was subdivided into small lots in the early part of the twentieth century. The 3,644-acre LOHCP Area features 6,032 assessors' parcels. The following outlines the general parcel status (Table 2-1, Figure 2-1):

1. **Developed**: 1,525 acres (48.3%) of the Plan Area is held within 5,290 parcels that have been partially or entirely built up for residential and commercial uses and public facilities;
2. **Undeveloped:** 705 acres (22.3%) of the Plan Area is within 701 parcels that are undeveloped or largely undeveloped, in that they feature limited improvements. This category also includes parcels that are in cultivation.
3. **Protected:** 925 acres (29.3%) of the Plan Area are within parks, reserve, or other open space or conservation areas managed, at least in part, for natural resource protection. An additional 23.7 acres within the Plan Area are privately held but protected via open space easements: legal agreements that restrict development, though may not allow active management.

Within the Plan Area, the land use pattern varies, particularly with respect to the Urban Services Line (USL) which demarks the Urban-Rural boundary in the Local Coastal Plan (County of San Luis Obispo 2015). The area inside of the USL contains more than 95% of the LOHCP Area parcels (5,744), though it represents just 48% (1,509 acres) of the area of land contained within parcels in the Plan Area (Table 2-1). Parcels within the USL are small (average is 0.26 acres, median is 0.14 acres) and the majority (88%) are already developed. Most are residential, though the USL contains all of the land in the LOHCP Area that is designated for commercial use and contains most of the existing commercial development including the central business district (Figure 2-2).

While the majority of the area within the USL is built up, this area also contains eight vacant parcels of greater than five acres each and that total 104 acres (Figure 2-1). These parcels generally feature stands of exotic trees (e.g., eucalyptus) or coastal sage scrub habitat that has been degraded by land use including vegetation clearing (e.g., mowing); while such habitat can be restored (Section 3.1.5.1), its location with respect to development reduces its long-term conservation value (Section 5.3.1.2)

In contrast, 50% of the Plan Area located outside of the USL is permanently protected from development, with an additional 388 acres (12.3%) in 45 vacant, unprotected private parcels (Figure 2-1). Of these, 14 parcels are greater than 5 acres and total 343 acres, much of which is adjacent to existing protected land. Many of these undeveloped parcels support coastal sage scrub, central maritime chaparral, and coast live oak woodlands that are relatively intact and contiguous with similar native communities outside of the Plan Area, particularly to the west, south, and east. The notable exceptions include a few large parcels that are used for row crop agriculture, with the remaining development parcels outside of the USL zoned for residential use.

2.1.2 Land Use Policies, Designations, and Development Patterns

Land use within Los Osos Urban Reserve Line (including the USL) is governed by the County of San Luis Obispo, through implementation of the Estero Area Plan, a component of the County General Plan and Local Coastal Program. Adopted in 1988, the Estero Area Plan was updated for the community of Cayucos and the rural portions (areas outside of the urban reserve lines) in 2009 (County of San Luis Obispo 2009).

A key objective of the Estero Area Plan is to protect agriculture, open space, and sensitive resources, including ground water supplies, in part by focusing future development within the Los Osos, Morro Bay, and Cayucos urban reserve lines (County of San Luis Obispo 2009). The Estero Area Plan identifies numerous sensitive resource areas (SRAs) within the Los Osos URL including: Los Osos Dune Sands Habitat, Morro Bay kangaroo rat habitat, Los Osos Oaks State Reserve, Hazard Canyon and Vicinity, and the pygmy oaks within the 86-acre Los Osos Oaks State Natural Reserve (County of San Luis Obispo 2009). The Sensitive habitats program in the Estero Area Plan calls for protection and management of sensitive habitat, including areas that support threatened and endangered species, include a range of vegetation types, are sufficiently large to support ecosystem processes, include buffer areas that separate habitat from incompatible uses, and include continuous wildlife corridors. Strategies for protecting land include encouraging acquisition of fee title or conservation easements by public agencies or conservation organizations and obtaining easements in connection with development projects (County of San Luis Obispo 2009).

Within the Los Osos URL, land use designations typically focus future commercial and residential development largely inside the USL; this infill development approach is designed to aid preservation of a green belt around Los Osos. Table 2-2 and Figure 2-2 illustrate the land use designations and acreage under the Estero Area Plan. Of the approximately 3,150 acres located in parcels within the LOHCP Area, 229 acres (7.3 %) are designated for commercial and multifamily residential uses. These are focused within the center of the Plan Area. A total of 2,318 (73.6%) are designated for single-family residential development. The remaining 19.1% of the Plan Area is designated for recreation (328 acres), open space (122 acres), and public facilities (66), while 87 acres (3%) were not certified as part of the Estero Area Plan (i.e., are ‘white holed’).

2.1.2.1 Changes Since the 1988 Plan Was Adopted

Since the Estero Area Plan land use designations were adopted in 1988, development within Los Osos has been limited. In January 1988, the Regional Water Quality Control Board established a discharge moratorium to protect water quality in the aquifer underlying the community and in the Morro Bay Estuary, which was being degraded by the thousands of individual septic systems in the Plan Area. This moratorium prohibited the County from issuing permits for new on-site sewage disposal (septic) systems within a 1,584-acre prohibition area in the center of Los Osos. It halted most new construction or major expansion of existing development until a new wastewater system (sewer) is operational.

During the more than 25-year period in which the moratorium has been in effect, increasing recognition of the high biodiversity conservation value of intact habitat within the Los Osos area led local, state, and federal agencies and non-profit organizations to collaborate on several habitat protection projects. Working with willing sellers, the conservation agencies and organizations protected 451 acres of land designated for rural, suburban, or single-family residential development, 84 acres that were not designated (i.e., were 'white holed'), and an additional 12 acres designated for commercial or multifamily residential development (Table 2-3). Combined with other lands zoned for parks, recreation, and open space, the conservation lands in the Plan Area total 948 acres (Table 2-4, Figure 2-3).

2.1.2.2 Anticipated Future Development

In 2016, the County completed construction of a wastewater treatment facility that will service 5,147 parcels within a 1,584-acre wastewater service area in the center of Los Osos that contains the highest density of development (Figure 2-2). Most existing parcels are hooked up to the system. Once the Los Osos Community Plan is approved by the Board of Supervisors and certified by the Coastal Commission, new development can proceed within the service area, which features 579 vacant, unprotected parcels totaling 260 acres; some of the larger parcels have existing approvals to be subdivided. The 882 parcels located outside of the sewer service area will continue to utilize septic systems for on-site sewage treatment and disposal. This area features 122 vacant, unprotected parcels totaling 445 acres that are within one of three land-use categories intended for single-family development. These categories are collectively referred to in this plan as Single-Family Residential.

Future development in Los Osos may be constrained by water issues. As part of the adjudication process, the County and the water purveyors in the region, the LOCSD, Golden State Water, and S&T Mutual Water Company, developed a management plan for the Los Osos groundwater basin to address saltwater intrusion resulting from overdraft and thus develop a sustainable water supply (County et al. 2015). Adopted in October 2015, the basin management plan includes a series of measures to reduce water use and increase the sustainable yield of the basin as part of a coordinated strategy to reduce overdraft.

2.1.3 Existing Protected Lands and Open Space Easements

Within the 3,644-acre LOHCP Area, 948 acres (26%) are protected from development (Table 2-4, Figure 2-3). These lands include 925 acres within a state ecological reserve, state parks, County parks and open space, and other land owned by other government agencies and nonprofit organizations. These lands are managed, at least in part, for natural resource conservation and biodiversity protection, and exclude small parks that are largely built-up, such as the 6.8-acre Los Osos Community Park.

An additional 24 acres within the Plan Area are protected by open space easements granted by landowners to the County pursuant the California Open Space Easement Act of 1974 (Government Code Sections 51070 through 51097; Table 2-4). These conservation measures restrict, in perpetuity, development and other uses including agricultural development, grading, vegetation removal, landscaping, hardscaping (i.e., paving).

Collectively, these public and private are referred to as 'protected' in this Plan. They will not be targeted for acquisition to protect habitat in the LOHCP Conservation Program. Selected existing protected parks and ecological reserves that contain intact habitat that is of the greatest long-term conservation value for the rare and endangered species in the Bayview fine sands ecosystem will be subject to restoration and enhanced habitat management to promote recovery of the endangered species (Section 5.3.1).

The LOHCP Area adjoins approximately 12,000 acres of protected land and water located outside of the Plan Area (Figure 2-3):

- **Montaña de Oro State Park:** an 8,396-acre park south and west of the LOHCP Area;
- **Morro Bay State Park**: approximately 2,300 acres of this state park, which is partially within the LOHCP area, is located north of the Plan Area;
- **Morro Bay Wildlife Area:** a 1,307-acre area containing most of the Morro Bay estuary, which is managed by CDFW and is located north of the LOHCP Area; and
- **Los Osos Creek Wetlands:** an approximately 120-acre conservation easement located northeast of the LOHCP Area, which is held by the United States Natural Resource Conservation Service.

Though these adjacent protected lands do not feature the Baywood fine sands ecosystem, effective conservation and management of their other upland and wetland ecosystems can promote effective conservation within the LOCHP Area. Specifically, they can buffer lands that are protected, managed, and restored as part of the LOHCP Conservation Program against the indirect effects of more intensive land uses (e.g., development or agriculture).

The following sections describe the protected lands that are within the LOHCP Area, according to their owner and managing agency, to provide information about land use in the area and as context for the LOHCP Conservation Program. The lands targeted for inclusion in the LOHCP Preserve System, which will be established to mitigate the impacts of the covered activities, are identified in Section 5.3.3.1.

2.1.3.1 County of San Luis Obispo

Within the Plan Area, the County owns seven parcels totaling 142 acres that feature parks and open space (Table 2-4, Figure 2-3).

2.1.3.1.1 Division of Parks and Recreation

The County of San Luis Obispo Division of Parks and Recreation (County Parks) manages two properties: the 14-acre Monarch Grove Natural Area, which features a blue gum (*Eucalyptus globulus*) grove, and the 34-acre County-owned portion of the Elfin Forest Natural Preserve, which supports coastal sage scrub, central maritime chaparral, and pygmy coast live oak woodland plant communities.
The mission of County Parks is to ensure personal enrichment of the County's residents and visitors while protecting it's natural, cultural, and historical resources. The Elfin Forest is managed as part of a

93-acre natural area, which includes 59 acres of state-owned land. Currently, Small Wilderness Area Preservation (SWAP), a local non-profit conservation organization that helped protect the land, works with the landowners to manage the Natural Area as part of an "Adopt-A-Park" agreement. Through the 10-year, renewable agreement, that was last extended in 2014, the all-volunteer organization provides docent-led interpretive hikes on the trails, which include a raised boardwalk, and conducts habitat maintenance activities including: native plant revegetation, weed management, erosion control, and trail maintenance activities, such as vegetation trimming, boardwalk repair, and installing deterrents for non-designated trails.

The Monarch Grove Natural Area is managed by County Parks for passive recreational use, including hiking and equestrian use. It mostly serves as an access route to reach the adjacent Montaña de Oro State Park. Management includes trail and fence maintenance, litter removal, and twice-yearly vegetation management for fuel reduction.

The County also owns the 6.8-acre Los Osos Community Park, which is managed by County Parks. This largely-developed park features tennis courts, a playground, a skate park, bathrooms, and picnic areas. The approximately 1.6 acres of open space north of the park is slated to be developed as part of a park expansion outlined in the County General Plan (Section 2.2.5.2). Therefore, this park was not included in the list of conservation lands (Table 2-4).

Of the County-owned lands, only a small portion of the Monarch Grove Natural Area was identified as suitable for inclusion in the LOHCP Preserve System, which will be used to mitigate the impacts of the covered activities on the covered species (Section 5.3.3.1). The LOHCP Implementing Entity will evaluate opportunities to coordinate management of other County lands within the LOHCP Preserve System and other protected lands, to maximize effectiveness of the conservation program for the covered species (Section 5.3.3.1).

2.1.3.1.2 Department of Public Works and Transportation

The Department of Public Works and Transportation (County Public Works) manages two open space properties: the 82-acre Broderson Site and the 12-acre Midtown site. These properties feature coastal sage scrub, central maritime chaparral, and coast live oak woodland plant communities that have been degraded in places due to prior land use. They were partially developed as part of the Los Osos Wastewater Project and feature a leach field (Broderson) and pump station (Midtown).

The temporarily disturbed areas are being actively restored and will be permanently protected via conservation easements or deed restrictions, revegetated to address the impacts caused by facilities development as well as the existing habitat degradation, and then actively managed to protect the rare species and natural communities of the LOHCP Area, including the covered species (SWCA 2012). The County currently holds the properties but intends to transfer the 73-acre portion of the Broderson property that is used for mitigation to a land conservation and management agency or organization (County 2012). Because this site is already serving as mitigation for the LOWPP, it will not be considered for incorporation within the LOHCP Preserve System; however, the LOHCP Implementing Entity will evaluate opportunities to coordinate management of the LOHCP Preserve System with other protected lands to maximize effectiveness of the conservation program (Section 5.3.3.1)

2.1.3.2 California Department of Fish and Wildlife Properties

2.1.3.2.1 Morro Dunes Ecological Reserve

The California Department of Fish and Wildlife (CDFW) owns and manages the 279-acre Morro Dunes Ecological Reserve (MDER). Located in the south-central portion of the LOHCP Area, the 230-acre Bayview Unit of MDER supports a mosaic of coastal sage scrub, central maritime chaparral, and coast live oak woodland, and features populations of, or habitat for, all four covered species. The remainder of MDER is in a disjunct 48-acre parcel located in the southwest portion of the Plan Area (Figure 2-3); it supports coastal sage scrub and central maritime chaparral that provides suitable habitat for the Morro Bay kangaroo rat and populations of Morro shoulderband snail and Morro manzanita.

Ecological reserves are established under California law to protect rare, threatened or endangered native plants, wildlife, aquatic organisms and specialized terrestrial or aquatic habitat types (Fish and Game Code 1580). They are managed to conserve biodiversity, while providing opportunities for education, research, and compatible recreation, as outlined in the California Code of Regulations Title 14, Chapter 11, Section 630. A management plan was prepared for the MDER in 1982, when it featured only the 48-acre Pecho Unit located west of Pecho Valley Road (CDFW 1982). Appendix G lists the management recommendations identified in the plan.

2.1.3.2.2 Morro Bay Wildlife Area

The CDFW manages the Morro Bay Wildlife Area, a 1,307-acre estuarine (i.e., largely inundated) area. The approximate four acre-portion of this area that is mapped within the LOHCP Area supports wetland and adjacent upland communities. However, this sliver of land likely reflects mapping imprecision in the spatial data layers used to assess protected lands for the LOHCP, as the wildlife area is, by definition, below the median high tide line and therefore located north of the LOHCP Plan Area.

State wildlife areas are established primarily for wildlife conservation and providing opportunities for compatible recreation, including hunting and wildlife viewing (Fish and Game Code 1525-1530). The wildlife area is managed pursuant the California Code of Regulations Title 14, Chapter 8, Sections 550, 551, and 553.

2.1.3.3 California Department of Parks and Recreation Properties

The California Department of Parks and Recreation (State Parks) is responsible for 21 parcels (447 acres) of land within the LOHCP Area. This land is managed by the San Luis Obispo Coast District as part of four parks or reserve units (Table 2-4, Figure 2-3). State Parks is governed under Sections 500-514 of the State Public Resources Code. Their natural resource mission is to acquire, protect, restore, maintain, and sustain outstanding and representative examples of California's natural and scenic values for the benefit of present and future generations. Management activities include habitat restoration, prescribed fire management, corrective and ongoing maintenance, and monitoring.

State Parks declined to have its lands evaluated for inclusion in the LOHCP Preserve System, which will be used to mitigate the impacts of the covered activities on the covered species. However, the LOHCP Implementing Entity will evaluate opportunities to coordinate management of the LOHCP Preserve

System with other protected lands including State Parks, to maximize effectiveness of the conservation program for the covered species (Section 5.3.3.1).

2.1.3.3.1 Morro Bay State Park

The LOHCP Area includes part of Morro Bay State Park—an approximately 2,400-acre park located east of Morro Bay. The southernmost 90 acres of the park located within the northeastern corner of the LOHCP Area primarily support coastal sage scrub and coast live oak woodland, with areas of riparian and wetland vegetation occurring along Los Osos Creek. No existing, authorized trails or facilities occur within the portion of the park within the LOHCP Area.

2.1.3.3.2 Los Osos Oaks State Natural Reserve

Located in the southeastern portion of the LOHCP Area, the 86-acre Los Osos Oaks State Natural Reserve primarily supports a mosaic of coastal sage scrub (24 acres) and coast live oak woodland (60 acres), which features old-growth coast live oaks. The oaks support diverse assemblage of lichens, including splitting yarn lichen (*Sulcaria isidifera*), which is endemic to the area.

2.1.3.3.3 Montaña de Oro State Park

The western portion of the LOHCP Area features five parcels totaling 236 acres that are managed as part of Montaña de Oro State Park: a nearly 8,400-acre park that wraps around the western and southern portions of the Plan Area. Within the LOHCP Area, the park incudes parcels managed as part of the Morro Dunes Nature Preserve. They primarily support coastal sage scrub (185 acres) and central maritime chaparral communities (47 acres). The parcels feature five hiking and equestrian trails totaling 3.5 miles that provide beach access from Pecho Valley Road. The park's main facilities including campground and picnic areas are located south of the LOHCP Area.

2.1.3.3.4 Elfin Forest Natural Preserve

Within the LOHCP Area, the State of California owns four parcels totaling 35 acres that are managed as part of the 90-acre Elfin Forest Natural Preserve, which also features County-owned parcels and is managed by SWAP (Section 2.2.3.1). This property primarily supports coast live oak woodland (32 acres) but also features a small area of central maritime chaparral communities (2.1 acres).

2.1.3.4 Bureau of Land Management Property

The Bureau of Land Management (BLM) owns and manages one five-acre parcel that supports coastal sage scrub and is contiguous with Morro Bay State Park in the northeast corner of the Plan Area (Figure 2-3). The parcel was designated as an Area of Critical Environmental Concern (ACEC) in the Resource Management Plan for the Bakersfield Office (BLM 2014).

The goal of management in this area is to protect and preserve important cultural resources, natural systems and processes, and habitat for listed species. The objectives are to:

1. Protect significant cultural resources from damage and degradation;

2. Maintain rare and endemic plant communities including coastal dune scrub, central maritime chaparral, and pygmy oak forest; and

3. Ensure no net loss of associated habitat for special status plants and animals

This designation provides for the following special management:

- excludes rights-of-ways related to utility scale renewable energy projects;
- excludes livestock grazing;
- prohibits campfires and overnight camping;
- prohibits off-highway vehicles, mechanized use, equestrian use, and cross-country travel by pedestrians;
- requires pets to be leashed (maximum eight-foot length) at all times and removal of pet fecal matter by owners or handlers;
- prohibits air-soft and paintball activities, including organized games and casual use of these types of equipment; and
- prohibits the casual collection of plants or their parts without BLM authorization.

The BLM parcel is federal land and, as such, activities thereon cannot be included for take coverage as part of the LOHCP including the conservation program (Section 5.3.3.1). However, the LOHCP Implementing Entity will evaluate opportunities to coordinate management of the LOHCP Preserve System with the BLM, where appropriate, to maximize effectiveness of the conservation program for the covered species (Section 5.3.3.1).

2.1.3.5 Morro Coast Audubon Society

The Morro Coast Audubon Society (MCAS) owns three parcels that comprise the Sweet Springs Nature Preserve (29.4 acres), which is located on Morro Bay in the north-central part of the Plan Area (Figure 2-3). Protected by an easement held by the State Coastal Conservancy, the preserve primarily supports wetlands (28 acres) and riparian areas (0.3 acres) along the estuary as well as upland habitat featuring a mosaic of exotic trees (0.6 acres) and degraded coastal sage scrub (0.1 acres). It features hiking trails and is used for bird watching, nature study, and community outreach efforts. In 2011, MCAS prepared a *Morro Shoulderband Snail Recovery Action Plan for the Sweet Springs Nature Preserve* (SWCA 2011) to guide restoration and management of the Preserve and promote recovery of the Morro shoulderband snail.

The MCAS has two additional conserved parcels totaling 1.15 acres: a 0.92-acre parcel near Cuesta Inlet that has an easement held by the State Coastal Conservancy and a 0.23-acre parcel on the northern border of the Planning Area, which is protected from development via deed restrictions. These parcels primarily support disturbed wetlands (0.05 acres) and landscape trees (0.9 acres).

The mission of the MCAS, a volunteer-based organization that is a part of the non-profit network the National Audubon Society, is to promote the appreciation, conservation, and restoration of ecosystems, focusing on the biological diversity of birds, other wildlife, and their habitats, particularly in San Luis Obispo County.

The MCAS lands are being managed by the MCA and were not considered for inclusion in the LOHCP Preserve System. However, the LOHCP Implementing Entity will evaluate opportunities to coordinate management of the LOHCP Preserve System with the MCAS, where appropriate, to maximize effectiveness of the conservation program for the covered species (Section 5.3.3.1).

2.1.3.6 Conservation and Open Space Easements

Within the LOHCP Area, 23.7 acres on 15 parcels are protected through conservation easements voluntarily granted by private landowners to the County. Located primarily in the outer portion of the Plan Area, these easements restrict development in areas ranging in size from less than 0.1 acres to nearly five acres. They occur on vacant parcels as well as undeveloped portions of residential parcels. Collectively, the easements protect a mosaic of riparian communities (7.7 acres) as well as upland communities including central maritime chaparral (6.4 acres), coastal sage scrub (6.3 acres), and coast live oak woodlands (1.1 acres). While most are not actively managed for habitat values, the easements may prohibit activities that can degrade habitat, such as planting exotic and ornamental plants, and vegetation clearing. While not considered for incorporation as part of the LOHCP Preserve System, these easement lands can help buffer and protect habitat in other protected lands and the LOHCP Implementing Entity will evaluate opportunities to coordinate management with private landowners where doing so can promote the goals and objectives of the LOHCP

2.2 Activities Covered by Permit

Covered Activities are actions for which the County is seeking incidental take permit coverage, and for which the LOHCP identifies avoidance, minimization, and mitigation measures. The covered activities include one-time actions occurring in discrete locations, such as capital improvements (e.g., expanding the library), as well as ongoing actions that occur broadly within the Plan Area, such as mowing road medians.

This section discusses the criteria and methods that were used to identify covered activities, and then outlines the LOHCP covered activities. The final section of this chapter lists activities that will not be covered by the permit requested as part of the LOHCP.

2.2.1 Covered Activity Selection Criteria and Methods

As described in the *Habitat Conservation Planning Handbook* (USFWS and NMFS 2016), covered activities are actions within the Plan Area that: (1) are likely to result in incidental take of the covered species; (2) are reasonably certain to occur over the life of the permit; and (3) are controlled by the applicant(s) to some extent. Based on this guidance, and in consideration of the LOHCP goals, the following criteria were established for covered activities in the LOHCP:

1. **Location:** the activity will occur within the 3,644-acre LOHCP Area (Figure 2-1);
2. **Timing:** the activity will or is likely to occur during the 25-year period of the take permit;
3. **Entity:** the activity is conducted by the County of San Luis Obispo, is subject to the County's jurisdiction as the local land use authority, or is otherwise conducted under contract with the County of the Implementing Entity (which contracts with the County);
4. **Impact:** the otherwise-lawful activity has the potential to result in incidental take or impacts to one or more of the covered species by causing ground disturbance, which includes any activity

that removes vegetation or compacts or displaces soil not covered by existing impervious surfaces (Section 1.4);

5. **Addressed:** the effects of the taking or impacts of the covered activity were evaluated and addressed as part of the plan (Chapter 4); and
6. **Goals:** the activity will not prevent achievement of the biological goals and objectives of the LOHCP (Section 5.1).

To determine activities meeting these criteria, the County worked internally, as well as with landowners, agencies, and organizations, to identify the general types of activities, as well as specific projects that would occur in the LOHCP Area during the next 25 years and would benefit from take coverage. The County circulated to agencies and organizations a LOHCP fact sheet, which provided potential project proponents including landowners and land management entities with information about the HCP, and an activity worksheet designed to obtain information about anticipated covered activities, including their location, timing, frequency and size. This information was synthesized to identify the covered activities outlined in this chapter, and to assess their potential impacts to covered species (Chapter 4).

2.2.2 Anticipated Project Proponents

The following entities are anticipated to conduct activities that will be covered under the LOHCP incidental take permit.

Private property owners: Owners of private land within the LOHCP Area conducting residential and commercial development projects that are eligible for coverage under the LOHCP permit, and who choose to participate in this voluntary program; their projects will be permitted by the County through the local land use and building application procedures.
County of San Luis Obispo: three separate County departments are anticipated to conduct covered activities:

- Department of Public Works and Transportation (Public Works): This department is responsible for construction and maintenance of infrastructure including roads and drainage systems;
- Library Department: This department operates and manages the Los Osos Public Library.
- Parks Department: This department operates and manages parks, open space, and recreation facilities, develops and maintains trails, and conducts recreation programs.

Los Osos Community Services District: The LOHCP Area includes 3,127 acres under the jurisdiction of this local agency, which provides drainage systems, water, parks, recreation, street lighting, solid waste, and fire emergency and rescue response services, and as well as supplies water within an 826-acre service area.

Golden State Water Company: This private utility company maintains water facilities used to supply water within their approximately 1,569-acre service area in the LOHCP Area.

S & T Mutual Water Company: This private utility company provides water within an approximately 90-acre area near the Sea Pines Golf Course in Los Osos.

California Department of Fish and Wildlife: This state agency manages the 279-acre MDER which is within the LOHCP Area, as well as the 1,307-acre Morro Bay Wildlife Area located adjacent to the LOHCP Area.

Though the BLM owns and manages approximately 5 acres of land in the northeastern portion of the LOHCP Area, take resulting from any activities on this property should be covered through a Section 7 consultation with the USFWS, rather than under a Section 10 incidental take permit; therefore, no BLM activities were included as part of the LOHCP.

Though the California Department of Parks and Recreation (State Parks) manages land within the LOHCP area, State Parks did not identify any covered activities to be included in this plan. Additionally, they elected not to have their land considered for enrollment in the LOHCP Preserve System. As lands within State Parks can influence effectiveness of the LOHCP conservation strategy, the County and the Implementing Entity will coordinate implementation of the LOHCP conservation strategy with State Parks to maximize effectiveness of these regional conservation efforts (Section 5.3.3).
Additional entities may also seek coverage under the LOHCP for projects that meet the covered activity criteria. To receive take coverage, all project proponents must apply to the Implementing Entity, which will coordinate directly with the County Planning and Building Department to process applications for County-permitted projects (Section 6.3).

2.2.3 General Categories of Covered Activities

Four main categories of covered activity were identified through the outreach conducted by the County to prepare the LOHCP:

1. **Private development:** Commercial and residential development and redevelopment (including remodels or additions) on privately-owned legal parcels;
2. **Capital Projects:** Public and private infrastructure development projects, such as building or expanding roads, libraries, parks, and water facilities;
3. **Facilities Operations and Maintenance:** Public and private activities to operate and maintain, including repair and replace, existing facilities, such as roads, drainage basins, water systems, and parks;
4. **Fire Hazard Abatement:** Vegetation modification and other related treatments to reduce the amount and contiguity of fuels to reduce the risk of wildfire, as part of the Community Wildfire Protection Plan (SLOCCFSC 2009); and
5. **Conservation Program Implementation**: Activities conducted to implement the LOHCP conservation program (Chapter 5), including restoration, management, maintenance, and monitoring of habitat preserves used to mitigate the effects of the other covered activities.

The following sections describe the general activities as well as anticipated specific projects, that will be covered by the permit issued based on the LOHCP. Additional projects not listed here can be covered under the incidental take permit. All projects must meet the following requirements:

1. The project must meet the plan's eligibility criteria (Section 2.2.1), as determined by the County or Implementing Entity through review of an application for take coverage (Section 6.3);

2. The project proponent must agree to the terms of the voluntary program, including implementation of the avoidance, minimization, and mitigation measures (Section 5.7); and
3. There must be adequate take coverage remaining under the permit at the time the project application is approved.

2.2.4 Private Development

The LOHCP incidental take permit will cover the impacts of private development activities permitted by the County through both ministerial and discretionary permit processes, as defined in CEQA Guidelines Sections 15369 and 15357. The general types of private activities that will be permitted include:

- **New Construction:** New commercial and residential construction including associated onsite improvements (e.g., driveways, utilities, and storm water control measures) that are part of the development project.
- **Remodels and Reconstruction:** Additions or adjustments to existing commercial and residential buildings and associated onsite infrastructure and facilities that add to the ground surface footprint of the existing development.
- **Defensible Space**: selective vegetation removal in compliance with state law (PRC 4291), which requires property owners to maintain around structures defensible space: an area of reduced flammability materials that will slow the spread of fire and enable firefighters to safely access structures. The defensible space should extend 100 feet or to the property line, whichever is nearer. The first 30 feet should lack flammable vegetation and woodpiles; fuels should be reduced and spaced within the remaining 70 feet.

To be eligible for coverage, activities on private property must:

1. Meet the general covered activities criteria (Section 2.2.1);
2. Conform with the current Estero Area Plan/Los Osos Community Plan standards; and
3. Meet specific eligibility criteria for private development under the LOHCP, which are described below.

2.2.4.1 Private Project Eligibility Criteria

The additional eligibility criteria for private development are based on three factors:

1. **Development Type:** commercial and multifamily residential development are included in one category, while various types of single-family residential development are included in another;
2. **Parcel size**: the size of the parcel in one of several size categories used for planning purposes**;** and
3. **Planning Zone**: location with respect to the Urban Services Line (Figure 2-1).

For single-family residential development, Table 2-5 outlines the eligibility criteria and identifies the number and total acreage of parcels to which they apply. Table 2-6 identifies the acres of habitat within undeveloped parcels that are estimated to be impacted by all new, residential development, while

Table 2-7 estimates the acres of existing developed parcels that can be impacted through redevelopment of all residential parcels.

2.2.4.1.1 Single-Family Residential Development

On the 5,367 parcels totaling 2,362 acres in the Plan Area that are designated Residential Single-Family, Residential Rural, or Residential Suburban in the Estero Area Plan (Table 2-5, Figure 2-2), development can be permitted through the LOHCP. For parcels outside of the USL, development must be contained within maximum disturbance envelopes designed to protect habitat while allowing reasonable use of the land (Table 2-5). These eligibility criteria also apply to 10 unprotected privately-owned parcels within the USL designated for Recreation and Open Space.

The disturbance envelope includes the entire area featuring non-natural elements, including buildings and other facilities (e.g., septic systems) and infrastructure, hardscapes (e.g., driveways and patios), and non-native plantings including cultivated agriculture as well as ornamental plants or other species not native to the Baywood fine sand. The disturbance envelope includes areas of temporary disturbance, such as a corridor in which underground utilities are installed, as well as areas that are permanently covered by project elements. The disturbance envelope also includes the area impacted through creation and maintenance of defensible space. The maximum disturbance envelope applies to remodels and reconstruction, including additions and remodels that disturb additional ground, as well as new construction.

The maximum disturbance envelope was determined based on the parcel size and location with respect to the Urban Services Line, which collectively reflect the general conservation value of the habitat within the parcel (Table 2-5). Parcels cannot be subdivided, unless they have received prior approval. Importantly, a single assessor's parcel may feature more than one legal lot, and in some cases, assessor's parcels do not constitute legal lots for purposes of development. On balance, the number of legal lots approximately equals the number of assessor's parcels.

2.2.4.1.2 Commercial and Multi-Family Residential Development

The LOHCP will also permit development on parcels designated for Commercial Retail, Commercial Service, Office Professional, and Residential Multifamily development. These 621 parcels total just 258 acres (7%) of the LOHCP Area; they are located within the center of the existing developed community (Figure 2-2, Figure 2-4). Located entirely within the USL, these parcels will not be subject to maximum disturbance envelopes. Instead, by focusing future development inside the existing developed area, the LOHCP will minimize the negative effects of the permitted projects on the more intact and viable habitat concentrated on the perimeter of the Plan Area, outside of the USL.

2.2.5 Capital Projects

Infrastructure development projects conducted by public entities, private utility companies, and conservation organizations will be covered by the LOHCP. The following are specific capital projects that are slated to be implemented and will be covered. Figure 2-5 illustrates locations of projects for which there are available spatial data; the precise locations of several projects are unknown. As outlined above, other projects that meet the plan eligibility criteria can also be covered by the LOHCP permit, following approval of an application to the County or Implementing Entity (Section 6.3).

2.2.5.1 County of San Luis Obispo Library Department

During the 25-year term of the requested incidental take permit, the San Luis Obispo County Library plans to expand or relocate the main library building (or demolish the existing library and build a larger library) and add paved parking on the 0.3-acre undeveloped south and west sides of the existing building (Table 2-8). Groundskeeping and other maintenance activities will continue on other portions of this parcel (Section 2.2.6.1).

2.2.5.2 County of San Luis Obispo Division of Parks

The Division of Parks operates and manages parks, open space, trails, and recreation facilities and conducts recreation programs. Parks activities anticipated to occur in the LOHCP Area during the permit term were identified based on the Parks and Recreation Element of the County General Plan (County of San Luis Obispo 2006) and the San Luis Obispo County Coastal Access Guide (County of San Luis Obispo 2007). Table 2-8 lists the anticipated capital projects, which are briefly described below.

Facility Creation or Expansion: The Division of Parks anticipates conducting the following projects to create or expand facilities during the permit term (Table 2-8):

- Los Osos Community Park Expansion: The next phase of the County-approved master plan to expand Los Osos Community Park includes addition of tennis courts, a sand volleyball court, and restrooms in an approximately three-acre undeveloped area north of the existing park facilities.
- New Park: The County anticipates building in Los Osos a new, approximately 10-acre park that would feature facilities including play equipment, courts, fields, buildings, paved parking, and other facilities. Though the precise location is unknown, it will likely occur within the USL, and may be located adjacent to existing parks to provide joint-use opportunities.
- New Aquatic Center: The County anticipates building a new aquatic park, which would feature swimming pools and associated facilities. Though the precise location is unknown, it will likely occur within the USL and is estimated to be three acres in size.
- New Boat Ramp: The County anticipates installing a boat ramp in the back bay to provide access the estuary. The facility is estimated to impact 1.5 acres, with the precise location uncertain. Any impacts to wetland species associated with this project would not be covered by the LOHCP permit (Section 2.2).

Trails and Paths: Parks plans to build 10 multi-use trails ranging in length between 0.1-1.7 miles and totaling 7.8 miles. Located within the road rights-of-way in Los Osos (Figure 2-5), the trails are within the USL, with the exception of the Coastal Trail and the Los Osos Perimeter Trail. Trail areas were estimated based a 15-foot anticipated width and were rounded to the nearest quarter acre (Table 2-8).

Elfin Forest Natural Preserve Projects: Parks has an approved plan to expand the existing boardwalk between the loop and 13th Street. The County also anticipates erecting 5,000 lineal feet of symbolic fencing. These projects are designed to increase accessibility and reduce impacts to habitat by focusing visitor travel on well-defined paths.

Coastal Access: County Parks anticipates creating 14 coastal access points in Los Osos, as outlined in the Coastal Access Guide for San Luis Obispo County (County of San Luis Obispo 2007). These access points generally consist of approximately five-foot-wide trails featuring native soils. Their installation may require some minor vegetation clearing and occasionally, installation of fences and signage.

Of these projects planned by County Parks, only half are anticipated to be conducted during the 25-year permit term. Thus, while all constitute covered activities, the County Parks' projects totaling 65.6 acres were estimated to cause just 32.8 acres of disturbance in the take/impacts assessment (Section 4.1.1.2). Additional impacts from County Parks projects can be covered under the LOHCP provided that projects meet the eligibility criteria for the LOHCP, the impacts do not exceed the maximum permitted amount of 532 acres, and that the project impacts are mitigated as required in the conservation program (Section 5).

2.2.5.3 County of San Luis Obispo Department of Public Works and Transportation

Within the LOHCP Area, County Public Works is responsible for construction and maintenance of infrastructure including roads and drainage systems designed to limit soil run off onto roads, reduce pollutants that reach the estuary, and promote water infiltration. Drainage systems include ditches, detention basins, bioswales, and underground infiltrators.

Importantly, impacts of the Los Osos Wastewater System, including the treatment plant and pipelines, which were constructed by Public Works, are being addressed through a biological opinion (USFWS 2011a) issued under Section 7 of the federal Endangered Species Act. Impacts to state-listed species were avoided, such that a State 2081(b) permit was not required. The following new capital projects will be covered by the LOHCP permit (Table 2-8).

New Roads and Road Expansion: Public Works anticipates extending two roads located within the USL to adjacent arterials. A 1,015-foot extension of Ramona Avenue will connect South Bay Blvd and Fifteenth Street and cause approximately two acres of disturbance within the 85-foot right-of-way. A 686-foot extension of Doris Avenue between Rosina and South Court will cause an estimated 0.7 acres of disturbance within the 45-foot-wide right-of-way (Table 2-8).

During the term of the permit, County Public Works will also expand existing roads to create new lanes, including turn lanes and bike lanes, install signs, and realign the routes. These activities are anticipated to disturb an estimated 33 acres within the designated road right-of-way: 25 acres to build new roads and widen existing roads, and eight acres to install bicycle lanes.

Drainage Infrastructure Installation and Improvements: During the permit term, Public Works plans to create detention basins in seven sites located within the USL (Figure 2-5). The anticipated footprints of four sites are just under 10,000 square feet each, while one is 1.2 acres and another is 7.2 acres; bringing the total to 11.4 acres (Table 2-8). Installing these features entails removing existing vegetation, grading soil to achieve the desired topography, and excavating soil, in places, to install underground devices (e.g., infiltrators). In addition, Public Works will conduct drainage improvements within the County right-of-way and along road shoulders; these improvements are anticipated to impact seven acres.

2.2.5.4 Los Osos Water Purveyors

Water in Los Osos is largely provided by the Los Osos Community Services District (LOCSD), Golden State Water Company (GSW), and S & T Mutual Water Company (S&T); individual, private wells supply properties in rural areas outside of the service areas of the three purveyors (Figure 2-6). The following sections describe capital improvements that will be conducted by the water purveyors that will be covered by the LOHCP permit; facilities operations and maintenance activities of these entities are described in the Section 2.2.6. The future infrastructure projects include projects recommended in the draft basin management plan (County et. al 2013), such as new and expanded water wells, groundwater blending projects, a community nitrate removal facility, pipeline construction, and water main upgrades. These and similar projects identified in the final plan will be covered by the LOHCP permit.

2.2.5.4.1 Los Osos Community Services District

The LOCSD operates water facilities within their approximately 826-acre service area located primarily within the USL (Figure 2-6). The following capital projects anticipated to be completed during the LOHCP permit term were identified for coverage, based on review of the Los Osos Community Services District 2010 Water Master Plan Capital Improvements Update (Wallace Group 2011) and the Basin Management Plan (County et al. 2013), as well as discussions with the LOCSD staff.

Pipeline Projects: The LOCSD plans to install new pipelines and upgrade existing water pipes (two to 16-inch diameter). These pipelines projects are anticipated to affect an approximately 2.6-acre area within the County right-of-way.

Well Decommissioning and Construction: The LOCSD anticipates the following well projects:

- Disconnecting the decommissioned Ferrell Well from their water distribution system; this will likely include upgrading the existing pipeline in the one-acre site.
- Installing a new well, including appurtenances and possibly nitrate removal equipment, within the 0.5-acre 8th Street and El Moro Yard.
- Constructing a new water tank within the 0.11-acre LOCSD parcel at Highland Drive and Alexander Avenue.
- Installing a new expansion well (approximately 0.42-acres) at the north end of Sage Avenue as part of the Basin Management Plan (County et al. 2013).

Nitrate Removal and Blending Projects: The LOCSD anticipates installing a skid-mounted unit to remove high nitrates in the upper aquifer wells by blending with water from the lower aquifer; this facility will likely be located within a 0.01-acre area within the County right-of-way. As part of the Basin Management Plan, the LOCSD will implement a joint project with Golden State Water Company (GSW) to install a community nitrate removal facility within an estimated 0.023-acre area on a GSW-owned parcel (1,000 square feet).

2.2.5.4.2 Golden State Water Company

The Golden State Water Company (GSW) operates water facilities to supply water within its 1,569-acres service area in the LOHCP Area (Figure 2-6). Capital projects anticipated to occur during the permit

term were provided by GSW staff and identified through review of the Basin Management Plan (County et al. 2013).

Pipeline and Blending Projects: To reactivate existing upper aquifer wells, GSW anticipates constructing a pipeline in the County right-of-way to connect their lower aquifer Rosina Well to the upper aquifer Skyline Well, which will occur in an approximate 0.261-acre area. Additionally, to accommodate additional water flow from three expansion wells, the segment of the Los Osos Valley Road water main within an approximately 0.14-acre area near Sea Oaks Drive and Tierra Drive will be upgraded to a 12-inch diameter pipe.

Well Construction: GSW anticipates constructing a new upper aquifer well and a new lower aquifer well, which along with the pipeline to connect them, is estimated to impact an approximately 0.254-acre area; the location of these wells is unknown. Additionally, GSW plans to install a new expansion well south of Los Osos Valley Road in an estimated 0.22-acre area located in the vicinity of the Sunny Oaks Mobile Home Park.

2.2.5.4.3 S & T Mutual Water Company

The S& T Mutual Water Company (S&T) is a corporation that provides water to an approximately 90-acre service area in the Sunset Terrace area around Sea Pines Golf Course in the western portion of the LOHCP Area (Figure 2-6). This private utility company recently installed new water meters for its 199 connections. As described in the Basin Management Plan (County et al. 2013), S&T owns three upper aquifer wells on a parcel that may be developed in the future; if so, S&T will need to construct replacement wells that will occur in an approximately 0.069-acre area (3,000 square feet). Alternatively, S&T could purchase water from either the LOCSD or GSW.

2.2.6 Facilities Operations and Maintenance

The LOHCP also proposes to cover activities conducted by agencies and organizations to operate and maintain existing facilities. This includes the repair or replacement of existing infrastructure such as roads, drainage systems, and water systems, as well as the maintenance of parks and open space.

2.2.6.1 County of San Luis Obispo Library Department

Ongoing operations and maintenance of the Los Osos Library facilities and grounds (e.g., landscaping) within the library parcel and on the perimeter of the adjacent 12-acre parcel also owned by the County may cause impacts that would be covered under the requested permit.

2.2.6.2 County of San Luis Obispo Department of Public Works and Transportation

Road Maintenance: County Public Works maintains 54 miles of roads which are located within the County right-of-way. This 489-acre area is located between assessor's parcels and includes paved and unpaved roads as well as vegetation (Figure 2-5). Existing roads will be maintained by paving and mowing vegetation to maintain visibility and reduce fire risk, which will impact approximately five acres along the road shoulder (Table 2-8).

Drainage Infrastructure Maintenance: County Public Works maintains ten drainage basins inside the USL that total approximately 4.9 acres (Figure 2-5). During the permit term, County Public Works will maintain these as well as the newly installed drainage infrastructure (Section 2.2.2) by removing established vegetation, grading to remove deposited sediment, and excavation, as needed, to repair underground devices.

2.2.6.3 Los Osos Community Services District (LOCSD)

The LOCSD operates and maintains 24 properties, on which it anticipates conducting the following facilities maintenance activities that will be covered under the LOHCP.

Maintain Drainage Basins: The LOCSD maintains five drainage basins that total approximately four acres (Figure 2-5). During the permit term, the LOCSD will maintain these areas approximately annually, by removing established vegetation, grading deposited sediment, and conducting additional excavation to repair underground devices, as needed.

Vegetation Management: The LOCSD conducts fuel reduction and vegetation removal activities annually or as needed on 8 LOCSD parcels totaling approximately 4.9 acres (Figure 2-5). This is in addition to the vegetation management on LOCSD parcels that will be conducted as part of the Community Wildfire Protection Plan (Section 2.2.7).

Facility Maintenance: The LOCSD operates seven water facility sites totaling approximately two acres, which feature tanks, wells, pump stations, water mains, fire hydrants, water meters, sample stations, and associated infrastructure. Operations and maintenance of these facilities includes: equipment removal and replacement, material storage, grounds keeping, weed abatement, rodent and pest control, painting, inspections, and other related activities.

2.2.6.4 Golden State Water Company

Golden State Water Company (GSW) maintains the water facilities including blending facilities, pump stations, wells, pipeline, and fire hydrants within their service area (Figure 2-6). The following operation and maintenance activities by GSW will be covered by the LOHCP (Table 2-8).

Water Facility Operations and Maintenance: On its ten sites in the LOHCP Area that total approximately five acres, GSW will repair water tanks, booster pumps, filtration units, and buildings, and conduct necessary maintenance of the grounds, including weeding. These activities are anticipated to impact 2.8 acres through the potential mobilization of heavy equipment including cranes, trucks, backhoes, and dump trucks, welding, painting, sandblasting, excavating, grading, and other construction and maintenance activities.

Water Pipeline and Main Repair, Replacement, and Flush-Outs: As needed, water mains and other pipelines totaling approximately 25 miles will be excavated for repair or replacement and flushed until water within the pipeline runs clear. These pipelines are located primarily in the County right-of-way.

Meter Box Maintenance and Replacement: Approximately twice per year, GSW will clean out its 2,673 water meter boxes. They also need replace meter boxes or water meters, as needed. These maintenance activities can affect immediately adjacent habitat.

Fire Hydrant Maintenance: GSW will maintain its 248 fire hydrants and wharf heads, which are generally located in the County right-of-way, by flushing them with water until they run clear; this activity can impact adjacent areas.

2.2.6.5 S&T Mutual Water Company

The S&T Mutual Water Company will likely conduct facilities maintenance activities similar to those conducted by GSW, to maintain their estimated two miles of pipeline and 199 meter boxes. Such activities, which are estimated to affect 0.85 acres, will be covered under the LOHCP permit (Table 2-8).

2.2.7 Community Wildfire Protection Plan

The incidental take permit issued based on the LOHCP will cover take associated with vegetation management and related fire hazard abatement work implemented as part of the Los Osos Community Wildfire Protection Plan (CWPP). The CWPP was developed by the San Luis Obispo County Community Fire Safe Council to identify areas that will receive a range of fuel reduction and fire hazard abatement treatments within and adjacent to the community (SLOCCFSC 2009). Anticipated treatments include removal of downed, dead, or diseased vegetation, the creation of shaded fuel breaks, and mowing of non-native grassland.

These activities are anticipated to occur in a total of 89.4 acres located at the wildland–urban interface (WUI)—the zone where human development meets wildland with vegetative fuels that can present risks to life, property, infrastructure, and habitat (Figure 2-7). Fuel management in these areas will help protect human lives and property as well as adjacent intact habitat from the impacts of wildfire.

Since completion of the plan, the California Department of Fire and Forestry (CALFIRE) Station 15, under contract with the LOCSD, has been working with the USFWS, CDFW, and local landowners to implement the CWPP in three areas totaling 20.5 acres where no State or federally listed animal species occur (Figure 2-7). The permit issued pursuant to the LOHCP will provide take authorization under ESA, enabling the activities to be initiated in the remaining 68.9 acres, as well as take of covered species throughout the 89.4-acre treatment area.

CALFIRE estimates that approximately one-third of the total 89.4-acre treatment area would be retreated annually depending on site-specific conditions, the need for hazard abatement activities, and funding. A maximum distance of 50 feet from structures would be mowed in non-native grassland areas, with the shaded fuel breaks established to complete a total distance of 100 feet from structures. This 100-foot distance is considered the minimum strategically-effective distance necessary for hazard abatement. Mowing would likely be done every two to three years, with maintenance of established shaded fuel breaks occurring every three to four years after they are created.

The USFWS and CDFW have worked closely with CALFIRE to develop avoidance and minimization measures for the CWPP (Section 5.2.4; Table 5-4). The CWPP will avoid take of Morro Bay kangaroo rat and Indian Knob mountainbalm, and is anticipated to have negligible effects on Morro shoulderband snail and Morro manzanita through implementation of avoidance and minimization measures (Section 4.1.1.2, Section 5.2.4). Accordingly, the CWPP acreages are not included in the total calculation of take/impacts, which is used to identify the compensatory mitigation as the take/impacts of the CWPP will not be compensated for in the manner used to mitigate the take/impacts of the other covered activities in this plan.

2.2.8 Conservation Program Implementation

The LOHCP conservation program includes measures designed to avoid, minimize, and mitigate the take/impacts of the covered activities on the covered species and impacts to their habitat (Chapter 5). These activities, which are essential to achieving the biological goals and objectives of the LOHCP (Section 5.1) include:

- Avoidance and minimization measures, including surveys (Section 5.2, Section F);
- Habitat restoration and management within the LOHCP Preserve System—the network of protected lands that will be managed and monitored in perpetuity to mitigate the impacts of the covered activities on the covered species (Section 5.3); and
- Monitoring to track the status and trends of the covered species populations (Section 5.4).

The County will implement the conservation program through contracts within an Implementing Entity, which will also implement other aspects of the LOHCP (e.g., issuing certificates of inclusion to project proponents; Section 6.1).

Avoidance and minimization measures for the covered activities will be conducted at project sites throughout the LOHCP Area. They will be implemented during the permit term, as well as part of management of the LOHCP Preserve System in perpetuity.

Other aspects of the conservation program will take place primarily within the LOHCP Preserve System, which will include eligible existing protected lands (e.g., the Morro Dunes Ecological Reserve) that will be managed and restored as part of the LOHCP, as well as new preserves established through plan implementation (Section 5.3.1). The detailed management and restoration activities will be identified in the LOHCP Preserve System AMMP, which will be developed and must be approved by the USFWS during the first three years of plan implementation (Section 5.3.3.2).

Though the elements of the conservation program will benefit the covered species by contributing to their recovery, some measures or treatments may cause short-term effects that may result in take of the species. For example, exotic plant removal projects will promote long-term viability of Morro shoulderband snail by restoring the natural community structure and species composition of the habitat; however, they can also have short-term negative impacts on individuals that may occupy infested areas. Similarly, construction of fuel breaks to reduce the risk of wildfire spreading into the, from adjacent developed areas will cause short-term negative effects to covered species in the treatment areas, which will be outweighed by the protection of habitat from fire and fire suppression activities. The consequences of the potential take/impacts caused by the covered activities caused by the conservation program are limited and will be outweighed by their long-term benefits (Chapter 4).

All measures to implement the conservation program that are consistent with the goals and objectives of the plan will be covered. The following outlines anticipated activities.

2.2.8.1 Species Protection Measures

A series of measures will be used to minimize the amount or severity of take of/impacts to the covered species during the course of implementing covered activities (Section 5.2). These include pre-project surveys to evaluate whether a species is present, installation of fences and other barriers to limit project disturbance areas, and capture and relocation of individuals to intact, suitable habitat that is

permanently protected and located away from covered activity footprints and adjacent areas that can be indirectly impacted. These measures, which are designed to reduce impacts of the covered activities, may have some limited negative effects themselves; for example, Morro shoulderband snails could be injured or killed inadvertently during efforts to install fences or capture and relocate them out of harm's way (Section 4.2.1.2). Take/impacts caused by these measures will be covered by the Plan incidental take permit.

Prior to engaging in any activity that could result in take in any form, which includes capture of the covered species, qualified personnel must obtain written approval from the USFWS and, if required, CDFW.

2.2.8.2 Species Population Enhancement Measures

Some elements of the conservation program designed to increase or otherwise enhance the viability of the covered species populations in order to promote their recovery may cause short-term negative impacts or take. Activities that will be covered include:

- Collection of seeds or cuttings of the covered plants, for salvage, storage in a seed bank, genetic analysis, or to propagate for revegetation of the LOHCP Preserves as part of restoration and enhancement projects; and
- Capture and relocation of Morro shoulderband snail individuals in order to establish or enhance populations following successful restoration to address the factors that eliminated or suppressed their populations.

Prior to conducting these activities, qualified personnel must obtain written approval from the USFWS and, if required, CDFW. Notably, an incidental take permit issued under Section 2081(a) of CESA would be obtained prior to any propagation or other activities involving collecting Indian Knob mountainbalm, which is a state-listed plant.

2.2.8.3 Habitat Management and Restoration

The LOHCP Preserve System will be actively managed to maintain and enhance the natural structure and species composition of the communities, and the size and persistence of the covered species populations. Habitat management and restoration will be designed to address factors that are negatively impacting the populations and communities, which include exotic species, fire exclusion, erosion, and incompatible recreation. In some cases, management will utilize treatments that have been proven effective, while in other cases, management will be experimental; that is, the prescriptions will be developed based upon ecological models for the biological systems that are informed by the best available science, and will be conducted in a manner that is designed to limit deleterious effects and allow examination of effectiveness (Section 5.5.2).

Specific habitat restoration and management treatments will be identified in the LOHCP Preserve System AMMP, which will be developed during the first three years of plan implementation (Section 5.3.3.2). Prior to then, the amount of take will be very limited. The following are anticipated techniques that will be included in the plan, and that will be covered by the LOHCP permit:

- Management of vegetation using manual, mechanical, and chemical techniques, as well as fire, to promote natural community structure and native species composition or habitat conditions for the covered species;
- Eradication and control or exotic plants using the most appropriate techniques, which may include manual, mechanical, chemical, and biological means;
- Eradication and control of non-native animals including techniques to address non-native snails and other invertebrates, as well as, amphibians and reptiles, birds, and mammals, if any such activities negative effect the covered species;
- Erosion control in unnaturally-denuded areas that would otherwise result in excessive or accelerated soil movement caused by water, wind, and gravity;
- Demolition and removal of structures and other infrastructure; and
- Removal of debris and hazardous material, including soil remediation, closure of underground storage tanks, and removal of dumped materials.

Habitat management treatments causing similar take/impacts and that are determined to advance the biological goals and objectives will also be covered by the permit.

2.2.8.4 General Land Stewardship Management

The LOHCP will also cover general activities required to maintain the LOHCP Preserves. The following activities are covered by this plan.

- **Facilities:** Maintenance of existing facilities to:
  - Protect the land, including fences and gates;
  - Patrol properties, including roads and trails; and
  - Enable restoration, including water systems (wells, tanks, and pipelines) for temporary irrigation.
- **Recreation:** Provide limited opportunities for passive recreation where doing so is compatible with the LOHCP goals and objectives, by:
  - Installing and maintaining trails and providing opportunities for trail use, including boardwalks that facilitate accessibility while limiting habitat degradation in the sand soil, as well as deterring use of non-designated trail routes;
  - Developing and maintaining limited interpretation facilities, including signage, kiosks, and wildlife observation platforms; and
  - Creating and maintaining parking lots, staging areas, picnic areas, and restrooms.

2.2.8.5 Monitoring

Effective long-term management of the LOHCP Preserve System will require implementation of monitoring studies (Section 5.4), which are generally designed to:

- fill gaps in the scientific understanding of the biology of the covered species, including their distribution and abundance within the Preserve System, and the factors that influence their occurrence and demographic performance; and
- track the status and trends in the distribution, abundance, and performance of the covered species populations; and
- evaluate the effects of management, including responses of the covered species populations to restoration projects.

Monitoring activities that can cause take include trapping, handling, and marking individuals, and collecting individuals for *ex situ* (e.g., laboratory) studies or analyses. The adverse effects of such activities that are determined to be essential to long-term effectiveness of the conservation strategy at attaining the goals and objectives will be covered as part of this plan. Appendix E outlines the draft monitoring protocols, which will be revised, as needed, in the LOHCP Preserve System AMMP, which will be reviewed and approved by the USFWS during the first three years of plan implementation (Section 6.2.3.2).

2.3 Activities Not Covered by Permit

In developing the LOHCP, the County attempted to identify activities that would require take coverage during the 25-year permit term. Some activities identified did not meet the other criteria needed to qualify for coverage (Section 2.2.1). Specifically, these activities were:

- Not compatible with the LOHCP biological goals and objectives; and/or
- Not sufficiently well-described to enable evaluation of their impacts.

The following activities will not be covered under the LOHCP.

- **Agricultural Land Conversion:** Conversion of habitat to agricultural uses will not be covered by the LOHCP permit.
- **Construction Activities that Do Not Cause Soil Disturbance:** Not all land use activities permitted by the County will cause soil disturbance, which is defined as any activity that removes vegetation or compacts or disturbs soil, and thus potential impacts to the covered species. For example, interior remodels or vertical construction in which disturbance is confined to the existing disturbance footprint on a parcel would not require coverage under the LOHCP. If such projects cannot avoid ground disturbance, then they will require a take permit and will be covered under this plan.
- **Projects Impacting Riparian or Wetland Communities, unless a separate permit is provided:** Most of the covered activities described in this section are not anticipated to take/impacts to species and habitats in wetland and riparian areas. If any project proposed for coverage occurs within or near, or otherwise is anticipated to adversely affect, wetlands and riparian areas or species, the project proponents must obtain separate permits to cover those impacts, in order to be eligible for coverage of their impacts to the LOHCP covered species through this plan (Section 6.3.1).

The County and Implementing Entity will refer proponents of activities not covered by the LOHCP permit to the USFWS and CDFW for permitting. The County will not issue permits to those projects that cause take/impacts, unless proponents provide proof of compliance with CESA and ESA (Section 6.3).

Table 2-1: Parcel Status

	Inside Urban Services Line				Outside Urban Services Line				Total			
	Parcels		Acres		Parcels		Acres		Parcels[2]		Acres[3]	
Status[1]	N	%	Total	%	N	%	Total	%	N	%	Total	%
Developed	5,082	84.3%	1,149	36.4%	208	3.4%	376	11.9%	5,290	87.7%	1,525	48.3%
Undeveloped	656	10.9%	317	10.1%	45	0.7%	388	12.3%	701	11.6%	705	22.3%
Protected	6	0.1%	43	1.4%	32	0.5%	882	28.0%	41	0.7%	925	29.3%
Total	**5,744**	**95.2%**	**1,509**	**47.8%**	**285**	**4.7%**	**1,646**	**52.2%**	**6,032**	**100%**	**3,155**	**100%**

[1] Number and percent of total, parcels and area (acres) that are developed, undeveloped, or permanently protected inside and outside the Los Osos Urban Services Line from the 2009 Estero Area Plan, which is the current community plan. The USL was modified slightly to reflect actual development intensity.

[2] Number of mapped parcels in assessor's parcel database

[3] Acres based on GIS and County of San Luis Obispo Official Maps of 2016. 490 acres in Plan Area are located outside assessor's parcels in the County right-of-way.

Table 2-2: Land Use Designations

	Urban Services Line[1]					
	Inside		Outside		Total	
Status	Acres[1]	%	Acres[1]	%	Acres[1]	%
Commercial and Multifamily Residential						
Commercial Retail	70	4.6%	0	0.0%	70	2.2%
Commercial Services	24	1.6%	0	0.0%	24	0.7%
Office and Professional	25	1.6%	0	0.0%	25	0.8%
Residential Multifamily	111	7.3%	0	0.0%	111	3.5%
Subtotal: Commercial/Multifamily	**229**	**15.1%**	**0**	**0.0%**	**229**	**7.3%**
Single-Family Residential						
Residential Rural	0	0.0%	107	6.5%	107	3.4%
Residential Suburban	62	4.1%	851	52.2%	913	29.0%
Residential Single Family	1,113	73.3%	184	11.3%	1,298	41.2%
Subtotal: Single-Family Residential	**1,175**	**77.4%**	**1,143**	**70.0%**	**2,318**	**73.6%**
Other						
Open Space	13	0.9%	109	6.7%	122	3.9%
Recreation	38	2.5%	290	17.8%	328	10.4%
Public Facilities	40	2.6%	26	1.6%	66	2.1%
White Holed[3]	23	1.5%	64	3.9%	87	2.8%
Subtotal: Other	**114**	**7.5%**	**489**	**30.0%**	**603**	**19.1%**
Grand Total	**1,518**	**100.0 %**	**1,632**	**100.0%**	**3,150**	**100.0%**

[1] Acres and percent of land inside and outside of the Los Osos Urban Services Line within the land use categories within the Los Osos Community Plan. For planning purposes in the LOHCP, the USL was modified slightly to reflect the actual development intensity (Figure 2-2). Acres based on GIS and the County of San Luis Obispo Official Maps of 2016. Remaining acreage results from small gaps in land use category map and land area located in the County right-of-way.

[3] No land use category designation

Table 2-3: Land Use Designation of Existing Protected Lands

Land Use Category	Acres of Protected Land[1]		
	Fee Title	Easements	Total[2]
Commercial and Multifamily Residential			
Commercial Retail	8.4		8.4
Commercial Services	0		0
Office Professional	3.2		3.2
Residential Multifamily	0.2		0.2
Subtotal: Commercial/Multifamily	**11.8**	**0**	**11.8**
Single-Family Residential			
Residential Single Family	173.7	2.5	176.2
Residential Suburban	213.6	21.0	234.7
Residential Rural	39.6	0.0	39.6
Subtotal: Single-Family Residential	**426.9**	**23.6**	**450.5**
Other			
Open Space	114.1	0.1	114.1
Recreation	279.4		279.4
Public Facilities	0.3		0.3
White Holed	84.4		84.4
Agriculture	1.6		1.6
Subtotal: Other	**479.7**	**0.1**	**479.8**
Grand Total	**918.4**	**23.6**	**942.0**

[1] Acres of existing parks (excluding highly built-up parks), reserves, conservation easements, or open space easements in the LOHCP Area according the 1988 Estero Area Plan land use categories.

[2] The total is less than overall protected lands (948.5 ac.; Table 2-4) due to offsets in the land use category map

Table 2-4: Existing Protected Lands [1]

Management Agency	Acres[2]	% of Total
County of San Luis Obispo		
Elfin Forest Natural Preserve (County Parks)	31.8	3.3%
Monarch Grove Natural Area (County Parks)	16.8	1.8%
Broderson Site (County Public Works)	81.5	8.6%
Midtown Site (County Public Works)	12.2	1.3%
Subtotal: County of San Luis Obispo	**142.3**	**15.0%**
California Department of Fish and Wildlife		
Morro Dunes Ecological Reserve	278.7	29.4%
Morro Bay Wildlife Area [3]	4.2	0.4%
Subtotal: Department of Fish and Wildlife	**283.0**	**29.8%**
California Department of Parks and Recreation		
Elfin Forest Natural Preserve (State Parks portion)	34.8	3.7%
Los Osos Oaks State Natural Reserve	85.7	9.0%
Montaña de Oro State Park (a portion of)	236.2	24.9%
Morro Bay State Park (a portion of)	107.4	11.3%
Subtotal: State Parks	**447.0**	**47.1%**
U.S. Bureau of Land Management		
Unnamed (APN: 038-711-016)	4.8	0.5%
Morro Coast Audubon Society		
Sweet Springs Nature Preserve	29.4	3.1%
Other Unnamed Properties	1.2	0.1%
Subtotal: Morro Coast Audubon Society	**30.5**	**3.2%**
Conservation Easements on Private Land	23.7	2.5%
Total	**948.4**	**100.0%**

[1] This table lists existing protected lands in the LOHCP Area. Table 5-5 evaluates their suitability for inclusion in the LOHCP Preserve System managed as mitigation for the covered activities.

[2] Acres within the LOHCP Area

[3] This area likely reflects mapping imprecision and does not occur in the LOHCP Area

Table 2-5: Single-Family Residential Development Eligibility Criteria[1]

Planning Zone	Parcel Size	Number of Parcels	Total Acres	Maximum Disturbance Envelope (sf)
Inside the USL	<20,000 sf	4,799	747	None
	20,000 sf – 1 ac.	185	119	None
	>1 acre	111	299	None
Outside the USL	<=5 acres	230	327	30,000
	> 5 acres	42	870	30,000
All Single Family-Residential Parcels		**5,367**	**2,362**	

[1] Criteria for parcels in Single-Family Residential Development Categories based on parcel size and location with respect to the Urban Services Line. Includes 10 privately-held, unprotected parcels totaling 16.5 ac. that were designated for 'Recreation' or 'Open Space' that will be eligible for single-family residential land use.

Table 2-6: Undeveloped Parcel Land Eligible for Private Development[1]

Parcel Locate and Size Category	Single-Family Residential Development					Commercial and Multifamily Development				Total Undeveloped Land	
	Max. Disturbance Envelope[3]	Undeveloped Land		Max. Developed [4]		Undeveloped Land		Max. Developed [4]			
		Parcels	Acres	Assumption	Acres	Parcels	Acres	Assumption	Acres	Parcels	Acres
Inside the USL											
<20,000 sf	None	469	77.8	All Developed	77.8	81	16.1	All Developed	16.1	550	93.9
20,000 sf - 1 ac.	None	30	18	20,000 sf/parcel	13.8	6	4.2	All Developed	4.2	36	22.2
>1 ac.	None	35	95.6	1 ac./parcel	35	18	82.8	All Developed	82.8	53	178.4
Subtotal: Inside the USL		**534**	**191.4**		**126.6**	**105**	**103.1**		**103.1**	**639**	**294.5**
Outside the USL											
<= 5 acres											
<30,000 sf[5]	entire parcel	8	2.8	total parcel	2.8	0	0	0		8	2.8
>30,000 sf but ≤ 5 acres	30,000	24	53.6	30,000 sf/parcel	16.5	0	0	0		24	53.6
Parcels Acquired for Protection[6]	0	4	13.0	Fee Title Acquisition	2.8					4	13.0
Subtotal: Parcels ≤ 5 acres		28.0	43.4		16.5	0	0	0		28.0	43.4
>5 acres	30,000	13	331.2	30,000 sf/parcel	9	0	0	0		13	331.2
Parcels Acquired for Protection[6]	0	2	63.5	Fee Title Acquisition	1.4	0	0	0		2	63.5
Subtotal: Outside the USL		**39**	**311.1**		**24.1**	**0**	**0**	**0**		**39**	**311.1**
Grand Total		**573**	**502.5**		**150.7**	**105**	**103.1**	**103**		**678**	**605.6**

[1] Parcels designated for private development. Single family includes the Residential Rural, Residential Suburban, and Residential Single Family, land use categories, as well as 12 privately owned lots designated "Recreation" and "Open Space", which can be developed as the other designations listed here

[2] Location of the parcel with respect to the Urban Services Line (USL)

[3] Maximum area within the parcel to be disturbed permanently or temporarily during development, in the eligibility criteria for private development under the HCP

[4] Maximum acres that will be developed at build out, based on the maximum disturbance envelop and amount of vacant land

[5] Of the 32 total parcels ≤ 5 acres outside the USL, 8 are smaller than 30,000 sf; these parcels are assumed here to be entirely developed.

[6] Six vacant parcels outside of the USL (and inside the PCA) totaling 76.5 acres are assumed to be protected through fee-title acquisition; 4 are anticipated to be less than 5 acres and 2 are anticipated to be greater than five areas. These parcels and associated acreages were subtracted from the calculations of total developed land

Table 2-7: Redevelopment of Private Land

Land Use Category	Parcels	Acres	Assumption	Acres to Be Impacted[1]
Commercial	518	162	15% of acres to be further impacted	24
Other	7	49	No additional impacts (schools and parks covered elsewhere)	0
Residential Inside the USL	4,558	964	10% of area to be further impacted	96
Residential Outside the USL	207	350	10% of area to be further impacted	35
Residential Subtotal	4,765	1,314	10% of the area to be further impacted	131
Grand Total	**5,290**	**1,525**		**156**

[1] Estimated acres to be impacted by redevelopment of developed, privately-held parcels, based on County Planning Department estimates of redevelopment.

Table 2-8: Anticipated Public and Private Utility Covered Activities

Entity	Proposed Project	Estimated Acres
County Parks and Recreation Department	**Parks and Aquatic Center**	
	New Park in Los Osos	10
	Aquatic Center	3
	Los Osos Community Park Expansion	1.6
	Boat Ramp	1.5
	Coastal Access	0.45
	Subtotal: Parks and Facilities	**16.55**
	Creation of New Paths and Trails	
	Elfin Forest Boardwalk 13th St.to loop	0.25
	Elfin Forest Symbolic fencing (5000 ft.)	0.05
	Los Osos to San Luis Obispo Trail (Los Osos URL)	2
	Pismo Ave. to South Bay Blvd. Trail	1.5
	South Bay Blvd to LOVR Trail	3
	Mountain View Dr. Trail	1.5
	Nipomo Street to Buckskin Street Trail	0.75
	2nd/3rd St. to Los Osos Valley Road Trail	2.5
	Pismo Ave. 3rd Street to 18th Street Trail	1.75
	Sweet Springs Preserve Trail	1
	Sea Pines to LOVR through Midtown Site Trail	2
	Highland/Monarch Grove School/Sea Pines/Los Osos Valley Road Trail	2.75
	Highland Drive to Nipomo Ave. via Los Osos Community Park	3.25
	Los Osos Valley Road to Los Osos Community Park to Montaña De Oro	3.5
	Coastal Trail in Los Osos	8.25
	Los Osos Perimeter Trail	15
	Subtotal: Trails	**49.05**
	County Division of Parks: Total Planned Projects	**65.6**
	County Division of Parks: Total Anticipated Projects	**32.8[1]**
County Public Works Department	**Capital Projects**	
	Road Expansion	22
	New Roads	2.7
	Bike Lanes	8
	New Drainage Basins	11.4
	New Bioswales	6.6
	Drainage Improvements	7
	Subtotal: Capital Projects	**57.7**
	Facilities Operations and Maintenance	
	Road Maintenance	5
	Maintain Drainage Basins	4.9
	Subtotal: Facilities Operations and Maintenance	**9.9**
	County Public Works Department Total	**67.6**
County Library	Expansion or relocation of Los Osos Public Library	0.33

Table 2-8: Anticipated Public and Private Utility Covered Activities		
Entity	**Proposed Project**	**Estimated Acres**
	Los Osos Public Library Grounds Maintenance	0.45
	County Library Department Total	**0.78**
Los Osos Community Services District	**Capital Projects**	
	Pipeline Projects	2.60
	Ferrell Well Loop Upgrade	1
	Upper Aquifer Well at 8th & El Moro Yard	0.50
	New Water Tank at Highland Drive and Alexander	0.11
	South Bay Upper Aquifer Well Nitrate Removal/Blending Project	0.01
	New Expansion Well	0.42
	New Community Nitrate Removal Facility[2]	0.02
	Subtotal: Capital Projects	**4.67**
	Facilities Operations and Maintenance	
	Vegetation Management	4.9
	Maintain Drainage Basins	4
	Facilities Maintenance	2
	Subtotal: Facilities Operations and Maintenance	**13.1**
	Los Osos Community Services District Total	**17.77**
Golden State Water Company	**Capital Projects**	
	Blending Project	0.26
	Well Construction	0.25
	Expansion Well	0.22
	Los Osos Valley Road Main Upgrade	0.14
	Subtotal: Capital Projects	**0.87**
	Facilities Operations and Maintenance	
	Major Plant Site Maintenance	2.8
	Meter Box Maintenance	0.55
	Flush Water Mains	0.07
	Water Main Repair and Replacement	0.05
	Fire Hydrant Maintenance	0.05
	Subtotal: Facilities Operations and Maintenance	**3.52**
	Golden State Water Company Total	**4.39**
S & T Mutual Water Company	Well Construction	0.07
	Water Main and Pipeline Maintenance	0.85
	S & T Mutual Water Company Total	**0.92**
	Anticipated Public and Utility Covered Activities Total	**122.1**

[1] This table does not include the acreage of temporary impacts that will result from the Community Wildfire Protection Plan.

[2] Though County Parks has projects that could cause up to 65.6 acres of soil disturbance, only half of the projects are anticipated to be conducted during the term of the permit.

[3] Joint project of the Los Osos Community Services District and Golden State Water Company under the Basin Plan for the Los Osos Groundwater Basin (County et al. 2013)

Table 2-9: Summary of Anticipated Covered Activity Impacts[1]

			Acres	
General Category	**Sub Category**	**Type**	**Total**	**To Be Impacted**
Private Land Development and Improvements	New Development on Vacant Parcels	Single Family	573	150.7
		Multifamily-Commercial	105	103.1
		Subtotal: New Development	**678**	**253.8**
	Improvements to Existing Developed Parcels	Private Redevelopment	1,314	131.4
		Commercial Redevelopment	162	24.3
		Subtotal: Redevelopment	**1,476**	**155.7**
Public and Private Utility Projects	County Division of Parks			32.8
	County Public Works			67.6
	County Library Department			0.8
	Los Osos Community Services District			15.6
	Golden State Water Company			4.4
	S & T Mutual Water Company			0.9
		Subtotal: Public/Utility Projects		**122.1**
		Grand Total		**531.5**

[1] Does not include take due to implementation of the conservation program and the Community Wildfire Protection Plan, which will result in temporary impacts to habitat.

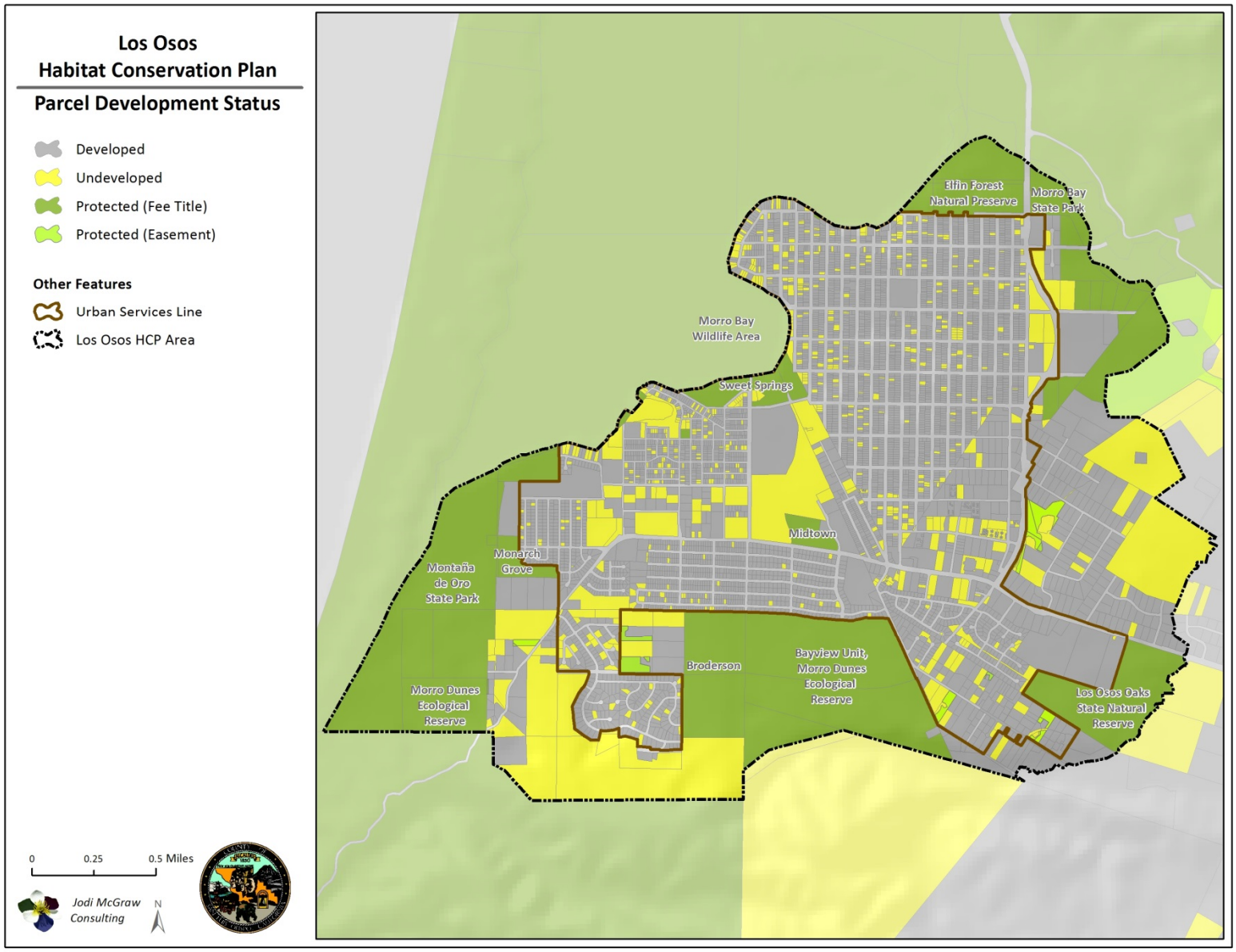

Figure 2-1: Parcel Status

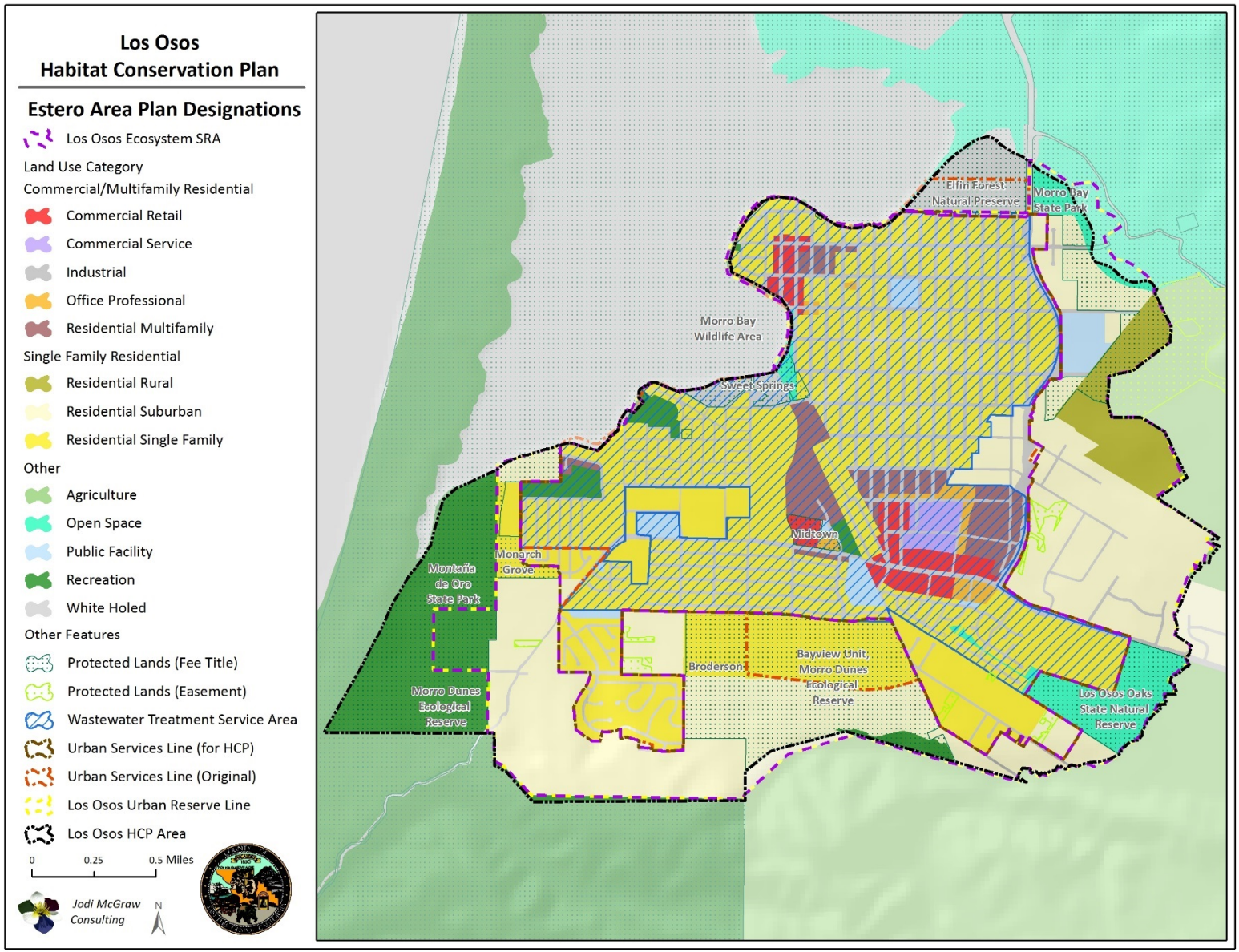

Figure 2-2: Land Use

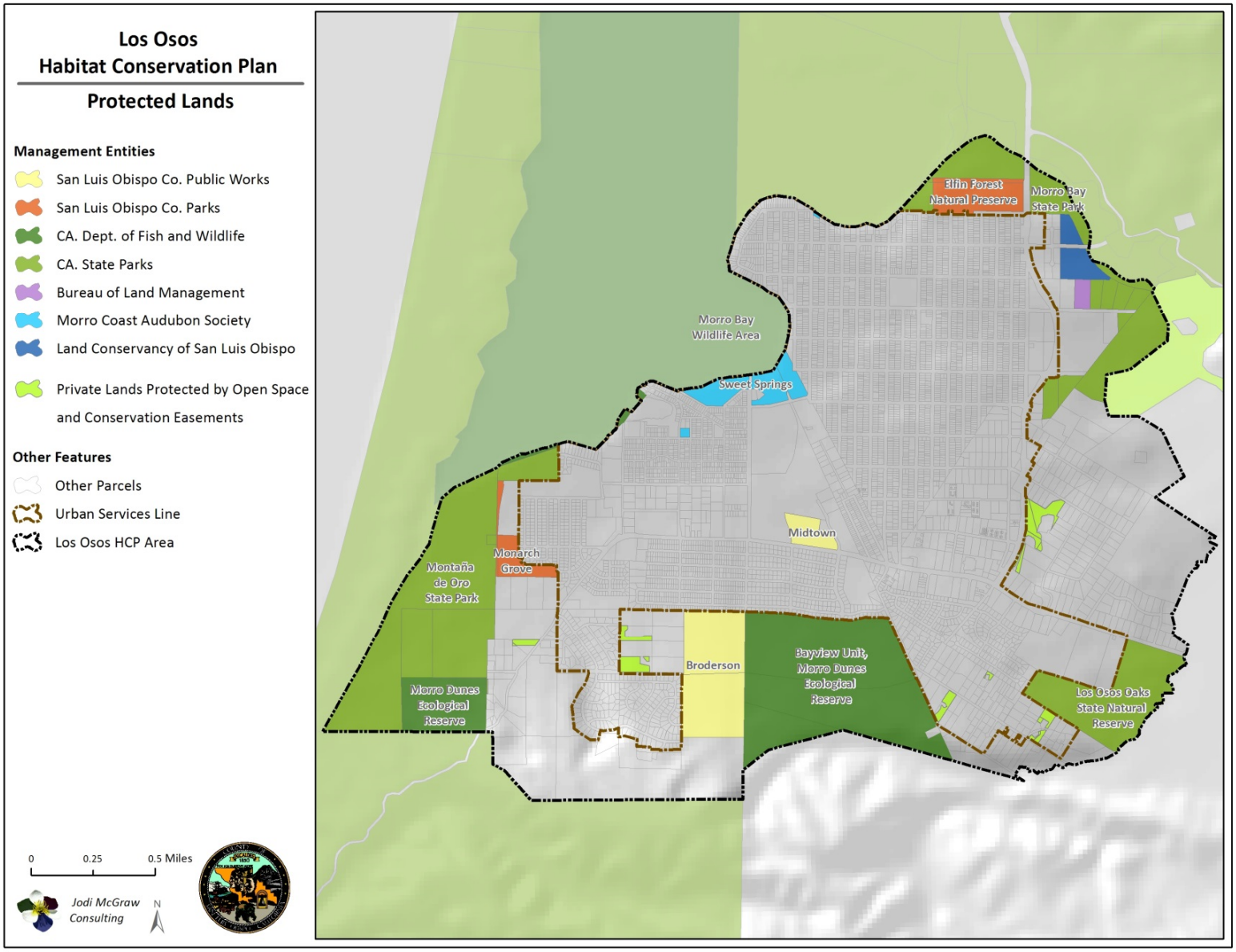

Figure 2-3: Existing Protected Lands

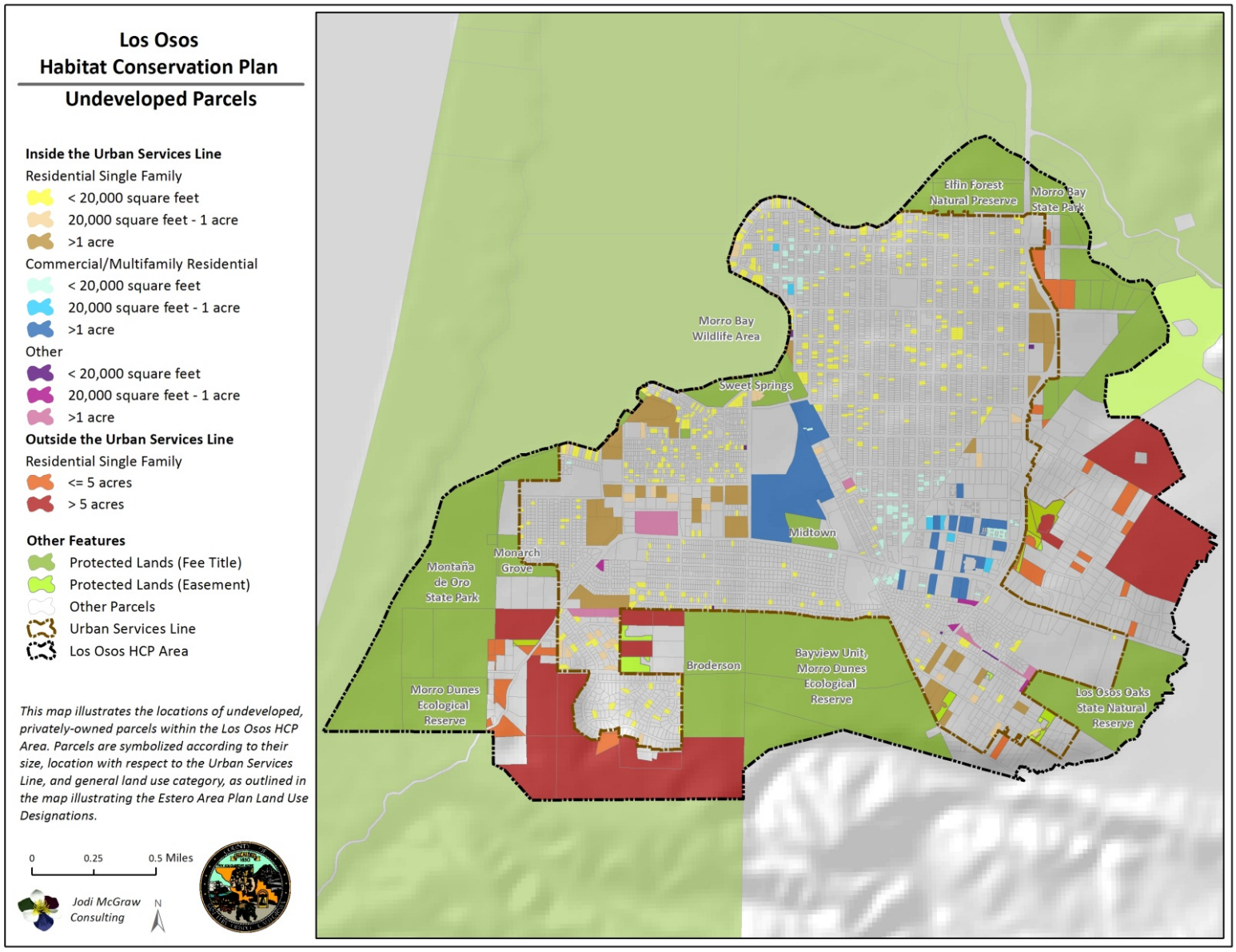

Figure 2-4: Undeveloped Parcels According to their Size and Location with Respect to the Urban Services Line

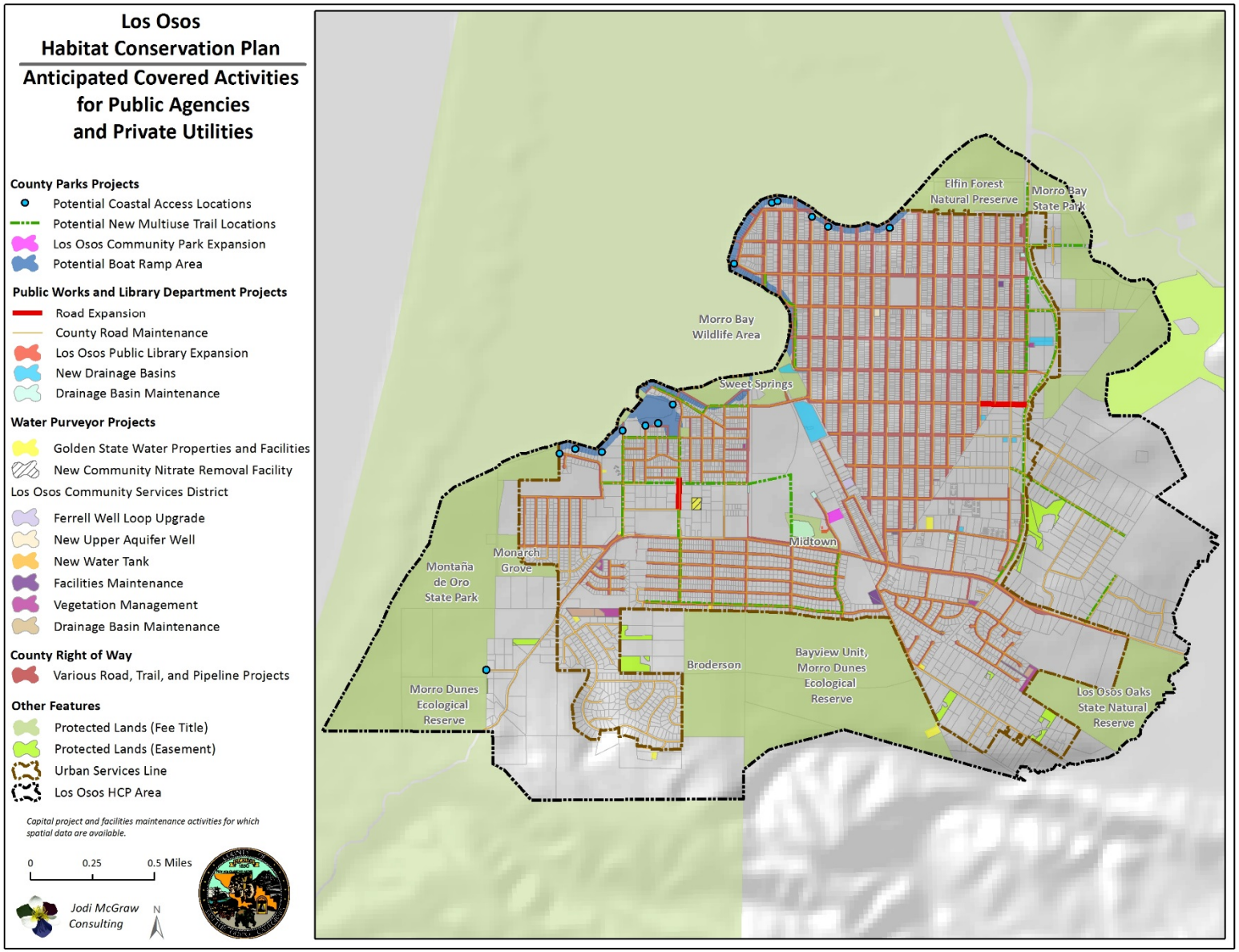

Figure 2-5: Public Agency and Private Utility Projects

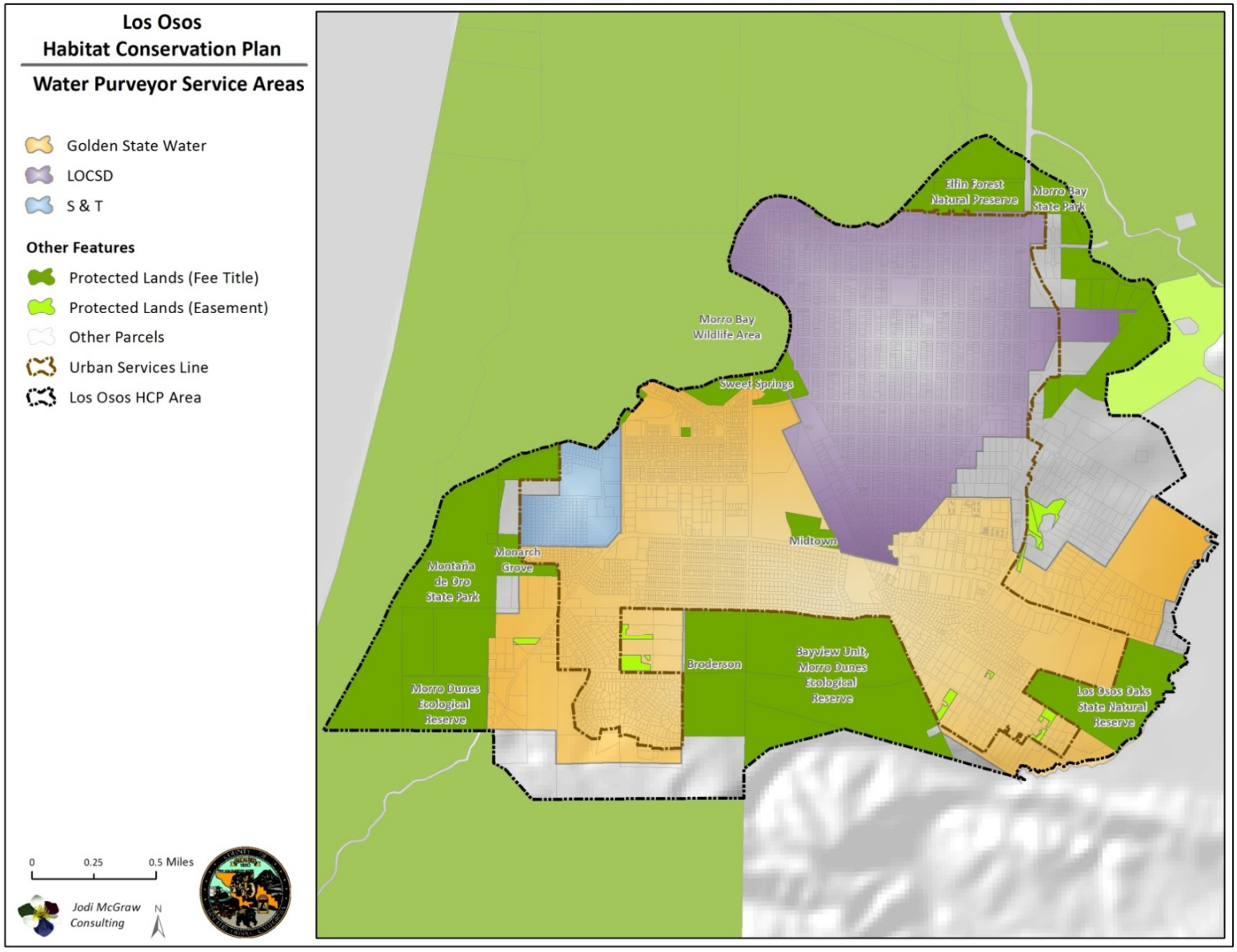

Figure 2-6: Water Purveyor Service Areas

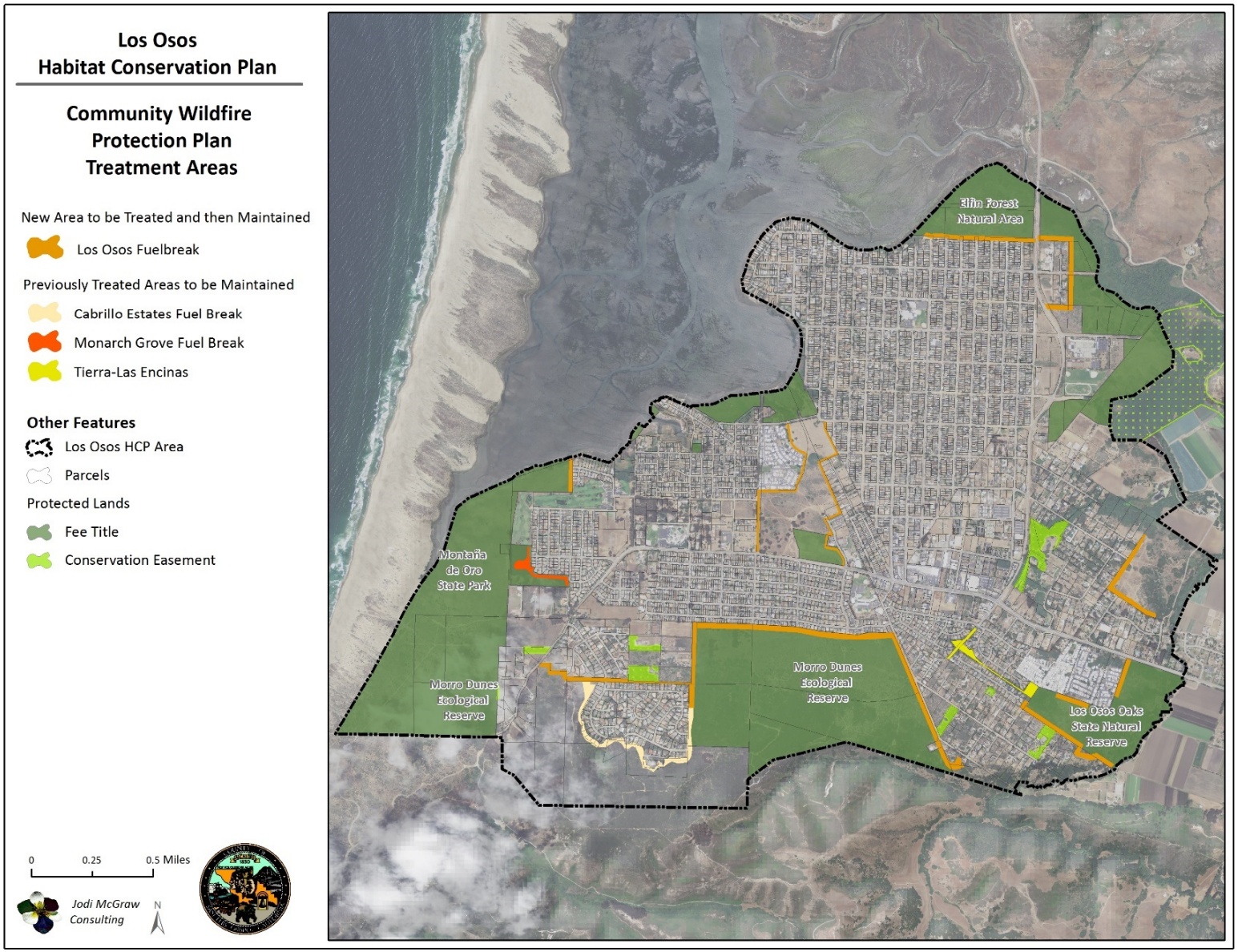

Figure 2-7: Community Wildfire Protection Plan Fire Hazard Abatement Treatment Areas

3 Environmental Setting and Biological Resources

The Los Osos HCP Area features a unique combination of soils and climate that give rise to a suite of endemic communities within the Baywood fine sands ecosystem (Section 3.1). The ecosystem and broader region supports numerous rare species, including several narrowly endemic species (Section 3.2.1). These communities and species have the potential to be negatively impacted by the covered activities (Section 2.2). To identify the species to be covered by the LOHCP, 140 species (70 plants and 70 animals) occurring within the region were evaluated according to their range, status, potential impacts, and available information (Section 3.2.1). This analysis resulted in the identification of four covered species: two animals (Morro shoulderband snail and Morro Bay kangaroo rat) and two plants (Morro manzanita and Indian Knob mountainbalm) for which the incidental take permit issued based on the LOHCP will authorize take, at least for some covered activities (Section 3.2.2). These species will also be the subject of the LOHCP conservation program, designed to avoid, minimize, and mitigate the impacts of the covered activities (Chapter 5).

3.1 Environmental Setting

Centered on the Los Osos community in coastal San Luis Obispo County, the 3,644-acre Los Osos HCP Area (Plan Area) is bounded on the west and north by Morro Bay, on the northeast and east by Los Osos Creek, and on the south by Montaña de Oro State Park (Figure 1-1).

Despite its small size, the Plan Area features a diverse and unique flora and fauna due to two main factors:

- **Biogeography:** Los Osos is located near the center of the California Floristic Province, which has been identified as one of the world's global biodiversity hotspots owing to the richness of its flora (Myers et al. 2000). Located in the center along the Pacific Coast, the area is a mixing zone for species with northern and southern ranges.
- **Unique Soil Conditions:** The Plan Area is located on an ancient dune complex that has given rise to sandy soils of varying degrees of development, and thus fertility. The sandy soils combine with the maritime climate to create a mosaic of conditions that support unique assemblages of plants and animals, include several narrowly-endemic species that occur in this region and nowhere else.

This section describes the Plan Area, with an emphasis on the factors that influence the species and the communities, or habitats, in which they occur. It was developed based on the best available scientific and technical information including:

- Field surveys conducted for the LOHCP and other local projects;
- Environmental review documents (i.e., EIRs/EISs and EAs, previously approved parcel specific HCPs for properties in the LOHCP Area);
- The California Department of Fish and Wildlife's Natural Diversity Database (CNDDB 2016);
- US Fish and Wildlife Service's (USFWS) Critical Habitat Designations and Recovery Plans;
- California Native Plant Society's (CNPS) inventory of rare plants (CNPS 2016); and,
- Information from local biological reports and experts.

3.1.1 Climate

Los Osos features a Mediterranean climate characterized by relatively warm, dry summers and cool, wet winters. Due to its proximity to the coast, Los Osos experiences moderate temperatures; mean high temperatures in July are just 66 ◦F while mean low temperatures in January are 41◦F (PRISM 2011). Dense morning fog is frequent during the summer and helps moderate temperatures and reduce plant desiccation stress. Los Osos receives an average of 18 inches of precipitation, which occurs as rain that falls primarily between November and March. There is a slight precipitation gradient within the LOHCP Area, with the coast receiving an average of 17 inches of rainfall and the higher elevation areas further inland receiving 19 inches (PRISM 2011).

Interannual variability in weather, particularly precipitation, is high and can have important implications for biological systems. Over the 53-year period of record for which daily rainfall was measured at the Morro Bay Fire Station Coop weather station north of the Plan Area (WRCC 2013), mean rainfall was 16.6 inches; the standard deviation of the mean was 7.7, reflecting the high variability. In 21 of the years, precipitation was less than 75% of normal, and there were four periods of two or more years of such low rainfall, which constitute a drought: 1960 - 1961, 1984 - 1985, 1989 - 1990, and 2007 - 2009. Given the low water-holding capacity of the Baywood fine sand soil, drought can have important implications for plant and animal populations and habitat conditions (Section 6.5.6).

3.1.2 Topography and Geology

The LOHCP Area occurs on a broad coastal terrace that is deeply buried by ancient sand dunes. Topography is flat to gently sloping throughout much of the Plan Area, with steep terrain limited to the south where the ancient dunes abut the Irish Hills—a portion of the Coast Range Mountains (Figure 3-1). Elevations within the Plan Area range from just above mean sea level adjacent to the Morro Estuary, to 275 feet above mean sea level at the base of the Irish Hills.

Los Osos is within a seismically active region that includes several active earthquake faults including the Los Osos fault zone, which cuts through the Los Osos Valley area in an east-west fashion. It is underlain primarily by Jurassic-age to Cretaceous-age (approximately 120 to 180 million years old) rocks of the Franciscan complex: a mixture of igneous, metamorphic and sedimentary rocks. This complex is overlain by Cretaceous-age (65 to 140 million years old) and Tertiary-age (2 to 65 million years old) sedimentary rocks, including an unnamed Cretaceous sandstone, and the Lospe, Vaqueros, Rincon, Monterey and Pismo formations. These formations are, in turn, overlain by a late Pleistocene and Holocene Dune Complex and Lower Pleistocene sediments of the Paso Robles Formation. The upper Paso Robles beds can be distinguished from the dune sands by their higher proportion of clay and silt particles (Chipping 1987).

3.1.3 Soils

The unique geology and climate have combined with other factors including slope, microclimate, and vegetation, to result in the development of seven classified and mapped soil types within the region (USDA 1984, Figure 3-2). The Plan Area itself, however, predominantly features Baywood fine sand soil; with other types occurring on less than 3% of the Plan Area along its perimeter. The relatively coarse texture of the predominantly sand soils in the Plan Area contrasts with the mix of sandy, loam, and clay soils developed on a mix of parent material further inland (Figure 3-2).

Covering 3,550 acres (98%) of the LOHCP Area, the Baywood soil is a deep, somewhat excessively drained fine sand that is derived from the aeolian sand deposits (i.e., dunes). The surface layer of Baywood soils is slightly acidic, with soils having medium acidic or strongly acidic with increasing depth. Within the Plan Area, Baywood soils primarily occur on slopes between nine and 15 percent (3,225 acres or 89%); 256 acres (7%) in the southwestern portion of the Plan Area are on 15 to 30 percent slopes, and the remaining 69 acres (2%) in the northeast portion of the Plan Area are on slopes of just 2 to 9% (Figure 3-2).

The Baywood soils vary in their degree of development, which increases with the age of the ancient dunes from which they are derived. Soils on the older and middle-aged dunes farther inland and at higher elevation are more developed than soils closer to the coast (JSA 1997). Soil formation processes have led to a gradient of soil development; these processes include accumulation of organic matter, clay synthesis, clay migration to lower profile position, and iron mineral transformation (JSA 1997). Generally speaking, soil development results in greater organic matter and smaller soil particles (i.e., finer-texture). These factors increase soil water-holding capacity and nutrient availability. These properties have important implications for plant growth and thus influence the vegetation and other habitat conditions within the Plan Area (Section 3.1.5).

Located on the perimeter of the LOHCP Area, the other soil types feature characteristics that reflect their occurrence within or near the wetlands and along Los Osos Creek, as well as the different parent material (e.g., sandstone and siltstone) found adjacent to the ancient dunes. When compared with the Baywood fine sand, the other soils have finer texture and are more developed.

- **Santa Lucia shaly clay loam** occurs on 44 acres (1.2%) of the Plan Area on a steep (30-75%) slope in the headwaters of Los Osos Creek;
- **Concepcion fine sandy loam** and **Corralitos loamy sand** occur on 12 acres (0.3%) and two acres (<0.1%), respectively, on the eastern portion of the Plan Area where they support coast live oak woodland;
- **Salinas silty clay** loam occurs on 12 acres (0.3%) along Los Osos Creek in the southeastern portion of the Plan Area;
- **Marimel silty clay** loam occurs on seven acres (0.2%) in the eastern portion of the Plan Area along Los Osos Creek;
- **Dunes** occur on 3.2 acres (0.1%) on the western portion of the Plan Area; and
- **Aquolls saline soils** cover 0.9 acres (<0.1%) of the Plan Area and primarily support wetlands located on the northern portion of the LOHCP Area.

3.1.4 Hydrology

3.1.4.1 Streams, Rivers, Drainages

The LOHCP Area is within the Los Osos Creek Watershed: an approximately 28-square-mile area east and southeast of Morro Bay. It is one of two that drain to Morro Bay, the other being the Chorro Creek Watershed to the north (Figure 3-1).

The watershed is drained by Los Osos Creek, which features two named tributaries. The mainstem of Los Osos Creek flows through the Clark Valley, a narrow valley at the base of the Irish Hills. There, the

stream's upper reaches have been extensively channeled and diked as part of agricultural activity. After Clark Valley, Los Osos Creek flows along a 2.5-mile portion of the eastern perimeter of the LOHCP Area to its confluence Eto Creek—an approximately one-mile-long tributary that flows from Los Osos Valley Road just east of South Bay Boulevard northeasterly to Eto Lake, a small lake formed at the confluence with Los Osos Creek. From there, the stream flows another 1.5 miles along the perimeter of the LOHCP Area to the confluence with Warden Creek located 0.75 miles upstream of Morro Bay (Figure 3-2).

Located outside of the Plan Area, Warden Creek drains the western portion of Los Osos Valley. The creek flows through an area known as Warden Lake and then northwesterly along the edge of the valley until it joins Los Osos Creek just above the abandoned crossing of Santa Ysabel Avenue. Like Los Osos Creek, Warden Creek's hydrology has been altered as part of agricultural activities in the valley.

Los Osos Creek has an approximately 0.75-mile-long estuary that extends from its confluence with Warden Creek until it enters Morro Bay. The estuary is bordered on the northwest by the delta and tributary system of Chorro Creek, which along with Los Osos Creek provides most of the fresh water that flows to Morro Bay.

Los Osos Creek is a perennial stream, though it features numerous dry reaches during the summer. It has an unconsolidated streambed substrate composed of sand, gravel, and silt.

3.1.4.2 Lakes and Ponds

The Plan Area includes three ponds: a 0.8-acre pond in the upper headwaters of Eto Creek, a 4.5-acre pond on Eto Creek just upstream of its confluence with Los Osos Creek, and a freshwater pond in the Sweet Springs Preserve (Figure 3-2). No other mapped ponds or lakes occur in the LOHCP Area, though small, unmapped, created ponds may be on some private parcels.

3.1.5 Vegetation

The soils and climate within the LOHCP Area create a unique ecosystem that is found only within Los Osos. As in other areas of Central Coastal California featuring soils derived from ancient dune systems, including Fort Ord to the north (Monterey County) and Burton Mesa to the south (Santa Barbara County), the Baywood fine sand in Los Osos combines with the maritime climate to create unique conditions for plants and animals. These unique environmental conditions support a mosaic of native plant communities (vegetation), including one endemic type: Morro manzanita chaparral, a form of central maritime chaparral that is dominated by the endemic Morro manzanita (*Arctostaphylos morroensis*). This and the other communities that occur on Baywood fine sand support three additional endemic species adapted to the ecosystem: Morro shoulderband snail (*Helminthoglypta walkeriana*), Morro kangaroo rat (*Dipodomys heermanni morroensis*), and splitting yarn lichen (*Sulcaria isidifera*). They also support rich assemblages of more widespread plants and animals, including species with northern and southern ranges that overlap in central coastal California.

3.1.5.1 Overview

The LOHCP Area features assemblages of plants adapted to the relatively low-nutrient, well-drained soil Baywood fine sand soil (Section 3.1.3). Within the LOHCP Area, the distributions of plant species and communities reflect several factors including:

- **Soil development**, which is correlated with dune age, with inland areas having more fertile soils derived from older dunes than areas closer to the coast;
- **Microclimate**, which can result from variation in topography (e.g., cooler north-facing slopes) and also subtle temperature, precipitation, and fog gradients that occur with distance from the coast;
- **Hydrology**, including streams, lakes, and seasonally inundated areas including Morro Bay and Los Osos Creek;
- **Natural disturbances such as fire and erosion,** which remove established vegetation and initiate a process of succession (i.e., changes in plant community composition over time); and
- **Historic land use,** including agriculture, grazing, land clearing, and other human activities such as recreational use, which remove or alter native vegetation.

These and other factors interact in complex ways to create a mosaic of plant assemblages (or communities) within the LOHCP Area, which have been classified and mapped (JSA 1997).

Plant community conditions vary in terms of the cover of exotic plants, which are species that do not naturally occur within the communities, and instead were planted, accidentally introduced to the area, or spread from other areas where they were introduced. As described below, several exotic plant species including primarily trees, grasses, and ice plants, have become abundant and have degraded habitat for native plants and animals in the LOHCP Area. The distribution and abundance of many exotic plants has been facilitated by natural disturbance and historic land uses.

Much of the LOHCP Area has been modified by human land use. Vegetation can reestablish after disturbances including agriculture, grazing, and other clearing, through natural succession or revegetation. Many native plants are adapted to natural disturbances and recolonize cleared areas from seed or vegetative materials (e.g., roots, rhizomes, and tubers). For example, cultivated land on the south end of the Plan Area in 1949 returned to coastal sage scrub and Morro manzanita chaparral by 1987. Following dry crop bean cultivation in the 1980s on another site, known as Powell II, dune lupine (*Lupinus chamissonis*), California croton (*Croton californicus*), and other native herbaceous plants became established and created a sparse, coastal sage scrub habitat. Following subsequent bean production on the property in 1997, coastal sage scrub vegetation again re-established within five years. The property has since been permanently protected.

3.1.5.2 Vegetation and Other Land Cover

As a result of the diverse microsite conditions, the 3,644-acre LOHCP Area supports a fine-scale mosaic of plant communities (or vegetation) and other land cover types (Table 3-1, Figure 3-3). An estimated 1,894 acres (52%) supports native and exotic vegetation that can be classified into six main types based primarily on structure: coastal sage scrub (866 acres or 24%), central maritime chaparral (503 acres or 14%), woodland (367 acres or 10%), grassland (39 acres or 1.1%), wetlands (43 acres or 1.2%), and riparian (77 acres or 2.1%). These general types were further divided into 20 communities that differ in plant species composition due to variability in soil conditions, time since disturbance, microclimate, and other factors (Table 3-1, Figure 3-4). The remaining 1,750 acres (48%) of the Plan Area features other land cover, including primarily development, but also agricultural land (Table 3-1).

The following sections describe each general vegetation and land cover type, according to factors influencing its distribution, the dominant species, and important habitat conditions, including prevalence of exotic plants. Distinctions between the subtypes within each general category are also outlined.

3.1.5.2.1 Coastal Sage Scrub

Approximately 866 acres (24%) of the LOHCP Area features coastal sage scrub: a shrubland dominated by short to medium height, soft-woody shrubs. When compared to the shrubs dominating central maritime chaparral, the other shrubland in the LOHCP Area, coastal sage scrub features shrubs that are shorter-statured, less woody, and form a discontinuous canopy.

Coastal sage scrub occurs primarily on relatively flat terraces adjacent to the Pacific Ocean. Within the LOHCP Area, coastal sage scrub dominates the middle-aged dunes; it also occurs as a mosaic with central maritime chaparral and woodlands found on the older dunes.

Coastal sage scrub is dominated by several shrubs including California sagebrush (*Artemisia californica*), coyote brush (*Baccharis pilularis*), California goldenbush (*Ericameria ericoides*), silver lupine *(Lupinus albifrons*), dune (or sand) almond (*Prunus fasciculata* var. *punctata)*, dune lupine (*Lupinus chamissonis*), deer weed (*Acmispon glaber*), and black sage (*Salvia mellifera*). Herbaceous plants occur between shrubs, with common species including California croton (*Croton californicus*), wedgeleaf horkelia (*Horkelia cuneata*), rush rose (*Helianthemum scoparium*), and common sandaster (*Corethrogyne filaginifolia*).

In the Los Osos region, many areas of coastal sage scrub have been highly modified by prior land use, including agriculture and grazing. These activities remove shrub cover and facilitate the invasion and spread of exotic plant species such as perennial veldt grass (*Ehrharta calycina*), fig marigold (*Carpobrotus edulis*), narrow leaved ice plant (*Conicosia pugioniformis*), wild oats (*Avena* spp.), rip-gut brome (*Bromus diandrus*), and red brome (*Bromus madritensis* ssp. *rubens*).

Within the LOHCP Area, four coastal sage scrub community types have been mapped; they are distinguished by their dominant shrubs and level of invasion by exotic plants (Table 3-1, Figure 3-4).

California Sagebrush – Black Sage: An estimated 482 acres, or 13% of the LOHCP Area, supports this community, which features a 2- to 5-foot-tall, continuous or intermittent canopy of California sagebrush and black sage with California buckwheat (*Eriogonum fasciculatum*), deer weed, and white sage (*Salvia apiana*) often present.

California Sagebrush – Black Sage Disturbed: Located on 373 acres in areas that have been relatively recently graded or cleared, including fallowed agricultural fields, this community consists of a relatively low cover of California sagebrush and black sage that are 1 to 4 feet tall. Herbaceous exotic plants are widespread and patchily abundant in these areas.

California Sagebrush – Black Sage Heavily Disturbed: An estimated 11 acres (0.3%) of the LOHCP Area supports small patches of California Sagebrush-Black Sage that have been heavily or more recently disturbed. These areas feature a relatively low abundance of native shrubs and high cover of veldt grass and other exotic plants.

Coyote Brush: Found on just 0.7 acres (<0.1%), this community features a continuous or intermittent shrub canopy dominated by coyote brush that is 3 to 6 feet tall. California sagebrush, California buckwheat, poison oak, and black sage may also be present. It occurs as small patches within disturbed portions of the LOHCP Area.

3.1.5.2.2 Central Maritime Chaparral

Central maritime chaparral occurs on approximately 503 acres (14 %) of the LOHCP Area. It is dominated by sclerophyllous (hard-leaved) shrubs and features scattered trees. Due to the low light and deep leaf litter in the understory, herbaceous plant cover is primarily limited to gaps in the shrub canopy.

Central maritime chaparral occurs in coastal areas of central California that are within reach of the summer fog. Within the LOHCP Area, central maritime chaparral occurs primarily on the older dunes (i.e., farther inland), on the southern hillsides and on the north-facing slopes of the marine terraces just south of Los Osos Creek in the northern portion of the Plan Area (Figure 3-3).

In the LOHCP Area, central maritime chaparral is dominated by Morro manzanita: a species endemic to Los Osos ecosystem. Other common species include chamise (*Adenostoma fasciculatum*) coast live oak, wedge-leaf ceanothus (*Ceanothus cuneatus*), and sticky monkeyflower (*Mimulus aurantiacus*). Canopy gaps support a variety of subshrubs including California goldenbush and deer weed, as well as herbs such as wedgeleaf horkelia, seacliff buckwheat (*Eriogonum parvifolium*), California croton, and golden yarrow (*Eriophyllum confertiflorum*).

Central maritime chaparral forms a mosaic with coastal sage scrub and woodland communities. Though it occurs primarily on the Baywood fine sand, which dominate the Plan Area (Section 3.1.3), central maritime chaparral is also supported by the Santa Lucia shaly clay loam. When compared with the coastal sage scrub, central maritime chaparral occurs on the steeper slopes and predominates the portions of the Plan Area that feature more than 30% slopes. This may reflect the dominant shrubs' requirements for more developed soils that occur on the older dunes farther inland. Alternatively, it may result because the gentler slopes (2-9%) have been more recently cleared (Tyler and Odion 1996).

Central maritime chaparral is a fire-adapted community. Though precise aspects of the fire regime are unknown, long fire-free periods (i.e., 100 years) are thought to be necessary for the dominant Morro manzanita to accumulate a sufficient seed bank to regenerate (Odion and Tyler 2002).

Based on their variability in dominant species, four types of central maritime chaparral have been mapped within the LOHCP Area (Table 3-1, Figure 3-4).

Morro Manzanita: Found on 321 acres (9% of the Plan Area), the Morro manzanita community is characterized by dense cover of Morro manzanita, with coast live oak, wedgeleaf ceanothus, sticky monkey flower, and black sage also present in a canopy, which is 4-12 feet tall. It occurs primarily on the older dunes and on steeper slopes in the southern portion of the Plan Area (Figure 3-4).

Morro Manzanita - Wedgeleaf Ceanothus: This community occurs on 113 acres (3.1% of the Plan Area) and features Morro manzanita and wedgeleaf ceanothus as co-dominant species creating a dense shrub canopy that is 3 to 6 feet tall. California sagebrush, black sage and sticky monkey flower

may be present in this community, which appears transitional between coastal sage scrub and Morro Manzanita in the southern portion of the Plan Area.

Morro Manzanita - California Sagebrush: This community consists of Morro manzanita and California sagebrush as co-dominant species creating a sparse canopy that is approximately 3 to 6 feet tall. California buckwheat (*Eriogonum fasciculatum*), deer weed, wedgeleaf ceanothus, sticky monkeyflower, and black sage may also be present. It occurs on 38 acres (1% of the Plan Area) at the transition between middle-aged dunes and older dunes and in areas that have been cleared relatively recently.

Wedgeleaf Ceanothus - California Sagebrush: This community features a dense, 3- to-6-foot-tall canopy of wedgeleaf ceanothus and California sagebrush, with black sage and sticky monkey flower often present. It occurs in one, 31-acre patch in the northern portion of the Plan Area.

3.1.5.2.3 Woodland

Approximately 367 acres (10%) of the Plan Area is covered by woodlands: upland communities characterized by a largely continuous canopy of trees, with variable understory featuring primarily shade-tolerant herbs and shrubs.

Within the LOHCP Area, there are two native woodlands, coast live oak and bishop pine (*Pinus muricata*) woodland, as well as stands of the exotic eucalyptus (*Eucalyptus* spp.). The native woodlands occur primarily on the older dunes on the perimeter of the Plan Area, presumably reflecting their requirement for the higher nutrient availability and water-holding capacity of the more developed soils found there (Figure 3-4). The exotic eucalyptus woodland occurs patchily throughout the Plan Area, reflecting its establishment through deliberate plantings, from which the species subsequently spread into adjacent areas.

Coast Live Oak: Approximately 291 acres (8%) of the LOHCP Area features an intermittent or continuous canopy dominated by coast live oak, which typically range from 20 to 45 feet in height. The understory can feature Morro manzanita, wedgeleaf ceanothus, coffee berry, poison oak, and herbaceous species dominated by exotic annual grasses.

Within the LOHCP Area, coast live oak woodlands occur as two distinct phases. The area south of Morro Bay and west of Los Osos Creek support stunted, wind-pruned coast live oaks featuring with multiple trunks. These 'pygmy oaks' are well-represented within the Elfin Forest Natural Preserve and the Los Osos Oaks State Reserve. North-facing slopes and canyons, particularly those featuring sandstone or shale-derived soils, support more typical coast live oak woodlands.

Bishop Pine: The LOHCP Area features two stands of bishop pine totaling 3.4 acres (0.1% of the Plan Area). This community features a continuous tree canopy of bishop pine 20 to 35 feet in height, and a shrub understory. Located on soils derived from older dunes in the southern portion of the Plan Area, the bishop pine woodland occurs as pockets within Morro manzanita chaparral. More widespread in the Irish Hills, the isolated stands, which are visible in aerial photographs from 1949, may be restricted by unique soil conditions or lack of fire; like other closed-cone conifers, bishop pine establishes primarily following fire, which releases seeds from their serotinous cones and creates an open canopy and bare-mineral soil conditions that facilitate seedling establishment.

Eucalyptus: The LOHCP Area features numerous, scattered patches of eucalyptus woodland, which total 72 acres (2% of the Plan Area). These non-native woodlands feature a continuous canopy of 20 to 75-foot-tall eucalyptus (*Eucalyptus* spp.), including primarily blue gum (*E. globulus*), with a sparse understory of shrubs and herbs. Eucalyptus create dense canopy and litter (barks and leaves) that often prevent native plant species from growing in the understory. Eucalyptus woodlands in the LOHCP Area provide overwintering habitat for Monarch butterflies (*Danaus plexippus*), a "California Special Resource. They are also often used by raptors for nesting and wintering habitat.

3.1.5.2.4 Grassland

Approximately 39 acres (1.1%) of the Plan Area supports grasslands—communities that lack appreciable shrub or tree cover and instead are dominated by herbaceous plants, including primarily grasses but also other graminoids (grass-like plants) such as sedges and rushes, as well as forbs (broad-leaf herbs).

Within the LOHCP Area, grasslands occur primarily in areas where shrublands (coastal sage scrub or central maritime chaparral) and woodlands have been cleared for use in agriculture, grazing, or development. As a result, the grasslands occur primarily as small patches scattered throughout the LOHCP Area (Figure 3-3), and are dominated by non-native species including common velvet grass (*Holcus lanatus*), slender wild oats (*Avena barbata*), common wild oats (*Avena fatua*), rip-gut brome, soft chess (*Bromus hordeaceus*), red brome, Italian ryegrass (*Festuca perennis*), foxtail barley (*Hordeum murinum*), and rat-tail fescue (*Festuca myuros*). Though dominated by exotic plant species, grasslands can provide foraging habitat for raptors. In addition, in the absence of ongoing disturbance (i.e., grazing, cultivation, mowing, etc.), native shrubs and trees can re-establish in these areas, converting them to shrublands and woodlands over time.

Two grassland communities have been mapped within the LOHCP Area, based on their differences in plant species composition (Table 3-1, Figure 3-4).

California Annual Grassland*:* Approximately 4 acres (0.1%) of the LOHCP Area features a mix of native and exotic annual grasses and herbs, including purple needle-grass (*Stipa pulchra*) and wildflowers such as California buttercup (*Ranunculus californicus*), blue-eyed grass (*Sisyrinchium bellum*), blue dicks (*Dichelostemma capitatum*), owl's clover (*Castilleja* spp.), larkspur (*Delphinium* spp.), and annual lupine (*Lupinus* spp.).

Non-Native Grassland: Approximately 35 acres (1%) of the LOHCP Area supports annual grasses and herbs dominated by introduced species and genera such as veldt grass, bromes, wild oats, ryegrass, and Harding grass (*Phalaris aquatica*). Shrubs are absent or occur only very sparsely.

3.1.5.2.5 Wetlands

The LOHCP Area includes 43 acres (1.2%) of vegetation growing in permanently or seasonally-saturated soils. This wetland vegetation occurs almost exclusively on the northern perimeter of the Plan Area on Morro Bay and the Los Osos Creek estuary (Figure 3-3). These communities are an important link between the upland ecosystem and the Morro Bay estuary.

Three types of wetlands have been mapped within the LOHCP Area (Table 3-1, Figure 3-4).

Cattail: Approximately 0.2 acres (<0.1%) of the Plan Area supports a continuous, intermittent, or open, 4- to 8-foot-tall community dominated by common cattail (*Typha latifolia*). Associated with permanently or seasonally-flooded fresh and brackish water wetlands near the Los Osos Creek estuary, the cattail wetland community contains bulrush (*Schoenoplectus* spp.), sedges (*Carex* spp.), rushes (*Juncus* spp.), mugwort (*Artemisia douglasiana*) and arroyo willow (*Salix lasiolepis*).

Pickleweed: Approximately 1.3 acres (<0.1%) of the LOHCP Area features a continuous or intermittent canopy dominated by 0.5-to-1-foot-tall pickleweed (*Salicornia* spp.). This community occurs in areas permanently or seasonally flooded by saltwater or brackish water along the Los Osos Creek estuary. Associated species include common brass buttons (*Cotula coronopifolia*), marsh jaumea (*Jaumea carnosa*), and saltgrass (*Distichlis spicata*).

Disturbed Wetlands: The LOHCP Area features 41.7 acres (1.1%) of wetlands that have been degraded by human activities. Most occur along Morro Bay near Cuesta-by-the-Sea, where salt and alkali marsh have been impacted by the invasion of exotic species including fig marigold and eucalyptus. A small patch of degraded freshwater wetland occurs south of the intersection of South Bay Boulevard and Los Osos Valley Road (Figure 3-4). This may contain a mixture of riparian and wetland plants including arroyo willow, cattail, rushes, and sedges.

3.1.5.2.6 Riparian

The LOHCP Area includes 77 acres (2.1%) of vegetation associated with waterways, particularly Los Osos and Eto creeks. This riparian vegetation also includes small areas that support arroyo willow along Morro Bay near Cuesta-by-the-Sea.

Riparian vegetation stabilizes stream banks, traps sediment before it reaches the stream, moderates stream temperature, and provides nesting, feeding, and cover habitat for a number of birds, mammals, and other species. Riparian areas also provide corridors that facilitate animal movement through otherwise fragmented landscapes.

Three types of riparian vegetation occur in the LOHCP Area (Table 3-1, Figure 3-4).

Arroyo Willow: Approximately 12 acres (0.3%) of the LOHCP Area features a continuous canopy of arroyo willow, which occurs as a shrub or tree that is 8 to 30 feet in height. Located in seasonally-flooded areas, including along Los Osos Creek, Eto Creek, and adjacent to Morro Bay near Cuesta-by-the-Sea, this community may also feature California sycamore (*Platanus racemosa*), black cottonwood (*Populus trichocarpa*), and coyote brush, as well as a sparse or abundant herbaceous understory layer that can include common cattail.

Arroyo Willow - Black Cottonwood: Approximately 0.8 acres (<0.1%) of the LOHCP Area features black cottonwood, a large tree (30-75 feet) that is co-dominant with arroyo willow. This community occurs in a single patch located along Los Osos Creek on the northeast corner of the LOHCP Area, within Morro Bay State Park (Figure 3-4). It features California sycamore in the overstory, with coyote brush and herbaceous species in the understory.

Coast Live Oak - Arroyo Willow: Arroyo willow and coast live oak are co-dominant within woodland comprised of 20 to 50-foot-tall trees that occurs on 62 acres (1.7%) of the LOHCP Area. Located

along Los Osos and Eto creeks, where it forms a fairly-continuous corridor in the eastern portion of the Plan Area, this riparian community may contain wetland plants in the understory and California bay (*Umbellularia californica*) in the stand.

Black Cottonwood: Located on less than two acres in the southeastern portion of the LOHCP Area along Los Osos Creek just downstream of Clark Valley, this community features a nearly continuous canopy of 50- to-100- foot-tall black cottonwood with an understory of shrubs. Arroyo willow is also present.

3.1.5.2.7 Other Land Cover

The following other land cover types cover a total of 234 acres (6.4%) within the LOHCP Area (Table 3-1, Figure 3-4).

Ruderal Disturbed: Approximately 50 acres (1.4%) of the Plan Area supports vegetation that has been significantly disturbed by agriculture, development, land clearing, or other human activities. This vegetation primarily supports exotic plant species that are adapted to colonizing disturbed areas, including wild mustard (*Brassica* spp.), wild radish (*Raphanus sativus*), Russian thistle (*Salsola tragus*), castor bean (*Ricinus communis*), sweet fennel (*Foeniculum vulgare*), Bermuda grass (*Cynodon dactylon*), and red stem filaree (*Erodium cicutarium*). Ruderal vegetation also contains exotic annual grasses common in the grasslands, such as wild oat, red brome, and ripgut brome; however, unlike in the grassland, native species occur at very low diversity and abundance in these areas. The only native plant species that occurs commonly within ruderal habitat is coyote brush.

Landscaped Trees Series: Approximately 131 acres (3.6%) of the Plan Area features dense canopy of native and exotic trees that were planted as for landscaping or as wind blocks. Species include Monterey pine (*Pinus radiata*), Monterey cypress (*Hesperocyparis macrocarpa*), and eucalyptus, which range from 40 to 60 feet in height.

Agriculture: Approximately 49 acres (1.3%) of the Plan Area is used for agricultural crops. Located primarily in areas of flat terrain with fertile soils, agricultural lands have been altered by tillage, irrigation, fertilization, and the use of pesticides and herbicides. Crops vary in terms of their sizes and growing patterns, creating various canopy cover.

Open Water: Covering a total of approximately 4 acres (0.1%) of the LOHCP Area, open water occurs within Eto Lake, Eto Creek, and Los Osos Creek. Eto Lake occurs at the confluence of Los Osos Creek and its tributary, Eto Creek, which is located east of the intersection of Los Osos Valley Road and South Bay Boulevard (Figure 3-1). Los Osos Creek flows from the Irish Hills northerly to Morro Bay, and features a small estuary extending from its confluence with Warden Creek (outside of the LOHCP Area), to where it flows into Morro Bay (Section 3.1.4).

3.2 Covered Species

The LOHCP Area supports diverse assemblages of plant and animal species that are adapted to the unique conditions created by the soil, climate, and vegetation. While some species inhabit a broad geographic area (e.g., the California Coast), others have a more limited geographic range (e.g., central coastal California). Among these species, some exhibit narrow habitat specificity, being found solely

within communities on the Baywood sand soils. For these narrow endemic species, which are naturally rare, the loss and degradation of habitat in and around the LOHCP Area has reduced populations, rendering them vulnerable to extinction. In recognition of their peril, these species have been listed as threatened or endangered under the state and federal endangered species acts. The LOHCP is designed to conserve these listed species by protecting, restoring, and managing habitat that can also support the diverse array of native species in the LOHCP Area.

This section describes the analysis conducted to identify the species within the LOHCP Area that should be covered by the take permit issued pursuant to the state and federal endangered species acts and be the focus of the LOHCP conservation program (Chapter 5).

3.2.1 Covered Species Analysis

To determine the species to be covered by the incidental take permit issued based on the LOHCP (covered species), available distribution information for the species and communities (vegetation) within the project area was reviewed, in consideration of the anticipated impacts of the covered activities (Section 2.2).

Four primary criteria were used to evaluate species for coverage:

1. **Range:** The species is known to occur within the coastal San Luis Obispo County based on several sources including:
    - California National Diversity Database (CNDDB 2016): The database of rare species updated July 2016 was queried in GIS to identify plants and animals occurring within the USGS 7.5-minute quad centered on the LOHCP Area, Morro Bay South;
    - California Native Plant Society Rare Plant Inventory (CNPS 2016): The on-line database of rare plant occurrences was queried using the nine-quad search based on the Morro Bay South quadrangle;
    - Existing Literature: Documented occurrences in the literature including reports; and,
    - Expert information: Observations of scientists and other experts in the region, including agency representatives.

2. **Status:** The species is state- or federally- listed as threatened or endangered or is likely to become listed during the 25-year permit term. The following factors were considered to evaluate species' status:
    - Federal Endangered Species Act: listed or proposed for listing;
    - California Endangered Species Act: listed or candidates for listing;
    - Fully-Protected Species: listed under California Fish and Game Code;
    - Species of Special Concern on the special animals list (CDFW 2016);
    - California Native Plant Society Rare Plan Inventory: plants that are rare, threatened or endangered in California (Lists 1B and 2); and,
    - CEQA: other species that meet the definition of rare or endangered under CEQA, including those are not listed but known to be very rare or declining.

3. **Impact:** The species will, or is likely to be, negatively affected by the LOHCP covered activities (Section 2.2). This was gauged based primarily on whether the species is known or likely to inhabit, or utilize for a significant part of their life history (including breeding, foraging, etc.), the following vegetation or land cover types that will be impacted by the covered activities:

    - grassland;
    - coastal sage scrub;
    - central maritime chaparral;
    - woodland; and
    - other upland, including agricultural, ruderal disturbed, and landscape trees.

    Species inhabiting wetlands, riparian, and riverine communities within LOHCP Area, as well as adjacent beach and dune communities outside of the Plan Area, were not considered for coverage though were identified (Section 3.2.3) to facilitate development of appropriate measures to avoid indirect impacts (Section 5.2.2).

4. **Information:** There is sufficient information about the species life history, habitat requirements, and occurrence in the Plan Area to adequately evaluate impacts of the covered activities on the species, and to develop elements of a conservation program to mitigate these activities. Because comprehensive, focal species surveys of the Plan Area have not been conducted, distribution information is limited for some species. Such information is necessary to conduct the take/impacts assessment, and to develop elements of the conservation program, including ensuring adequate representation of the populations or suitable habitat within the preserves established to mitigate the project impacts.

Table 3-2 lists the species evaluated and the criteria met by each. Appendix A summarizes key aspects of the distribution and habitat of species known to occur within the Plan Area, or for which suitable habitat is present in the Plan Area.

3.2.2 Covered Species

Take coverage is requested for four state and/or federally-listed threatened or endangered species for which the covered activities, including implementation of the LOHCP conservation program, were deemed to potentially cause take/impacts. As described above, this is based on the species' listing status and documented current or historical occurrence within the upland habitats of the LOHCP Area where the covered activities will take place (Table 3-2, Appendix A).

Covered Species	**Federal Status/State Status**
Morro shoulderband snail (*Helminthoglypta walkeriana*)	Endangered/None
Morro manzanita (*Arctostaphylos morroensis*)	Threatened/None
Morro Bay kangaroo rat (*Dipodomys heermanni morroensis*)	Endangered/Endangered, Fully Protected
Indian Knob mountainbalm (*Eriodictyon altissimum*)	Endangered/Endangered

Take coverage for Morro Bay kangaroo rat and Indian Knob mountainbalm is only requested for management and restoration activities during implementation of the conservation program. Coverage for these species is only requested for impacts to suitable but unoccupied habitat, not take of individuals. Take in the form of harm to individuals of these species associated with development and facilities operations and maintenance activities covered by the permit will be avoided.

Conservation, restoration, and management of the mosaic of natural communities as part of the LOHCP conservation program designed to promote recovery of the covered species will benefit many other species including several other sensitive species in the Plan Area (Table 3-2).

The covered species' distribution, life history, and ecology, are described in detail in species profiles that synthesize the best available scientific information and identify important gaps in information that will be addressed through implementation of the conservation program (Appendix B). This information, along with the vegetation distribution information (Section 3.1.5) and description of the covered activities (Section 2.2) is the basis for the LOHCP impact analysis (Chapter 4) and conservation strategy (Chapter 5).

The following sections provide a brief summary of the more-detailed species profiles which are provided in Appendix B.

3.2.2.1 Morro Shoulderband Snail

The Morro shoulderband snail (*Helminthoglypta walkeriana* Helminthoglyptidae), is a federally-listed endangered terrestrial mollusk endemic to the area immediately north and south of Morro Bay in coastal San Luis Obispo County (Roth and Tupen 2004). When listed by the USFWS in 1994, the taxon, which was also known as the banded dune snail, was comprised of two subspecies, *H. w. walkeriana,* and *H. w. morroensis* (USFWS 1994). These taxa have since been recognized as two separate species: Morro shoulderband snail (*H. walkeriana*) and Chorro shoulderband snail (*H. morroensis*; Roth and Tupen 2004).

The current known range of Morro shoulderband snail is estimated to encompass approximately 7,700 acres (Roth and Tupen 2004). Most of the area is centered on Los Osos north of Hazard Canyon, west of Los Osos Creek, and south of Morro Bay; however, it also includes a narrow strip of coastal dunes north of Morro Bay in Morro Strand State Park (Roth and Tupen 2004, USFWS 2006). Within this geographic area, native habitat occupied by the species includes coastal sage scrub along the immediate coast, and coastal sage scrub and open central maritime chaparral communities on stabilized dunes further inland. Within these areas, Morro shoulderband snail is often found in areas featuring dense plant cover comprised of shrubs or mat-forming species (e.g., iceplant) where plant cover including branches is in contact with the ground (USFWS 1998). Individuals are typically patchily dispersed and observed in clumps of coastal sage scrubs or clumps of veldt grass (SWCA 2014).

Though intact habitat includes primarily coastal sage scrub, and open central maritime chaparral, Morro shoulderband snail can also occur, sometimes in high abundance, in areas of degraded habitat, including areas invaded by dense exotic plants, such as veldt grass, fennel (*Foeniculum vulgare*), and iceplant (SWCA 2013). However, the species distribution was negatively associated with exotic eucalyptus (Walgren and Andreano 2012). Morro shoulderband snails also found in association with a variety of anthropogenically disturbed habitat areas, including areas where coastal sage scrub has been converted

to non-native grassland due to vegetation clearing and mowing, areas covered by veldt grass and iceplant, landscaping and ornamental plantings, woodpiles, and other habitats within developed areas and rights-of-way (SWCA 2013, 2014, 2015, 2016, and 2017). Indeed, frequent observation of MSS within a range of habitat conditions found within existing developed parcels areas as well as remaining vacant parcels suggest MSS has the potential to occur throughout the urban services line and Los Osos Wastewater Treatment Plant Area (Figure 2-2), as well as intact habitat on the perimeter of the Plan Area.

Morro shoulderband snail is also often found in litter that accumulates on the soil surface, and under piles of rock, downed wood, or other debris (SWCA 2013). These microsites provide moist, sheltered environments of reduced desiccation stress that are required by the terrestrial mollusk (Roth 1985). The species is occasionally observed in shallow (less than ½ inch) depressions within the soil (Belt 2016). Morro shoulderband snails can be attracted to and found in water puddles, where they can be drowned (SWCA 2013).

Morro shoulderband snails feed on decaying matter and fungal mycelia that grow on decaying matter and plant roots. The species is most active during periods of moist conditions, including during and after rain, as well as when there is heavy fog or morning dew. Feeding, reproduction, and growth occur primarily during the rainy season (i.e., October to April; Roth 1985). During periods of drought, Morro shoulderband snails are typically inactive, and may aestivate (Roth 1985).

Morro shoulderband snail is threated by loss of habitat due to development, and degradation of habitat as a result of exotic plants, recreational activities, and senescence of dune vegetation (USFWS 2001). When originally listed as federally-endangered in 1994, additional threats to Morro shoulderband snail included competition from non-native snails such as the European garden snail (*Helix aspersa*) and parasitism by sarcophagid flies (USFWS 1994); however, the most recent five-year review of the status of the species found no evidence for the effects of the former, and the latter threat was deemed unlikely to threaten the species' persistence (USFWS 2006).

Though the recommendation from the five-year review was that the species be down listed to 'threatened' (USFWS 2006), that status of Morro shoulderband snail remains 'endangered'. The down listing was based in part, on the findings of the most recent five-year review, which found the population appears stable and that species' threats have been reduced considerably, including through protection of large tracts of suitable habitat (USFWS 2006). However, there are no data indicating about population performance within existing protected lands. The reclassification would mean that Morro shoulderband snail is at risk of becoming endangered, rather than risk of becoming extinct.

3.2.2.2 Morro Bay Kangaroo Rat

The Morro Bay kangaroo rat (*Dipodomys heermanni morroensis*) is a small, nocturnal, fossorial rodent endemic to the Baywood fine sands ecosystem centered on the community of Los Osos in coastal San Luis Obispo County. Within its range, which was estimated at less than five square miles, habitat for the species includes compacted sandy soils with slopes of less than 15 degrees, supporting a range of vegetation types (Gambs and Holland 1988).

Optimal habitat for Morro Bay kangaroo rat appears to be early-successional stages of coastal sage scrub, which are characterized by scattered subshrubs and shrubs less than three feet tall, interspersed

with herbaceous plants and bare ground. Characteristic plant species of Morro Bay kangaroo rat habitat include sandcarpet (*Cardionema ramosissimum*), wedgeleaf ceanothus, western thistle (*Cirsium occidentale*), California croton (*Croton californicus*), seacliff buckwheat, wedgeleaf horkelia, deer weed, and grasses (Roest 1973, Gambs and Holland 1988).

Morro Bay kangaroo rats are solitary, and inhabit burrow systems that they use for nesting, escape, and caching seeds, which constitute their primary food source. Predators likely include snakes, owls, bobcat (*Lynx rufus*), coyote (*Canis latrans*), domestic cat (*Felis catus*) and domestic dog (*Canis lupus*); the domestic animals enter habitat from adjacent residential areas (USFWS 2011b).

Morro Bay kangaroo rat is listed as endangered under the CESA and the ESA; the species is also fully protected under the California Fish and Game Code. Listed as federally endangered in 1970 (USFWS 1970), Morro bay kangaroo rat has not been observed in the wild since 1986 despite several surveys (Section B.4.8). The last observed occurrence was within habitat currently within the Bayview Unit of the Morro Dune Ecological Reserve (USFWS 2011b). The species may still be present in the Plan Area below detectable levels; alternatively, it may have gone extinct (USFWS 2011b). However, observations of potential signs that may be evidence of the species (e.g., burrow entrance shaped like an upside down "U" with a runway, tail drag mark, surface seed pit cache) from 2008 to 2011 suggest that some isolated colonies may persist in pockets of suitable habitat (USFWS 2011b). The species may persist on several large, privately owned parcels featuring potentially suitable habitat, including two where the species previously occurred, where surveys could not be conducted (USFWS 2011b).

Declines in the population of this species are attributed to habitat loss, degradation, and fragmentation caused primarily by development within the Los Osos and Baywood Park communities; habitat has also been degraded and fragmented by fire exclusion, which converts early-successional coastal sage scrub habitat to later successional communities that lack the preferred food plants and perhaps other important structural components of their habitat. Declines may have also resulted from predation by domestic cats and use of rodenticides (USFWS 1999, USFWS 2011b).

3.2.2.3 Morro Manzanita

Morro manzanita (*Arctostaphylos morroensis*) is a large, evergreen shrub in the heath family (Ericaceae) that is federally-listed as a threatened species (USFWS 1994). Though not state-listed under CESA, Morro manzanita has a California Rare Plant Rank of 1B.1, which is used for plants that are rare, threatened, or endangered in California and elsewhere (CNPS 2016).

Morro manzanita is endemic to the Los Osos region in coastal San Luis Obispo County where it occurs primarily on Baywood fine sand soils. Based on the likely historic distribution of these soils, Morro manzanita may have covered between 2,000 and 2,700 acres (McGuire and Morey 1992). The current range of Morro manzanita is approximately 890 acres (LSA Associates 1992). Within that area, Morro manzanita covers approximately 350 acres (Tyler and Odion 1996).

Within the LOHCP Area, Morro manzanita primarily occurs within central maritime chaparral communities; it is the dominant species (i.e., in terms of canopy cover) within the Morro manzanita chaparral and co-dominates with wedgeleaf ceanothus and California sagebrush. Morro manzanita also occurs at low abundance in the coast live oak woodland, in the understory or canopy gaps of coast live

oak. Scattered Morro manzanita may also be found in other communities including within the developed areas (Section 3.1.5).

This long-lived shrub (>50-year life span) is adapted to recurring fire, which is an important component of the disturbance region within the Baywood fine sands ecosystem. Fire kills adult Morro manzanita, which lack a burl from which to resprout; however, it also promotes seed germination and establishment, and therefore regeneration (Tyler et al. 2000). Effective fire management will likely be essential to the species' long-term persistence. Too-frequent fire may decrease populations by killing adults prior to accumulation of sufficient viable seed to replace them (Odion and Tyler 2002). At the same time, fire exclusion may cause 'senescence risk.' As adult shrubs senesce and die, seed production decreases; at some point, seed availability could be reduced to a level below which seedling establishment following an eventual fire is insufficient to replace the stand.

As a narrow endemic species, Morro manzanita persistence is also threatened by habitat loss, including land conversion; habitat degradation, including exotic plants and incompatible recreational uses, which can cause erosion, can further impact persistence (USFWS 2008). Morro manzanita may also be impacted by vegetation management, including fire hazard abatement on private lands (the Community Wildfire Protection Plan avoids removing this species; Section 5.2.4).. Although individual Morro manzanita are typically trimmed rather than removed in most hazard abatement activities, as noted above, the species does not resprout from a burl when cut, and in the absence of fire, seedling establishment is very limited (Tyler et al. 1998).

3.2.2.4 Indian Knob Mountainbalm

Indian Knob mountainbalm (*Eriodictyon altissimum*) is a shrub in the borage family (Boraginaceae) that is both state and federally-listed as an endangered (USFWS 1994); it is also has a California Rare Plant Rank of 1B.1, which signifies that it is rare, threatened, or endangered in California and elsewhere (CNPS 2016).

Indian Knob mountainbalm is known from just seven occurrences in western San Luis Obispo County (CNDDB 2016). Two occurrences are on Indian Knob, a rock outcrop area south of San Luis Obispo and north of Pismo Beach. Two additional occurrences represented by a total of four, disjunct stands are in Hazard Canyon within Montaña del Oro State Park south of the LOHCP Area (USFWS 2013a). Of the three occurrences within the LOHCP Area, one is located in the Broderson site and the other two are within the Bayview Unit the Morro Dunes Ecological Reserve. A census of the three sites within the LOHCP in April 2016 found 22 individual plants (Occurrence 6) and 23 individual plants (Occurrence 4) in the two occurrences within the Bayview Unit; however, no Indian Knob mountainbalm plants were observed in the Broderson Unit (Occurrence 1; USFWS 2016).

Though the populations have not been comprehensively censused throughout the species' range, they are estimated to total fewer than 600 plants, with most of those (~500) occurring within the Indian Knob occurrence approximately 13 miles east of Los Osos (USFWS 2013a).

Indian Knob mountainbalm occurs on sandy soils derived from marine sandstone at Indian Knob, and Pleistocene older and partly cemented aeolian deposits (i.e., the Baywood fine sand soils) in Los Osos. In both areas, the species occurs in a mosaic of chaparral and oak woodland vegetation. Within these communities, the species' distribution is very limited. While the microhabitat characteristics of the

endangered shrub have not yet been examined, the stands are thought to be remnants of once larger occurrences that have contracted over time as a result of succession, which creates less favorable conditions for this early successional species that is promoted by fire (USFWS 2013a).

Indian Knob mountainbalm can reproduce vegetatively by establishing clones from rhizomes (Wells 1962). Individuals may survive fire by resprouting from belowground tissues. Fire may be required to stimulate seed germination and create open canopy, bare soil conditions conducive to seedling establishment and survival (USFWS 2013a).

As part of the most recent five-year review, persistence of Indian Knob mountainbalm was deemed threatened by fire exclusion, exotic plants, climate change, and demographic and environmental stochasticity (randomness; USFWS 2013a). Most land supporting Indian Knob mountainbalm, including all stands within the Los Osos region, is now protected; however, development still threatens a portion of one of the Indian Knob occurrences, which is within unprotected, private land (USFWS 2013a).

3.2.3 Additional Listed Species

The LOHCP Area contains populations of eight additional state and/or federally-listed threatened, endangered, or fully-protected species for which take will be avoided. These species primarily or exclusively utilize habitats where the covered activities will not occur, including wetlands and riparian areas. Impacts to these species can be avoided by the covered activities through implementation of a series of avoidance measures (Section 5.2.2).

These additional listed species will continue to be protected under ESA, CESA, and CEQA under separate permitting processes. If available information indicates that a future project proposed for coverage under the LOHCP has the potential to impact these species, the project must demonstrate compliance with the state and federal regulations for these species in order to receive a Certificate of Inclusion conferring take coverage for the four covered species under the LOHCP (Section 6.3.1).

Appendix C provides detailed species accounts that were used to develop the avoidance measures outlined in Section 5.2.2.

Covered Species	**Federal Status/State Status**
California red-legged frog (*Rana draytonii*)	Threatened/None
California Black Rail (*Laterallus jamaicensis coturniculus*)	None/Threatened
California seablite (*Suaeda californica*)	Endangered/None
Salt marsh bird's beak (*Chloropyron maritimum ssp. maritimum*)	Endangered/Endangered
Marsh sandwort (*Arenaria paludicola*)	Endangered/Endangered
South Central CA Coast Steelhead (*Oncorhynchus mykiss irideus*)	Threatened/None
White-tailed kite (*Elanus leucurus*)	None/Fully Protected
Golden Eagle (*Aquila chrysaetos*)	None[9]/Fully Protected

[9] Though not listed under ESA, golden eagles receive federal protection through the Bald and Golden Eagle Protection Act.

Table 3-1: Vegetation and other Land Cover		
Vegetation/Land Cover	**Acres**	**Percent**
COASTAL SAGE SCRUB		
California Sagebrush – Black Sage	481.6	13.2%
California Sagebrush – Black Sage Disturbed	373.0	10.2%
California Sagebrush – Black Sage Heavily Disturbed	10.8	0.3%
Coyote Brush	0.7	<0.1%
Subtotal: Coastal Sage Scrub	**866.0**	**23.8%**
CENTRAL MARITIME CHAPARRAL		
Morro Manzanita California Sagebrush	38.0	1.0%
Morro Manzanita	321.2	8.8%
Morro Manzanita Wedgeleaf Ceanothus	113.4	3.1%
Wedgeleaf Ceanothus - California Sagebrush	30.6	0.8%
Subtotal: Central Maritime Chaparral	**503.3**	**13.8%**
WOODLAND		
Bishop Pine	3.4	0.1%
Coast Live Oak	291.2	8.0%
Eucalyptus	72.0	2.0%
Subtotal: Woodland	**366.6**	**10.1%**
GRASSLAND		
California Annual Grassland	3.5	0.1%
Non-Native Grassland	35.0	1.0%
Subtotal: Grassland	**38.5**	**1.1%**
WETLAND		
Cattail	0.2	<0.1%
Pickleweed	1.3	<0.1%
Disturbed Wetlands	41.7	1.1%
Subtotal: Wetland	**43.1**	**1.2%**
RIPARIAN		
Arroyo Willow Black Cottonwood	0.8	<0.1%
Arroyo Willow	11.6	0.3%
Black Cottonwood	1.8	<0.1%
Coast Live Oak - Arroyo Willow	62.3	1.7%
Subtotal: Riparian	**76.6**	**2.1%**
OTHER LAND COVER		
Agricultural Land	48.5	1.3%
Developed	1,515.8	41.6%
Landscaped Trees	131.4	3.6%
Open Water	4.2	0.1%
Ruderal Disturbed	49.9	1.4%
Subtotal: Other Land Cover	**1,750.0**	**48.0%**
Total	**3,643.8**	**100%**

Table 3-2: Evaluation of rare and special status species in the Los Osos Region

		Status[1]			Criteria[2]						LOHCP	
Common Name	**Scientific Name**	**ESA**	**CESA**	**Other State**	**Range**	**Status**	**Habitat**	**Data**	**Impact**	**Listed**	**Treatment**	**Information**
ANIMALS												
Invertebrates												
obscure bumble bee	*Bombus caliginosus*	-	-	-	Y	N	Y	N	N	N	-	Table A-1
vernal pool fairy shrimp	*Branchinecta lynchi*	FT	-	-	Y	Y	N	Y	N	Y	-	
sandy beach tiger beetle	*Cicindela hirticollis gravida*	-	-	-	Y	N	N	Y	N	N	-	
globose dune beetle	*Coelus globosus*	-	-	-	Y	Y	N	Y	N	N	-	
monarch butterfly	*Danaus plexippus*	-	-	-	Y	Y	Y	Y	Y	N	-	Table A-1
Morro shoulderband snail	*Helminthoglypta walkeriana*	FE	-	-	Y	Y	Y	Y	Y	Y	C	Table A-1, App. B
California linderiella	*Linderiella occidentalis*	-	-	-	Y	N	N	Y	N	N	-	
Morro Bay blue butterfly	*Plebejus icarioides moroensis*	-	-	-	Y	N	Y	N	N	N	-	Table A-1
Atascadero June beetle	*Polyphylla nubila*	-	-	-	Y	Y	N	N	N	N	-	
San Luis Obispo pyrg	*Pyrgulopsis taylori*	-	-	-	Y	N	N	Y	N	N	-	
mimic tryonia	*Tryonia imitator*	-	-	-	Y	N	N	Y	N	N	-	Table A-1
Fish												
tidewater goby	*Eucyclogobius newberryi*	FE	-	SSC	Y	Y	N	Y	N	Y	-	Table A-1
steelhead - SCC DPS	*Oncorhynchus mykiss irideus*	FT	-	SSC	Y	Y	N	Y	N*	Y	AL	Table A-1, App. C
Amphibians												
foothill yellow-legged frog	*Rana boylii*	-	-	SSC	Y	Y	N	Y	N	N	-	
California red-legged frog	*Rana draytonii*	FT	-	SCC	Y	Y	N	Y	N*	Y	AL	Table A-1, App. C
western spadefoot	*Spea hammondii*	-	-	SSC	Y	Y	N	Y	N	N	-	
Coast Range newt	*Taricha torosa*	-	-	SSC	Y	Y	N	Y	N	N	-	
Reptiles												
black/silvery legless lizard	*Anniella pulchra nigra/pulchra*	-	-	SSC	Y	Y	Y	Y	Y	N	-	Table A-1
western pond turtle	*Emys marmorata*	-	-	SSC	Y	Y	N	Y	N	N	-	Table A-1
coast horned lizard	*Phrynosoma blainvillii*	-	-	SSC	Y	Y	Y	Y	Y	N	-	Table A-1
Two-striped garter snake	*Thamnophis hammondii*	-	-	SSC	Y	Y	N	Y	N	N	-	

Table 3-2: Evaluation of rare and special status species in the Los Osos Region

		Status[1]			Criteria[2]						LOHCP	
Common Name	**Scientific Name**	**ESA**	**CESA**	**Other State**	**Range**	**Status**	**Habitat**	**Data**	**Impact**	**Listed**	**Treatment**	**Information**
				Birds								
Cooper's hawk	*Accipiter cooperii*	-	-	WL	Y	Y	Y	Y	N	N	-	Table A-1
sharp-shinned hawk	*Accipiter striatus*	-	-	WL	Y (w)	N	N	Y	N	N	-	Table A-1
tricolored blackbird	*Agelaius tricolor*	-	SE	SSC	Y	Y	N	Y	N	N	-	
grasshopper sparrow	*Ammodramus savannarum*	-	-	SSC	Y	Y	N	Y	N	N	-	
golden eagle	*Aquila chrysaetos*	-	-	FP, WL	Y	Y	Y	Y	N*	N	AL	Table A-1, App. C
black turnstone	*Arenaria melanocephala*	-	-	-	Y	N	N	Y	N	N	-	
burrowing owl	*Athene cunicularia*	-	-	SSC	Y	Y	N	Y	N	N	-	Table A-1
ferruginous hawk	*Buteo regalis*	-	-	WL	Y	N	N	Y	N	N	-	
western snowy plover	*Charadrius alexandrinus nivosus*	FT	-	SSC	Y	Y	N	Y	N	Y	-	Table A-1
northern harrier	*Circus cyaneus*	-	-	SSC	Y	Y	Y	Y	N	N	-	Table A-1
western yellow-billed cuckoo	*Coccyzus americanus occidentalis*	FT	SE	-	Y	N	N	Y	N	Y	-	
olive sided flycatcher	*Contopus cooperi*	-	-	SSC	Y	N	N	Y	N	N	-	
white-tailed kite	*Elanus leucurus*	-	-	FP	Y	Y	N	Y	N*	N	AL	Table A-1, App. C
southwestern willow flycatcher	*Empidonax traillii* ssp. *extimus*	FE	SE	-	N	Y	N	Y	N	Y	-	
California horned lark	*Eremophila alpestris actia*	-	-	WL	Y	N	N	Y	N	N	-	
merlin	*Falco columbarius*	-	-	WL	Y (w)	Y	Y	Y	Y	N	-	Table A-1
prairie falcon	*Falco mexicanus*	-	-	WL	Y	N	Y	Y	N	N	-	Table A-1
peregrine falcon	*Falco peregrinus anatum*	DE	DE	FP	Y	Y	Y	Y	Y	Y	AL	Table A-1
black oystercatcher	*Haematopus bachmani*	-	-	-	Y	N	N	Y	N	N	-	
loggerhead shrike	*Lanius ludovicianus*	-	-	SSC	Y	Y	Y	Y	N	N	-	Table A-1
California black rail	*Laterallus jamaicensis coturniculus*	-	ST	FP	Y	Y	N	Y	N*	Y	AL	Table A-1, App. C
marbled godwit	*Limosa fedoa*	-	-	-	Y (w)	N	N	Y	N	N	-	Table A-1
long billed curlew	*Numenius americanus*	-	-	WL	Y (w)	N	N	Y	N	N	-	Table A-1
whimbrel	*Numenius phaeopus*	-	-	-	Y (w)	N	N	Y	N	N	-	Table A-1

Table 3-2: Evaluation of rare and special status species in the Los Osos Region

		Status[1]			Criteria[2]						LOHCP	
Common Name	**Scientific Name**	**ESA**	**CESA**	**Other State**	**Range**	**Status**	**Habitat**	**Data**	**Impact**	**Listed**	**Treatment**	**Information**
large-billed savannah sparrow	*Passerculus sandwichensis rostratus*	-	-	SSC	Y (w)	Y	N	Y	N	N	-	Table A-1
California brown pelican	*Pelecanus occidentalis californicus*	DE	DE	FP	Y	Y	N	Y	N	N	-	Table A-1
purple martin	*Progne subis*	-	-	SSC	Y	Y	N	Y	N	N	-	
California clapper rail	*Rallus longirostris obsoletus*	FE	SE	FP	Y	Y	N	Y	N	Y	-	Table A-1
Allen's hummingbird	*Selasphorus sasin*	-	-	-	Y (b)	N	Y	Y	Y	N	-	Table A-1
yellow warbler	*Setophaga petechia*	-	-	SSC	Y	Y	N	Y	N	N	-	Table A-1
California spotted owl	*Strix occidentalis occidentalis*	-	CT	SSC	Y	Y	Y	Y	N	N	-	Table A-1
elegant tern	*Thalasseus elegans*	-	-	WL	Y(w)	N	N	Y	N	N	-	Table A-1
California thrasher	*Toxostoma redivivum*	-	-	-	Y	N	Y	Y	Y	N	-	Table A-1
Mammals												
pallid bat	*Antrozous pallidus*	-	-	SSC	Y	Y	Y	N	N	N	-	Table A-1
Townsend's big-eared bat	*Corynorhinus townsendii*	-	CT	SSC	Y	Y	N	N	N	N	-	
Morro Bay kangaroo rat	*Dipodomys heermanni morroensis*	FE	SE	FP	Y	Y	Y	Y	N*	Y	C[1]	Table A-1, App. B
southern sea otter [4]	*Enhydra lutris nereis*	FT	-	FP	Y	Y	N	Y	N	Y	-	Table A-1
western mastiff bat	*Eumops perotis californicus*	-	-	SSC	Y	Y	N	N	N	N	-	
long-eared myotis	*Myotis evotis*	-	-	-	Y	N	Y	N	N	N	-	Table A-1
fringed myotis	*Myotis thysanodes*	-	-	-	Y	N	N	N	N	N	-	
Long-legged myotis	*Myotis volans*	-	-	-	Y	N	N	Y	N	N	-	
Yuma myotis	*Myotis yumanensis*	-	-	-	Y	Y	N	Y	N	N	-	
San Diego desert woodrat	*Neotoma lepida intermedia*	-	-	SSC	Y	Y	Y	Y	Y	N	-	Table A-1
big free-tailed bat	*Nyctinomops macrotis*	-	-	SSC	Y	Y	Y	N	Y	N	-	
harbor seal	*Phoca vitulina*	-	-	-	Y	N	N	Y	N	N	-	Table A-1
Mexican free-tailed bat	*Tadarida brasiliensis*	-	-	-	Y	N	Y	N	N	N		Table A-1
American badger	*Taxidea taxus*	-	-	SSC	Y	Y	N	N	N	N	-	Table A-1

Table 3-2: Evaluation of rare and special status species in the Los Osos Region

		Status[1]			Criteria[2]						LOHCP	
Common Name	**Scientific Name**	**ESA**	**CESA**	**Other State**	**Range**	**Status**	**Habitat**	**Data**	**Impact**	**Listed**	**Treatment**	**Information**
VASCULAR PLANTS AND LICHENS												
Vascular Plants												
Hoover's bent grass	*Agrostis hooveri*	-	-	1B.2	Y	Y	Y	N	Y	N	-	Table A-2
Arroyo de la Cruz manzanita	*Arctostaphylos cruzensis*	-	-	1B.2	Y	Y	N	Y	N	N	-	Table A-2
Santa Lucia manzanita	*Arctostaphylos luciana*	-	-	1B.2	Y	Y	N	Y	N	N	-	Table A-2
Morro manzanita	*Arctostaphylos morroensis*	FT	-	1B.1	Y	Y	Y	Y	Y	Y	C	Table A-2, App. B
Santa Margarita manzanita	*Arctostaphylos pilosula*	-	-	1B.2	Y	Y	N	Y	N	N		
Oso manzanita	*Arctostaphylos osoensis*	-	-	1B.2	Y	Y	N	Y	N	N	-	Table A-2
Pecho manzanita	*Arctostaphylos pechoensis*	-	-	1B.2	Y	Y	N	Y	N	N	-	Table A-2
dacite manzanita	*Arctostaphylos tomentosa* ssp. *daciticola*	-	-	1B.1	Y	Y	N	Y	N	N	-	Table A-2
marsh sandwort	*Arenaria paludicola*	FE	SE	1B.1	Y	Y	N	Y	N*	Y	AL	Table A-2, App. C
Miles' milk-vetch	*Astragalus didymocarpus* var. *milesianus*	-	-	1B.2	Y	Y	N	N	N	N	-	
Coulter's saltbush	*Atriplex coulteri*	-	-	1B.2	Y	Y	Y	N	N	N	-	Table A-2
round-leaved filaree	*California macrophylla*	-	-	1B.2	Y	Y	N	Y	N	N	-	
San Luis Obispo mariposa-lily	*Calochortus obispoensis*	-	-	1B.2	Y	Y	N	Y	N	N	-	
La Panza mariposa-lily	*Calochortus simulans*	-	-	1B.3	Y	Y	N	Y	N	N	-	
Cambria morning-glory	*Calystegia subacaulis* ssp. *episcopalis*	-	-	4.2	Y	Y	Y	N	N	N	-	Table A-2
Hardham's evening-primrose	*Camissoniopsis hardhamiae*	-	-	1B.2	Y	Y	Y	N	Y	N	-	Table A-2
San Luis Obispo sedge	*Carex obispoensis*	-	-	1B.2	Y	Y	N	Y	N	N	-	
San Luis Obispo owl's-clover	*Castilleja densiflora* var. *obispoensis*	-	-	1B.2	Y	Y	N	Y	N	N	-	
Congdon's tarplant	*Centromadia parryi* ssp. *congdonii*	-	-	1B.1	Y	Y	N	Y	N	N	-	
pappose tarplant	*Centromadia parryi* ssp. *parryi*	-	-	1B.2	Y	Y	N	Y	N	N		
coastal goosefoot	*Chenopodium littoreum*	-	-	1B.2	Y	Y	Y	Y	Y	N		Table A-2

Table 3-2: Evaluation of rare and special status species in the Los Osos Region

		Status[1]			Criteria[2]						LOHCP	
Common Name	Scientific Name	ESA	CESA	Other State	Range	Status	Habitat	Data	Impact	Listed	Treatment	Information
dwarf soaproot	*Chlorogalum pomeridianum* var. *minus*	-	-	1B.2	Y	Y	N	Y	N	N	-	
salt marsh bird's-beak	*Chloropyron maritimum* ssp. *maritimum*	FE	SE	1B.2	Y	Y	N	Y	N*	Y	AL	Table A-2, App. C
Brewer's spineflower	*Chorizanthe breweri*	-	-	1B.3	Y	Y	N	Y	N	N	-	
Chorro Creek bog thistle	*Cirsium fontinale* var. *obispoense*	FE	SE	1B.2	Y	Y	N	Y	N	Y	-	
compact cobwebby thistle	*Cirsium occidentale* var. *compactum*	-	-	1B.2	Y	Y	Y	Y	N	N	-	Table A-2
Cuesta Ridge thistle	*Cirsium occidentale* var. *lucianum*	-	-	1B.2	Y	Y	N	Y	N	N		
surf thistle	*Cirsium rhothophilum*		ST	1B.2	Y	Y	Y	Y	N	Y	-	Table A-2
leafy tarplant	*Deinandra paniculata*	-	CBR	4.2	Y	Y	N	Y	N	N	-	
Eastwood's larkspur	*Delphinium parryi* ssp. *eastwoodiae*	-	-	1B.2	Y	Y	N	Y	N	N		
beach spectaclepod	*Dithyrea maritima*	-	ST	1B.1	Y	Y	N	Y	N	N	-	
Betty's dudleya	*Dudleya abramsii* ssp. *bettinae*	-	-	1B.2	Y	Y	N	Y	N	N	-	
mouse-gray dudleya	*Dudleya abramsii* ssp. *murina*	-	-	1B.3	Y	Y	N	Y	N	N	-	
Blochman's dudleya	*Dudleya blochmaniae* ssp. *blochmaniae*	-	-	1B.1	Y	Y	N	Y	N	N	-	
yellow-flowered eriastrum	*Eriastrum luteum*	-	-	1B.2	Y	Y	N	Y	N	N	-	
Blochman's leafy daisy	*Erigeron blochmaniae*	-	-	1B.2	Y	Y	N	Y	N	N	-	Table A-2
saint's daisy	*Erigeron sanctarum*	-	-	4.2	Y	N	Y	N	Y	N	-	Table A-2
Indian Knob mountainbalm	*Eriodictyon altissimum*	FE	SE	1B.1	Y	Y	Y	Y	N*	Y	C[2]	Table A-2, App. B
Hoover's button-celery	*Eryngium aristulatum* var. *hooveri*	-	-	1B.1	Y	Y	N	Y	N	N	-	
suffrutescent wallflower	*Erysimum suffrutescens*	-	-	4.2	Y	N	Y	Y	Y	N	-	Table A-2
San Benito fritillary	*Fritillaria viridea*	-	-	1B.2	Y	Y	N	Y	N	N	-	
San Francisco gumplant	*Grindelia hirsutula* var. *maritima*	-	-	3.2	Y	Y	Y	N	Y	N	-	Table A-2
mesa horkelia	*Horkelia cuneata* var. *puberula*	-	-	1B.1	Y	Y	Y	Y	N	N	-	Table A-2
Kellogg's horkelia	*Horkelia cuneata* var. *sericea*	-	-	1B.1	Y	Y	Y	Y	Y	N	-	Table A-2
Coulter's goldfields	*Lasthenia glabrata* ssp. *coulteri*	-	-	1B.1	Y	Y	N	Y	Y	N	-	Table A-2

Table 3-2: Evaluation of rare and special status species in the Los Osos Region

		Status[1]			Criteria[2]						LOHCP	
Common Name	Scientific Name	ESA	CESA	Other State	Range	Status	Habitat	Data	Impact	Listed	Treatment	Information
pale-yellow layia	*Layia heterotricha*	-	-	1B.1	Y	Y	N	Y	N	N	-	
Jones' layia	*Layia jonesii*	-	-	1B.2	Y	Y	N	Y	N	N	-	
San Luis Obispo County lupine	*Lupinus ludovicianus*	-	-	1B.2	Y	Y	N	Y	N	N	-	
Carmel Valley bush-mallow	*Malacothamnus palmeri* var. *involucratus*	-	-	1B.2	Y	Y	N	Y	N	N	-	Table A-2
Santa Lucia bush-mallow	*Malacothamnus palmeri* var. *palmeri*	-	-	1B.2	Y	Y	N	Y	N	N	-	
Palmer's monardella	*Monardella palmeri*	-	-	1B.2	Y	Y	N	Y	N	N	-	
southern curly-leaved monardella	*Monardella sinuata* ssp. *sinuata*	-	-	1B.2	Y	Y	Y	Y	Y	N	-	
crisp monardella	*Monardella undulata* ssp. *crispa*	-	-	1B.2	Y	Y	Y	N	Y	N	-	Table A-2
San Luis Obispo monardella	*Monardella undulata* ssp. *undulata*	-	-	1B.2	Y	Y	Y	N	Y	N	-	Table A-2
woodland woollythreads	*Monolopia gracilens*	-	-	1B.2	Y	Y	N	Y	N	N	-	
shining navarretia	*Navarretia nigelliformis* ssp. *radians*	-	-	1B.2	Y	Y	N	Y	N	N	-	
coast woolly-head	*Nemacaulis denudata* var. *denudata*	-	-	1B.2	Y	Y	Y	Y	N	N		Table A-2
short-lobed broomrape	*Orobanche parishii* ssp. *brachyloba*	-	-	4.2	Y	N	Y	Y	Y	N	-	Table A-2
hooked popcorn-flower	*Plagiobothrys uncinatus*	-	-	1B.2	Y	Y	N	Y	N	N	-	
Diablo Canyon blue grass	*Poa diaboli*	-	-	1B.2	Y	Y	N	Y	N	N	-	
sand almond	*Prunus fasciculata* var. *punctata*	-	-	4.3	Y	N	Y	Y	Y	N	-	Table A-2
adobe sanicle	*Sanicula maritima*	-	-	1B.1, SR	Y	Y	N	Y	N	N	-	
chaparral ragwort	*Senecio aphanactis*	-	-	2B.2	Y	Y	N	Y	N	N	-	Table A-2
Cuesta Pass checkerbloom	*Sidalcea hickmanii* ssp. *anomala*	-	-	1B.2, SR	N	Y	N	Y	N	N	-	
most beautiful jewel-flower	*Streptanthus albidus* ssp. *peramoenus*	-	-	1B.2	Y	Y	N	Y	N	N	-	

Table 3-2: Evaluation of rare and special status species in the Los Osos Region

		Status[1]			Criteria[2]						LOHCP	
Common Name	**Scientific Name**	**ESA**	**CESA**	**Other State**	**Range**	**Status**	**Habitat**	**Data**	**Impact**	**Listed**	**Treatment**	**Information**
California seablite	*Suaeda californica*	FE	-	1B.1	Y	Y	N	Y	N*	Y	AL	Table A-2, App. C
saline clover	*Trifolium hydrophilum*	-	-	1B.2	Y	Y	N	Y	Y	N	-	
caper-fruited tropidocarpum	*Tropidocarpum capparideum*	-	-	1B.1	Y	Y	N	Y	N	N	-	
Lichens												
Spiraled old man's beard	*Bryoria spiralifera*	-	-	1B.1	Y	?	Y	N	Y	N	-	Table A-2
firm cup lichen	*Cladonia firma*	-	-	2B.1	Y	N	Y	N	Y	N	-	Table A-2
Los Osos black and white lichen	*Hypogymnia mollis*	-	-	-	Y	?	Y	N	Y	N	-	Table A-2
long fringed parmotrema	*Parotrema hypolecinum*	-	-	-	Y	?	Y	N	Y	N	-	Table A-2
splitting yarn lichen	*Sulcaria isidiifera*	-	-	1B.1	Y	N	Y	Y	Y	N	-	Table A-2

[1] Status

Federal Endangered Species Act:

FE: Federal Endangered

FT: Federal Threatened

DE: Delisted species

California Endangered Species Act

SE: State Endangered

ST: State Threatened

CT: State candidate for listing

DE: Delisted species

CBR: Considered but Rejected for state listing

Other State Designations:

California Rare Plant Rank Designations:

List 1B: Plants rare, threatened, or endangered in California and elsewhere

List 2B: Plants rare, threatened, or endangered in California, but more common elsewhere

List 3: Plants about which more information is needed — a review list

List 4: Plants of limited distribution or infrequent presence throughout California —a watch list

California Rare Plant Threat Ranks, represented as decimals after status categories (e.g., "List 1B.1"):

Table 3-2: Evaluation of rare and special status species in the Los Osos Region

		Status[1]			Criteria[2]					LOHCP
Common Name	Scientific Name	ESA	CESA	Other State	Range	Status	Habitat	Data	Impact	Listed	Treatment Information

0.1: Seriously threatened populations

0.2: Marginally threatened populations

0.3: Populations with limited threats

FP: Fully Protected - may not be taken or possessed at any time without a permit for necessary scientific research or relocation

SR: State Rare-Although not presently threatened with extinction, it is in such small numbers throughout its range that it may become endangered if its present environment worsens (California Native Plant Protection Act)

SSC: Species of Special Concern

WL: Watch List - previously SSCs but no longer merit SSC status

[2] Criteria: Detailed description of criteria is provided in the text.

Range: Y= occurs within; Y(w)= wintering, and Y(b)= breeding within the LOHCP Area; N=outside of range

Habitat: Y = Species occurs within the upland habitat found in the LOHCP Area; N=species does not occur in LOHCP Area upland habitats

Impacts: Y=potential for impacts from covered activities and N= impacts unlikely; * Indicates that impacts can be avoided through measures outlined in the Conservation Strategy of the LOHCP.

Listed: Y= species is listed federal and/or state as endangered or threatened, N=species is not listed under CESA and ESA

[3] LOHCP Treatment:

AL= Additional listed species for which impacts can be avoided.

C= Species recommended for coverage in the LOHCP.

C^1= Take coverage only requested for habitat impacts (not impacts to individuals) for management and restoration as part of the LOHCP Conservation Strategy.

C^2= Take coverage only requested for management and restoration as part of the LOHCP Conservation Strategy.

LOHCP Information: Section of document where additional species information is provided.

[4] The southern sea otter is designated as a Special Species of Concern by the Marine Mammal Commission

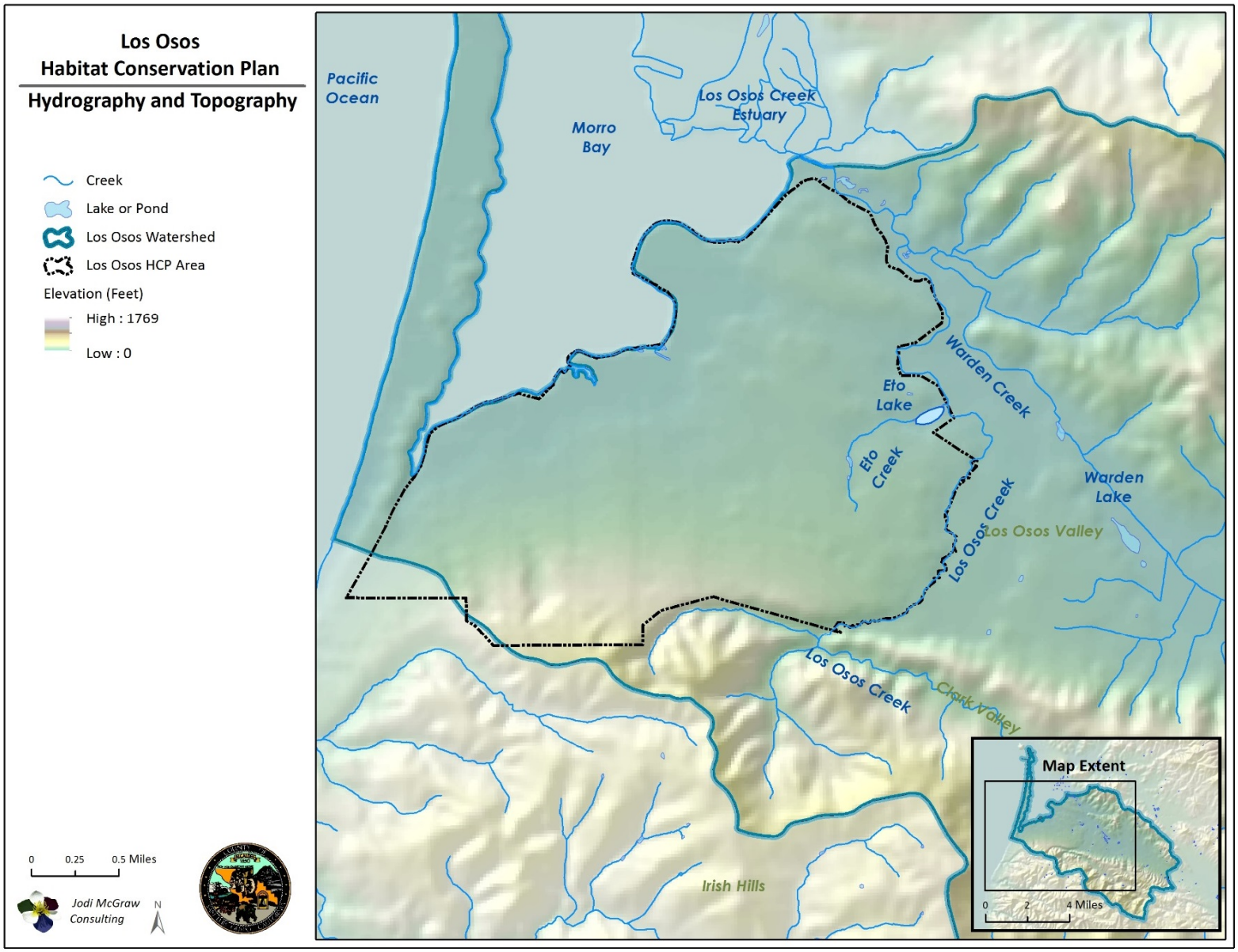

Figure 3-1: Hydrography and Topography

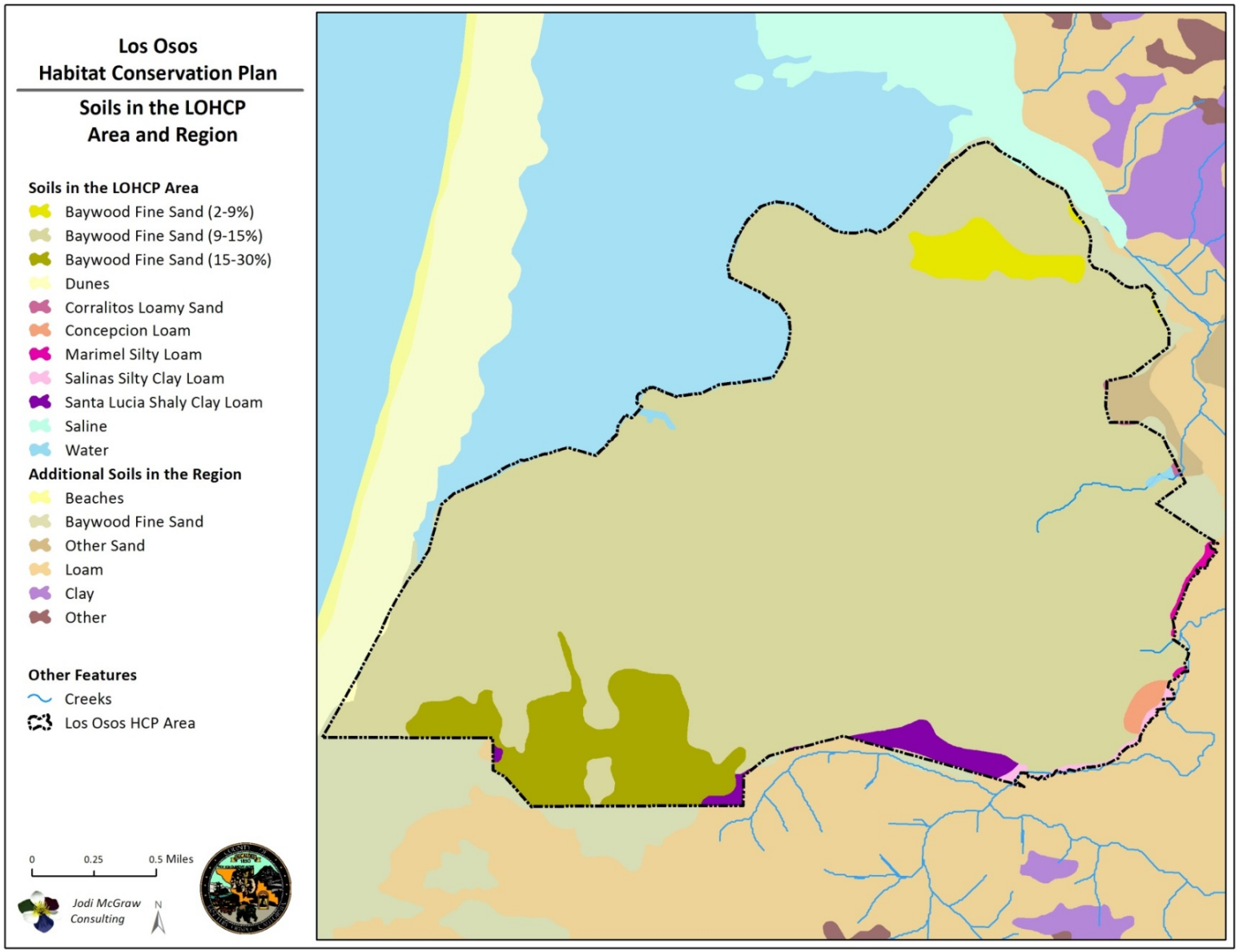

Figure 3-2: Soils

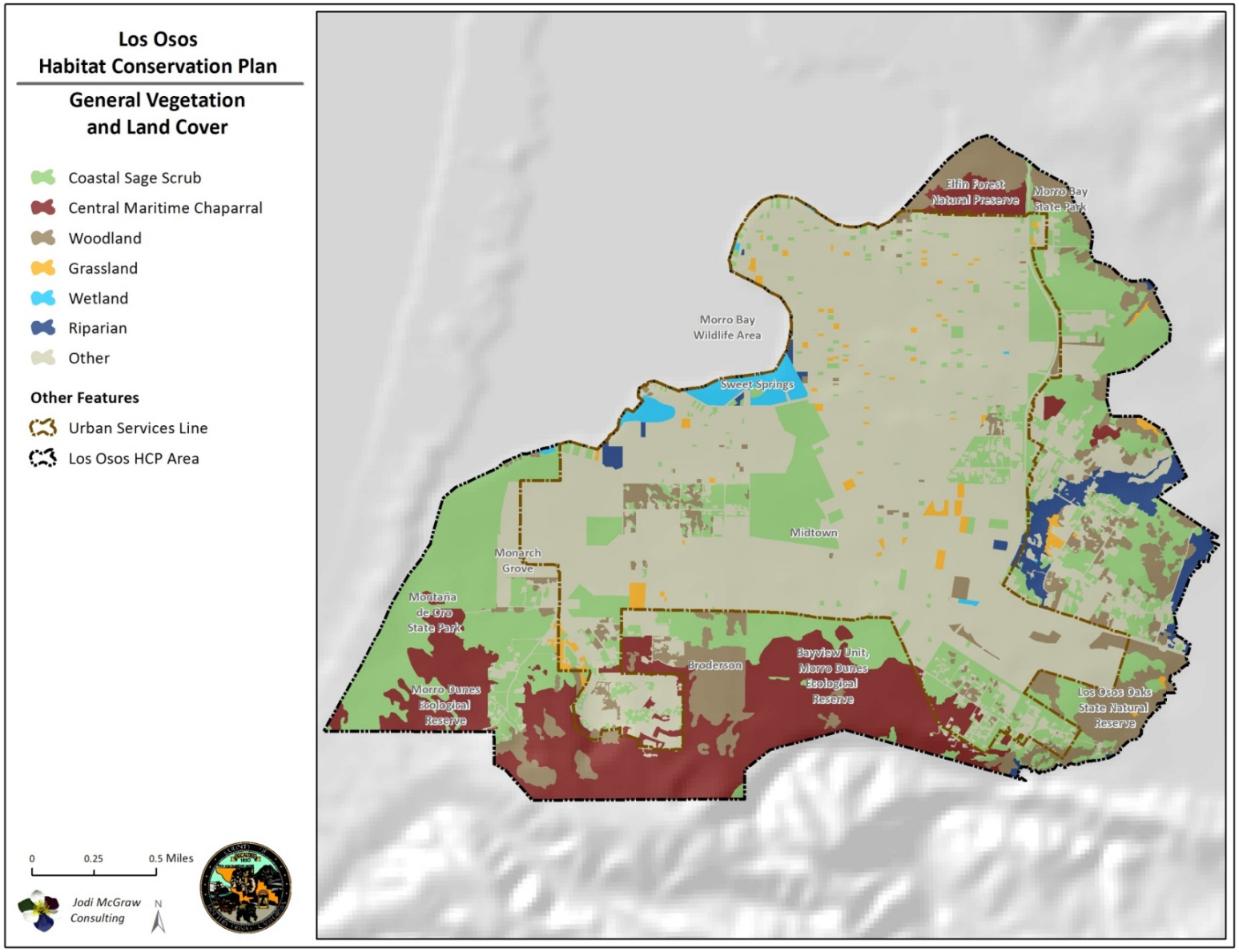

Figure 3-3: General Vegetation and Land Cover

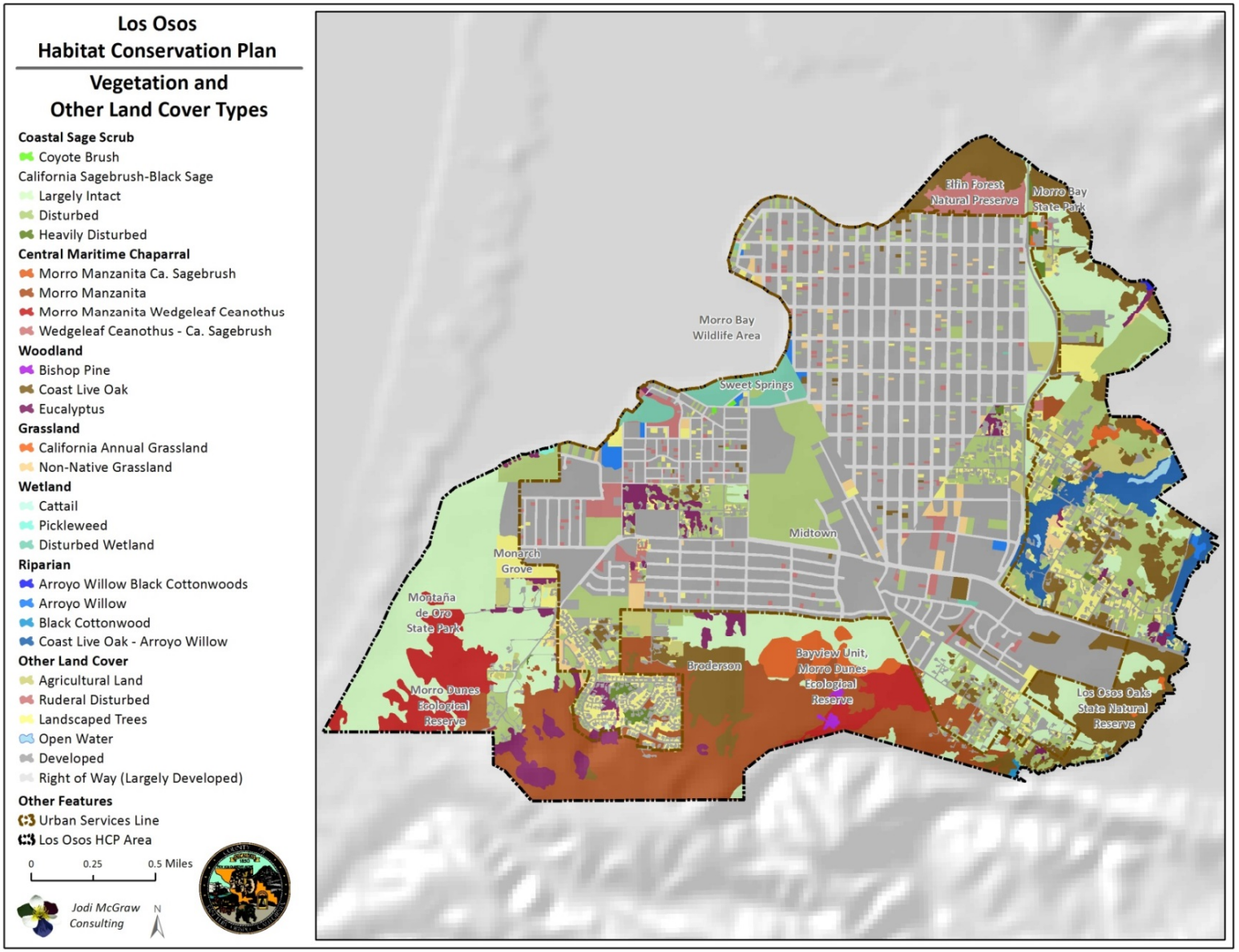

Figure 3-4: Specific Vegetation and Other Land Cover Types

4 Potential Biological Impacts/Take Assessment

The activities that will be covered by the LOHCP have the potential to negatively impact the covered species and their habitats. This chapter assesses the take/impacts both qualitatively, based on the various ways or mechanisms in which they affect species, and quantitatively, based on their direct effects on potentially occupied habitat. This assessment of impacts and take was based on the anticipated covered activities (Section 2.2), and available information about the habitats (Section 3.1.5) and occurrences (Section 3.2.2, Appendix B). It informed the conservation program (Chapter 5) and financial analyses used to determine how it will be funded (Chapter 7).

After first describing both the general effects of the covered activities and the approach used to quantify the habitat impacts, this section evaluates the anticipated effects of the covered activities on each of the covered species. It ends with an assessment of the cumulative effects of the covered activities, which considers their effects in light of past, present, and reasonably foreseeable future actions.

During plan implementation, a database will be created and used to track each project covered by the LOHCP permit and document their actual take/impacts on the covered species and the impacts to their habitats (Section 5.4.1.1). This database will be used to prepare the annual reports (Section 5.6) and enable the County, the Implementing Entity, and the USFWS to evaluate whether the benefits of the conservation program are keeping pace with, or exceeding, the impacts of the covered activities, as part of the Plan's 'stay-ahead provision' (Section 6.2.4).

4.1 General Effects and their Mechanisms

The covered activities will impact the covered species through a variety of mechanisms, which can generally be categorized as:

- **direct effects:** impacts that occur where and when the covered activity occurs; and
- **indirect effects:** impacts that occur at a different place, and/or at a later time, than the covered activity, but are still reasonably certain to occur as a result of the activity.

4.1.1 Direct Effects

The covered activities will directly affect the covered species, potentially causing take of covered animals and impacts to the cover plants, by causing:

- **direct mortality** or injury that leads to mortality to individuals (excludes Morro Bay kangaroo rat and Indian Knob mountainbalm, for which no take/impacts in the form of injury or mortality will be permitted);
- **permanent loss of habitat suitable for or occupied by covered species**, resulting from covering vegetated areas with impermeable surfaces (e.g., pavement or buildings); and/or
- **temporary loss of habitat suitable for or occupied by covered species**, such as by disturbing soil and removing vegetation in an area that will otherwise be restored. For example, temporary habitat loss will result from soil and vegetation disturbance to install a below-ground pipeline, after which habitat recovers naturally or as part of an active restoration effort.

4.1.1.1 General Consequences of Direct Effects

Habitat loss and mortality can decrease the long-term viability of the covered species, by reducing the size of their populations. Loss of habitat is the leading threat to endangered species persistence (Wilcove et al. 1998), and can be especially problematical for narrowly endemic species such as the covered species, given their natural rarity (Skinner and Pavlik 1994). Habitat loss was identified as a leading threat to the covered species when they were originally listed (USFWS 1994); accordingly, and protecting remaining habitat was identified as essential to their recovery (USFWS 1998a and 1999).

As part of more recent evaluations of the species' status, which has been documented in their five-year reviews (USFWS 2006, 2008, 2011b, and 2013), and more recent surveys, habitat loss has been characterized as having lower threat, relative to at the time the species were listed, due to successful efforts during the past twenty years to protect large tracts of high-quality habitat in the LOHCP Area (Section 2.1.2.1). Nonetheless, given their extremely small geographic ranges and narrow habitat specificity, habitat loss remains a significant factor contributing to the declines; as a result, loss of additional habitat has potential to impact their long-term viability, in the absence of efforts to offset its effects.

Even if habitat loss and direct mortality do not directly lead to the loss of populations, known as a local extinction or extirpation, they can cause a genetic bottleneck—the process through which genetic diversity is lost when populations go through a large decline (Primack 2002). These losses of genetic diversity can influence individual fitness, population growth, and thus species persistence.

4.1.1.2 Methods used to Estimate Direct Effects

Direct effects on the covered species were quantified by estimating the acres of habitat that will be affected by the covered activities. Direct effects were quantified in terms of habitat, rather than the number of individuals, for a variety of reasons including:

- this regional conservation plan is focused on protecting and improving the quality of habitat, within which the covered species can persist;
- there is no systematic information about the distribution and abundance of the covered species, which would be needed to estimate impacts to individuals; and
- this programmatic plan covers a suite of activities over 25 years, and finite project footprints are not yet known for many of the activities, such that surveys of cannot be used in advance to evaluate their effects.

The direct effects on habitat were estimated for the anticipated private development, facilities maintenance, and capital improvement projects that will be covered by the LOHCP permit (Section 2.2). The direct effects on habitat caused by the activities covered to implement the conservation program, including avoidance and minimization measures, habitat management, restoration, and monitoring, are generally anticipated to be temporary and are discussed in Section 4.2.

Because only the conservation program activities are anticipated to affect Morro Bay kangaroo rat and Indian knob mountainbalm, both of which occur within extremely limited distribution in the Plan Area, impacts to these species were also qualitatively described.

To estimate impacts to potentially occupied habitat for Morro shoulderband snail and Morro manzanita, available information about the species' ecology (Appendix B) was used to characterize the vegetation and land cover types as habitat if it is more likely than not to be occupied by the species. This analysis was designed to approximate the acres of suitable habitat that will be affected by the covered activities. This cross walk was also used to calculate the acres of potentially-occupied habitat that will be benefited by conservation and management of the Los Osos Preserve System (Section 5.8.1).

Importantly, additional occurrences of the covered species may occur outside of the areas mapped as suitable; conversely, some of the area mapped may not be occupied. Additional habitat may become suitable in the future, as a result of succession, alterations in land use, and/or restoration. Moreover, new information about covered species distribution and ecology may indicate that additional areas are suitable. For these and perhaps other reasons, this landscape-scale analysis of potentially-occupied habitat is not designed to be used to determine the appropriate measures that must be implemented to avoid and minimize impacts the covered species. Instead, Section 5.2.1 describes how project-specific site evaluations will be used to identify the avoidance and minimization measures that must be implemented, which are outlined in Section 5.2 and Tables 5-2 through 5-4.

The direct effects of the covered activities were quantified using a spatial analysis of the LOHCP Plan Area, based on a series of assumptions about the size, location, and in some cases, frequency of the anticipated private development, facilities maintenance, and capital improvement projects. Table 4-1 lists the assumptions for each of these anticipated covered activities identified in Section 2.2. The following outlines the approach used to quantify the impacts of the covered activities on vegetation and land cover types, and thus the covered species' habitat.

Step 1: Estimate the size of the disturbance envelope. The disturbance envelope (or project footprint) is the entire area that will be disturbed during the course of implementing the covered activity. For construction projects, this includes the area that will be covered by the structures or other improvements, including hard surfaces, as well as the adjacent area that will be disturbed but then later restored. For purposes of this analysis, the disturbance envelopes include areas of existing impervious surfaces and areas of fire hazard abatement, as they could not be estimated based on available information; such areas will be excluded from the take/impacts calculations conducted during implementation of the plan (Section 5.7.2). Therefore, the disturbance envelopes used in this analysis likely overestimate the actual habitat impacts and thus take/impacts to the covered species. This overestimate may be large for projects occurring in or near existing developed areas, such as developed parcels or the County right-of-way.

The disturbance envelopes correspond to the sizes outlined in Section 2.2, and Tables 2-6 through 2-8. Tables 2-6 and 2-7 outline the assumptions for the private development and redevelopment, respectively. These estimates were based on the patterns of existing development within Los Osos.

For capital projects (Table 2-8), the disturbance envelopes were largely estimated by the project proponents; where size estimates were not provided, the envelopes were estimated based on the dimensions of typical projects, and assumptions about the adjacent area that would be disturbed. As noted, although County Parks has numerous projects planned, only half of these projects are likely to be implemented during the course of the 25-year permit term; therefore, the estimated total disturbance envelope of County Parks Projects (65.6 acres) was cut in half (32.8 acres) or purposes of conducting this take/impacts assessment.

Step 2: Determine the vegetation or other land cover types that are likely to be impacted. The vegetation or other land cover types that will be impacted by each covered activity were quantified using geographic information system (GIS) featuring the best available vegetation map for the region (Section 3.1.5). Impacts were assessed using one of two main methods, depending on whether the location of the covered activity was known.

a. **Projects with Known Locations:** For activities with a known location, such as mapped project footprint (e.g., drainage basin) or specific parcels that will be entirely impacted (e.g., the Los Osos Community library parcel), the vegetation and other land cover mapped that occur within the anticipated project area were characterized as being impacted in this analysis. Similarly, the impacts of projects known to occur within the County right-of-way, such as road and major pipeline projects, were allocated to this largely-developed portion of the Plan Area.

b. **Projects with Unspecified Locations:** For activities with unknown locations, the impacts to vegetation and other land cover types were extrapolated based on their proportional occurrence within the broader geographic area in which the activity is anticipated to occur. For example, development of a five-acre facility on a 10-acre parcel featuring two acres of coastal sage scrub and eight acres of central maritime chaparral is presumed to result in the loss of one acre of coastal sage scrub and four acres of central maritime chaparral.

   When conducting such extrapolations to estimate vegetation and other land cover impacts, available information was used to attribute the habitat impacts to the most accurate area possible, given the available information (Table 4-1). Extrapolations were conducted for a variety of different geographic areas, including:

   i. **Parcels:** For activities anticipated to impact a portion of a given parcel, the acres of impact were allocated proportionally to the vegetation and other land cover types mapped within the parcel;

   ii. **Service Areas:** For activities anticipated to occur within the service area of a specific water purveyor (e.g., Golden State Water), the impacts were allocated proportionally to the vegetation and other land cover types within the service area; and

   iii. **Inside the Urban Services Line:** For projects anticipated to occur within the largely developed portion of the LOHCP Area, such as development of a new County park, impacts were allocated proportionally to the vegetation and land cover types occurring within the Urban Services Line (USL).

When extrapolating impacts, vegetation and other land cover types were excluded from the proportional allocation if they were assumed unlikely to be impacted by the activity. Most notably, impacts to wetland and riparian vegetation, as well as open water, were excluded from most development projects, as impacts to these habitats will not be covered by the LOHCP; therefore, it is assumed in this analysis that such covered activities will be sited in other habitats.

Where actual mapped project footprints contained riparian and wetland vegetation, or open water habitat, these habitat impacts were tabulated so that the total anticipated disturbance envelope would equal to the total vegetation and other land cover type impacts (Tables 4-2 and 4-3). However, take of other listed species that occur in these habitats is not covered by the permit issued by the LOHCP; therefore, proponents of projects in these areas must either avoid

such habitats, or demonstrate that they have complied with state and federal regulations for these non-covered listed species before they can receive take coverage under the LOHCP take permit (Section 6.3.1).

Step 3: Characterize the Activity Location with Respect to the Urban Services Line. The urban services line largely circumscribes the area of greater existing development density within the LOHCP Area (Section 2.1.1). Habitat within this area is generally considered to have lower long-term conservation value for the covered species. In order to assess the relative impacts of habitat loss on the covered species, the impacts of covered activities were assessed based on their location with respect to the USL.

As with the assessment of impacts to vegetation and other land cover, this assessment was conducted using GIS following one of two approaches:

- **Specified Project Location**: In many cases, the location of covered activity was known and thus could be attributed as occurring inside or outside of the USL; and
- **Extrapolate by Area:** Where the precise location of the activity was unknown, its impacts were allocated to habitats inside or outside of the USL based on assumptions about where it might occur. For example, if a Golden State Water capital improvement project lacked a specific location, its impacts were allocated as 65% inside and 35% outside the USL (35%), as these are the percentages of the utility's service area located inside and outside of the USL.

Step 4: Estimate the Permanent and Temporary Impacts. The impacts of each covered activity were broken down into the percentages of permanent and temporary impacts, based on available information about the nature of the activity and its impacts on habitat. As defined above, permanent impacts remove habitat; therefore, the percentage of the disturbance envelope to be covered with impervious surfaces or other non-habitat land cover (e.g., mulch) was characterized as permanently impacted.

Temporary impacts occur when vegetation and perhaps soil are disturbed but not permanently covered, such that habitat within the affected area is revegetated and otherwise restored to the conditions pre-project or to an improved condition. Temporary impacts commonly result during project construction, when habitat is impacted to install infrastructure or access the building site and is later restored. The area of temporary impacts for each project was estimated as a percentage of the total disturbance envelope based on available information about the project including its construction methods and dimensions.

Importantly, areas that will be chronically disturbed by covered activities were characterized as permanently impacted for purposes of this take/impacts assessment, as these areas are unlikely to be restored or otherwise contribute to the viability of the covered species populations. For example, drainage basin maintenance, which requires annual removal of accreted soil and established vegetation, was characterized as having 100% permanent impacts even though the area could be revegetated between treatments. Areas of fuel modification to create and maintain defensible space, as required by state and local fire departments (i.e., under Public Resources Code 4291) is similarly regarded as permanently impacted since ongoing vegetation removal is needed to maintain the fuel reduction standards.

Step 5: Estimate Impacts to Morro Shoulderband Snail and Morro Manzanita Habitat. To assess impacts to Morro manzanita and Morro shoulderband snail habitat, the vegetation and land cover types were categorized as follows:

1. **Habitat:** For Morro manzanita, this designation was applied to vegetation types that are suitable and has a high potential to be occupied;
2. Primary Habitat: for Morro shoulderband snail, this designation refers to native vegetation types where the species is preferentially found;
3. Secondary Habitat: for Morro shoulderband snail, these areas are either native vegetation types in which the species is found at lower frequency and/or abundance, or anthropogenic land cover types (e.g., Ruderal Disturbed) where the species may occur at higher frequency and/or density than in native vegetation types as described in sections 3.2.2.1 and B.1.6.
4. **Non-habitat:** vegetation or land cover types that are generally not suitable and unlikely to be occupied.

Table 4-4 identifies the vegetation and land cover types within each habitat category for each species, while Table 4-5 illustrates the permanent and temporary impacts to their habitats, which are illustrated in Figures 4-1 (Morro shoulderband snail) and Figure 4-2 (Morro manzanita).

Due to their extreme rarity within the Plan Area, the impacts of the covered activities on Indian Knob mountainbalm and Morro Bay kangaroo rat were evaluated based on the likely impacts to individuals, rather than habitat. To quantify the habitat benefits that will result from implementation of the conservation program, Morro Bay kangaroo rat was assumed to benefit from protection, restoration, and management of coastal sage scrub and central maritime chaparral communities, as the species can occur in the latter when they are managed for open conditions (Section 3.2.2.2). Habitat benefits for Indian Knob mountainbalm were assessed based on protection, restoration, and management of central maritime chaparral communities.

Implementation of avoidance and minimization measures developed for the fire hazard abatement measures as part of the Community Wildfire Protection Plan (Section 5.2.4, Table 5-4) will avoid impacts to Morro Bay kangaroo rat and Indian Knob mountainbalm. These measures will also reduce take of Morro shoulderband snail in the form of injury or mortality and reduce the severity of impacts to Morro manzanita caused by trimming of individual shrubs. As a result, the CWPP will result in only short-term negative impacts to the covered species and their habitat, which are anticipated to benefit from the vegetation modifications including invasive plant removal in the long term.

Given the limited scope of the CWPP and the requisite avoidance and minimization measures that will be implemented to protect the covered species during the fire-hazard-abatement activities (Table 5-4), implementation of the CWPP is expected to have a negligible effect on the covered species. Habitat impacts are anticipated to be temporary: they do not convert the land to hardscape or other impermeable surface. Instead, the treated areas will support native plants and intact soils that can support the covered species. Additionally, certain aspects of the CWPP fire hazard abatement treatments have the potential to improve habitat conditions for covered species in the long term, by removing invasive plant species and creating early-successional conditions required by Morro Bay kangaroo rat. Accordingly, this covered activity was not subject to the analysis of direct effects that is outlined above, and that was used to tabulate habitat impacts in this chapter. Nonetheless, the take and impacts of CWPP treatments on the covered species are assessed qualitatively in sections 4.2 and 4.3.

4.1.2 Indirect Effects

The covered activities can also indirectly, negatively affect the covered species, by degrading adjacent habitat, fragmenting habitat, and increasing human activity in the area.

4.1.2.1 Habitat Degradation

Through a variety of mechanisms, the covered activities can lead to the degradation of habitat in adjacent areas, including existing protected lands as well as habitat that will be protected through implementation of the LOHCP conservation program (Section 5.3). Generally speaking, habitat degradation is the reduction in the quality of the habitat due to anthropogenic factors, including those outlined below, which can reduce or eliminate the ability of the covered species to inhabit these areas. Resulting population reductions can reduce their long-term viability, as smaller populations are more susceptible to demographic and environmental stochasticity—chance events in population demography and environmental conditions, respectively, which can reduce populations and result in extirpations (localized extinctions), to which small populations are more vulnerable (Gilpin and Soulé 1986, Land 1993, Matthies et al. 2004). Habitat degradation causes population bottlenecks that can reduce genetic diversity, which can reduce individual fitness and thus population growth (Keller et al. 1994, Young et al. 1996). Small populations can ultimately suffer from inbreeding depression—the reduced fitness (performance) of a population as a result of breeding of related individuals (Hedrick and Kalinowski 2000, Keller and Waller 2002).

The following sections describe specific mechanisms by which the covered activities could indirectly degrade habitat for the covered species. These and other factors will be the focus of habitat restoration and management conducted within the LOHCP Preserve System to mitigate the impacts of the covered activities (Section 5.3).

4.1.2.1.1 Promote the Invasion or Spread of Exotic Species

Some covered activities can indirectly degrade habitat for the covered species by promoting the invasion and spread of exotic plants and animals, which threaten the persistence of many endangered species (Wilcove et al. 1998), including the covered species (USFWS 1994, 1998, 1999, 2006, 2008, 2011b, 2013). When abundant, exotic plants reduce the ability of habitat to support populations of native species both directly, through competition (Carlsen et al. 2000), and indirectly, by altering habitat conditions so that they are no longer suitable (D'Antonio and Vitousek 1992, Levine et al. 2003). Exotic animals may similarly affect the covered species. For example, the brown snail (*Helix aspersa*) is hypothesized to compete with the Morro shoulderband snail (USFWS 1994), while domestic cats (*Felis catus*) and European red foxes (*Vulpes vulpes*) may date predate upon native mammals including the Morro Bay kangaroo rat (USFWS 2011b).

Human activities can promote the invasion and spread of exotic species through a variety of mechanisms. For plants, these include:

1. Planting exotic plant species into landscapes, from which they spread into adjacent habitat;
2. Removing vegetation or disturbing soil, which can promote establishment and growth of disturbance-adapted exotic plants;

3. Vectoring seed of exotic plants into intact habitat areas on their clothes, pets, stock (e.g., horses), or equipment.

The occurrence of exotic animals in habitat areas can similarly be promoted by the covered activities. Development can increase the density of dogs and cats and their proximity to habitat areas. Non-native snails can similarly spread from nearby gardens and landscapes where they are introduced, and their populations are promoted by watering and other horticultural activities.

4.1.2.1.2 Promote Incompatible Fire Management

Some of the covered activities can indirectly negatively impact the covered species by further altering the fire regime of the Baywood fine sand communities. Fire is a natural component of the disturbance regime in the ecosystem, and the covered species exhibit many adaptations to fire and the conditions it creates. Fire promotes Morro manzanita seed germination and creates conditions appropriate for seedling establishment (Tyler et al. 2000). Fire similarly is thought to promote establishment of Indian Knob mountainbalm from seed as well as vegetatively (Wells 1962, USFWS 1998a). Fire is thought to have played an important role in maintaining early successional conditions characterized by a low density of subshrubs and perennial herbs (e.g., *Croton californicus, Horkelia cuneata,* and *Acmispon glaber*), which is the preferred habitat of Morro Bay kangaroo rat (USFWS 1999). Fire may similarly create and maintain habitat for Morro shoulderband snail, which occurs in coastal sage scrub but is not typically observed in later-successional central maritime chaparral; the species is itself vulnerable to mortality due to fire (Roth 1985, Walgren 2003a).

Within the LOHCP Area, fires are suppressed in order to protect lives and property. Removing fire from the ecosystem may threaten persistence of the fire-adapted covered species. For Morro manzanita and Indian Knob mountainbalm, an excessively long fire return interval (time between fire) can lead to senescence of the adult population without regeneration of a cohort (group) of seedlings of sufficient density to replace them (Tyler et al. 2000). Likewise, a long fire-free period may result in canopy closure in coastal sage scrub and ultimately succession to central maritime chaparral or coast live oak woodland, thus degrading habitat for Morro Bay kangaroo rat and Morro shoulderband snail (USFWS 1998a, 1999).

Although unlikely to alter the current policy of fire suppression, implementation of the covered activities may exacerbate fire exclusion by further impeding the use of fire as a management tool (e.g., prescribed fire) in protected lands, where it can be used to promote the natural community structure and species composition of the Baywood fine sand communities and the populations of the covered species. Increased density of human development in proximity to parks and ecological reserves could increase the concern about the threat to public health and safety posed by fire management.

The covered activities may also indirectly impact the covered species by facilitating human-caused fires. The covered activities will increase the population density and the proximity of development to protected lands, both of which will increase the probability of a wildfire occurring in the protected habitat areas. Such wildfires can cause mortality of the covered species and could lead to the extirpation of Morro Bay kangaroo rat and Indian Knob mountainbalm which occur at extremely low density. Fires could similarly eliminate occurrences of Morro shoulderband snail (Walgren 2003a). Due to the fragmented nature of the remaining habitat, recolonization of habitat following fire may be inhibited.

In addition to killing individuals and potentially extirpating occurrences or populations, fire may negatively impact the covered species populations by causing soil erosion, which can preclude native

plant re-establishment, and promoting the invasion and spread of exotic plant species. Many exotic plants are adapted to establishing within the low-litter, open-canopy conditions created by fire (Hobbs and Huenneke 1992, Haidinger and Keeley 1993).

The risk of wildfire in the region, which results from high density development occurring immediately adjacent to fire-prone vegetation, has promoted vegetation management projects designed to reduce the risk of wildfire. Such vegetation management projects, which are often conducted by fire safe councils and fire prevention agencies, can include establishment of shaded fuel breaks at the wildland-urban interface, which are designed to reduce the risk of wildfire and slow its rate of spread. Efforts to conduct vegetation management may be intensified as a result of implementation of the covered activities, due to the increased development and thus risk of lives and property. Such vegetation management projects have the potential to negatively impact the covered species directly, by killing individuals Morro manzanita and Morro shoulderband snail, which can be trampled during vegetation removal, and also by removing suitable habitat, including downed woody debris used by Morro shoulderband snail. Vegetation management projects can also impact the covered species indirectly, by promoting the invasion and spread of exotic plants, which are often promoted by disturbance and thrive in the open-canopy conditions of shaded fuel breaks.

Vegetation management projects also have the potential to promote populations of the covered species, by simulating the beneficial effects of fire in this fire-adapted system; for example, vegetation management can possible be used to re-create early successional conditions in coastal sage scrub that are required by Morro Bay Kangaroo rat. They can also potentially promote regeneration of Morro manzanita populations at risk of 'senescence risk', where prescribed fire is not feasible. Research and monitoring will be needed to fully evaluate the positive and negative, short-term and long-term, effects of vegetation management and other fire management in the LOHCP Area.

4.1.2.1.3 Promote Incompatible Recreation Activities

Some of the covered activities can indirectly negatively impact the covered species by increasing the frequency of recreation within remaining habitat areas. New development will increase the human population overall, as well as increase the proximity of development adjacent to parks, reserves, and other open spaces. The covered activities include creation of new trails within Los Osos, some of which will connect developed areas to parks and reserves on the perimeter of the Plan Area (Table 2-8, Figure 2-5). As a result, these areas will likely receive more frequent use, including both allowed use of trails for passive recreation, as well as unauthorized uses.

Like all disturbances, recreation impacts plant communities and species in various ways, which depend on the type, areal extent, and frequency of the use; these factors can interact with conditions of the habitat in which they occur, including the topography (e.g., slope), soil conditions, and vegetation, to determine the ultimate effects of the use (Section D.2.1). Generally speaking, recreational use will have greater impacts if it occurs on steep slopes with loose, sand soil, where vegetation removal renders slopes vulnerable to erosion, which further degrades habitat through soil loss. Negative impacts of recreation can be reduced by siting trails appropriately and implementing measures to facilitate compliance with the trail use provisions, including installing signage and symbolic fences, and conducting trail patrols.

4.1.2.1.4 Increase Pollution including Nitrogen Deposition

The covered activities have the potential to indirectly impact the covered species by increasing pollution. Greater human development and associated activities including automobile use in the region can increase concentrations of nitrogen in the atmosphere, the deposition from which can fertilize the otherwise low-nutrient Baywood fine sand soil. This could promote the invasion and spread of exotic plants, particularly annual grasses, and can be promoted by increased nitrogen (Weiss 1999, Brooks 2003, James et al. 2011). These and other exotic plants can complete with the covered plant species, degrade habitat conditions for the covered animal species, and create fine fuels that can increase the risk of wildfire, which can further degrade habitat (Section 4.1.2.1.2).

4.1.2.2 Habitat Fragmentation

The covered activities can indirectly negatively impact the covered species by fragmenting their habitat. Private development and capital public and private utility projects including roads and trails can fragment habitat for less mobile species, including Morro shoulderband snail and plants that are lack long-range seed dispersal mechanisms, such as wind or dispersal by wide-ranging animals (e.g., medium and large mammals or birds).

Like habitat loss, habitat degradation can fragment remaining covered species habitat. For example, fire suppression that converts coastal sage scrub and central maritime chaparral communities to coast live oak woodland also fragments remaining habitat for the covered species, which preferentially occur in the shrublands.

Fragmentation can effectively isolate individuals, thus creating multiple smaller populations where there was previously one large population (Primack 2002, Fahrig 2003). By eliminating or greatly reducing the likelihood of immigration into newly separated habitat patches, fragmentation reduces population size and therefore the likelihood of population persistence amidst demographic and environmental stochasticity (Gilpin and Soulé 1996, Hanski 1998). Fragmentation also limits opportunities for a “rescue effect”, whereby immigration from an adjacent patch can boost population growth (Brown and Kodrick-Brown 1997, Hanski et al. 1995). Fragmentation can also decrease genetic diversity by reducing population size and causing genetic bottlenecks. Small fragmented populations can ultimately suffer from inbreeding depression, which can further imperil the covered species populations. This scenario is likely for Indian knob mountainbalm, given its exceptionally population small size.

To mitigate these potential effects, the LOHCP conservation program includes habitat protection, restoration, and management measures, including efforts to maintain habitat connectivity and protect large contiguous blocks of habitat that can promote long-term viability of the covered species (Chapter 5).

4.2 Anticipated Take of Covered Animals

The following sections integrate the qualitative assessment of indirect effects and quantitative and qualitative assessments of direct effects to characterize the anticipated take of the covered animal species. The assessment of net impacts compares the anticipated negative effects of the covered activities, to the positive benefits anticipated from implementation of the LOHCP conservation program based on the LOHCP Preserve System configuration scenario (Section 5.8.1).

4.2.1 Morro Shoulderband Snail

The covered activities will impact Morro shoulderband snail individuals and habitat both directly and indirectly, causing take as defined under ESA. The effects of these impacts will be offset by the protection, restoration, and management of habitat in the LOHCP Preserve System (Section 5.3) and are not anticipated to affect the long-term persistence of the species within the LOHCP Area or throughout its range.

4.2.1.1 Impacts to Habitat

The covered activities are anticipated to impact approximately 189 acres of habitat suitable for Morro shoulderband snail (Table 4-5), which includes all upland habitats in the Plan area (Table 4-4, Figure 4-1). This is the area of mapped vegetation types with high potential to support the species that is anticipated to be impacted by the covered activities, other than the conservation program (Table 4-4, Figure 4-1). This represents 20 percent of the species habitat (935 acres) within the Plan Area; 48 percent (445 acres) is within existing protected lands, and an additional 37 acres (4 percent) is anticipated to be protected through habitat protection efforts conducted as part of the LOHCP conservation program (Section 4.2.1.3).

The covered activities are anticipated to impact an additional 289 acres (15%) of the 1,898 acres of habitat that is potentially suitable for Morro shoulderband snail (Table 4-5). This habitat primarily includes existing developed areas and County rights-of-way, where prior surveys have detected the species (Table 4-5, Figure 4-1). Ongoing monitoring for Morro shoulderband snail as part of the conservation program for the Los Osos Wastewater Treatment Project has revealed that Morro shoulderband snail frequently inhabit, and are often found at high abundance, in such ruderal and disturbed areas (SWCA 2013, 2014, 2015, 2016, and 2017), providing further support for their inclusion in the analysis of take and habitat impacts.

The area of primary and secondary habitat estimated to be impacted by the covered activities is greater than the acres supporting Morro shoulderband snail that will be impacted, as the species does not occupy the entire area of primary and secondary habitat. Moreover, projects occurring on larger parcels supporting the covered species can avoid direct impacts to habitat or individuals, by implementing the required protection measures, including siting the project disturbance envelope away from occupied habitat (Section 5.2).

Of the total 478 acres of habitat for Morro shoulderband snail anticipated to be impacted, 429 acres (90%) is located inside the urban services line (Figure 4-1)—the portion of the Plan Area that is already densely developed (Section 2.1.1), and where the Estero Area Plan will focus remaining development (Section 2.1.2). When compared with habitat outside of the USL, habitat within the USL is more degraded, in that it features higher cover by exotic plants and lower native plant cover due to vegetation management (e.g., frequently mowing), intense recreational use, and other historic and current land uses. Habitat within the USL also occurs primarily on small parcels, which are highly fragmented by roads and other development. While surveys document the occurrence of Morro shoulderband snail in fragmented and degraded habitat, such areas provide lower long-term conservation value for the species. Due to the small size and degraded nature of the habitat patches, in the USL, the Morro shoulderband snail population there is likely smaller and more vulnerable to extirpation due to environmental or demographic stochasticity (than habitat of the same size outside of

the USL). If Morro shoulderband snails are extirpated from habitat patches in this area, the probability of recolonization is lower due to habitat fragmentation, which will constrain dispersal of this species.

An estimated 30 acres of habitat and 20 acres of secondary habitat for Morro shoulderband snail habitat located outside of the USL will be impacted by the covered activities (Table 4-5, Figure 4-1). This will primarily be due to low-density residential development and redevelopment on primarily larger parcels, though some public and private utility projects will also impact small areas of habitat in this area.

The caps on the disturbance envelopes for private development outside of the USL (30,000 square feet; Table 2-6), and the requirement for on-site habitat set asides for new development on parcels in the portion of this area that is within the Priority Conservation Area (Section 5.7.2.1.1) are collectively designed to promote persistence of Morro shoulderband snail on even developed parcels in order to support populations in protected habitat and habitat connectivity and landscape permeability in this area.

Of the total 478 acres of suitable and potentially suitable habitat for Morro shoulderband snail impacted by the covered activities, 59 acres (12%) is anticipated to be temporarily impacted (Table 4-5). This represents the area adjacent to, or in the access path of, the improvement area, which will be degraded as a result of construction. These habitat areas will be restored to the pre-project or better habitat condition as part of the measures to minimize impacts to the covered species (Section 5.2).

Fuel hazard abatement treatments implemented as part of the CWPP are anticipated to impact an additional 45.6 acres of Morro shoulderband snail primary habitat, as well as 15.7 acres of secondary habitat for this species. These treatments, as well as other fuel breaks created on lands within the Preserve System which are created to protect habitat from wildfire, which can include removal of dead plants, construction of shaded fuel breaks through thinning and selective removal of shrubs and trees, as well as mowing of non-native grasslands, are anticipated to have temporary impacts on Morro shoulderband snail habitat, by removing plants used by the species for cover and food. By targeting invasive plants, such as eucalyptus, veldt grass, and exotic annual grasses, fuel hazard abatement projects can promote growth of native plant species and enhance habitat conditions in the long-term. Nonetheless, these treatments have the potential to negatively impact Morro shoulderband snail habitat in the short term, and cause in the form of capture, to move individuals within the treatment areas out of harm's way (Section 5.2.4, Table 5-4).

4.2.1.2 Impacts to Individuals

The covered activities will impact Morro shoulderband snails occurring within their disturbance envelopes, where vegetation removal and soil disturbance can cause individuals to be trampled, crushed, buried or otherwise injured or killed. These impacts will be reduced through implementation of avoidance and minimization measures, which for certain projects including the CWPP will include pre-project surveys to capture and relocate the species out of harm's way (Section 5.2.1, 5.2.4, Table 5-4, Section F.2).

Habitat modifications caused by the covered activities, whether permanent or temporary, can also increase Morro shoulderband snail vulnerability to exposure, including predation and desiccation. Similarly, vegetation removal can also reduce food availability by removing plant biomass. As a result, habitat impacts have the potential to impact individuals of this species.

The number of individual Morro shoulderband snails subject to take by the covered activities is impossible to predict for this programmatic plan and will likely vary greatly for each covered activity depending on the nature of activity and the condition of the habitat that it affects. Notably, even non-native dominated habitat, including ruderal disturbed vegetation, and landscaping along County rights-of-way, can support relatively high concentrations of this species, as were observed during construction monitoring for the Los Osos Wastewater Plant (SWCA 2013, 2014, 2015, 2016, and 2017).

Impacts to individual Morro shoulderband snails may also result from implementation of the LOHCP conservation program. Pre-construction surveys and construction monitoring to capture and move individuals out of harm's way will greatly reduce take in the form of injury or mortality. Although such handling has some potential to cause take of Morro shoulderband snail in the form of injury or mortality, the incidence of this is low if the handling is done correctly (J. Vanderwier, pers. comm. 2017).. Monitoring studies to track the status and trends of populations can similarly result in negative impacts to individuals handled and relocated during monitoring.

Morro shoulderband snail can also be impacted by habitat restoration and management activities, including erosion stabilization and revegetation, exotic plant control projects, and fire hazard abatement activities.

Notably, Morro shoulderband snails may be impacted by the use of herbicides to control exotic plants as part of work to implement the LOHCP conservation strategy; specifically, to restore and manage habitat that has been degraded by veldt grass, exotic annual grasses, and iceplants. Morro shoulderband snails could be exposed to herbicides by ingestion and absorption while living in, or migrating through, a recently treated area. Direct herbicide spray or drift from spray could contaminate soil; leaves, stems and branches of shrubs; leaves, mold, and fungi in plant litter; and potential shelter sites for Morro shoulderband snails, including downed wood, rocks, or debris piles.

The potential effects of herbicide exposure for Morro shoulderband snail are unknown as most standard toxicology analyses do not test effects of pesticides on snails (USFWS 2018). A study found that the herbicide glyphosate caused genotoxicity to *Bulinus truncates*, an air-breathing, freshwater snail (Bakry et al. 2015). Aquatic snails exposed to glyphosate exhibited abnormalities in development and reproduction (Tate et al. 1997). However, atrazine was concluded to have no effects on four species of freshwater snails (Gustafson et al. 2015).

Exotic plant control and other restoration and management projects, which will be designed and are intended to improve habitat conditions and promote long-term population viability, will be implemented following methods to avoid or minimize impacts to Morro shoulderband snail (Section 5.2). For example, pre-project surveys and project monitoring will be used to capture and move out of harm's way any individuals observed. Treatments will be conducted in small-scale areas, where feasible, to avoid impacting large numbers of individuals, and refugia will be maintained in or near treatment areas to facilitate recolonization of the affected habitat area.

Despite these measures, some impacts to individual snails may occur as a result of even well-designed and carefully-implemented habitat management and restoration treatments. For example, in the Los Osos Wastewater Plant construction projects, Morro shoulderband snails were drowned after being attracted to puddles created in tarps used to cover equipment in a construction area (SWCA 2013). Implementation of the conservation program through an adaptive management framework, in which

new information, including monitoring results, is used to enhance effectiveness of the program elements, will reduce the likelihood of such inadvertent impacts.

Finally, Morro shoulderband snail individuals may be killed, injured, or otherwise harmed during implementation of the biological effectiveness monitoring protocols (Section E. 2) and also pre-project surveys conducted to minimize impacts of the covered activities by moving individuals from harm's way (Section F.2). Long-term monitoring to examine the effectiveness of the conservation program at achieving the Plan biological goals and objectives (Section 5.1) will entail surveys for and counts of Morro shoulderband snails, to evaluate their distribution and abundance within the LOHCP Preserve System (Section 5.4.2.1, Section E.2. Surveys and counts for Morro shoulderband snail might also be used to evaluate the effectiveness of specific habitat restoration and management treatments as part of project-specific monitoring (Section 5.4.2.2). Covered activities on selected parcels will also need to be preceeded by pre-project surveys in which biologists search for Morro shoulderband snails and then move them to suitable habitat that will not be impacted by the project (Section F.2) While these monitoring protocols and pre-project surveys will be conducted by highly-qualified, USFWS-approved biologists following procedures designed to avoid harming individuals, individuals will likely be taken in the form of harming and harassing, and a small number will even be inadvertently injured or killed .

4.2.1.3 Assessment of Net Impacts

The negative effects of the covered activities on Morro shoulderband snail populations will be offset by the beneficial effects that will result from efforts to protect, restore, and manage habitat within the LOHCP Preserve System—the network of protected lands that will be managed and monitored in perpetuity to promote populations of, and habitat conditions for, the covered species (Section 5.3).

In the scenario used for this analysis (Section 5.7.2.3.2), the LOHCP Preserve System will benefit 231 acres of habitat suitable for Morro shoulderband snail (Section 5.8.1; Table 5-10). Specifically, it is anticipated to protect and manage, in perpetuity, 49 acres of habitat suitable for Morro shoulderband snail that is currently unprotected and thus subject to development and other land uses that could degrade it. An estimated six acres of this newly-protected habitat will be restored, to re-create habitat conditions where they have been severely degraded by erosion and dense exotic plant infestations (Section 5.7.2.3.2; Table 5-10).

The 386-acre Preserve System will also restore 26 acres of habitat suitable for Morro shoulderband snail and provide additional management for another 193 acres of suitable habitat within existing protected lands; these parks and reserves feature some of the largest areas of remaining habitat, where additional restoration and management can promote species population sizes and viability. When these existing protected land acreages are multiplied by the mitigation equivalency or crediting ratios (Section 5.7.2.3.1), which relate the conservation value of acquiring, restoring, and managing new habitat to the value of not implementing the typical covered activity, a total of 301-acre equivalents of Morro shoulderband snail habitat will benefit from the LOHCP Preserve System (Table 5-10). This reflects the greater quality and long-term viability of the habitat in the Preserve System compared to that which will be impacted by the covered activities. Therefore, protecting, restoring, and managing an equivalent of 139 acres of habitat in the LOHCP Preserve System will more than compensate, for the anticipated loss of 189 acres of habitat for the species due to the covered activities (Table 4-4). For these and other reasons outlined in Section 5.8, implementing the Plan is anticipated to have a large, positive effect for persistence of Morro shoulderband snail including by contributing to recovery.

4.2.2 Morro Bay Kangaroo rat

4.2.2.1 Impacts to Habitat

Covered activities permitted under the LOHCP are not anticipated to permanently impact habitat occupied by Morro Bay kangaroo rat. Suitable habitat for this species is primarily located outside of the USL. In areas of suitable habitat for the species, private development and public and private utility projects will only be permitted under the LOHCP pending a negative visual assessment or, as needed, a negative presence/absence survey (species not found; Section 5.2.1, Section F.1). Moreover, as part of the compensatory mitigation component of the LOHCP conservation program, the Implementing Entity will work with willing landowners to protect remaining private land featuring suitable habitat for Morro Bay kangaroo rat as part of the LOHCP Preserve System (Section 5.3); as a result, fewer covered activities (e.g., private residential development projects) are likely to be conducted than were included in the covered activities and thus take/impacts assessment (Table 2-8).

Suitable habitat for Morro Bay kangaroo rat may be temporarily impacted by fire hazard abatement treatments as part of the CWPP (Section 2.2.7), as well as well as other fuel breaks created on lands within the Preserve System to protect them from wildfire. Specifically, the creation of the Los Osos fuel break will require removing some plants on the perimeter of the County's Broderson Property and adjacent the Bayview Unit of the Morro Dunes Ecological Reserve, which is owned by the state and managed by CDFW (Figure 2-7). These treatments have the potential to enhance habitat for the endangered species, by removing invasive plants and dead or senescent vegetation, which can create more open habitat conditions preferred by this species.

Habitat suitable for Morro Bay kangaroo rat may also be temporarily impacted by habitat management and restoration activities implemented within the LOHCP Preserve System as part of the Plan's conservation program (Sections 2.2.7 and 5.3). Activities that will take place on existing protected lands, as well as new lands protected as part of the LOHCP, will include restoration of eroded areas such as old roads and trails, exotic plant control, and fire management including vegetation management to simulate the beneficial effects of fire. These and other treatments designed to enhance habitat for Morro Bay kangaroo rat in the long term, may have short-term, negative impacts on habitat. These temporary effects can include soil disturbance and removal of native plants, which can temporarily reduce food availability for this herbivorous small mammal.

4.2.2.2 Impacts to Individuals

The covered activities will avoid take of Morro Bay kangaroo rat individuals, which will not be hunted, harmed, harassed, or captured, other than as part of surveys conducted to evaluate presence (Section 5.2.1; Section F.1) and to conduct long-term monitoring (Sections 5.4 and Section E.5). Prior to implementation of activities within potentially occupied habitat for the species, pre-project visual assessments and then surveys, if warranted, will be conducted to evaluate whether the species is present (Section 5.2.1). If the species is detected, all work will stop immediately, and the project proponents will contact CDFW and the USFWS to discuss project permitting. Take of individuals, in the any form with the exception of impacts to habitat as part of form of hunting, pursuing, catching, capturing, or killing, of this species will not be permitted under this plan (Section 1.4).

4.2.2.3 Assessment of Net Impacts

The short-term, negative effects of the covered activities on Morro Bay kangaroo rat habitat due to implementation of the covered activities will be offset by the long-term benefits that will result from protection, restoration, and management of suitable habitat for this species within the LOHCP Preserve System. Under the configuration scenario developed for this assessment (Section 5.7.2.3.2), the Preserve System will benefit 240 acres of coastal sage scrub, the preferred habitat for this species, and 110 acres of central maritime chaparral communities, which Morro Bay kangaroo rat can utilize when in an early-successional state. These habitat benefits will be accomplished through the following (Table 5-10):

- protecting and managing an estimated 33 acres of coastal sage scrub and 42 acres of central maritime chaparral communities that are currently unprotected;
- restoring 26 acres of coastal sage scrub and 9 acres of central maritime chaparral in existing protected lands, including through vegetation management projects to promote early-successional habitat conditions; and
- actively managing an additional 226 acres of coastal sage scrub and 67 acres of central maritime chaparral communities within parks and reserves where habitat conditions can be improved through enhanced management to meet unmet needs (Section 5.3.3.1).

The covered activities are anticipated to impact just 189 acres of coastal sage scrub, and 18 acres of central maritime chaparral (Table 4-3). Therefore, the 475-acre equivalents of benefits to these communities that are anticipated to occur through implementation of the conservation program will offset the effects of the covered activities at a more than 2:1 ratio (Section 5.8.1 ; Table 5-10). This ratio reflects the anticipated net benefits of the Plan for Morro Bay Kangaroo rat, as the habitat benefited by the conservation program has much higher viability than that which will be impacted by the covered activities. Specifically, of the 207 acres of coastal sage scrub and central maritime chaparral anticipated to be impacted by the covered activities, 166 acres (80%) is anticipated to be inside the Urban Services Line (Table 4-3). Habitat within this already densely-developed portion of Los Osos has very little long-term conservation value for Morro Bay kangaroo rat, as the species is highly-sensitive to the effects of habitat fragmentation, including predation by domestic cats and dogs. In contrast, the 475-acre equivalents of habitat benefits resulting from protection, restoration, and/or management of 350 total acres of coastal sage scrub and central maritime chaparral communities in the 386-acre Preserve System (Table 5-10), will all occur in larger, contiguous habitat areas largely outside of the USL, including the Morro Dunes Ecological Reserve where the species was last observed. Restoration and active management of this and other high-quality habitat areas are necessary to recover Morro Bay kangaroo rat (USFWS 1999, Section 5.8).

4.3 Anticipated Impacts on Covered Plants

The following sections integrate the qualitative assessment of indirect effects and quantitative and qualitative assessments of direct effects to characterize the anticipated impacts of the covered plant species.

4.3.1 Morro Manzanita

4.3.1.1 Impacts to Habitat

The covered activities will impact an estimated 40 acres of habitat suitable for Morro manzanita (Tables 4-4 and 4-5, Figure 4-2). This is the area of central maritime chaparral, as well as coast live oak woodland—the mapped vegetation types that can support the species—that are anticipated to be impacted by the covered activities (excluding the conservation program and CWPP; Tables 4-3 and 4-4). This represents just over five percent of the species total habitat (798 acres) within the Plan Area; 491 acres (62%) is within existing protected lands, and an additional 98 acres (12%) is anticipated to be protected through implementation of the Plan's conservation program (Table 5-10).

Implementation of the CWPP is anticipated to impact an additional 29.0 acres of Morro manzanita habitat, 19.1 acres of which are anticipated to be modified under the Plan for the first time; the remaining 9.8 acres have been previously modified and will just be treated to maintain the desired conditions (Section 2.2.7). In these areas, fuel reduction treatments may actually benefit Morro manzanita by stimulating seed germination and creating open canopy, bare mineral soil conditions that can promote seedling establishment. Conversely, these treatments may degrade habitat for Morro manzanita if they promote the invasion and spread of exotic plants, though these indirect negative effects can be prevented through follow-up invasive plant removal.

The estimated area of suitable habitat that will be impacted by the covered activities is greater than the actual acres covered by the Morro manzanita, as the species does not occupy the entire area of suitable habitat; most notably, the species likely occurs at only limited abundance within the 22.5 acres of coast live oak woodland that are anticipated to be impacted (Table 4-3). Coast live oak woodland was included as 'habitat' (Table 4-4) for purposes of this analysis, as the Morro manzanita occurs at low frequency and abundance in this community (Section 3.1.5.2.3). Moreover, some projects occurring on parcels supporting the Morro manzanita habitat can be sited so the project disturbance envelope avoids suitable habitat.

The impacts to suitable habitat for Morro manzanita are anticipated to occur nearly evenly inside (20.6 acres) and outside (19.5 acres) of the USL (Table 4-5, Figure 4-2). This results from inclusion of coast live oak woodland as Morro manzanita habitat; 67% of total impacts the central maritime chaparral communities, where the species occurs at greatest frequency and abundance, will occur outside the USL (Table 4-3). There, the impacts primary impacts will result from single-family residential development. Shrubs within the building footprint will be removed, as might some Morro manzanita individuals within the 100-foot area around structures in which woody vegetation must be well-spaced in order to maintain defensible space for fire safety (Section 2.2.4).

Of the 41 acres of habitat to be impacted, 5 acres (12%) is anticipated to be temporarily impacted. This represents the area adjacent to, or in the access path of, the improvement area, which will be degraded as a result of construction but will be restored to the pre-project or better habitat condition in order to minimize effects on the covered species (Section 5.2).

4.3.1.2 Impacts to Individuals

The covered activities will impact Morro manzanita individuals that occur within the disturbance envelopes of projects that are sited in areas where the species cannot be avoided. Established individuals will be killed as will viable dormant seed in the areas permanently covered by development, other impervious surfaces, and landscaping elements that are not conductive to the species (e.g., turf grass, weed matting etc.). Implementation of the CWPP minimization measure, which precludes removal of Morro manzanita and requires that canopy thinning and limbing be minimized (Table 5-4), will limit impacts to individuals associated the fire hazard abatement treatments within the CWPP (Section 5.2.4); however, some mortality may result from this covered activity. Overall, the number of individuals is impossible to predict for this programmatic plan and will likely vary greatly for each covered activity depending on the nature of activity and the condition of the habitat that it affects.

Individual Morro manzanita may also be impacted during implementation of the conservation program. Individuals could experience die back (loss of biomass) or mortality due to use of herbicides to control invasive plants. The potential for this will be reduced through implementation of elements of an integrated pest management approach to exotic plant control, in which: 1) non-chemical treatments are used in areas supporting Morro manzanita, wherever possible, and 2) chemical treatments deemed necessary to achieve the management objectives are conducted using techniques that will prevent chemical contact with Morro manzanita, such as cut stump treatment or wicking, and foliar spray only away from Morro manzanita and when winds are calm.

Adult Morro manzanita shrubs are also anticipated to be killed by fire or fire surrogates—treatments that simulate the beneficial effects of fire, including mechanical vegetation removal. These treatments will be used to maintain the mosaic of natural communities of the Baywood fine sands ecosystem and promote regeneration of Morro manzanita and Indian Knob mountainbalm, among other fire-dependent species (Section D.3). These direct, negative, short-term impacts to the individuals are anticipated to promote long-term persistence of the populations by facilitating regeneration through germination of seeds of this obligate seeding plant from the soil seed bank (Section B.2.3). Fire and fire surrogates have the potential to facilitate the invasion and spread of exotic plants that are adapted to such disturbance and the conditions it creates (Section D.3.1.2). Accordingly, fire and fire surrogate treatments will be monitored to evaluate the establishment of exotic plants, and remedial exotic plant removal treatments employed to prevent exotic plants from outcompeting Morro manzanita seedlings and other native plants. Other habitat management and restoration treatments, including revegetation of denuded areas, and control of exotic plants such as eucalyptus, will similarly enhance habitat for this covered species.

4.3.1.3 Assessment of Net Impacts

The negative impacts of the covered activities on Morro manzanita are anticipated to be greatly outweighed by the positive effects of implementation of the conservation program. The ratio of habitat benefits to impacts for Morro manzanita is more than 8 to 1 (Section 5.8.1,, Table 5-10). While the covered activities are anticipated to impact just 41 acres of habitat (Table 4-4), the Preserve System, which will contain 263 acres of Morro manzanita habitat, is anticipated to benefit 354-acre equivalents of Morro manzanita habitat (Table 8-1). These benefits are anticipated to be accrued by the following aspects of the LOHCP conservation strategy (Table 5-10):

- Protecting 51.7 acres of habitat, of which approximately 5 acres will be restored and managed, and the remainder will be actively managed to address threats;
- Restoring 22.3 acres of habitat for this species within existing protected lands, including by conducting fire management to promote regeneration of the populations, as needed;
- Actively managing an additional 189 acres of suitable habitat, to address factors that can degrade it including exotic plants.

The skewed ratio for Morro manzanita habitat benefits to impacts reflects the far greater proportion of central maritime chaparral habitat and to a lesser extent, coast live oak woodland, located in the Priority Conservation Area, where the Preserve System will be assembled, compared to the anticipated disturbance envelopes of the covered activities, which are largely within the USL (Table 5-10). The ratio of habitat benefits to impacts for central maritime chaparral is 8.5 to 1; for every acre of these communities that will be impacted, 8.5-acre equivalents will be benefited in the LOHCP Preserve System (Table 8-1).

In addition, implementation of the LOHCP will have a strong net positive effect on Morro manzanita by funding long-term, active habitat management in an adaptive management framework, which is essential to ensure long-term persistence and recovery of this fire-adapted species. Fire or fire surrogates will be needed to maintain persisting populations of Morro manzanita; however, funds necessary to implement such intensive treatments are often not available. Moreover, the LOHCP provides a mechanism for coordination among landowners and agencies that is necessary to carry out such projects, which can have deleterious impacts on some species, at least in the short term. As a result, implementing the Plan is anticipated to have a large, positive effect for persistence of Morro manzanita including by contributing to recovery (Section 5.8).

4.3.2 Indian Knob Mountainbalm

4.3.2.1 Impacts to Habitat

The covered activities will impact an estimated 18 acres of habitat that is suitable for Indian Knob mountainbalm. This is the area of central maritime chaparral communities that is anticipated to be impacted by the covered activities other than the conservation program and CWPP (Table 4-3). Fire hazard abatement projects conducted to implement the CWPP are anticipated to impact an additional 20.9 acres of central maritime chaparral habitat which may be suitable for Indian Knob mountainbalm. The vegetation removal projects are anticipated to largely improve habitat conditions for this early-successional species, by mimicking the beneficial effects of a fire and creating more open canopy, bare mineral soil conditions which may promote plant establishment. However, the fuel reduction treatments may degrade habitat for Indian Knob mountainbalm if they promote the invasion and spread of exotic plants, though these indirect negative effects can be prevented through follow-up exotic plant control treatments.

4.3.2.2 Impacts to Individuals

The covered activities will not directly impact Indian Knob mountainbalm individuals, impacts to which will instead be avoided in this Plan. A 2016 survey in Los Osos found Indian Knob mountainbalm individuals occur in only two patches within the Plan area, in the southeastern corner of the Bayview

Unit of the Morro Dunes Ecological Reserve, which is owned by the state and managed by CDFW (Section 2.1.3.2.1); the species was not observed in the historic occurrence mapped within the County's Broderson Property (USFWS 2016).

The only covered activities anticipated to occur on the Morro Dunes Ecological Reserve are construction of the Los Osos fuel break as part of the CWPP (Figure 2-7), establishment of other fuel breaks needed to protect the Preserve Lands from wildfire, and implementation of habitat restoration and management as part of conservation strategy for the Plan. To prevent impacts to individual Indian Knob mountain balm, which would constitute take under CESA and is not covered in this Plan or the ITP, pre-project surveys for Indian Knob mountainbalm will be conducted prior to implementation of the CWPP, the conservation program, and any other projects within suitable habitat for the species (Section 5.2). If the species is present, the project proponent must take steps to avoid direct effects to individual plants as the County is not requesting a state incidental take permit for this species and therefore will avoid all direct impacts to individuals (Section 1.4).

To prevent die back (loss of biomass) or mortality due to use of herbicides to control invasive plants, herbicides will be applied using techniques that will prevent their contact with Indian Knob mountainbalm, such as cut stump treatment or wicking; foliar spray will only be permitted when winds are calm and will not be allowed within 50 feet of Indian Knob mountainbalm individuals.

If take of Indian Knob mountainbalm individuals cannot be avoided, the County will contact the USFWS and CDFW to discuss project permitting requirements. Should the agencies determine that implementation of the conservation program may cause mortality to Indian Knob mountainbalm individuals, the County will first obtain a separate permit from the state, such as a state recovery permit issued pursuant Section 2081(a) of CESA. Such permits can be issued to cover restoration treatments designed to increase the size and thus viability of the population within the Plan Area and that would involve take of individuals, including the collection of seeds or cuttings to propagate plants that will be out planted into suitable habitat. A recovery permit would also be needed to cover any take of individuals resulting from the use of fire or fire surrogates to stimulate reproduction and create open habitat conditions that may promote regeneration. Such direct, negative, short-term impacts to individual Indian Knob mountainbalm plants, which are anticipated to be outweighed by the long-term benefits of the treatments and increase the population size and promote its viability, would need to be permitted through a separate state permits. Implementation of activities that result in take of individual Indian Knob mountainbalm (as defined under CESA) would also require reinitiating consultation with the USFWS for the LOHCP and ITP and may require a major amendment to the Plan (Section 6.7.3).

4.3.2.3 Assessment of Net Impacts

Like Morro manzanita, Indian Knob mountainbalm will benefit in the long-term from the protection of the central maritime chaparral habitat, which provides suitable habitat. The LOHCP Preserve System is anticipated to protect an additional 42.2 acres supporting central maritime chaparral communities. When combined with the restoration of 8.5 acres and the management of 58.9 acres of central maritime chaparral within existing protected lands, the conservation program will benefit 155.5-acre equivalents of this endemic community which provides habitat that is potentially suitable for Indian Knob mountainbalm (Table 5-10). The covered activities will impact an estimated 18 acres of habitat, of which six acres are expected to be inside the densely-developed Urban Services Line are (Table 4-3) where the active habitat management required to recover this species will be more difficult.

In addition to the anticipated more than 8-to-1 ratio of habitat benefits to impacts for central maritime chaparral, the LOHCP will promote recovery of Indian Knob mountainbalm by implementing management required to promote population growth, including fire management, that could increase the species distribution and abundance and thus promote long-term persistence. As a result, implementing the Plan is anticipated to have a positive effect for persistence of Indian Knob mountainbalm including by contributing to recovery (Section 5.8).

4.4 Effects on Critical Habitat

Under the federal Endangered Species Act, critical habitat is defined as "the specific areas within the geographic area occupied by a species on which are found those physical and biological features essential to the conservation of the species, and that may require special management considerations or protection; and specific areas outside the geographic area occupied by a species at the time it is listed, upon determination that such areas are essential for the conservation of the species."

The LOHCP features critical habitat that has been designated for Morro shoulderband snail and Morro Bay kangaroo rat. In addition, the Plan Area features a 1.5-acre strip of area designated as critical habitat for the Western snowy plover (*Charadrius alexandrinus nivosus*). This area is at the toe of the inland slope of the Morro Sand Spit on the extreme western boundary of the Plan Area within the Morro Dunes Natural Preserve in Montaña de Oro State Park. This area is not anticipated to be affected by the Plan's covered activities and is therefore not discussed further.

4.4.1 Morro Shoulderband Snail

Critical habitat was designated for Morro shoulderband snail on February 7, 2001 (USFWS 2001). Located entirely south of the City of Morro Bay, the area designated consists of land contained within three disjunct units that total 2,576 acres[10] (Figure 4-3):

- **Unit 1-Morro Spit and West Pecho:** This 1,831-acre unit includes the Morro Bay sand spit and foredune south toward Hazard Canyon in Montaña de Oro State Park, as well as the coterminous area west of Pecho Valley Road. The protection and recovery of this unit is essential to maintain the genetic diversity of the Morro shoulderband snail.
- **Unit 2-South Los Osos:** This 330-acre unit features critical habitat south of the residential area along Highlands Drive and north of the lower slopes of the Irish Hills. At the time of designation, this area contained what was considered to be a core population that could be expanded, and threats to the species reduced, with appropriate management.
- **Unit 3-Northeast Los Osos:** This 414-acre unit includes undeveloped areas between Los Osos Creek on the east and development on the west. The protection and recovery of this unit is essential to maintain the genetic diversity within the species and conserve the full range of ecological settings within which it occurs.

Of the total area, 2,192 acres (85%) is within existing protected lands, including Montaña de Oro State Park and Morro Dunes Ecological Reserve (Unit 1), the Broderson Parcel and the Bayview Unit of the

[10] This is the acreage in a geographic information system shapefile produced by the USFWS, which differs slightly from the 2,556 acres listed in the critical habitat designation (USFWS 2001).

Morro Dunes Ecological Reserve (Unit 2), and Morro Bay State Park and the Elfin Forest Natural Preserve (Unit 3; Figure 4-3).

Of the total 2,575 acres of designated critical habitat, 1,594 acres (62%) is located outside of the Plan Area. Of the 981 acres (38%) inside the LOHCP Area, 695 acres (71%) is within existing protected lands. Of the critical habitat in unprotected parcels,

Of the 286 acres (29%) of designated critical habitat that is within the LOHCP Area and is not protected, approximately 87% is within the 412 already developed parcels; the remaining 13% lies within just 60 undeveloped that feature land that is all or partially designated as critical habitat for Morro shoulderband snail. While private parcels of relatively high conservation value will be targeted for protection as part of the LOHCP conservation program (sections 5.3.2 and 6.2.2), the LOHCP will also cover private development and other public and private infrastructure projects in these areas. Based on the maximum disturbance envelope and parcel size distribution, development of vacant parcels could remove up to 37.5 acres of additional MSS Critical Habitat. Residential redevelopment projects, which are assumed to affect 10% of the residentially developed parcels, could impact another 14.2 acres. Finally, small public and private utility projects (e.g., road or pipeline work along South Bay Boulevard), as well as perhaps construction of the Los Osos Perimeter trail, and as some facilities maintenance projects have the potential to impact an estimated 2 acres of MSS critical habitat. In total, the covered activities are estimated to impact up to 53.7 acres of MSS critical habitat within the LOHCP Area.

Importantly, most of the land within the unprotected parcels lacks the physical and biological features that are essential to conservation of the species, These primary constituent elements are “sand or sandy soils needed for reproduction, a land slope not greater than ten percent to facilitate movement of individuals, and the presence of native coastal sage scrub vegetation, which was defined as typically but not exclusively represented by “California goldenbush, buckwheat, *Eriastrum,* chamisso lupine and *Dudleya*; and in more inland locations by California sagebrush, coyote brush and black sage” (USFWS 2001).

Implementation of the LOHCP conservation program will enhance critical habitat for Morro shoulderband snail in all three units, by contributing to the restoration and management of the existing protected lands with the exception of the Broderson property, which the County is managing as part of a separate habitat management plan (SWCA 2012). In doing so, the LOHCP will help achieve the objectives for designating the three units (USFWS 2001). The LOHCP conservation program may also protect additional designated critical habitat, through fee title acquisition or through on-site habitat set-asides dedicated as part of partial residential development of the remaining private parcels described above.

4.4.2 Morro Bay Kangaroo Rat

Critical habitat was designated for Morro Bay kangaroo rat in April 1977 (USFWS 1977). The single 689-acre unit includes the southern portion of the Morro Bay sand spit and adjacent habitat west of Pecho Valley Road (Figure 4-3); specifically, the southern half of section 14 and portions of Sections 23 and 24 that are west of Pecho Valley Road in T30S R10E of the Mount Diablo Base and Meridian.

The critical habitat is largely contained within the Morro Dunes Ecological Reserve and the northern portion of Montaña de Oro State Park, much of which is designated as part of the Morro Dunes Natural Preserve (Figure 4-3). Of the 672 acres contained within parcels (the remainder is outside of the parcel

GIS database), 629 acres (94%) of the critical habitat area is already protected. An estimated 43 acres is within adjacent private land located west of Pecho Valley Road. Of this, 27 acres is contained in a total of eight vacant parcels, one of which is greater than five acres. Zoned for single family residential land use, development of these parcels as part of the LOHCP could result in a loss of 3.9 acres of critical habitat. An estimated 1.6 acres of additional impacts to critical habitat for Morro Bay kangaroo rat could result from redevelopment on the 18 already-developed parcels, which total 16 acres, based on the estimate of 10% of the area to be further impacted by redevelopment (Table 2-1). Finally, construction of the Los Osos Perimeter Trail (Table 2-8) could impact a small area (i.e. 1.2 acres assuming the trail is one mile long and ten feet wide) though the alignment of this trail has not been determined. In total, the covered activities are estimated to impact 6.7 acres of critical habitat for Morro Bay kangaroo rat.

Implementation of the LOHCP conservation program will enhance critical habitat for Morro Bay kangaroo rat by contributing to the restoration and management of the Morro Dunes Ecological Reserve, which is proposed for inclusion in the LOHCP Preserve System (Table 5-5). The LOHCP conservation program may also protect additional designated critical habitat, through fee title acquisition or through on-site habitat set-asides dedicated as part of partial residential development of the remaining private parcels described above.

4.5 Cumulative Impacts

4.5.1 Analysis

The cumulative impacts are the incremental effects of the LOHCP taken together with the impacts of past, present, and reasonably-foreseeable future actions, as required under NEPA (40 CFR 1508.7). In contrast with the analysis of cumulative impacts under Section 7 of the ESA, NEPA analysis of cumulative impacts accounts for incremental impacts of the action on the environment when added to other past, present, and reasonably-foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. The geographic area for analysis may be defined by the manifestation of direct or indirect impacts as a result of covered activities.

Under ESA Section 7 regulations, cumulative impacts are limited to the effects of future state or private actions that are reasonably certain to occur within the action area (50 CFR 402.02); the cumulative effects of federal projects, including projects that require federal permits or are federally funded, will be considered in future Section 7 consultations. In addition, the EIR/EA for the LOHCP presents a thorough analysis of the cumulative effects of all projects, federal and non-federal, when combined with the effects of the Plan. The internal consultation by the USFWS for the LOHCP will also address the Plan's cumulative effects.

4.5.2 Current Projects Not Covered by the LOHCP

The cumulative impacts of the LOHCP include the effects of prior projects causing take of Morro shoulderband snail permitted under individual low-effect HCPs in the Plan Area. Fourteen HCPs affecting a total of 47.40 acres have been permitted by the USFWS and are in various stages of implementation. The USFWS is currently reviewing two additional low-effect HCPs for Morro shoulderband snail in Los Osos. In addition, California State Parks prepared an HCP in support of an incidental take permit for 0.41 acres of impacts to Morro shoulderband snail within Morro Bay State Park outside of the LOHCP Area (California State Parks 2008).

These projects are similar to the activities covered in this plan, and therefore will likely have similar direct and indirect, permanent and temporary effects on Morro shoulderband snail (Section 4.2.1). The impacts of these projects will be mitigated through implementation of their respective conservation programs, which include habitat protection, restoration, and contributions to an in-lieu fee program which will fund projects to promote recovery of this species. Given their moderate size , and the occurrence of some in existing developed parcels that feature degraded habitat (e.g., Tenera 2010), the impacts of these projects, when considered with those of the LOHCP covered activities, are not anticipated to negatively influence recovery of Morro shoulderband snail or the other covered species.

Only the Kelley and McDonough (2013) project is within designated critical habitat for Morro shoulderband snail. Development of a single-family residence on an 8,000 sf (0.18-acre) parcel will impact 8,000 sf of critical habitat within Unit 2, which is centered on the Bayview Unit of the Morro Dunes Ecological Reserve, but also includes some small residential parcels to the east of Bayview Heights Drive (Figure 4-3). The development of this small parcel in an area which is already largely developed will not significantly further impair the function of this critical habitat unit, most of which is protected within the Bayview Unit of the Morro Dunes Ecological Reserve and the adjacent Broderson Property, which is protected and managed by the County.

Overall, the loss of 0.18-acres of critical habitat through the low-effect HCPs, when combined with the anticipated impacts of the LOHCP covered activities of approximately 53.7 acres of critical habitat, is not anticipated to degrade the overall function of the critical habitat for Morro Shoulderband snail, as 85% of critical habitat is protected within existing protected lands (Section 4.4.1) and the LOHCP will restore and manage critical habitat within the Morro Dunes Ecological Reserve, and help protect additional critical habitat in the Priority Conservation Area as part of the LOHCP Preserve System (Section 5.3).

4.5.3 Future Activities Not Covered by the LOHCP

Cumulative impacts also include the effects of future activities not covered by the Plan. The County does not anticipate any additional projects that will impact the covered species in the Plan Area, other than the covered activities (Section 2.2) and those activities that are specifically not covered by the plan (Section 2.3). As part of work to develop this regional plan, the County contacted local and state agencies and private organizations that manage land within the Plan Area, to ascertain whether they anticipate conducting activities, including ongoing maintenance and operations and capital projects, that would impact the covered species. The activities identified by these entities were all included in the covered activities (Section 2.2). Take/impacts caused by activities on Bureau of Land Management Lands cannot be covered by an incidental take permit issued pursuant Section 10 of ESA and must instead be covered through the Section 7 consultation with the USFWS. The USFWS does not expect any take to occur on the 5-acre BLM parcel, which was also excluded from the potential LOHCP Preserve System, other than that which might be covered under an endangered species recovery permit (J. Vanderwier, pers. comm. 2017).

Soil-disturbing activities not covered by the LOHCP, including agricultural activities and activities for which the County does not issue permits, such as landscaping, have the potential to further impact the covered species directly and indirectly, causing both permanent and temporary impacts. Such projects are anticipated to primarily impact Morro shoulderband snail, by causing direct mortality to individuals as well as temporary and permanent loss of habitat, as this species inhabits existing developed parcels

and other degraded habitat areas. These activities will generally impact a small number of isolated individuals of Morro manzanita, which remain within existing developed areas. Non-covered activities may also affect suitable habitat for these and other covered species.

The magnitude of these effects is unknown though in general, they are anticipated to affect a small amount of habitat, most of which is highly degraded and lacks long-term conservation value due to its poor landscape context (i.e., fragmented nature and location within existing developed areas). The cumulative impacts of these activities, when considered along with the LOHCP covered activities and the impacts of other projects permitted through low-effect HCPs, are not anticipated to influence recovery of the covered species. Instead, implementation of the LOHCP Conservation Strategy as outlined in the next section of the plan, is anticipated to have a net benefit for the covered species.

Table 4-1: Take/impacts Assessment Methods for Anticipated Covered Activities within the LOHCP Area

Activity	Description	Take/Impacts Assessment Methods
County Parks and Recreation Department		
New Park in Los Osos	County Parks plans to build an approximately 10-acre park in a yet to be determined location likely within the Urban Services Line (USL).	Impacts were distributed proportionally to vegetation and other land cover types mapped within unprotected land within the USL. Because the project was anticipated to affect only undeveloped, upland vegetation types; impacts to developed areas and the County right-of-way (right-of-way), as well as wetland and riparian vegetation types and water were excluded. Within the project footprint, the habitat impacts from this construction project are anticipated to be 90% permanent, as this portion will be converted or lost, and 10% temporary, as the adjacent area disturbed during construction will be restored.
Aquatic Center	County Parks plans to build 3.5-acre aquatic center in an undetermined location likely within the USL	Impacts were distributed proportionally to vegetation and other land cover types mapped within unprotected land within the USL. Because the project was anticipated to affect only undeveloped, upland vegetation types; impacts to developed areas and the right-of-way, as well as wetland and riparian vegetation types and water were excluded. Within the project footprint, the habitat impacts from this construction project are anticipated to be 90% permanent, as this portion will be converted or lost, and 10% temporary, as the adjacent area disturbed during construction will be restored.
Los Osos Community Park Expansion	Count Parks plans to expand the Los Osos Community Park, which is estimated to impact the remaining undeveloped 1.6 acres on the parcel.	Impacts were allocated to the vegetation and other land cover types mapped within the project footprint. Habitat impacts from this construction project are anticipated to be 90% permanent, as this portion will be converted or lost, and 10% temporary, as the adjacent area disturbed during construction will be restored.

Table 4-1: Take/impacts Assessment Methods for Anticipated Covered Activities within the LOHCP Area

Activity	Description	Take/Impacts Assessment Methods
Boat Ramp	County Parks plans to build a boat ramp, which is estimated to impact 1.5 acres of habitat near the Morro Bay shoreline.	Impacts were distributed proportionally to vegetation and other land cover types mapped within unprotected land located within 150 feet of the shoreline inside the USL. Impacts from this activity excluded developed areas and the right-of-way, as well as open water, where this project is unlikely to occur. Potential impacts to riparian and wetland habitat within these areas will not be covered by the LOHCP. Within the project footprint, the habitat impacts from this construction project are anticipated to be 90% permanent, as this portion will be converted or lost, and 10% temporary, as this area will be restored.
Coastal Access	County Parks plans to build 14 coastal access routes (i.e., trails to the coast), which would require some vegetation clearing and sign installation. Each route was estimated to be 200 feet long and 7-feet wide creating a cumulative 0.45-acre footprint.	Impacts of 13 routes located inside the USL were distributed proportionally to the vegetation and other land cover types mapped within 150 feet of the shoreline between Montaña de Oro State Park and Elfin Forest Natural Preserve. Impacts for the other route, which is in the vicinity of Costa Azul Drive outside the USL, were assigned to the vegetation mapped within the anticipated access area. This activity was not anticipated to affect developed areas, right-of-ways or open water. Potential impacts to riparian and wetland vegetation within these areas will not be covered by the LOHCP. Within the project footprints, the habitat impacts from these activities are anticipated to be 90% permanent, as this portion will be converted or chronically disturbed, and 10% temporary, as the adjacent area disturbed during construction will be restored.

Table 4-1: Take/impacts Assessment Methods for Anticipated Covered Activities within the LOHCP Area

Activity	Description	Take/Impacts Assessment Methods
New Paths and Trails	County Parks plans to create sixteen new trails in the LOHCP Area. Of these, two are anticipated to be entirely within intact open space, five are expected to occur near existing streets, and nine are likely to be near existing streets but affect adjacent open space. To estimate the total area affected, each trail's approximate length was multiplied by 15 feet and rounded to the nearest quarter acre, resulting in a total 49.05-acre project footprint.	Impacts were assessed separately for trails occurring near existing streets and trails occurring within open space. Impacts within the 19.3-acre total footprint of trails anticipated to be constructed within open space were distributed proportionally to vegetation and other land cover types mapped outside the USL, excluding the following types in which trails are not likely to be built: wetland and riparian vegetation, open water, and developed areas and rights of way. The 29.75-acre total footprint of trails near existing streets was estimated to be comprised of 25% developed areas and 25% right-of-way. The remaining 50% of the impacts were distributed proportionally to the vegetation and other land cover types mapped within the USL, excluding wetland and riparian vegetation and open water which presumably will be avoided. Within the project footprints, the habitat impacts from trail construction are anticipated to be 90% permanent, as this portion will be converted or chronically disturbed, and 10% temporary, as the adjacent area disturbed during construction will be restored.
County Public Works Department		
Road Expansion	County Public Works plans to expand existing roads, to install turn lanes, and widen and realign roads in a 22-acre footprint of the existing right-of-way.	Impacts of road expansion were allocated to the right-of-way. Within the project footprints, the habitat impacts from road expansion are anticipated to be 90% permanent, as this portion will be converted or chronically disturbed, and 10% temporary, as the adjacent area disturbed during construction will be restored.

Table 4-1: Take/impacts Assessment Methods for Anticipated Covered Activities within the LOHCP Area

Activity	Description	Take/Impacts Assessment Methods
New Roads	County Public works plans to extend Ramona and Doris avenues by 1,013 feet and 686 feet, respectively. They estimate Ramona Avenue would impact an 85-foot wide area, and Doris Avenue would affect a 45-foot wide area, resulting in a total 2.7-acre footprint for new roads.	Impacts to vegetation and other land cover types were based on the acres of each that are mapped within the project footprint. The habitat impacts from road construction are anticipated to be 90% permanent, as this portion will be converted or chronically disturbed, and 10% temporary, as the adjacent area disturbed during construction will be restored.
Bike Lanes	Public Works plans to install bike lanes in an 8-acre portion of the existing right-of-way.	Impacts of bike land construction were allocated to the right-of-way. Within the project footprints, the habitat impacts are assumed to be 60% permanent, as this is the portion of the outer roadway that will be converted or chronically disturbed, and 40% temporary as this area will be restored.
New Drainage Basins	Public Works plans to create 7 new drainage basins totaling 11.4 acres.	Impacts to vegetation and other land cover types were based on the acres of each that are mapped within the anticipated project footprints, which were mapped by County Public Works. Any impacts to riparian and wetland vegetation located within these areas will not be covered by the LOHCP. The habitat impacts from drainage basin construction are anticipated to be 90% permanent, as this portion will be chronically disturbed through basin maintenance activities, and 10% temporary, as the adjacent area disturbed during construction will be restored.
New Bioswales	Public Works plans to install new bioswales in the existing right-of-way that would impact approximately 6.6 acres.	Impacts of this activity were allocated to the right-of-way. As the bioswales can be revegetated, their construction was assumed to result in just 20% permanent impacts and 80% temporary impacts to the affected habitat.
Drainage Improvements	Public Works plans to implement drainage improvements throughout the right-of-way, which are estimated to affect a 7-acre area.	Impacts of drainage improvements were allocated to the right-of-way. The habitat impacts are anticipated to be 90% permanent, as this portion will be lost or chronically disturbed through ongoing maintenance, and 10% temporary, as the adjacent area disturbed during construction will be restored.

Table 4-1: Take/impacts Assessment Methods for Anticipated Covered Activities within the LOHCP Area

Activity	Description	Take/Impacts Assessment Methods
Road Maintenance	Public Works anticipates conducting annual road maintenance, including resurfacing roadways and vegetation management along roadsides, which would impact 5 acres.	Impacts of road maintenance were allocated to the right-of-way, where habitat impacts were assumed to be 100% permanent, due to the regular, chronic disturbance required to maintain roadways.
Maintain Drainage Basins	Public Works will annually maintain 10 sediment basins that total 4.9 acres, through removal of soil and vegetation management to maintain capacity.	Impacts to vegetation and other land cover types were based on the acres of each that are mapped within the footprints of the drainage basins. Potential impacts to riparian and wetland vegetation within these areas will not be covered by the LOHCP. Habitat impacts associated with maintenance of drainage basins were assumed to be 100% permanent, as the affected area will be disturbed annually (rather than affected then restored).
County Library Department		
Expansion of Los Osos Public Library	The County Library Department plans to expand the Los Osos Public Library, which is estimated to affect the 0.57-acre undeveloped area around the existing facility.	Impacts to vegetation were based on the acres of each type mapped within the project footprint. The habitat impacts from library expansion are anticipated to be 90% permanent, as this portion will be lost or chronically disturbed through maintenance activities, and 10% temporary, as the adjacent area disturbed during construction will be restored.
Los Osos Public Library Grounds Maintenance	The County conducts monthly vegetation management and associated activities to maintain approximately 0.4 acres of the grounds around the existing library.	Impacts were distributed proportionally to vegetation and other land cover types mapped within the library parcel that are outside of the library expansion project footprint. Habitat impacts associated with grounds maintenance were assumed to be 100% permanent, as the affected area will be disturbed chronically.

Table 4-1: Take/impacts Assessment Methods for Anticipated Covered Activities within the LOHCP Area

Activity	Description	Take/Impacts Assessment Methods
Los Osos Community Services District (LOCSD)		
Pipeline Projects	The LOCSD plans to build and maintain pipelines within the right-of-way. Installation and maintenance of the 2 to 16-inch-wide pipes were estimated to impact a 3.5-foot-wide area; based on their cumulative length, the projects are estimated to impact 2.6-acres.	Impacts from pipeline projects were allocated to the right-of-way, where this activity will be located. Within the project footprint, 40% of the habitat will be permanently impacted by an estimated 16-inch diameter pipe; the 60% temporary impacts reflect the adjacent area disturbed during construction that will be restored.
Ferrell Well Loop Upgrade	The LOCSD plans to disconnect a decommissioned well from the distribution system, which will impact a 1-acre area within the project parcel.	Impacts were distributed proportionally to the vegetation and other land cover types mapped within the parcel boundary. The habitat impacts are anticipated to be 90% permanent, as this portion will be lost, and 10% temporary, as the adjacent area disturbed during construction will be restored.
New Upper Aquifer Well at 8th & El Moro Yard	The LOCSD plans to drill a new upper aquifer well and install appurtenances, such as a skid-mounted nitrate removal equipment with a brine tank. The LOCSD estimates the project will impact the entire 0.5-acre parcel where it will occur.	Impacts to vegetation and other land cover types were based on the acres of each that are mapped within the project parcel. The habitat impacts are anticipated to be 90% permanent, as this portion will be lost, and 10% temporary, as the adjacent area disturbed during construction will be restored.
New Water Tank at Highland Drive and Alexander	The LOCSD plans to install a new water tank that would impact the entire 0.11-acre target parcel.	Impacts were allocated to the vegetation and other land cover type mapped within the project parcel. The habitat impacts are anticipated to be 90% permanent, as this portion will be lost, and 10% temporary, as the adjacent area disturbed during construction will be restored.
South Bay Upper Aquifer Well Nitrate Removal/Blending Project	The LOCSD plans to construct a 0.01-acre brine storage tank on a skid mounted unit within the right-of-way.	Impacts of the new facility were allocated to the right-of-way, where the habitat impacts are anticipated to be 90% permanent, as this portion will be lost, and 10% temporary, as the adjacent area disturbed during construction will be restored.

Table 4-1: Take/impacts Assessment Methods for Anticipated Covered Activities within the LOHCP Area

Activity	Description	Take/Impacts Assessment Methods
New Expansion Well	The LOCSD will install an expansion well on the north end of Sage Avenue as part of the Basin Management Plan. The project footprint was assumed to include a 0.023-acre area for the well and an additional 0.4-acre area for the pipeline (5,000 lineal feet x 3.5-foot-wide area of impact).	Impacts were allocated to the vegetation and other land cover types mapped within the intended project area. The habitat impacts are anticipated to be 33% permanent impacts (well footprint and 12" pipeline) and 67% temporary (disturbed area adjacent to the well and pipeline).
New Community Nitrate Removal Facility	The LOCSD and Golden State Water (GSW) intend to install a facility to remove nitrates from upper aquifer water supplies in a location identified in the Draft Basin Plan for the Los Osos Groundwater Basin (2013).	The project was assumed to impact a 0.023-acre area. Within this area, impacts were distributed proportionally to the vegetation and other land cover types mapped within the anticipated project parcel. The habitat impacts are anticipated to be 90% permanent, as this portion will be lost, and 10% temporary, as the adjacent area disturbed during construction will be restored.
Vegetation Management	The LOCSD plans vegetation maintenance including fuel reduction and tree trimming on 8 parcels totaling 4.9 acres.	Impacts were distributed proportionally to vegetation and other land cover types mapped within the parcels where the LOCSD conducts vegetation management, excluding the area that will be affected by sediment basins, facilities maintenance, or capital projects, for which impacts were estimated separately. Potential impacts to riparian and wetland vegetation within these areas will not be covered by the LOHCP. Due to the chronic disturbance they cause, vegetation management impacts were characterized as permanent.
Maintain Drainage Basins	The LOCSD plans to annually remove soil and vegetation to maintain the capacity of its 5 drainage basins which total 4 acres.	Impacts were allocated to the vegetation and other land cover types mapped within the basin footprints, three of which were supplied by County Public Works; the other two were digitized based on recent aerial images. Potential impacts to riparian and wetland habitat within these areas will not be covered by the LOHCP. Due to the chronic disturbance required to maintain them, sediment basin impacts to habitat were identified as permanent.

Table 4-1: Take/impacts Assessment Methods for Anticipated Covered Activities within the LOHCP Area

Activity	Description	Take/Impacts Assessment Methods
Facilities Maintenance	The LOCSD plans to conduct facilities maintenance including repairing storage tanks, booster pumps, generators, and other types of equipment and buildings on 7 of parcels totaling 2 acres.	Impacts were distributed proportionally to vegetation and other land cover types mapped within parcels in which the LOCSD maintains facilities. Potential impacts to riparian and wetland habitat within these areas will not be covered by the LOHCP. Due to the chronic disturbance they cause, facilities maintenance impacts were characterized as permanent.
CalFire/Los Osos Community Services District		
Los Osos Community Wildfire Protection Plan	CalFire plans to conduct fuel hazard abatement projects in an 89.4-acre area at the wildlife-urban interface.	Impacts were assessed using the shapefile for the proposed project area (Figure 2-7). The area was assumed to be temporarily impacted. It was not included in the overall calculation of acres of habitat to be impacted, which was used to calculate the compensatory mitigation need, because the CWPP projects are assumed to have negligible impacts after implementation of project-specific avoidance and minimization measures (Table 5-4).
Golden State Water Company (GSW)		
Blending Project	As described in the Draft Basin Plan for the Los Osos Groundwater Basin (2013), GSW plans to install pipelines to connect its lower aquifer Rosina and upper aquifer Skyline wells to the community nitrate removal facility. The total 3,254-foot-long pipelines are estimated to affect a 3.5-foot wide area, and thus impact 0.261 acres.	Impacts of the pipelines were allocated to the right-of-way, where they are expected to be installed. Of the project footprint, 30% is anticipated to be permanently impacted by the approximately 12” diameter pipe; the remaining 30% of the area will be restored and therefore was assumed to be temporarily impacted.

Table 4-1: Take/impacts Assessment Methods for Anticipated Covered Activities within the LOHCP Area

Activity	Description	Take/Impacts Assessment Methods
Well Construction	The Draft Basin Plan for the Los Osos Groundwater Basin (2013) states that GSW plans to construct a new upper aquifer and a new lower aquifer well within its service area, which would also require installation of a pipeline to connect the well to the water system	The well footprints were estimated to be 1,000 square feet (0.023 acres) each. The pipeline footprints were estimated to be 0.104 acres each based on the dimensions provided for the pipeline of the new aquifer well (1,300 lineal feet x 3.5-foot wide area of impact). Impacts within the cumulative 0.254-acre footprint were distributed proportionally to vegetation and other land cover types mapped within the GSW service area, excluding wetland and riparian vegetation and open water which presumably will be avoided. The vegetation impacts were distributed according to the percentages of the GSW service area located inside the USL (65%) and outside the USL (35%). Within the project footprint, habitat impacts were assumed to result in 41% permanent impacts from the well and pipe footprints; the remaining 59% will be restored and assumed to be temporary.
New Expansion Well	As described in the Draft Basin Plan for the Los Osos Groundwater Basin (2013), GSW plans to install an expansion well located in the vicinity of Sunny Oaks Mobile Home Park south of Los Osos Valley Road. The project footprint was assumed to include a 0.023-acre area for the well and an additional 0.2-acre area for the pipeline (2,400 lineal feet x 3.5-foot-wide area of impact).	Impacts within the cumulative 0.22-acre footprint were distributed proportionally to vegetation and other land cover types mapped within the GSW service area, excluding wetland and riparian vegetation and open water which presumably will be avoided. The vegetation impacts were allocated to within the USL, where the well is anticipated to be located. Within the project footprint, habitat impacts were assumed to be 36% permanent due to the well and pipe footprints; the remaining 64% will be restored and was assumed to be temporary.
Los Osos Valley Road Main Upgrade	To accommodate increased flows from new wells and well expansion, GSW plans to replace a 1,757-foot-long segment of the Los Osos Valley Road water main between Sea Oaks Drive and Tierra Drive with a larger, 12-inch diameter pipe.	Impacts of the water main were allocated to the right-of-way, where it is located. The project footprint is estimated to be 0.14 acres (1,757 lineal feet x 3.5-foot-wide area of impact). Of this, 30% is anticipated to be permanently impacted by the approximately 12” diameter pipe; the remaining 30% of the area will be restored and therefore was assumed to be temporarily impacted.

Table 4-1: Take/impacts Assessment Methods for Anticipated Covered Activities within the LOHCP Area

Activity	Description	Take/Impacts Assessment Methods
Major Plant Site Maintenance	Golden State Water anticipates 2.8 acres of impacts within their 10 facilities, which total 4.6 acres, will be further impacted through major plant site maintenance, including repairing water tanks, booster pumps, and filtration units, as well as building maintenance.	Impacts were distributed proportionally to vegetation and other land cover types mapped within the GSW's seven parcels and three additional facilities. Impacts to riparian and wetland vegetation and open water within the project footprints will not be covered by the HCP. Of the 4.6 acres impacted, 65% are anticipated to occur within the USL (3 acres) and 35% (1.6 acres) outside the USL. The habitat impacts were estimated to be 90% permanent due to major site and facility repair, and 10% temporary due to disturbance of adjacent habitat which will be restored.
Meter Box Maintenance	Golden State Water plans to maintain 2,673 meter boxes approximately twice per year by cleaning them out, maintaining the surrounding area, and replacing the meters and boxes as needed. This activity is estimated to impact 9 square feet per meter box or 0.552 acres total.	Because meter boxes are located on private development near the right-of-way, 40% of impacts were allocated to developed areas and another 40% of impacts were allocated to the right-of-way. To estimate the impacts to adjacent habitat, the remaining 20% of impacts were distributed to upland vegetation types to reflect potential impacts to adjacent habitat. The vegetation impacts were distributed according to the percentages of the GSW service area located inside the USL (65%) and outside the USL (35%). The impacts of this activity were characterized as permanent, as ongoing maintenance of meter boxes will result in chronic disturbance of the habitat.
Flush Water Mains	On an ongoing basis, GSW plans to flush pipelines, hydrants, and wharf heads. These activities are estimated to impact a total of 3,000 square feet (0.07 ac.), with each event affecting 100 square feet.	Impacts from flushing water mains were allocated to the right-of-way where water mains occur. There, habitat impacts were assumed to be 100% permanent, due to the regular, chronic disturbance required to maintain roadways.
Water Main Repair and Replacement	Based on its historic records, GSW anticipates 2,000 square feet (0.046 ac.) of vegetation will be impacted by the maintenance of water mains within their service area.	Impacts from repairing and replacing water mains were allocated to the right-of-way where water mains occur. There, habitat impacts were assumed to be 100% permanent, due to the regular, chronic disturbance required to maintain the pipelines.

Table 4-1: Take/impacts Assessment Methods for Anticipated Covered Activities within the LOHCP Area

Activity	Description	Take/Impacts Assessment Methods
Fire Hydrant Maintenance	Golden State Water indicated they would maintain 248 fire hydrants approximately once per year, through cleaning, painting, and testing. Occurring approximately once per year, this activity will impact approximately 9 square feet per fire hydrant for a total of 2,232 square feet (0.051 ac.).	Impacts from maintaining fire hydrants were allocated to the right-of-way where they primarily occur. There, habitat impacts were assumed to be 100% permanent, due to the regular, chronic disturbance required to maintain roadways.
S & T Mutual Water Company (S&T)		
Well Construction	The Draft Basin Plan for the Los Osos Groundwater Basin (2013) indicates that S&T may construct three wells to replace their existing upper aquifer wells.	Each well footprint was estimated to be 1,000 square feet, for a total of 3,000 square feet (0.069 acres). Impacts were distributed proportionally to vegetation and other land cover types mapped within unprotected land located inside the USL, exclusive of wetland and riparian vegetation and open water which presumably will be avoided. Within the project footprint, the habitat impacts from this construction project are anticipated to be 90% permanent, as this portion will be converted or lost, and 10% temporary, as the adjacent area disturbed during construction will be restored.
Water Main and Pipeline Maintenance	S&T will likely maintain pipelines within their service area, which could impact 0.85 acres (approximately 10,560 feet of pipeline x 3.5-foot-wide area of impact). To estimate the lineal feet of pipeline, the number of S&T meter boxes (199), was multiplied by the ratio of meter boxes to pipeline in the GSW service area (2,673 meter boxes and 25 miles of pipeline) and rounded up to the nearest mile.	Impacts from pipeline projects were allocated to the right-of-way, where the pipelines occur. Of this area, 30% is anticipated to be permanently impacted by the approximately 12” diameter pipe; the remaining 30% of the area will be restored and therefore was assumed to be temporarily impacted.

Table 4-1: Take/impacts Assessment Methods for Anticipated Covered Activities within the LOHCP Area

Activity	Description	Take/Impacts Assessment Methods
New Development on Privately-Owned Vacant Parcels: Inside the Urban Services Line		
Single-Family Residential parcels <20,000 sf	The County anticipates that 469 vacant parcels that are less than 20,000 square feet in size will be completely developed, thus impacting their total 77.8 acres inside the USL.	Impacts to vegetation and other land cover types were based on the acres of each type mapped within the parcels. Potential impacts to riparian and wetland habitat within these areas will not be covered by the LOHCP. Habitat impacts from development of these small parcels were characterized as permanent, as the entire parcel will be impacted by development and/or ongoing land use activities which will chronically impact habitat.
Single-Family Residential parcels between 20,000 sf and 1 acre	The County anticipates that 30 vacant parcels between 20,000 square feet and one acre will be developed inside the USL. The total 13.8 acres of impacts were based on an assumption that 20,000 sf would be impacted per parcel.	Impacts were distributed proportionally to the vegetation and other land cover types mapped within these parcels, excluding riparian and wetland vegetation, and open water which will not be permitted through the LOHCP. Habitat impacts from development of these larger parcels were characterized as 80% permanent, to reflect the area that will be developed or chronically disturbed by ongoing land use, and 20% temporary, to reflect the adjacent area disturbed during development that will be restored.
Single-Family Residential parcels greater than 1 acre	The County anticipates that 35 vacant parcels greater than one acre will be developed inside the USL. The total 35 acres of impacts were based on an assumption that one acre would be impacted per parcel.	Impacts were distributed proportionally to the vegetation and other land cover types mapped within these parcels, excluding riparian and wetland vegetation, and open water, which will not be permitted through the LOHCP. Habitat impacts from development of these larger parcels were characterized as 80% permanent, to reflect the area that will be developed or chronically disturbed by ongoing land use, and 20% temporary, to reflect the adjacent area disturbed during development that will be restored.
Multifamily-Commercial	The County anticipates that 105 vacant parcels designed for commercial, industrial, multifamily, and professional land use, will be completely developed, impacting their total 103 acres inside the USL.	Impacts to vegetation and other land cover types were based on the acres of each type mapped within the parcels. Potential impacts to riparian and wetland vegetation and open water will not be covered by the LOHCP. Habitat impacts from the development of these parcels were characterized as permanent, as the entire parcel will be impacted by development and/or ongoing land use activities which will chronically impact habitat.

Table 4-1: Take/impacts Assessment Methods for Anticipated Covered Activities within the LOHCP Area

Activity	Description	Take/Impacts Assessment Methods
New Development on Privately-Owned Vacant Parcels: Outside the Urban Services Line		
Single-Family Residential parcels less than or equal to 5 acres	The County anticipates that 32 vacant parcels less than or equal to 5 acres will be developed outside the USL. The total 14.7 acres of impacts were based on the assumption that development within each will impact the maximum per-parcel disturbance envelope of 20,000 sf.	Impacts were distributed proportionally to the vegetation and other land cover types mapped within these parcels, excluding riparian and wetland vegetation, and open water, which will not be permitted through the LOHCP. Habitat impacts from development of these larger parcels were characterized as 80% permanent, to reflect the area that will be developed or chronically disturbed by ongoing land use, and 20% temporary, to reflect the adjacent area disturbed during development will be restored.
Single-Family Residential parcels greater than 5 acres	The County anticipates that 13 vacant parcels greater than 5 acres will be developed outside the USL. The total 9 acres of impacts were based on the assumption that development within each will impact maximum per-parcel disturbance footprint of 30,000 sf.	Impacts were distributed proportionally to the vegetation and other land cover types mapped within these parcels, excluding riparian and wetland vegetation, and open water, which will not be permitted through the LOHCP. Habitat impacts from development of these larger parcels were characterized as 80% permanent, to reflect the area that will be developed or chronically disturbed by ongoing land use, and 20% temporary, to reflect the adjacent area disturbed during development will be restored.
Improvements to Developed, Privately-Owned Parcels		
Commercial Redevelopment	The County anticipates that 15% of the area within the existing developed commercial parcels located in the USL will be further impacted by expansion and redevelopment activities (e.g., remodeling, renovation, and reconstruction), thus impacting a total of 24.3 acres.	Impacts were distributed proportionally to the vegetation and other land cover types mapped within these parcels, excluding riparian and wetland vegetation, and open water, which will not be permitted through the LOHCP. Habitat impacts from redevelopment were characterized as 80% permanent, to reflect the area that will be developed or chronically disturbed by ongoing land use, and 20% temporary, to reflect the adjacent area disturbed during construction that will be restored.

Table 4-1: Take/impacts Assessment Methods for Anticipated Covered Activities within the LOHCP Area

Activity	Description	Take/Impacts Assessment Methods
Residential Redevelopment within the USL	The County anticipates that 10% of the area within developed single family parcels located inside the USL will be further impacted by expansion and redevelopment, thus impacting a total of 96.4 acres.	Impacts were distributed proportionally to the vegetation and other land cover types mapped within these parcels, excluding riparian and wetland vegetation, and open water, which will not be permitted through the LOHCP. Habitat impacts from redevelopment were characterized as 80% permanent, to reflect the area that will be developed or chronically disturbed by ongoing land use, and 20% temporary, to reflect the adjacent area disturbed during construction that will be restored.
Residential Redevelopment outside the USL	The County anticipates that 10% of the area within developed single-family parcels outside the USL will be further impacted by expansion and redevelopment, thus impacting a total of 35 acres.	Impacts were distributed proportionally to the vegetation and other land cover types mapped within these parcels, excluding riparian and wetland vegetation, and open water, which will not be permitted through the LOHCP. Habitat impacts from redevelopment were characterized as 80% permanent, to reflect the area that will be developed or chronically disturbed by ongoing land use, and 20% temporary, to reflect the adjacent area disturbed during construction that will be restored.

Table 4-2: General Activities and their Habitat Impacts in Acres[1]

	Inside the Urban Services Line				Outside the Urban Services Line				Entire LOHCP Area			
General Activity Type	Upland Habitats[2]	Wet Areas[3]	Developed Areas[4]	Total	Upland Habitats	Wet Areas	Developed Areas	Total	Upland Habitats	Wet Areas	Developed Areas	Total
New Private Single-Family Residential	109.6	2.0	15.0	126.6	23.1	<0.1	1.0	24.1	132.7	2.0	16.0	150.7
New Commercial and Multifamily	87.6	1.3	14.3	103.2	0.0	0.0	0.0	0.0	87.6	1.3	14.3	103.2
Redevelop/Remodel/Rebuild	20.2	<0.1	100.5	120.0	27.2	<0.1	7.8	35.0	47.5	<0.1	108.2	155.7
Public and Private Utility Projects	40.7	2.6	67.6	110.9	10.9	<0.1	0.4	11.4	51.6	2.6	68.0	122.2
Total	**258.2**	**5.8**	**197.3**	**460.6**	**61.2**	**0.0**	**9.2**	**70.5**	**319.4**	**5.8**	**206.5**	**531.8**

[1] Acres of upland vegetation, riparian and wetland vegetation, and developed areas and right-of-ways, to be impacted by the covered activities, showing the location with respect to the Los Osos Urban Services Line in the 2009 Estero Area Plan

[2] Upland habitats include all vegetation and land cover *except* wet areas and developed areas, each of which are defined below.

[3] Wet areas include riparian and wetland communities, as well as open water. Impacts to species in these habitats will not be covered by the LOHCP ITP.

[4] Developed areas include existing developed lands lacking vegetation, and County right-of-ways.

Table 4-3: Impacts by Vegetation and Land Cover Type, Location, and Duration[1]

	Total in LOHCP Area		Existing Protected		To be Impacted by Covered Activities					
Vegetation/Land Cover	Acres	Percent	Acres	Percent Protected	Inside USL	Outside USL	Permanently Impacted	Temporarily Impacted	Total	Percent of Total
COASTAL SAGE SCRUB										
California Sagebrush – Black Sage										
Largely Intact	481.6	13.2%	327.5	68.0%	18.7	14.7	27.3	6.1	33.4	6.9%
Disturbed	373.0	10.2%	54.9	14.7%	138.7	13.4	143.1	9.0	152.1	40.8%
Heavily Disturbed	10.8	0.3%	0.1	0.9%	1.6	0.8	2.1	0.3	2.4	22.2%
Coyote Brush[2]	0.7	<0.1%	0	0	0.7	0.0	0.7	<0.1	0.7	100.0%
Subtotal: Coastal Sage Scrub	**866.0**	**23.8%**	**382.4**	**44.2%**	**159.7**	**28.9**	**173.2**	**15.4**	**188.6**	**21.8%**
CENTRAL MARITIME CHAPARRAL										
Morro Manzanita California Sagebrush	38.0	1.0%	34.4	90.5%	<0.1	0.6	0.5	0.1	0.6	1.6%
Morro Manzanita	321.2	8.8%	135.1	42.0%	6.1	10.1	13.6	2.7	16.2	5.0%
Morro Manzanita Wedgeleaf Ceanothus	113.4	3.1%	111.3	98.1%	0.1	1.2	1.1	0.2	1.3	1.1%
Wedgeleaf Ceanothus - California Sagebrush	30.6	0.8%	28.4	92.9%	<0.1	0.2	0.2	<0.1	0.2	0.7%
Subtotal: Central Maritime Chaparral	**503.3**	**13.8%**	**309.2**	**61.4%**	**6.2**	**12.1**	**15.4**	**2.9**	**18.3**	**3.6%**
WOODLAND										
Bishop Pine[3]	3.4	0.1%	3.4	100.0%	0.0	<0.1	<0.1	<0.1	<0.1	0.6%
Coast Live Oak	291.2	8.0%	178.3	61.2%	14.4	7.4	19.7	2.1	21.8	7.5%
Eucalyptus	72.0	2.0%	10.7	14.8%	7.1	3.6	8.8	1.8	10.7	14.9%
Subtotal: Woodland	**366.6**	**10.1%**	**192.4**	**52.5%**	**21.5**	**11.0**	**28.5**	**3.9**	**32.5**	8.9%
GRASSLAND										
California Annual Grassland	3.5	0.1%	1.2	34.4%	0.1	0.1	0.1	<0.1	0.2	4.4%
Non-Native Grassland	35.0	1.0%	1.0	2.9%	20.7	0.4	20.5	0.7	21.1	60.4%
Subtotal: Grassland	**38.5**	**1.1%**	**2.2**	**5.8%**	**20.8**	**0.5**	**20.6**	**0.7**	**21.3**	**55.3%**
WETLAND[4]										
Cattail	0.2	<0.1%	0.1	47.3%	<0.1	0	<0.1	<0.1	<0.1	<0.1%

Table 4-3: Impacts by Vegetation and Land Cover Type, Location, and Duration[1]

	Total in LOHCP Area		Existing Protected		To be Impacted by Covered Activities					
Vegetation/Land Cover	Acres	Percent	Acres	Percent Protected	Inside USL	Outside USL	Permanently Impacted	Temporarily Impacted	Total	Percent of Total
Pickleweed	1.3	<0.1%	1.2	90.5%	<0.1	0	<0.1	<0.1	<0.1	1.5%
Disturbed Wetlands	41.7	1.1%	29.5	70.8%	2.6	0	2.5	0.1	2.9	6.8%
Subtotal: Wetland	**43.1**	**1.2%**	**30.7**	**71.3%**	**2.6**	**0.0**	**2.5**	**0.1**	**2.9**	**6.7%**
RIPARIAN										
Arroyo Willow Black Cottonwood	0.8	<0.1%	0.8	100%	<0.1	0	<0.1	<0.1	<0.1	<0.1%
Arroyo Willow	11.6	0.3%	0.4	3.6%	3.1	0	3.1	<0.1	3.1	26.7%
Black Cottonwood	1.8	<0.1%	0	0%	<0.1	0	<0.1	<0.1	<0.1	<0.1%
Coast Live Oak - Arroyo Willow	62.3	1.7%	7.7	12.3%	<0.1	0	<0.1	<0.1	<0.1	<0.1%
Subtotal: Riparian	**76.6**	**2.1%**	**9.0**	**11.7%**	**3.1**	**0**	**3.1**	**<0.1**	**3.1**	**4.1%**
OTHER LAND COVER										
Agricultural Land	48.5	1.3%	0.1	0.1%	2.8	3.0	4.8	1.0	5.8	12.0%
Developed	1,515.8	41.6%	4.5	0.6%	197.4	9.2	169.0	37.6	206.5	13.6%
Landscaped Trees	131.4	3.6%	16.8	12.8%	16.3	5.3	19.2	2.4	21.6	16.4%
Open Water	4.2	0.1%	0.6	15.0%	0.0	0	0.0	0.0	0.0	0.0%
Ruderal Disturbed	49.9	1.4%	0.5	1.1%	30.9	0.6	30.1	1.4	31.5	63.0%
Subtotal: Other Land Cover	**1,750.0**	**48.0%**	**22.5**	**1.3%**	**247.4**	**18.0**	**223.1**	**42.3**	**265.4**	15.2%
Total	**3,643.8**	**100%**	**948.4**	**26.0%**	**461.3**	**70.5**	**466.3**	**65.4**	**532.0**	**14.6%**

[1] Areas of each mapped vegetation and other land cover type to be impacted temporarily and permanently by the covered activities. The amount of each type within existing protected lands is provided for reference.

[2] Impacts to coyote brush were overestimated as a result of this community primarily occurring in single family residential parcels, which as presumed to be completely impacted, as well as the community being included in the extrapolation used to estimate community-level impacts of activities without specified project footprints.

[3] Impacts to bishop pine community, which is only within existing protected lands, are overestimated as a result of the process of estimating impacts of activities without specified project footprints using extrapolation.

[4] Impacts to species in wetland and riparian communities will not be covered by the LOHCP ITP.

Table 4-4: Morro shoulderband snail and Morro manzanita Habitat Types

Vegetation/Land Cover	Acres	Percent	Morro Shoulderband Snai[1]l	Morro Manzanita
COASTAL SAGE SCRUB				
California Sagebrush – Black Sage				
Largely Intact	481.6	13.2%	Primary Habitat	
Disturbed	373.0	10.2%	Primary Habitat	
Heavily Disturbed	10.8	0.3%	Primary Habitat	
Coyote Brush	0.7	<0.1%	Primary Habitat	
Subtotal: Coastal Sage Scrub	**866.0**	**23.8%**		
CENTRAL MARITIME CHAPARRAL				
Morro Manzanita California Sagebrush	38.0	1.0%	Primary Habitat	Habitat
Morro Manzanita	321.2	8.8%		Habitat
Morro Manzanita Wedgeleaf Ceanothus	113.4	3.1%	Secondary Habitat	Habitat
Wedgeleaf Ceanothus - California Sagebrush	30.6	0.8%	Primary Habitat	Habitat
Subtotal: Central Maritime Chaparral	**503.3**	**13.8%**		
WOODLAND				
Bishop Pine	3.4	0.1%		Habitat
Coast Live Oak	291.2	8.0%		Habitat
Eucalyptus	72.0	2.0%		
Subtotal: Woodland	**366.6**	**10.1%**		
GRASSLAND				
California Annual Grassland	3.5	0.1%	Secondary Habitat	
Non-Native Grassland	35.0	1.0%	Secondary Habitat	
Subtotal: Grassland	**38.5**	**1.1%**		
WETLAND[3]				
Cattail	0.2	<0.1%		
Pickleweed	1.3	<0.1%		
Disturbed Wetlands	41.7	1.1%		
Subtotal: Wetland	**43.1**	**1.2%**		
RIPARIAN				
Arroyo Willow Black Cottonwood	0.8	<0.1%		
Arroyo Willow	11.6	0.3%		
Black Cottonwood	1.8	<0.1%		
Coast Live Oak - Arroyo Willow	62.3	1.7%		
Subtotal: Riparian	**76.6**	**2.1%**		
OTHER LAND COVER				
Agricultural Land	48.5	1.3%	Secondary Habitat	
Developed	1,515.8	41.6%	Secondary Habitat	
Landscaped Trees	131.4	3.6%	Secondary Habitat	
Open Water	4.2	0.1%		
Ruderal Disturbed	49.9	1.4%	Secondary Habitat	
Subtotal: Other Land Cover	**1,750.0**	**48.0%**		
Total	**3,643.8**	**100%**		

[1] MSS Primary Habitat: native vegetation where the species is more likely to occur than not; and
MSS Secondary Habitat: native vegetation where the species occurs at lower frequency and/or abundance than in primary habitat, as well as anthropogenically altered that often support MSS.

Table 4-5: Areas of Morro shoulderband snail and Morro manzanita habitat to be temporarily and permanently impacted by the covered activities (excludes the CWPP).

Habitat	Total Acres	Existing Protected		To be Impacted (Acres)					Percent to be impacted
		Acres	%	Inside USL	Outside USL	Permanently Impacted	Temporarily Impacted	Total	
Morro Manzanita Habitat	797.9	490.9	61.5%	20.6	19.5	35.0	5.1	40.1	5.0%
Morro Shoulderband Snail									
Primary Habitat	934.6	445.2	47.6%	159.7	29.6	173.9	15.4	189.3	20.3%
Secondary Habitat	1,897.5	135.4	7.1%	269.1	19.6	245.5	43.2	288.7	15.2%
Total Morro shoulderband Snail	**2,832.1**	**580.7**	**20.5%**	**428.8**	**49.2**	**419.4**	**58.6**	**478.0**	**16.9%**

[1] Areas of Morro shoulderband snail and Morro manzanita habitat to be temporarily and permanently impacted by the covered activities. Habitat impacts were determined based on the acres of impacts to vegetation and other land cover types (Table 4-3) using the cross walk presented in Table 4-4.

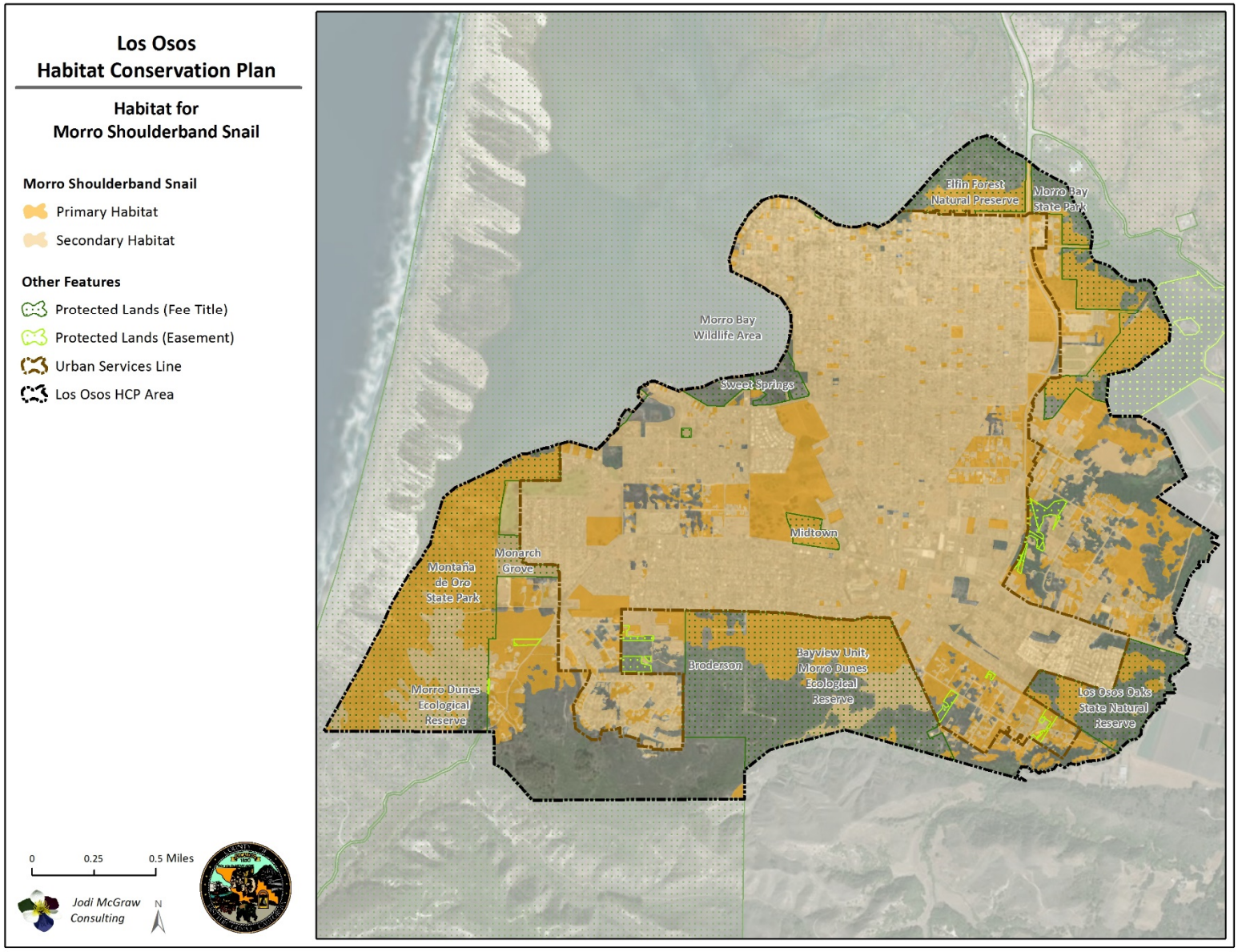

Figure 4-1: Morro Shoulderband Snail Habitat

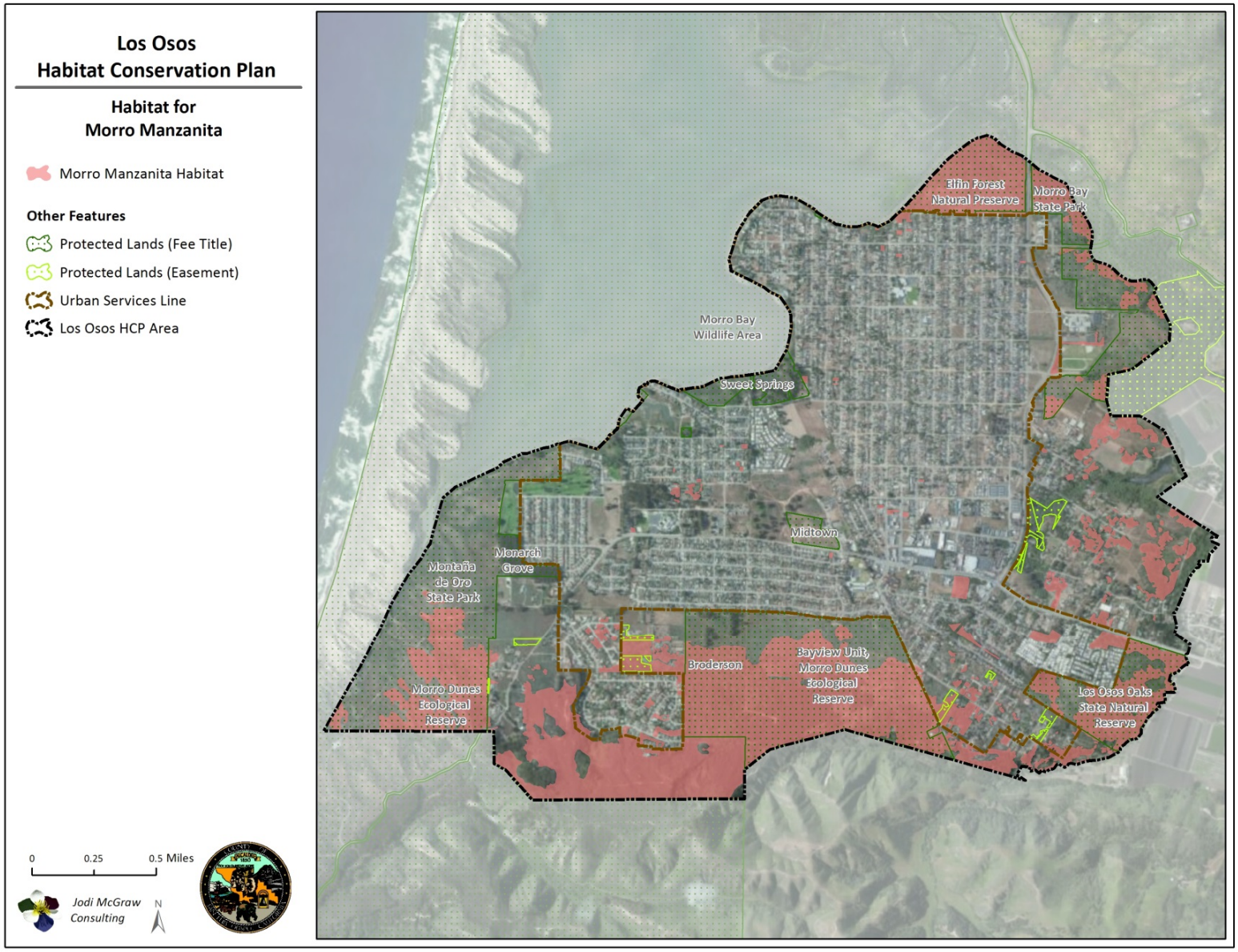

Figure 4-2: Morro Manzanita Habitat

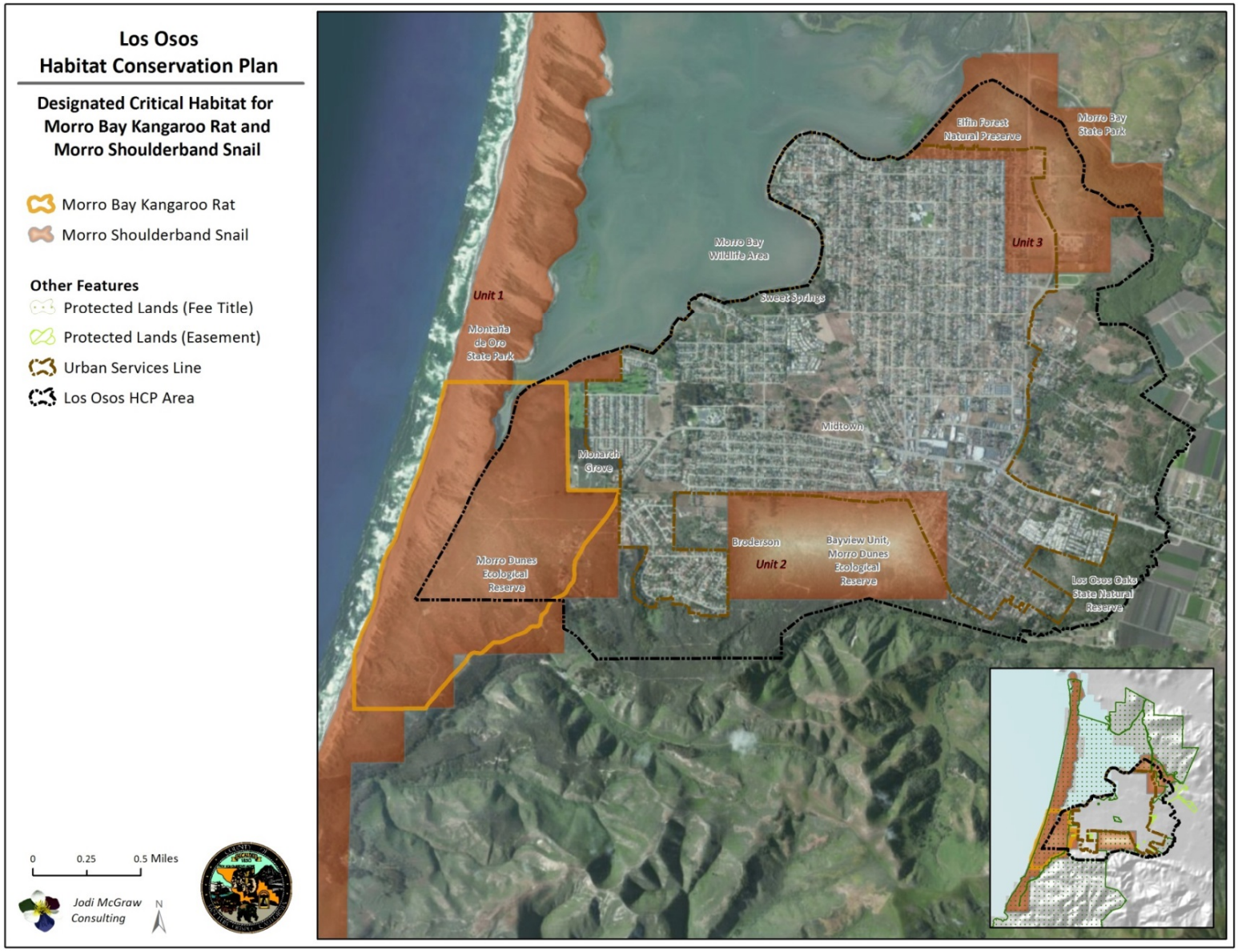

Figure 4-3: Designated Critical Habitat

5 Conservation Program

This chapter describes the LOHCP conservation program, which is designed to avoid, minimize, and mitigate the impacts of covered activities on the covered species such that the benefits of the mitigation will be, in aggregate, commensurate with the take /impacts of the covered activities on the covered species. The program features seven primary elements:

1. **Biological Goals and Objectives:** goals identify the desired outcome or future condition of the covered species, communities, and ecosystem in which they occur (collectively, "biological systems"), and the objectives identify specific targets for attaining the goals through implementation of the conservation program (Section 5.1).
2. **Avoidance and Minimization:** measures that will be taken during implementation of the covered activities, in order to avoid or minimize their effects on covered species and the degradation of habitat, as well as measures to avoid take of other listed species not covered by the permit (Section 5.2);
3. **Habitat Protection**: efforts to safeguard habitat by preventing its development or other uses that would result in its degradation in order to expand and connect existing protected habitat that is managed at least in part for the covered species (Section 5.3.2);
4. **Habitat Restoration:** projects to re-create habitat conditions suitable for the covered species, including native plant community structure and species composition, where it has been substantially degraded by anthropogenic factors, such as erosion or dense infestations of exotic plants, and fire exclusion (Section 5.3.3);
5. **Habitat Management:** ongoing efforts to maintain or enhance habitat conditions and promote the long-term population viability of the covered species, by addressing factors that negatively impact habitat, including (but not limited to) incompatible recreational use and invasion by exotic plant species (Section 5.3.3);
6. **Monitoring:** studies to tract the status and trends of the covered species populations and the condition of their respective habitats, as well as the effects of restoration and management projects (Section 5.4); and
7. **Adaptive Management:** the framework through which the six other elements will be implemented in order to enhance long-term effectiveness of the conservation program at achieving the biological goals and objectives (Section 5.5).

These elements are intended to fulfill the habitat conservation plan requirements for issuance of a take permit; specifically, plans must identify goals and objectives, and steps that will be taken to avoid and minimize (protection measures) impacts of the covered species, as well as compensate for them (habitat protection, restoration, and management). Habitat conservation plans must also include monitoring to evaluate plan effectiveness toward achieving the goals and objectives, as well as adaptive management framework to enhance effectiveness over time (USFWS and NMFS 2016).

This section describes the elements of the conservation program. Appendix D provides details of the approaches that will be used to manage three primary factors that impact the covered species within protected habitat: exotic plants, incompatible recreation, and fire, including wildfires and fire exclusion. Appendix E provides initial monitoring protocols for the communities, the covered species, and their habitats. Appendix F provides details for pre-project surveys to avoid take of Morro Bay kangaroo rat

and minimize take in the form of injury or mortality for Morro shoulderband snail. These elements of the Plan will be combined with results of surveys and other information obtained early during implementation, to develop the LOHCP Preserve System AMMP, which will detail how habitat restoration, management, and monitoring will be implemented based on the framework developed in this plan (Section 5.3.3.2).

Chapter 6 describes how the conservation program will be implemented by the Implementing Entity under contract with the County (Section 6.1). Chapter 7 outlines how the conservation program will be funded through fees paid by plan participants.

5.1 Biological Goals and Objectives

The biological goals identify the desired outcome, condition, or state of the biological systems. The objectives identify targets for attaining the goals and related directly to the three primary elements of the conservation strategy: habitat protection, restoration, and management (Table 5-1). Goals and objectives reflect the ecological hierarchy: ecosystems, communities, and covered species. Although the primary purpose of the conservation program is to mitigate the impacts of the covered activities on covered species, goals were also developed for ecosystems and communities in order to:

1. create a unified, coordinated strategy for habitat-based management for the covered species, which co-occur within the various plant communities and their successional stages within the Baywood fine sands ecosystem; and
2. avoid negative impacts associated with single-species management, including cost inefficiencies, competing objectives, and unintended negative consequences for sensitive species and communities, as well as other natural resources in the Plan Area.

The LOHCP biological goals and objectives, which are listed in Table 5-1, are centered on promoting long-term persistence of the species, communities, and broader ecosystem. As such, the objectives emphasize the important role of maintaining connectivity and promoting natural processes, such as natural disturbance regimes, and other ecosystem functions. Recognizing the critical role of natural disturbances in creating and maintaining the habitat conditions to which the covered species are adapted, the objectives emphasize the importance of restoring and managing existing protected habitat as well as protecting and managing habitat in currently unprotected land.

The objectives also reflect the importance of maintaining and enhancing connectivity of habitat within the Plan Area, in order to promote long-term viability of the species populations, including by enabling movements in response to climate change.

For each biological objective, Table 5-1 identifies the following:

1. **Conservation measures:** the general habitat protection, restoration, and management measures that will be implemented to achieve the objective;
2. **Implementation monitoring**: the approach that will be used to track implementation of measures to achieve the objective (e. g. tracking the acres of habitat managed to control exotic plants); and
3. **Effectiveness monitoring**: the studies that will be used to evaluate the effectiveness of the conservation program at achieving the objective (e.g., monitoring the distribution and abundance of the Morro shoulderband snail population).

As part of efforts to develop and implement the LOHCP Preserve System AMMP, the goals and objectives will be updated to provide quantitative targets that will enable success to be measured (Section 5.3.3.2). Likewise, the monitoring protocols (Appendix E) will be revised to feature quantitative thresholds based on results of the initial baseline surveys.

5.2 Avoidance and Minimization Measures

During implementation of Plan covered activities, Plan participants will be required to implement a series of measures to avoid and/or minimize take of the covered animal species and impacts to the covered plant species (Section 5.2.1), avoid take of other listed species in the Plan Area that are not covered by the LOHCP permit (Section 5.2.2), avoid impacts to active bird nests (i.e., with eggs, nestlings), migratory birds, including birds of prey (Section 5.2.3), and avoid and minimize impacts to covered species and nesting birds during implementation of the CWPP (Section 5.2.4) The Implementing Entity will facilitate their successful implementation, and evaluate their effectiveness, in order to recommend adjustments to ensure species protection as part of the adaptive management framework (Section 6.2.1).

5.2.1 Avoidance and Minimization Measures for Covered Species

Section 10 (a)(2)(B) of the Endangered Species Act stipulates that the impacts of covered activities must be minimized and mitigated to the maximum extent practicable. Table 5-2 lists the measures that will be implemented as part of the LOHCP to avoid or minimize take of/impacts to the covered species during implementation of the covered activities. These measures are designed to reduce the take of/impacts to individuals and the degradation of remaining habitat to the maximum extent practicable, in compliance with federal and state endangered species laws. The measures are outlined in accordance with the LOHCP conservation hierarchy, where attaining goals and objectives for ecosystems and communities will promote conservation of the covered species, as well as other species within the Baywood fine sands ecosystem of Los Osos (Table 5-2).

5.2.2 Avoidance Measures for Other Listed Species Not Covered by the LOHCP

The Plan Area and the area immediately adjacent supports habitat for eight state and/or federally-listed species that will not be covered by the LOHCP permit (Section 3.2.3, Appendix C). Six of these species primarily inhabit riverine, riparian, and wetland communities, rather than the upland communities on Baywood fine sands ecosystem, which are the focus of this HCP. Constraints to development within these aquatic systems are such that take coverage for these species is not necessary to implement the covered activities of the LOHCP. However, certain activities occurring in proximity to these habitat areas may have potential to cause take of these species; proponents of these projects will be required to implement measures to avoid such impacts in order to participate in the LOHCP.

To ensure that activities proposed for coverage under the LOHCP avoid wetland and riparian listed species, proponents of projects in parcels bordering the estuary, lake, stream or another water body, as well as parcels featuring mapped wetland and/or riparian habitat, will be required to implement pre-project habitat assessments. Figure 5-4 illustrates the map of parcels that will be subject to a prep-project habitat assessment for wetland and riparian species; the map will be updated, as needed, as part of the adaptive management process.

The purpose of the assessment will be to evaluate whether the project has the potential to result in take of state or federally listed species not covered by the LOHCP permit. Assessments will be conducted by qualified biologists approved by the USFWS and CDFW. Where the Implementing Entity determines that potentially suitable habitat is known or likely to occur on the project site, focal species surveys will be required to ensure that no take of/impacts to non-covered wetland and riparian species occurs. Those that cannot avoid impacts will be required to obtain a separate take permit or otherwise demonstrate compliance with ESA and CESA, or they will be deemed ineligible for coverage under the LOHCP (Section 6.3.1).

The other two species, white-tailed kite and golden eagle, occur at low density and frequency but forage broadly within the LOHCP Area; they may infrequently nest in discrete locations in the Plan Area. These birds of prey are California Fully Protected Species therefore CDFW cannot issue permits for take of individuals; golden eagle is also protected by the Bald and Golden Eagle Protection Act.

Table 5-3 lists measures that will be implemented to avoid impacts to the other state or federally-listed species and take of the California Fully Protected Species. They include ecosystem and community-level avoidance measures, which will protect aquatic, wetland, and riparian habitats more broadly, as well as species-specific avoidance measures.

5.2.3 Other Protection Measures

The Plan Area features populations of nesting birds and additional birds of prey. In compliance with Section 3503 of the California Fish and Game Code (Section 1.5.2.2), project proponents will implement measures to avoid and minimize impacts to bird nests and birds of prey. Specifically,

- Projects that remove vegetation and other nesting habitat will be conducted outside of the nesting season (September 1 - January 31), whenever feasible; and
- If it is not feasible, then they will use pre-project surveys for nesting birds to identify measures that will be implemented to avoid impacts to nests of birds of prey and any other nesting birds.

These and other measures will be identified based upon the specific project.

5.2.4 Avoidance and Minimization Measures for the Community Wildfire Protection Plan

A series of separate avoidance and minimization measures will be implemented to limit take of/impacts to the covered species and nesting birds during implementation of the fire hazard abatement treatments as part of the Community Wildfire Protection Plan (Table 5-4). These measures were developed by the USFWS and CDFW, which have worked closely with CALFIRE since 2010 to develop and implement avoidance and minimization measures for listed species within the CWPP area. The measures for the four covered species are designed to reduce take in the form of injury or mortality for Morro shoulderband snail, reduce the severity of impacts to Morro manzanita, and avoid take of/impacts to Morro Bay kangaroo rat and Indian Knob mountainbalm. Take of Morro shoulderband snail would be predominantly in the form of capture; trimming of Morro manzanita would be kept to a minimum, with no removal of individual plants allowed. Based on the use of these measures as part of the LOHCP (Table 5-4) and the limited scope of abatement activities, implementation of the CWPP is expected to have a negligible effect on the covered species.

5.3 Compensatory Mitigation: The LOHCP Preserve System

In addition to avoiding and/or minimizing the impacts of the covered activities, the LOHCP conservation program will mitigate their negative effects on the covered species to a level that is commensurate with the impacts of the covered activities by:

- **Protecting** additional habitat from activities that would type-convert or degrade it;
- **Restoring** degraded habitat so that it can support larger and thus more viable populations of the covered species; and
- **Managing** protected habitat to ensure it remains suitable and can support persisting populations.

Habitat and covered species will be monitored in order to evaluate and enhance the long-term effectiveness of these compensatory mitigation components of the LOHCP conservation program. These activities will be conducted within the Los Osos Habitat Conservation Plan Preserve System—a network of protected lands managed as part of the LOHCP to maximize their long-term benefits for the covered species, as the communities and ecosystem they inhabit.

This section describes the approach used to design the LOHCP Preserve System, and then describes how it will be managed, and restored to enhance its ability to promote the biological goals and objectives. Section 5.7.2.3 describes how the Preserve System will be assembled over time, to mitigate the impacts of the LOHCP covered activities.

5.3.1 Preserve System Design

5.3.1.1 Background and Approach

The LOHCP encompasses much of the range of each covered species (Section 3.2.2, Appendix B). As a result, the LOHCP covered activities and conservation program have great potential to influence their persistence and recovery. In consideration of this, these elements of the LOHCP were developed based in part on USFWS recovery plans for the Morro Bay kangaroo rat (USFWS 1999) and Morro shoulderband snail, Morro manzanita, and Indian Knob mountainbalm (USFWS 1998a), as well as updated recommendations provided in the species most recent status reviews and species reports (USFWS 2006. 2008, 2011b, 2013).

Developed by the USFWS with input from outside biologists with additional expertise in these species, the recovery plans identify general strategies and specific measures to promote long-term viability of the listed species; the plans are designed to achieve the goal of either down listing (i.e., reclassify endangered species as threatened) or, where possible, delisting (removing the list of threatened and endangered species). Recovery plan measures primarily include habitat protection and management, as well as research to fill key data gaps to inform effective conservation measures. These plans feature additional components such as captive breeding program for Morro bay kangaroo rat; though outside of the scope of a habitat conservation plan, such efforts could be conducted by agencies and organizations in coordination with implementation of the LOHCP conservation program.

Since the plans were developed, agencies and organizations have implemented several measures of the recovery plans, including protecting much of the habitat of greatest conservation value. This includes

lands within the Morro Dunes Ecological Reserve (CDFW), and Morro Bay and Montaña de Oro state parks. Elements of the LOHCP conservation program were designed to build upon these prior efforts to contribute to the recovery of the covered species and avoid jeopardizing their persistence in the wild. Most notably, to achieve the biological goals and objectives, the LOHCP Preserve System will include selected existing protected lands (Section 5.3.3.1), as well as the acquisition of new lands as mitigation for covered activities (Section 5.3.2). Enhancing management of existing protected lands will increase the long-term viability of the covered species by creating and maintaining the largest, most contiguous area of high-quality habitat possible, given the constraints in the landscape. The following sections provide the rationale as well as details for this approach to assembling LOHCP Preserve System.

5.3.1.2 Priority Conservation Area

A key consideration in developing the habitat protection, restoration, and management measures is where they should take place; specifically, what land should be included in the LOHCP Preserve System to maximize the benefits for the covered species. Therefore, the LOHCP planning process evaluated habitat within the Plan Area for protection, restoration, and management. Properties that will ultimately be included in the LOHCP Preserve System will be determined during implementation of the plan by the Implementing Entity, which will work with willing landowners to acquire additional lands (Section 6.2.2) and enroll existing protected lands in the Preserve System based on approval from the USFWS (Section 6.2.3).

The LOHCP Preserves will primarily occur within the 1,510-acre Priority Conservation Area—the general area identified as most important for habitat protection, restoration, and management (Figure 5-1). The Priority Conservation Area was identified based on a critical review and analysis of the recovery plan conservation measures, including the recovery Conservation Planning Areas (USFWS 1998a), existing habitat conditions, and the principles reserve design (Soulé and Simberloff 1986, Soulé and Terbough 1999), including those to promote resiliency to climate change (Hannah et al. 2002).

Located on the perimeter of Plan Area (Figure 5-1), the Priority Conservation Area:

1. features relatively large blocks of nearly-contiguous and largely-intact habitat on Baywood fine sands ecosystem;
2. supports the diverse mosaic of the upland habitats that support the covered species; and
3. contains significant habitat adjacent to open space lands located outside of the Plan Area, that feature largely intact habitat including the estuary, wetlands, riparian areas, and dunes, as well as other upland communities, which are either protected or occur in large parcels featuring low-intensity land use.

As a result of this landscape context, habitat within the Priority Conservation Area is considered to provide the greatest conservation value, both in terms of current conditions and long-term viability; specifically, land within this area will be more conducive to effective, long-term management, which is essential to the persistence of the covered species (Section 5.7.2). Therefore, land within the Priority Conservation Area will be prioritized for additional habitat protection, restoration, and management, as part of the LOHCP Preserve System.

Conservation and management of habitat outside of the Priority Conservation Area can also promote achievement of the LOHCP biological goals and objectives. As part of implementation of the LOHCP, the Implementing Entity will evaluate additional land protection, restoration, and management

opportunities that arise, and compare their relative conservation benefits to alternative actions, including future, unknown protection projects (Section 6.2.2). The cost-benefit analyses will critically evaluate the long-term contributions to achieving the goals and objectives, including long-term viability of the habitat and restoration and management needs and thus costs.

5.3.2 Habitat Protection

Protecting and connecting relatively large areas of comparatively intact habitat is essential to obtain the LOHCP biological goals and objectives (Table 5-1) and compensate for the permanent loss of habitat resulting from implementation of the covered activities (Section 4.2.1.1). Habitat for the covered species is naturally rare, and largely confined to the Baywood fine sand soils in the Plan Area (Section 3.2.2, Appendix B). Residential and commercial development has reduced the amount of habitat supporting the covered species and has contributed to their population declines. Habitat loss has also fragmented and led to the degradation of remaining habitat, including by promoting the invasion and spread of exotic species, and leading to fire exclusion. Protecting significant areas of remaining habitat will be essential to maintaining viable populations of the covered species.

As part of implementation of the LOHCP, unprotected habitat (i.e., privately-owned habitat not protected by conservation easements) will be protected and managed and monitored in perpetuity as part of the LOHCP Preserve System. Habitat protection will occur through one of two main mechanisms:

- **Acquisition of Fee Title or Conservation Easements**: The Implementing Entity will use habitat mitigation fees and supplemental funding (e.g., grants) where available, to acquire from willing sellers fee title or conservation easements. These conservation easements will protect habitat from activities that could result in its loss or degradation, such as new development, grading, and other land uses (e.g., agriculture), and also allow the Implementing Entity periodic access to the property to conduct habitat management, monitoring, and in some cases, habitat restoration (Section 6.2.2.2).
- **Dedication of Conservation Easements**: If a private landowner developing vacant land inside the Priority Conservation Area chooses to participate in the LOHCP, they will be required to dedicate conservation easements approved by the USFWS and granted to the Implementing Entity at a ratio of 3:1 for the amount of habitat disturbed (Section 2.2.4.1.1, Section 5.7.2.1.1), as well as pay the Restoration/Management/Administration Fee (Section 5.7.2).

Lands acquired in fee title will also be protected by a conservation easement approved by the USFWS and granted to the LOHCP Implementing Entity identified by the County. All conservation easements will provide the Implementing Entity and USFWS the right to access the conserved habitat to implement necessary habitat management and restoration (Section 5.3.3), and monitoring (Section 5.4). Additional information about the easements is provided in Section 6.2.2.

The newly protected lands incorporated within the LOHCP Preserve System will be located primarily within the Priority Conservation Area. They will specifically be chosen to achieve the following objectives:

1. protect habitat that supports, is suitable for, or can be restored to render it suitable for, one or more of the covered species;

2. protect relatively large areas of habitat, including by buffering and expanding existing protected habitat areas, in order to safeguard large areas that feature reduced perimeter-to-area ratios that are therefore more resistant to edge effects and can be effectively managed using techniques designed to promote diversity and long-term population persistence, including prescribed fire of fire surrogates; and
3. maintain and restore critical landscape linkages between significant habitat areas, including protected lands and other large areas of relatively intact habitat. Connecting habitat that might otherwise become isolated will facilitate gene flow (exchange of genetic material) between individuals in otherwise isolated habitat, and recolonization of sites where populations are extirpated.

In addition, land protected as part of the LOHCP Preserve System must meet the following criteria:

- Contribute to meeting the biological goals and objectives of the LOHCP (Section 5.1);
- Permanently protect the biological functions and values that contribute to the LOHCP;
- Be managed in perpetuity according to the LOHCP Preserve System AMMP (Section 5.3.3.2);
- Be monitored according to the requirements and guidelines in Section 5.4; and
- Have no hazardous materials or property encumbrances that conflict with LOHCP goals and objectives.

The specific habitat areas to be protected as part of the LOHCP Preserve System will be identified during implementation of the LOHCP. For purposes of estimating mitigation needs and thus the fees, the LOHCP Preserve System was assumed to include 107.5 acres of newly protected habitat, with a minimum of 55.25 acres acquired in fee title and protected with a conservation easement (Section 5.7.2.3.2). Table 5-10 lists the total acres of habitat type that could be protected in newly protected lands, which are based on the proportions of each vegetation type within unprotected land within the Priority Conservation Area. The total acres of habitat, as well as the number of acres of each vegetation type, that are ultimately included in the LOHCP Preserve System will depend on the specific parcels acquired from willing sellers, and land dedications from participants in this voluntary plan. Most of the habitat in the Priority Conservation Area (where land acquisition will primarily occur) is either coastal sage scrub and central maritime chaparral communities which is most suitable for the covered species and thus will ensure that the first objective of habitat protection listed above is achieved.

Proponents of development projects that would impact Environmentally Sensitive Habitat Areas (ESHA) may be required to set aside additional habitat in order to comply with the California Coastal Act. While the LOHCP requires that proponents in the PCA set aside habitat at a 3:1 ratio, the State Coastal Commission may require that all remaining habitat outside of the development envelope be protected through a County open space easement, which limits uses to natural resource management. These habitats set asides would protect additional habitat not included in the analysis of the conservation benefits of the LOHCP Conservation Program (Section 5.8.1).

5.3.3 Habitat Restoration and Management

Lands protected within the LOHCP Preserve System will be restored, where needed, and then managed in perpetuity. Restoration and management of habitat within the LOHCP Preserve System will be critical to attaining the biological goals of the plan, and to the recovery of the covered species. Much of the

remaining habitat in the Plan Area has been degraded to some extent by a variety of factors which reduce populations of the covered species, thus threatening their long-term persistence. Described in detail in Appendix D, the three main factors that degrade habitat are:

1. **Exotic Plants:** plants that are not native to the region outcompete native plants, modify habitat for native animals, and have the potential to promote fire outside of the natural disturbance regime, which can further impact the covered species (Section D.1);
2. **Incompatible recreation activities:** intensive recreation (e.g., off-highway vehicle use), unmanaged use, and trespass removes vegetation, can cause erosion, and promote the invasion and spread of exotic plants (Section D.2); and
3. **Incompatible fire management:** vegetation clearing and other hazard abatement (e.g., mowing) removes habitat and can injure individuals, while the suppression of the natural fire regime alters the structure and species composition of the plant communities, degrades habitat for the covered animals, and can inhibit population regeneration of the covered plants (Section D.3).

The LOHCP Preserve System will be managed to restore priority degraded habitat areas and prevent further deterioration of its condition as a result of the above and other factors, including global climate change by maintaining areas of contiguous habitat and microsite conditions that can confer resiliency to a future hotter and potentially drier climate. Mean annual temperature in San Luis Obispo County is projected to increase by 2.1 to 3.9 °F by 2045 and 4.1 and 7.6 °F by 2085 (Koopman et al. 2010), though coastal areas such as Los Osos may experience less dramatic changes. The effects of these and other changes on individual species or communities can be difficult to predict as they will be influenced by a host of cascading indirect effects mediated by complex species interactions. Promoting persistence of the covered species may entail additional measures to address the effects of climate change (Section 6.5.3).

While the terms restoration and management have a variety of definitions, the following are operational definitions for the Plan:

1. **Restoration:** specific projects designed to recreate native habitat structure and/or function where they have been lost or severely impacted by anthropogenic (human-related) factors (e.g., invasion by exotic plant species, vegetation removal). Restoration activities typically occur over a discrete period of time, after which the habitat is restored and subject to ongoing management.
2. **Management:** treatments designed to address current or future threats to habitat, to enhance conditions for the covered species. Management treatments are often recurring or even ongoing, in the case of habitat maintenance activities, to prevent negative impacts to habitat, or continue to improve generally degraded conditions.

Examples of restoration activities include controlling erosion; revegetating (actively) historic off-highway vehicle trails or roads within a protected habitat area; or conducting a prescribed fire in an area of senescent central maritime chaparral. Examples of management activities include annual control of veldt grass or conducting patrols of trails to enforce the use regulations.

When compared with management, restoration generally has greater relative benefits for the covered species, which are assumed to not be able to utilize many several-degraded habitat areas (e.g., erosion gullies that lack vegetation) but may occur within areas that require management, albeit at reduced population levels, depending on the habitat condition. Restoration activities are also generally more

costly than management, on a per-acre basis, as they require more intensive planning (e.g., engineered solutions for erosion) and often more extensive effort to implement (e.g., extensive exotic plant removal, or active planting of denuded areas).

These distinctions were used as the basis for assigning these compensatory mitigation activities 'mitigation equivalencies' or 'mitigation crediting ratios', which express their relative benefits for the covered species of restoring or managing habitat within existing protected land, to *not* implementing a typical covered activity (Section 5.7.2.3.1). These mitigation crediting ratios were used to evaluate the net-effects and costs of a LOHCP Preserve System configuration scenario that was developed to illustrate how the conservation strategy can mitigate the impacts of the covered activities (sections 5.7.2.3.2 and 5.8.1). The ratios will also be used by the Implementing Entity to track the status of the Plan's stay-ahead provision, which requires that compensatory mitigation measures keep pace with, or exceed, the impacts caused by the covered species (Section 6.2.4)

Specific Habitat restoration and management activities will be identified in the LOHCP Preserve System AMMP, which will be developed during the first three years of Plan implementation (Sections 5.3.3.2 and 6.2.3.2). Criteria used to select and prioritize projects will include:

1. **Number of Plan Goals and Objectives Advanced:** Projects that can advance multiple biological goals and objectives of the Plan (Section 5.1, Table 5-1) will be prioritized over those that advance fewer goals. For example, projects that can restore habitat for multiple covered species, and connect existing protected habitat areas, will be prioritized over projects that might benefit just a single covered species.
2. **Likelihood of Success**: Projects with a high likelihood of being successful, in terms of advancing one or more Plan goals and objectives, will be prioritized over those that are experimental or otherwise have lower probability of success;
3. **Cost Effectiveness**: To maximize effective use funds at achieving the Plan's biological goals and objectives, projects that are lower cost will be prioritized over projects that are higher cost, all else being equal (i.e., if they advance similar numbers of goals and objectives); and
4. **Sustainability:** Restoration and management projects that can have sustained benefits for the covered species, communities, and ecosystem will be prioritized over those that will require ongoing inputs, all else being equal.

Management and restoration projects will be required to meet specified success criteria before the acres of habitat benefited can be credited as mitigation and be used to offset the impacts of covered activities. Success criteria will be developed in the LOHCP Preserve System AMMP and, as appropriate, in project specific plans (e.g., for detailed restoration projects). The success criteria will reflect the specific functions or values that the project or strategy is designed to address and provide quantitative methods for objectively evaluating its benefits for the covered species, communities, and/or ecosystem, in order to clearly link the proposed work to the biological goals and objectives of the LOHCP (Section 5.1, Table 5-1).

5.3.3.1 Incorporation of Existing Protected Lands in the LOHCP Preserve System

The largest and most important habitat areas for the covered species within the Priority Conservation Area are within existing protected lands (Figure 5-1, Section 2.1.3). Restoration and management of these lands are essential to the long-term persistence of the covered species. Presently, management of

habitat in County Parks, State Parks, State Ecological Reserves, Bureau of Land Management lands, and privately-held conservation lands in the Plan Area is constrained by the limiting funding of the respective land management entities. In many cases, the properties were relatively recently acquired, and habitat conditions still reflect the legacies of prior land uses, including cultivation and off-highway vehicle use. As a result, areas of habitat within these lands are degraded, and in need of active management and in some cases, restoration.

Increases in the human population in Los Osos, which will result, in part, from additional development permitted as a result of the LOHCP, may indirectly impact habitat in existing protected lands, and thus the populations of the covered species (Section 4.2). For example, increasing the human population will likely increase the frequency of recreational use, which can trample vegetation and cause erosion (Section D.2). Degradation of habitat within these parks and reserves will impede efforts to restore and manage habitat that is protected during implementation of the Plan. Also, uncontrolled exotic plant populations and incompatible recreational uses on existing protected lands can result in the degradation of habitat on adjacent or nearby habitat protected through the LOHCP. Conversely, efforts to control veldt grass or deter incompatible recreational uses on a property protected through the LOHCP would be more effective if similar efforts were undertaken on adjacent protected lands.

Recognizing that enhanced and coordinated management of protected habitat within the Priority Conservation Area will promote long-term persistence of the covered species, the LOHCP Preserve System will include existing protected lands, which will be managed and restored along with new land protected through implementation of the Plan, as part of a coordinated, strategy outlined below. In addition, the Implementing Entity will work with managers of other conservation lands not part of the LOHCP Preserve System (e.g., State Parks and BLM), as resources allow, to achieve common goals and objectives for management, including control of exotic plants.

To ensure that management of existing lands promotes attainment of the LOHCP goals and objectives, agencies and organizations seeking to enroll their lands into the LOHCP Preserve System must guarantee the following:

1. **Maintenance of effort:** the agency or organization will continue existing restoration and management efforts on the property, such that efforts funded through the LOHCP have added benefit for the covered species and do not simply replace existing efforts; and

2. **Long-term habitat protection:** the agency or organization must demonstrate that the property, or at least the portion that will be managed as part of the LOHCP Preserve System, is permanently protected from development or other activities that would result in loss or degradation of the habitat.

To ensure these conditions are met, participating agencies and organizations shall enter into an agreement with the Implementing Entity, which is subject to the review and concurrence of the USFWS, to provide these assurances. Such a cooperative management arrangement, which must be in place before habitat management and/or restoration of the site can be credited toward mitigation in the LOHCP, will also establish other important aspects of how the lands will be managed, including access by LOHCP Preserve System personnel (Section 6.2.3). The cooperative management agreements will also identify the legal authorities that govern management of the sites, and otherwise demonstrate how the habitat management and restoration conducted within the properties will have lasting benefits, and not be undone as a result of development or incompatible land uses.

As part of the LOHCP planning process, County staff met with representatives of respective agencies to discuss the opportunity for have their lands within the Plan Area managed as part of the LOHCP Preserve System. The County also worked with conservation landowners to evaluate whether any policies or legal agreements, including deed restricts or terms within grant agreements, might preclude them from having their lands subject to restoration and enhanced management (i.e., management above and beyond what the agency is already required to implement) s mitigation.

Representatives of California Department of Parks and Recreation (State Parks) San Luis Obispo District determined that their lands would not be eligible for restoration and management as mitigation for the LOHCP. The County similarly determined that it could not manage or restore the County-owned portion of the Elfin Forest Natural Area, since it was purchased, in part, with a grant from the State Coastal Conservancy which precludes future use of the property for mitigation. The portion of the County's Monarch Grove Natural Area that features a dense stand of mature blue gum (*Eucalyptus globulus*), is also unsuitable for mitigation, as it lacks suitable habitat for the covered species and is unlikely restored as the trees provide nesting habitat for raptors and support overwintering monarch butterflies (*Danaus plexippus*). The BLM lands were eliminated from consideration for inclusion within the LOHCP Preserve System because take cannot be authorized on federal lands under a Section 10(a)(1)(B) permit.

Staff from CDFW determined that the proposed management and restoration of the Morro Dunes Ecological Reserve is consistent with the CDFW mitigation policy (CDFW 2012; Appendix G). Therefore, of the nearly 800 acres of existing protected land within the Priority Conservation Area (Table 5-5, Figure 5-1), 281.1 acres were found to be suitable for management and restoration as part of the LOHCP (Table 5-5). Of the 281.1 suitable acres, an estimated 35.4 acres (12.6%) will require restoration to address severely degraded habitat conditions (Table 5-5). This area was determined based on an estimate of the percent of each property that features highly-degraded habitat, including dense veldt grass infestation and denuded areas (e.g., trails or old roads), which were observed in recent aerial imagery and through limited site reconnaissance. The remaining 245.7 acres (87.4%) are eligible for enhanced management.

The precise areas to be restored and managed as part of the LOHCP will be identified in the LOHCP Preserve System Adaptive Management and Monitoring Plan, which will be developed early during implementation of the LOHCP (sections 5.3.3.2 and 6.2.3.2). This management plan will identify and prioritize areas for restoration and enhanced management based upon a comprehensive assessment of the lands to be enrolled, and application of the criteria listed in Section 5.3.3. As noted above, in order for activities to count as mitigation in the LOHCP, they must be above and beyond that which the land owner is already obligated to do. For the MDER, Appendix G documents how the enhanced management and restoration will be above and beyond the existing responsibility of CDFW (R. Stafford, pers. comm. 2016), which are taken to be the management recommendations identified in the land management plan for the ecological reserve (CDFW 1982). Appendix G also outlines how management of the ecological reserve is consistent with CDFW's *Policy for Mitigation on Publicly Owned, Department Owned, and Conserved Lands* (CDFW 2012).

There is currently no management plan identifying existing management obligationsfor the County's Monarch Grove Natural Area. Prior to the potential enrollment of this property into the LOHCP Preserve System, the existing obligations for management will be identified and used to determine the enhanced management and restoration activities proposed in the LOHCP Preserve System Adaptive Management and Monitoring Plan.

Though the remaining 497.7 acres of habitat within existing protected lands inside the Priority Conservation Area are not eligible for enrollment in the LOHCP Preserve System, these BLM, State Parks, and County lands contain habitat that is important for recovery of the covered species. Effective management of these lands can help promote the biological goals and objectives of the LOHCP, by limiting the potential of stressors degrading habitat on adjacent lands, such as exotic plants and incompatible recreational use, from impacting the LOHCP Preserves. Accordingly, the Implementing Entity will work with managers of other existing protected lands within the Priority Conservation Area to coordinate management in order to maximize effectiveness and achieve shared conservation goals. Such coordinated management can also enhance the cost-effectiveness of efforts on the LOHCP Preserve System. For example, by coordinating exotic plant management across properties, the Implementing Entity can help prevent reinvasion of a preserve from an adjacent property; coordinating exotic plant management can also reduce the per-acre costs through economies of scale.

5.3.3.2 LOHCP Preserve System Adaptive Management and Monitoring Plan

Restoration and management of land within the LOHCP Preserve System, as well as monitoring (Section 5.4.2), will be implemented following an Adaptive Management and Monitoring Plan (AMMP) that identifies the coordinated strategies that will be implemented in perpetuity to achieve the greatest long-term conservation benefits for the covered species. To ensure that it is based upon the most current information about habitat conditions, species ecology, threats, and management, the LOHCP Preserve System AMMP will be developed by the Implementing Entity during the first three years of plan implementation. The AMMP will be subject to written approval of the USFWS as representatives of agencies whose lands will be managed as part of the LOHCP Preserve System, including CDFW (Section 6.2.3.2).

The LOHCP Preserve System AMMP will be developed based on information contained in this Plan, which will provide the framework for its development based upon updated assessment of habitat conditions. Specifically, the plan will be designed to promote achievement of the LOHCP biological goals and objectives (Section 5.1, Table 5.1), integrate the Plan's avoidance and minimization measures (Section 5.2), and prioritize restoration and management actions (Section 5.3.3) that will have the greatest lasting benefits for the covered species. The management plan will reflect other elements of the conservation strategy outlined in this plan, including the appendices which contain the following information designed to inform the Preserve System AMMP:

- Detailed descriptions of the covered species, with an emphasis on aspects of their ecology that can inform habitat management (Appendix B);
- a critical assessment of three main factors that degrade habitat— exotic species, unmanaged recreation, and altered fire regimes— and approaches to addressing them through restoration and management projects (Appendix D); and
- draft monitoring protocols for the covered species, natural communities, and general habitat conditions (Appendix E).

During the first three years of Plan implementation, the framework and initial information presented in the LOHCP will be integrated with new information obtained through the following:

- baseline surveys and monitoring of the habitats and covered species populations; and
- the latest scientific information including results of habitat management and restoration projects.

This current information will be used to develop robust management and restoration strategies to achieve the biological goals and objectives of this plan (Table 5-1, Section 5.1). The site-specific surveys will also be used to identify the initial projects or tasks within the preserve system lands, which will be prioritized based on their long-term conservation value for the covered species, communities, and ecosystem. For example, exotic plant management strategies will reflect the distribution, abundance, and impacts of the exotic plants found in or near the preserves. These elements will be adapted over time, based on the results of monitoring that will be used to evaluate effectiveness of management and restoration, as well as to identify changed conditions (e.g., new invasive species). The Preserve System AMMP will also be updated as new preserves are enrolled in the Preserve System following acquisition of fee title and/or easement (Section 5.3.2).

The following are the specific objectives of Preserve System AMMP, which will:

1. **Evaluate current conditions of habitat**, including the structure and species composition of the vegetation and occurrences of the covered species;
2. **Examine existing and future threats** to habitat and the covered species, which include a variety of factors that can degrade habitat or reduce populations (Appendix B), such as exotic species, altered disturbance regimes, and current and historic land uses (Appendix D), as well as climate change;
3. **Identify goals and objectives**, which tier off the Plan biological goals and objectives (Section 5.1), reflect the desired future condition of habitat, and provide specific measures or success criteria designed to evaluate their status;
4. **Describe general restoration practices** that can be used to enhance the condition of degraded habitat areas, including eroded or otherwise denuded areas;
5. **Identify a series of management treatments** to address ongoing threats, including exotic plants, incompatible recreation, wildfire, and fire exclusion (Appendix D);
6. **Prioritize restoration and management projects,** based on the criteria outlined in Section 5.3.3 and the results of the baseline surveys and monitoring, and identify a timeline or system of phasing projects (e.g., short, medium, and long-term projects) to maximize long-term effectiveness of the regional strategy;
7. **Identify performance criteria for restoration and management protects,** which will specify the conditions that the projects are desigend to achieve, in terms of quantitative measures of habitat condition that relate to the covered species, and/or direct measures of the covered species populations (e.g., occupancy or indices of abundance), and the timeframes in which the criteria will be achieved in order for the projects to be used as mitigation in the plan;
8. **Describe the final monitoring protocols** that will be used to evaluate status toward the goals and objectives and track trends in the covered species and their habitats (Appendix E), as well as evaluate the effectiveness of specific restoration and management projects; and
9. **Describe the adaptive management process** that will be used to make changes in restoration, management, and monitoring over time, to achieve the goals and objectives of the Plan.

By developing the LOHCP Preserve System AMMP at the outset of LOHCP implementation based on the framework and background information in this plan, combined with the information gained through current, site-specific surveys and assessments and a critical review of the latest scientific literature and management and restoration practices, the management plan will be able to most accurately identify

the priority projects for properties incorporated in the LOHCP Preserve System. Once developed, the Preserve System AMMP will be updated at approximately five-year intervals, or as needed to integrate new lands, monitoring results, scientific information, changed circumstances, new properties, and determine any measures needed to achieve the Plan's goals and objectives (Section 5.5).

5.4 Monitoring

Monitoring is an essential element of the LOHCP conservation program and is integral to implementation of the LOHCP in an adaptive management framework (Section 5.5). Monitoring for the LOHCP will include two main components:

1. **Implementation Monitoring:** steps taken to document implementation of the Plan and compliance with the terms of the incidental take permit; and
2. **Biological Effectiveness Monitoring**: methods to track the status and trends in the covered species populations and their habitats, examine the effectiveness of restoration and management projects, and evaluate progress toward attaining the LOHCP biological goals and objectives.

Table 5-6 identifies the monitoring methods that will be used to track implementation and effectiveness of the LOHCP toward achieving the Plan's biological goals and objectives (Table 5-1). Appendix E provides draft protocols for the biological effectiveness monitoring studies. These monitoring protocols will be finalized upon review and approval of the USFWS part of work to develop the Preserve System AMMP (Section 5.3.3.2). During implementation of the Plan, monitoring results will be documented in the annual reports provided to the USFWS (Section 5.6).

5.4.1 Implementation Monitoring

The Implementing Entity will track implementation of the Plan, and compliance with the terms of the incidental take permit. The Implementing Entity will conduct monitoring of individual projects, to ensure that their impacts do not exceed the predetermined envelopes specified in their certificate of inclusion. If additional impacts are determined to have occurred, or if projects are conducted without a certification of inclusion, the Implementing Entity will contact the USFWS and County Code Enforcement and proceed with addressing the violations as outlined in Section 6.3.3.

The Implementing Entity will also conduct implementation monitoring to ensure that take/impacts due to the covered activities does not exceed the limits of the permit, and that the Plan is being implemented in compliance with the stay-ahead provision, which ensures that the habitat protection, restoration, and management activities keep pace with, or outpace, habitat and species impacts that result from covered activities (Section 6.2.4).

5.4.1.1 Covered Activities Implementation Monitoring

To track implementation of the covered activities, the Implementing Entity will create and maintain a database that documents their impacts as well as the success of the required mitigation elements. The spatial database will identify the type and location of each covered activity as well as the following:

1. **Impacts**: the area (i.e., square feet) of habitat temporarily impacted, the area of habitat permanently impacted, as well as the take of/impacts to individuals, if any is observed;

2. **Protection measures:** implementation of the measures established to avoid and minimize impacts to the covered species and avoid impacts to other listed species in the Plan Area (Section 5.2); and
3. **Mitigation**: payment of habitat mitigation fees, and dedication of conservation easements, where applicable, by the plan participants (Section 5.7.2).

The database will be used to evaluate implementation of the plan to ensure the covered activities are mitigated to a level that is commensurate with the impacts of the covered activities.

5.4.1.2 LOHCP Preserve System Implementation Monitoring

To track implementation of the compensatory mitigation, the Implementing Entity will create and maintain a database that documents LOHCP Preserve System activities, including habitat protection, restoration, and management funded by the mitigation fees that are designed to collectively compensate for impacts of the covered activities (Section 5.7.2). The spatial database will track the following:

1. **Habitat Protection:** the area of new habitat permanently protected through acquisition of fee title, and the area protected through conservation easements;
2. **Habitat Restoration:** the degraded habitat area that was successfully restored to promote the ability of the habitat to sustain the covered species; and
3. **Habitat Management:** the type and area of habitat management treatments used address factors that degrade habitat for the covered species.

The database will track application of these activities to each of the vegetation and other land cover types mapped in the area and used for the take/impacts assessment (Table 4-3); this will enable the Implementing Entity to compare the net effects of Plan implementation on the covered species and their habitats and to determine whether the plan is being properly implemented in accordance with the terms of the plan and permit. In order for the acres of habitat restored or managed to be counted as mitigation under the Plan, the treated area will need to meet the performance criteria identified in the AMMP, which will be evaluated through the LOHCP effectiveness monitoring program, as described below.

The database will also track costs associated with these activities, to facilitate ongoing work to improve the cost-effectiveness of the conservation program, as well as facilitate updates to the mitigation program fee schedule (Section 7.4).

5.4.2 Effectiveness Monitoring

The Implementing Entity will conduct monitoring to evaluate the effectiveness of the conservation program, including:

1. **Long-Term Monitoring:** studies designed to evaluate the status and trends in the covered species populations and the conditions of their habitats, and thus progress toward the biological goals and objectives; and
2. **Project-Specific Monitoring:** studies designed to evaluate the effectiveness of specific restoration and management projects, to ensure that they achieve the performance criteria

established to gauge their effectiveness at achieving the biological goals and objectives of LOHCP Preserve System Management, and substantiate the mitigation to compensate for the impacts of the covered activities on the covered species.

The following sections describe the objectives and approaches to these two general types of monitoring. Appendix E provides draft monitoring protocols for the covered species and habitat conditions within the LOHCP Preserve System. Additional details will be developed in the LOHCP Preserve System AMMP that will be developed during the first two years of plan implementation (sections 5.3.3.2 and 6.2.3.2).

5.4.2.1 Long-Term Monitoring

The Implementing Entity will conduct a suite of complementary studies collectively designed to track the status of the covered species populations and evaluate the conditions of their habitat that could influence viability of their populations. Table 5-6 summarizes the monitoring protocols, while Table 5-1 identifies how they will track progress toward the goal and objectives. Initial monitoring protocols for the studies in Table 5-6 are outlined in Appendix E; these will be revised as part of efforts to develop the LOHCP Preserve System AMMP.

Long-term monitoring studies will be conducted in perpetuity as mitigation for the covered activities. During the permit period, the frequency of monitoring, or number of years between study implementation, varies depending on the life history and ecology of the biological system being examined, to maximize cost effectiveness of the overall monitoring effort. Specifically, annual monitoring will be conducted to evaluate the general conditions of the habitat to detect changes or threats that merit remedial actions. Annual monitoring will also be used to track populations of Morro shoulderband snail; this relatively short-lived species can exhibit greater population fluctuations than longer-lived species (e.g., Morro manzanita). More frequent monitoring is needed to identify natural fluctuations in the populations and understand factors that influence them (e.g., climate), and distinguish these from population declines that can threaten long-term persistence.
Morro manzanita and the other covered species will be monitored on a five-year interval. This interval will also be used to map exotic plants and the plant communities, as well as quantitatively assess plant community structure and species composition to evaluate habitat conditions (Table 5-6). While these factors can vary annually due to weather, the goal of the monitoring is to detect long-term changes due to management, or lack thereof.

After the permit has expired, and no additional take/impacts of the covered species will be permitted under the LOHCP, the habitat and covered species populations will continue to be monitored as part of in perpetuity implementation of habitat management, which will be designed to ensure that the biological goals and objectives related to their long-term persistence are attained. However, the frequency of monitoring for the covered species will decrease (Table 5-6) to reduce overall costs of the conservation program while still providing information needed to monitor success toward the biological goals and objectives in perpetuity.

5.4.2.2 Project-Specific Monitoring

As part of the adaptive framework that will be used to manage the LOHCP Preserve System, monitoring will also be conducted to examine the effects of individual restoration and management projects, to both evaluate achievement of the performance criteria needed to credit them as mitigation for the

covered activities, and enhance their long-term effectiveness. Wherever possible, these projects will be conducted using an experimental design, which enables quantitative examination of their effects. Such experimental methods include establishing controls or reference populations, and replicating treatments, wherever feasible.

Project-specific monitoring will be conducted for all restoration and management actions that are designed to offset the impacts of the covered activities. The monitoring methods will vary depending on the nature of the project, but in all cases will be designed to evaluate whether the management or restoration action has achieved the performance criteria: specific objectives of the action that reflect its effectiveness and enhancing habitat or promoting population growth and persistence directly (Section 5.3.3.2).

Project-specific monitoring will be especially important for projects that can have uncertain or potentially deleterious effects on the covered species. To leverage expertise and other resources, the Implementing Entity will partner with research institutes such as California Polytechnic State University San Luis Obispo to design and implement effective monitoring studies.

Within a given study, the monitoring duration and interval will depend on the project and the study objectives. Generally speaking, project-specific monitoring will be conducted three to five times during a ten-year period; longer monitoring periods may be required depending on the nature of the habitat or species response(s) being evaluated. For example, treatments to control the exotic perennial veldt grass could be evaluated in years 1, 3, and 5. Monitoring for a prescribed burn or fire surrogate designed to promote Morro manzanita regeneration could occur in years 1, 5, and 10. These and other details of project-specific monitoring protocols will be developed based upon the specific aspects of the project and the goals for monitoring.

5.4.2.3 Facilitate Research

As part of the LOHCP, the Implementing Entity will also facilitate research by scientists at universities, agencies, and organizations by maintaining a list of priority studies, conducting outreach to research institutions to engage their participation in research in the LOHCP Preserve System, and as feasible, seeking outside funds to support research (Section 6.1.2.4). The goal of the research, which will not constitute mitigation in the conservation program, will be to improve upon the understanding of the biology of the covered species in order to develop and implement effective conservation strategies to facilitate their persistence. Examples of such research identified in the recovery plan for the species include (USFWS 1998a, 1999):

- Examination of the species' habitat requirements;
- New exotic plant control methods that maximally benefit the covered species;
- Techniques to maintain a mosaic of vegetation appropriate for all listed and sensitive species; and
- Evaluate recolonization abilities of species.

The research studies promoted by the Implementing Entity will complement its own work to increase understanding of the ecology and conservation needs of the covered species and the natural communities in which they occur through long-term and project-specific monitoring implemented as in

the LOHCP Preserve System as described above and in Appendix E. This information will be integrated into the adaptive management process used to promote effectiveness of the LOHCP.

5.5 Adaptive Management

The LOHCP conservation program will be implemented through an adaptive framework, in which the elements of the program are adjusted, over time, in order to enhance their long-term effectiveness at achieving the program goals (Figure 5-5). It incorporates the four elements recommended by the USFWS for adaptive management in HCPs (65 FR 35252):

1. Identify uncertainties and the questions that must be addressed to resolve the uncertainties;
2. Develop alternative strategies and determine which experimental strategies to implement;
3. Integrate a monitoring program that is able to detect the necessary information for strategy evaluation; and
4. Incorporate feedback loops that link implementation and monitoring to a decision-making process.

The adaptive management process will be used to implement all elements of the conservation program, including the avoidance and minimization measures as well as habitat protection, restoration, management, and monitoring.

5.5.1 Adaptive Management of the Overall Conservation Program

The LOHCP conservation program will be managed adaptively as part of the annual cycle in which monitoring results (Section 5.4) are used to assess progress toward achieving the biological goals and objectives (Section 5.1). New scientific information and changed conditions or circumstances (Section 6.5) will also be evaluated to identify modifications to the conservation program components, including avoidance and minimization measures (Section 5.2) habitat protection strategies (Section 5.3) and habitat management and restoration techniques (Section 5.4). The annual report (Section 5.6) will identify proposed adjustments to enhance effectiveness of the program, which will be based on one or more the following:

- **Biological effectiveness monitoring results**, which can refine management strategies and techniques;
- **Implementation monitoring results**, which can identify additional or different protection measures;
- **New scientific information,** which can inform effective conservation and management of the covered species and the communities in which they occur; and
- **Changes in habitat conditions,** including threats to the covered species, such as invasion and spread of exotic plants or animals, fire, drought, or global climate change, which may necessitate additional or different management treatments (Section 6.5).

The Implementing Entity will identify proposed adjustments to the LOHCP conservation program in the annual reports, which will be provided to the agencies by March 31 during the year following that which

is covered by the report. The Implementing Entity will convene a meeting of agency representatives to review the annual report and discuss proposed changes.

5.5.2 Adaptive Management in Management of the LOHCP Preserve System

The LOHCP Preserve System will be managed following adaptive management techniques, which address the uncertainty inherent in habitat restoration and management, enable managers to adapt to changed conditions within the LOHCP Preserve System, and will increase understanding of the covered species and communities over time, in ways that will promote long-term effectiveness of management.

As part of this adaptive approach, management and restoration projects will be conducted as experiments that can be used to evaluate their effects on the covered species and communities, and their effectiveness (Figure 5-5, Walters and Holling 1990, Nyberg 1998, Lee 1999, Elzinga et al. 2001). Should management succeed, monitoring will be used to document their long-term success. Should a project fail, the results will be used to refine the model for the system that will increase the likelihood of future management and restoration project success. Notwithstanding the objective of learning from unsuccessful projects, management and restoration projects will still be required to meet specified success criteria, which will be identified in the LOHCP Preserve System AMMP and that reflect their conservation value for the covered species, in order to be credited as mitigation in the Plan (Section 5.3.3).

Adaptive management will also be needed to confront the changes in conditions during the course of management of the LOHCP Preserve System in perpetuity. Changes in community composition (e.g., the invasion of an exotic plant) and species populations (e.g., a decline in Morro shoulderband snail populations due to disease outbreak), among others, will require changes in management strategies and priorities. In addition, management techniques that might have been effective in one place or time may not be effective in another, requiring continued vigilance to achieve the conservation goals of the LOHCP.

Adaptive management will therefore by utilized at several levels during management of the LOHCP Preserve System to facilitate attainment of the biological goals and objectives. To fund the remedial management to address adaptive management, as well as changed circumstances, 10 percent was added to the estimated restoration, management, and monitoring costs (Section 7.2.3); this reflects remedial management costs budgeted in another recent regional HCP (County of Santa Clara et al. 2012).

5.6 Reporting

In order to document implementation of the Plan and its progress toward the goals and objectives, the Implementing Entity will prepare and submit to the USFWS an annual report by March 31 of the year immediately following the reporting year, allowing time for results of annual monitoring studies, as well as all other requisite record keeping, to be prepared and synthesized. The Implementing Entity will convene a meeting of the County and USFWS to review the annual report during the second quarter of the year (April-June) to discuss changes to plan implementation and proposed plan amendments (Section 6.7).

The annual report will document the results of the implementation and biological effectiveness monitoring conducted during the calendar year, as well as provide the status of the overall conservation program to date. The following is an outline of specific elements that will be integrated into the annual report.

1. **Implementation Monitoring Report:** This component of the annual report will describe the effectiveness of efforts to implement the plan and quantify its impacts on the covered species. It will include the following:

    - **Plan Impacts to Covered Species:** The number of applications and approvals for take authorization, the area (i.e., square feet) of habitat temporarily impacted and the area of habitat permanently impacted, as well as the take/impacts of individual covered species, including that resulting from any pre-project surveys;
    - **Protection measures:** the results of compliance monitoring to ensure implementation of the measures to avoid and minimize impacts to the covered species and avoid impacts to other listed species in the Plan Area (Section 5.2); and
    - **Mitigation:** work to implement the conservation strategy, including mitigation fees collected, and acres of habitat permanently protected, restored and managed.

2. **Biological Effectiveness Monitoring Report:** This component of the report will document the results of monitoring studies to evaluate condition of the habitat and covered species populations, and effectiveness of the plan at achieving its biological goals and objectives. Report components will depend on the studies conducted in the plan year, but will generally include:

    - Results of long-term monitoring studies for the communities, habitats, and covered species populations; and
    - Results of specific monitoring studies conducted for habitat management and restoration projects to examine the effects and effectiveness.

3. **Financial Report:** This report will document the financial status of Plan implementation, including mitigation fees collected, mitigation costs (funds expended to implement the conservation program), and the balances of the trust accounts that contain funds for management during the permit term, and the endowments held by the Implementing Entity, which will be used to fund administration and management post-permit (Section 7.3).

4. **Changes to the Plan:** This component of the report will document any minor or administrative amendments to the Plan approved for the preceding year in accordance with the procedures described in Section 6.7. It will also outline any recommended changes identified as part of the adaptive management process (Section 5.5).

The annual report will contain as appendices the reports from studies to monitor specific projects, the covered species, and their habitats (Section 5.4.2; Appendix E). Mitigation Requirements and Implementation

5.7 Mitigation Requirements and Implementation

The elements of the LOHCP conservation program will be implemented by the Implementing Entity and the project proponents, in coordination with and under the control of the County, who will mitigate the impacts of their permitted activities on the covered species and their habitats.

The mitigation in this plan includes two main components:

1. **Avoidance and Minimization measures,** designed to prevent or reduce the number or severity of take of/impacts to the covered species resulting from the covered activities, including by restoring temporarily-disturbed habitat on-site; and
2. **Compensatory Mitigation,** which is designed to offset the unavoidable take/impacts of the covered species resulting from the covered activities by permanently protecting and managing habitat, as well as restoring degraded habitat.

Tables 5-2 through 5-4 outline the measures designed to avoid and minimize impacts. Table 5-7 identifies the compensatory mitigation requirements. These elements were developed so that collectively:

1. the LOHCP mitigates the impacts of the covered activities to level that is commensurate with the effects of the taking; and
2. there is rough proportionality between the take/impacts of the covered activities and the mitigation requirements.

The following sections describe the mitigation requirements; additional information about the actions themselves is provided in the preceding sections of this chapter.

5.7.1 Avoidance and Minimization

Participants in LOHCP will be required to avoid and/or minimize takeoff/impacts to the covered species (Table 5-2) and avoid impacts to other listed species not covered by the incidental take permit (Table 5-3). A separate suite of avoidance and minimization measures will be implemented for activities conducted to implement the CWPP (Table 5-4) to ensure these projects have negligible impacts on covered species (sections 2.2.7 and 5.2.4).

As part of the application review and permitting process, the Implementing Entity will identify the specific protection measures that must be conducted for each project permitted under the LOHCP. These measures will be identified within the Certificate of Inclusion issued for projects covered by the LOHCP (Appendix H).

Certain avoidance and minimization measures may entail costs (e.g., for pre-project surveys), which will be the responsibility of the project proponents. The mitigation fees provided to compensate for the project impacts do not fund implementation of the avoidance and minimization measures; mitigation fees will fund mitigation under the HCP and monitoring that will be conducted by the Implementing Entity to ensure that the measures are conducted as required on the Certificate of Inclusion, and thus in compliance with the County's permits (Section 5.4.1.1).

5.7.2 Compensation

Participants in the LOHCP will be required to compensate for the impacts of their permitted projects on the covered species by implementing mitigation to protect, restore, and manage habitat that contributes to the long-term viability of their populations. The level of compensatory mitigation will be commensurate with the impacts of the project activity and will be based on the amount of disturbance caused by the project. For purposes of this plan, disturbance is defined as any activity that removes vegetation or disturbs soil, including by displacing it or covering it. The disturbance envelope, for purposes of mitigation calculations, includes the entire area that is disturbed as a result of the project and that is not covered by existing impervious surfaces including existing buildings or other structures, and hardscapes such as concrete, asphalt, or other land cover that is impervious. Areas that are landscaped, denuded, or feature pervious surfaces, as well as natural or semi-natural habitat, are all included within the disturbance envelope.

The disturbance envelope includes the area surrounding buildings or other structures where fire hazard abatement and vegetation modification are required to create and maintain defensible space (Section 2.2.4), as well as the area of new improvements themselves, including buildings, hardscapes, and landscaping.

The disturbance envelope for purposes of compensatory mitigation includes the area of habitat that is temporarily impacted as a result of construction activities including access and staging, and is restored following completion of the project, as well as the area of permanent habitat impacts. This inclusive disturbance envelope ensures compensation for all take/impacts, including that which occurs in areas of temporary disturbance, as well as from permanent loss of habitat.

Compensatory mitigation is not required for the impacts of activities to restore, manage, and monitor the Preserve System, as outlined in the Preserve System AMMP (Section 5.3.3.2), as to do so would require compensation for the compensatory mitigation itself. Compensatory mitigation will also not be required for implementation of the CWPP activities, which are limited in scope and will have negligible and largely temporary impacts that will be adequately mitigated through implementation of the avoidance and minimization measures (Table 5-4; Section 5.2.4).

5.7.2.1 Habitat Protection Requirement

Safeguarding additional unprotected habitat from development or other factors that degrade habitat for the covered species is an essential component of the LOHCP conservation program (Section 5.3.2). In order to mitigate the covered activities, project proponents will be required to protect habitat on-site or off-site, with the specific requirement depending on the type of project (Table 5-7). To summarize, private residential landowners developing vacant parcels located within the Priority Conservation Area will be required to set aside habitat on site at a ratio of 3:1 for the impacts caused by the development projects (Section 5.7.2.1.1). Other project proponents will pay a Habitat Protection Fee which will be used to protect land through acquisition of fee title or conservation easements from willing sellers largely inside the Priority Conservation Area (Section 5.7.2.1.2). All project proponents will be required to pay a habitat restoration, management, and administration fee, which will fund restoration and management of the land within the LOHCP Preserve System, as well as administration of the Plan (Section 5.7.2.2).

5.7.2.1.1 On-Site Habitat Protection

Participants in the LOHCP conducting new residential development on vacant within the Priority Conservation Area (Figure 5-1) will protect habitat on site at a ratio of 3:1 for the disturbance caused by the activity. For example, landowners seeking to develop a new single-family home and associated improvements that disturb 30,000 square feet will be required to set aside 90,000 square feet of habitat within the parcel. Proponents of new development projects on the eight vacant parcels inside the PCA that are too small to set aside the required set aside based on the maximum disturbance envelop can either reduce the size of their project to a size that accommodates the requisite habitat set aside or mitigate habitat loss through payment of the Habitat Protection Fee (Section 5.7.2.1.2).

The undeveloped parcels located within the Priority Conservation Area generally feature habitat of greater general conservation value for the covered species than other parcels in the Plan Area (Section 5.3.1.2). This accounts for the higher ratio for habitat protection (3:1) when compared to that required for other projects (1:1), which will pay the habitat mitigation fee (Section 5.7.2.1.2). Protecting habitat within parcels in the Priority Conservation Area will help promote several of the biological objectives, most notably by promoting connectivity of habitat in the region (Table 5-1).

The location of the habitat set aside will be determined by the Implementing Entity in coordination with the USFWS, which will work with the landowner to identify a set-aside area that provides high conservation value and is conducive to long-term protection, management, and monitoring. The habitat will be permanently protected via a conservation easement dedicated to the Implementing Entity (Section 6.2.2). To ensure that the protected habitat facilitates the biological goals and objectives of the LOHCP (Section 5.1, Table 5-1), the easement will provide for permanent management and monitoring of the conserved area. (Section 6.2.2.2).

Proponents of development projects that would impact Environmentally Sensitive Habitat Areas (ESHA) may be required to set aside additional habitat in order to comply with the California Coastal Act. While the LOHCP requires that proponents in the PCA set aside habitat at a 3:1 ratio, the State Coastal Commission may require that all remaining habitat outside of the development envelope be protected through a County open space easement, which limits uses to natural resource management. These habitats set asides would protect additional habitat not included in this analysis of the conservation benefits of the LOHCP Conservation Program.

Proponents of these projects must also pay a separate habitat restoration, management, and administration fee which will be used to manage and restore land within the LOHCP Preserve System, including that which they dedicate on site, as well as to administer the plan (Section 5.7.2.2).

5.7.2.1.2 Habitat Protection Fee

Proponents of the other covered activities identified in Table 5-7) will pay a Habitat Protection Fee that will be used by the Implementing Entity to protect additional privately held, unprotected land that will be included in the LOHCP Preserve System (Section 5.3.2). Proponents of these covered activities will be required to mitigate their project impacts at a ratio of 1:1; for every square foot of ground disturbance caused by the covered activity. As outlined above, ground disturbance includes any activity that removes vegetation or disturbs soil in an area not covered by existing impervious surfaces. For every

square foot of ground disturbance, project proponents will pay a fee that was calculated to cover the costs to acquire through fee or conservation easement (i.e., protect) in perpetuity, a square foot of suitable habitat (Section 7.3).

Permanent habitat loss is typically mitigated at a ratio greater than 1:1, with 3:1 ratios being common. However, the 1:1 ratio used in this Plan is appropriate since the habitat anticipated to be impacted by the covered activities that will pay the Habitat Protection Fee (Table 5-7) is, generally speaking, of much lower long-term value for species recovery than the habitat that will be protected and managed inside the Priority Conservation Area.

The Habitat Protection Fee was calculated based on vacant land costs in the area (Section 7.2.1). The fee will be re-evaluated after three years, and then every five years thereafter, with adjustments made, as needed, to ensure the fee is sufficient to fund habitat protection (Section 7.4).

Though on-site habitat protection is preferable in many cases, it was determined to be infeasible and/or ineffective at contributing to the biological goals and objectives of the LOHCP for the suite of projects designated to pay the Habitat Protection Fee (Table 5-7).

Private Development of Vacant Parcels outside of the PCA: Habitat within vacant parcels located outside the PCA has limited ability to promote population viability of the covered species. Much of it is on small, often isolated parcels and is therefore fragmented; a lot of this habitat has been degraded by more intensive land uses in this area, including frequent mowing or incompatible recreational uses. Habitat outside the PCA would be difficult to restore and manage due to its proximity to dense development, which increases the impacts of incompatible recreation use and inhibits effective fire management.

Redevelopment on Developed Parcels: Habitat on parcels that have already been developed either for commercial or residential uses, with all else being equal, is less valuable for conservation of the covered species, as it is fragmented by existing development, and degraded by the associated land use activities. The value of on-site set asides established for redevelopment activities would be further limited by their small size; most redevelopment projects will affect 500 to 5,000 square feet which would lead to set asides of just 1,500 to 15,000 square feet. Such small areas are extremely cost-ineffective to monitor and manage.

Public and Private Utility Projects: Many public and private utility projects will occur outside the PCA where habitat is fragmented and degraded, and has lower long-term viability as outlined above. Many will occur in the County right-of-way or on small parcels with existing facilities, where habitat protection is not feasible. As with redevelopment projects, many of the public and private utility projects are small, such that the value of resulting set asides would be low relative to their costs to manage and monitor.

Proponents of these projects must also pay a separate fee is also paid to manage and restore habitat, as well as fund administration of the plan (Section 5.7.2.2).

5.7.2.2 Habitat Management and Restoration Requirement

All proponents of projects outlined in Table 5-7 must pay a Restoration/Management/Administration Fee, which will be used to restore and manage habitat in the LOHCP Preserve System, as well as fund monitoring and administration of the Plan.

Restoration of habitat is necessary to compensate for the loss of habitat caused by the covered activities (Section 4.2). This off-site restoration designed to offset the impacts of the covered activities, is in addition to restoration of temporarily-disturbed habitat on-site, which is required to minimize project impacts (Table 5-2). Ongoing management is required to ensure that the habitat restoration achieved is sustained, and that habitat protected from development in LOHCP Preserves is enhanced in terms of its functions for the covered species (Section 5.3.3). Long-term monitoring of the Preserve System is essential to ensuring long-term effectiveness of the restoration and management treatments (Section 5.4).

These critical components of the conservation program will be funded through a Restoration/Management/Administration Fee, which will also fund administration of the Plan, so that its costs are born by the Plan participants (Section 7.3). Like the Habitat Protection Fee, the Restoration/Management/Administration Fee is based on the area disturbed by the covered activity; this ensures the mitigation is proportional to the project impacts.

The initial fee was determined based on the anticipated costs of conducting the necessary habitat restoration and management activities within the LOHCP Preserve System, as well as administering the plan (Section 7.2). The cost analysis included establishment of endowments to fund ongoing management and monitoring of the LOHCP Preserve System (Section 7.3). These endowments will ensure the condition of habitat protected and restored within the LOHCP Preserve System is maintained in perpetuity.

Like the Habitat Protection Fee, the Restoration/Management/Administration Fee will be re-evaluated after three years, and then every five years thereafter or as needed; adjustments to the fee will be made, as needed, to ensure it funds the actual costs of restoration, management, monitoring, and administration (Section 7.4).

5.7.2.3 Preserve System Assembly and Management

In this programmatic, 25-year plan, the LOHCP Preserve System will be assembled over time as the Implementing Entity accepts conservation easements dedicated by landowners developing vacant land inside the Priority Conservation Area; uses Habitat Protection Fees collected from other project proponents identified in Table 5-7 to acquire fee title or easement from willing sellers of land inside the Priority Conservation Area; and uses restoration, management, and administration fees collected from all project proponents identified in Table 5-7, to manage and restore the newly acquired land, as well as manage and restore existing protected lands enrolled into the LOHCP Preserve System. These land protection, restoration, and management actions will be phased in over time and keep pace with the covered activities, such that at any time during plan implementation, the benefits of the Preserve System for the covered species exceed or at least match the impacts of the covered activities, such that the mitigation is commensurate with the impacts on the covered activities.

The Implementing Entity will use the fees and habitat dedications to establish and manage the LOHCP Preserve System—the network of protected habitat, which will include existing protected lands as well as habitat protected through implementation of the Plan, which will be restored, managed, and monitored in a coordinated manner to achieve the biological goals and objectives of the LOHCP. The LOHCP covered activities are estimated to result in 532 acres of ground disturbance within the Baywood fine sands ecosystem (Section 2.2; Table 2-9). This will primarily result from private residential and commercial development (409.5 acres), including that of vacant parcels (253.8 acres) and redevelopment of partially-developed parcels (155.7 acres). The remaining area (122.1 acres) is anticipated to be impacted by capital improvements and maintenance activities associated with public and private utility projects (Table 2-9).

To mitigate the impacts of these projects at a ratio of 1:1, the LOHCP Preserve System must benefit at least 532 acres of habitat suitable for the covered species. Analyses conducted to develop the Plan identified more than 300 acres of privately owned, unprotected land within the Priority Conservation Area, which is illustrated in Figure 5-1. These lands are highly suitable for long-term conservation and that could be protected (i.e., through acquisition of fee title and dedication of a conservation easement) and managed to mitigate the impacts of the covered activities. In addition, the Priority Conservation Area features 298.2 acres of habitat within existing protected lands that were identified as suitable for management as managed as part of the LOHCP; of these, an estimated 35.4 acres merit restoration to address highly degraded conditions (Section 5.3.3.1; Table 5-5).

During the permit period (Years 0-25 of Plan Implementation), the Implementing Entity will work with willing landowners to conduct habitat protection, restoration, and management projects to compensate for the impacts of the covered activities. Because the required mitigation is provided when plan participants receive their local building or other land-use permits, which is anticipated to occur throughout the 25-year permit term, the LOHCP Preserve System will be assembled over time. As participants pay mitigation fees, the Implementing Entity will use the revenue to fund elements of the conservation program, pay for Plan administration, and establish a non-wasting endowment that will fund management and administration in the post-permit term. The Implementing Entity will also receive the land dedications (i.e., conservation easements) offered on vacant parcels developed for residential use inside the Priority Conservation Area (Section 5.7.2.1.1).

To maximize the long-term conservation benefits of the mitigation fees, the Implementing Entity will conduct further analyses to strategize conservation within the LOHCP Area, to identify the highest-priority habitat protection, restoration, and management projects; that is, those that are deemed most beneficial to long-term achievement of the biological goals and objectives. Developed based on the analysis presented in this Plan, the Implementing Entity's strategies will be continually updated, to reflect changing conditions that create new opportunities and constraints.

As mitigation funds accrue, the Implementing Entity will use the funds to implement the priority conservation actions, which will include protecting and managing unprotected habitat, as well as conducting habitat restoration and additional management on existing protected lands that are enrolled in the LOHCP Preserve System (Section 5.3.1). The Implementing Entity will create and maintain a database that will be used track implementation of the various activities on a per-square-foot basis, according to the type of vegetation or other land cover type affected. This database will be used to track benefits to the covered species, based on the crosswalk between the vegetation and land cover types and their habitats (Table 4-4).

5.7.2.3.1 Mitigation Crediting Ratios

Mitigation equivalencies will be used to track the mitigation value of different types of actions in this conservation program. These mitigation equivalencies are expressed as ratios that relate the conservation value of habitat protection, restoration, and additional management, to the impacts of the covered activities. Table 5-8 discusses the ratios and summarizes the rationale used to assign them based on the relative value of the actions for the long-term recovery of the covered species. They were developed by asking the question: *What is the relative value of protecting new habitat, restoring existing protected habitat, or providing enhanced management of existing protected habitat, for the long-term viability of the covered species, relative to* not *implementing a typical covered activity?*

Restoration and Management of Existing Protected Lands

The ratios for restoration (1.5:1) and management (1.25:1) of existing protected lands are both greater than 1:1, reflecting:

1. the imperative nature of active habitat management within the Baywood fine sands ecosystem in order to maintain and enhance the habitat conditions for the covered species, and the high importance of appropriate habitat conditions for achieving the biological goals and objectives for the covered species (Section 5.3.3); and
2. The greater conservation value of land within existing protected lands relative to much of the land that will be impacted by the covered activities.

Active Management and restoration of eligible existing protected lands, including the Morro Dunes Ecological Reserve (MDER; Table 5-5), will be essential to the long-term persistence of the covered species. This and other protected lands feature large areas of unfragmented habitat that have the greatest potential to support large and persisting populations. Although protected from development, habitat within the MDER has been degraded by a variety of factors that impair its ability to support the covered species populations including historic land uses, such are off-highway vehicle use, erosion resulting from old roads and trails, invasive plant species, and fire exclusion, much of which occurred prior to the acquisition of the property by CDFW. Funding and staff capacity within the Department of Fish and Wildlife are insufficient to conduct the restoration and habitat management tasks beyond that which is identified in the land management plan for the property (CDFW 1982) necessary to enhance the habitat. Conducting enhanced management and restoration within the MDER to address these and other factors that degrade habitat and otherwise impact the covered species within the MDER and any other existing protected lands that are ultimately enrolled in the LOHCP Preserve System can increase the distribution, abundance, size, and persistence of populations.

In doing so, such conservation actions will have greater long-term benefit for the covered species than *not* implementing a typical activity covered by the LOHCP. This is because the majority of covered activities will impact habitat that lacks the physical and biological features and landscape context to provide long-term conservation value for the covered species. Specifically, of the 532 acres of habitat that will be impacted by the covered activities in this plan, 461 acres (87%) are projected to be inside the USL—the area slated for urban (rather than rural) development in Los Osos, which features 95% of the parcels yet just 48% of the land in the LOHCP Area. This already features small parcels (median=0.14 acres, the majority (885) of which area already developed, with remaining undeveloped land scattered throughout the USL rather than in contiguous areas and degraded by prior land use including vegetation

clearing. Indeed, of the 461 acres to be impacted within the USL, an estimated 197 acres (43%) will occur in parcels and in the right of way, which were mapped as developed (Figure 3-4); degraded habitat within these lands is anticipated to be impacted through public and private utility projects, infill, and redevelopment projects (Table 4-2, figures 2-4 and 2-5). Such projects will similarly impact an estimated 9.2 acres of degraded habitat outside of the USL. Of the 532 acres of impacts from the covered activities, only 61.2 acres (12%) will affect intact habitat outside of the USL which, generally speaking, is of higher conservation value. Therefore, compensating for the loss of habitat (largely) inside the USL, much of which is already developed and fragmented and therefore has lower long-term conservation value, by restoring and enhancing the condition of habitat within existing protected lands, specifically the MDER, will have a net benefit for the long-term persistence of the covered species.
The value of restoration, relative to not implementing a covered activity, is greater (1.5:1) than for enhanced management (1.25:1), because restoration will recreate the appropriate habitat structure and/or functions for the covered species. In most cases, restoration will enable covered species to expand their distribution into restore areas. By increasing the area occupied by the species. Restoration can promote population growth and resilience to the impacts of future perturbations in the landscape. While management activities are not anticipated to increase areal extent of occupied habitat, they are expected to increase the size of populations by increasing abundance and/or demographic performance in areas treated to improve habitat conditions by addressing anthropogenic factors that degrade it.

Areas that are subject to restoration and management within existing protected lands will be managed (i.e. following restoration) and monitored in perpetuity, to address future anthropogenic factors that might otherwise degrade their ability to support the covered species. This long-term management and monitoring of high-value conservation lands protected for the covered species will be essential to their recovery and vastly outweigh the negative impacts of the LOHCP covered activities. As a result, both management and restoration then management have ratios that exceed the 1:1, reflecting their net benefits for promoting population growth and persistence of the covered species relative to the average impacts of the LOHCP covered activities, which will primarily occur in habitat that has low long-term conservation value.

Protection and Management of New Habitat

The ratios used to credit protection of new habitat as mitigation for the covered activities will reflect the long-term conservation value of the habitat for the covered species, and its ability to facilitate achievement of the Plan's biological goals and objectives (Section 5.1, Table 5-1). Habitat protected through acquisition of fee title or conservation easement, which will primarily occur in the Priority Conservation Area (Section 5.3.2), will be assigned to one of four tiers, based on their size, development status, habitat condition, and landscape context, including potential to promote habitat connectivity. Table 5-8 identifies the general attributes of parcels that will be used to assign unprotected parcels into one of four tiers, the protection of which would be credited at ratios ranging from 0.5:1 to 2:1.

As with the mitigation crediting ratios for restoration and management of existing protected lands, the ratios for new habitat protection reflect the long-term value for species recovery of permanently protecting and then managing, in perpetuity, the currently unprotected habitat. The ratios reflect the net benefit of protecting and managing the habitat in perpetuity, relative to implementing a typical covered activity in the LOHCP.

As illustrated in Table 5-8, Permanent protection of habitat in large (>10 acre) undeveloped parcels or moderately sized (3-10 acres) undeveloped parcels that are adjacent to protected lands, and that

feature habitat that is intact and of high value to one or more of the covered species, will be credited at a ratio of 2:1. This high ratio reflects the far greater conservation value of the habitat in such parcels of Very High Conservation Value, relative to the generally low conservation value of most of the habitat that will be impacted by the covered activities. As described above, these activities will largely occur in small parcels and rights of way within the USL and many will affect either developed habitat or habitat that is degraded owing to prior land-use activities including vegetation clearly habitat. Owing to its highly-fragmented nature, including extensive network of streets, habitat in this area has low long-term conservation value, such that funding protection of parcels in the Priority Conservation Area that are large and/or adjacent to existing protected lands will far outweigh the impacts of the covered activities on the covered species.

Protection of moderately sized parcels (3-10 acres) that feature habitat that can help connect existing protected land and Tier 1 parcels will be credited at a ratio of 1.5:1. Like the Very High Conservation Value parcels, protection of these High Conservation Value parcels will yield a net benefit for recovery of the covered species relative to implementation of the covered activities. Protection of smaller parcels (<3 acres) that have moderate conservation value due to their landscape context, including adjacency to existing protected lands, and intact habitat conditions, will be credited at a ratio of 1:1. Protecting and managing these parcels is anticipated to benefit the covered species at a level that is commensurate with the impacts of the covered activities. Protection of such small (<3 acre) parcels that lack adjacency to other protected lands, could still contribute to species recovery; however, they would not yield a net benefit such that twice as much habitat would have to be protected to mitigate the impacts of the covered activities on a per-acre basis (Table 5-8).

During implementation of the LOHCP Conservation Program, the Implementing Entity will work with the County and USFWS to protect habitat that is of the greatest long-term conservation value and that can maximally promote achievement of the LOHCP biological goals and objectives (Section 5.1, Table 5-1). The mitigation crediting ratios applied to new habitat protection projects will be determined during specific acquisition projects, based upon on-the-ground assessments of habitat conditions, evaluations of current landscape context, and other factors that influence conservation value, based on the criteria and value for recovery outlined in Table 5-8.

5.7.2.3.2 Preserve System Configuration Scenario

The mitigation crediting ratios were used along with the total estimated (and thus maximum permitted) habitat impacts (532 acres; Table 2-9), to develop a scenario for the configuration of the LOHCP Preserve System. The scenario was used to develop three components of the plan.

1. **Financial Analysis:** The scenario was used to estimate the costs to implement the LOHCP Preserve System (Section 7.2), and therefore determination of the mitigation fees (Section 7.3).
2. **Impact Analysis:** The scenario was used to assess the net effects of Plan implementation on the covered species, their habitats, and the environmentby comparing the anticipated impacts of the covered activities (Section 4) to the anticipated benefits of the conservation program (Section 5.8, Table 5-10), including in compliance with state and federal laws (i.e., CEQA and NEPA; Section 1.5).
3. **Alternatives to Take/impacts:** The scenario was used to develop and analyze the net effects of the alternatives to the take/impacts of the Plan (Chapter 8).

The following outlines the configuration of the LOHCP Preserve System in the realistic, albeit hypothetical, scenario for the ultimate LOHCP Preserve System design (Table 5-9). The County will work with the Implementing Entity to assemble the LOHCP Preserve System over time, by incorporating a mix of newly protected habitat and restoring and managing existing protected land to benefit the covered species in the greatest extent practicable (sections 5.3 and 6.2).

Management and Restoration of Existing Protected Lands (278.7 acres generating 357.- acre mitigation credits): Of the 298.2 acres of habitat contained in three existing protected lands that would be eligible for additional management and monitoring as part of the LOHCP (Table 5-5), this scenario assumes that the 278.7-acre Morro Dunes Ecological Reserve (MDER) will be enrolled in the LOHCP Preserve System. This enrollment will occur at the outset of LOHCP implementation, prior to take authorization. The Implementing Entity will coordinate its management activities with managers of the other protected lands inside the Priority Conservation Area; however, mitigation fees will not be used to provide additional management of these lands.

Of the MDER's 278.7 acres expected to be enrolled in the LOHCP Preserve System, 35.0 acres (12.5%) will be restored to address highly degraded habitat conditions, prior to ongoing active management (Table 5-5, Table 5-10). This acreage was identified based on an assessment and preserve management plan developed for the 230-acre Bayview Unit of the Morro Dunes Ecological Reserve (McGraw 2005), and conversations with the MDER's land manager regarding current habitat conditions and management units in that unit as well as the 48-acre Pecho Unit of the MDER (R. Stafford, pers. comm. 2016). The remaining 243.7 acres of the MDER are in good, but not excellent, condition such that they will require only enhanced management above and beyond what CDFW has committed to implement to achieve the biological goals and objectives of the LOHCP (Table 5-9).

Based on the mitigation crediting ratios, the restoration of 35.0 acres within the MDER will yield 52.5 acres of mitigation credits, based on the 1.5:1 crediting ratio for restoration; meanwhile, the 1.25:1 crediting ratio for management will generate 304.6-acre-mitigation credits for management of the remaining 243.7 acres within the MDER.

Dedication of Easements (31 acres generating 31-acre mitigation credits): This preserve system scenario assumes that the Implementing Entity will be granted conservation easements for a total of 31 acres of habitat, as mitigation for impacts of private development on vacant parcels located within the Priority Conservation Area. This estimate assumes that project proponents required to set aside habitat will develop their parcels to the maximum allowed levels (Table 2-6). Proponents of residential development projects in vacant land in the Priority Conservation Area will be required to set aside habitat on site at a ratio of 3:1—for every square foot of habitat impacted, three square feet will be required to be protected through a conservation easement dedicated to the Implementing Entity, which will permanently protect, manage, and monitor the habitat (Section 5.7.2.1.1). Although the conservation value of habitat in these habitats set asides may vary, these habitat set asides will all be credited at a ratio of 1:1, in which one square-foot-mitigation credit is generated to offset impacts of all covered activities for every square foot set aside (Table 5-8).

Fee title acquisition (76.5 acres generating 176 mitigation credits): In this preserve system configuration scenario, the Implementing Entity will acquire from willing sellers 76.5 acres of land, which will then be managed as part of the LOHCP Preserve System. Most (63.5 acres or 83%) would be in the Tier 1 (very high conservation value) parcels, with a smaller area (10 acres or 13%)

protected in Tier 2 (high conservation value) parcels and just 3 acres (4%) protected in parcels of moderate conservation value; no Tier 4 (low conservation value) parcels are anticipated to be protected in this scenario (Table 5-9). In this scenario, the new habitat would be protected through acquisition of fee title or conservation easements on parcels within the Priority Conservation Area and then actively managed as part of the LOHCP Preserve System (Section 5.3.1.2).

Under this scenario, the LOHCP Preserve System will include 107.5 acres of currently unprotected land, of which 10% (11 acres) will be restored and then managed, and the rest will be managed. The LOHCP Preserve System will contain 35 acres of degraded habitat in existing protected lands (i.e., the MDER) that will be restored, and an additional 243.7 acres of existing protected land that will be actively managed. In total, this hypothetical configuration for the LOHCP Preserve System will include 386.2 acres of habitat which will be protected, restored, and managed to generate 533.1-acre equivalents of benefits (Table 5-10); this mitigation will offset the 532 acres of habitat impacts at an overall ratio of 1:1. As a result, the mitigation from the Plan will be commensurate with the impacts of the covered activities, as required under ESA. As noted at the outset of this section, this Preserve System design described above and summarized in Table 5-9, is a realistic, albeit hypothetical, scenario for the ultimate LOHCP Preserve System. The scenario was developed to illustrate the anticipated benefits of the conservation strategy, estimate its costs and thus determine the mitigation fees (sections 7.2 and 7.3), and evaluate alternatives to the taking (Section 8). In this 25-year, programmatic plan, the actual Preserve System will be assembled over time as the Implementing Entity accepts conservation easements dedicated by landowners developing vacant land inside the Priority Conservation Area; uses Habitat Protection Fees collected from other project proponents identified in Table 5-7 to acquire fee title or easement from willing sellers of land inside the Priority Conservation Area; and uses restoration, management, and administration fees collected from all project proponents identified in Table 5-7, to manage and restore the newly acquired land, as well as manage and restore existing protected lands enrolled into the LOHCP Preserve System. These land protection, restoration, and management actions will be phased in over time and keep pace with the covered activities to ensure that the mitigation stays ahead of the impacts (Section 6.2.4), such that at any time during plan implementation, the benefits of the Preserve System for the covered species exceed or at least match the impacts of the covered activities, such that the mitigation is commensurate with the impacts on the covered activities.

The plan establishes mitigation equivalencies to relate the conservation value for species recovery, of restoration and management of existing protected lands to protection and management of unprotected habitat, enabling these two important elements of the overall conservation strategy to be implemented as appropriate, to achieve the biological goals and objectives (Section 5.1, Table 5-1). However, in order to ensure that new habitat is protected in this programmatic plan, the LOHCP Preserve System will include a minimum of 55.25 acres of habitat acquired from willing sellers if the anticipated 531.5 acres of impacts are permitted. Though the scenario used here assumes the Implementing Entity will acquire fee title or conservation easements for a mix of Tier 1, Tier 2, and Tier 3 parcels totaling 76.5 acres (Table 5-9), the minimum habitat protection requirement could be fulfilled through acquisition of just 55.25 acres of Tier 1 parcels, due to their higher mitigation credit ratio (Table 5-8). Thus, this minimum habitat protection target of 55.25 acres is designed to connect and buffer existing protected lands and safeguard important habitat in the Priority Conservation Area. The 55.25 acres to be acquired by the Implementing Entity in addition to the 31 acres of land that is anticipated to be dedicated voluntarily by those project proponents developing vacant parcels inside of the PCA. As a result, if the covered activities are implemented in their entirety, a minimum of 86.25 acres of new habitat will be protected through implementation of the LOHCP conservation Strategy.

5.8 Benefits of the Conservation Program

Implementation of the LOHCP Conservation Program is anticipated to have benefits for the covered species that outweigh the effects of the taking caused by the covered species, by protecting, restoring, and enhancing habitat that is greater long-term conservation value than the habitat impacted through the covered activities (Section 5.8.1). Indeed, the mitigation is anticipated to facilitate species recovery (Section 5.8.2).

5.8.1 Habitat Benefits

In order to compare the habitat benefits to the impacts (Section 4.2), the acres of vegetation and other land cover types to be benefited by the LOHCP Preserve System were extrapolated using proportions (Table 5-10). Acreages within existing protected lands were estimated based on the proportions of the vegetation and other land cover types contained within the parks and reserves identified as eligible for inclusion (Table 5-5). For the newly protected lands, the acreages were calculated using the proportions of the vegetation and other land cover types within vacant, unprotected parcels in the Priority Conservation Area; these are the parcels on which habitat set-asides will be established (if developed), and that the Implementing Entity will target for fee title acquisition and management using the mitigation fees (Section 7.2.1).

The specific vegetation types and other land cover types in the respective areas were summarized according to the general type (Table 5-10) and also used to calculate the area of habitat for Morro shoulderband snail and Morro manzanita, based on the crosswalk between the specific vegetation and other land cover types and the habitats, which was used to assess the impacts of the covered activities (Table 4-4).

The Preserve System will primarily benefit coastal sage scrub, which is estimated to comprise 240.4 acres or 60% of the land, and central maritime chaparral, which is estimated to occur on 109.6 acres or 30% of the preserve system (Table 5-10). In comparison, these two community types, which constitute the primary habitat for the four covered species and will comprise 90% of the land in the preserve system, are estimated to comprise just 25.4% of the habitat to be impacted by the covered activities (Table 4-3).

The analysis of alternatives of the take/impacts provides the comprehensive list of ratios for impacts to benefits (Table 8-1). This analysis reveals that the benefits of the conservation program will more than offset the impacts of the covered activities. Specifically, for every acre of coastal sage scrub impacted (189 acres; Table 4-3) 1.7-acre equivalents will be benefited in the LOHCP Preserve System scenario, which will benefit 320-acre equivalents (Table 5-10). The ratio for central maritime chaparral communities is even greater (8.5 to 1); the 18 acres of this community that are anticipated by be impacted by the covered activities will be more than offset by the 156-acre equivalent benefits (Table 5-10).

Likewise, the ratio of habitat benefits to impacts for Morro manzanita is more than 8:1; the Preserve System is anticipated to benefit 176 acre-equivalents of Morro manzanita habitat (Table 5-10), whereas the covered activities are anticipated to impact just 41 acres of habitat (Table 4-4). This reflects the far

greater proportion of central maritime chaparral habitat in the Preserve System compared to the footprint of the covered activities.

The Preserve System will benefit 301-acre equivalents of habitat for Morro shoulderband snail. This value is lower than the total acres impacted (478 acres), which includes developed areas and County rights-of-way; these highly degraded habitat areas were included in the take/impacts assessment, as the species can be found in them. However, they provide low long-term conservation value for the species. The greater long-term viability of the habitat in the Preserve System, compared to that which will be impacted, elevates the ratio of conservation benefits to impacts anticipated (Section 4.2.1.3).

As a result, the mitigation provided through the LOHCP Conservation Program is expected to more than offsets the anticipated impacts of the covered activities, thus exceeding the incidental take permit issuance criterion, that the mitigation be commensurate with the impacts.

The scenario reflects levels of habitat protection, restoration, and management that can achieve the biological goals and objectives (Section 5.1), and that could be feasible based on anticipated landowner interest in participating in the LOHCP. The actual Preserve System configuration, which will almost certainly differ from this scenario, will depend on the willing sellers of private land, land prices, and the precise area of existing protected lands enrolled in land management and restoration, among other factors. These changes will influence costs and thus mitigation fees. To ensure adequate funding for the plan, the actual mitigation components and their costs will be tracked (Section 5.4.1.2) and used to update the financial analysis used to develop the mitigation fee schedule (Section 7.4). Ultimately, the mitigation crediting ratios used in the plan will enable the County to work with the Implementing Entity to implement a suite of conservation actions (habitat protection, restoration, and management) that will have benefits that are commensurate with the impacts of the covered activities and promote species recovery.

Proponents of development projects that would impact Environmentally Sensitive Habitat Areas (ESHA) may be required to set aside additional habitat in order to comply with the Los Osos Community Plan and therefore the California Coastal Act (sections 1.5.2.4 and 2.1.2.2). While the LOHCP requires that proponents in the PCA set aside habitat at a 3:1 ratio, the Los Osos Community Plan may require that all remaining habitat outside of the development envelope be protected through a County open space easement, which limits uses to natural resource management. These habitats set asides would benefit additional habitat not included in this analysis.

5.8.2 Contributions to Species Recovery

In addition to compensating for the impacts of the covered activities on the covered species, the preserve system scenario will contribute to their recovery by protecting and restoring priority habitat, as well as restoring and managing existing protected lands of the greatest long-term conservation value for the covered species. The Priority Conservation Area, where the LOHCP Preserve System will be assembled and managed, incorporates much of the habitat that has been identified as important for protection in the recovery plans for the covered species (USFWS 1998a and 1999; Figure 5-1). It also features much of designated critical habitat for Morro shoulderband snail and Morro Bay kangaroo rat (Figure 4-3).

In addition to protecting high-priority habitat, the LOHCP Preserve System will also manage habitat to address exotic plants, non-native animals, fire exclusion, threat of catastrophic wildfire, and recreation; these activities will help ensure that the habitat that is protected from development supports more viable populations. Also, by minimizing impacts of development of remaining vacant lands that are not protected within the Priority Conservation Area, the LOHCP will help promote landscape connectivity between protected habitat areas, which can be essential to maintaining genetic diversity and promoting long-term species persistence. These benefits will be achieved through implementation of the Plan's minimization measures (Table 5-2 through 5-4), including:

- Siting new development and other projects in already developed or degraded habitat areas (Measure C1), away from habitat occupied by the covered species (MSS-1, MBKR-1, IKM-1, and MM-1), wherever possible;
- Restoring areas of temporary disturbance (Measure C2); and
- Minimizing the impacts of vegetation management projects conducted for fire safety (i.e., defensible space; Measure C4).

The LOHCP will also contribute to species recovery and advance specific objectives of the USFWS recovery plans, by using surveys and long-term monitoring to increase understanding of the habitat factors influencing the distribution and abundance of the covered species, evaluating their management needs, and assessing the effectiveness of restoration and management strategies. Specifically, the studies and monitoring will be designed to fill data gaps identified in the recovery plans, including regarding the role of fire in promoting plant establishment and maintaining habitat for the covered animals (Section 5.4 and Appendix E).

The LOHCP AMMP, which will synthesize existing information, guide initial management and monitoring, and be adapted over time to incorporate new scientific information obtained through implementation of the plan, will inform and help prioritize restoration and management, as well as ongoing habitat protection, to further recovery

Table 5-1: LOHCP Biological Goals and Objectives, showing associated conservation measures and monitoring activities

Goal and Objective	Conservation Measures	Implementation Monitoring	Effectiveness Monitoring
Ecosystem Goal: Promote persistence of the Baywood fine sands ecosystem and the natural processes that sustain it.			
Objective E1: Protect large, contiguous areas of land within the Baywood fine sands ecosystem, which can support large and therefore more viable populations of the covered species, feature greater native biodiversity, and enable effective management.	Protect or expand large habitat areas, as well as smaller areas that can expand and buffer existing protected lands, with an emphasis on land within the Priority Conservation Area that supports or can support one or more of the covered species.	Annual tracking of habitat protection projects will be used to document expansions to protected habitat	Plant community sampling will be used to characterize native species cover and richness in lands protected through the LOHCP.
Objective E2: Maintain and enhance connectivity of habitat within and adjacent to the Baywood fine sands ecosystem, to promote dispersal and other ecological processes including gene flow, which are necessary to maintain viable populations of the covered species.	Protect land that can connect or maintain corridors between habitat within and adjacent to the LOHCP Area, with an emphasis on land that connects protected lands within the Priority Conservation Area.	Annual tracking of habitat protection projects will be used to document steps to connect protected habitat	Plant community mapping will be used to evaluate status of habitat between protected habitat areas.
Objective E3: Maintain and enhance the natural mosaic of Baywood fine sands communities and their varying successional stages, to provide a range of habitat conditions for the covered species and the broader assemblages of native plants and animals in the ecosystem.	Use fire and fire surrogates—vegetation management treatments that mimic fire's beneficial effects—to create and maintain a mosaic of native plant communities of various successional stages and thus habitat conditions.	Annual tracking of habitat restoration and management projects will be used to document implementation of fire management/surrogate projects	• Plant community mapping will be used to evaluate the status and trends in the mosaic of communities and their protected status. • Plant community sampling will be used to evaluate effectiveness of the treatments and identify the need for additional management.
Community Goal: Promote the natural structure and native species composition of the upland native plant communities of the Baywood fine sand.			
Objective C1: Protect land supporting representative areas of each of the natural communities and their successional stages within the Baywood fine sands ecosystem.	Protect additional areas of coastal sage scrub, central maritime chaparral, and oak woodland that provide habitat for the covered species, as well as the associated	Annual tracking of habitat protection projects will be used to document steps to protect habitat and the acres	• Plant community mapping will track the areal extent of the native plant communities by successional stage, as

Table 5-1: LOHCP Biological Goals and Objectives, showing associated conservation measures and monitoring activities

Goal and Objective	Conservation Measures	Implementation Monitoring	Effectiveness Monitoring
	aquatic, wetland, and riparian communities.	of each community type protected in each project.	feasible, and evaluate their protected status. • Plant community sampling will be used to examine successional changes in protected habitat.
Objective C2: Restore degraded habitat to increase suitability for populations of the covered species and promote native biodiversity.	Restore habitat within the LOHCP Preserve System, within an emphasis on land within the Priority Conservation Area that has been degraded by prior land use, erosion, recreation, and/or dense infestations of exotic plant species.	Annual tracking of habitat restoration and management projects will be used to document the acres of habitat subject to restoration treatments.	• Project-specific monitoring protocols will be used to evaluate effectiveness of restoration. • Plant community mapping will be used to document expansion of areal extent of communities into previously denuded or degraded areas. • Plant community sampling will be used to evaluate increases in native plant cover and species richness as a result of restoration.
Objective C3: Maintain habitat conditions suitable to support populations of the covered species and promote native biodiversity.	Actively manage habitat within the LOHCP Preserve System, to limit the negative effects of factors that degrade it, including incompatible recreation, erosion, exotic plants, and fire exclusion.	Annual tracking of habitat restoration and management projects will be used to document the acres of habitat subject to management treatments.	• For large scale management projects (e.g., veldt grass control), project-specific monitoring protocols will be used to evaluate effectiveness of management. • Plant community sampling will be used to evaluate characteristics of habitat that make it suitable for the covered species (e.g., various

Table 5-1: LOHCP Biological Goals and Objectives, showing associated conservation measures and monitoring activities

Goal and Objective	Conservation Measures	Implementation Monitoring	Effectiveness Monitoring
			structure and species composition variables). • Species-specific monitoring will be used to evaluate changes in covered species populations with respect to habitat changes.
Morro Shoulderband Snail Goal: Promote recovery and long-term population viability of Morro shoulderband snail.			
Objective MSS-1: Protect additional native habitat suitable for Morro shoulderband snail.	Protect additional coastal dune and coastal sage scrub communities, prioritizing large blocks of habitat and areas that can buffer and expand existing protected lands within the Priority Conservation Area.	Annual tracking of habitat protection projects will be used to document protection of additional coastal dune and coastal sage scrub communities.	• Plant community mapping will track the areal extent of the native plant communities and evaluate their protected status. • Plant community sampling will be used to examine conditions of protected habitat to evaluate its suitability for Morro shoulderband snail. • Morro shoulderband snail population monitoring will be used to evaluate the species distribution and abundance in habitat protected as part of the LOHCP.
Objective MSS-2: Connect Morro shoulderband snail populations within and adjacent to the LOHCP Area.	• Maintain permeability of habitat between lands within the LOHCP Preserve System, by protecting additional suitable habitat, and minimizing development footprints and promoting persistence of natural	Annual tracking of habitat protection projects will be used to document protection of additional coastal dune and coastal sage scrub communities.	Plant community mapping will be used to evaluate connectivity of habitat for Morro shoulderband snail between protected habitat areas.

Table 5-1: LOHCP Biological Goals and Objectives, showing associated conservation measures and monitoring activities

Goal and Objective	Conservation Measures	Implementation Monitoring	Effectiveness Monitoring
	or semi-natural habitat conditions on intervening private land. • Manage and restore habitat within the LOHCP Preserve System to address factors that degrade and fragment habitat, including dense exotic plant infestations and wide trails or other denuded areas.		
Objective MSS-3: Increase the distribution and abundance of Morro shoulderband snail populations, by restoring degraded habitat within the LOHCP Preserve System.	Restore coastal dune and coastal sage scrub vegetation within protected lands that have been degraded by erosion, incompatible recreation, dense invasive species infestations, and/or other factors.	Annual tracking of habitat restoration will be used to document implementation of restoration projects in coastal dune and coastal sage scrub communities that can promote populations of Morro shoulderband snail	• Project-specific monitoring protocols will be used to evaluate effectiveness of restoring habitat suitable for Morro shoulderband snail. • Morro shoulderband snail population monitoring will be used to evaluate the species distribution and abundance with respect to restoration projects, as feasible.
Objective MSS-4: Maintain or increase populations of Morro shoulderband by addressing factors that can degrade habitat within the LOHCP Preserve System.	• Control populations of invasive plants using methods that avoid or minimize impacts to Morro shoulderband snail. • Control populations of exotic snails and prevent their spread, where doing so can promote Morro shoulderband snail populations. • Limit impacts of recreational use of protected lands, by siting trails in the least sensitive areas, and managing trail use (type, frequency) to limit impacts.	Annual tracking of habitat management projects will be used to document projects in coastal dune and coastal sage scrub communities that can promote populations of Morro shoulderband snail	• For large scale management projects (e.g., veldt grass control), project-specific monitoring protocols will be used to evaluate effectiveness of management. • Plant community sampling will be used to evaluate characteristics of habitat that make it suitable for Morro shoulderband snail.

Table 5-1: LOHCP Biological Goals and Objectives, showing associated conservation measures and monitoring activities

Goal and Objective	Conservation Measures	Implementation Monitoring	Effectiveness Monitoring
	• Prevent unnatural succession of coastal dune and scrub which may occur as a result of fire exclusion, by managing fire or vegetation management techniques that mimic its beneficial effects; treatments should occur within the range of variation of the return interval of the natural disturbance regime.		• Species-specific monitoring will be used to evaluate changes in populations with respect to habitat changes.
Morro Bay Kangaroo Rat Goal: Maintain habitat suitable for Morro Bay kangaroo rat.			
Objective MBKR-1: Protect additional suitable habitat for Morro Bay kangaroo rat.	Protect additional coastal sage scrub and central maritime chaparral communities, prioritizing areas featuring open habitat conditions and areas where or near where the species has been most recently observed.	Annual tracking of habitat protection projects will be used to document protection of additional coastal sage scrub and central maritime chaparral communities, particularly those where the species has been most recently observed.	• Plant community mapping will track the areal extent of the native plant communities and evaluate their protected status. • Plant community sampling will be used to examine conditions of protected habitat to evaluate its suitability for Morro Bay kangaroo rat. • Morro Bay kangaroo rat population monitoring will be used to evaluate the species distribution and abundance in habitat protected as part of the LOHCP.
Objective MBKR-2: Maintain connectivity between suitable habitat for Morro Bay kangaroo rat.	• Maintain permeability of habitat between protected areas of coastal sage scrub and central maritime chaparral, particularly those in the Priority Conservation Area and where	Annual tracking of habitat protection projects will be used to document protection of additional coastal sage scrub	Plant community mapping will be used to evaluate connectivity of habitat for Morro Bay kangaroo rat between protected habitat

Table 5-1: LOHCP Biological Goals and Objectives, showing associated conservation measures and monitoring activities

Goal and Objective	Conservation Measures	Implementation Monitoring	Effectiveness Monitoring
	Morro Bay kangaroo rat has been most recently observed, by protecting additional habitat, and minimizing development footprints and promoting persistence of natural or semi-natural habitat conditions on intervening private land. • Manage and restore habitat within the LOHCP Preserve System to address factors that fragment habitat for Morro Bay kangaroo rat, including dense exotic plant infestations, and areas of dense woody plants.	and central maritime chaparral communities.	areas where the species has most recently been observed.
Objective MBKR-3: Restore habitat that is suitable for Morro Bay kangaroo rat.	Restore open coastal sage scrub and central maritime chaparral communities in the LOHCP Preserve System that have been degraded, particularly where Morro Bay kangaroo rat was most recently observed.	Annual tracking of habitat restoration will be used to document implementation of restoration projects in coastal sage scrub and central maritime chaparral communities that can promote populations of Morro Bay kangaroo rat	• Project-specific monitoring protocols will be used to evaluate effectiveness of restoring habitat for Morro Bay kangaroo rat. • Morro Bay kangaroo rat population monitoring will be used to evaluate the species distribution and abundance with respect to restoration projects, as feasible.
Objective MBKR-4: Manage habitat to maintain conditions suitable for Morro Bay kangaroo rat, and other species adapted to early-successional coastal sage scrub and central maritime chaparral.	• Use prescribed fire or fire surrogates in the LOHCP Preserve System to maintain open-canopy conditions characterized by relatively high density of herbaceous plants and open sand and relatively sparse cover of shrubs.	Annual tracking of habitat management projects will be used to document projects in coastal sage scrub and central maritime chaparral communities that can promote populations of Morro Bay kangaroo rat, particularly	• For large scale management projects (e.g., veldt grass control), project-specific monitoring protocols will be used to evaluate effectiveness of management.

Table 5-1: LOHCP Biological Goals and Objectives, showing associated conservation measures and monitoring activities

Goal and Objective	Conservation Measures	Implementation Monitoring	Effectiveness Monitoring
	• Control populations of invasive plants that degrade conditions for Morro Bay kangaroo rat, including eucalyptus, veldt grass, and ice plant. • Manage recreation in the LOHCP Preserve System to minimize its impacts on Morro Bay kangaroo rat and other small mammal populations, including by limiting use to defined trails sited in the least impactful areas, and controlling dog use.	projects in areas of suitable habitat where the species was most recently observed	• Plant community sampling will be used to evaluate characteristics of habitat that make it suitable for Morro Bay kangaroo rat, including low cover of relatively short-statured shrubs, with high cover of herbs and subshrubs Species-specific monitoring will be used to evaluate changes in populations with respect to habitat changes.
Morro Manzanita Goal: Promote recovery and long-term viability of Morro manzanita.			
Objective MM-1: Protect additional suitable habitat for Morro manzanita.	Protect additional central maritime chaparral, prioritizing large habitat blocks, areas adjacent to existing protected lands, areas that support a relatively high density of Morro manzanita, and areas located within the Priority Conservation Area.	Annual tracking of habitat protection projects will be used to document protection of additional central maritime chaparral communities and the acreage supporting Morro manzanita.	• Plant community mapping will track the areal extent of the native plant communities and evaluate their protected status. • Plant community sampling will be used to examine the suitability of habitat for, and distribution of, Morro manzanita. • Morro manzanita population monitoring will be used to examine the distribution and population status (including demography) of Morro manzanita.

Table 5-1: LOHCP Biological Goals and Objectives, showing associated conservation measures and monitoring activities

Goal and Objective	Conservation Measures	Implementation Monitoring	Effectiveness Monitoring
Objective MM-2: Promote connectivity of habitat between Morro manzanita populations	• Maintain permeability of habitat between protected areas of central maritime chaparral, particularly those in the Priority Conservation Area and where Morro manzanita occurs, by protecting additional suitable habitat, and minimizing development footprints and promoting persistence of natural or semi-natural habitat conditions on intervening private land. • Manage and restore habitat within the LOHCP Preserve System to address factors that fragment habitat for Morro manzanita, including dense exotic plant infestations and denuded habitat areas.	Annual tracking of habitat protection projects will be used to document protection of additional central maritime chaparral communities, particularly those occupied by Morro manzanita.	Plant community mapping will be used to evaluate connectivity of habitat occupied by Morro manzanita.
Objective MM-3: Restore central maritime chaparral supporting Morro manzanita.	Restore central maritime chaparral communities in the LOHCP Preserve System that have been degraded, particularly those adjacent to existing Morro manzanita chaparral and in the Priority Conservation Area.	Annual tracking of habitat restoration will be used to document implementation of restoration projects in central maritime chaparral and other communities, including degraded and denuded areas, which can support Morro manzanita.	• Project-specific monitoring protocols will evaluate effectiveness of restoring populations of Morro manzanita. • Morro manzanita population monitoring will evaluate the species distribution, abundance, and demography with respect to restoration projects, as feasible.
Objective MM-4: Manage central maritime chaparral supporting Morro manzanita	• Control populations of invasive plants that degrade habitat for Morro manzanita, including eucalyptus and	Annual tracking of habitat management projects will be used to document projects in central maritime chaparral	• For large scale management projects (e.g., prescribed fire or fire surrogate), project-specific monitoring protocols

Table 5-1: LOHCP Biological Goals and Objectives, showing associated conservation measures and monitoring activities

Goal and Objective	Conservation Measures	Implementation Monitoring	Effectiveness Monitoring
	exotic cypress, as well as veldt grass and ice plant. • Use prescribed fire or fire surrogates conducted within the range of variation of the natural fire return interval in the LOHCP Preserve System, to maintain areas of Morro manzanita chaparral that might otherwise transition to coast live oak woodland or become senescent, and to promote regeneration of Morro manzanita, which is an obligate seeding species. • Manage recreation in the LOHCP Preserve System to minimize its impacts on Morro manzanita, including by limiting use to defined trails sited in the least impactful areas.	communities and other areas, including degraded or denuded areas, which can promote populations of Morro manzanita.	will evaluate effectiveness of management. • Plant community sampling will evaluate suitability of habitat for Morro manzanita. • Morro manzanita population monitoring will evaluate changes in populations with respect to habitat management, including responses to management treatments designed to promote regeneration.
Indian Knob Mountainbalm Goal: Promote recovery and long-term viability of Indian Knob mountainbalm.			
Objective IKM-1: Protect additional suitable habitat for Indian Knob mountainbalm.	Protect additional central maritime chaparral, prioritizing large habitat blocks, areas adjacent to existing protected lands, and areas within the Priority Conservation Area.	Annual tracking of habitat protection projects will document protection of additional coastal sage scrub and central maritime chaparral communities, with potential to support Indian Knob mountainbalm.	• Plant community mapping will track the areal extent of the native plant communities and evaluate their protected status. • Plant community sampling will examine the suitability of habitat for, and distribution of, Indian Knob mountainbalm.

Table 5-1: LOHCP Biological Goals and Objectives, showing associated conservation measures and monitoring activities

Goal and Objective	Conservation Measures	Implementation Monitoring	Effectiveness Monitoring
			• Indian Knob mountainbalm population monitoring will evaluate the demography of the species in the LOHCP Preserve System.
Objective IKM-2: Promote connectivity between habitat suitable for Indian Knob mountainbalm.	• Maintain permeability of habitat between protected areas featuring central maritime chaparral, particularly those in the Priority Conservation Area, by protecting additional suitable habitat, and minimizing development footprints and promoting persistence of natural or semi-natural habitat conditions on intervening private land. • Manage and restore habitat within the LOHCP Preserve System to address factors that fragment habitat for Indian Knob mountainbalm, including dense exotic plant infestations and denuded habitat areas.	Annual tracking of habitat protection projects will document protection of additional coastal sage scrub and central maritime chaparral communities.	Plant community mapping will evaluate connectivity of habitat for Indian Knob mountainbalm within the LOHCP Preserve System.
Objective IKM-3: Expand populations of Indian Knob mountainbalm.	Increase the distribution and abundance of Indian Knob mountainbalm within the LOHCP Preserve System by conducting habitat restoration treatments including prescribed fire or fire surrogates designed to promote its vegetative reproduction and/or establishment from seed.	Annual tracking of habitat restoration will document implementation of restoration projects in coastal sage scrub and central maritime chaparral communities that can promote populations of Indian Knob mountainbalm.	• Project-specific monitoring protocols will evaluate effectiveness of restoring habitat for Indian Knob mountainbalm. • Indian Knob mountainbalm population monitoring will evaluate changes in populations with respect to habitat changes.

Table 5-1: LOHCP Biological Goals and Objectives, showing associated conservation measures and monitoring activities

Goal and Objective	Conservation Measures	Implementation Monitoring	Effectiveness Monitoring
Objective IKM-4: Manage central maritime chaparral supporting Indian Knob mountainbalm.	• Control populations of invasive plants that degrade habitat for Indian Knob mountainbalm, including eucalyptus and exotic cypress, as well as veldt grass and ice plant. • Use prescribed fire or fire surrogates conducted within the range of variation of the natural fire return interval within the LOHCP Preserve System, to maintain areas central maritime chaparral that might otherwise transition to coast live oak woodland or become senescent, and to promote regeneration of Indian Knob mountainbalm. • Manage recreation in the LOHCP Preserve System to minimize its impacts on Indian Knob mountainbalm, including by limiting use to defined trails sited in the least impactful areas.	Annual tracking of habitat management projects will be used to document projects in coastal sage scrub and central maritime chaparral communities that can promote populations of Indian Knob mountainbalm, particularly projects in areas of suitable habitat where the species was most recently observed	• For large scale management projects (e.g., veldt grass control), project-specific monitoring protocols will evaluate effectiveness of management. • Plant community sampling will evaluate characteristics of habitat that make it suitable for Indian Knob mountainbalm, including measurement of the cover of exotic plants. • Indian Knob mountainbalm population monitoring will evaluate changes in populations with respect to habitat changes.

Table 5-2: Covered Species Avoidance and Minimization Measures

Type	Measure
Ecosystem	E1: Minimize habitat fragmentation and maintain connectivity between aquatic, riparian, and upland habitats by limiting the creation of barriers to species movement, maintaining corridors to connect remaining habitat for the covered species, clustering development, and minimizing length of driveways and other impervious surfaces.
Community	C1: Minimize loss and degradation of the natural communities of the Baywood fine sand, including coastal sage scrub, central maritime chaparral, and oak woodlands by minimizing the area of permanent and temporary habitat disturbance and by siting projects in already developed or degraded areas. C2: Restore all areas of temporary disturbance such as staging areas or areas adjacent to the project footprint, to pre-project conditions or ecologically-superior conditions for the covered species. Avoid installing plants identified as invasive by the California Invasive Plant Council and include plants native to the Baywood Fine Sand communities from local sources (i.e., the LOHCP Plan Area). C3: Avoid use of herbicide and pesticides; where necessary, apply biocides as part of integrated pest management strategies, and following all local, state, and federal regulations. C4: Minimize impacts of vegetation management projects conducted for fire safety, including to create and maintain defensible space, by implementing the best management practices. The list of BMPs will be maintained by the County and reviewed periodically by the USFWS and CDFW and will include specific fuel-reduction prescriptions designed to minimize impacts to the covered species. C5: Install temporary construction fencing to prevent disturbance outside of the designated footprint
Morro Shoulderband snail (MSS)	Avoid and minimize the impacts to Morro shoulderband Snail to the maximum extent practical, by locating projects away from known or likely occupied habitat, as well as suitable but unoccupied habitat. MSS-1: Prior to and during all ground-disturbing activities in designated parcels (Figure 5-2), a biologist approved by the USWFS shall capture and move all Morro shoulderband snails to suitable habitat away from the project impact area (Section F.2). MSS-3: Avoid introducing non-native snails, and the use of snail control applications, such as mulluscicide, beer, or salt.
Morro Bay Kangaroo Rat (MBKR)	MBKR-1: Prior to ground-disturbing activities in habitat suitable for Morro Bay kangaroo rat (Figure 5-3), the project proponent will retain a CDFW- and USFWS-approved biologist to conduct a visual assessment of the site, which will be followed by a survey, as needed, to ensure the site is not occupied (Section F.1).

Table 5-2: Covered Species Avoidance and Minimization Measures

Type	Measure
Indian Knob Mountainbalm (IKM)	IKM-1: Prior to ground-disturbing activities in habitat suitable for Indian Knob mountainbalm, the project proponent will retain a USFWS-approved biologist to conduct a survey for the species in the project area. If the species is present, the project proponent will work with the County, USFWS, and CDFW to develop a plan to ensure that no take/impacts of this species occurs during project implementation. If a plan cannot be developed, the project proponent will be required to obtain a permit from CDFW.
Morro Manzanita (MM)	MM-1: Avoid and minimize impacts of project activities on Morro manzanita, by siting project disturbance envelopes at least 10' away from the copy of existing plants wherever possible. MM-2: Avoid or minimize trimming or removing Morro manzanita when conducting vegetation management including in association with required hazard abatement activities. [1] MM-3: Avoid planting manzanita species (*Arctostaphylos* spp.) other than Morro manzanita.

[1] Does not apply to projects to implement the conservation program, where impacts to individuals will be needed to promote regeneration and maintain suitable habitat.

Table 5-3: Avoidance Measures for Other Listed Species

Type	Measures
Ecosystems	Avoid altering aquatic ecosystems, including streams, lakes, ponds, and the Morro Bay estuary.
Communities	Avoid impacts to riparian vegetation and wetlands, including freshwater, brackish water, and saltwater wetlands. Conduct vegetation management activities that could affect nesting birds outside of the nesting period, which is currently February 1 – August 31, but may change as a result of climate change.
Species: California seablite, Salt marsh bird's beak, and marsh sandwort	Proponents of covered activities that occur within 100 feet of known or potential habitat for one of more of the listed plant species will arrange for a USFWS-approved biologist to conduct a survey to evaluate presence of the species within suitable habitat within the project parcel. Surveys will be conducted within the flowering period of the three species, which may change as a result of global climate change, but currently are as follows: • California seablite: July to October • Salt marsh bird's beak: May to October • Marsh sandwort May to August If one or more species are present, the project will be designed and implemented to avoid impacts to the species or its habitat. The following are specific measures that will be implemented. • The project disturbance envelope will exclude occurrences of the species. • Orange construction fencing shall be placed between the occurrence and the disturbance envelope. • A USFWS-approved biologist will provide a pre-project training to all project personnel regarding the species and the measures that must be taken to avoid impacts; the biologist will monitor project implementation to ensure the measures are being implemented and are effective. • Erosion and sedimentation control measures will be implemented for projects that have the potential to result in the sedimentation of occupied or suitable habitat. • Herbicide application shall be limited to times outside of the rainy season to prevent runoff carrying the herbicide to potential or known habitat. In addition, herbicide application shall be conducted during times of low wind (<10 mph) to prevent herbicide drift into potential or known listed plant habitat.

Table 5-3: Avoidance Measures for Other Listed Species

Type	Measures
South-Central California Coast Steelhead (*Oncorhynchus mykiss irideus*)	Proponents of covered activities that occur within or adjacent to habitat for steelhead including Los Osos Creek will implement best management practices to avoid impacts to the threatened species. The measures to be implemented will be identified during the application process, based upon aspects of the covered activity and the site it which it occurs, and may include the following: • All project activities shall minimize disturbance to riparian and upland vegetation. • A NMFS-approved biologist will provide a pre-project training to all project personnel regarding the species and the protection measures that must be taken to avoid impacts; the biologist will monitor the project to ensure the measures are being implemented and are effective. • Projects will be conducted between June 1 and October 15. • Appropriate erosion and sedimentation avoidance measures till be taken to prevent sediment runoff into flowing water. • Measures will be taken to ensure that petroleum products and other materials do not enter nearby streams and surface waters.
California red-legged frog (*Rana draytonii*)	Proponents of covered activities that occur within or adjacent to California red-legged frog breeding, dispersal, or foraging habitat will implement best management practices to avoid impacts to the threatened species. The measures to be implemented will be identified during the application process, based upon aspects of the covered activity and the site it which it occurs, and may include the following: • All project activities shall avoid disturbance to suitable breeding habitat, including ponds and streams. • A USFWS-approved biologist will provide a pre-project training to all project personnel regarding the species and the protection measures that must be taken to avoid impacts; the biologist will monitor the project to ensure the measures are being implemented and are effective. • All construction-related holes capable of entrapping wildlife will either be covered at the end of each workday or ramped in a manner that will prevent entrapment. • Appropriate measures will be taken to ensure petroleum products and other hazardous materials do not enter nearby streams, ponds, and other aquatic habitat.

Table 5-3: Avoidance Measures for Other Listed Species

Type	Measures
California Black Rail (*Laterallus jamaicensis coturniculus*)	Proponents of covered activities that occur within or adjacent to California black rail nesting or foraging habitat will implement best management practices to avoid impacts to the state-listed threatened and California Fully-Protected Species. The measures to be implemented will be identified during the application process, based upon aspects of the covered activity and the site it which it occurs, and may include the following: • In or adjacent to potential or known California black rail habitat, work activities shall be confined to areas outside of known or potential habitat to the extent feasible. Staging, access and parking areas shall be located outside of salt marsh and brackish marsh habitats. • If woody vegetation within or immediate adjacent to salt marsh habitat must be removed as part of the project, vegetation removal should be conducted between September and January, in order to avoid impacts on nesting birds. If vegetation removal must occur between February and August, a qualified biologist should conduct a pre-construction survey for nesting birds prior. If nesting California black rail are identified, protection measures shall include avoiding work activities within 300 feet of the nesting location. • If an active California black rail nest is located closer than 300 feet to a construction or maintenance site and there is the potential for substantial disturbance to nesting birds due to construction activities, a plan to monitor nesting birds during construction shall be prepared and submitted to the CDFW for review and approval. • A qualified biological monitor shall be present during all work activities in or adjacent to California black rail habitat. If California black rail is detected during work activities, work shall be stopped immediately and the CDFW shall be contacted immediately. Work shall not resume at that location until authorization is obtained from the CDFW, unless prior approval has been granted by the CDFW.
Golden Eagle (*Aquila chrysaetos*)	Proponents of covered activities that occur within 500 feet of a recorded golden eagle nest site will have a USFWS and CDFW-approved biologist conduct a golden eagle survey to determine whether there is a nest site within 400 yards of the proposed project footprint. Projects with confirmed nesting golden eagles within 400 yards will implement best management practices to avoid impacts to this California Fully Protected Species. The measures to be implemented will be identified during the application process, based upon aspects of the covered activity and the site it which it occurs, and may include the following:

Table 5-3: Avoidance Measures for Other Listed Species

Type	Measures
	• Avoid vegetation removal and other project activities that would disrupt nesting behavior during the primary nesting season, which is currently February to August though may change as a result of global climate change, or until the nesting cycle is determined by a USFWS and CDFW-approved biologist to be completed. • Avoid removing any suitable trees or other nest sites.
White-tailed kite (*Elanus leucurus*)	Proponents of covered activities that occur within 500 feet of a recorded or observed white-tailed kite nest site will have a CDFW-approved biologist conduct a white-tailed kite survey to determine whether there is an active nest site within 500 feet of the proposed project footprint. Projects with confirmed nesting white-tailed kite within 500 feet will implement best management practices to avoid impacts to this California Fully-Protected Species. The measures to be implemented will be identified during the application process, based upon aspects of the covered activity and the site it which it occurs, and may include the following: • Avoid vegetation removal and other project activities that would disrupt nesting behavior during the primary nesting season (February-August), or until the nesting cycle is determined by the USFWS and CDFW-approved biologist to be completed. • Avoid removing any suitable trees or other nest sites.

Table 5-4: **Minimization Measures for the Community Wildfire Protection Plan**

Taxa	Measure	Description
All Covered Species	All-1: Procedures and Training	Clearly-defined operational procedures will be developed and implemented by CALFIRE. A USFWS-approved biologist will develop and deliver environmental awareness training sessions for all personnel involved in hazard abatement activities. The training will inform personnel regarding the identification, status, and presence of covered species likely to be present in each abatement area; those avoidance and minimization measures that must be implemented, and the legal ramifications associated with non-compliance. Training materials will include descriptions and pictures of the covered species, relevant provisions of the State and Federal Endangered Species Acts, and the project boundaries for each abatement action. CALFIRE will ensure that all personnel who participate in hazard abatement activities within the Plan Area receive this training immediately prior to the start of any hazard abatement activities.
	All-2: Biological Monitor	A USFWS-approved biologist will monitor all vegetation removal activities that will take place within habitat suitable for the covered species. Monitoring activities will be required daily until completion of initial disturbance at each location to ensure that avoidance and minimization measures are implemented. The monitor will be granted full authority to stop work at his or her discretion if abatement-related activities occur outside the demarcated boundaries of the treatment footprint. The monitor will stop work if any of the covered species are detected within the proposed abatement area and take the appropriate species-specific avoidance or minimization measures.
Morro Shoulderband Snail	MSS-1: Pre-Project Survey and Translocation of Morro shoulderband snail	Prior to the start of any abatement activities, a USFWS-approved biologist will conduct surveys to identify the location of any Morro shoulderband snails present in treatment areas. These surveys shall be conducted within 24 hours of the commencement of any activities associated with hazard abatement that could result in take of the species. The primary objective of the pre-activity surveys is to locate as many Morro shoulderband snails as possible so that they can be captured and moved out of harm's way. All live Morro shoulderband snails of any life stage found during pre-activity surveys, or any phase of hazard abatement, will be captured and moved out of harm's way to a pre-determined, USFWS-approved receptor site by the surveying biologist.
	MSS-2: Minimize Impacts to Native Plants Important to Morro shoulderband snail	Canopy thinning and limbing up of plant species of particular value to Morro shoulderband snail must be avoided or minimized to the maximum extent possible. Pre-project surveys of treatment areas should be used to identify plant species that should be avoided, which include but are not limited to mock heather (*Ericameria ericoides*), coastal busy lupine (*Lupinus arboreus*), and sand almond (*Prunus fasciculate* var. *punctata*).

Table 5-4: **Minimization Measures for the Community Wildfire Protection Plan**

Taxa	Measure	Description
	MSS-3: Monitor for Morro shoulderband snail	Prior to initiating any hazard abatement activities, a USFWS-approved biologist will be present to ensure that the limits of work are clearly delineated. This biologist shall have the authority to order any reasonable measure necessary to avoid the take of Morro shoulderband snail and to stop any work or activity not in compliance with the conditions set forth in the HCP/ITP. The biologist will notify the Ventura Fish and Wildlife Office and the County of San Luis Obispo Department of Planning and Building of any "stop work" order that is issued and this order will remain in effect until the issue has been resolved.
Morro Bay Kangaroo Rat	MBKR-1: Avoid Impacts to Morro Bay Kangaroo rat	Prior to initiating any fire hazard abatement activities in areas featuring habitat suitable for MBKR (Figure 5-3), a CDFW and USFWS-approved biologist will conduct a visual assessment of the site, which will be followed by a survey, as needed, to ensure the site is not occupied (Section F.1)
Morro Manzanita	MM-1: Minimize Impacts to Morro Manzanita	No individual Morro manzanita plants will be removed and all canopy thinning and limbing up of lower branches of Morro Manzanita will be avoided or minimized to the extent that abatement goals can still be achieved.
Indian Knob Mountainbalm	IKM-1: Avoid Impacts to Indian Knob Mountainbalm	Prior to initiating any hazard abatement activities, a CDFW and USFWS-approved biologist will survey the treatment area to assess the presence of Indian Knob mountainbalm. If the species is detected within or adjacent to the treatment area, CALFIRE must consult with the USFWS and CDFW to determine how to proceed as no impacts to individuals this species will be authorized.
Migratory Birds	MBA-1: Avoid Impacts to Migratory Birds	All hazard abatement activities will be conducted outside of the bird breeding season, which is generally considered to be between March 15 and September 15, annually. This seasonal prohibition period will be adjusted, as needed, to reflect changes in the breeding bird season due to climate change or other factors. If it is necessary to conduct abatement activities during this timeframe, a USFWS-approved biologist must be retained to conduct breeding bird and nest surveys; treatments may only proceed if no breeding activity or nests are detected.

Table 5-5: Existing Protected Land within the Priority Conservation Area

Property and Management Entity	Total Acres[1]	Eligible for Mitigation[2]		Restoration[3]		Management[4]		Total Acres Eligible for Preserve System[5]
		Percent	Acres	Percent	Acres	Percent	Acres	
Morro Dunes Ecological Reserve (Department of Fish and Wildlife)	278.7	100%	278.7	13%	35	87%	243.7	278.7
San Luis Obispo County Parks[1]								
Elfin Forest (County Property) [6]	31.7	0%	0	0%	0	0%	0	0
Monarch Grove Natural Area	16.8	14.6%	2.4	15%	0.4	85%	2.0	2.4
State Parks[7]								
Elfin Forest (State Property)	34.8	0%	0	0%	0	0%	0	0
Los Osos Oaks State Natural Reserve	85.7	0%	0	0%	0	0%	0	0
Montaña de Oro State Park	235.9	0%	0	0%	0	0%	0	0
Morro Bay State Park	107.5	0%	0	0%	0	0%	0	0
Bureau of Land Management[8]	4.8	100%	0	0%	0	0%	0	0
Total	**795.9**		**281.1**		**35.4**		**245.7**	**281.1**

[1] Total acres within the LOHCP Priority Conservation Area (Figure 5-1)

[2] Percent and acres of property held by willing landowners suitable for enrollment of lands in the LOHCP Preserve System, and that features upland habitat of the Baywood fine sands ecosystem

[3] Percent of acres eligible for mitigation that is severely degraded and requires restoration

[4] Percent of acres eligible for mitigation that would benefit from additional active habitat management

[5] Total acres within property that is eligible for enrollment in the LOHCP Preserve System

[6] The acquisition of this property was funded, in part, by a grant from the California Coastal Conservancy, which restricted its use for mitigation

[7] State Parks has opted to exclude their lands from consideration for inclusion in the LOHCP Conservation Strategy

[8] As federal land, the BLM parcel is not eligible for inclusion in the LOHCP Preserve System.

Table 5-6: Biological Effectiveness Monitoring Protocol Summary (Appendix E)

Focal Species or System	Description	Study Area	Frequency	
			Permit Term	Post-Permit
Plant Communities and Habitat Conditions				
General Habitat Condition	Qualitatively examine the general condition of habitat within lands being managed as part of the regional conservation strategy, to detect new threats and impacts to habitat and the covered species	Entire Preserve System	Annual	Annual
Exotic Plant Areal Extent Mapping	Track changes in the distribution and abundance of exotic plant species	Entire Preserve System	Every 5 years	Every 5 years
Plant Community Areal Extent Mapping	Map the plant communities according to series with successional stages (e.g., cover) as appropriate	Entire Preserve System	Every 10 years	Every 10 years
Plant Community Structure Monitoring	Quantify plant community structure and species composition to evaluate covered species habitat characteristics, including the diversity and cover of native and exotic plants, to track changes due to or to trigger restoration and management	Entire Preserve System	Every 5 years	Every 5 years
Covered Species Populations				
Morro Shoulderband Snail Population Monitoring	Quantitative monitoring of the species distribution and abundance to evaluate population trends and responses to management	Suitable habitat for MSS (~300 ac.)	Annual	Every 5 years
Morro Manzanita Population Monitoring	Quantitative monitoring of the species areal extent and demography to examine population trends and responses to monitoring	Suitable habitat for MM (~250 ac.)	Every 5 Years	Every 10 Years
Indian Knob Mountainbalm Population Monitoring	Demographic monitoring of the existing occurrences and any new occurrences established through management.	Single occurrences	Every 5 Years	Every 10 Years
Morro Bay Kangaroo Rat Population Monitoring	Presence/absence surveys followed by ongoing surveys to track distribution, abundance, and population demography if the species is detected.	Suitable habitat for MBKR	Every 5 Years	Every 10 Years

Table 5-7: Compensatory Mitigation Requirements for LOHCP Covered Activities[1]

Project Category	Habitat Protection		Restoration, Management, and Administration Fee
	On-Site	Fee	
Vacant, Private Land Development			
Outside of the Priority Conservation Area		✓	✓
Inside the Priority Conservation Area	3:1 ratio for disturbance		✓
Redevelopment of Developed Parcels			
All Residential or Commercial Projects[2]		✓	✓
Public Projects and Private Utility Projects			
All New Disturbance (inside and outside of the Priority Conservation Area)		✓	✓

[1] Covered activities to implement the conservation program in the LOHCP Preserve System (i.e., habitat management, restoration, and monitoring) as well as implementation of the Community Wildfire Protection Plan do not require compensatory mitigation.

[2] Proponents of projects on vacant parcels inside the Priority Conservation Area that are too small to set aside habitat on site for the project impacts (i.e., <2.75 acres for the maximum 30,000 sf or 0.69 acres of impacts) must pay the habitat mitigation fee for any area that cannot be set aside on site.

Table 5-8: **Mitigation Crediting Ratios for Components of the LOHCP Conservation Strategy. Details provided in Section 5.7.2.3.1.**

Conservation Strategy Component	Definition	Example Characteristics	Mitigation Crediting Ratio[1]
Restoration of Existing Protected Lands[2]	Restore the natural community structure and species composition of habitat that has been severely degraded	Denuded trail corridors; eroded gullies; areas of debris or dense infestations of eucalyptus, ice plants, veldt grass, or other exotic species; or other areas where native habitat has been substantially degraded.	1.5:1
Enhanced Management of Existing Protected Land[2]	Improve condition of habitat that has been degraded by anthropogenic factors to enhance its natural community structure and species composition.	Vegetation management (including prescribed fire or fire surrogates), exotic plant species management, unauthorized uses management (e.g., installation of fences and signage), and long-term maintenance-level management and monitoring of conserved lands as part of the LOHCP Preserve System.	1.25:1
Dedication of Habitat Set Asides[3]	Land protected on vacant parcels located inside the Priority Conservation Area, through conservation easements voluntarily granted by project proponents to the Implementing Entity at a ratio of 3:1 for project impacts (i.e., three square feet are set aside for every one square foot of ground disturbance).	New development on vacant parcels inside the Priority Conservation Area must be clustered and otherwise sited to minimize habitat impacts and fragmentation; the habitat set aside will be located in areas that are most conducive to long-term species recovery.	1:1
<u>Protection (Acquisition of Fee Title or Conservation Easement) and Management of New Habitat</u>			
Tier 1: Very High Conservation Value	Protection of habitat in these parcels can greatly promote recovery of one or more covered species by securing a relatively large area of habitat that has high recovery value to one or more covered species	Large undeveloped parcels (>10 acres) or moderately sized (3-10 acres) undeveloped parcels that are adjacent to protected lands and feature habitat that is intact and of high value to one or more of the covered species	2:1

Table 5-8: **Mitigation Crediting Ratios for Components of the LOHCP Conservation Strategy. Details provided in Section 5.7.2.3.1.**

Conservation Strategy Component	Definition	Example Characteristics	Mitigation Crediting Ratio[1]
Tier 2: High Conservation Value	Protection of habitat in these parcels can facilitate recovery of one or more covered species	Moderate sized (>3 acre) undeveloped parcels with good quality remaining intact habitat of recovery value to one or more of the covered species or partially developed parcels of moderate size where development is consolidated, undeveloped portions contain high quality intact habitat of high values, some of which is adjacent to, or can help connect, existing protected lands or Tier 1 parcels, such that it would contribute to the recovery of one or more of the covered species.	1.5:1
Tier 3: Moderate Conservation Value	Protection of habitat in these parcels can promote habitat connectivity, which can enhance long-term viability.	Smaller parcels (<3 acres) with moderate value in terms of landscape context, habitat condition, and/or habitat viability such as parcels adjacent to existing protected lands	1:1
Tier 4: Low Conservation Value	Protection of habitat in these parcels would do little to promote species recovery such that the benefits are likely not worth the anticipated financial costs	Smaller parcels (<3 acres) with low value in terms of landscape context (e.g., disjunct, isolated), habitat condition, and habitat viability (e.g., subject to edge effect, partially developed). Undeveloped portions would be adjacent to, or can help with connectivity to existing protected lands, such that it would contribute to the recovery of one or more of the covered species.	0.5:1

[1] Acres of mitigation credit earned for every acre of habitat benefited by the conservation strategy. For example, for every acre restored, the County will receive 1.5-acre credits to mitigate the covered activities at a 1:1 ratio (i.e., for every acre of habitat impacted, 1 acre must be benefited).

[2] For mitigation credits to be generated on existing protected lands, the property must be enrolled in the LOHCP Preserve System and restored or managed in accordance with the LOHCP Preserve System AMMP, which will outline the habitat restoration, management, and monitoring approaches that will be used to achieve the biological goals and objectives of the plan.

[3] Although habitat set asides may vary in their conservation value, and the land itself will be set aside at a ratio of 3:1, the area set aside will be credited at a ratio of 1:1, in which one square foot mitigation credit is generated to offset the covered activities for every square foot set aside.

Table 5-9: Scenario for the LOHCP Preserve System

Conservation Strategy Component	Description	Acres of Land: Total Available	Acres of Land: Used in Scenario[1]	Mitigation Crediting Ratio[2]	Acres or Acre Equivalents
Management and Restoration of Existing Protected Lands					
Restore Habitat within Existing Protected Lands	Recreate the structure and/or functions of habitat in highly degraded areas within existing protected lands, and then actively manage and monitor the habitat in perpetuity	35.4	35.0	1.5:1	52.5
Manage Habitat within Existing Protected Lands	Actively manage and monitor in perpetuity habitat degraded by one or more anthropogenic factors with existing protected lands,	245.7	243.7	1.25:1	304.6
	Subtotal: Existing Protected Lands	**281.1**	**278.7**		**357.1**
New Habitat Protection					
Habitat Set Asides	Private land protected through conservation easements dedicated at a 3:1 ratio by project proponents developing vacant parcels inside the Priority Conservation Area[3]		31.0	1:1	31.0
New Fee Title or Conservation Easement Acquisitions	New land to be protected through acquisition of fee title or conservation easements from willing sellers				
	Tier 1: Very High Conservation Value	302	63.5	2:1	127
	Tier 2: High Conservation Value	165	10.0	1.5:1	15
	Tier 3: Moderate Conservation Value	84	3.0	1:1	3
	Tier 4: Low Conservation Value	46	0	0.5:1	0
	Subtotal: New Habitat Protection	**597**	**76.5**		**176.0**
	Total Mitigation Credits[4]				**533.1**
	Acres Impacted by the Covered Activities (Table 2-9)				**531.5**

[1] Acres of land estimated to be included in the LOHCP Preserve System in this scenario developed to evaluate conservation benefits and estimate costs.

[2] Ratio reflecting the value of the component of the conservation strategy to the impacts of the covered activities on a per acre basis (Table 5-8)

[3] Of the 44 undeveloped parcels within the Priority Conservation Area, 25 are less than 2.75 acres: the minimum size to develop the maximum area (30,000 sf or 0.69 acres) and provide the required on-site habitat set aside of 2.1 acres to mitigate at a 3:1 ratio. Proponents of projects on these parcels are assumed here to pay the mitigation fee rather than mitigate on site.

[4] The preserve system scenario includes 1.6 acre-credits more than needed, to address computational errors including rounding error.

Table 5-10: Habitat within the LOHCP Preserve System Configuration Scenario

	Existing Protected Lands[1]						Newly Protected Lands[2]						Total Preserve System					
	Restoration & Management[3]		Management Only[4]		Total		Restoration & Management[5]		Management Only[6]		Total		Restoration & Management[3]		Management Only[4]		Total	
Preserve System Habitats	**Ac.**	**Cr.[7]**	**Ac.**	**Cr.[7]**	**Ac.**	**Cr.[7]**	**Ac.**	**Cr.[7]**	**Ac.**	**Cr.[7]**	**Ac.**	**Cr.[7]**	**Ac.**	**Cr.[7]**	**Ac.**	**Cr.[7]**	**Ac.**	**Cr.[7]**
General Vegetation Types (Table 3-1)																		
Coastal Sage Scrub	26.0	39.0	181.0	226.3	207.0	265.2	3.3	5.5	30.1	49.2	33.4	54.7	29.3	44.5	211.1	275.5	240.4	320.0
Central Maritime Chaparral	8.5	12.7	58.9	73.7	67.4	86.4	4.2	6.9	38.0	62.2	42.2	69.2	12.7	19.6	97.0	135.9	109.6	155.5
Woodland	0.5	0.8	3.6	4.5	4.1	5.3	1.6	2.6	14.5	23.7	16.1	26.4	2.1	3.4	18.1	28.2	20.2	31.6
Grassland	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.6	1.0	0.7	1.1	0.1	0.1	0.6	1.0	0.7	1.1
Wetland	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Riparian	0.0	0.0	0.0	0.0	0.0	0.0	0.6	1.1	5.8	9.5	6.5	10.6	0.6	1.1	5.8	9.5	6.5	10.6
Other	0.03	0.0	0.17	0.2	0.2	0.3	0.9	1.4	7.7	12.7	8.6	14.1	0.9	1.4	7.9	12.9	8.8	14.3
Total	**35.0**	**52.5**	**243.7**	**304.6**	**278.7**	**357.1**	**10.7**	**17.6**	**96.7**	**158.4**	**107.5**	**176.0**	**45.7**	**70.1**	**340.4**	**463.0**	**386.2**	**533.1**
Covered Species Habitats (Table 4-4)																		
Morro Manzanita Habitat	**22.3**	**33.4**	**188.6**	**235.8**	**210.9**	**269.2**	**5.2**	**8.5**	**46.5**	**76.2**	**51.7**	**84.6**	**27.5**	**41.9**	**235.1**	**311.9**	**262.6**	**353.8**
Morro Shoulderband Snail	**20.7**	**31.0**	**144.2**	**180.2**	**164.9**	**211.3**	**5.5**	**9.0**	**49.2**	**80.6**	**54.7**	**89.6**	**26.1**	**40.0**	**193.4**	**260.9**	**219.6**	**300.8**
Primary Habitat	10.8	16.1	91.0	113.8	101.8	129.9	**3.7**	6.1	**33.6**	55.1	37.4	61.2	14.5	22.3	124.7	168.9	139.2	191.1
Secondary Habitat	9.9	14.9	53.2	66.4	63.1	81.3	1.7	2.8	15.6	25.5	17.3	28.4	11.6	17.7	68.7	92.0	80.4	109.7

[1] Existing protected land to be restored and/or managed as part of the LOHCP. Acreages of habitat based on the Morro Dunes Ecological Reserve, which is anticipated to be enrolled in the LOHCP.

[2] Habitat protected through fee title or easement and then restored and/or managed as part of the LOHCP. Acreages based on unprotected habitat on parcels of at least 2 acres in size in the Priority Conservation Area. Area of restoration presumed to be 10% of the total area.

[3] Habitat subject to intensive activities designed to accelerate recovery of severely-degraded habitat, followed by ongoing active habitat management, defined below. Acreages to be restored in each community are calculated based upon the proportion of the total acreage in the respective parcels.

[4] Habitat actively managed to address current and future threats to its condition through ongoing treatments. Acreage managed is the total acres minus the area that will be restored and then managed.

[5] 10% of newly acquired lands are estimated to require restoration.

[6] 90% of newly acquired lands are estimated to require enhanced management only

[7] Number of mitigation credits to be generated, based on mitigation crediting ratios that relate the conservation value of habitat protect, restoration, and management to the covered activity impacts (Table 5-8). For newly protected lands, the ratio was calculated as the weighted average based on the four ratios for new habitat protection: habitat set asides (1:1), acquisition of Tier 1 parcels (2:1), acquisition of Tier 2 parcels (2:1), and acquisition of Tier 3 parcels (1.5:1).

Table 5-11: Summary of the potential effects and conservation program activities for the covered species for the main categories of covered activities

Covered Activity Category	Covered Species	Potential Effects	Avoidance Measures	Minimization	Compensation
All Public and Private Construction and Facility Maintenance Projects (includes: private land development, public and private utility and capital improvement projects, and maintenance projects)	Morro shoulderband snail	Direct Negative Effects • Individual mortality (e.g., from trampling or crushing) • Habitat loss Indirect Negative Effects • Habitat fragmentation • Habitat degradation due to the invasion and spread of non-native plants and animals • Increases in natural predators • Potential for spread of rodenticides • Potential increase in diseases • Increased risk of fire	MSS-1: Locate projects away from occupied habitat, as well as suitable but unoccupied habitat, whenever possible. MSS-3: Avoid introducing non-native snails, and the use of snail control applications, such as mulluscicide, beer, or salt.	MSS-2: For projects located in designated parcels (Figure 5-2), have a USFWS-approved biologist survey for, capture, and move all Morro shoulderband snails to the nearest suitable protected habitat away from the project impact area. E1: Minimize habitat fragmentation and maintain connectivity between aquatic, riparian, and upland habitats by limiting the creation of barriers to species movement, maintaining corridors to connect remaining habitat for the covered species, clustering development, and minimizing length of driveways and other impervious surfaces. C1: Minimize loss and degradation of the natural communities of the Baywood fine sand, including coastal sage scrub, central maritime chaparral, and oak woodlands by minimizing the area of permanent and temporary habitat disturbance and by siting projects in already developed or degraded areas. C2: Restore all areas of temporary disturbance such as staging areas or areas adjacent to the project footprint, to pre-project conditions or ecologically-superior conditions for the covered species. Avoid installing plants identified as invasive by the California Invasive Plant Council and include plants native to the Baywood Fine Sands communities from local sources (i.e., the LOHCP Plan Area). C3: Avoid use of herbicide and pesticides; where necessary, apply biocides as part of integrated pest management strategies, and following all local, state, and federal regulations. C4: Minimize impacts of vegetation management projects conducted for fire safety, including to create and maintain defensible space, by implementing the best management practices. The list of BMPs will be maintained by the County and reviewed periodically by the USFWS and CDFW and will include specific fuel-reduction prescriptions designed to minimize impacts to the covered species. C5: Install temporary construction fencing to prevent disturbance outside of the designated footprint.	Inside the Priority Conservation Area (PCA): • set aside habitat at a 3:1 ratio for area of disturbance; and • pay 74.88 cents/square foot of disturbance to fund restoration, management, and plan administration. Outside of the PCA: • pay 13.93 cents/square foot of disturbance to fund habitat protection; and • pay 74.88 cents/square foot of disturbance to fund restoration, management, and plan administration.
	Morro Bay kangaroo rat	Direct Negative Effects • Habitat loss Indirect Negative Effects • Habitat fragmentation • Habitat degradation due to the invasion and spread of non-native plants and animals • Increases in natural predators • Increased pet encounters • Potential for spread of rodenticides • Potential increase in diseases • Increased risk of catastrophic fire	Prior to ground-disturbing activities in habitat suitable for Morro Bay kangaroo rat (Figure 5-3), a CDFW and USFWS-approved biologist will conduct a visual assessment of the site, which will be followed by a survey, as needed, to ensure the site is not occupied (Section F.1).	Implementation of Measures E1 and C1-C5 as outlined in the first row will minimize impacts to Morro Bay kangaroo rat habitat. There are no minimization measures for individuals, as take of individuals must be avoided.	The mitigation measures for Morro shoulderband snail, described above, will also compensate for loss of habitat for Morro Bay kangaroo rat.

Table 5-11: Summary of the potential effects and conservation program activities for the covered species for the main categories of covered activities					
Covered Activity Category	**Covered Species**	**Potential Effects**	**Avoidance Measures**	**Minimization**	**Compensation**
		• Exclusion of fire, resulting in unnatural succession of habitat			
	Morro manzanita	Direct Negative Effects • Individual mortality (e.g., from cutting or crushing) • Habitat loss Indirect Negative Effects • Habitat fragmentation • Habitat degradation due to the invasion and spread of non-native plants • Potential for impacts from herbicides • Increased fire frequency • Exclusion of fire, resulting in unnatural succession of habitat and 'senescence risk' of population • Genetic pollution or introgression (e.g., hybridization)	MM-1: Avoid and minimize impacts of project activities on Morro manzanita, by siting project disturbance envelopes away from existing plants to the maximum extent practicable. MM-2: Avoid or minimize trimming or removing Morro manzanita when conducting vegetation management including in association with required hazard abatement activities. MM-3: Avoid planting manzanita species (*Arctostaphylos* spp.) other than Morro manzanita.	Implementation of Measures E1 and C1-C5 as outlined in the first row will minimize impacts of the covered activities on Morro manzanita habitat. Implement measures MM1-MM 3 at left.	The mitigation measures for Morro shoulderband snail, described above, will also compensate for impacts to Morro manzanita.
	Indian Knob Mountainbalm	Direct Negative Effects • Habitat loss Indirect Negative Effects • Habitat fragmentation • Habitat degradation due to the invasion and spread of non-native plants • Potential impacts from herbicides (e.g., from nearby landscaping) • Increased fire frequency • Exclusion of fire, resulting in unnatural succession of habitat and 'senescence risk' of population	IKM-1: Prior to ground-disturbing activities in habitat suitable for Indian Knob mountainbalm, the applicant will retain a USFWS-approved biologist to conduct a survey to determine the presence of Indian Knob mountainbalm. If the species is present, the applicant will work with the County, USFWS, and CDFW to develop a project-specific plan to ensure that no take of this species occurs during project implementation.	Implementation of Measures E1 and C1-C5 as outlined in the first row will minimize impacts to Indian Knob mountainbalm habitat. There are no minimization measures for individuals, as take of individual Indian Knob mountainbalm must be avoided.	The mitigation measures for Morro shoulderband snail, described above, will also compensate for loss of Indian Knob mountainbalm habitat.
Community Wildfire Protection Plan	Morro shoulderband snail	Direct Negative Effects • Individual mortality (e.g., from trampling or crushing) • Temporary habitat loss Indirect Negative Effects • Temporary habitat fragmentation	All-1: Treatments will follow clearly defined operational procedures and a USFWS-approved biologist will train crews on the identification, status, and presence of covered species in each treatment area.	Implementation of Measures E1 and C1-C5 as outlined in the first row will minimize impacts of the covered activities on Morro shoulderband snail habitat. The avoidance measures for Morro shoulderband snail will also help minimize impacts to the species habitat and individuals. MSS-2: Canopy thinning and limbing up of plant species of particular value to Morro shoulderband snail must be avoided or minimized to the maximum extent possible. Pre-project surveys of treatment areas should be used to identify plant species that	None. The avoidance and minimization measures will render the impacts of the CWPP on Morro shoulderband snail negligible and the treatments will likely improve habitat for the species in the long term,

Table 5-11: Summary of the potential effects and conservation program activities for the covered species for the main categories of covered activities					
Covered Activity Category	**Covered Species**	**Potential Effects**	**Avoidance Measures**	**Minimization**	**Compensation**
		• Habitat degradation due to the invasion and spread of non-native plants • Increased risk of fire Benefits: • Reduced risk of catastrophic wildfire • Maintenance of open canopy conditions.	All-2: A USFWS-approved biologist will monitor all vegetation removal activities that will take place within habitat suitable for the covered species. MSS-1: Prior to the start of any abatement activities, a USFWS-approved biologist will conduct surveys to capture and relocate to a USFWS-approved receptor site all Morro shoulderband snails identified during surveys.	should be avoided, which include but are not limited to mock heather (*Ericameria ericoides*), coastal busy lupine (*Lupinus arboreus*), and sand almond (*Prunus fasciculate* var. *punctata*). MSS-3: A USFWS-approved biologist will be present during all work to ensure that the limits of work are clearly delineated, take any reasonable measures necessary to avoid the take of Morro shoulderband snail, and to stop any work or activity not in compliance with the conditions set forth in the HCP/ITP.	such that compensatory mitigation is not required.
	Morro Bay kangaroo rat	Direct Negative Effects • Temporary habitat loss Indirect Negative Effects • Temporary habitat fragmentation • Habitat degradation due to the invasion and spread of non-native plants and animals • Increases in natural predators Benefits: • Reduced risk of catastrophic wildfire • Maintenance of open canopy/early successional habitat conditions required by the species.	MSS-3: Prior to initiating any fire hazard abatement activities in areas featuring habitat suitable for MBKR (Figure 5-3), a CDFW and USFWS-approved biologist will conduct a visual assessment of the site, which will be followed by a survey, as needed, to ensure the site is not occupied (Section F.1)	There are no minimization measures for individuals, as take of individual Morro Bay kangaroo rats must be avoided. Implementation of Measures E1 and C1-C5 as outlined in the first row will minimize impacts of the covered activities on Morro Bay kangaroo rat habitat.	None. The avoidance and measures will avoid take of Morro Bay kangaroo rat through the CWPP treatments, which may improve habitat conditions for the species in the long term, such that compensatory mitigation is not required.
	Morro manzanita	Direct Negative Effects • Individual mortality (e.g., from cutting or crushing) Indirect Negative Effects • Temporary habitat fragmentation • Habitat degradation due to the invasion and spread of non-native plants Benefits: • Reduced risk of catastrophic wildfire • Maintenance of open canopy/early successional habitat conditions that can promote seedling establishment	MM-1: No individual Morro manzanita plants will be removed and all canopy thinning and limbing up of lower branches of Morro Manzanita will be avoided or minimized to the extent that abatement goals can still be achieved.	The avoidance measure for Morro manzanita will also help minimize impacts to individuals of the species. Implementation of Measures E1 and C1-C5 as outlined above will minimize impacts of the covered activities on Morro manzanita habitat.	None. The avoidance and minimization measures will render the impacts of the CWPP on Morro manzanita negligible and the treatments may improve habitat for the species in the long term, such that compensatory mitigation is not required.

Table 5-11: Summary of the potential effects and conservation program activities for the covered species for the main categories of covered activities					
Covered Activity Category	**Covered Species**	**Potential Effects**	**Avoidance Measures**	**Minimization**	**Compensation**
		• Can facilitates use of prescribed fire to promote recruitment			
	Indian Knob Mountainbalm	Direct Negative Effects • None—all impacts to individuals will be avoided. Indirect Negative Effects • Temporary habitat fragmentation • Habitat degradation due to the invasion and spread of non-native plants Benefits: • Reduced risk of catastrophic wildfire • Maintenance of open canopy/early successional habitat conditions that can promote recruitment • Can facilitates use of prescribed fire to promote recruitment	IKM-1: Prior to initiating any hazard abatement activities, a CDFW and USFWS-approved biologist will survey the treatment area to assess the presence of Indian Knob mountainbalm. If the species is detected within or adjacent to the treatment area, CALFIRE must consult with the USFWS and CDFW to determine how to proceed as no impacts to individuals this species will be authorized.	There are no minimization measures for individuals, as take of individual Indian Knob mountainbalm must be avoided. Implementation of Measures E1 and C1-C5 as outlined in the first row will minimize impacts of the covered activities on Indian Knob mountainbalm habitat.	None. The avoidance measures will avoid impacts of the CWPP on Indian Knob mountainbalm and the treatments may improve habitat condition for the species in the long term, such that compensatory mitigation is not required.
Conservation Program Implementation (Habitat Restoration and Management, and Habitat and Species Monitoring)	Morro shoulderband snail	Direct Negative Effects • Individual mortality (e.g., from trampling or crushing) • Temporary habitat loss Indirect Negative Effects • Temporary habitat fragmentation • Temporary habitat degradation due to the invasion and spread of non-native plants and animals Benefits • Promote habitat condition in the long term, by increasing the cover and richness of native plants by controlling exotic plants. • Increase distribution and abundance by restoring and managing habitat to address stresses (e.g. exotic plants, erosion, incompatible recreation, and fire exclusion). • Increase understanding of the conservation biology of the species through-long term monitoring and		MSS-2: Prior to and during all ground-disturbing activities in designated parcels (Figure 5-2), a biologist approved by the USWFS shall capture and move all Morro shoulderband snails to suitable habitat away from the project impact area (Section F.2). Implementation of Measures E1 and C1-C5 as outlined in the first row, wherever appropriate, will also help minimize short-term negative impacts of the conservation program on Morro shoulderband snail.	None. The conservation program is the compensatory mitigation for the LOHCP, and the short-term negative impacts of the conservation program on Morro shoulderband snail are negligible.

Table 5-11: Summary of the potential effects and conservation program activities for the covered species for the main categories of covered activities					
Covered Activity Category	**Covered Species**	**Potential Effects**	**Avoidance Measures**	**Minimization**	**Compensation**
		adaptive management, to promote management and recovery actions elsewhere.			
	Morro Bay kangaroo rat	Direct Negative Effects • Temporary habitat loss Indirect Negative Effects • Temporary habitat fragmentation • Temporary habitat degradation due to the invasion and spread of non-native plants and animals. Benefits • As for Morro shoulderband snail (above) • Create and maintain open habitat conditions required for Morro Bay kangaroo rat using fire and/or fire surrogates	MBKR-1: Prior to ground-disturbing activities in habitat suitable for Morro Bay kangaroo rat (Figure 5-3), a CDFW and USFWS-approved biologist will conduct a visual assessment of the site, which will be followed by a survey, as needed, to ensure the site is not occupied (Section F.1).	There are no minimization measures for individuals, as take of individual Morro Bay kangaroo rats must be avoided. Implementation of Measures E1 and C1-C5 as outlined in the first row, wherever appropriate, will also help minimize short-term negative impacts of the conservation program on Morro Bay Kangaroo rat habitat.	None. The conservation program is the compensatory mitigation for the LOHCP, and the short-term negative impacts of the conservation program on Morro Bay kangaroo rat are negligible.
	Morro manzanita	Direct Negative Effects • Individual mortality (e.g., from cutting or crushing) Indirect Negative Effects • Temporary habitat fragmentation and habitat degradation (e.g., to conduct restoration and management projects) Benefits: • As for Morro shoulderband snail (above) • Promote regeneration of the population using fire and/or fire surrogates	MM-1: Avoid and minimize impacts of project activities on Morro manzanita, by siting project disturbance envelopes at least 10' away from the copy of existing plants wherever possible.	MM-2: Avoid or minimize trimming or removing Morro manzanita when conducting vegetation management including in association with required hazard abatement activities. Implementation of Measures E1 and C1-C5 as outlined in the first row, wherever appropriate, will also help minimize short-term negative impacts of the conservation program on Morro manzanita.	None. The conservation program is the compensatory mitigation for the LOHCP, and the short-term negative impacts of the conservation program on Morro manzanita are negligible.
	Indian Knob Mountainbalm	Direct Negative Effects • Individual mortality (e.g., from cutting or crushing) Indirect Negative Effects	IKM-1: Prior to ground-disturbing activities in habitat suitable for Indian Knob mountainbalm, the applicant will retain a CDFW and USFWS-approved biologist to conduct a survey to determine the	There are no minimization measures for individuals, as take of individual Indian Knob mountainbalm must be avoided. Implementation of Measures E1 and C1-C5 as outlined in the first row, wherever appropriate, will also help minimize short-term negative impacts of the conservation program on Indian Knob mountainbalm habitat.	None. The conservation program is the compensatory mitigation for the LOHCP, and the short-term negative impacts of the

Table 5-11: Summary of the potential effects and conservation program activities for the covered species for the main categories of covered activities					
Covered Activity Category	**Covered Species**	**Potential Effects**	**Avoidance Measures**	**Minimization**	**Compensation**
		• Temporary habitat fragmentation and habitat degradation (e.g., to conduct restoration and management projects) Benefits: • As for Morro shoulderband snail (above) • Promote regeneration of the population using fire and/or fire surrogates	presence of Indian Knob mountainbalm. If the species is present, the applicant will work with the County, USFWS, and CDFW to develop a project-specific plan to ensure that no take of this species occurs during project implementation.		conservation program on Indian Knob mountainbalm are negligible.

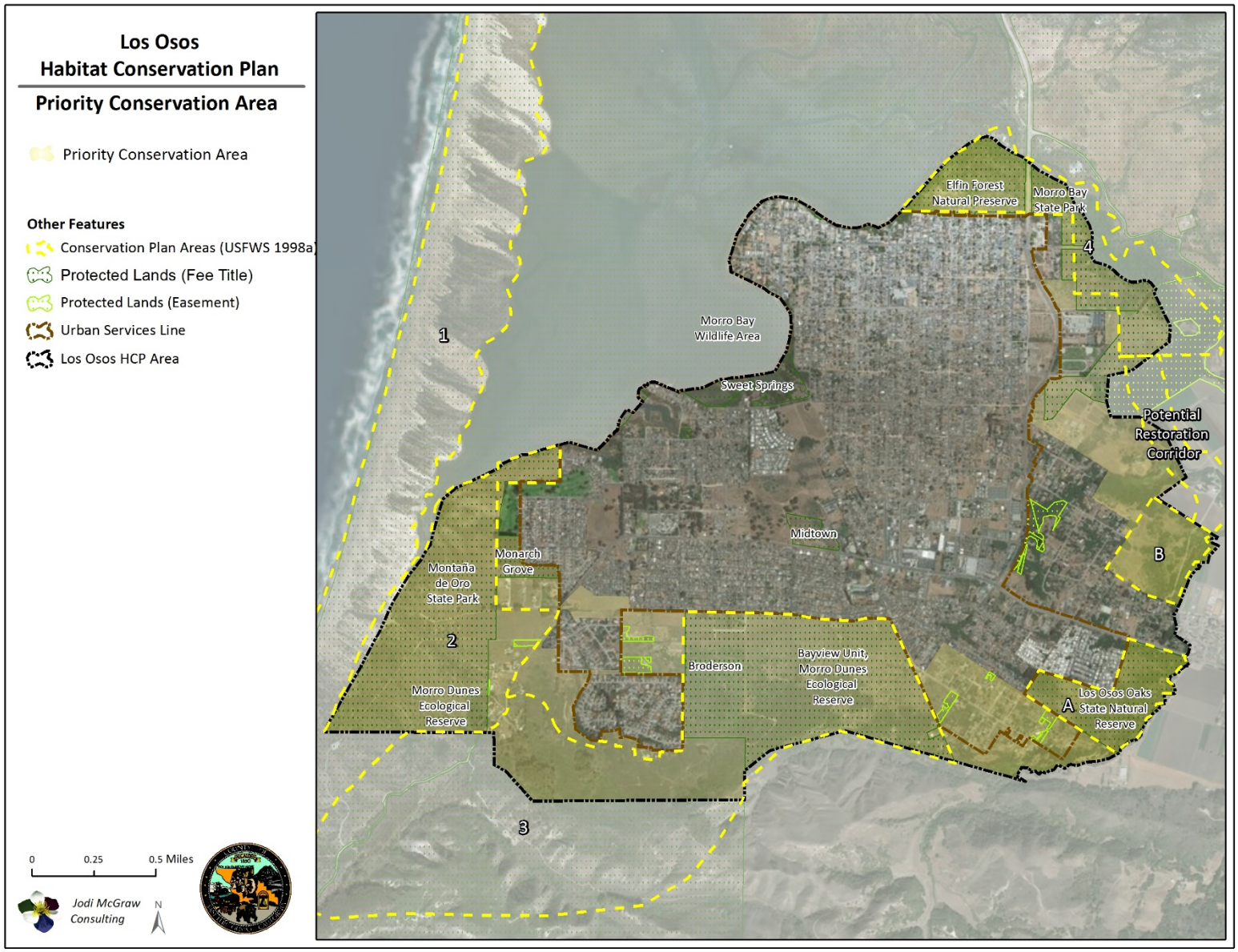

Figure 5-1: Priority Conservation Area

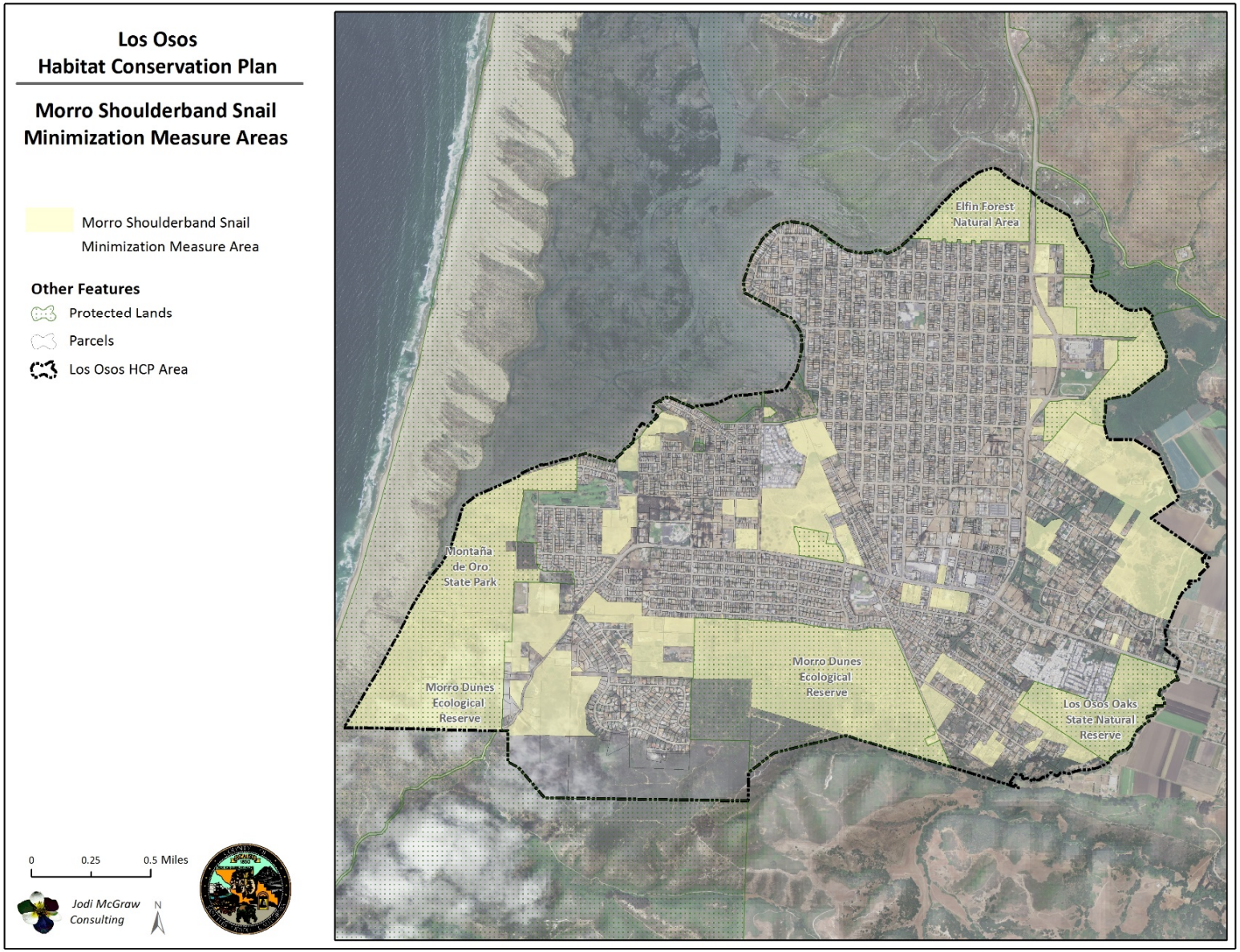

Figure 5-2: Morro Shoulderband Snail Minimization Area

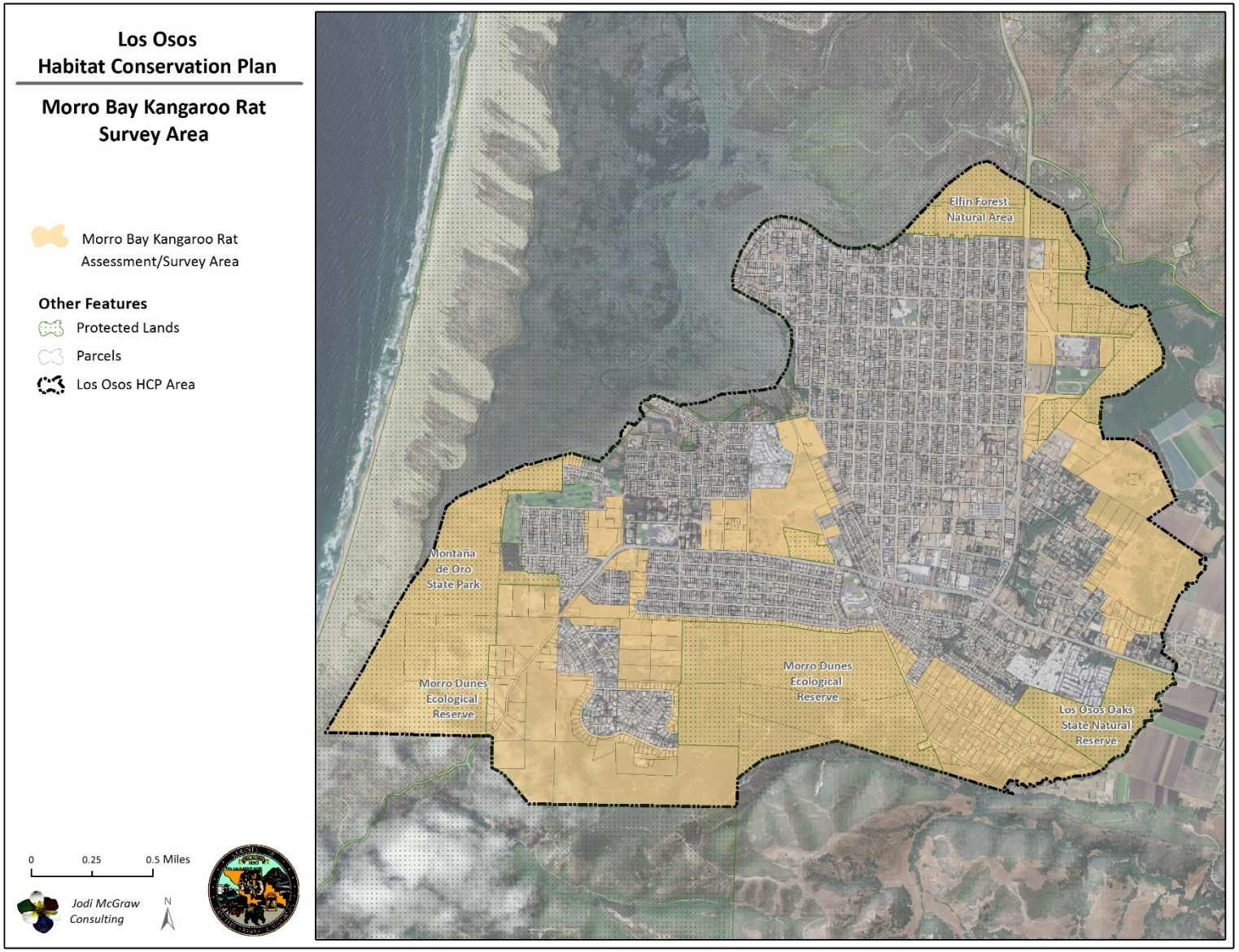

Figure 5-3: Morro Bay Kangaroo Rat Avoidance Area



Figure 5-4: Wetland and Riparian Pre-Project Habitat Assessment Area

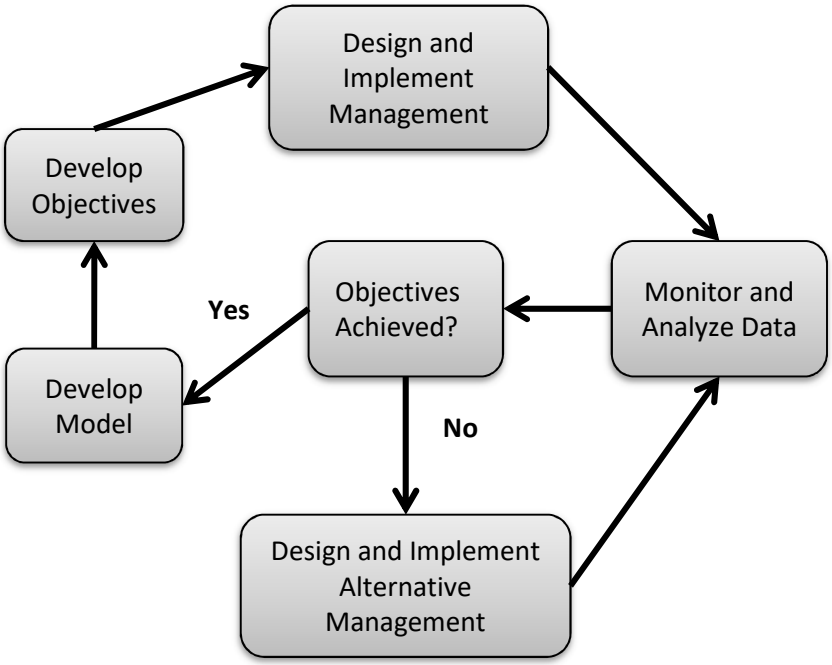

Figure 5-5: Adaptive Management Cycle (Elzinga et al. 2001)

6 Plan Implementation

This chapter describes the LOHCP implementation procedures, including organizational structure, project approval and permitting processes, roles and responsibilities, and plan amendment modification procedures

Implementation of the LOHCP will begin once the MOU is executed between the County and the CDFW, and the USFWS issues to the County the incidental take permit (ITP; Section 1.4).

6.1 Responsibility for Plan Implementation

As the permittee, the County of San Luis Obispo (County) will implement the LOHCP with oversight from the USFWS. The County envisions contracting with an Implementing Entity, approved by the USFWS and CDFW, to carry out specific roles and tasks to implement the HCP.

As the land manager of the Morro Dunes Ecological Reserve, which is anticipated to be enrolled into the LOHCP Preserve System at the outset of plan implementation for purposes of restoration and enhanced management under the plan, CDFW is a signatory to the MOU(Appendix K). They will also be responsible for implementing CESA and other state regulations administered by the Department (Section 1.5.2); however, CDFW will not be issuing a state incidental take permit under Section 2081 of CESA as the LOHCP will avoid take, as defined by the state act, of state-listed species (Morro Bay kangaroo rat and Indian Knob mountainbalm).

Accordingly, this section provides an overview of the County, Implementing Entity, and USFWS roles.

6.1.1 County

As the recipient of the ITP based on the LOHCP, the County has primary responsibility for implementing the LOHCP. The County intends to delegate specific responsibilities to implement aspects of the plan through contracts for services with an Implementing Entity—an existing or newly created non-profit conservation organization (e.g. land trust or conservancy) approved by the USFWS and CDFW, that will provide expertise in land conservation and management for endangered species, among other skills necessary to implement the delegated Plan tasks. Ultimately, the County is responsible for implementing the LOHCP and otherwise complying with the terms of the ITP so will coordinate closely with the Implementing Entity on all aspects of plan implementation. The County is remains responsible for ensuring compliance with the permit by the Implementing Entity and third parties who choose to obtain incidental take coverage through the permits and commits to use its police powers to ensure compliance with the HCP and permit by the Implementing Entity and third-party participants.

6.1.1.1 Identify or Establish the Implementing Entity

With input from and the approval of the USFWS and CDFW, the County will either identify an existing conservation organization that can carry out the responsibilities of the Implementing Entity (Section 6.2) or it will see that a new entity is formed following bylaws that are approved by the County. In either case, the Implementing Entity will be a non-profit organization designated under Section 501(c)3 of the United States Internal Revenue Code.

6.1.1.2 Contract with and Oversee the Implementing Entity

The County will contract with the Implementing Entity to fulfill the responsibilities outlined below (Section 6.2). The County will also review the annual reports prepared by the entity, to ensure that the plan elements are successfully implemented and that it is in compliance with the terms and conditions of the incidental take permit. The task of County oversight will be headed by the LOHCP Coordinator—a designated County staff member who will be responsible for overseeing the Implementing Entity and coordinating directly with the agencies. The County LOHCP Coordinator will work with the assistance of County staff or outside personnel with biological expertise, as needed, to review aspects of plan implementation including reviewing biological monitoring reports.

6.1.1.3 Screen Applications for County-Permitted Projects

The County will screen all development and related projects that it permits as part of its local land-use authority, to determine whether they meet the criteria for take authorization under the LOHCP (Section 6.3). The County will refer the proponents of projects identified as potentially eligible to the Implementing Entity, which will process applications for take coverage under the Plan (Section 6.1.2). The County will issue local permits as part of its land use authority once the applicant has been issued the Certificate of Inclusion, by the Implementing Entity, to confer take coverage under the ITP.

6.1.1.4 Ensure Compliance with Permit Terms

The County, in coordination with the Implementing Entity, will ensure that plan participants comply with the terms of the ITP. Should a participant fall out of compliance, the Implementing Entity will notify them and the County. If voluntary compliance is not provided, the Implementing Entity will revoke the Certificate of Inclusion and notify the County, which will issue a stop-work order on any County-permitted projects as described in greater detail in Section 6.3.3. The County remains liable under the permit for compliance with all applicable permit terms by each plan participant. Any violation of or failure to comply by a plan participant with the terms of the permit or the terms of any certificate of inclusion issued by or on behalf the County shall be attributed to the County.

6.1.2 Implementing Entity

Under contract with the County of San Luis Obispo, and with oversight of the County LOHCP Coordinator, the Implementing Entity will process take coverage applications for all projects, issue Certificates of Inclusion, and implement all aspects of the plan including the conservation program (Section 5).

6.1.2.1 Review Applications and Issue Certificates of Inclusion

The Implementing Entity will accept and review applications for take coverage. Proponents of projects that meet the LOHCP eligibility criteria and agree to comply with the terms of the take permit will be issued a Certificates of Inclusion that confers take coverage (Appendix H). The Implementing Entity will refer applicants whose projects are determined to be ineligible for permitting under the LOHCP to the state and federal agencies to discuss alternative options for take coverage.

6.1.2.2 Implement the Conservation Program

The Implementing Entity will be responsible for implementing the conservation program, including ensuring the avoidance and minimization measures are conducted, protecting new habitat, restoring habitat, and monitoring habitat incorporated within the LOHCP Preserve System. The Implementing Entity will ensure that all plan participants implement the necessary avoidance and minimization measures (Section 5.2) and provide the necessary mitigation (Section 5.7).

6.1.2.2.1 Ensure that Species Protection Measures Are Implemented

The Implementing Entity will ensure that all plan participants implement the necessary avoidance and minimization measures (Section 5.2). Specifically, the Implementing Entity will:

- Review all applications to identify the specific avoidance and minimization measures, as well as best management practices, that are necessary for each project, based on the general approaches (Section 5.2) as well as site and project-specific conditions;
- Review pre-construction surveys (which will also be reviewed by the USFWS and CDFW) and use results to evaluate additional measures to avoid and minimize impacts, including in project design;
- Monitor compliance of all plan participants to ensure they implement the LOHCP avoidance and minimization measures to prevent impacts to other listed species not covered under the permit; and
- Maintain a database of all avoidance and minimization measures, including survey results, which will be used to develop the annual report as well as to increase understanding of the species distribution and abundance.

6.1.2.2.2 Accept the Mitigation

The Implementing Entity will accept from all participants in the LOHCP, the mitigation required to compensate for the impacts of their projects (Section 5.7), including:

1. Conservation easements for habitat set-asides on parcels in the Priority Conservation Area that are developed as part of the LOHCP (Section 5.7.2.1.1);
2. Conservation easements for habitat acquired in fee title by the County using the Habitat Protection Fees (Section 5.7.2.1.2); and
3. Habitat mitigation fees, which include Habitat Protection Fees (Section 5.7.2.1.2) for those who do not set aside habitat, and habitat restoration and management fees required for all participants identified in Table 5-7 (Section 5.7.2.2).

The Implementing Entity is proposed to serve as the easement holder, rather than the County, for a variety of reasons including:

1. As a 501(c)3 land trust, the Implementing Entity will be most qualified to develop easements designed to protect the conservation values, and enforce the terms of the easements, as needed;

2. The Implementing Entity will be conducting the habitat restoration, management, and monitoring in conjunction with monitoring the easements, and will be more readily able to detect any violations; and
3. The County will hold fee title to lands acquired using mitigation fees collected through the LOHCP and having a separate easement holder provides additional protections for the habitat relative to having an easement that is held by the same entity that holds fee title and is therefore set up for self-monitoring.

As described in Section 6.2.2.2, the Implementing Entity will designate a successor to the easement, in the event the Implementing Entity is dissolved.

The required mitigation will be secured by the Implementing Entity following approval of the project applications and before development permits are issued by the County, and before a Certificates of Inclusion is issued by the Implementing Entity. Proponents of projects subject to County land-use jurisdiction must provide the County with a copy of their Certificate of Inclusion conferring take coverage before the County will issue the local permit (Section 6.1.1.3).

The Implementing Entity will deposit habitat mitigation fees into a dedicated trust account held by the Implementing Entity (the trustee) on behalf of the County (the third-party owner) to ensure that they are applied to implement the plan. A portion of the fees will be used to establish the endowment that will be held by the National Fish and Wildlife Foundation and will be used to fund habitat management and monitoring post permit (Section 7.2.3).

6.1.2.2.3 Assemble, Manage, and Monitor the LOHCP Preserve System

The County intends to delegate to the Implementing Entity the tasks associated with assembling the LOHCP Preserve System (Section 5.3) and conducting all activities to manage and monitor the preserves in order to achieve the biological goals and objectives of the LOHCP (Section 5.1). This includes steps to protect, manage, restore, and monitor habitat.

To protect habitat, the Implementing Entity will:

- Secure easements from landowners mitigating on site, by reviewing applications and identifying the set-aside area, and working with the USFWS to ensure the easement will protect habitat that is of high long-term conservation value for the covered species (Sections 5.7.1.1 and 6.2.2.2).
- Use habitat mitigation fees to acquire, from willing sellers, additional lands of high conservation value to be included in the LOHCP Preserve System, by working with the USFWS to identify parcels of greatest conservation value, conducting outreach to identify willing sellers, negotiating with landowners or their agents, and ultimately securing fee title or conservation easements. Lands acquired in fee simple title will be held by the County and permanently protected by conservation easements held by the Implementing Entity.
- Monitor and work with the County to enforce, where necessary, compliance with conservation easements over properties protected as part of the LOHCP to ensure long-term protection of the habitat.

The Implementing Entity will also work with CDFW and the County to enroll their land so that it can be managed, restored, and monitored as part of the LOHCP Preserve System (Section 5.3.4.2). This includes:

- Identifying the priority areas for habitat restoration and management and the techniques that will be used to ensure the habitat is protected in perpetuity;
- Determining the management goals and objectives for the property, which will be consistent with the biological goals of the LOHCP (Section 5.1) and the goals and objectives of the LOHCP Preserve System AMMP (Section 5.4.1.2);
- Developing and executing cooperative agreements with the eligible land management entities who may elect to enroll their lands, including CDFW and County Parks (Section 5.3.3.1); such agreements would specify what they will continue to do (i.e., as part of their maintenance of effort) and what the Implementing Entity will do directly, or under contract with the land manager, as mitigation under the LOHCP.

The Implementing Entity will conduct all habitat management, restoration, and monitoring within the LOHCP Preserve System directly or through administration of contracts (i.e., cooperative management agreements) with agencies and organizations that own land managed as part of the LOHCP Preserve System. Habitat management and monitoring responsibilities of the Implementing Entity include:

- Prepare and implement the LOHCP Preserve System AMMP, which will identify the goals and priority restoration and management projects for the lands within the Preserve System, based on a critical examination of the biological conditions on site, as well as the role of the preserve in the broader landscape (Section 5.4.1.2).
- Prepare annual work plans and budgets to implement the habitat management plan. Work plans will identify the habitat management and monitoring tasks that will be conducted each year, based on the priorities and existing funding, derived from habitat mitigation fees and other sources (e.g., grants).
- Conduct or oversee habitat restoration, management, and monitoring. Ensure that habitat management, restoration, and enhancement activities are carried out as outlined in the management plan, the LOHCP, and the permit and that the work is keeping pace with or exceeding the pace of the take/impacts in compliance with the Plan's stay-ahead provision (Section 6.2.4).
- Update the LOHCP Preserve System AMMP as part of the adaptive management process, in which changed conditions, new scientific information, and the results of prior projects and monitoring, among other changes, are addressed to promote long-term effectiveness of the conservation strategy (Section 5.5).

6.1.2.3 Administer the Plan

The Implementing Entity will also be responsible for implementation monitoring of the LOHCP (Section 5.4.1). As part of the Covered Activities Implementation monitoring, the Implementing Entity will create and maintain a database to record relevant information about each application submitted:

- The amount and location of habitat impacted by each covered activity;

- Whether all of the required avoidance and minimization measures, and best management practices required in the certificate of inclusion were implemented and the effectiveness of such measures;
- The number and type of Certificates of Inclusion issued during each calendar year and cumulatively since the take permit was issued; and
- The mitigation provided (i.e., the acres protected via conservation easement and fees accepted).

To document implementation of the conservation strategy, the Implementing Entity will establish one or more databases that will continuously track the following, which will be presented in each annual report to the USFWS (Section 5.6):

- The amount and location of new habitat protected (i.e. habitat acquired by the Implementing Entity and habitat set aside by project proponents on site; Section 5.7.2.1)
- The amount and location of habitat subject to each type of restoration treatment (e.g., erosion control);
- The amount and location of habitat subject to enhanced management, including the type(s) of management activities conducted in the area (e.g., veldt grass control);
- Progress toward the biological goals and objectives, based on monitoring;
- Accounting for all fees collected and funds expended;

The Implementing Entity will use the databases to prepare the annual report (Section 5.6), and to evaluate whether the area protected, restored, and managed as part of the conservation program is sufficient to meet the LOHCP stay-ahead provision (Section 6.2.4).

The Implementing Entity will prepare an annual report documenting implementation of the LOHCP (Section 5.6). The report will document the steps conducted to promote long-term effectiveness of the plan at achieving the biological goals and objectives (Sections 5.1 and 5.5). These include:

- Updating the overall conservation program as well as the LOHCP Preserve Management Plan, based on changed conditions, new scientific information and results of monitoring;
- Conducting periodic reviews of the fees, to ensure they are sufficient. The initial review will occur after three years, with subsequent reviews conducted at least once every five years (Section 7. 4) or sooner if circumstances, including information in the annual report, indicate that the fees collected may not be sufficient to implement conservation measures required under the plan; and
- Identifying proposed changes to the plan, including administrative changes as well as minor and major amendments (Section 6.7).

The Implementing Entity will prepare the draft report for review and approval by the County, which will then submit it to the agencies for their review and feedback.

6.1.2.4 Conduct Other Implementation Duties

The Implementing Entity will complete additional tasks to effectively implement the LOHCP including:

- **LOHCP Communications:** maintain a publicly-available website that provides information about the LOHCP, including annual reports and monitoring studies;
- **Promote Partnerships:** engage with agencies and organizations in the LOHCP Area, to promote their support for efforts to achieve the LOHCP goals and objectives. This includes conducting outreach to researchers to engage them in studies that will fill data gaps, evaluate effectiveness of monitoring, and otherwise inform the conservation program (Section 5.4.2.3);
- **Pursue Supplemental Funding**: as feasible, seek outside funds to support research as well as additional restoration, management, and monitoring to complement the LOHCP conservation strategy. Such funds sources would not replace or otherwise alter the mitigation responsibilities of the plan participants; rather, additional funding would be used to improve the quality of management of the LOHCP Preserve System.
- **Convene meetings: at least** annually or sooner if warranted convene representatives from the County and the USFWS, as well as owners/agency managers of land within the LOHCP Preserve System to keep these parties apprised of progress towards conservation goals and objectives, and provide updates on funding, monitoring, adaptive management, and other topics relevant to long-term effectiveness of the LOHCP.

6.1.3 USFWS

The USFWS will monitor and enforce the County's compliance with the ITP. The agency will review and comment on annual reports, which will identify the projects covered and mitigation provided under the ITP (Section 5.6). The USFWS is expected to remain involved in other aspects of implementation of the plan during the term of the ITP. Specific anticipated roles of USFWS include:

- Provide input and ultimately approval in the process of selecting the Implementing Entity;
- Monitor plan implementation and promptly notify the County and Implementing Entity if implementation of the plan is not proceeding in compliance with the ITP;
- Review and provide timely approval for all land acquisition and conservation easement proposals to ensure consistency with the habitat protection component of the conservation program (Section 5.3.3);
- Review, provide comments on, and approve the LOHCP Preserve System AMMP;
- Review annual reports documenting plan implementation and monitoring; and
- At their discretion and consistent with agency priorities and legal mandates, assist the Implementing Entity in attempting to secure funding to enhance the conservation program.

The USFWS is not expected to be involved in permitting activities on a project-by-project basis. Accordingly, the County and Implementing Entity will not transmit copies of application materials to the USFWS on a routine basis. If requested, the County will provide such information to the USFWS. The USFWS may identify issues with a particular application and otherwise offer comments to the County and/or the Implementing Entity with regard to a particular project, but the extension of take authorization to individual covered activities will be carried out by the County and the Implementing Entity in accordance with the ITP conditions. As the sole permittee, the County remains the sole entity liable for any non-compliance with the Plan or its ITP by any entity acting under the ITP.

6.2 Conservation Program Implementation

This section describes how the Implementing Entity will ensure implementation of the avoidance and minimization measures, and work with the County and willing landowners in the region, to establish and manage the LOHCP Preserve System. The Preserve System is the network of public and private conservation lands, including land protected through implementation of the LOHCP, as well as existing protected lands where additional management and restoration will be conducted to promote the biological goals and objectives. This section describes how the Implementing Entity will protect new habitat, as well as enroll existing protected lands in the LOHCP Preserve System. This section also describes the Plan's Stay-Ahead Provision, which will be used to ensure habitat benefits in the LOHCP Preserve System keep pace with, or outpace, habitat impacts caused by the covered activities.

6.2.1 Avoidance and Minimization Measure Implementation

As part of the process to review and permit applications for take coverage, the Implementing Entity will identify the necessary avoidance and minimization measures for each project as set forth in Tables 5-2 through 5-4, verify that projects can be implemented in a way that avoids impacts to Morro Bay kangaroo rat and Indian Knob mountainbalm individuals, condition the COI for each project on their successful implementation, and conduct monitoring to ensure that avoidance and minimization measures are effectively implemented as part of the LOHCP; this includes monitoring to ensure that the impacts are confined to the specified disturbance envelope. The Implementing Entity will notify the County of any violations of the terms of the COI and ITP, which the County will enforce as outlined in Section 6.3.3.

1. **Maintain Database:** The Implementing Entity will establish and maintain a GIS database to identify the locations of known occurrences and suitable habitat for the four covered species and the eight additional listed species not covered by the LOHCP permit, as well as known nests of birds of prey including golden eagle and white-tailed kite. The database will contain the latest available public information (e.g., California Natural Diversity Database), information available from conservation organizations (e.g., California Native Plant Society and Morro Coast Audubon Society), and data synthesized from prior applications and projects (e.g., results of project-specific surveys). The database will be assembled prior to issuance of the permit so that it can be used to screen the first applications (Table 6-1),

2. **Evaluate Covered Activities:** The Implementing Entity will evaluate each project proposed for take coverage under the LOHCP to identify its potential impacts on the covered species and other listed species. This evaluation will consider the location of the project with respect to known occurrences and suitable habitat in the database, characteristics of the project (e.g., type, size, and seasonality) and the ecology and life history of the species that could potentially be affected. The Implementing Entity may require that project proponents provide a habitat assessment to provide the information needed for the evaluation. The specific protection measures identified based on the above general criteria as well as site and project-specific considerations, will be included as conditions Certificate of Inclusion that is issued to confer take coverage for the project.

3. **Ensure Avoidance of Other Listed Species:** Prior to issuing a Certificate of Inclusion, the Implementing Entity will make the following determination for each project:

a. No take: The project can be conducted as designed without causing take of listed species not covered by the permit as well as Indian Knob mountainbalm and Morro Bay kangaroo rat individuals;

b. No take with implementation of avoidance measures: the project can avoid take to additional listed species through implementation of protection measures; or

c. Potential for take: there is a significant potential for take, which cannot be avoided through implementation of avoidance measures.

The Implementing Entity will refer proponents of projects with the potential for take (Item 3c, above) of listed species not covered by the permit and/or Indian Knob mountainbalm or Morro Bay kangaroo rat individuals to the USFWS and CDFW to discuss permitting options; the Implementing Entity will also notify the wildlife agencies of such referrals. Such projects will only be permitted under the LOHCP if the applicant provides the Implementing Entity with documents substantiating compliance with the state and/or federal regulations (Section 6.3.1).

4. **Implement Species Protection Measures:** Plan participants will be required to implement the applicable measures required by the Implementing Entity to avoid or minimize take/impacts resulting from their covered activity. Tables 5-2 through 5-4 list the avoidance and minimization measures, which may be updated periodically by the Implementing Entity, in coordination with the USFWS and/or CDFW, as part of the adaptive framework in which the Plan will be implemented, to promote effective species protection.

5. **Conduct Implementation Monitoring:** The Implementing Entity will monitor the covered activities to ensure that the requisite avoidance and minimization measures are conducted (Section 5.4.1.1). This includes ensuring that the project impacts are confined to the predetermined disturbance envelope. The Implementing Entity will record the results of this will be entered into a database, which will be used to quantify take/impacts including loss of habitat in the annual report (Section 5.6). Violations will be addressed as outlined in Section 6.3.2.

These steps will be revised, as needed, to ensure effective species protection.

6.2.2 Habitat Protection Process

The Implementing Entity will use mitigation fees to protect habitat in accordance with the biological goals and objectives. The Implementing Entity will also receive land conservation easements from plan participants who are required to set aside habitat on-site, to meet the habitat protection requirement of the compensatory mitigation (Section 5.7.2.1). Section 5.3 identifies the important conservation considerations for habitat protection. This section describes the process and provides greater detail about the conservation easements.

6.2.2.1 Land Acquisition

The Implementing Entity will use the habitat mitigation fees to acquire additional privately-held land for inclusion within the LOHCP Preserve System. This section outlines the general step-wise process that the Implementing Entity will use to secure suitable land.

1. Identify properties with the highest potential to promote attainment of the biological goals and

objectives, which include protecting, buffering, or connecting suitable and/or occupied habitat for the covered species (Section 5.3.2).

2. Discuss potential for acquisition of fee title or easement with the landowner, the County, and the USFWS.
3. Secure landowner permission to conduct site assessments and surveys, which will be funded by the Implementing Entity using mitigation fees.
4. Determine if the property features encumbrances (e.g., existing easements), title issues, resource extraction rights, hazardous materials, or other issues that conflict with LOHCP goals and objectives. Areas subject to incompatible easements or management will be excluded from the LOHCP Preserve System unless such incompatibilities can be resolved.
5. Reach agreement on the terms of the conservation easement, which must be approved in writing by the USFWS, and will include language enabling the Implementing Entity to conduct habitat management and monitoring necessary to maintain or restore the conservation values. The Implementing Entity will be the grantee for easements conserving on-site habitat set-asides (Section 5.7.2.1.1). Lands acquired by the Implementing Entity will be transferred to the County which will grant a conservation easement, approved in writing by the USFWS, to the Implementing Entity.
6. Conduct an appraisal of the property value (easement or fee) or have an appraisal conducted by the property owner reviewed by an independent real-estate specialist or appraiser responsible to the Implementing Entity.
7. Obtain written concurrence from the County and USFWS, regarding the land selected for acquisition. The Implementing Entity will provide the agencies with all available information about the property (including include maps, legal descriptions, preliminary title documents, Phase 1 Site Assessments, and draft conservation easements) along with a request for concurrence.
8. Negotiate fair-market price and final easement conditions, if applicable, with owner.
9. Acquire or place a conservation easement, approved by the USFWS, on the property.
10. If a site is purchased in fee simple title, the Implementing Entity will transfer fee title to the County and the County will concurrently execute a conservation easement (approved by the USFWS) in favor of the Implementing Entity. The Implementing Entity will prepare a site-specific restoration and management plan, reviewed and approved by the USFWS, that will be integrated into the LOHCP Preserve System AMMP. If a conservation easement is purchased, the Implementing Entity will prepare a management plan with the landowner, which shall also be reviewed and approved by the USFWS. These plans will be consistent with the LOHCP Preserve System AMMP (Section 5.3.3.2) and feature an adaptive management framework (Section 5.5).
11. Initiate preserve management and monitoring and conduct habitat restoration (if applicable). Monitoring and management will be initiated within one year of preserve establishment and will be seasonally timed as outlined in the management plan. The timeline for restoration projects will depend on the circumstances, including habitat conditions and available funding, which will be addressed in the preserve management plan which will be reviewed and approved by the USFWS.

6.2.2.2 Conservation Easements

All habitat to be protected through the LOHCP will have its conservation values permanently protected through dedication of a conservation easement. Conservation easements will be granted to the Implementing Entity which, as a 501(c)3 land trust, will be responsible for monitoring and defending the easement terms.

The Implementing Entity is anticipated to acquire conservation easements to protect habitat in the LOHCP under three circumstances:

1. Private landowners developing vacant land inside the Priority Conservation Area will grant easements to the Implementing Entity to protect the habitat set-asides that they establish on site at a ratio of 3:1, wherein three square feet of habitat is protected via conservation easement for every one square foot impacted by development (Section 5.7.2.1.1);

2. The County will grant to the Implementing Entity conservation easements over properties that the Implementing Entity acquires in fee simple title and then deeds to the County and as part of the habitat protection component of the LOHCP (Section 5.3.2); and

3. Landowners willing to donate or sell conservation easements to protect additional intact habitat on their parcels, particularly privately-owned parcels that feature residential development or other improvements for which the landowners wish to maintain fee simple ownership.

These conservation easements must meet the following criteria:

- Be in perpetuity;
- Be developed according to California Civil Code sections 815 et seq.; and
- Be voluntarily offered by the holder of the underlying fee, and not as a mandatory condition of any project approval[11];
- Be submitted to the USFWS for review and approval; and
- Name the USFWS, and the County as third-party beneficiaries, with rights of entry and enforcement.

The terms and prices of the easements will be negotiated on a case-by-case basis between the Implementing Entity and the landowner, who must abide by the terms of the conservation easement. Easement terms will depend on site conditions, including species occurrences and habitat conditions and management needs, and landowner preferences, including land-use activities.
Conservation easements will be drafted to ensure that the area of the property covered by the easement will be kept in its natural or existing condition to protect the conservation values of the property forever, to confine the allowable uses of the property to those activities that ensure or promote the preservation or restoration of those conservation values consistent with the LOHCP, and to prevent any use of the property which would impair or interfere with the conservation values of the

[11] Although conservation easements are required as mitigation for those developing vacant parcels inside the Priority Conservation Area in order to participate in the LOHCP, such easements are not a mandatory condition of project approval as landowners seeking to develop in these areas can satisfy state and federal endangered species act requirements through other means, including preparing their own HCP.

property. The conservation values shall be specifically described in terms of both the covered species and their habitat, and other natural communities on the property.

The Implementing Entity will obtain the following documentation prior to accepting a conservation easement:

- A baseline survey of the property documenting the presence and of the covered species, condition of their habitat, and factors that threaten their future condition;
- A preliminary title report and legal description of the property;
- Evidence of all other easements, covenants, restrictions, and reserved rights;
- A Phase I environmental analysis for hazardous materials;
- A map of the parcel in relation to other components of the LOHCP Preserve, or other properties subject to other permanent protections for conservation purposes;
- A Property Analysis Report (PAR) or comparable assessment of the initial and capital costs and ongoing funds required to manage and monitor the lands; and
- A detailed list of the allowable uses and use restrictions on the parcel as approved by the USFWS.

The above information shall be provided to the USFWS at their request.

All recorded conservation easements must include the items listed below:

- Provisions for access both by the Implementing Entity or its designee to monitor the terms of the conservation easement and to carry out all applicable management and monitoring requirements. A right of reasonable access to monitor compliance with the terms of the conservation easement shall also be granted to the USFWS. The easement shall include provisions for public access, where appropriate (e.g., trail corridors on properties connecting public lands) and approved by the USFWS.
- Provisions for enforcement and available remedies for the Implementing Entity or other party in the event that title holder or third party violates the terms of the conservation easement. Such right of enforcement and remedies provisions shall also be granted to the USFWS.

Appendix I contains a template conservation easement, which will be updated by the Implementing Entity early during plan implementation, and as necessary to ensure long-term effectiveness at protecting habitat.

6.2.3 Habitat Restoration, Management, and Monitoring Process

The Implementing Entity will work with landowners to manage, restore, and monitor habitat within the LOHCP Preserve System.

6.2.3.1 Enroll Existing Protected Lands in the LOHCP Preserve System

The Implementing Entity will meet with the agencies and conservation organizations responsible for the existing protected lands within the Priority Conservation Area, to discuss potential coordination of

management and restoration as part of the LOHCP Preserve System (Section 5.3.3). The purpose will be to identify the following:

- **Habitat to be enrolled:** the specific habitat areas to be enrolled in the LOHCP Preserve System, which must meet the following criteria:
    - provide suitable habitat for one or more of the covered species; and
    - have management or restoration needs that are not the current responsibility of the landowner/manager and met by available resources.

  If the property will be enrolled over time, the management units and their sequence or phasing will be determined.

- **Habitat Treatments**: the specific habitat restoration and management activities that will be implemented to improve habitat conditions as mitigation for the LOHCP.

- **Method of habitat protection:** the legal mechanism that will be used to ensure that the enrolled habitat is permanently protected from development, so that the restoration and management benefits resulting from mitigation are not wasted. Legal mechanisms can include conservation easements, permanent deed restrictions, and other legal documents (e.g., contracts) that restrict land use and associated activities, as appropriate and as approved by the USFWS.

- **Maintenance of Effort Plan:** the current management and restoration activities that are being implemented by the landowner. These activities will continue to be implemented by the landowner to ensure that the LOHCP mitigation has added benefits for the covered species.

The information outlined above will provide the basis for cooperative management agreements between the Implementing Entity and the landowner. It will also inform development of, or updates to, the LOHCP Preserve System AMMP, which will identify the complete restoration and management treatment plan for each enrolled property, to guide overall coordinated management of the preserves (Section 6.2.3).

The County will work with the Implementing Entity to initiate discussions with agencies and conservation organizations to develop cooperative management agreements prior to issuance of the ITP, so that existing protected lands can be enrolled in the in the LOHCP Preserve System during the first year of implementation (Table 6-1). Additionally, the County will fund an estimated 15- acres of exotic plant management work or other beneficial habitat management to 'jump start' the mitigation program. This will enable the impacts of covered activities to be offset by restoration and management projects once the performance criteria for the management projects have been achieved, and facilitate compliance with the Plan's 'stay-ahead provision' (Section 6.2.4). No take/impacts will be authorized under the plan for a particular project until lands have been enrolled, or acquired, subjected to management or restoration as appropriate, and the performance criteria used to document success toward promoting the biological goals and objectives have been met within an area sufficient to mitigate for the take/impacts of the particular activity.

6.2.3.2 Develop Preserve System Adaptive Management Plan

To guide restoration, management, and monitoring of habitat within the LOHCP Preserve System, the Implementing Entity will develop the LOHCP Preserve System AMMP—an action plan for the Preserve System, which will identify the coordinated strategies that will be used to achieve the greatest long-term conservation benefits for the covered species (Section 5.3.3.2). Developed during the first three years of Plan implementation of the LOHCP (Table 6-1), this living document will be updated as new preserves are established (e.g., new habitat is protected, or protected lands are enrolled), and otherwise be revised, as needed, to identify the priority restoration and management projects for the lands within the LOHCP Preserve System.

Section 5.3.3.2 outlines the anticipated contents and key functions of the management plan. To develop the plan, the Implementing Entity will conduct baseline biological effectiveness monitoring studies (Table 5-6) of land anticipated to be included in the Preserve System. The surveys, which will be conducted with permission of the landowners, will be designed to identify the distribution and relative abundance of the covered species, characterize the condition of their habitats, and identify initial priorities for restoration and management (Section 5.4.2.1).

To ensure adequate funding for this initial work, which will be conducted prior to accrual of sufficient mitigation fees, development of the management plan, including implementation of the baseline monitoring protocols, were included as part of the three-year Preserve Start-Up Costs, that will be funded by the County; the Implementing Entity will reimburse the County for these and other initial costs, over time, using future mitigation proceeds (Section 7.3.4).

6.2.4 Stay-Ahead Provision

During the course of LOHCP implementation, the Implementing Entity will ensure that the habitat benefits resulting from habitat protection, restoration, and management exceed the take, which will be measured in terms of area of habitat impacted by the covered activities. Evaluation of the status of the LOHCP toward compliance with the Stay-Ahead Provision will be conducted on an ongoing basis using the records maintained in the project databases; results will be presented in the annual reports provided to the USFWS (sections 5.4 and 6.1.2.3).

The Implementing Entity will implement the LOHCP conservation program in coordination and collaboration with willing landowners. Habitat mitigation activities will be funded by the fees collected from proponents of projects covered by the ITP issued based on the LOHCP. Given these circumstances, the two most likely factors that would prevent the Implementing Entity from complying with the Stay-Ahead Provision are:

1. insufficient time to complete habitat protection projects, or design and implement habitat restoration and management projects, and
2. insufficient funding accrued to finance the highest priority projects, which may also be capital-intensive.

To address these potentialities and meet the Stay-Ahead Provision, the Implementing Entity will initiate development of the collaborative management agreements that will enroll existing protected lands into the LOHCP Preserve System prior to issuance of the permit. During the first year of the permit, the

Implementing Entity will conduct habitat management, which for purposes of cost estimation, was assumed to include exotic plant removal within an estimated of 15 acres of habitat (Section 7.2.4). Based on the Plan's mitigation equivalency ratio relating the value of habitat management to disturbance (1.25:1), this initial work will mitigate up to 18.75 acres of habitat impacts, thus jump starting the mitigation program. During this same period, the Implementing Entity will also be actively pursuing land protection projects with willing landowners, in order to secure fee title or conservation easements to new habitat to be protected as part of the LOHCP Preserve System.

The Implementing Entity will also initiate work to protect habitat, by prioritizing habitat for protection, within input from the USFWS regarding the properties that are of the greatest long-term conservation value for the covered species and conducting outreach to landowners. The County will also evaluate whether any of its owns lands are suitable for permanent protection. Because land protection transactions can be both costly and time consuming, relative to habitat management, the County anticipates that the initial mitigation to jump start the program will be habitat management as described above.

No take/impacts will be authorized under the ITP until the initial mitigation has been implemented and, for habitat management, the project has achieved the performance criteria that will be established in the LOHCP Preserve System AMMP to document effectiveness of the treatments at promoting habitat conditions for and/or populations of the covered species.

If during the course of the first year, the Implementing Entity determines take permitting is likely to outpace mitigation, the Implementing Entity will implement one or more of the following to ensure compliance with the stay-ahead provision by the end of the year:

- expedite processing of pending habitat protection projects, including acquisition using the Habitat Protection Fees paid as mitigation;
- implement additional priority habitat restoration and management projects on lands managed as part of the LOHCP Preserve System.

Additionally, the Implementing Entity may increase outreach to landowners who may be willing to sell land to the Implementing Entity and enable the plan to catch up.

6.3 Application Review, Take Authorization, and Oversight

Upon issuance of the ITP by USFWS, establishment of the contract between the Implementing Entity and the County, and achievement of success criteria for the initial 15 acres of required "jump start" mitigation as set forth above in Section 6.2.4, the Implementing Entity will have the ability to extend take coverage to proponents of eligible projects once the initial habitat management project has achieved the performance criteria established in the LOHCP Adaptive Management and Monitoring Plan.

The Implementing Entity will issue Certificates of Inclusion that confer take coverage for projects, provided that they meet the LOHCP eligibility criteria. Landowners and other project proponents who receive take coverage are collectively referred to as third-party participants.

As part of the permitting process, the Implementing Entity will accept applications for covered activities and review them to determine whether they meet the criteria for take authorization under the LOHCP. The applications for covered activities will be used by the Implementing Entity to:

1. evaluate eligibility of the project for coverage;
2. assess the effects on covered species;
3. identify the applicable avoidance, minimization, and compensatory mitigation requirements, including fees; and
4. ensure compliance with the LOHCP conditions, if the project is approved.

If the application is complete and the project meets the eligibility criteria, the Implementing Entity will accept the fees and conservation easements for required on-site habitat set asides (Section 5.7.2.1.1), and then issue of Certificate of Inclusion. A copy of the certificate will be provided to the USFWS upon issuance. For projects that are under the County land-use authority, the County will not issue local development or building permits until it confirms that a Certificate of Inclusion has been issued; moreover, such permits will establish and impose the project conditions of approval including required avoidance and minimization measures (Section 5.7.1).

The Implementing Entity will monitor all third-party participants to ensure that they implement the required avoidance and minimization measures and comply with other terms of the incidental take permit. Should a participant become out of compliance, the Implementing Entity will notify them and the County. If voluntary compliance is not provided, the County will take steps to address the violation as outlined in Section 6.3.2.

The following sections describe two types of projects for which Certificates of Inclusion would not be issued:

- **Ineligible Projects:** activities that may result in take/impacts, but that do not meet the LOHCP eligibility criteria (Section 2.2.4.1) or would result in take of other listed species for which take coverage is not provided by the LOHCP permit, and for which take coverage has not been secured; and
- **Exempt Projects**: activities that meet the LOHCP eligibility criteria (Section 2.2.4.1) but will not be covered by the LOHCP permit, because the project proponent has identified an alternative means of complying with ESA and CESA, such as through Section 7 of ESA.

6.3.1 Ineligible Projects

Projects may be ineligible to receive take coverage under the County incidental take permit if they do not meet the eligibility criteria (Section 2.2.4.1), or if they fall into a category of activity not permitted by the LOHCP (Section 2.3). Most notably, projects that cannot avoid impacts to other listed species not covered by the LOHCP ITP will not be eligible for permitting unless they can demonstrate that they have complied with CESA and ESA protections for the other additional species in the area (Section 3.2.3). To demonstrate compliance with CESA and ESA and to be eligible for permitting under the LOHCP ITP, the County will require proponents of any such project to demonstrate that the project is not likely to result in the take of any listed species other than species covered under the permit or that, if the project is likely to result in take of non-covered listed species, the project proponent has obtained take

authorization for take from CDFW and/or USFWS, as appropriate. Evidence that the project is not likely to result in take may be demonstrated by a letter from CDFW or USFWS, issued at the discretion of the agency, stating that agency's opinion that take is not likely to occur. If take is likely to occur, the County will require a copy of the incidental take permit(s) issued for the covered activity.

Proponents of projects determined by the County or the Implementing Entity to be ineligible for permitting under the LOHCP will be referred to the state and federal agencies to discuss options for take coverage.

6.3.2 Exempt Projects

Proponents of activities that meet the eligibility criteria of the LOHCP but that have already received the necessary take authorizations under CESA and ESA or has otherwise complied with the state and federal endangered species acts will not be required to comply with the plan requirements In order for such a project to be deemed by the Implementing Entity and the County as being exempt from the requirements of the LOHCP, the project proponent must provide to the Implementing Entity with one of the following from CDFW and/or USFWS, as appropriate:

- a letter stating that the specific covered activity is not likely to result in take of any listed species; or
- a copy of the incidental take permit(s) issued for the covered activity.

6.3.3 Oversight, Enforcement, and Violations

The County, with the assistance of the Implementing Entity, will provide the necessary oversight of projects covered under the ITP to ensure that proponents implement the avoidance and minimization measures and do not exceed the take authorization, otherwise enforce the terms of the COI (Appendix H) and address any violations.

As described in Section 6.1.2.2.1, the Implementing Entity will conduct implementation monitoring to ensure that plan participants implement covered activities per the terms outlined in the COI for their project, will specify:

- The requisite avoidance and minimization measures (Tables 5-2 to 5-4); and
- The habitat impacts permitted (i.e., the project disturbance envelope) in terms of location and area (e.g. square feet).

If the implementing Entity determines that a project proponent has violated the terms of the COI, the Implementing Entity will notify the County LOHCP Coordinator, who will work with other County staff including County Code Enforcement and County Counsel, as needed, to enforce the terms of the COI.

Specifically, the process for addressing violations of the terms of the COI will include the following steps:

1. The Implementing Entity will contact the USFWS as well as County Code Enforcement to provide the information about the apparent violation;

2. The County will place a 'hold' on the permit, such that no additional work will be permitted until the violation is resolved;
3. A County Code Enforcement Officer will begin to investigate the case within 10 working days, with the assistance of the Implementing Entity and County LOHCP Coordinator; and
4. For projects that are determined to have violated the terms of the COI, the County will outline the terms that the project proponent must fulfill to address the violation, before the 'hold' on the permit will be removed.

For projects in which the actual area disturbed exceeds the area permitted in the COI, the project proponent will be required to pay on a per-square-foot basis, a fee that covers the additional area impacted. For projects conducted without a COI, the stipulation agreement will require landowners to first restore any habitat that was impacted, and then to obtain a COI (and County permit, if required) to do the work, including through payment of the fees. The County will use its authority to levy fines when/if the project proponent does not resolve the violation as outlined in the stipulation agreement.

6.4 Memorandum of Understanding

The County and CDFW have developed a MOU to establish the terms and conditions upon which the CDFW will authorize the County to conduct habitat management, restoration, and monitoring activities on CDFW lands enrolled within the LOHCP Preserve System including the Morro Dunes Ecological Reserve (MDER; Appendix K).

While the term of the MOU shall be five years, it is the intent of the County, CDFW, and USFWS to have the MOU extended for five consecutive five year terms, totaling 25 years, to coincide with the term length of the HCP. The requested (and anticipated) permit term will remain 25 years; however; in the event that the MOU established between the County and CDFW lapses, the county commits to (must) suspend its approval of any activities covered under the HCP/ITP.

6.5 Changed Circumstances

6.5.1 Summary of Circumstances

Changed circumstances are changes in circumstances affecting a species or geographic area covered by an HCP that can reasonably be anticipated by plan developers and the USFWS and for which plan responses can be prepared (50 CFR 17.3). If additional conservation and mitigation measures are deemed necessary to respond to changed circumstances and these additional measures are provided for in the LOHCP (e.g., the conservation management activities or mitigation measures expressly agreed to in the LOHCP), then the County will work with the Implementing Entity to implement those measures as specified in the LOHCP. However, if additional conservation management and mitigation measures are deemed necessary to respond to changed circumstances and such measures were not provided for in the LOHCP, the No Surprises rule (50 CFR 17.22(b)(5) and 17.32(b)(5)) generally provides that USFWS will not require these additional measures absent the consent of the County, provided that the LOHCP is being "properly implemented", which is to say that the commitments and the provisions of the LOHCP have been or are being fully implemented.

Section 10 regulations [(69 Federal Register 71723, December 10, 2004 as codified in 50 Code of Federal Regulations (C.F.R.), Sections 17.22(b)(2) and 17.32(b)(2))] require that an HCP specify the

procedures to be used for dealing with changed and unforeseen circumstances that may arise during the implementation of the HCP. In addition, the HCP No Surprises Rule [50 CFR 17.22 (b)(5) and 17.32 (b)(5)] describes the obligations of the County and the USFWS. The general purpose of the No Surprises Rule is to provide regulatory assurance to the non-federal landowners that obtain incidental take permit under Section 10(a)(2)(B) of the ESA that no additional land restrictions or financial compensation beyond the measures committed to under the plan will be required for species adequately covered by a properly implemented HCP, in light of unforeseen circumstances, without the consent of the permittee.

The following sections outline reasonably-foreseeable circumstances and their anticipated effects on the covered species. For each, the LOHCP identifies additional conservation and mitigation measures that will be used to respond to the changes in circumstances. To fund the remedial management to address changed circumstances as well as adaptive management, 10 percent was added to the estimated management costs (Section 7.2.3). This amount is anticipated to cover the costs to address the changed circumstances, based on the anticipated restoration, management and monitoring costs. It also reflects the remedial management costs budgeted in other recent regional HCPs, which feature similar changed circumstances and plan responses (JSA 2006, County of Santa Clara et al. 2012).

If the USFWS determines that a change circumstance has occurred, triggering the adaptive management provision, and the County has not changed its management practices in accordance with Section 5.5, the USFWS will notify the County and direct the County to make the required changes. Within 30 days of receiving such notice, the County will make the required changes and report to the USFWS on its actions. Such changes are provided for in the HCP and, hence, do not constitute Unforeseen Circumstances.

6.5.2 Newly-Listed Species Not Covered by the LOHCP/Designation of Critical Habitat

During the course of implementation of the LOHCP, the USFWS and/or CDFW (the wildlife agencies) may list as threatened or endangered under ESA or CESA a species that occurs in the LOHCP area but is not covered by the Plan. In the event that a new species is federally listed, the County, in consultation with USFWS, will ensure that LOHCP covered activities are modified if and as necessary to ensure that those activities are not likely to jeopardize, or result in the take of, or adverse modification of the designated critical habitat, if any, of the newly listed species. Working with the Implementing Entity, the County shall implement the modifications to the LOHCP covered activities identified by the USFWS as necessary to avoid the likelihood of jeopardy to, take of, or adverse modification of the designated critical habitat of the newly listed species. The County shall continue to implement such modifications until such time as the County has applied for and the USFWS has approved an amendment to the permit, in accordance with applicable statutory and regulatory requirements, to cover the newly listed species or until the USFWS notifies the County in writing that the modifications to the LOHCP's covered activities are no longer required to avoid the likelihood of jeopardy to, take of, or adverse modification of the designated critical habitat, if any, of the newly-listed species. In the event that a species becomes state-listed, the County will consult with the CDFW and make similar arrangements to avoid take and secure an incidental take permit, as needed, or otherwise ensure compliance with CESA.

In addition, if critical habitat is designated or revised for an existing covered species, and the USFWS determines that one or more covered activities is likely to result in adverse modification of the newly designated or revised critical habitat of the covered species, the County, working with the Implementing

Entity, shall implement the modifications to the LOHCP covered activities identified by the USFWS as necessary to avoid the likelihood of adverse modification of the newly designated or revised critical habitat of the covered listed species. The County shall continue to implement such modifications until such time USFWS notifies the County in writing that the modifications to the LOHCP's covered activities are no longer required to avoid adverse modification of the newly designated or revised critical habitat of the covered species.

6.5.3 Climate Change

Increased greenhouse gases, including primarily carbon dioxide, that are present in the atmosphere as a result of human activities are altering the climate; these alterations are anticipated to continue, and cause secondary effects including sea-level rise (IPCC 2007).

Mean annual temperature in San Luis Obispo County is projected to increase by 2.1 to 3.9 °F by 2045 and 4.1 and 7.6 °F by 2085, with summer temperature increases larger than those in winter (Koopman et al. 2010). Some of the models evaluated predict that temperature increases will be lower on the coast including in the Plan Area, than in inland portions of the county, while others do not (Koopman et al. 2010).Though precipitation projections varied across three models evaluated in a local study, a statewide analysis found consensus between six models that Central California would be drier (Westerling et al. 2009).

Unless global climate change brings substantial increases in precipitation, increased temperatures will have a net negative effect on soil moisture as a result of increased evapotranspiration. This climatic water deficit may be exacerbated by continuation of a trend of 33% reduction in the frequency of summer fog in coastal California (Johnstone and Dawson 2010).

The hotter and likely drier climate could affect natural biological systems within the LOHCP Area through a variety of mechanisms, including:

- shifting plant and animal distributions into regions with currently cooler climatic envelopes;
- increasing or reducing plant and animal species within their current range;
- causing changes in vegetation structure (i.e., forests transition to shrublands, shrublands transition to grasslands, or potentially new plant communities emerge as a result of novel climates);
- increasing fire frequency, promoting fire-adapted species and eliminating fire-sensitive species;
- increasing pest and pathogen outbreaks due to drought-stress; and
- promoting the spread of exotic species, due in part to increased fire.

While some studies suggest that species that presently co-occur will shift their distributions together in response to climate change, causing communities to move together (Breshears et al. 2008), other studies suggest that the unique combinations of temperature and precipitation not currently found in the region (D. Ackerly, unpublished data) will result in new assemblages of species (Stralberg et al. 2009).

Some species may be more vulnerable to climate change, as a result of their greater exposure or sensitivity, and reduced capacity to adjust to change (Hanson and Hoffman 2011). Several aspects of the covered species render them more vulnerable, including:

- they occupy specialized habitat or microhabitats (i.e., they are endemic to the communities of the Baywood fine sand in Los Osos);
- due to their narrow geographic distribution, they may have relatively narrow environmental tolerances that are likely to be exceeded by climate change; and
- they have limited dispersal abilities and thus poor ability to colonize new, more suitable locations if they were to exist.

The effects of climate change on the covered species and communities can be difficult to predict as they will be influenced by a host of indirect effects mediated by complex species interactions. The potential effects of climate change on fog frequency may have important implications for the covered species, which inhabit coastal sage scrub and central maritime chaparral communities, which are tied to the coastal fog. The predictions for future summer fog frequency on California's coast are unclear. While a 33% reduction in the frequency of California summer fog has been observed over the past century (Johnstone and Dawson 2010), the predicted increase in temperature differential between coastal and inland areas, which is a major driver of fog, may increase the frequency of summer fog, thus mitigating the effects of global change on temperatures in coastal San Luis Obispo County.

If the climate becomes hotter and drier, as currently predicted, fire could become more frequent, and may alter the structure and species composition of the natural communities within the LOHCP Area. Morro manzanita has been found to be vulnerable to frequent fire, which can prevent sufficient seed from being available to replace adult shrubs, which are killed by fire (Odion and Tyler 2002). Research in other shrub-dominated systems has shown that frequent fire in shrublands can convert them to grasslands, as part of a grass-fire cycle (D'Antonio and Vitousek 1992).

Sea-level rise due to thermal expansion and melting ice caps as a result of global climate change may also impact the covered species of the LOHCP, by reducing available habitat. Projections for sea-level rise range from 3.3 to 4.6 feet above current levels by 2100. In the LOHCP Area, this will result in increased flooding risk, and in some areas, permanent inundation of the coastal wetlands on the northern perimeter of the Plan Area. Where adjacent land is suitable (e.g., not developed), wetlands may migrate inland (Hebeger et al. 2009), thus inundating current upland habitat including coastal sage scrub and central maritime chaparral, which are occupied by Morro shoulderband snail and Morro manzanita, respectively. Due to the coarse nature of the statewide analysis (Hebeger et al. 2009), the precise amount of habitat loss is difficult to predict; finer-scale models are needed (Moser and Eksrom 2012). Sea-level rise is also anticipated to erode a large area of the dunes west of the Plan Area, which may impact Morro shoulderband snail populations occupying the sand spit.

Given that climate change is a foreseeable event, it is regarded as a changed circumstance. The LOHCP conservation program, including establishment, restoration, management, and monitoring of the LOHCP Preserve System, includes elements designed to confer resiliency of the covered species to climate change impacts (sections 5.3 and 5.4). Specifically, the LOHCP Preserve System will protect and actively manage large, interconnected habitat areas, which will feature a mosaic of communities that reflect a variety of microhabitat conditions including variation in microclimate. Cooler and moister microsites can potentially provide refugia to Morro shoulderband snail in particular, in a future hotter, drier climate. By

maintaining and promoting connectivity between protected habitat areas, the conservation program will enable species shifts in response to changing climatic conditions.

A major focus of the conservation program is enhancing and actively managing habitat within the LOHCP Preserve System to address the various factors that threaten persistence of the covered species populations, including exotic species, fire outside of the natural disturbance regime, and impacts of historic land uses (e.g., cultivation and incompatible recreation; Section 5.3). Importantly, the LOHCP monitoring program will be designed to detect changes in the covered species populations and habitats that may result directly or indirectly from climate change (Section 5.4.2; Appendix E). Management strategies can be adjusted over time as part of an adaptive management process to promote resiliency of the covered species to climate change (Section 5.5).

As a foreseeable event, the limits of climate change as a changed circumstance must be defined. Based on the best available prediction for San Luis Obispo County (Koopman et al. 2010), the anticipated maximum increase in temperature by 2045 of 3.9 °F (measured as 10-year rolling average) is considered a changed circumstance for which remedial actions will be funded as part of the LOHCP. The nature of the change will depend on the circumstances caused, and will be identified as part of an adaptive management process involving coordination with the USFWS, but could include:

- increased monitoring of the covered species or the communities to evaluate impacts of climate change on the populations and habitats;
- adjustments to management and restoration treatments to address changes that degrade habitat for the covered species, such as active revegetation with species adapted to current climate conditions, in areas where plant die-offs result from desiccation stress and thus alter the structure of habitat and reduce availability of food for the covered animals; and/or
- expansion of the exotic plant management program to address species that might invade, spread, or become more competitive due to climate change.

6.5.4 Fire

Fire is a component of the natural disturbance regime in the Baywood fine sands ecosystem (Section D.3.1). While the covered species exhibit many important adaptations to fire and/or the habitat conditions it creates, fire can have detrimental effects on the populations, particularly if the fire occurs outside of the range of natural variation of the disturbance regime (e.g., inappropriate season, intensity, severity, or frequency), or if it promotes the invasion and spread of invasive plants.

Due to the differences in plant species and thus fuel availability, the plant communities of the Baywood fine sands ecosystem may have experienced somewhat different fire regimes—characteristics of fire including type (e.g., surface or crown fire, severity (understory burn or stand replacing), areal extent (size), and return interval (time since last fire; Sousa 1984). Like other types of central maritime chaparral, Morro manzanita chaparral is thought to have a natural fire regime characterized by high-intensity, high-severity, stand-replacing fires that occurred every 50 to 100 years; these fires are likely to have occurred during late summer and early fall when fuel moisture is lowest and air temperatures are high (Greenlee and Langenheim 1990, Tyler and Odion 1996, Odion and Tyler 2002).Coastal sage scrub likely historically burned primarily in the late-summer and fall every 20-100 years, as part of moderate to high-intensity crown fires. Coast live oak woodlands experienced a similar regime, though the oldest, most mature stands may have experienced surface fires, rather than crown fires.

At the landscape scale, fire likely played an important role in creating and maintaining a mosaic of these communities in the Baywood fine sands ecosystem. More frequent fire may promote coastal sage scrub species over central maritime chaparral shrubs including Morro manzanita, which requires longer fire-free periods to produce sufficient seed to regenerate (Odion and Tyler 2002). Similarly, longer fire return intervals lead to succession of central maritime chaparral to coast live oak woodland where abiotic conditions (e.g., soils and microclimate) can support oaks. These trees are killed by fire when young (seedlings or saplings), however they are more resilient when mature (adults). In the absence of fire, oaks can eventually shade out chaparral shrubs.

The covered species exhibit many adaptations to fire and the conditions it creates. Fire promotes Morro manzanita seed germination and creates conditions appropriate for seedling establishment (Tyler et al. 2000). Fire also likely promotes establishment of Indian Knob mountainbalm from seed as well as vegetatively (Wells 1962, USFWS 1998a). Fire is thought to have played an important role in maintaining early successional conditions characterized by a low density of subshrubs and perennial herbs (e.g., *Croton* sp*., Horkelia* sp*.,* and *Acmispon* sp.), which is the preferred habitat of Morro Bay kangaroo rat (USFWS 1999). Fire may similarly create and maintain habitat for Morro shoulderband snail, which occurs in coastal sage scrub but is not typically observed in later-successional central maritime chaparral; though the individuals are vulnerable to mortality due to fire (Roth 1985, Walgren 2003a).

Mortality due to fire could have profound impacts on the covered species populations in the LOHCP Area. Two of the species, Morro Bay kangaroo rat and Indian Knob mountainbalm, occur at extremely low density, such that a fire could extirpate them from the preserve system. Fires could similarly eliminate occurrences of Morro shoulderband snail (Walgren 2003a). Due to the fragmented nature of the remaining habitat, recolonization of habitat following fire may be inhibited.

In addition to killing individuals and potentially extirpating occurrences or populations, fire may negatively impact the covered species populations by causing soil erosion, which can preclude native plant re-establishment, and by promoting the invasion and spread of exotic plant species.

Many exotic plants are adapted to establishing within the low-litter, open-canopy conditions created by fire (Hobbs and Huenneke 1992, Haidinger and Keeley 1993). The risk of exotic plant invasion and spread following fire is greatest within the Morro manzanita chaparral and the coast live oak woodland: closed-canopy communities which currently feature a relative low abundance and diversity of exotic plant species, which are primarily restricted to old road, trails, and adjacent gaps between shrubs, where competition from dominant shrub and trees is reduced. Fire may promote expansion of exotic plants currently present at low abundance or in high light available microhabitats, and create opportunities for new species to invade (Zedler and Scheid 1988, Hobbs and Huenneke 1992, Haidinger and Keeley 1993).

Negative fire effects are expected to be greater if the fire occurs outside of the natural regime, in terms of seasonality, intensity, and frequency. For example, if the fire return interval (i.e., time between fires) is too short, fire could reduce the population of Morro manzanita, by killing adults prior to establishment of a sufficient density of seeds in the soil (seed bank) to re-establish a cohort of seedlings that can replace the pre-fire population (Odion and Tyler 2002). While carefully planned and implemented prescribed fires will likely be an important tool for maintaining habitat required by the covered species, wildfires have the potential to cause negative impacts (Section D.3). The risk of wildfire may be exacerbated by climate change, which may increase the annual percentage of San Luis

Obispo County burned by wildfire from a historical average of 3.7% to 6.8 – 7.3% by 2035 – 45 by 8.1 – 8.5% by 2075-85 (Koopman et al. 2010). A separate study found projected substantial increases in area burned by wildfire, with much of San Luis Obispo County expected to experience 200-350% increase in acreage burned by 2085 as compared to the historic (1961-1990) amount (Westerling et al. 2009).

Given the small size of the LOHCP Plan Area and that fire is a natural part of the disturbance regime of the Baywood Fine Sands Ecosystem, all fires, including a fire that burns the entire LOHCP Preserve System, are foreseeable events and will be subject to remedial measures. If a wildfire occurs within the LOHCP Area, the County or Implementing Entity will notify the USFWS of this changed circumstance, and then implement the following actions:

- assess the damage caused by the fire, including the areal extent of communities and covered species habitat affected;
- develop and implement an exotic plant early detection and rapid response plan, to prevent the affected area from becoming dominated by invasive plants;
- develop and implement a monitoring program to evaluate recovery of the affected area for five years;
- if monitoring indicates that native plant re-establishment is insufficient, or that the indirect effects of fire including erosion and the invasion and spread of exotic plants, are degrading habitat in ways that impact the covered species, develop and implement a restoration plan designed to improve habitat conditions, through an adaptive management and monitoring program; and
- if monitoring indicates that the fire has reduced populations of the covered species below levels from which they are likely to be able to naturally recover, implement a plan to increase populations through active revegetation (covered plants) or translocation programs (covered animals).

6.5.5 Exotic Species and Diseases

Habitat within the LOCHP Area has been degraded by a suite of species not native to the area, including several invasive species, such as: perennial veldt grass (*Ehrharta calycina*), red brome (*Bromus madritensis* ssp. *rubens*), jubata grass (*Cortaderia jubata*), blue gum and other eucalyptus (*Eucalyptus* spp.), Monterey pine (*Pinus radiata*), Monterey cypress (*Hesperocyparis macrocarpa*), ice plant (*Carpobrotus* spp.) and narrow leaved iceplant (*Conicosia pugioniformis*; Section D.1).

These and other exotic species can have strong, negative impacts on the covered species and their habitats through a variety of direct and indirect mechanisms, including:

- directly reduce plant population abundance through competition;
- degrade habitat conditions for animals, by altering vegetation structure and species composition, including food availability; and
- promote fire, which can alter vegetation structure and species composition, including convert shrublands to grasslands.

Given their impacts and likelihood of future invasion and spread, exotic species will be a key focus of efforts to restore and manage habitat as part of the LOHCP conservation program. Specifically, the LOHCP Preserve System AMMP will identify measures to control existing occurrences of invasive plants including veldt grass, and ice plant species, and prevent the establishment of new plants and animals through implementation of an early detection and rapid response program (Section 5.3; Appendix D.1).

Non-native animals in the LOHCP Area that currently pose threats to the covered species include domestic cats (*Felis domesticus*), which can predate upon Morro Bay kangaroo rat, and garden snails (*Helix aspersa*), which may outcompete Morro shoulderband snail due to the exotic species' superior size (Hill 1974), though exotic snails are deemed unlikely to threaten the species' persistence (USFWS 2006).

Diseases can also cause morbidity and mortality to the covered species, as well as impact them directly by modifying their habitat. Notably, sudden oak death (SOD) is a disease caused by the pathogen *Phytophthora ramorum*, which infects and kills several tree species including coast live oaks and can infect manzanitas (*Arctostaphylos* spp.). Though not yet observed in San Luis Obispo County, sudden oak death has caused widespread mortality of tan oaks in coastal Monterey County, where it has altered the structure and species composition of forests.

The greatest predictor of sudden oak death is the presence of the host, California bay laurel (*Umbellularia californica*), a tree that is not known from the LOHCP Area, though is documented as occurring in Morro Bay State Park just north of the Plan Area. Given the appropriate climatic conditions and host species abundance, the LOHCP Area has been identified as an area of high risk for SOD (Smith 2002), though a subsequent model classified the region as only marginally suitable based on climate (Vennette and Cohen 2006).

Additional exotic plants, animals, and diseases have the potential to negatively impact the covered species directly, by causing morbidity and mortality to individuals, and indirectly, by degrading habitat conditions. In the LOHCP, the invasion of new invasive plants, animals, or diseases within up to 25% of the total habitat contained within the LOHCP Preserve System is considered a change circumstance for which remedial actions will be implemented. The nature of the actions will depend on the exotic species and its impacts. The County will work with the Implementing Entity to conduct an assessment and develop a plan to:

- control and to the extent possible, eradicate, the species; and
- remediate the impacts it caused to the covered species and habitats, including through restoration of the affected areas.

6.5.6 Drought

Extended periods of below-average precipitation can impact the covered species of the LOHCP through a variety of mechanisms including:

- reducing covered plant population abundance due to desiccation stress;
- reducing covered animal abundance, due to scarcity of food plants, free water, and moist microsites required by Morro shoulderband snail; and

- increasing the frequency of wildfire. Although a natural part of the Baywood fine sands ecosystem, fire can also directly kill the covered species and degrade their habitat by promoting the invasion and spread of exotic plants. If too frequent, fire can also reduce populations of Morro manzanita (Sections 6.5.4 and D.3).

Multi-year droughts are a natural part of the Mediterranean climate of California's Central Coast. Climate change may increase or decrease their likelihood by altering precipitation patterns. Climate change may also exacerbate the effects of drought if it results in reduced frequency of summer fog (Section 6.5.3).

Droughts can also hamper efforts to restore and manage habitat within the LOHCP Preserve System. Specifically, periods of drought during the typical rainy season (October-April), as well as multi-year droughts, can reduce the success of restoration plantings conducted in areas degraded by erosion, fire, and dense exotic plant infestations.

For purposes of the LOHCP, a drought is defined as two or more consecutive years with rainfall below 75% of average. Over the 53-year period of record for which daily rainfall was measured at the Morro Bay Fire Station Coop weather station (WRCC 2013), 21 years had precipitation under 12.4 inches, which is 75% of the 16.6-inch average; however, two or more consecutive dry years occurred just four times: 1960 - 1961, 1984 - 1985, 1989 - 1990, and 2007 - 2009. These years are the rainfall years, which are defined as July 1 of the prior year to June 30 of the year referenced above.

Recognizing that climate change may increase the frequency of drought, for purposes of the LOHCP, drought is defined as a changed circumstance if it occurs more than four times during the 25-year permit term (nearly twice the frequency of the period of record), or if a single drought extends up to four years in duration.

In the event that a drought during the permit term negatively impacts the covered species or efforts to promote their persistence as part of the conservation strategy, the County will work with the Implementing Entity to prepare a report assessing the impacts and identify strategies to ameliorate or repair them. The strategies will be based upon the monitoring results indicating the effects of the drought on the covered species and their habitats, and the best available scientific information that can guide management responses. For example, if the drought reduces fire has reduces covered species populations levels below that from which they are likely to recover naturally, the Implementing Entity will implement a plan to increase populations through active revegetation (covered plants) or translocation programs (covered animals). If the drought causes substantial mortality of native woody vegetation that could create a fire hazard that would threaten the species populations, the Implementing Entity would develop and implement a plan to reduce the fuels to protect the area from such a wildfire.

The report will be provided to the USFWS for review and comment and the County and Implementing Entity will implement the remedial measures identified in the report or as recommended by USFWS.

6.6 Unforeseen Circumstances

Unforeseen circumstances as defined in USFWS regulations, are changes in circumstances that affect a species or geographic area covered by the HCP that could not reasonably be anticipated by plan

developers and the USFWS at the time of the HCP's negotiation and development and that result in a substantial and adverse change in status of the covered species (50 CFR 17.3). The term "Unforeseen Circumstances" is used to define the limit of the County's obligation under the "No Surprises" regulations set forth in 50 code of Federal Regulations, Sections 17.22 (b)(5) and 17.32 (b)(5).

In case of an unforeseen circumstance, the County shall immediately notify the USFWS. In deciding whether Unforeseen Circumstances exist which might warrant requiring additional conservation measures, the USFWS shall consider, but not be limited to, the factors identified in 50 Code of Federal Regulations, Sections 17.22(b)(5)(C) and 17.32(b)(5)(C) (the No Surprises Rule), which are:

1. the size of the current range of the affected species;
2. the percentage of the range adversely affected by the LOHCP;
3. the percentage of the range conserved by the LOHCP;
4. the ecological significance of that portion of the range affected by the LOHCP;
5. the level of knowledge about the affected species and the degree of specificity of the conservation program for that species under the LOHCP; and
6. whether failure to adopt additional conservation measures would appreciably reduce the likelihood of survival and recovery of the affected species in the wild.

As described in 50 C.F.R., Sections 17.22(b)(5)(C) and 17.32(b)(5)(C), the No Surprises Rule, the USFWS shall have the burden of demonstrating that Unforeseen Circumstances exist, using the best data available. Any findings of Unforeseen Circumstances must be clearly documented and based upon reliable technical information regarding the biological status and habitat requirements of the affected species.

Except where there is substantial threat of imminent, significant adverse impacts to a Covered Species, the USFWS will provide the County at least sixty-(60)-calendar-days written notice of a proposed finding of Unforeseen Circumstances, during which time the USFWS will meet with the County to discuss the proposed finding, to provide the County with an opportunity to submit information to rebut the proposed finding, and to consider any proposed changes to the conservation program.

Pursuant to the No Surprises rule, if the USFWS determines that additional conservation and mitigation measures are necessary to respond to the Unforeseen Circumstances, the additional measures required of the County must be as close as possible to the terms of the original LOHCP and must be limited to modifications within any conserved habitat area or to the Plan's operating conservation program for the affected species. Additional conservation and mitigation measures shall not involve the commitment of additional land or financial compensation or restrictions on the use of land or other natural resources otherwise available for development or use under original terms of the LOHCP without the consent of the County.

6.7 Plan Modifications

During the course of LOHCP implementation, it may be necessary to make changes to the Plan. The County, and USFWS may seek to modify the LOHCP provided the changes are consistent with the terms of the incidental take permit and other state and federal laws and regulations. The following sections

outline three types of plan modifications, administrative changes, minor amendments, and major amendments, which reflect increasing magnitude of change and thus require increasing effort to modify the plan. The USFWS will evaluate proposed plan changes identified by the County or Implementing Entity, including changes recommended in annual reports (Section 5.6), to determine whether they constitute an administrative change, minor amendment, or major amendment, and identify the course of action to modify the plan based on those outlined below.

6.7.1 Administrative Changes

Administrative changes are modifications to the LOHCP that do not affect the take assessment or other aspects of the impact analysis, implementation of the conservation program, or the decision documents, including the biological opinion. Examples of administrative changes include clerical changes to plan text or maps to address non-substantive errors, as well as adjustments to the mitigation fees that are necessary to implement the conservation strategy over time (Section 7.4).

The County can make administrative changes following a written request submitted by one of the participating agencies, which includes documentation supporting the proposed change, and the concurrence of the USFWS. The County will coordinate with the USFWS when evaluating whether a change is administrative. Administrative changes shall not require any amendment to the LOHCP or the ITP. The annual report shall include a summary of administrative changes made to the LOHCP in the preceding calendar year.

6.7.2 Minor Amendments

Minor amendments are changes that do not materially modify the conservation program, change the amount of take, add new species or new covered activities, or result in impacts to the environment that were not evaluated under applicable laws at the time of permit issuance. The following are examples of minor amendments to the LOHCP:

- minor revisions to survey, monitoring, management, and/or reporting protocols that clearly do not adversely affect covered species or overall LOHCP Preserve System functions and values; and
- minor changes to the Priority Conservation Area boundaries that do not result in less or materially different conservation for the covered species under the plan or encompass new lands not analyzed in the original permit and environmental documents.

The County may propose minor amendments to the LOHCP by providing written notice to all other Parties. Such notice shall include a description of the proposed minor amendment, an explanation of the reason for the proposed minor amendment, an analysis of its environmental effects including any impacts to the conservation of covered Species, and a description of why the effects of the proposed minor amendment:

1. are not materially different from, and are biologically equivalent to, the terms in the LOHCP as originally adopted;
2. substantially conform to the terms in the LOHCP as originally adopted; and
3. will not reduce the ability to acquire the additional lands or otherwise implement the conservation strategy.

The USFWS shall use their reasonable efforts to provide comments and concurrence with the proposed minor amendments in writing within sixty days of receipt of such notice. Upon receipt of written concurrence of the USFWS, the minor amendment shall be incorporated into the plan and implemented. If the USFWS does not concur that the proposed amendment qualifies as a minor amendment, the amendment will be processed as an amendment to the permit.

The annual reports shall include a summary of all minor amendments made to the LOHCP in the preceding calendar year.

6.7.3 Major Amendments

Major amendments are those that affect the scope of the LOHCP, materially change the conservation program, increase the amount of take, add new species or covered activities, result in new or different impacts to the environment, or change the boundaries of the HCP. Examples of such changes include:

- all amendments, as determined by the USFWS to not qualify as minor amendments, or administrative changes to the LOHCP;
- non-clerical changes to the boundary of the LOHCP Area;
- addition of one or more species to the covered species list or the addition of new covered activities; and
- material changes in the LOHCP Preserve System assembly, or management and restoration funding, strategies, and schedules

A major amendment requires an amendment to the permit and requires compliance with all applicable laws and regulations governing permit issuance, including NEPA and ESA, and an opportunity for public review and comment. Major amendments shall be subject to review and approval by the County and the USFWS, as appropriate, at noticed public hearings. The USFWS will use reasonable efforts to process proposed major amendments within one hundred twenty days after publication in the Federal Register.

6.8 Suspension or Revocation of Permits

The USFWS may suspend or revoke the ITP for cause if the County fails to implement the LOHCP in compliance with the terms and conditions of the permit or if suspension or revocation is otherwise required by law. Suspension or revocation of the Section 10(a)(1)(B) permit, in whole or in part, by the USFWS shall be in accordance with 50 CFR 13.27-29, 17.22(b)(8),17.32 (b)(8).

6.9 Permit Renewal

Though the initial permit term requested, 25 years, is anticipated to provide sufficient time for completion of the covered activities, it is possible that some might not have been completed or initiated when the permit expires. The Section 10(a)(1)(B) permit may be renewed in accordance with governing laws and regulations in effect at the time of the proposed renewal.

6.10 Schedule

Table 6-1 outlines the timeline for initiation of key components of the LOHCP, beginning with steps that will be taken to prepare for implementation prior to issuance of the permit, continuing through the permit term, and then finally after the permit has expired. Greater detail about the steps is provided in the sections referenced in the table.

Table 6-1: General Timeline for LOHCP Implementation

Timeline	Task and Section Reference	Description
Prior to Permit Issuance	Identify or create the Implementing Entity (Section 6.1.1.2)	The County will identify qualified and interested entities to fulfill the responsibilities of the Implementing Entity (Section 6.1.2). If no suitable organizations exist, then the County will determine the necessary steps to establish one. The Implementing Entity will be specified by the County, with the concurrence of the USFWS.
	Establish Application and Review Process (Section 6.3)	The Implementing Entity, in coordination with the County, will prepare the application package that project proponents will complete for take coverage under the LOHCP, outline the detailed application processing steps, develop the database that will be used to determine and track avoidance and minimization measures (Section 6.2.1) and train staff to review and process the applications.
	Apply for State and Federal Grants (Section 6.1.2.4)	As feasible, the County will initiate work with the Implementing Entity and the agencies to prepare applications for state or federal grants that can complement implementation of the LOHCP, which can be submitted once the ITP have been issued.
	Begin Assembling the LOHCP Preserve System	The Implementing Entity will take initial steps to prepare lands for enrollment in the Preserve System, following issuance of the ITP, by drafting cooperative management agreements with agencies and organizations responsible for existing protected lands (Section 6.2.3.1)
	Execute the Memorandum of Understanding (Section 6.4)	The County will finalize and execute the Memorandum of Understanding (Appendix K) between the County and CDFDW.
	Revise the Template Conservation Easement (Section 6.2.2.2)	The Implementing Entity will revise the conservation easement templates to protect habitat set asides offered in lieu of the Habitat Protection Fee and provide it to the USFWS for review and approval (Appendix I).
	Create and Maintain the Implementation Monitoring Databases (Section 6.1.2.3)	The Implementing Entity will create the databases that will be used to track applications, certificates of inclusion, implementation of avoidance and minimization measures, and impacts of covered activities, as well as implementation of the

Table 6-1: General Timeline for LOHCP Implementation

Timeline	Task and Section Reference	Description
		conservation program (i.e., habitat protection, management, restoration, and monitoring activities).
After Permit Issuance Year 1	Begin Reviewing Applications for Coverage (Section 6.3)	The Implementing entity will begin processing applications for take coverage under the LOHCP, and issue Certificates of Inclusion pending application approval, and mitigation needed to satisfy the stay-ahead provision.
	Begin Managing the Preserve System	The Implementing Entity will begin managing the LOHCP Preserves including by conducting the baseline surveys, preparing the Preserve System AMMP (Section 6.2.3.2), initating work to protect habitat, and conducting the initial exotic plant management to jump start the mitigation (Section 6.2.4).
	Begin Accepting Mitigation (Section 6.1.2.2.2)	The Implementing Entity will begin accepting mitigation, including habitat mitigation fees that will be deposited in a trust account, and conservation easements granted for habitat set-asides on site in lieu of fees, where allowed (Section 5.7.2.1.1). The accounts will include those designed to fund ongoing management, as well as one to fund management and monitoring in perpetuity.
	Prepare first Annual Report (Section 6.1.2.3)	In coordination with the County, the Implementing Entity will prepare the first annual report, which will be submitted to the USFWS by March 31 of the year following the first year of plan implementation.
	Document Compliance with the Stay-Ahead Provision (Section 6.2.4)	As part of the first annual report and in every annual report thereafter, the Implementing Entity will document compliance with the stay ahead provision, by demonstrating how habitat mitigation is keeping pace with our outpacing habitat impacts resulting from the covered activities.
Year 3	Complete LOHCP Preserve System Adaptive Management and Monitoring Plan	The Implementing Entity, in coordination with the County, USFWS, and CDFW, will prepare the LOHCP Preserve System AMMP based on the Plan conservation strategy framework and results of surveys of initial preserve(s) (Section 5.3.3.2).
	Initial Financial Update (Sections 6.1.2.3 and 7.4)	The Implementing Entity will review the assumptions, unit costs, and other aspects of the financial model used to initially estimate the mitigation fees and derive

Table 6-1: General Timeline for LOHCP Implementation

Timeline	Task and Section Reference	Description
		a revised mitigation fee schedule that assures mitigation is fully funded, as needed. This revised financial analysis, which will be provided to the USFWS, will be conducted a minimum of every five years thereafter or sooner if land acquisition and other plan implementation costs indicate that the mitigation fees are not adequate to ensure mitigation is fully funded and implemented concurrently or prior to impacts
Year 22	Evaluate Permit Renewal (Section 6.9)	Within three years of expiration of the permit, the County and Implementing Entity will evaluate whether to request that the permit be extended and if so, take necessary steps to do so.
After Permit Expiration	Conduct In-Perpetuity Habitat Management	Using funding from the endowment held by the National Fish and Wildlife Foundation, which will be established during the permit term, manage and monitor the LOHCP Preserve System, in perpetuity, as part of the broader adaptive management framework, to ensure that the biological goals and objectives continue to be attained.

7 Funding

This chapter provides planning-level estimates of the cost of implementing the LOHCP, including implementing the minimization and mitigation measures for the covered activities (Chapter 2, and the conservation program (Chapter 5). As required by Section 10(a)(1)(B) of the ESA, this chapter also identifies a funding approach to cover the plan implementation costs.

These costs were based on the elements of the LOHCP conservation program and the Plan's required compensatory mitigation, in which the proponents of projects permitted by the LOHCP pay fees and, in some cases, set aside habitat on site in order to implement the conservation program (Section 5.7.2). This mitigation approach was developed to ensure that the benefits of the mitigation for the covered species are commensurate with the impacts (Section 5.8).

Mitigation fees for covered activities were developed to cover the full costs (estimated in 2016-dollar terms) that will be incurred by the Implementing Entity to administer the conservation program designed to mitigate the impacts of the covered activities. Individual project proponents may incur additional costs to implement the required avoidance and minimization measures, such as pre-project surveys to design their projects (sections 5.2 and 5.7.1), which were not evaluated as part of this analysis, but which will be required by the County and the Implementing Entity through the approval process for development projects and other covered activities (Section 6.2.1).

During the 25-year period of LOHCP implementation, numerous factors will result in variations and fluctuations in implementation costs. For example, market cycles may affect habitat protection costs and vary the pace of development, and thus mitigation fees; adaptive management may be needed to achieve the biological goals and objectives of the conservation program. Accordingly, this chapter outlines the approach that will be used to track and review mitigation costs and, as necessary, adjust the financing mechanism to ensure adequate funding is maintained through time.

This chapter begins by summarizing the mitigation costs and funding approach (Section 7.1); it then outlines the costs for various components of the mitigation and the assumptions used to estimate them (Section 7.2). The chapter ends by outlining the initial funding program including mitigation fees (Section 7.3), and the methods that will be used to adapt them over time (Section 7.4).

7.1 Overview of Costs and Funding

The covered activities will disturb a maximum of 531.5 acres of habitat in the LOHCP Area (Tables 2-9 and 4-2), with private development impacting an estimated 409.5 acres, and government and private utilities impacting an additional 122 acres. To compensate for the impacts of these activities on the covered species, the Implementing Entity will establish and manage the LOHCP Preserve System—a network of public and private protected lands (Section 5.3), which will be managed as part of a coordinated strategy designed to achieve the LOHCP biological goals and objectives (Section 5.1).

The total, planning-level costs to implement the LOHCP Conservation Program is estimated at $20.5 million in 2016 dollars. These costs, which are expected to change over time due to inflationary and market factors, include the following:

- **Habitat protection (15%):** acquire a total of 107.5 acres of unprotected land from willing sellers and participants in this Plan;

- **Preserve start-up (2%):** conduct initial surveys, develop the Preserve System AMMP, which will guide management and restoration, and conduct initial exotic plant management on 15 acres to jump start the conservation program;
- **Restoration (11%):** restore an estimated 45.7 acres of degraded habitat within the Preserve System; and
- **Habitat management and monitoring (38%):** actively manage habitat to promote the covered species and monitor their populations and habitat within the estimated 386-acre Preserve System. This component also includes funding of responses to changed circumstances.

The costs also include funds for the Implementing Entity to administer the program during the permit term (22%), including process applications and conduct all implementation monitoring and reporting. Remaining costs (12%) will establish the endowment held by the Implementing Entity that will fund program administration, including oversight of management, and monitoring, after the permit has expired.

Funds to implement the Plan will be provided by the proponents of projects covered by the plan, who will pay fees based on the mitigation approach outlined for the covered activities (Section 5.7.2). To ensure that the fees are proportional to the impacts of the covered activities, they are charged based on the extent of the project impacts to habitats on a per-square foot basis.

All funding for administrative, management, monitoring, and restoration costs will come from the Restoration /Management/Administration Fee, which will be paid by all those conducting projects outlined in Table 5-7. To protect habitat, plan participants developing vacant parcels inside the Priority Conservation Area will set-aside habitat on-site at a ratio of 3:1 for the habitat disturbed by their project (Table 5-7); these habitat-set-asides will be protected by conservation easements granted to the Implementing Entity. Proponents of all other projects, which will largely occur in areas where on-site habitat set asides would have limited conservation value (Section 5.7.2.1.2), will pay a Habitat Protection Fee (in addition to the Restoration/Management/Administration Fee), which will be used by the Implementing Entity to purchase fee title or conservation easements from willing sellers of land that that will be managed as part of the LOHCP Preserve System.

Table 7-1 shows the initial mitigation fee schedule in 2016 dollars, which was developed based on an analysis of the mitigation costs and is designed to ensure adequate funding for Plan implementation. This is the anticipated starting mitigation fee schedule for adoption at the start of Plan implementation; adjustments to the plan, or significant delays in its adoption (e.g., three or more years) would necessitate an adjustment to the fee. The mitigation fee schedule will be refined periodically to ensure funding is sufficient to meet implementation plan costs as they fluctuate through time (Section 7.4).

7.2 Mitigation Costs

Mitigation costs were estimated in this Plan based on the LOHCP Preserve System configuration scenario (Section 5.7.2.3.2)—a hypothetical though plausible scenario for the final preserve system design, which identifies the acres of land that will be acquired, restored, and management by the Implementing Entity to mitigate the impacts of the covered activities. This scenario was used to estimate the mitigation costs, based on a series of assumptions outlined in this section. Conservation program implementation costs include:

- **One-time costs:** These costs include those for habitat acquisition, habitat restoration, and preserve start-up activities (e.g., inventories). They are anticipated to be incurred only during the permit term.
- **Ongoing costs:** These costs include those for habitat management, monitoring, and administration; they are expected to continue after the permit term.

Because most of the impacts of the covered activities are permanent, the conservation actions must also be permanent and be implemented on an ongoing basis, in order to ensure that the habitat benefits are maintained. Specifically, land within the preserve system must continue to be managed in perpetuity, beyond the permit term, to ensure that it retains the biological values enhanced during the permit term (Section 5.7.2.2).

7.2.1 Habitat Acquisition

As outlined in the LOHCP Preserve System scenario (Section 5.7.2.3.2), the Implementing Entity will protect habitat by accepting easements from plan participants, which are estimated to result in the protection of 31 acres, as well as by purchasing an estimated 76.5 acres of land from willing sellers. The easements granted by plan participants developing parcels inside the Priority Conservation Area to fulfill their habitat protection mitigation requirement (Section 5.7.2.1.1) will be dedicated to the Implementing Entity at no cost; administrative costs for the Implementing Entity to obtain the easements are included as part of program administration (Section 7.2.5).

The cost to acquire the 76.5 acres of land anticipated from willing sellers within the Priority Conservation Area (Section 5.7.2.1.2) was estimated using comparable land sales data available from the County of San Luis Obispo Assessor as well as several private vendors (Table 7-2). The transactions reflected sales of vacant parcels located primarily within the LOHCP Area; however, comparables for larger parcels were also drawn from neighboring areas due to limited sales of large parcels within the Plan Area. Bayside parcels were excluded from the comparables list as they had much higher per-acre values owing to their waterfront location which is dissimilar to parcels in the Priority Conservation Area, where land will be protected. Sales occurred between 2003 and 2016, with most occurring between 2013 and 2016 (Table 7-2). All costs were converted to reflect 2016 dollars using the consumer price index (CPI).

Per-acre land costs vary greatly based on parcel size, which is also a major determinant of the tiers used to rate the conservation value of land that will be incorporated LOHCP Preserve System (Section 5.7.2.3.1, Table 5-8). Accordingly, parcels were divided into three size categories to estimate the per acre land costs: less than two acres, two to 10 acres, and greater than 10 acres (Table 7-2).

Interviews with local real estate brokers were used to further assess the average land costs, which were indicated to be accurate for the two smaller parcel size categories. However, the estimate for parcels greater than 10 acres ($25,449/acre) and the associated overall parcel value was deemed to be below market value due to the differences in parcel characteristics between the comparables and potential land acquisitions inside the Plan Area as well as the upward trend in land costs. To address this, the analysis assumed an average sales price of $1.0 million for the parcels greater than 10 acres in the LOHCP Priority Conservation Area, which average 31.5 acres, such that the per-acre price of $32,000 was used for parcels greater than 10 acres. This is expected to be more indicative of the average value of the larger parcels to be acquired.

The total cost of acquiring the land in the preserve system scenario was then estimated by multiplying the acreages of land protected in each of the three conservation value tiers by the per-acre costs for the parcel size category in which the habitat is most likely to occur (Table 7-3). Tier 1 parcels were assumed to be greater than 10 acres while Tier 2 and 3 parcels are anticipated to be two to 10 acres. Tier 4 parcels which will largely be less than two acres, were not included in the preserve system scenario (Table 5-9), as they generally feature low long-term conservation value, as well as significantly higher per-acre costs (Table 7-3).

Based on the land value analysis and assumptions outlined above, the total planning-level estimate for the Implementing Entity to acquire 76.5 acres of vacant land within the Priority Conservation Area in fee title is approximately $3.2 million. This represents an average land cost of $41,200 per acre (Table 7-3).

Actual habitat protection costs will vary depending on a variety of factors including:

- Aspects of the specific parcel, including size, development potential, and location, including proximity to roads, existing improvements, and scenic values; and
- The timing of the acquisition with respect to market conditions that influence land costs, including land supply and demand.

Additionally, the analysis presented here assumes that the County will work with the Implementing Entity to protect habitat by acquiring fee title from willing sellers; the County will, in turn, dedicate conservation easements over said lands to the Implementing Entity, to ensure the conservation values are protected in perpetuity (Section 6.1.2.2.2). This strategy is anticipated to be more conducive to long-term conservation, when compared to acquiring conservation easements, as fee-title lands are easier to manage and experience fewer indirect effects associated with easement lands which are partially developed. However, acquisition of conservation easements to protect remaining habitat on partially developed parcels inside the Priority Conservation Area can also be used to protect habitat of high conservation value as part of work to assemble the LOHCP Preserve System and may result in reduced land protection costs relative to fee title acquisition.

The Implementing Entity will track land sales for comparable parcels to continue to update and refine the estimated per-acre planning level land cost as part of the process to adapt the funding plan over time (Section 7.4).

7.2.2 Restoration

Of the 386 total acres of habitat included in the LOHCP Preserve System under the scenario used to estimate costs (Section 5.7.2.3.2), 45.7 acres (12%) will require restoration to ameliorate its highly-degraded condition, which limits its ability to promote viable populations of the covered species. The total acreage, which includes 35 acres in existing protected lands and an additional 10.2 acres of private lands to be protected as part of the LOHCP, was estimated based on a reconnaissance level examination of the conditions within the Priority Conservation Area based on 2016 aerial imagery.

For cost estimation purposes, a suite of anticipated restoration projects was identified based on examination of existing protected lands eligible to be included in the preserves (Table 5-5), and the assessment of their management and restoration outlined in Appendix D. These restoration projects include (Table 7-4):

- Stabilization of gullies and other erosion issues caused by washed out roads and trails;

- Intensive efforts to control dense infestations of exotic plants, such as veldt grass;
- Active revegetation including seeding and propagation, where it is necessary to promote native plant establishment and prevent exotic plant reinfestation in areas treated for erosion and exotic plant control; and
- Active vegetation management using fire or fire surrogates (e.g. manual or mechanical vegetation removal) to promote the population of Indian Knob mountainbalm, which is senescent and threatened with extirpation (local extinction).

The restoration costs include a 25 percent contingency designed to cover unanticipated components or overages, as well as the need for adaptive management. In total, restoration is estimated to cost $2.23 million for an average of $47,815 per treated acre.

7.2.3 Management and Monitoring

The entire anticipated 386-acre LOHCP Preserve System will require active management to ensure that the condition of habitat is maintained to support the covered species; the Preserve System must also be monitored to evaluate effectiveness of management at achieving the biological goals and objectives (Section 5.1) and inform the need for adaptive management (Section 5.5).

Management and monitoring costs were estimated for the 386-acre preserve system in the scenario based on the estimated per-unit costs of the anticipated activities (Appendices D and E), as well as their frequency (Table 7-5). The actual management projects and monitoring studies will be outlined in the LOHCP Preserve System AMMP, which will be developed as part of the Preserve Start-Up (Sections 5.3.3.2 and 7.2.4). To fund additional items not reflected in the initial list (Table 7-5) and ensure sufficient funds to address habitat needs, a 25 percent contingency was added to the itemized costs. In addition, 10 percent was added to these costs to fund remedial actions necessary to address the changed circumstances of the LOHCP (Section 6.5); this reflects remedial management costs budgeted in another recent regional HCP with similar changed circumstances and plan responses (JSA 2006, County of Santa Clara et al. 2012).

The resulting annual cost estimate for management and monitoring of the 386-acre LOHCP Preserve System during the 25-year permit term is $292,188 or $757 per acre. Because the frequency of management and monitoring will be reduced after the permit is expired, the costs decline post permit to $169,813 per year, or $440 per acre per year. Based on these annual costs, a $5.7 million endowment will need to be established by the Implementing Entity during the permit term in order to fund management and monitoring in perpetuity, following expiration of the permit.

The endowment calculations assumed a three percent net capitalization (real interest rate)—the long-term net, real interest rate (i.e., the average interest rate after inflation and money management fees are removed). This net capitalization rate is similar to that used in the Natomas Basin HCP (City of Sacramento et al. 2003) and is consistent with assumptions used by the National Fish and Wildlife Foundation (NFWF) —a foundation established by the U.S Congress in 1984, which acts as program manager and trustee for funds arising from conservation and mitigation plans. The actual net interest rate will depend on the particular investment strategy and overall market performance. A portion of the total habitat mitigation fees will be placed into the endowment, which is designed to be fully funded by the end of the 25-year permit term (Section 7.3). For the purposes of this analysis, it is assumed that the endowment funds will be held by NFWF.

7.2.4 Preserve System Start-Up

Preserve System start-up costs include the costs to prepare and to conduct restoration and management work within the LOHCP Preserve System. These include conducting baseline monitoring for the covered species and communities, as well as preparing the Preserve System AMMP (Table 7-6). They also include initial costs to install fences and signage to protect areas from trampling and other unauthorized activities.

The total preserve start-up costs were estimated for the initial 278-acre portion of the Preserve System that will be comprised of existing protected lands, based on the anticipated monitoring and planning tasks (Table 7-6). These preserve start-up costs are estimated to total $465,000, or about $1,310 per acre initially managed as part of the Preserve System.

7.2.5 Program Administration

Program administration costs include the costs for the Implementing Entity to administer the Plan. They include salaries of Implementing Entity personnel, as well as fees for outside professionals including attorneys, auditors, real-estate professionals, and others who will assist with plan implementation (Table 7-7). Administration costs also include the Implementing Entity's direct costs, such as rent, utilities, transportation, and insurance (Table 7-7).

Administration costs were estimated separately for the permit term, and the period post-permit, to reflect the greater personnel time to implement the plan during the former (Table 7-7). As with other aspects of the program, administration cost will be tracked by the Implementing Entity over time so that adjustments can be made, as needed, to ensure funds are sufficient to implement the plan.

7.2.5.1 Permit Term

During the term of the permit (Years 0 to 25), the Implementing Entity will be responsible for:

1. **Covered Activities:** processing applications for covered activities and tracking permittees' compliance with the avoidance and minimization measures;
2. **Habitat Protection**: researching habitat protection opportunities, conducting outreach to landowners, negotiating fee title land acquisition, and processing conservation easements including those granted by plan participants in the Priority Conservation Area (Section 6.2.2):
3. **Preserve Management:** implementing habitat maintenance, management, restoration, and monitoring projects directly and through contractors;
4. **Reporting:** conducting implementation monitoring and preparing annual reports; and
5. **Coordination:** coordinating with the County and agencies and USFWS regarding implementation of the plan.

This work is anticipated to require a half-time Executive Director and a full-time Planner. Their salaries, combined with their direct costs and fees for outside professionals, are estimated to be $180,000 per year (Table 7-7), and total $4.5 million over the course of the 25-year permit term. Assuming the covered activities impact 532 acres during the 25-year period, $8,466 per acre will be required to fund the annual administrative costs during the permit term.

7.2.5.2 Post-Permit

When the permit expires 25 years after it is issued, administrative costs to implement the LOHCP will be reduced, as tasks related to covered activities, habitat protection, restoration, and reporting on covered activities will no longer occur. Preserve management and monitoring and some level of coordination will continue, albeit at a reduced level. For example, there will be less administrative oversight needed as a result of completion of the habitat restoration components during the permit term. However, habitat management and monitoring will occur in perpetuity, in order to ensure the conservation benefits for the covered species are maintained (Section 5.7.2.2). Implementation of these tasks is assumed to require work by a quarter-time Executive Director and a half-time Planner. The salaries and direct costs for the Implementing entity, as well as professional fees, are estimated at $100,000 each year post-permit (Year 26 and beyond).

To estimate the funds required to establish, by the end of the permit period, an endowment sufficient to generate non-depleting revenues of $100,000, a net, real interest rate of three percent was again assumed (Section 7.2.3). In order to achieve the required $3.33 million endowment (2016-dollar terms), about $2.5 million will be required from mitigation fees with the remaining $886,000 generated by interest on the fees during the permit period. As a result, a per acre mitigation fee of $4,630 per acre is required. A portion of the total habitat mitigation fees will be placed into the endowment, which is designed to be fully funded by the end of the 25-year permit term (Section 7.3).

7.2.6 Total Mitigation Costs

Based on the estimates described above, the total planning-level estimated cost to implement the LOHCP in 2016 dollars is $20.5 million (Table 7-8). Costs for habitat management and monitoring (including both permit term and post-permit costs) represent 38 percent of the total cost. Plan administration costs (including post-permit costs) represent 34 percent, habitat acquisition costs comprise 15 percent, and restoration and preserve system start-up constitute 11 percent and 2 percent of the total cost, respectively (Table 7-8).

7.3 Funding

Plan implementation costs will be fully funded through mitigation fees paid by the project proponents to compensate for the habitat impacts of the covered activities (Section 5.7.2). The fees were calculated by dividing the plan implementation costs by the acres of permitted habitat impacts. The per-acre fee was converted to a per-square-foot fee, as fees charged will be based on the number of square feet of ground disturbance caused by the project; therefore, they are proportional to the project impacts (Section 5.7.2).

Proponents of residential development projects on vacant land inside the Priority Conservation Area, who are required to protect habitat on-site through dedication of conservation easements, are only required to pay the approximately[12] $0.75 per-square-foot Restoration /Management/Administration Fee; proponents of other projects covered by the plan that are listed in Table 5-7 pay this fee as well as the approximately $0.14 per square foot Habitat Protection Fee (Table 7-1). In order to fund

[12] The fees will be calculated to the nearest hundredth of a cent (Table 7-8); they are rounded to the nearest cent in the text for simplicity.

management and monitoring and administration post-permit, about 38 percent or $0.29 of the Restoration/Management/Administration fee will be placed in a non-depleting endowment.

The Implementing Entity will collect these fees from participants whose applications have been approved for take coverage. Fees must be paid before the Implementing Entity will issue plan participants a Certificate of Inclusion, which confers take coverage (Appendix H). The County will ensure that a Certificate of Inclusion has been issued prior to issuing local land use and building permits (Section 6.3).

The Implementing Entity will deposit fees into a trust account held by the Implementing Entity (the trustee) on behalf of the County (the third-party owner). A database will be used to separately track Restoration/Management/ Administration Fees and Habitat Protection Fees; however, the funds will be pooled and used by the Implementing Entity to maximize their effectiveness at achieving the biological goals and objectives. That is, Habitat Protection Fees can be used to fund habitat management, and likewise, the Restoration/Management/Administration Fees can be used to fund key habitat acquisitions. The Implementing Entity will identify the proposed expenditures in annual work plans included as part of annual reports provided to the County and the agencies (Section 6.1.2.3).

The portion of fees needed to establish the endowment that will fund post-permit management and monitoring will be provided to NFWF for deposit in a separate trust account on behalf of the County. The endowment account will be established in year one of the Plan and funds will be added throughout the permit term as projects are implemented and mitigation fees are paid. Since the Preserve System will be assembled as covered activities are implemented, and its size will depend on the amount of disturbance caused by the covered activities, the costs to manage and monitor the LOHCP Preserves will be lower if fewer covered activities are permitted than anticipated. Therefore, based on the level of participation and the corresponding amount of management and monitoring necessary, it is anticipated the endowment will be fully funded to necessary levels at the end of the 25-year permit term. Nevertheless, to ensure that the endowment has sufficient funds to manage and monitor the LOHCP Preserves post-permit, as part of the adaptive financial management of the LOHCP (Section 7.4), the funding plan will be reviewed at least once every five years during the permit term and will be modified over time, if necessary, to ensure the endowment is adequately funded, including fee increases as needed.

During the first three years of plan implementation, when mitigation fee revenues are anticipated to be insufficient to fund plan implementation, the County will fund the preserve start-up and administrative costs through annual appropriations. Total costs during this initial period are estimated at $1,005,000: $180,000 per year for three years for administration ($480,750) and $465,000 total for preserve system startup (Table 7-6). As mitigation revenues accumulate, the Implementing Entity will repay the County over time. The habitat mitigation fees have been established to generate revenues to fully fund habitat mitigation costs, including reimbursing the County (without interest) for any upfront costs that it covers.

Beyond the first three years, the County will fund the administrative costs of the Implementing Entity if annual mitigation fees are below the anticipated average, or in the event that the administrative costs exceed the annual estimate. These measures, combined with adoption of the proposed mitigation fee and the periodic updates to the fee program, will ensure that there is adequate funding to implement the Plan.

7.4 Adaptive Financial Management

Just as adaptive management will be used to ensure that the elements of the LOHCP conservation program achieve the Plan's biological goals and objectives (Section 5.5), adaptive financial management will be used to ensure that the Plan is adequately funded, so that the impacts to covered species are fully offset by the mitigation in accordance with the incidental take permit.

The mitigation fees identified in this Plan were developed based on planning-level cost analyses, which required a series of assumptions regarding the cost of land, habitat restoration projects, and administration, among other factors that will influence actual plan implementation costs. In addition, the mitigation costs and thus fees were developed based a specific scenario for the LOHCP Preserve System configuration (Section 5.7.2.3.2) that is anticipated to be both feasible and achieve the biological goals and objectives. Variation in landowner interests in participating in the voluntary program as well as land costs will almost certainly lead to a different Preserve System Configuration which, while equivalent in conservation benefits, could result in different costs. Finally, the scenario used to evaluate funding assumes complete implementation of the covered activities (or other eligible activities impacting the same area); reductions in participation in the plan and adjustments to the pace of permitting could affect the actual costs of HCP implementation.

To address uncertainties in the actual costs to implement the Plan, as well as general inflationary pressures on costs, a two-part process will be followed to adjust cost estimates and mitigation fees over time:

1. **Annual Adjustments**: Automatic adjustments to mitigation fees will be made annually based on the Consumer Price Index measure of inflation. This will ensure the mitigation fees do not fall behind due to general inflation.
2. **Periodic Detailed Cost Review and Mitigation Fee Adjustment**. After the first three years, and a minimum of every five years thereafter, mitigation costs will be reviewed, and mitigation fees adjusted, as needed. With the assistance of the Implementing Entity, the County will use the data collected about actual implementation costs, as well current market information that affects the plan (e.g., land costs), to update the assumptions, unit costs, and overall cost estimates and derive a revised mitigation fee schedule. The Count will review the results of the analysis and its recommendation for adjustment of the fees with the USFWS. The County's failure to modify the fees as necessary to ensure the plan is fully funded and implemented would expose the incidental take permit to potential suspension or revocation. These updates will constitute administrative changes under the plan (Section 6.7.1).

Table 7-1: Mitigation Fee Schedule

Fee Category	Fee Per Disturbed Acre ($)	Fee Per Disturbed Square Foot ($) [1]
Restoration /Management/Administration Fee	32,620	0.7488
Habitat Protection Fee[2]	6,069	0.1393
Total	**38,688**	**0.8882**

[1] Project fees will be charged by multiplying the area of ground-disturbing activities in square feet by the values listed here. In the text, fees are rounded to the nearest cent for ease of discussion.

[2] Dedication of conservation easements will be required instead of the Habitat Protection Fee for residential development projects on vacant parcels that are located within the Priority Conservation Area.

Table 7-2: Land Sale Comparables used to Assess Habitat Protection Costs

Property and Parcel Size Class[1]	Use Type	Acreage	Sale Date	Sale Price ($) [2]	Price/ Acre ($)	Adjusted Price/Acre ($) [3]
< 2 Acres						
1442 14th St.	Residential	0.14	2/26/2016	40,000	278,739	278,739
1110 Bay Oaks Dr.	Residential	0.15	10/23/2015	65,000	433,599	433,772
1324 17th St.	Residential	0.14	12/18/2015	75,000	524,482	524,692
757 Mar Vista Ave.	Residential	0.22	7/13/2015	65,000	300,382	300,502
445 Rosina Dr.	Residential	1.10	6/24/2016	290,000	263,636	263,636
1135 Calle Cordoniz	Residential	1.18	10/15/2015	299,950	254,194	254,296
1250 Los Olivos	Residential	1.23	3/18/2016	100,000	81,301	81,301
375 Skyline Dr.	Residential	1.30	2/28/2014	220,000	169,231	169,502
2045 Pine Ave.	Residential	2.00	2/12/2013	211,000	105,500	107,378
Weighted Average for Parcels <2 acres		**1.36**		**151,772**	**183,034**	**268,733**
2 - 10 Acres						
1835 Pecho	Residential	2.32	9/23/2014	440,000	189,983	190,287
2050 Pine Ave.	Residential	4.71	1/2/2015	367,000	77,885	77,916
2079 Willow	Residential	5.09	12/12/2014	200,000	39,293	39,356
1614 Sage Ave.	Residential	8.68	3/11/2016	795,000	91,590	91,590
Weighted Average for Parcels 2-10 acres		**5.20**		**450,500**	**86,643**	**86,699**
>10 Acres[4]						
2880 Nicola Ranch Rd.	Vacant Land	20.0	6/10/2014	360,000	18,000	18,029
1370 Atascadero Road	Agricultural	17.0	12/7/2012	450,000	26,471	27,336
2350 Los Osos Valley Rd.	Agricultural	32.4	6/14/2007	480,000	14,815	16,942
1130 Nicola Ranch Rd.	Agricultural	40.0	2/11/2003	850,000	21,245	27,376
5666 Los Osos Valley Rd.	Agricultural	54.0	11/14/2007	1,380,000	25,556	29,225
5850 Los Osos Valley Rd.	Residential	20.2	2/2/2015	849,900	42,116	42,133
2985 Prefumo Canyon Rd.	Residential	23.8	1/9/2003	640,000	26,902	34,666
3975 See Canyon Rd.	Residential	45.0	7/29/2015	700,000	15,556	15,562
Weighted Average for Parcels <10 acres		**31.5**		**713,738**	**22,624**	**25,449**

[1] Land sales predominantly from the LOHCP Area. However, for larger parcels, several sales comparables were drawn from neighboring areas due to limited sales within the plan area.

[2] Sources: CoStar, Redfin, LoopNet, Trulia, Zillow, and San Luis Obispo County Assessor; EPS.

[3] Adjusted to 2016 dollars using annual inflation estimates from the Consumer Price Index (CPI) as reported by the U.S. Bureau of Labor Statistics (BLS).

[4] This averaged was deemed to be low; as a result, the value of 32,000/acre was used based on an estimated $1.0 M cost for parcels greater than 10 acres inside the LOHCP Priority Conservation Area, which average 31.5 acres.

Table 7-3: Estimated Costs to Acquire Land from Willing Sellers

Category	Acres in LOHCP Preserve System[1]	Assumed Parcel Size Category[2]	Estimated Per-Acre Land Costs ($) [3]	Total Costs ($)
Tier 1 [4]	63.5	> 10 Acres	32,000	2,032,000
Tier 2 [5]	10.0	2-10 acres	87,000	870,000
Tier 3 [5]	3.0	2-10 acres	87,000	261,000
Tier 4 [6]	0.0	< 2 acres	269,000	0
Total	**76.5**			**3,163,000**
			Average Per Acre	**41,346**

[1] Based on the LOHCP preserve system scenario (Section 5.7.2.3.2, Table 5-9)

[2] Based on criteria for parcel tiers that reflect conservation value (Table 5-8)

[3] Rounded values from calculation using comparable land sales (Table 7-2)

[4] The estimated land cost for parcels in this tier was based upon an estimated $1.0 M cost for parcels greater than 10 acres inside the LOHCP Priority Conservation Area, which average 31.5 acres.

[5] The Tier 2 and Tier 3 parcels are anticipated to be 2-10 acres.

[6] Tier 4 parcels, which are assumed to be less than 2 acres, are not included in the preserve system scenario.

Table 7-4: Estimated Restoration Costs[1]

Type	Description	Assumptions	Unit Cost ($)
Road/Trail Restoration	Intensive work to restore eroded and denuded trails and historic roads	15 acres of affected area, which will be addressed in five, 3-acre restoration efforts.	$750,000
Initial Exotic Plant Removal	Initial, intensive work to control veldt grass, ice plants, and pampas grass	Total treatment area is 25 acres. Treatment will occur as part of 10 projects each of which will take place over 5-10 years and will include phased work as well as follow-up treatment to achieve restoration goals.	$500,000
Active Revegetation	Using seed and some limited propagation to revegetate denuded areas	50 acres of roads and areas heavily infested by veldt grass, or treated for road/trail restoration, that are not naturally recolonized, or where active revegetation will prevent invasive plant recolonization. Treatment will occur as part of 10 projects each of which will include 2-3 years of seeding and monitoring.	$300,000
IKM Population Restoration	Vegetation management and other techniques to promote establishment of IKM	Design and implementation of an experimental management program with 3-5 years of effectiveness monitoring.	$200,000
		Base Total	**$1,750,000**
		Contingency (@25%)	**$437,500**
		Total with Contingency	**$2,187,500**
		Assumed Acreage[2]	**45.7**
		Cost Per Acre	**$47,815**

[1] Estimated costs for proposed restoration projects that would be conducted on habitat within the LOHCP Preserve System based on the known management and restoration issues (Appendix D). The Preserve System AMMP will identify actual restoration projects and estimate their costs.

[2] A total of 46 acres of habitat within the LOHCP Preserve System includes the 35 acres of existing protected land that are estimated to require restoration (tables 5-5 and 5-9) plus 10.7 acres (10%) of the anticipated 107.5 acres of newly-protected private land to be protected and managed as part of the LOHCP Preserve System (Table 5-9). The acres treated is less than the total estimated acres of projects identified in this table, as some areas will receive more than one treatment (e.g., erosion control plus exotic plant control).

Table 7-5: Estimated Habitat Management Costs during the 25-Year Permit, and after the Permit Has Expired

				Frequency[1]		Annual Cost ($)	
Type	**Description**	**Assumptions**	**Unit Cost ($)**	**Permit Term**	**Post Permit**	**Permit Term**	**Post Permit**
Management							
Exotic Plant Control	Control of veldt grass, ice plants, jubata grass, and other invasive species	General treatment of approximately 15 moderately-infested acres	$75,000	1	0.5	$75,000	$37,500
Recreation Management	Trail maintenance including routine erosion control, closures; also post signage	~8 miles of trails to be managed	$15,000	1	0.5	$15,000	$7,500
Vegetation Management	Prescribed fire and surrogates in central maritime chaparral	Treat ~50 of the 300 acres of upland habitat on a rotating basis to maintain natural community structure and species composition	$200,000	0.1	0.1	$20,000	$20,000
IKM Population Management	Ongoing species Restoration	Treatment conducted once every five years following initial restoration (Table 7-4)	$20,000	0.2	0.2	$4,000	$4,000

Table 7-5: Estimated Habitat Management Costs during the 25-Year Permit, and after the Permit Has Expired

				Frequency[1]		Annual Cost ($)	
Type	**Description**	**Assumptions**	**Unit Cost ($)**	**Permit Term**	**Post Permit**	**Permit Term**	**Post Permit**
Pre-Project Surveys	Pre-project surveys, project monitoring, and capture and moving of MSS	30 days/year	$30,000	1	0.5	$30,000	$15,000
Monitoring							
Exotic Plants	Areal Extent Mapping of Exotic Plants	Entire Preserve System (~386 acres) mapped	$25,000	0.2	0.2	$5,000	$5,000
Plant Community Mapping	Areal Extent Mapping of Native Plant Communities	Entire Preserve System (~386 acres) mapped	$15,000	0.1	0.1	$1,500	$1,500
Plant Community Sampling	Quantitative Sampling of Plant Community Structure and Species Composition	Entire Preserve System (~386 acres) sampled	$20,000	0.2	0.2	$4,000	$4,000
General Habitat Condition	Qualitative Examination of Habitat to Detect Impacts from Recreation, New Invasions, and other threats	Entire Preserve System (~386 acres) assessed	$15,000	1	1	$15,000	$15,000
Morro Shoulderband Snail	Population Distribution/ Abundance Sampling	Suitable habitat for (~300 ac.) sampled	$25,000	1	0.2	$25,000	$5,000
Morro Manzanita	Population Distribution/ Abundance Sampling	Suitable habitat (~200 ac.) sampled	$25,000	0.2	0.1	$5,000	$2,500

Table 7-5: Estimated Habitat Management Costs during the 25-Year Permit, and after the Permit Has Expired

Type	Description	Assumptions	Unit Cost ($)	Frequency[1] Permit Term	Frequency[1] Post Permit	Annual Cost ($) Permit Term	Annual Cost ($) Post Permit
Indian Knob Mountainbalm Mountain	Demographic Monitoring	Up to three occurrences monitored	$15,000	0.2	0.1	$3,000	$1,500
Morro Bay Kangaroo Rat	Presence/Absence Monitoring	Suitable habitat for (~300 ac.) surveyed	$50,000	0.2	0.1	$10,000	$5,000
				Total Annual Costs		**$212,500**	**$123,500**
				Contingency (@25%)		**$53,125**	**$30,875**
				Total with Contingency		**$265,625**	**$154,375**
				Remedial Management for Changed Circumstances or Adaptive Management (@10%)		**$26,563**	**$15,438**
				Total		**292,188**	**169,813**
				Cost Per Acre for Preserve (386 ac.)		**$757**	**$440**

[1] Number of occurrences per year. For example, a frequency of 0.2 indicates the activity is conducted every five years.

Table 7-6: Preserve System Start-Up Costs[1]

Type	Description	Assumptions	Unit Cost ($)
Baseline Surveys			
Morro Shoulderband Snail Monitoring	Initial survey to identify the distribution and relative abundance of MSS to inform management	Quantitative sampling within ~160 acres of suitable and potentially suitable habitat	$60,000
Morro Manzanita Mapping	Initial surveys to characterize the distribution, relative abundance, and stand condition	Areal extent mapping, canopy cover sampling, and demographic monitoring within~ 210 acres of suitable habitat	$30,000
Morro Bay Kangaroo Rat Survey	Surveys to evaluate presence/absence of MBKR	Visual surveys within ~250 acres of suitable habitat followed by limited trapping, if sign detected	$50,000
Indian Knob Mountainbalm Monitoring	Survey suitable habitat for the species and then establish demographic monitoring study	Populations currently occur within the LOHCP Area	$10,000
Exotic Plant Mapping	Areal Extent Mapping of Exotic Plants	Mapping throughout initial Preserve System	$25,000
Plant Community Mapping	Areal Extent Mapping of Native Plant Communities	Sampling throughout initial Preserve System	$15,000
Plant Community Structure	Quantitative Sampling of Plant Community Structure	Sampling throughout initial Preserve System	$20,000
General Habitat Condition	Qualitative Examination of Habitat to Detect Impacts from Recreation, New Invasions, and other threats	Assessment within initial Preserve System	$15,000
Preserve System AMMP	Develop management plan for the preserve system through field reconnaissance and mapping and coordination with landowners	Assessment and planning for Preserve System	$100,000
Fences and Signage	Install wildlife-friendly perimeter fences and signs where doing so will facilitate management	~5 miles of fence, ~100 signs	$50,000
Exotic Plant Management	Initial Exotic Plant Management Work to jump start the program	Control exotic plants infesting 15 acres. Assumes initial treatment plus 2 years of follow up	$90,000

Table 7-6: Preserve System Start-Up Costs[1]

Type	Description	Assumptions	Unit Cost ($)
		Total	**$465,000**
		Per Year for Three Years	**$155,000**
		Cost Per Acre (278 ac. Initial Preserve)	**$1,310**

[1] Estimated costs to begin enhanced management within the 278-acre Morro Dunes Ecological Reserve. Acreages differ from those in Table 7-5, which addresses costs to manage and monitor the entire preserve system that will created following full implementation of the plan. The per-acre start-up costs exclude the costs to prepare the Preserve System AMMP.

Table 7-7: **Administrative costs for the LOHCP**

Type	Description	Permit Term		Post-Permit Term	
		Assumptions	**Cost ($)**	**Assumptions**	**Cost ($)**
General Operations and Administration		***Full-Time Planner, Half-Time Executive Director***	**130,000**	***Half-Time Planner, Quarter-Time Executive Director***	**65,000**
Covered Activities	Processing applications, track compliance with permit terms, incl. avoidance and minimization measures	Executive Director (10%); Planner (25%)	29,900	Executive Director (5%), Planner (10%)	13,000
Habitat Protection	Research habitat protection opportunities including conduct outreach to potentially interested landowners; process conservation easements for habitat set-asides offered in lieu of the Habitat Protection Fee; monitor and enforce easements	Executive Director (10%); Planner (25%)	29,900	Executive Director (5%), Planner (10%)	13,000
Coordination and Contracting	Coordinate with the County and agencies to implement plan; coordinate with the contractors implementing preserve management tasks; coordinate with agencies and organizations involved in the Preserve System	Executive Director (15%); Planner (20%)	31,200	Executive Director (5%); Planner (15%)	16,900
Reporting	Create and maintain databases to track certificates of inclusion and impacts of covered activities; prepare annual reports	Planner (10%)	7,800	Planner (5%)	3,900
General Administration	Other duties to operate the Implementing Entity and to implement the plan	Executive Director (15%), Planner (20%)	31,200	Executive Director (10%), Planner (10%)	18,200

Table 7-7: **Administrative costs for the LOHCP**

		Permit Term		Post-Permit Term	
Type	**Description**	**Assumptions**	**Cost ($)**	**Assumptions**	**Cost ($)**
Professional Fees	Fees for attorneys, real estate professionals, and other experts needed during initial implementation, including develop conservation easement, conduct	$20,000/year	20,000	$10,000/year	10,000
Other Direct Costs	Rent, utilities, interiors, transportation, insurance, and other costs of the Implementing Entity	$30,000/year	30,000	$25,000/year	25,000
	Total Administration Costs (per year)		**180,000**		**100,000**

Table 7-8: Summary of Mitigation Costs and Fees

Cost Category		Planning Level Mitigation Costs (2016 dollars)	Percentage of Total Mitigation Costs
Mitigation Cost			
Administration (permit term)		$4,500,000	22%
Administration (post-permit)		$2,461,002	12%
Management and Monitoring (permit term)		$3,652,344	18%
Management and Monitoring (post-permit)		$4,172,542	20%
Preserve Start-Up		$365,000	2%
Restoration		$2,187,500	11%
Acquisition of Fee Title		$3,163,000	15%
	Total Cost	**$20,501,388**	**100%**
Mitigation Fee Summary per Acre			
Restoration /Management/Administration Fee		$32,620	
Habitat Protection Fee		$6,069	
	Total	**$38,688**	
Mitigation Fee Summary per Square Foot[1]			
Restoration /Management/Administration Fee		$0.7488	
Habitat Protection Fee		$0.1393	
	Total	**$0.8882**	

[1] Project fees will be charged by multiplying the area of ground-disturbing activities in square feet by the values listed here. In the text, fees are rounded to the nearest cent for ease of discussion.

8 Alternatives to Take

The federal Endangered Species Act (ESA) requires that habitat conservation plans (HCPs) discuss alternatives to the taking of listed species due to the covered activities (Project) and the reasons why such alternatives are not implemented. These are alternatives to the taking, and not overall Project alternatives and impacts, which will be discussed in the LOHCP EIR/EIS.

8.1 Alternative 1: No Take

Under the No-Take Alternative, the USFWS would not approve the Section 10(a)(1)(B) incidental take permit application.

In this scenario, landowners and other project proponents seeking to conduct activities that would result in take/impacts of one or more of the Plan's four covered species, would either have to abandon their activity or apply for an incidental take permit by preparing their own HCP, to avoid violating Section 9 of the ESA. The latter scenario could result in development of potentially hundreds of individual HCPs and associated CEQA/NEPA compliance documents in Los Osos, as well as other regulatory permits and authorizations (e.g., California Coastal Act compliance). This alternative would therefore create a large burden on agencies while delaying development, facilities maintenance, and other covered activities.

The No-Take Alternative would also create an economic burden on landowners and other project proponents, who would need to fund preparation of individual HCPs. As a result of the added costs and time required to receive an ITP in this alternative, some project proponents might be more likely to attempt to conduct activities in violation of ESA, resulting in adverse impacts to the covered species and potential civil and criminal penalties.

Permitting the covered activities of this programmatic plan through numerous individual HCPs would likely result in lower conservation benefits for the covered species and their habitats. To mitigate the impacts of the typical project, which would be less than one acre, individual HCPs would protect and/or manage small, often isolated habitat areas. This piecemeal approach to conservation would have dramatically reduced benefit for the covered species relative to implementation of the strategic, coordinated conservation plan outlined in this plan. Moreover, without a mechanism to contribute to off-site mitigation of high-quality habitat, as outlined in the conservation program for this Plan, the individual HCPs would likely conduct habitat protection and management on site. As the vast majority of the projects would occur within the already densely developed area of Los Osos inside the urban services line, the mitigation would likely be of limited long-term conservation value for the covered species. As a result, the No-Take Alternative would provide less conservation benefit than the proposed Project.

Due to the extended timeline and costs for permitting to lawfully conduct projects in the absence of a programmatic permit resulting from this community-wide HCP, the No-Take Alternative would slow the pace and may ultimately reduce the amount of habitat conversion. This could limit the impacts to Morro shoulderband snail and Morro manzanita individuals and populations relative to the proposed Project; however, it would be unlikely to have a net benefit for the species. The benefits of preserving, restoring, and managing high-quality habitat in the Priority Conservation Area as part of the proposed Project's

conservation strategy will not only outweigh the negative impacts associated with the covered activities, but also promote recovery of the species relative to the No-Take Alternative.

For each of these reasons outlined above, the No-action Alternative was rejected.

8.2 Alternative 2: Reduced Take

Under the reduced-take alternative, the total acres of habitat disturbed by the covered activities would be capped at 266 acres, or 50% of the maximum amount under the proposed Plan. Rather than helping protect the covered species, capping habitat disturbance as part of a Reduced-Take Alternative will negatively impact them relative to implementing the proposed Plan for several reasons.

The Reduced-Take Alternative will reduce the benefits of the conservation program for the covered species and their habitat. The ratios relating the benefits of the conservation program for the covered species habitats to the impacts of the covered activities on a per acre basis are at or exceed 1:1 (Table 8-1). For example, while 41 acres of Morro manzanita habitat are anticipated to be impacted, the conservation program in this Plan is anticipated to benefit 354-acre equivalents, resulting in a more than 8:1 ratio of habitat benefits to impacts. Because the conservation program leverages the mitigation to improve habitat, reducing the amount of take/impacts by 50% will similarly reduce the habitat benefits of the conservation program (Table 8-1). These ratios reflect the fact that habitat protection, restoration, and management will benefit habitat that is of greater long-term conservation value for the covered species, than the habitat impacted by the covered activities (Section 4.2).

As a result, for every acre of coastal sage scrub or central maritime chaparral impacted by the covered activities, which generally will occur in degraded and more fragmented habitat, 1.7 acres of coastal sage scrub and 8.5 acres of central maritime chaparral will be benefited (Table 8-1); this habitat will largely occur within the Priority Conservation Area (Figure 5-1), where habitat conservation efforts can better facilitate long-term viability of the covered species.

Habitat not developed (or protected, restored and managed) under this Reduced-Take Alternative will continue to degrade due to exotic species, incompatible fire management, and incompatible recreational use, among other factors.

The Reduced-Take Alternative will reduce the biological effectiveness of the conservation program. A key approach of the LOHCP conservation program is to conserve and effectively manage the most important land within the Baywood fine sands ecosystem, including existing protected lands as well as land protected as part of the Plan, as part of a coordinated strategy that will maximize effectiveness (Section 5.3). Reducing the amount of take/impacts reduces the mitigation revenue and thus the amount of habitat that is able to be conserved, restored, and managed as part of the LOHCP Preserve System. Unless other funds for habitat protection and management are obtained, habitat outside of the Preserve System will continue to degrade and impede effective management of habitat within the Preserve System. For example, uncontrolled erosion and exotic plant infestations on habitat adjacent to the preserves can degrade habitat contained within and necessitate more intensive management of the Preserves.

The Reduce-Take Alternative will reduce the cost effectiveness of the conservation program. There are economies of scale associated with many aspects of habitat restoration, management,

and monitoring. Moreover, many components of the administrative costs of the conservation program are fixed. As a result, the Reduced-Take Alternative will increase the per-acre costs of operating the Preserve System, which provides the compensatory mitigation for the covered activities. To address this, the mitigation fee would need to be increased, thus putting added burden on the project proponents. Alternatively, the amount of habitat protection, restoration, management, and monitoring would have to be scaled back, thus reducing the benefits of the Reduced-Take Alternative relative to the Proposed Project.

The above assessment assumes that if the Reduced-Take Alternative is implemented, the other covered activities will not be conducted. However, this is unrealistic, as many of these activities important for the Los Osos community (e.g., library and parks expansions, facilities maintenance). After the cap on maximum disturbance for the LOHCP permit is reached, project proponents would instead need to prepare individual HCPs in order to receive take coverage. The increased timeline and costs for project permitting may result in issues similar to the No-Take alternative, including projects being conducted without take coverage, and therefore without mitigation. Projects that are permitted as a result of individual HCPs would result in small, piecemeal mitigation and uncoordinated and inconsistent management that is less effective than what would be accomplished under the Proposed Plan.

8.3 Alternative 3: Greater Mitigation Requirement

Under the greater- mitigation requirement alternative, project proponents would be required to mitigate the impacts of their projects at a ratio of 2:1; for every acre of habitat disturbed, two acres of habitat be benefited through habitat protection, restoration, and/or management, rather than just one acre, as in the Proposed Plan (Alternative 4). The anticipated covered activities (Section 2.2) would impact 532 acres of habitat and would be offset by 1,064-acre equivalents of mitigation activities in the LOHCP Preserve System.

This higher mitigation alternative could be achieved by doubling the acres of habitat presumed to be restored, managed, and/or protected within the LOHCP Preserve System based on the scenario used for this plan. Doubling the habitat protection would entail protecting 772 rather than 386 acres (Table 5-10). When compared with the proposed plan, the Preserve System scenario under this alternative would protect 215 acres of currently unprotected habitat, rather than 107.5 acres; restore and manage 70 acres of existing protected lands, as opposed 35 acres; and manage 487 acres of existing protected lands rather than 243.5 acres. The Preserve System under this scenario would be expected to have double the benefits (and double the ratios) of the Proposed Project for vegetation and species habitat (Table 8-1).

This alternative is likely infeasible because there is not enough suitable habitat available for use as mitigation. Of the 948 acres of existing protected lands within the LOHCP Area (Table 2-4), only 796 acres are within the Priority Conservation Area where habitat management and restoration activities can most effectively promote long-term persistence of the covered species (Section 5.3.1.2, Table 5-5). Of this area, 498 acres were identified by the landowners as unavailable for use as mitigation (Section 5.3.3.1).

It would also be infeasible to achieve this higher mitigation ratio through protection of twice as much habitat. The Priority Conservation Area contains only approximately 621 acres of unprotected upland habitat of which only 386 acres are in undeveloped vacant parcels; the remaining 235 acres of habitat is within existing developed parcels. The Plan already assumes that 107.5 acres of unprotected land would

be protected through acquisition of conservation easements or fee title (Table 5-9). Protecting additional acreage to bring the mitigation ratio to 2:1 would require participation of numerous additional landowners who may not be interested in selling their parcels or conservation easement over portions of them. Protecting additional habitat outside of the Priority Conservation Area would be possible but would not achieve the full desired additional benefits intended by a higher ratio, because land outside of the Priority Conservation Area is less suitable for long-term conservation and management, though it could still contribute to species conservation.

Doubling the mitigation ratio would therefore be unlikely to double the benefits for the covered species, as might be intended in such an alternative. This is because the additional habitat that would be protected, restored, and managed, would be of generally lower long-term conservation value for the covered species. Including habitat within parcels that are smaller, partially-developed, and/or located outside of the Priority Conservation Area, would result in a more fragmented preserve system that has lower habitat connectivity and is more challenging to cohesively manage.

Increasing the mitigation ratio from 1:1 to 2:1 would also likely more than double the mitigation fees for Plan participants. The Habitat Protection fee required to protect the additional habitat would be expected to more than double, because doubling the land protected would require acquisition of a larger number of smaller parcels, thus resulting in higher per-acre land costs (Section 7.2.1) as well as higher transactional costs (i.e., administration). The Restoration/Management/Administration fee would also be expected to double as a result of the 100% increase in the amount of habitat to be restored, managed, and monitored. Any economies of scale associated with increasing the area managed would likely be outweighed by the increased management costs associated with managing multiple, smaller, and likely disjunct parcels. All else being equal, such parcels are anticipated to experience greater threats to the covered species, such as higher richness and abundance of exotic plants, due to their greater edge effects resulting from their lower area-to-perimeter ratios.

More than doubling the mitigation fees for plan participants would increase the cost burden associated with habitat mitigation as well as the overall cost burden associated with infrastructure, capital facilities, and mitigation fees collectively. The cost burden analysis conducted for the LOHCP (Appendix J) revealed that mitigation fees under the proposed plan range between 0.9 and 1.9 percent of the expected value of new single family, multifamily, office, and retail development (Section J.2). When added to the existing infrastructure and capital facility fees (e.g., water and school fees; Section J.1), the total cost burden for multifamily residential development exceeds the threshold beyond which fees present feasibility challenges for development under general circumstances. The cost burden for office and retail development is close to the accepted threshold under the proposed fee alternative (Section J.2). Doubling the LOHCP mitigation fees so that they are 1.8 to 3.8 percent of the new development value (Section J.2) will increase the total cost burden, further challenging the feasibility of new multifamily and non-residential development (Section J.3).

Some Plan participants will also be required to separately fund implementation of some of the LOHCP's required avoidance and minimization measures. For example, some will be required to contract the services of a qualified biologist to conduct pre-project habitat assessment and surveys, and to salvage and relocate Morro shoulderband snails (Section 5.2). The costs for these services will be determined by the market and will depend on the nature of the survey and the project; therefore, these costs were not included in the cost burden analysis (Appendix J). Doubling the mitigation fees could further challenge the feasibility of new multifamily/commercial development as well as increase the burden for residential project proponents.

Unlike many coastal communities in California, Los Osos is less wealthy than the county as a whole. In 2012, median annual income in Los Osos was just $57,683/year compared to $59,628 countywide, while median home value is $387,100 in Los Osos compared to $449,300 countywide (US Census 2012). Lower incomes and home values may further limit the ability of landowners to afford the fees in a greater mitigation alternative.

In addition, doubling the mitigation fees would increase the cost of public capital improvement projects, such as bike lane construction, water utility improvements, library expansion, and park development. In an era of constrained public resources, these additional costs could make some of these projects cost prohibitive for public agencies. As a result, requiring greater mitigation could impede the goals for development and enhancement of the Los Osos community, which the proposed plan is designed to achieve along with the biological goals and objectives for the covered species (Section 5.1).

To summarize, the greater mitigation requirement alternative would make implementation of the LOHCP potentially infeasible due to the anticipated limited habitat available from willing sellers, which would have reduced per-acre conservation value for the covered species due to the higher per-acre costs and lower conservation value. The greater mitigation alternative would similarly present a higher cost burden to plan participants and could render cost prohibitive some development and enhancement projects including those that can benefit the Los Osos Community.

8.4 Alternative 4: Proposed Plan

Under the Proposed Plan, private landowners, public agencies, and private utilities will receive take coverage for their respective development, infrastructure, and facilities maintenance activities, provided that their projects meet the eligibility criteria and they agree to implement the required mitigations of this voluntary program.

The covered activities will collectively impact a maximum of 532 acres of land within the Baywood fine sands ecosystem. The habitat impacts will be concentrated (87%) inside the Urban Services Line (USL)—the existing, largely-developed portion of community, where additional development will be focused as part of the Estero Area Plan (County of San Luis Obispo 2009, 2015). Concentrating development within the USL will minimize impacts to the largely intact habitat on the perimeter of the Plan Area. Nearly 40% of the impact area was characterized as developed, as it features some existing improvements. Due to the small size of parcels, this habitat is already highly fragmented and degraded though may support the covered species.

To mitigate the impacts of the covered activities on the covered species, the Implementing Entity will protect, restore, manage, and monitor habitat at a 1:1 ratio relative to the impacts, within the LOHCP Preserve System—a network of protected lands located on the perimeter of the Plan Area in the Priority Conservation Area (Figure 5-1), where habitat has been identified as most essential to the recovery of the covered species (Section 5.3.1.2). The Preserve System will feature habitat protected through implementation of the Plan, as well as existing protected lands where habitat will be restored and managed to achieve the Plan's biological goals and objectives (Section 5.1).

The Preserve System will be assembled during implementation of the Plan as project proponents pay fees that are calculated based on their project impacts. The Implementing Entity will use the fees to

acquire new land from willing sellers new land via acquisition of fee title or conservation easements. They will also coordinate with owners of conservation lands to restore habitat, such as by controlling erosion or conducting fire management, and actively manage habitat to address other factors that degrade it, including exotic plants and incompatible recreational uses. The Implementing Entity will also accept conservation easements granted by proponents of new private development projects in the Priority Conservation Area, who will set aside habitat on-site rather than paying the Habitat Protection Fee paid by others to fund off-site habitat protection.

The precise configuration of the Preserve System will depend on a variety of factors, including the interest of landowners in developing or conserving their land. Based on the Preserve System configuration scenario used to assess impacts and develop funding strategy for the Plan (Section 5.7.2.3.2), the 386-acre Preserve System will:

- **Protect 107.5 acres** of currently unprotected land, of which 10 acres will be restored and then managed (the other 97.5 acres will be actively managed);
- **Restore 35 acres** of degraded habitat within existing protected lands, to increase its ability to support the covered species; and
- **Actively manage 244 acres** of habitat within existing parks and reserves, to meet the unmet management needs and address factors that threaten long-term persistence of the covered species.

Based upon the mitigation crediting ratios, which relate the conservation value of protecting new habitat,and managing and restoring existing protected lands to the benefits of *not* implementing the covered activities (Section 5.7.2.3.1), the 386-acre Preserve System will provide 533-acre equivalents of habitat benefits, thus mitigating the impacts of the covered activities at a ratio of 1:1 (Table 5-10). Proponents of development projects that would impact Environmentally Sensitive Habitat Areas (ESHA) may be required to set aside additional habitat in order to comply with the California Coastal Act, effectively increasing the ratio of habitat protected through activities covered in this plan above 1:1 (Section 5.7.2.1.1).

To issue a Section 10(a)(1)(B) permit, the USFWS must have sufficient evidence to find that take has been avoided and minimized to the maximum extent practicable and that the mitigation is commensurate with the impacts of the taking. The County believes the mitigation and avoidance and minimization measures of the Proposed Plan address the impacts of the proposed take under ESA including by fully offsetting the impacts of the taking, as illustrated in the analysis of the Greater-Mitigation Requirement Alternative (Section 8.3). The minimization and mitigation measures are also the maximum extent practicable, given the circumstances in the landscape including availability of habitat and also financial resources to fund its protection (Appendix J).

In addition, the coordinated conservation program of this Plan will promote recovery of the four covered species by protecting and managing habitat that has the greatest long-term viability for conservation. It will also help conserve other native plants and animals that comprise the endemic communities of the Baywood fine sands ecosystem.

Unlike the greater-mitigation alternative, which would protect, manage, and restore more habitat and thus have greater benefit for the covered species, the Proposed Plan is more feasible to implement, as it will not encounter limitations of land available from willing sellers. The Proposed Plan also provides a

more cost-effective permitting solution for project proponents including public as well as private entities seeking to conduct much needed infrastructure and utility projects as well as development projects that can enhance the Los Osos Community.

Table 8-1: Proposed Project and Reduced-Take Alternative Acreages

	LOHCP Area[1]		Proposed Project					Reduced Take[5]	
			Impacted[2]						
	Total	Protected	Inside USL	Outside USL	Total	Benefited[3]	Ratio[4]	Impacted	Benefited
General Vegetation/Land Cover (Table 3-1)									
Coastal Sage Scrub	866	382	160	28	189	320	1.7	94	160
Central Maritime Chaparral	503	309	6	13	18	156	8.5	9	78
Woodland	367	192	22	11	33	32	1.0	16	16
Grassland	39	2.2	21	0.5	21	1.1	0.1	11	1
Wetland	43	31	2.9	0	2.6	0.0	0.0	1	0
Riparian	77	9	3.1	0	3.1	11	3.4	2	5
Other (Primarily Developed)	1,750	23	248	18	265	14	0.1	133	7
Total	**3,644**	**948**	**464**	**70**	**532**	**533**	**1.0**	266	**267**
Covered Species Habitats (Table 4-4)									
Morro Manzanita Habitat	798	491	21	20	41	354	8.6	21	177
Morro Shoulderband Snail[6]	2,833	580	429	49	478	301	0.6	239	150
Primary Habitat	935	445	160	29	189	191	1.0	95	96
Secondary Habitat[6]	1,898	135	269	20	289	110	0.4	145	55

[1] Total and protected acres of vegetation and other land cover (Table 4-3), and covered species habitat (Table 4-5), based on the cross-walk of vegetation and habitats (Table 4-4).

[2] Total proposed acres of vegetation and other land cover (Table 4-3) and covered species habitat (Table 4-5) to be impacted inside the Urban Services Line (USL), an area which is already densely developed, and outside the USL.

[3] Total acres to benefit from acquisition of new protected lands, and restoration and management of existing protected lands (Table 5-10).

[4] Total acres to be benefited divided by total acres impacted by proposed projects.

[5] Take reduced by 50% relative to the Proposed project (266 acres rather than 532 acres).

[6] These ratios are below 1, because secondary habitat includes developed areas where the species can be found, and where many covered activities (redevelopment, infill development, etc.) will occur. Such areas lack the long-term conservation value of the intact habitat, which will be protected at a higher ratio (1.0).

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Appendix A Species Summaries

A.1 Animal Species Summaries

Table A-1: Animal Species Summaries

Species	ESA[1]	CESA[2]	Other State[3]	Distribution	Preferred Habitat	Occurrence in LOHCP Area[4]
Invertebrates						
Obscure bumble bee (*Bombus caliginosus*)	-	-	-	Coast range mountains of northern Washington to southern California	Relatively humid and foggy areas	Known. The CNDDB (2016) has three records for wintering sites within the LOHCP Plan Area
Monarch butterfly (*Danaus plexippus*)	-	-	-	Roost in coastal regions from San Francisco to Baja California.	Winter roost sites Extend Along the Coast from Northern Mendocino to Baja California, Mexico. Roosts located in wind-protected tree groves (eucalyptus, Monterey Pine, cypress), with nectar and water sources nearby.	Known. The CNDDB (2016) has three records for wintering sites within the LOHCP Plan Area. The records in the Plan Area consist of a eucalyptus grove in Skyline Grove, which is near the intersection of Doris Avenue, West Woodland Ave at the end of Monarch Lane, and Sweet Springs Marsh, north of Ramona Street.
Morro shoulderband snail (*Helminthoglypta walkeriana*)	FE	-	-	Inhabits areas on the south end of Morro Bay and is endemic to the western portion of San Luis Obispo County, California.	Coastal dune and scrub communities with the dominant shrub associated with the snail's habitat being California goldenbush (*Ericameria ericoides*), as well as a variety of ruderal, developed, and degraded habitats including non-native grasslands.	Known. The CNDDB (2016) has ten records for the Morro shoulderband snail in the LOHCP Plan Area.

Table A-1: Animal Species Summaries

Species	ESA[1]	CESA[2]	Other State[3]	Distribution	Preferred Habitat	Occurrence in LOHCP Area[4]
Morro Bay blue butterfly (*Plebejus icarioides morroensis*)	-	-	-	Locally common from March to July and resides only along the immediate coast of San Luis Obispo and western Santa Barbara counties.	Found in close proximity to host plant silver dune lupine (*Lupinus chamissonis*).	Known. The CNDDB (2016) has five records for Morro Bay blue butterfly within the LOHCP Plan Area.
Mimic tryonia (*Tryonia imitator*)	-	-	-	Historically occupied coastal lagoons and areas where creek mouths joined the tidal marsh, from San Diego to Sonoma County. Present populations are scattered throughout the former range; Sonoma County populations are likely extirpated.	Coastal lagoons and where creek mouths join tidal marshes.	Known. The CNDDB (2016) has one record for mimic tryonia within the LOHCP Plan Area.
Fish						
Tidewater goby (*Eucyclogobius newberryi*)	FE	-	SSC	From the Agua Hedionda Lagoon, San Diego County, in the south to the mouth of the Smith River (Tillas Slough), Del Norte County, in the north.	Sandy and silty bottoms of shallow lagoons and lower stream areas where the water is brackish (salinities usually <10 ppt) to fresh.	Known. The CNDDB (2016) has one record for tidewater goby within the LOHCP Plan Area.

Table A-1: Animal Species Summaries

Species	ESA[1]	CESA[2]	Other State[3]	Distribution	Preferred Habitat	Occurrence in LOHCP Area[4]
Steelhead-South/ Central California Coast DPS (*Oncorhynchus mykiss irideus*)	FT	-	SSC	They occur in Malibu Creek, Ventura River, Santa Clara River, and Santa Ynez River, although in greatly reduced numbers. Recent records show that they have been found in Mission and Atascadero creeks (Santa Barbara County) and Mulholland, Big Sycamore, and Topanga canyons (Los Angeles Co.).	Steelhead inhabit riparian, emergent, palustrine habitat. Perennial streams usually characterize spawning and rearing habitat with clear, cool to cold, fast flowing water with high dissolved oxygen content and abundant gravels and riffles.	Potential to occur. The CNDDB (2016) and existing literature have no records for south/central steelhead occurrence within the LOHCP Plan Area, but suitable habitat is available within Los Osos Creek, on the eastern perimeter of the Plan Area.
Amphibians						
California red-legged frog (*Rana draytonii*)	FT	-	SSC	Found along the coast and coastal mountain ranges of California from Humboldt County to San Diego County; Sierra Nevada (mid elevations [above 1,000 feet] from Butte County to Fresno County).	Inhabits lowland streams, wetlands, riparian woodlands, and livestock ponds.	Potential to occur. The CNDDB (2016) and existing literature have no records for the CRLF within the LOHCP Plan Area. There is suitable habitat in the LOHCP Area and they are found in the Morro Bay tributaries that include Los Osos Creek.
Reptiles						

Table A-1: Animal Species Summaries

Species	ESA[1]	CESA[2]	Other State[3]	Distribution	Preferred Habitat	Occurrence in LOHCP Area[4]
Black legless lizard and silvery legless lizard (*Anniella pulchra nigra* and *A. p. pulchra*)	-	-	SSC	Antioch (Contra Costa County), south through the Coast, Transverse, and Peninsular ranges; parts of the San Joaquin Valley; and the western edge of the Sierra Nevada Mountains and Mojave Desert to El Consuelo (Baja California Norte).	Areas with sandy or loose loamy soils under the sparse vegetation of beaches, chaparral, or pine-oak woodland; or sycamores, cottonwoods, or oaks that grow on stream terraces.	Known. The CNDDB (2016) has five records for black legless lizard/silvery legless lizard within the LOHCP Plan Area.
Western pond turtle (*Emys marmorata*)	-	-	SSC	Occurs along the central coast of California east to the Sierra Nevada and along the southern California coast inland to the Mojave and Sonora Deserts; range overlaps with that of the northwestern pond turtle throughout the Delta and in the Central Valley from Sacramento County to Tulare County.	Inhabits slow moving permanent or intermittent streams, small ponds, small lakes, reservoirs, abandoned gravel pits, permanent and ephemeral shallow wetlands, stock ponds, and sewage treatment lagoons.	Potential to occur. The CNDDB (2016) and existing literature have no records for western pond turtle within the LOHCP Plan Area, but suitable habitat is available. This species is thought to occur at the Sweet Springs Nature Preserve.
Coast horned lizard (*Phrynosoma blainvillii*)	-	-	SSC	California endemic with distribution from Lake Shasta southward along the edges of the Sacramento Valley into much of the South Coast Ranges, San Joaquin Valley, and Sierra Nevada foothills to northern Los Angeles, Santa Barbara and Ventura counties. Several fine-scaled populations in the Shandon-Cuyama Valley region, Santa Barbara and San Luis Obispo counties.	Inhabits exposed gravelly-sandy substrate containing scattered shrubs (e.g., California buckwheat) to clearings in riparian woodlands, to dry uniform chamise chaparral to annual grassland with scattered saltbush. Maximum abundance is reached in sandy loam areas on alkali flats.	Known. The CNDDB (2016) has two records for coast horned lizard within the LOHCP Plan Area.
Birds						

Table A-1: Animal Species Summaries

Species	ESA[1]	CESA[2]	Other State[3]	Distribution	Preferred Habitat	Occurrence in LOHCP Area[4]
Cooper's hawk (*Accipiter cooperii*)	-	-	WL	Throughout California except high altitudes in the Sierra Nevada; winters in the Central Valley, southeastern desert regions, and plains east of the Cascade Range.	Nests primarily in riparian forests dominated by deciduous species; forages in open woodlands.	Potential to occur. The CNDDB (2016) has one historical record of nesting within the LOHCP Plan Area in Baywood. The existing literature regards the species as a resident of San Luis Obispo County, nesting and foraging in and near deciduous riparian areas.
Sharp-shinned hawk (*Accipiter striatus*)	-	-	WL	Permanent resident in the Sierra Nevada, Cascade, Klamath, and north Coast Ranges at mid-elevations and along the coast in Marin, San Francisco, San Mateo, Santa Cruz, and Monterey counties; winters over the rest of the state except very high elevations.	Prefers riparian habitats; not restricted to them and are found in mid-elevation habitats such as pine forests, woodlands and mixed conifer forests. For nesting they occur in dense tree stands that are cool, moist, well shaded and usually near water. For hunting habitat, they often use openings at the edges of woodlands and also brushy pastures.	Potential to occur. The CNDDB (2016) and existing literature have no records for sharp-shinned hawk within the LOHCP Plan Area. There is suitable wintering habitat present in LOHCP Plan Area.
Golden eagle (*Aquila chrysaetos*)	-	-	FP, WL	Foothills and mountains throughout California; uncommon non-breeding visitor to lowlands such as the Central Valley.	Cliffs and escarpments or tall trees for nesting; annual grasslands, chaparral, and oak woodlands for hunting.	Potential to occur. The CNDDB (2016) and existing literature have no records for golden eagles within the LOHCP Plan Area. No suitable nesting habitat is present within LOHCP Plan Area.

Table A-1: Animal Species Summaries

Species	ESA[1]	CESA[2]	Other State[3]	Distribution	Preferred Habitat	Occurrence in LOHCP Area[4]
Burrowing owl (*Athene cunicularia*)	-	-	SSC	Restricted to the Central Valley extending from Redding south to the Grapevine, east through the Mojave Desert and west to San Jose, the San Francisco Bay area, the outer coastal foothills area which extend from Monterey south to San Diego and the Sonoran Desert.	Inhabits dry, sparse grasslands, desert scrub, and agricultural areas.	Potential to occur. The CNDDB (2016) and existing literature have no records for western burrowing owl within the LOHCP Plan Area. There is potentially suitable wintering and foraging habitat present in LOHCP Plan Area, although it is outside of its known range.
Western snowy plover (*Charadrius alexandrinus nivosus*)	FT	-	SSC	Coastal areas from Del Norte County to San Diego County.	Nests, feeds, and takes cover on sandy or gravelly beaches along the coast, on estuarine salt ponds, alkali lakes, and at the Salton Sea.	Potential to occur. The CNDDB (2016) and existing literature have no records for western snowy plover within the LOHCP Plan Area. There is no suitable nesting habitat present in LOHCP Plan Area.
Northern harrier (*Circus cyaneus*)	-	-	SSC	Occurs from annual grassland up to lodgepole pine and alpine meadow habitats. It breeds from sea level to 5,700 ft. in the Central Valley and Sierra Nevada, and up to 3,600 ft. in northeastern California. It is a permanent resident of the northeastern plateau and coastal areas; it is a less common resident of the Central Valley.	Grasslands, meadows, marshes, and seasonal and agricultural wetlands providing tall cover.	Known. The CNDDB (2016) and existing literature have no records for northern harrier within the LOHCP Plan Area. The northern harrier is a frequent forager on the southern portion of Morro Bay S.P. and the Bayview Unit of the Morro Dunes E.R. (J. Chesnut, pers. comm.).

Table A-1: Animal Species Summaries

Species	ESA[1]	CESA[2]	Other State[3]	Distribution	Preferred Habitat	Occurrence in LOHCP Area[4]
White-tailed kite (*Elanus leucurus*)	-	-	FP	Lowland areas west of Sierra Nevada from head of Sacramento Valley south, including coastal valleys and foothills to western San Diego County at the Mexico border.	Forage in low foothills or valley areas with valley or live oaks, riparian areas, and marshes near open grasslands. Breeds in lowland grasslands, agriculture, wetlands, oak-woodland, and savannah habitats, and riparian areas associated with open areas.	Known. A large roosting concentration of white-tailed kite has been observed north of Nipomo Avenue and east of South Bay Blvd near Eto Creek. The birds are winter resident, with occasional summer presence (J. Chesnut, pers. comm.).
Merlin (*Falco columbarius*)	-	-	WL	Does not nest in California; rare but widespread winter visitor to the Central Valley and coastal areas.	Forages along coastlines, open grasslands, savannas, and woodlands; often forages near lakes and other wetlands.	Potential to occur. The CNDDB (2016) and existing literature have no records for merlin within the LOHCP Plan Area. There is no suitable breeding habitat in the LOHCP Plan Area. This species may be a wintering visitor, but presence is unlikely in the LOHCP Plan Area.
Prairie falcon (*Falco mexicanus*)	-	-	WL	Uncommon permanent resident and migrant that ranges from southeastern deserts northwest along the inner Coast Ranges and Sierra Nevada. It is distributed from annual grasslands to alpine meadows within this region. It is not found in the northern coastal fog belt, or along the coastline.	Annual grasslands to alpine meadows, but they are also associated primarily with perennial grasslands, savannahs, rangeland, some agricultural fields, and desert scrub areas, typically dry environments of western North American where there are cliffs or bluffs for nest sites.	Potential to occur. The CNDDB (2016) and existing literature have no records for prairie falcon within the LOHCP Plan Area. Suitable foraging habitat is present in LOHCP Plan Area, but the LOHCP Plan Area is out of its known range.

Table A-1: Animal Species Summaries

Species	ESA[1]	CESA[2]	Other State[3]	Distribution	Preferred Habitat	Occurrence in LOHCP Area[4]
Peregrine falcon (*Falco peregrinus anatum*)	DE	DE	FP	Common along the coast north of Santa Barbara, in the Sierra Nevada, and in other mountains of northern California. In winter, found inland throughout the Central Valley, and occasionally on the Channel Islands. Migrants occur along the coast and in the western Sierra Nevada in spring and fall.	Open habitats, including tundra, marshes, seacoasts, savannahs and high mountains. Breeds mostly in woodland, forest, and coastal habitats.	Known. The CNDDB (2016) have no record of known peregrine falcon occurrence within the LOHCP Plan Area. However, the undeveloped shorefront lots in Baywood are a preferred hunting area for the Morro Bay peregrine falcons. They are frequently observed feeding on shorebirds at the end of Pine Street, 2nd Street frontage, and Pecho Valley Road (J. Chesnut, pers. comm.).
Loggerhead shrike (*Lanius ludovicianus*)	-	-	SSC	Found throughout the foothills and lowlands of California as a resident. Winter migrants are found coastally, north of Mendocino County.	Forage over open ground within areas of short vegetation, pastures with fence rows, old orchards, mowed roadsides, cemeteries, golf courses, riparian areas, open woodland, agricultural fields, desert washes, desert scrub, grassland, broken chaparral and beach with scattered shrubs.	Potential to occur. The CNDDB (2016) has no records for loggerhead shrike within the LOHCP Plan Area. Suitable foraging habitat present in LOHCP Plan Area.
California black rail (*Laterallus jamaicensis coturniculus*)	-	ST	FP	Northern reaches of the San Francisco Bay estuary, especially the tidal marshland of San Pablo Bay and associated rivers; several small, fragment subpopulations still existed at Tomales Bay, Bolinas Lagoon, Morro Bay, and in southeastern California.	Tidal salt marshes associated with heavy growth of pickleweed; also occurs in brackish marshes or freshwater marshes at low elevations.	Known. The CNDDB (2016) has two records for the California black rail within the LOHCP Plan Area. Observed at Sweet Springs Preserve, adjacent to Cuesta-by-the-Sea. Also found at other locations in the LOHCP Plan Area during the Morro Coast Audubon Christmas Bird Counts.

Table A-1: Animal Species Summaries

Species	ESA[1]	CESA[2]	Other State[3]	Distribution	Preferred Habitat	Occurrence in LOHCP Area[4]
Marbled godwit (*Limosa fedoa*)	-	-	-	The species winters in greatest numbers along the Pacific coast from central California south through Southern California. A number of Important Bird Areas (IBAs) in both the United States and Canada help protect important habitat for marbled godwit. These sites include California's Morro Bay IBA, which regularly hosts over 2,000 wintering godwits.	Winters in coastal mudflats.	Potential to occur. The CNDDB (2016) and existing literature have no records for marbled godwit within the LOHCP Plan Area, but suitable habitat is available.
Long billed curlew (*Numenius americanus*)	-	-	WL	Breeding grounds include northeastern California. Wintering range along entire Pacific Coast of California.	Breed mainly in the native grasslands of arid western regions and are often found in farm fields and grasslands during migration and on their wintering grounds. Occur in coastal marshes and mudflats during the winter. Nest on the ground in the open, on dry prairie.	Potential to occur. The CNDDB (2016) and existing literature have no records for long billed curlew within the LOHCP Plan Area, but suitable habitat is available.
Whimbrel (*Numenius phaeopus*)	-	-	-	Winter along the coast of California	Dry heath uplands to dwarf shrub, and mossy lowlands. During the winter, it forages in tidal flats, mangroves and a variety of other coastal habitats.	Potential to occur. The CNDDB (2016) and existing literature have no records for whimbrel within the LOHCP Plan Area, but suitable habitat is available.
Large-billed savannah sparrow [*Passerculus sandwichensis rostratus (wintering)*]	-	-	SSC	Winter along the coast of California	Salt marches or dune grasses.	Potential to occur. The CNDDB (2016) and existing literature have no records for large-billed savannah sparrow within the LOHCP Plan Area, but suitable habitat is available.

Table A-1: Animal Species Summaries

Species	ESA[1]	CESA[2]	Other State[3]	Distribution	Preferred Habitat	Occurrence in LOHCP Area[4]
California brown pelican (*Pelecanus occidentalis californicus*)	DE	DE	FP	Ranges along entire California coast. Breeds on Channel Islands (Santa Barbara, Anacapa, and Santa Cruz). Also, occasionally can be found on Salton Sea.	Estuarine, marine subtidal, and marine pelagic waters along the California coast. Specifically, they are found on rocky shores and cliffs, in sloughs, and coastal river deltas.	Potential to occur. The CNDDB (2016) and existing literature have no records for brown pelican within the LOHCP Plan Area, but suitable habitat is available.
California clapper rail (*Rallus longirostris obsoletus*)	FE	SE	FP	Currently limited to San Francisco Bay, San Pablo Bay, Suisun Bay, and tidal marshes associated with estuarine sloughs draining into these bays.	Marshes supporting tidal sloughs that provide direct tidal circulation throughout the area and shallow water and mudflats with sparse vegetation.	Potential to occur. The CNDDB (2016) and existing literature have no records for California clapper rail within the LOHCP Plan Area, but suitable habitat is available.
Allen's hummingbird (*Selasphorus sasin*)	-	-	-	Breeds in a narrow strip along the Pacific coast, throughout California.	Inhabit mixed evergreen, riparian woodlands, eucalyptus and cypress groves, oak woodlands, and coastal sage scrub areas in breeding season.	Potential to occur. The CNDDB (2016) and existing literature have no records Allen's hummingbird within the LOHCP Plan Area, but suitable habitat is available.
Yellow warbler (*Setophaga petechial*)	-	-	SSC	Nests over all of California except the Central Valley, the Mojave Desert region, and high altitudes in the Sierra Nevada; winters along the Colorado River and in parts of Imperial and Riverside counties; two small permanent populations in San Diego and Santa Barbara counties.	Breeds in lowland and foothill riparian woodlands dominated by cottonwoods, alders, or willows and other small trees and shrubs typical of low, open-canopy riparian woodland.	Potential to occur. The CNDDB (2016) and existing literature have no records for the yellow warbler within the LOHCP Plan Area.

Table A-1: Animal Species Summaries

Species	ESA[1]	CESA[2]	Other State[3]	Distribution	Preferred Habitat	Occurrence in LOHCP Area[4]
California spotted owl (*Strix occidentalis occidentalis*)	-	CT	SSC	The south Cascade Range and northern Sierra Nevada from near Burney (Pit River), Shasta County, California south through the remainder of the western Sierra Nevada and Tehachapi Mountains to Lebec, Kern County.	In northern California it resides in dense, old growth, multi-layered mixed conifer, redwood, and Douglas-fir habitats. In southern California, it occurs at low elevations (sea level to 3,300 ft.), and occupies habitats dominated by hardwoods, primarily oak and oak-conifer woodlands.	Potential to occur. The CNDDB (2016) and existing literature have no records for California spotted owl within the LOHCP Plan Area, but suitable habitat is available.
Elegant tern (*Thalasseus elegans*)	-	-	WL	Breed in nesting colonies located in southern California. Disperse northward to central and northern California following breeding season.	Found along the shallow waters of estuaries and bays along the ocean. During the breeding season, they nest on sandy or rocky islands.	Potential to occur. The CNDDB (2016) and existing literature have no records for elegant tern within the LOHCP Plan Area, but suitable habitat is available.
California thrasher (*Toxostoma redivivum*)	-	-	-	Endemic in what is known as the California Biotic Province (mostly in the western part of the state).	Breeds from sea level to the higher parts of the montane chaparral. It will breed in adjacent oak woodlands and pine-juniper scrub as well as occasionally in parks and gardens, but only if dense cover is available.	Potential to occur. The CNDDB (2016) and existing literature have no records for California thrasher within the LOHCP Plan Area, but suitable habitat is available.
Mammals						
Pallid bat (*Antrozous pallidus*)	-	-	SSC	Occur throughout California, except in the high Sierra Nevada.	Inhabit a variety of habitats, including grasslands, shrublands, woodlands, and forests from sea level up through mixed coniferous forests.	Potential to occur. The CNDDB (2016) and existing literature have no records for pallid bat occurrence within the LOHCP Plan Area, but suitable habitat is available.

Table A-1: Animal Species Summaries

Species	ESA[1]	CESA[2]	Other State[3]	Distribution	Preferred Habitat	Occurrence in LOHCP Area[4]
Morro Bay kangaroo rat (*Dipodomys heermanni morroensis*)	FE	SE	FP	Restricted to stabilized sand dunes south of Morro Bay in San Luis Obispo County.	Associated with coastal sage scrub and chaparral communities on stabilized sand dunes.	Known. The CNDDB (2016) has five records for Morro Bay kangaroo rat within the LOHCP Plan Area.
Southern sea otter (*Enhydra lutris nereis*[5])	FT	-	FP	Año Nuevo, San Mateo County to Point Sal, Santa Barbara County.	Shallow ocean waters, particularly in the vicinity of kelp beds.	Potential to occur. The CNDDB (2016) and existing literature have no records for southern sea otter within the LOHCP Plan Area, but suitable habitat is available.
Long-eared myotis (*Myotis evotis*)	-	-	-	Widespread in California but avoids the arid Central Valley and hot deserts. Occurs along the entire coast and in the Sierra Nevada, from sea level to at least 9,000 ft.	Prefers coniferous woodlands and forests, but is found in brush, woodland, and forest habitats.	Potential to occur. The CNDDB (2016) and existing literature have no records for long-eared myotis within the LOHCP Plan Area, but suitable habitat is available.
San Diego desert woodrat (*Neotoma lepida intermedia*)	-	-	SSC	Found in two disjunct areas in California. Found throughout southern California, with range extending northward along the coast to Monterey County, and along the Coast Range to San Francisco Bay.	Common to abundant from sea level to 8,500 feet in a variety of habitats which includes Joshua tree, pinyon-juniper, mixed and chamise-redshank chaparral, sagebrush, and most desert habitats.	Potential to occur. The CNDDB (2016) and existing literature have no records for San Diego desert woodrat within the LOHCP Plan Area, but suitable habitat is available.
Harbor seal (*Phoca vitulina*)	-	-	-	Found on California islands and along entire mainland coast.	Prefers to remain close to shore in subtidal and intertidal habitats. Often swims into bays and estuaries. Groups form on emergent offshore and tidal rocks, mudflats, sandbars, and sandy beaches.	Potential to occur. The CNDDB (2016) and existing literature have no records for harbor seal within the LOHCP Plan Area, but suitable habitat is available.

Table A-1: Animal Species Summaries

Species	ESA[1]	CESA[2]	Other State[3]	Distribution	Preferred Habitat	Occurrence in LOHCP Area[4]
Mexican free-tailed bat (*Tadarida brasiliensis*)	-	-	-	Found throughout California, mostly absent from high Sierra Nevada (from Tehama to Tulare cos.) and north coastal region (from Del Norte and Siskiyou counties to northern Sonoma County).	All habitats up through mixed conifer forests are used, but open habitats such as woodlands, shrubland, and grasslands are preferred. Requires caves, mine tunnels, crevices, or buildings for roosting and hibernation.	Potential to occur. The CNDDB (2016) and existing literature have no records for Mexican free-tailed bat within the LOHCP Plan Area, but suitable habitat is available.
American badger (*Taxidea taxus*)	-	-	SSC	An uncommon, permanent resident found throughout most of the state, with the exception of the North coast area.	Grasslands, savannas, mountain meadows, and openings in desert scrub.	Potential to occur. The CNDDB (2016) and existing literature have no records for American badger within the LOHCP Plan Area, but suitable habitat is available.

[1] **ESA Status:** Listing Status under the Federal Endangered Species Act

FE: Federal Endangered

FT: Federal Threatened

[2] **CESA Status:** Listing Status under the California Endangered Species Act

SE: State Endangered

ST: State Threatened

[3] **Other State Designations**

FP: Fully Protected - may not be taken or possessed at any time without a permit for necessary scientific research or relocation

SSC: Species of Special Concern

WL: Watch List - previously SSCs but no longer merit SSC status

[4] **Based on known records and observations, which are not comprehensive of all actual occurrences and therefore underrepresent species distributions.**

[5] The southern sea otter (*Enhydra lutris neris*) has a Special Species of Concern designation by the Marine Mammal Commission

A.2 Plant Species Summaries

Table A-2: Plant Species Summaries

Species	FESA[1]	CESA[2]	Other State[3]	Distribution	Preferred Habitat	Occurrence in LOHCP Plan Area[4]
Vascular Plants						
Hoover's bentgrass (*Agrostis hooveri*)	-	-	1B.2	Native and endemic to California. Occurs in Los Osos Valley, San Luis Valley, and the east slope of Santa Lucia Mountains in San Luis Obispo County and south to La Purisima Hills in Santa Barbara County.	Occurs in chaparral, cismontane woodland, and valley foothill grassland communities with dry sandy soil.	Potential to occur. The CNDDB (2016) and existing literature have no records for Hoover's bent grass within the LOHCP Plan Area.
Arroyo de la Cruz manzanita (*Arctostaphylos cruzensis*)	-	-	1B.2	Found in San Luis Obispo and Monterey counties.	Found in broad-leafed upland forest, coastal bluff scrub, closed-cone coniferous forest, chaparral, coastal scrub, and valley and foothill grassland.	Known. The CNDDB (2016) has one record for Arroyo de la Cruz manzanita within the LOHCP Plan Area.
Santa Lucia manzanita (*Arctostaphylos luciana*)	-	-	1B.2	San Luis Obispo County endemic found in locally abundant stands in the southern portion of the Santa Lucia mountain range.	Found in chaparral and woodland areas, on shale substrates and outcrops on hill slopes.	Potential to occur. The CNDDB (2016) and existing literature have no records for Santa Lucia manzanita within the LOHCP Plan Area, which largely features inappropriate substrate for the species.
Morro manzanita (*Arctostaphylos morroensis*)	FT	-	1B.1	San Luis Obispo County, from Morro Bay to just south of Hazard Canyon.	The distribution of Morro manzanita is correlated with Baywood fine sand and is found in association with coastal sage scrub, central maritime chaparral, and coast live oak woodland communities in sites with no or low to moderate slopes.	Known. The CNDDB (2016) has three records for Morro manzanita, which is known to occur throughout much of the central maritime chaparral within the LOHCP Plan Area.

Table A-2: Plant Species Summaries

Species	FESA[1]	CESA[2]	Other State[3]	Distribution	Preferred Habitat	Occurrence in LOHCP Plan Area[4]
Oso manzanita (*Arctostaphylos osoensis*)	-	-	1B.2	Narrowly endemic to the mountains north of Los Osos Valley, San Luis Obispo County.	Grows in chaparral and in cismontane woodland on dacite porphyry buttes.	Known. The CNDDB (2016) has one record for Oso manzanita within the LOHCP Plan Area.
Pecho manzanita (*Arctostaphylos pechoensis*)	-	-	1B.2	California endemic found in the Pecho Hills area of San Luis Obispo County.	Closed-cone coniferous forest, chaparral, coastal scrub, siliceous shale outcrops.	Potential to occur. The CNDDB (2016) and existing literature have no records for Pecho manzanita within the LOHCP Plan Area.
Dacite manzanita (*Arctostaphylos tomentosa* ssp. *daciticola*)	-	-	1B.1	Near Cambria and northeastern portion of Los Osos Valley, San Luis Obispo County.	Located in chaparral and cismontane woodland on dacite porphyry buttes.	Potential to occur. The CNDDB (2016) and existing literature have no records for dacite manzanita within the LOHCP Plan Area.
Marsh sandwort (*Arenaria paludicola*)	FE	SE	1B.1	Occur within the counties of Los Angeles, San Bernardino (in southern San Bernardino), Santa Cruz (Felton), San Francisco (northern), and San Luis Obispo (Oceano).	Stoloniferous, perennial herb; blooms May to August; occurs in freshwater marshes and swamps, bogs and fens, and some coastal scrub, ranging from 10 to 558 feet in elevation; common associates include Typha, Juncus, and Scirpus.	Known. The CNDDB (2016) has one record for marsh sandwort within the LOHCP Plan Area.
Coulter's saltbush (*Atriplex coulteri*)	-	-	1B.2	Primarily found in South Coast of California: Channel Islands and Los Angeles, Orange, Riverside, Santa Barbara, San Bernardino, and San Diego counties. Four record accounts in San Luis Obispo County (CalFlora 2011).	Coastal dunes, coastal scrub, and edges of coastal salt and brackish marsh and swamp communities between 1 and 35 m elevation.	Potential to occur. The CNDDB (2016) and existing literature have no records for Coulter's saltbush within the LOHCP Plan Area.
Cambria morning-glory (*Calystegia subacaulis* ssp. *episcopalis*)	-	-	4.2	Found in central Outer South Coast Ranges in San Luis Obispo County.	Chaparral and cismontane woodland at elevations from 60 to 500 meters. Perennial herb that blooms from April to May.	Potential to occur. The CNDDB (2016) and existing literature have no records for Cambria morning-glory within the LOHCP Plan Area.

Table A-2: Plant Species Summaries

Species	FESA[1]	CESA[2]	Other State[3]	Distribution	Preferred Habitat	Occurrence in LOHCP Plan Area[4]
Hardham's evening-primrose (*Camissoniopsis hardhamiae*)	-	-	1B.2	Grows in outer South Coast Ranges in both Monterey and San Luis Obispo counties.	Prefers sandy soil, limestone and disturbed oak woodland.	Known. The CNDDB (2016) has one record for Hardham's evening-primrose within the LOHCP Plan Area.
Coastal goosefoot (*Chenopodium littoreum*)	-	-	1B.2	Endemic to the south central coast between Los Angeles and San Luis Obispo counties	Coastal dunes and other sandy soils	Known. The CNDDB (2016) has two records for coastal goosefoot within the within the LOHCP Plan Area.
Salt marsh bird's beak (*Chloropyron maritimum ssp. maritimum*)	FE	SE	1B.2	Cuesta-By-The-Sea and at Sweet Springs Marsh, San Luis Obispo County.	Grows in the higher reaches of coastal salt marshes to intertidal and brackish areas influenced by freshwater input.	Known. The CNDDB (2016) has one record for salt marsh bird's beak within the LOHCP Plan Area.
Compact cobwebby thistle (*Cirsium occidentale* var. *compactum*)	-	-	1B.2	Grows in Central Coast (San Luis Obispo, Monterey counties, formerly San Francisco).	Chaparral, coastal dunes coastal prairie, coastal scrub at elevations from 5 to 150 meters. Perennial herb that blooms from April to June.	Potential to occur. The CNDDB (2016) and existing literature have no records for compact cobwebby thistle within the LOHCP Plan Area.
Surf thistle (*Cirsium rhothophilum*)	-	ST	1B.2	An endemic to the dunes of southern San Luis Obispo and northern Santa Barbara counties.	Perennial herb; blooms April through June; ranges in elevation from 10 to 197 feet; occurs in coastal dune and coastal bluff scrub communities.	Potential to occur. The CNDDB (2016) and existing literature have no records for surf thistle within the LOHCP Plan Area.
Blochman's leafy daisy (*Erigeron blochmaniae*)	-	-	1B.2	Endemic to Santa Barbara and San Luis Obispo counties.	Rhizomatous, perennial herb; blooms July through August; ranges from 10 to 147 feet in elevation and occurs in coastal dunes and coastal scrub.	Known. The CNDDB (2016) has two records for Blochman's leaf daisy within the LOHCP Plan Area. Blochman's leafy daisy is also found in undisturbed areas of the LOHCP Plan Area (J. Chesnut, pers. comm.). The species has also been documented on Bayview Unit of the Morro Dunes E.R. (Holland and Kiel 1985).

Table A-2: Plant Species Summaries

Species	FESA[1]	CESA[2]	Other State[3]	Distribution	Preferred Habitat	Occurrence in LOHCP Plan Area[4]
Saint's daisy (*Erigeron sanctarum*)	-	-	4.2	Occur in Santa Barbara, Santa Cruz Island, Santa Rosa Island, and San Luis Obispo	Found in chaparral, cismontane woodland, and coastal scrub.	Known. The CNDDB (2016) has no records for Saint's daisy within the LOHCP. However, it has been documented throughout the LOHCP Plan Area by Holland and Keil (1985).
Indian Knob mountainbalm (*Eriodictyon altissimum*)	FE	SE	1B.1	Between San Luis Obispo and Pismo Beach on Indian Knob Ridge, San Luis Obispo County.	Central maritime chaparral and coastal scrub. Ridges in open, disturbed areas within chaparral on Pismo sandstone.	Known. The CNDDB (2016) has two records for Indian Knob mountainbalm within the LOHCP Plan Area; the one in the center of the Bayview Unit of the Morro Dunes Ecological Reserve is extant (USFWS 2016a).
Suffrutescent wallflower (*Erysimum suffrutescens*)	-	-	4.2	Found in coastal regions of Los Angeles County northward into San Luis Obispo, Santa Barbara, and Ventura counties.	Flowers from December to August and is found on stabilized coastal sand dunes and coastal scrub vegetation from 0 to 150 m elevation.	Potential to occur. The CNDDB (2016) and existing literature have no records for suffrutescent wallflower within the LOHCP Plan Area. However, this species has been documented on the Broderson Site and adjacent Morro Dunes Ecological Reserve (MBA 2008).
Mesa horkelia (*Horkelia cuneata* ssp. *puberula*)	-	-	1B.1	Generally found in dry, sandy soils with coastal chaparral.	Sandy or gravelly sites in chaparral, cismontane woodland, and coastal scrub communities between 70 and 810 m elevation.	Known. The CNDDB (2016) has one record for mesa horkelia within the LOHCP Plan Area.
Kellogg's horkelia (*Horkelia cuneata* ssp. *sericea*)	-	-	1B.1	Found coastally along central coast and outer south coast ranges.	Perennial herb; blooms April through September; ranges from 33 to 656 feet in elevation; occurs in closed-cone coniferous forest, maritime chaparral, and coastal scrub on sandy or gravelly soils, often in open areas.	Potential to occur. The CNDDB (2016) and existing literature have no records for Kellogg's horkelia within the LOHCP Plan Area.

Table A-2: Plant Species Summaries

Species	FESA[1]	CESA[2]	Other State[3]	Distribution	Preferred Habitat	Occurrence in LOHCP Plan Area[4]
Coulter's goldfields (*Lasthenia glabrata* ssp. *coulteri*)	-	-	1B.1	From interior portions of Monterey County, south to coastal and interior portions of San Diego County, and on Santa Rosa Island.	Occurs in coastal salt marshes.	Known. The CNDDB (2016) has one record of known occurrence for Coulter's goldfields within the LOHCP Plan Area. The species is also known to occur on the undeveloped lots at the shore end of Pine and Ramona (J Chestnut, pers. comm.).
Carmel Valley bush-mallow (*Malacothamnus palmeri* var. *involucratus*)	-	-	1B.2		Chaparral, cismontane woodlands; talus hills andslopes, sometimes on serpentine. Commonly found in burned area. Elevations from 90 to 3,500 feet.	Potential to occur. The CNDDB (2016) and existing literature have no records for Carmel Valley bush-mallow within the LOHCP Plan Area.
Crisp monardella (*Monardella undulata ssp. crispa*)	-	-	1B.2	Known in Santa Barbara and San Luis Obispo counties. Occurs in the dunes of Point Arguello, Guadalupe, Point Sal, Casmalia, and Oceano.	Rhizomatous, perennial herb; blooms April through August; ranges from 33 to 394 feet in elevation and occurs on sandy soils in coastal dunes and coastal scrub.	Potential to occur. The CNDDB (2016) and existing literature have no records for crisp monardella within the LOHCP Plan Area.
San Luis Obispo monardella (*Monardella undulata ssp. undulata*)	-	-	1B.2	San Luis Obispo monardella is found from Marin to Santa Barbara counties.	Occurs in coastal sand dune, chaparral, and coastal scrub communities.	Known. The CNDDB (2016) and existing literature have no records for San Luis Obispo monardella within the LOHCP Plan Area. However, Holland and Keil (1985) have documented the species within Los Osos.
Coast woolly-head (*Nemacaulis denudata* var. *denudata*)	-	-	1B.2	South central coast between San Luis Obispo and San Diego counties	Coastal dunes and beaches	Known. The CNDDB (2016) has one record for this species within the LOHCP Plan Area.

Table A-2: Plant Species Summaries

Species	FESA[1]	CESA[2]	Other State[3]	Distribution	Preferred Habitat	Occurrence in LOHCP Plan Area[4]
Short-lobed broomrape (*Orobanche parishii* ssp. *brachyloba*)	-	-	4.2	San Diego County, San Luis Obispo County, San Nicolas Island, Santa Catalina Island, Santa Cruz Island, San Miguel Island, Santa Rosa Island; Baja California and Isla Guadalupe, Mexico.	Found in coastal bluff scrub and coastal dunes.	Potential to occur. The CNDDB (2016) and existing literature have no records for short-lobed broomrape within the LOHCP Plan Area.
Sand almond (*Prunus fasciculata* var. *punctata*)	-	-	4.3	Endemic to Santa Barbara and San Luis Obispo counties.	Found in maritime chaparral, cismontane woodland, coastal dunes, coastal scrub and sand.	Known. The CNDDB (2016) has no records for sand almond within the LOHCP Plan Area. However, previous surveys by Morro Group have documented sand almond within the LOHCP Plan Area.
Chaparral ragwort (*Senecio aphanactis*)	-	-	2B.2	Found growing in central western California, south coast and Channel Islands.	Found in chaparral, cismontane woodland, coastal scrub/alkaline.	Potential to occur. The CNDDB (2016) and existing literature have no records for chaparral ragwort within the LOHCP Plan Area.
California seablite (*Suaeda californica*)	FE	-	1B.1	Grows along central coast and specifically occurs along the perimeter of Morro Bay in San Luis Obispo County.	It is restricted to the upper intertidal zone within coastal marsh habitat.	Known. The CNDDB (2016) has one known occurrence for California seablite within the LOHCP Plan Area in Baywood Park at Sweet Springs Marsh. It is also found on the shoreline of Morro Bay on undeveloped properties/
Lichens						

Table A-2: Plant Species Summaries

Species	FESA[1]	CESA[2]	Other State[3]	Distribution	Preferred Habitat	Occurrence in LOHCP Plan Area[4]
Spiraled old man's beard (*Bryoria spiralifera*)	-	-	1B.1	North and Central Coastal California endemic. Humboldt, Sonoma, Monterey, and San Luis Obispo counties.	Occurs on twigs and small branches of trees and older shrubs within coast live oak woodland, chaparral, and coastal scrub.	Known. The CNDDB (2016) and existing literature have three records for spiraled old man's beard within the LOHCP Plan Area.
Popcorn lichen (*Cladonia firma*)	-	-	2B.1	Believed to only occur in the Elfin Forest in Los Osos.	Common at the base of small shrubs.	Known. The CNDDB (2016) has three records for popcorn lichen within the LOHCP Plan Area.
Los Osos black and white lichen (*Hypogymnia mollis*)	-	-	-	Fog belt of Central California: Monterey, San Luis Obispo, Riverside, and San Diego County.	Occurs on bark and twigs of trees and older shrubs in Coast Live Oak Woodland, Chaparral, and Coastal Scrub.	Known. The CNDDB (2016) does not have any occurrences for Los Osos black and white lichen within the LOHCP Plan Area. The Consortium of North American Lichen Herbaria documents 5 occurrences of Los Osos Black and White lichen within the LOHCP Plan Area (CCH 2016).
Long fringed parmotrema (*Parotrema hypolecinum*)	-	-	-	Fog belt of Central and Southern California: Marin, San Luis Obispo, Santa Barbara, Ventura, Los Angeles, Orange, and San Diego County.	Occurs on bark and twigs of trees and older shrubs in Coast Live Oak Woodland, Chaparral, Coastal Scrub, and Arroyo Willow Series.	Known. The CNDDB (2016) does not have any occurrences for long-fringed parmotrema within the LOHCP Plan Area. The Consortium of North American Lichen Herbaria documents two occurrences of long fringed parmotrema within the LOHCP Plan Area (CCH 2016).
Splitting yarn lichen (*Sulcaria isidiifera*)	-	-	1B.1	Los Osos/Baywood Park area, San Luis Obispo County.	On trunks of coast live oaks, chamise and Ceanothus.	Known. The CNDDB (2016) has four records for splitting yarn lichen within the LOHCP Plan Area.

[1] **ESA Status:** Listing Status under the Federal Endangered Species Act

FE: Federal Endangered

FT: Federal Threatened

[2] **CESA Status:** Listing Status under the California Endangered Species Act

SE: State Endangered

Table A-2: Plant Species Summaries

Species	FESA[1]	CESA[2]	Other State[3]	Distribution	Preferred Habitat	Occurrence in LOHCP Plan Area[4]

ST: State Threatened

[3] Other State Designations

California Rare Plant Rank Designations:

List 1B: Plants rare, threatened, or endangered in California and elsewhere

List 2B: Plants rare, threatened, or endangered in California, but more common elsewhere

List 3: Plants about which more information is needed—a review list

List 4: Plants of limited distribution or infrequent presence throughout California —a watch list

California Rare Plant Threat Ranks, represented as decimals after status categories (e.g., "List 1B.1"):

0.1: Seriously threatened populations

0.2: Marginally threatened populations

0.3: Populations with limited threats

[4] Based on known records and observations, which are not comprehensive of all actual occurrences and therefore underrepresent species distributions.

Appendix B Covered Species Profiles

B.1 Morro Shoulderband Snail (*Helminthoglypta walkeriana*)

B.1.1 Listing and Conservation Status

The Morro shoulderband snail (*Helminthoglypta walkeriana*: Helminthoglyptidae) is a federally-listed endangered species (USFWS 1994). The U.S. Fish and Wildlife Service (USFWS) completed a recovery plan for the endangered snail and four plants from western San Luis Obispo County (USFWS 1998a) and designated critical habitat for Morro shoulderband snail (USFWS 2001). The USFWS conducted a five-year review for this species in 2006, providing additional information about its ecology and conservation status (USFWS 2006).

B.1.1.1 Recovery Plan

The recovery plan for Morro shoulderband snail, which also addresses Morro manzanita and Indian Knob mountainbalm and two other plant species not present in the LOHCP Area, identifies four conservation planning areas in and around Los Osos that support other listed and sensitive species and where recovery potential is high. Specific criteria used to designate the planning areas where conservation activities should be focused included:

1. The distributions of the Morro manzanita, Morro shoulderband snail, and Indian Knob mountainbalm overlap or are contiguous with one another, with historic or occupied habitat for the Morro Bay kangaroo rat, or with the distributions of other sensitive species; and,
2. Natural habitats are relatively large and unfragmented by development; or,
3. Natural habitats are in public ownership or are adjacent to areas that are already secured and are to be managed for their biological diversity.

The recovery plan set as a down-listing criterion protection of relatively unfragmented habitat blocks in each of the four conservation planning areas that can support populations that are large enough to minimize extinction risk in the short term (i.e., for the next 50 years). The recovery plan also provides guidance on management of these areas to recover the Morro shoulderband snail, which requires intact habitat that is relatively unfragmented by urban development, and is secure from threats of exotic snail predation, pesticides, recreational use, and invasion of exotic plants. Special management needs include controlling exotic pest plants to maintain intact native habitat, restoring and maintaining connectivity among isolated populations to preserve genetic diversity, controlling pesticides in snail areas, controlling exotic predatory snails, and restoring native plant communities.

In the first in-depth review of the species' status since the recovery plan was developed, the USFWS (2006) concluded in its five-year review that Morro shoulderband snail populations are stable to increasing, and that threats due to habitat loss and degradation have been reduced considerably. The USFWS also stated its intention to work to expand habitat maintenance activities in other areas essential for the species using habitat conservation plans and other regulatory mechanisms as applicable (USFWS 2006). Though the five-year review recommended that the species be down listed to 'threatened' (USFWS 2006), the federal status of Morro shoulderband snail remains 'endangered.'

B.1.1.2 Critical Habitat

The USFWS designated critical habitat for MSS throughout the species' existing range. Within this area, the primary constituent habitat elements are: sand or sandy soils needed for reproduction; a slope not greater than 10 percent to facilitate movement of individuals; and the presence of native coastal sage scrub vegetation. This vegetation is typically, but not exclusively, represented by mock heather (*Ericameria ericoides*), seaside buckwheat (*Eriogonum parvifolium*), eriastrum (*Eriastrum densifolium*), dune lupine (*Lupinus chamissonis*) and dudleya (*Dudleya sp*.); and in more inland locations by California sagebrush (*Artemesia californica*), coyote brush (*Baccharis pilularis*) and black sage (*Salvia mellifera*) (USFWS 2001).

Critical habitat mapped in three units total approximately 2,576[13] acres (Figure 4-4). The units correspond to the areas delimited in the recovery plan, with except that the Morro Spit and West Pecho units were merged for purposes of critical habitat (Figure 4-3).

Unit 1: Morro Spit and West Pecho: This unit consists of 1,831 acres of land that is largely (90.4%) protected and managed by Montaña de Oro State Park (Dunes Natural Preserve) and the City of Morro Bay (north end of spit), including the length of the spit and the foredune areas extending south toward Hazard Canyon, and private lands further inland. It features several significant viable populations of MSS and is deemed essential to maintaining genetic diversity of the species. The LOHCP Area includes 376 acres (20.5%) of this unit.

Unit 2: South Los Osos: Unit 2 features 331 acres on the lower slopes of the Irish Hills that supports central maritime chaparral and coastal sage scrub. Located almost entirely within the LOHCP Area (33, this area is considered essential to the conservation of the Morro shoulderband snail because, appropriate management maintain habitat allowing the core population to expand and threats to the species to be reduced (USFWS 2001). Of the 661 acres, 282 (85%) is protected within the Bayview Unit of the Morro Dunes Ecological Reserve and the County's Broderson Property.

Unit 3: Northeast Los Osos: This 414-acre unit, of which 274 acres (66%) is within the Plan Area, includes 256 acres (62%) that is protected in State and county-owned Elfin Forest Preserve and portions of Morro Bay State Park. It features 416 acres of undeveloped area between Los Osos Creek and Baywood Park, which supports coastal sage scrub, with scattered stands of central maritime chaparral and coast live oak woodland (*Quercus agrifolia*). Protection and recovery of this unit is essential to maintain the genetic variability of the species and the full range of ecological setting within which the snail is found. Habitat conditions are favorable for the expansion and persistence of the core population and, with the reduction of threats through appropriate management, this area could support a larger Morro shoulderband snail population and contribute to the recovery of the species (USFWS 2001).

B.1.2 Available Information

Morro shoulderband snail research has examined the species taxonomy and morphology (Pilsbry 1939, Miller 1985, Roth 1985, Walgren 2003a, Tupen and Roth 2005) b), geographic distribution (Walgren

[13] This is the acreage in a geographic information system shapefile produced by the USFWS, which differs slightly from the 2,556 acres listed in the critical habitat designation (USFWS 2001).

2003a), and habitat specificity (Adams et al. 2000, Reeves et al. 2000). These and other studies have used observations to hypothesize about aspects of the animal's dispersal (Walgren 2003a), parasitism (Hill 1974, Walgren 2003a), and competition within introduced snails (Hill 1974, Walgren 2003a). Additional information about the distribution, abundance, and habitat of MSS has been developed through pre-project surveys and salvage conducted to construct and hook up homes and business to the Los Osos Wastewater Treatment Plant (SWCA 2012-2017).

B.1.3 Taxonomy

Also commonly known as the banded dune snail (USFWS 1998a), the Morro shoulderband snail (*Helminthoglypta walkeriana*) is a member of the Helminthoglypta family which is in the Class Gastropoda of the Phylum Mollusca. Species in the genus *Helminthoglypta* occur in a wide range of habitats west of the Sierra Nevada from Baja California to southwestern Oregon (Miller 1985) and have similar shell characteristics, which include the shoulderband—a revolving dark band on the shell (Walgren 2003a). Based on morphometric analysis of shell characteristics, Walgren (2003b) recommended that MSS populations be divided into two subspecies, which were as recognized at the time of MSS listing in 1944 as *H. w. walkeriana* and *H. w. morroensis*. Roth and Tupen (2004) argued for the separation of two distinct species: *H. walkeriana* and *H. morroensis*. The USFWS accepted the results of Roth and Tupen (2004) that elevated to the taxa to the species level (USFWS 2006).

B.1.4 Description

Morro shoulderband snail is a terrestrial snail with a slightly translucent shell featuring 5-6 whorls. Its shell is 18-29 mm in diameter and 14-25 mm tall (Roth 1985). The Morro shoulderband snail can be differentiated from the Big Sur shoulderband snail (*Helminthoglypta umbilicata*) as the MSS has incised spiral grooves and an occluded umbilicus—the cavity in the center of the base of the shell that is surrounded by the whorls. Rather than a distinct band, the exotic brown garden snail (*Helix asper*) has a marbled color pattern on its shell and a completely occluded umbilicus (Roth 1985, Walgren 2003a). In differentiating between subspecies of *H. walkeriana*, Walgren (2003b) defined *H. w. morroensis* by its profuse, coarse, papillations (bumps) and weak incised spiral grooves and *H. w. walkeriana* by its weak papillation and strong incised spiral grooves. He found that *H. w. walkeriana* was larger at time of sexual maturity than *H. w. morroensis*.

B.1.5 Distribution

The current known range of Morro shoulderband snail is approximately 7,700 acres (Roth and Tupen 2004). Most of the area is centered on Los Osos north of Hazard Canyon, west of Los Osos Creek, and south of Morro Bay; however, it also includes a narrow strip of coastal dunes north of Morro Bay in Morro Strand State Park (Roth and Tupen 2004, USFWS 2006).

B.1.6 Habitat

Within the Los Osos area, the Morro shoulderband is primarily found on the Baywood fine sands soils and the active dunes of the Morro Bay sand spit (Walgren 2003a). In a single location, MSS were observed on a "clay" soil in Los Osos Oaks Reserve approximately 200 m from the nearest mapped Baywood fine sands soil. Based on this description, the "clay" soil was likely the Conception loam, which has a higher proportion of smaller soil particles (clay and silt) than Baywood fine sands (USDA 1984).

However, other locations supporting live snails were all located on Baywood fine sand soils (Walgren 2003a).

Due to a combination of factors which affect plant growth, including topography, soil conditions, disturbance history, and land use history, the Baywood fine sand soils support a diverse mosaic of plant assemblages varying from open dunes to dense woodlands. Originally, MSS was thought to be restricted to coastal dune and scrub communities which predominant in the Los Osos region (Roth 1985, USFWS 1998a, 2001). It was hypothesized that early and mid-successional coastal sage scrub communities would provide optimal MSS habitat by featuring greater density of immature shrubs which, unlike mature shrubs, have lower branches in contact with the soil (Roth 1985).

The California Department of Parks and Recreation commissioned two studies to characterize the distribution and habitat of MSS within coastal dune and coastal sage scrub of the Los Osos region (Adams et al. 2000, Reeves et al. 2000), and a third study examined the distribution of MSS with respect to eucalyptus (Walgren and Andreano 2012).

Adams et al. (2000) examined vegetation characteristics near Shark's Inlet then sampled the abundance of MSS and characterized the vegetation in 101 plots randomly located in "representative vegetation" in the Montana de Oro and the Elfin Forest. The analyses based on biased sampling in which a greater number of plots were deliberately located within coastal sage scrub preclude determination of whether the MSS is preferentially found within the different community types described and mapped. The study did not examine potential correlations of snail distribution and abundance with individual plant species or other habitat characteristics. However, the researchers reported that, of the 44 MSS observed in the 101 sampled 20 m^2 circular quadrats, 26 were found in the litter under mock heather (*Ericameria ericoides*) and 14 were found under iceplant (*Carpobrotus* sp.) (Adams et al. 2000).

Reeves et al. (2000) sampled litter, vegetation, and MSS abundance in 3.14 m^2 quadrats located along transects deliberately located within known MSS populations at three sites: the Sand Spit and Sharks Inlet areas of Montaña de Oro State Park and the Elfin Forest. Their results indicated the following:

- MSS occurred in plots with 17% more litter cover by weight than habitat without;
- MSS occupied plots with 10% less open sand and therefore more plant cover;
- Species composition in plots with MSS differed from those without, though not single plant species were predictive of MSS occurrence;
- *Senecio blochmanii, Eriogonum parvifolium, Lessingia filaginifolia* var. *filaginifolia* and *Dudleya lanceolata* showed trends toward greater abundance in plots with MSS that those without MSS;
- *Lessingia filaginifolia* var. *californica* and *Artemesia californica* exhibited trends toward lower abundance in plots with MSS than those without MSS;
- MSS was more likely to be found in plots with greater percentage of vegetation in contact with the soil; and,
- Live MSS snails occurred with MSS shells in the 3.14 m^2 plots more likely than predicted by chance alone, suggesting that MSS may occupy the same small patches through time.

During a more recent distribution survey of the Los Osos Valley, Walgren (2003b) observed Morro shoulderband snails in a variety of plant associations that he classified as follows:

- coast live oak woodland;
- California annual grassland;
- dune lupine-goldenbush;
- introduced perennial grasslands (*Ammophila* sp. and *Ehrharta* sp.); and
- iceplants.

In a more recent study, Walgren and Andreano (2012) evaluated MSS distribution with respect to eucalyptus (*E. cephalocarpa*) in Montaña de Oro State Park and found just one MSS under the exotic tree canopy compared to 37 MSS in intact habitat away from the exotic trees. A lower number of MSS were similarly salvaged from eucalyptus litter than from coastal sage scrub and veldt grass areas in the Broderson site, as part of efforts to capture and relocate MSS at the Broderson site as part of the wastewater treatment plant (SWCA 2013). Though the mechanisms limiting MSS abundance under eucalyptus are unknown, it may reflect alterations in the availability of plant detritus, competition (including predation) by other snail species, and/or modifications to abiotic habitat conditions, including light, temperature, moisture, or soil chemistry (Walgren and Andreano 2012).

Though there is little information about the relative abundance of MSS within these communities, these observations suggest that the species occupies a wider range of plant communities within the Baywood fine sand soils than simply coastal dune and sage scrub. Importantly, the species has been found in association with a variety of anthropogenically disturbed habitat areas, including areas where coastal sage scrub has been converted to non-native grassland due to vegetation clearing and mowing, areas covered by veldt grass and iceplant, landscaping and ornamental plantings, woodpiles, and other habitats within developed areas and rights-of-way (SWCA 2013, 2014, 2015, 2016, and 2017). Indeed, frequent observation of MSS within a range of habitat conditions found within existing developed parcels areas as well as remaining vacant parcels suggest MSS has the potential to occur throughout the urban services line and Los Osos Wastewater Treatment Plant Area (Figure 2-2), as well as intact habitat on the perimeter of the Plan Area.

Based on his observations and the results of Adams et al. (2000) and Reeves et al. (2000), Walgren (2003a) suggests that snail presence may be primarily influenced by moisture retention and protection from solar radiation, which are in turn influenced by leaf litter density, vegetation density, and the extent to which the vegetation is in contact with the soil, and that the species of plant is less important in predicting soil presence than its habit or physiognomy. This finding is similar to that observed for the congener *H. arrosa*, which was deemed a habitat generalist as it inhabits a variety of coastal communities on Bodega Head, in Sonoma County, California (Van der Laan 1971).

B.1.7 Life History

Few studies have examined aspects of the ecology or life history of the Morro shoulderband snail. The following summary provides current known and hypothesized information; however, much more research is needed.

B.1.7.1 Longevity

No studies have examined the life cycle of MSS. Based on population biology research on the congeneric *Helminthoglypta arrosa* (Van der Laan 1971), Roth (1985) hypothesized that MSS may live six to ten

years and reach sexual maturity at three years. Growth of MSS is determinant, and sexual maturity is reached shortly after maximum size is attained. When compared to adult MSS, immature shells are smaller, have fewer whorls, and lack an aperture lip (Roth 1985).

B.1.7.2 Activity and Behavior

Like all land snails, which are susceptible to desiccation, MSS activity is closely tied to moisture. They are primarily active during or soon after rainfall events during the wet season (November – March). During the dry season (May-October), their activity is tied to the occurrence of precipitation from dense coastal fog, which can be frequent especially during the early morning hours; however, they are occasionally observed during dry periods within the rainy season (Ballantyne 2016). During dry periods, MSS likely estivate within the litter layer or below ground covering vegetation to avoid desiccation (Roth 1985).

Morro shoulderband snails are most often observed underneath plant or litter cover. Hill (1974) noted that the five snails he located during searches of the lower limbs and litter of vegetation were attached to the undersides of limbs of mock heather (*Ericameria ericoides*). The five live MSS individuals observed by Roth (1985) were under a mat of *Carpobrotus* sp. (n=3) or under boards located in the habitat. Though the small number of observations and methods of searching in both studies do not enable definitive conclusions about microhabitat, these observations are consistent with the behavior of reducing exposure to radiant energy, wind, and predators. These observations are similar to those of the congener *H. arrosa*, which frequently attached to the trunks of bush lupine (*Lupinus arboreus*) in the coastal scrub of Bodega Bay, CA (Van der Laan 1971).

Roth (1985) did not locate MSS below the surface of the soil during excavations around the base of mock heather, and thus stated that it appears the species is not fossorial. He did not quantify the level of effort in the search, and it is not clear whether additional searches in different years, sites, and/or plant species might provide different results. During efforts to capture and relocate MSS as part of the Los Osos Wastewater Treatment Plan project construction, biologists observed MSS occurring in shallow divots in the soil, of no more than half of an inch (Belt 2016, Ballantyne 2016).

At Bodega Head in Sonoma County, a coastal area supporting coastal scrub vegetation, *H. aspersa* was typically active during reduce solar illumination, including under overcast skies and at night (Van der Laan 1971).

B.1.7.3 Reproduction

No studies have examined the reproductive ecology of Morro shoulderband snails. Based on a study of the congener *H. arrosa* in coastal Sonoma County (Van der Laan 1971) and the constraints on snail activity that result from the marked dry season in the Mediterranean climate of Los Osos, Roth (1985) hypothesized that copulation, oviposition, and growth of MSS occur primarily during the wet season (November – April).

The eggs of MSS may be susceptible to mortality caused by desiccation or heat. Roth (1985) observed desiccated 2 mm diameter eggs in mock heather (*Ericameria ericoides*) litter on the Morro Spit, which he attributed to Helminthoglypta spp., though could not distinguish between *H. walkeriana* and *H. umbilicata*. Because most eggs of *H. arrosa* were viable (Van der Laan 1971), Roth (1985) suggested that drought and/or heat may have caused mortality of the eggs he observed. Due to the abundance of

scattered eggs relative to the low density of live MSS, Roth (1985) speculated that the eggs were a result of several years of oviposition.

B.1.7.4 Feeding

There have been no studies to determine the feeding ecology of the Morro shoulderband snail. Hill (1974) suggests that the rows of small file-like structures in the radula (mouth parts) of the MSS are consistent with that of herbivorous land snails and that MSS may feed on fungal mycelia in litter. However, no studies have been conducted to test these hypotheses (Walgren 2003a).

B.1.7.5 Competition

Within the Los Osos Valley, MSS co-occur with four other snail species: Big Sur shoulderband (*Helminthoglypta umbilicata*), Chorro shoulderband snail (*H. morroensis*), brown garden snail (*Helix aspersa*), cellar glass snail (*Oxychilius cellarius*), and California lancetooth (*Haplotrema minimum*; Walgren 2003a, Tenera 2006). Hill (1974) suggested that, because brown garden snails co-occur with MSS and because he observed each species on the same plant, brown garden snails compete with MSS.

Roth (1985) and Walgren (2003a) both point out that there is weak evidence to support the claim that brown garden snails compete with MSS. Roth (1985) observed that brown garden snails inhabit the interior portions of shrubs and MSS the litter near the canopy edge. Walgren (2003a) noted that the brown garden snail is primarily found in wetter microsites, including perennial wetlands, along estuaries and riparian edges, and near human structures, where MSS are also known to occur (SWCA 2013).

In the 101 sampled $20m^2$ circular quadrats located within coastal dune and sage scrub within Montaña de Oro State Park, Adams et al. (2000) found 46 Morro shoulderband snails in a total of 21 quadrats, 2 of which contained a total of 6 live brown garden snails, and 9 of which contained a total of 37 Big Sur shoulderband snails. The researchers note that the greatest number of MSS were observed in two quadrats that lacked Big Sur shoulderband and brown garden snails (n=10 and n=4). However, this observation could suggest different microhabitat affinities (Walgren 2003a) as well as interspecific competition.

Though more research is needed to evaluate the effects of competition on MSS, management should still prevent the invasion and spread of brown gardens snails, as well as other exotic animals, into MSS habitat.

B.1.7.6 Predation

Heagy (1980) speculated that deer mice (*Peromyscus maniculatus*), alligator lizards (*Elgaria coerulea*), and unidentified beetles may prey upon MSS as they do with other snail species. Roth suggested that a broken MSS shell was indicative of rodent kill (Roth 1985). The shells of MSS have been observed on the feeding perches of unidentified birds (Walgren 2004.).

In nearby Diablo Canyon, the Decollate snail (*Rumina decollata*), an introduced, predatory snail, has been observed. These snails are sold in nurseries in unregulated counties and states as a way to control garden snails. Introduction of this snail may present a threat to MSS (Walgren 2004). It is unknown whether these snails currently occur within the range of Morro shoulderband snail.

B.1.7.7 Parasitism

The presence of Sarcophagid fly puparia (pupa casings) within Morro shoulderband snail shells has lead researchers to hypothesize that MSS are parasitized by these flies (Hill 1974, Roth 1985). Walgren (2003a) points out that the presence of puparia cannot be used to infer parasitism as Sarcophagid flies commonly feed on dead flesh and may simply be saprophagous (i.e., carrion feeders). In their study, Adams et al. (2000) observed no evidence of parasitism in 121 live MSS and Big Sur shoulderband snails sampled. Based on his literature review, field observations, and discussions with entomologists, Walgren suggests that the pupae found in MSS shells are from consumption of already dead snails (Walgren 2003a).

Two studies have documented the frequency of occurrence of Sarcophagid fly puparia within MSS shells. Walgren (2003a) found that the frequency of puparia presence ranged from 1.9% to 32% among 7 sites sampled throughout the range of H. w. walkeriana and H. w. morroensis. At Montaña de Oro State park, Adams et al. (2000) found that 3.7% (4 of 109) of MSS shells had Sarcophagid fly puparia.

If the presence of puparia does indeed indicate parasitism-induced mortality, it is not clear how these rates of would influence MSS population dynamics and persistence. Moreover, though attempts to identify the species of fly found in MSS shells have been foiled by difficulty in rearing the larva in the lab, there is no current evidence that the species of fly observed in MSS shells is non-native or introduced (Walgren 2003a).

B.1.8 Population Abundance and Density

No studies have quantified the abundance of MSS. In 1985, Roth estimated the total abundance of MSS as “in the hundreds”, though added that additional field research would be required to accurately estimate abundance (Roth 1985). Adams et al. (2000) sampled density of MSS in 101, 20 m^2 circular quadrats located on transects deliberately placed in habitat known or hypothesized to support populations of MSS. They reported densities ranging from 0 – 10 snails/ 20 m^2 but did not report the mean or variance for the samples. Though Reeves et al. (2000) also counted the number of MSS found within sampled quadrats along transects, they did not report the density of individuals observed.

Walgren (2003a) examined MSS presence/absence and thus did not report population abundance, though thought that, based on the number of individuals observed during distribution sampling, the population is likely greater than the hundreds estimated by Roth (1985).

As part of efforts to minimize the impacts of installation of the Los Osos Wastewater Treatment Plant and associated connections (i.e., laterals), biologists have conducted pre-disturbance surveys to capture and relocate MSS from disturbance areas since 2012. These surveys have been conducted on the County’s Broderson and Midtown properties, where the wastewater treatment infrastructure was installed, and on hundreds of residential and commercial parcels, as well as adjacent County rights-of-where, where landowners are connecting buildings to the collection system. Since 2012, 2,121 MSS have been encountered during the surveys (SWCA 2016 and 2017). The survey reports do not indicate the total number of parcels or area surveyed, nor do they report negative findings, such that it is not possible to use these data to assess MSS frequency or density. Nonetheless, these surveys have indicated that MSS can be very abundant in the Plan Area, both in intact habitat as well as degraded habitat associated with existing development. For example, 404 MSS were captured at the County’s

12.2-acre Midtown Property, while 245 were captured in a 0.14-acre parcel near San Luis Avenue and 6th Street (SWCA 2016).

B.1.9 Dispersal and Colonization

No studies have examined dispersal of MSS. Active dispersal of MSS would likely involve slow, short distance migration during periods of favorable conditions. Over time, perhaps several generations, the species could actively disperse larger distances, provided populations persist and favorable conditions are maintained.

As with other land snails, MSS active dispersal may be limited by natural and anthropogenic barriers. Natural barriers, such as bodies of water or inappropriate vegetation types (e.g., dense riparian vegetation or woodlands), may inhibit dispersal, either by preventing snail locomotion or by lacking the appropriate stimulants, such as food odors, to attract snails (New 1995). Human-created barriers such as structures, landscaping, wide trails, and roads can similarly inhibit snail movement. Roads may present particular barriers as they can cause desiccation if the snails cannot create sufficient mucus to traverse the dry surfaces.

Morro shoulderband snails might be able to disperse across barriers and over larger distances through passive migration. Various mammals, birds, and insects may vector the species, as could wind or rafting on floating objects. Human activity might also result in longer distance dispersal of MSS.
Walgren (2003a) suggests that MSS have colonized areas that were previously unoccupied. He observed live or recently dead MSS in three locations that had either been highly disturbed or created in the recent past (an artificial peninsula and an artificial dune created by deposition of dredged material and a former mine). Though they were not known to be deliberately introduced, it is not clear whether MSS naturally dispersed or if their colonization resulted from anthropogenic factors (Walgren 2003a).

B.1.10 Threats

Due to its limited geographic range (Los Osos Region) and narrow habitat specificity (Baywood fine sand soils and stabilized dunes), the Morro shoulderband snail is naturally rare. Though the original acreage of habitat occupied by the species is unknown, loss of habitat due to conversion for development and agriculture has no doubt reduced the distribution and abundance of MSS. Fragmented habitat may support smaller populations of MSS that would be more vulnerable to extirpation due to environmental stochasticity, such as fire, drought, or disease, reductions in population growth due to insufficient population size (Allee effects), and reduced fitness due to inbreeding depression. Frequent observations of MSS in areas of anthropogenically modified habitat, including landscaped areas (SWCA 2013), suggest populations may be able to persist in such areas.

Little is known about the factors that influence the distribution, abundance, and population persistence of Morro shoulderband snails, making it difficult to understand the threats to the populations within protected habitat. Previous reports have identified parasitism by Sacrophagid flies and competition from brown garden snails (*Helix asper*) as potential threats to MSS populations (Hill 1974, USFWS 1994, 2001); however, the five-year review for MSS concluded that there is no evidence to substantiate these threats (USFWS 2006).

Three additional factors that may threaten the persistence of MSS even within protected habitat: wildfire, unnatural succession due to fire exclusion, disturbance due to recreation, and the invasion and spread of exotic species.

B.1.10.1 Fire

A large wildfire could potentially threaten persistence of Morro shoulderband snail populations. Snails cannot evade fire, and unless the fire is cool or very patchy, it will likely kill all snails. Arson within Morro Strand State Beach killed all snails within the approximately three-acre area burned (M. Walgren, pers comm. 2004). State Parks ecologists have established permanent plots to monitor potential snail recolonization from adjacent, intact habitat; however, no data are yet available (Walgren 2003a).

Prescription fires designed to simulate the natural fire regime of the Baywood fine sand communities, increase native biodiversity, and facilitate populations of fire-adapted species including Morro Bay kangaroo rat (*Dipodomys heermanni morroensis*), Morro manzanita (*Arctostaphylos morroensis*), and Indian Knob mountainbalm (*Eriodictyon altissimum)* could directly negatively impact populations of Morro shoulderband snail. Roth (1985) observed two recently dead MSS shells and no live snails after a 19-acre prescription fire in coastal sage scrub designed to enhance Morro Bay kangaroo rat habitat. Fire management should incorporate avoidance and minimizations measures designed to reduce the potential for such direct negative impacts and maximize the potential for fires to facilitate long term persistence of MSS populations, including removing snails prior to conducting burns and using small, narrow, rectangular burns that can enhance the likelihood of snail recolonization (Roth 1985, Simmons et al. 1995).

B.1.10.2 Fire Exclusion

Roth (1985) has hypothesized that MSS population growth is maximized in early to mid-successional coastal sage scrub habitat, where younger shrubs provide softer tissues for food and foliage that is contiguous with the ground litter layer, for shelter. Unnatural succession of the coastal dune and sage scrub plant communities due to widespread fire exclusion could reduce the areal extent of such early and mid-successional assemblages. The extent to which fire threatens MSS populations is unclear, however, because the species' specific habitat requirements are uncertain. Moreover, though fire is a natural component of the Baywood fine sand communities, aspects of the natural fire regime and the successional relationships between the plant assemblages are unknown. More research is needed to understand the role of fire in maintaining habitat conditions required for MSS.

B.1.10.3 Recreation

Recreation within the Baywood fine sand communities causes disturbance. It removes established plant cover, including litter, and depending on the intensity and frequency, causes erosion and prevents plant re-establishment. Because plants and their litter create cover and shade and retain moisture required by MSS, recreation that removes plant and litter cover degrades or removes habitat for MSS. Recreation can also directly kill MSS, as their size and low vagility limits their ability to move away approaching humans, horses, and bicycles. Dogs allowed to wander unrestrained through the habitat may eat, harass, or otherwise impact MSS. Equestrians and humans could also trample MSS.

B.1.10.4 Exotic Animals

Exotic animals including rats (*Rattus rattus* and *Rattus norvegicus*) and feral cats (*Felis domesticus*) may prey upon MSS and could reduce their populations. This potential has increased the proximity of MSS habitat to development, with which these species are associated. Introduced predatory snails such as *Oxycheilus* sp. and the Decollate snail (*Rumina decollata*), which was recently identified in Diablo Canyon, could similarly negatively impact MSS populations (Roth, 1985, Walgren 2004); however, there is currently no direct evidence that exotic animals impact MSS populations (USFWS 2006).

B.1.10.5 Exotic Plants

The invasion and spread of exotic plant species can potentially threaten the persistence of MSS populations by degrading habitat and thus reducing or eliminating MSS populations. Many exotic plants are presently found within remaining intact habitat in the Los Osos region. These species vary greatly in their distribution, abundance, and aspects of their ecology that influence their potential impacts to MSS, which also depend on aspects of MSS ecology.

In general, exotic plants might indirectly threaten MSS populations by a variety of mechanisms. First, invasive, exotic trees can transform the native shrublands into woodlands, rendering habitat conditions unsuitable for MSS. In a recent study, MSS was not observed within stands of eucalyptus (*Eucalyptus* sp.) (Adams et al. 2000) and MSS has not been described as occurring in eucalyptus forests in any other studies (Walgren 2004). These trees have invaded native vegetation from initial plantations in Montaña de Oro State Park and Los Osos. They produce abundant shade and litter and competitively exclude native shrubs and herbs, thus limiting the distribution of MSS. Other exotic trees within the region including Monterey pine (*Pinus radiata*) and Monterey cypress (*Callitropsis macrocarpa*) might similarly restrict the distribution of MSS.

Herbaceous exotic plant species including iceplants and grasses can outcompete and, in some cases, competitively exclude native plant species on which MSS might rely for food or shelter. The endangered snail has been found in a wide variety of plant assemblages on the Baywood fine sands, including those dominated by invasive exotic species including iceplant (*Carpobrotus* spp.), veldt grass (*Ehrharta calycina*), and annual grasses (*Avena* spp., *Bromus diandrus*, and *B. rubens* ssp. *madritensis*) (Walgren 2003a), as well as fennel (*Foeniculum vulgare*), and ornamental/landscape plants (SWCA 2013). Though these exotic plants may not restrict the distribution of MSS, areas infested by these exotic plants may support smaller populations of MSS, though this has not yet been examined.

Finally, exotic plants can enhance the flammability of the vegetation and thus increase the risk of wildfire, thus indirectly threatening MSS populations. Eucalyptus is highly flammable while the annual and perennial grasses that have invaded coastal sage scrub create dry, fine fuels in the summer that are highly flammable. MSS populations are likely to be completely eliminated by fire, as discussed above.

B.2 Morro Manzanita (*Arctostaphylos morroensis*)

B.2.1 Conservation Status

Morro manzanita (*Arctostaphylos morroensis* Wiesl & B. Shreiber Ericaceae), is a federally-listed threatened species (USFWS 1994) and is ranked as most threatened and endangered according to the California Rare Plant Ranking (List 1B.1; CNPS 2016).

B.2.2 Available Information

A number of studies have examined many aspects of Morro manzanita biology, including: distribution and morphological variation (Mullany 1990), seed ecology and reproductive biology (Tyler and Odion 1996, Tyler et al. 1998, Tyler et al. 2000), and seed bank response to prescribed burning (Tyler et al. 2000, Odion and Tyler 2002). Research conducted on other species of *Arctostaphylos* in California, particularly those occurring in central maritime chaparral, provides additional information to help conserve and manage the endangered shrub. The USFWS conducted a five-year review for this species in 2008, providing additional information about its ecology and conservation status (USFWS 2008).

B.2.1 Distribution

Morro manzanita is endemic to the Los Osos region in coastal San Luis Obispo County where it occurs primarily on Baywood fine sands soils. Based on the likely historic distribution of these soils, Morro manzanita may have covered between 2,000 and 2,700 acres (McGuire and Morey 1992). Much of the Morro manzanita habitat has been converted for development, especially in the center of its historic range which is now occupied by the community of Los Osos. Currently, the range of *A. morroensis* is estimated to be approximately 840-890 acres, with the total number of individuals ranging between 86,000 and 153,000 (Crawford, Multari and Clark 2005).

B.2.2 Biology

B.2.2.1 Morphology

Morro manzanita is an evergreen tree-like shrub that grows to be 1.5-4.0 m tall. This non-burl forming manzanita has deep red stems with gray, shredding bark. The 2.5- to 4-cm long leaves are oblong to ovate to elliptic. Attached to the stems by 2- to 6-mm long petioles, Morro manzanita leaves nearly overlap along the stem, resulting in a whorled appearance despite their alternate arrangement (Hickman 1993). The upper surface of the leaves is dark green and smooth but can have a gray appearance due to a white or bluish film. The lower leaf surface is gray, owing to dense white hairs (Hickman 1993). Morro manzanita has white to pinkish urn shaped flowers that are 5- to 9-mm long and occur in dense racemes at the end of branches. The 8-13 mm diameter fruits are red to orange brown and contain 8 - 10 seeds each (Hickman 1993, USFWS 1994).

Morro manzanita can be differentiated from the co-occurring La Cruz manzanita (*Arctostaphylos cruzensis*) by the endangered shrub's shaggy grey bark, leaf base shape, and short woolly hairs on its lower leaf surface (USFWS 1994).

B.2.2.2 Phenology

Morro manzanita flowers in the mid-winter through early spring (January-May) and develops fruit between early spring (March) and early summer (Tyler et al. 2000). A 1999 study showed that fruits begin to fall from the plant as early as May, with the majority falling between August and early October (Tyler et al. 2000).

As with other shrubs in California's Mediterranean climate, Morro manzanita seeds likely germinate with the onset of the rains between October and December. In a study examining post-fire seedling establishment, maximum seedling abundance was observed in March, though no observations were made prior, making it difficult to say how early the seedlings established.

B.2.2.3 Life History

The age or size of shrubs at the onset of reproduction is currently unknown. Observations of small plants (<50 cm tall) with fruits on the old Broderson Road at the Bayview Unit of the Morro Dunes Ecological Reserve suggest that plants become reproductive within 5-8 years of establishment (J. McGraw, pers obs.)

Morro manzanita adults may be relatively long-lived. Analysis of historical aerial photographs combined with dendrochronology (annual ring counting of shrub stems) suggested that the oldest stands of Morro manzanita were 62 years old (in 2011); however, these analyses were constrained by the fact that earliest aerial photographs of the region were from 1949 (Tyler and Odion 1996). Tyler et al. (1998) observed recent mortality in the Elfin Forest stand, which was hypothesized to be the oldest stand of Morro manzanita (Tyler and Odion 1996). However, it is not known whether this mortality was the result of senescence or other site-specific conditions (e.g., soil pathogens).

B.2.3 Ecology

B.2.3.1 Habitat Preference

Though small portions are located on Santa Lucia shaly clay loam, Morro manzanita primarily occurs on the Baywood fine sand soils (Tyler et al. 2000). Formed from Pleistocene aeolian sand dunes, these soils are very deep and somewhat excessively drained. Due to its relatively coarse nature, the Baywood fine sand soils have low water holding capacity and, relative to loam and clay soils, low nutrient availability (H).

Of the three slope categories in the Baywood fine sand series (2-9% slope, 9-15% slope, and 15-30% slope), Morro manzanita cover is greater on the 9-15% and 15-30% slopes (Tyler and Odion 1996). This pattern may reflect the species' requirement for older, more developed soils that may feature a clay lens, which increases water holding capacity and thus is more conducive to the growth of large statured plants including Morro manzanita (JSA 1997). It could also reflect the disproportionately high rate of habitat conversion on areas of gentle slopes, which have been more recently cleared for agriculture than the steeper slopes (Tyler and Odion 1996). Determining whether Morro manzanita can persist on gentle slopes and whether it did prior to human alterations in the region is important for restoration and management.

B.2.3.2 Reproduction

Morro manzanita flowers are perfect; they contain both stamens and a pistil. These flowers are not self-fertilized, however, and instead require pollination to produce viable seed (Tyler et al. 1998, Tyler et al. 2000). It is not known whether plants are self-compatible; that is, whether viable seed can be produced from pollen from the same plant.

B.2.3.3 Pollination Biology

Pollinator studies conducted in 1998 and 1999 revealed that the most abundant pollinators of Morro manzanita were bumblebees (*Bombus vosnesenksii*). Addition pollinators include an Anthophorid bee (*Anthophora urbana*), several bee flies (*Bombylius* sp.) and Syrphid flies. In both years, the researchers noted the surprising low abundance of pollinator activity, even on warm, sunny days (Tyler et al. 1998, Tyler et al. 2000).

There is no record of Morro manzanita nectar robbery, in which animals obtain nectar from without pollinating the flower, typically by accessing nectaries through the corolla wall, rather than its aperture. Nectar robbery was observed to reduce seed production in the endangered silverleaf manzanita (*Arctostaphylos silvicola*), endemic to northern maritime chaparral in Santa Cruz County (Jacobson 1994).

B.2.3.4 Fruit Set

In 1998, an average of only 10% of Morro manzanita flowers produced fruits (Tyler et al. 1998). This rate is expected to vary from year to year depending on pollinator abundance, which can be influenced by spring weather, and flower production, which can be influenced by rainfall in the previous year when buds are produced (Keeley 1977).

B.2.3.5 Seed Biology

Morro manzanita is an obligate seeding species (Hickman 1993). Unlike many manzanita species (e.g., *Arctostaphylos tomentosa*), it does not have an underground burl from which it can regenerate following moderate to high intensity fires that consume aboveground biomass. Instead, population persistence requires successful germination of seeds.

Extensive research has been conducted to determine the factors which might influence the regeneration of Morro manzanita from seed following disturbance (Tyler and Odion 1996, Tyler 1996, Tyler et al. 1998, Tyler et al. 2000).

B.2.3.6 Seed Production

From limited available data, it is estimated that Morro manzanita produces 8-10 seeds per fruit (USFWS 1994).

B.2.3.7 Seed Predation

A 1998 study examining Morro manzanita fruit predation found that an average of 60% of fruits were removed from trays located under and away from Morro manzanita shrubs over a 46-day period (Tyler

et al. 1998). Rodents, including woodrats (*Neotoma lepida*) and brush rabbits (*Sylvilagus bachmani*), were hypothesized to be responsible for removing fruits as their nests and scat, respectively, were observed near the experimental trays in which the fruits were placed. Because the fruits were presumed to be removed by small mammals, which eat seeds within the fruits (Keeley and Hays 1976), the authors concluded that fruit predation results in seed predation and thus dramatically reduces the amount of available seed (Tyler et al. 1998).

B.2.3.8 Seed Dispersal

Birds and large mammals including by coyote (*Canis latrans*) and mule deer (*Odocoileus hemionus*) may eat Morro manzanita fruits from the stems and perhaps disperse viable seed as observed for other species of manzanita (Keeley and Hays 1976). However, the majority of Morro manzanita seeds likely fall to the soil below. These may be secondarily dispersed by birds and mammals. Seeds not killed during digestion can be dispersed by these animals. However, a study in another California chaparral system found that the majority of *Arctostaphylos* seeds remained within the canopy radius (Keeley 1977). Tyler and Odion (1996) found that that soil cores extracted from 1.5 m away from the canopy edge had an average of 90% fewer seeds than cores taken below the Morro manzanita canopy, suggesting secondary dispersal is likely limited.

B.2.3.9 Seed Viability

Studies have found that Morro manzanita seed obtained from the litter and soil has low viability (Tyler and Odion 1996, Tyler et al. 1998, Tyler et al. 2000). In 1996, mean seed viability across four sites was 4.8%, with the Elfin Forest sites having only 1.7% viable seed. In both 1996 and 1998, 45% of seeds examined lacked an embryo (Tyler and Odion 1996, Tyler et al. 1998). Such low fertility could indicate inbreeding problems associated with small populations (Tyler and Odion 1996).

Viability was slightly, but significantly lower in the litter (3.6%) compared to the soil (5.8%) (Tyler et al. 2000). Seed viability varied among sampled shrubs and ranged from less than 1% to 11% (Tyler et al. 2000). Viability was not lower in the soil at a depth of 5-10 cm, compared the top 5 cm of soil (Tyler and Odion 1996). Viability of seed collected under and dead live shrubs also did not significantly differ (Tyler et al. 1998).

B.2.3.10 Seed Dormancy

Morro manzanita exhibits some seed dormancy; some viable seed does not germinate but instead persists over several years and perhaps decades despite the presence of appropriate environmental cues during the fall/winter seasons. Though research has not specially examined the dormancy mechanism for Morro manzanita seeds, congeners including *Arctostaphylos glandulosa, A. patula, A. uva-ursi* and *A. alpina* all exhibit physiological dormancy: a physiological inhibiting mechanism prevents germination of the seed even in the presence of appropriate environmental conditions (Baskin and Baskin 2001). This dormancy is likely overcome by warm and/or cold stratification (Keeley 1977, 1991, Baskin and Baskin 2001). These species are found in different habitats and not surprisingly, require different temperature regimes to break dormancy (Baskin and Baskin 2001).

Laboratory studies (Tyler et al. 1998, Tyler et al. 2000) indicated that there is not complete dormancy in Morro manzanita, since some seeds do germinate without any stratification, scarification, or treatment

other than watering. Tyler et al. 2000 found 40% germination of viable seeds in controls. Seed treated with heat and charate to simulate the effects of fire germinated at a rate 80%, however.

B.2.3.11 Seed Bank

As a result of its dormancy, Morro manzanita has a seedbank—a population of viable seed in the soil and litter. A series of studies investigating the distribution and abundance of seed in the seedbank have found the following (Tyler and Odion 1996, Tyler et al. 1998, and Tyler et al 2000):

- 80% of seed occurred in the top 5 cm of the soil, and 20% in the lower 5 cm;
- 10 times more seed is found under the shrub canopy than 1.5 m away;
- a mean of 1,482 viable seeds/m^2 were observed across four sites, which varied greatly
- 35% less total seed was found under dead shrubs than live shrubs at the Elfin Forest;
- sites differed significantly in total seed in the seed bank;
- approximately 600 seeds/m^2 (not all viable) were added to the seedbank each year;
- sites vary in seed production and predation, and thus the amount of seed added to the bank; and,
- prescription fire greatly reduced the density of viable seed in the top 5 cm of the soil.

B.2.3.12 Seed Germination

Fire enhances Morro manzanita seed germination. Tyler et al. (2000) evaluated the combined effect of heat and charate--chemicals resulting from combustion of plant material--in overcoming dormancy and initiating Morro manzanita seed germination. They found that untreated, viable seed germinated at a rate of 40% while seed treated with heat and charate germinated at a rate of 80% (Tyler et al. 2000).

Morro manzanita germination was measured following a prescription fire (Tyler et al. 2000), though the lack of control plots limited the ability to evaluate the effects of fire on seed germination. Seedlings established at equal rates during the first two years following the prescription burn after which the plots were not monitored (Tyler et al. 2000). Other studies of fire in maritime chaparral have found no shrub emergence after the first year following fire, perhaps because the seed bank was exhausted by fire induced germination and mortality (Keeley 1991, Odion 2000, Odion and Davis 2000). Though the authors note that no studies have documented germination of obligate seeding species more than two years following fire (Tyler et al. 2000), they also suggest that seedling establishment occurred at rates lower than expected based on analysis of the post fire density of viable seed. In the absence of ongoing monitoring of the prescribed burn plots, it is not clear whether additional Morro manzanita seedlings may have established following the prescribed burn.

Like other obligate seeding species in the genus, *Arctostaphylos morroensis* may experience increased seed germination following fire. However, even in “refractory seed species”, in which germination is triggered by an environmental stimulus, some of the seed crop is non-refractory; it will germinate without the stimulus (Keeley 1991). This could explain the low density of Morro manzanita seedlings observed in areas of the Bayview Unit of the Morro Dunes Ecological Reserve that have not likely burned in decades (J. McGraw, pers obs.).

B.2.3.13 Seedling Establishment

Though seeds of Morro manzanita can germinate in the absence of heat and charate under laboratory conditions (Tyler et al. 2000), very few young Morro manzanita are found in unburned areas. One exception is in an area that receives chronic soil disturbance due to recreation and associated erosion on the old Broderson Road in the Bayview Unit of the Morro Dunes Ecological Reserve. There, a stand of approximately 10 Morro manzanita that are juvenile to small adult (< 50 cm tall but reproductive) occur along a deep gully that presumably was caused by water erosion on the steep slopes of the former road (J. McGraw, pers obs.). It is possible that these individuals were planted as part of an informal restoration project; however, there has been no indication that this is the case.

These observations suggest that soil disturbance may create aspects of this fire-adapted species' regeneration niche. However, more research is needed to determine whether other disturbances can be used to successfully establish Morro manzanita seedlings. In a field experiment in another maritime chaparral system, *A. purissima* seedling establishment was enhanced by fire but not manual removal of shrubs, suggesting some aspect of fire (e.g., heat or charate) is required for germination (Tyler 1996). It is important to note that Morro manzanita seedling establishment may result in the absence of disturbances, as laboratory trials found that some seed germinated without treatments intended to remove the dormancy mechanism (Tyler et al. 1998, 2000).

Morro manzanita seedlings established even in sample plots that lacked adults prior to prescription fire (Tyler et al. 2000). Though none of the seedlings survived, their establishment itself surprised the researchers, given the low density of viable seed detected in soil cores obtained away from shrub canopies (Tyler et al. 1998).

B.2.3.14 Seedling Survival

Morro manzanita seedlings are highly susceptible to mortality. The first-year cohort (annual crop of seedlings) following fire exhibited 95% mortality over 1 year (March 1998 to March 1999); only 2 of the 41 sampled seedlings surviving the first year (Tyler et al. 2000). Survivorship was not monitored further, nor was survivorship of the second-year cohort examined.

Mortality was likely caused by several factors including desiccation stress and herbivory. Available soil moisture in the sandy soil is low throughout the year and may result in mortality during the long summer drought (May-October). Seedling mortality caused by herbivory by both large (deer) and small (rabbits) mammals might have also been a factor. The authors speculate that the small burn size may have resulted in unnaturally high levels of herbivory and thus seedling mortality. Trampling may have also reduced survival of small seedlings (Tyler et al. 2000).

B.2.3.15 Adult survivorship

No studies have examined the factors affecting survival of adult Morro manzanita; however, observations suggest that survivorship is high. In 1998, Tyler et al. observed recently mortality of adults in the Elfin Forest stand, which was hypothesized to be the oldest stand of Morro manzanita. However, it is not known whether this mortality is due to senescence or other site-specific conditions (e.g., disease). Mortality may increase as the stands age and individuals become more susceptible to disease.

B.2.4 Threats

B.2.4.1 Habitat Loss

As a narrowly distributed endemic species, Morro manzanita is threatened by habitat destruction. The loss of habitat due to conversion for development and agriculture has reduced the areal extent of the species by over 50% and fragmented remaining habitat patches (Tyler et al. 2000). As a result, the overall population of Morro manzanita has been reduced, and remaining populations are artificially small. Small populations face greater extinction risks due to environmental stochasticity (e.g., wildfire, drought, disease), Allee effects (reductions in population growth due to insufficient population size), and reduced fitness due to inbreeding depression.

Within protected habitat, populations of Morro manzanita are threatened by wildfire, fire exclusion, and exotic species.

B.2.4.2 Wildfire

Previous research found that Morro manzanita subject to prescription burning at Montaña de Oro State Park likely failed to re-establish at the pre-burn population density due to insufficient seedling establishment, likely because the return interval at the stand was too short to allow sufficient accumulation of viable seed (Tyler et al. 2000, Odion and Tyler 2002). These results suggest that frequent fires could reduce populations.

B.2.4.3 Fire Exclusion

The widespread exclusion of fire from the LOHCP Preserve System could also threaten persistence of Morro manzanita in the long term. Fire is the natural disturbance that promotes population regeneration. Morro manzanita seedlings do not appear to recruit in stand replacing densities in the absence of fire. Though it is not known at what age stands senesce, mortality of adult Morro manzanita will presumably increase at some time following fire. In the absence of fire, the canopy gaps created might be colonized by other species already present, including exotic plants, rather than recruiting Morro manzanita seedlings. Suppression of naturally occurring wildfire and avoidance of prescription fire as a management tool due to proximity of development may, in the long term, cause type conversion of Morro manzanita chaparral (e.g., to coast live oak woodland). The USFWS (2008) identified managing disturbance to regenerate and revitalize Morro manzanita populations as the primary issue for recovery of the species, after protecting habitat from conversion.

B.2.4.4 Exotic Plants

Exotic plant species threaten the persistence of Morro manzanita directly through competition, and indirectly, by altering abiotic conditions, rendering them unsuitable for Morro manzanita population persistence. Large, shade producing trees including eucalyptus (*Eucalyptus* spp.), and introduced conifers including Monterey pine (*Pinus radiata*) and Monterey cypress (*Callitropsis macrocarpa*) can outcompete seedling and adult Morro manzanita for both light and soil resources (e.g., water). Expansion of a eucalyptus grove in Montaña de Oro State Park has reduced the areal extent of Morro manzanita over the past 100 years (Tyler and Odion 1996). Though not currently invasive like eucalyptus, spp., Monterey pine and Monterey cypress are both fire adapted species and could increase

their populations and further compete with Morro manzanita following fire or other disturbance (Tyler and Odion 1996, Tyler 1996).

Iceplants including *Carpobrotus* spp. and *Conicosia pugioniformis* are widespread through the coastal sage scrub communities and occur in canopy gaps with the Morro manzanita chaparral. Following wildfire or prescription burn, these species can spread and form dense mats that can compete with small, slowing growing Morro manzanita seedlings, thus precluding successful stand regeneration (D'Antonio 1990a, D'Antonio 1993, D'Antonio et al. 1993).

Like the iceplant species, veldt grass (*Ehrharta calycina*) may spread following fire and compete with Morro manzanita seedlings, reducing their establishment. In addition, the perennial grass will increase the density of fine fuel and, in doing so, might increase the frequency of fire, thus extirpating Morro manzanita. Annual grasses including red brome (*Bromus madritensis* ssp. *rubens*), ripgut brome (*Bromus diandrus*), and wild oats (*Avena* spp.) similarly threaten Morro manzanita populations, both by competing with seedlings for scarce soil resources and initiating a deleterious grass-fire cycle that can convert maritime chaparral to degraded grassland (D'Antonio and Vitousek 1992, Brooks 1999).

B.3 Indian Knob Mountainbalm (*Eriodictyon altissimum*)

B.3.1 Conservation Status

Indian Knob mountainbalm (*Eriodictyon altissimum* P. Wells; Boraginaceae) has been listed as endangered under both the California and federal endangered species acts and is ranked as most threatened and endangered according to the California Rare Plant Ranking (List 1B.1; CNPS 2016).

B.3.2 Available Information

There is little available information about the biology of Indian Knob mountainbalm (IKM). It was first collected in 1960 and described in 1962 (Wells 1962). No known research has examined the ecology of the species. The role of leaf resins in deterring insect herbivory of a widespread congener, yerba santa (*Eriodictyon californicum*) has been investigated (Johnson et al. 1985). The USFWS conducted a five-year review for this species in 2013, providing additional information about its ecology and conservation status (USFWS 2013a).

B.3.3 Distribution

Indian Knob mountainbalm is known from just seven occurrences in western San Luis Obispo County (CNDDB 2016). Two occurrences are on Indian Knob, an area south of San Luis Obispo and north of Pismo Beach. Two additional occurrences represented by a total of four, disjunct stands are in Hazard Canyon within Montaña del Oro State Park south of the LOHCP Area (USFWS 2013a). Of the three occurrences within the LOHCP Area, one is located in the Broderson site and the other two are within the Bayview Unit the Morro Dunes Ecological Reserve. A census of the three sites within the LOHCP in April 2016 found 22 individual plants (Occurrence 6) and 23 individual plants (Occurrence 4) in the two occurrences within the Bayview Unit; however, no Indian Knob mountainbalm plants were observed in the Broderson Unit (Occurrence 1; USFWS 2016). Though the populations range wide have not been comprehensively censused, they are estimated to total fewer than 600 plants, with most of those (~500) occurring within the Indian Knob occurrence approximately 13 miles east of Los Osos (USFWS 2013a).

Indian Knob mountainbalm occurs on sandy soils derived from marine sandstone at Indian Knob and Pleistocene older and partly cemented aeolian deposits in the Los Osos Valley (i.e., Baywood fine sand). In both areas, Indian Knob mountainbalm occurs in vegetation characterized as a mosaic of chaparral and oak woodland. Within these communities, the distribution of Indian Knob mountainbalm is very limited; however, the microhabitat characteristics of the endangered shrub have not yet been examined. Observations at the Bayview Unit of the Morro Dunes Ecological Reserve indicates that remaining individuals are found in gaps along eroding trails within the otherwise contiguous canopy comprised primarily of Morro manzanita and coast live oak (J. McGraw, pers. obs.). More research is needed to determine the habitat characteristics required for persistence of IKM within the Los Osos region.

B.3.4 Biology

B.3.4.1 Morphology

Indian Knob mountainbalm is a tall (2-4 m) erect, evergreen shrub with diffuse branches. Its sticky stems support 5-9 cm long, narrow (2-4 mm wide) linear leaves with rolled margins that have a sticky upper surfaces and dense white hairs on their lower surfaces. Indian Knob mountainbalm produces lavender to whitish yellow tubular flowers that are 11-15 mm long and sparsely hairy. Its fruits are narrow capsules that produce small (ca. 0.4 mm long), brown seeds (Wells 1962, Hickman 1993).

While Indian Knob mountainbalm has an inflorescence that is morphologically similar to that of *Eriodictyon californicum*, the endangered shrub has rolled leaves that do not resemble that of its more widespread congener. Instead, the leaves are similar to that of Lompoc yerba santa (*Eriodictyon capitatum*), which has a very different inflorescence. Despite these morphological similarities, Indian Knob mountainbalm is not thought to be a hybrid of the two other species (Wells 1962), with which it does not co-occur.

B.3.4.2 Phenology

Indian Knob mountainbalm flowers in early summer (June-July) and develops fruit in late summer and early fall. There is no available information about other aspects of the species phenology. As with other shrubs in California's Mediterranean climate, seeds of Indian Knob mountainbalm likely germinate with the onset of the rains between October and December, though this has not been documented.

B.3.4.3 Life History

Indian Knob mountainbalm is a polycarpic perennial shrub. Based on observations of slow-growing lichens attached to its stems, IKM is thought to be long-lived (USFWS 1998a), though no estimates for its life span are available. The small size of colonies suggests current individuals are survivors of once larger populations; however, there is no information about historic population densities. The age or size of shrubs at the onset of reproduction is currently unknown.

B.3.4.4 Vegetative Reproduction

Indian Knob mountainbalm appears to be able to establish additional ramets (i.e., clones) from root sprouts (Wells 1962). This form of vegetative reproduction has important implications for population persistence by influencing regeneration following disturbance, and genetic diversity. Following fire, IKM may be able to re-establish from below-ground tissues that remain. Removal of aboveground parts combined with changes in abiotic and biotic conditions following fire may increase the rate at which new ramets ('clones') are produced from the root structures of current individuals.

Because it can spread vegetatively, multiple plants observed within a given occurrence may be part of the same genet or genetically unique individual. If this is the case, and if IKM is self-incompatible, then uniclonal patches may not be able to regenerate from seed, at least not substantially so, unless viable seed remains within the seed bank. Clumped plant distributions can result not only from clones developing from common root structures, but also limited seed dispersal and higher rates of establishment and survival in appropriate habitat conditions, which tend to be spatially autocorrelated (i.e., clumped). As a result, it is not possible to determine whether individual ramets observed within remaining stands are genetically distinct individuals, without perhaps destructively examining their underground structures.

Vegetative reproduction of IKM also has potentially importance for the genetic diversity and resulting persistence of the species. If IKM requires fire to reproduce sexually, the remaining small populations are comprised of one or a few genets that have survived in the absence of fire, and there is no viable seed bank, then the populations may have gone through narrow genetic bottlenecks. Such reductions in genetic diversity might reduce future population viability, even following successful management to increase establishment and thus population abundance.

There is no information available about the factors which influence vegetative reproduction in the species, such as the age or stage of the parent plant, the habitat conditions, or role of disturbances such as fire in initiating formation of a new ramet. Based on observations of high density, vigorous stands along road cuts at Indian Knob, Wells (1962) hypothesizes that the species is disturbance-dependent for its regeneration, though does not specify whether establishment in disturbed areas occurs exclusively from seed.

B.3.4.5 Sexual Reproduction

Reproduction

Indian Knob mountainbalm plants are perfect flowers (i.e., they feature both stamens and a pistil). It is not known whether these flowers can self-pollinate. It is also not known whether the species is self-incompatible; that is, if the ovary of a given individual plant cannot produce viable seed when fertilized by pollen from the same plant. Self-incompatibility has been documented for the narrow-leaved congener endemic to Santa Barbara County, Lompoc yerba santa (*Eriodictyon capitatum*) (Elam 1995).

Pollination Biology

There is no specific information available about the pollination biology of IKM. The recovery plan for the species reports that "a variety of non-specialist, potentially pollinating insects have been recovered

visiting the flowers of this species"; however, there is no additional information about the insects, the study, or the observers (USFWS 1998a).

Seed and Seedling Biology

Due to their low weight (0.2 mg), IKM seeds are hypothesized to be wind dispersed (Wells 1962). Based on its association in fire-prone chaparral communities, its ability to regenerate from belowground structures following fire, its low abundance or perhaps absence of seedling and juveniles within remaining stands, and its high abundance along roadsides and other disturbed areas (Wells 1962), it is hypothesized that Indian Knob mountainbalm requires disturbance, specifically fire, to stimulate seed germination and/or create habitat conditions required for seedling establishment. Research is needed to determine the regeneration niche of Indian Knob mountainbalm and the potential role of fire and fire surrogates in facilitating recruitment within these aging populations.

John Chesnut, a biologist from the Los Osos region, is quoted in the recovery plan as indicating that IKM exhibit that low seed set (USFWS 1998a); however, there is no information about the nature of the observations. Low seed set is consistent with self-incompatibility in small populations comprised of one or just a few genets (as described below). Low seed set can also result from insufficient pollinator visitation, which can be problematic in small populations of plants that require specialist pollinators.

There is no information available about IKM seed predation, seed viability, seed dormancy, seed germination, or seed bank dynamics.

B.3.5 Threats

B.3.5.1 Habitat Loss

Indian Knob mountainbalm is threatened by habitat loss. Though its original distribution within the Los Osos Valley is unknown, the species' populations very likely have been reduced due to habitat destruction, which has reduced the areal extent of central maritime chaparral communities (Tyler et al. 2000). Habitat conversion for development and agriculture has also fragmented remaining habitat patches, thus reducing the size of remaining populations and increasing their extinction risks due to environmental stochasticity (e.g., wildfire, drought, disease), Allee effects (reductions in population growth due to insufficient population size), and reduced fitness due to inbreeding depression.

Within protected habitat, IKM populations are threatened by fire exclusion, exotic species, recreation, and perhaps a wildfire.

B.3.5.2 Fire Exclusion

The widespread exclusion of fire has likely reduced the distribution and population abundance of IKM and may have contributed to the likely extirpation of two of the three occurrences within the LOHCP Area (USFWS 2013a). Remaining occurrences are restricted to gaps within otherwise contiguous shrub cover and consist of a low number of individuals (USFWS 1998a, 2013), many of which may be senescent as indicated by sparse leaves confined to branch tips that were observed even during Wells initial description of the species (Wells 1962). As a natural part of the disturbance region in the region, fire is likely required to facilitate both sexual and vegetative reproduction of IKM. In the absence of fire, canopy gap closure may occur, thus creating unsuitable conditions for remaining plants, many of which

may be susceptible to mortality due to disease, herbivory, or senescence. Suppression of naturally occurring wildfire and avoidance of prescription fire as a management tool due to proximity of development may cause the extirpation of the remaining stands.

B.3.5.3 Exotic Plants

Exotic plant species may threaten the persistence of IKM directly through competition, and indirectly, by altering abiotic conditions, rendering them unsuitable for the species. Large, shade-producing trees including eucalyptus (*Eucalyptus* spp.) and introduced conifers such as Monterey pine (*Pinus radiata)* and Monterey cypress (*Callitropsis macrocarpa*) reduce light availability for IKM, which is likely adapted to the open canopy conditions characteristic of early successional chaparral. These trees may also compete with seedling and adult IKM for soil resources, including water which can be scarce in the sandy soils.

Iceplants, including *Carpobrotus* spp. and *Conicosia pugioniformis,* are widespread through the coastal sage scrub communities in the Los Osos area and occur in canopy gaps with the Morro manzanita chaparral. Following wildfire or prescription burn, these species can aggressively invade and form dense mats that might compete with small, slowing growing IKM seedlings, thus precluding successful stand regeneration (D'Antonio 1990a, 1993, D'Antonio et al. 1993).

Like the iceplant species, veldt grass (Ehrharta calycina) may spread following fire and compete with IKM seedlings, reducing their establishment. In addition, the perennial grass will increase the density of fine fuel and, in doing so, might increase the frequency of fire, thus extirpating IKM. Annual grasses including red brome (Bromus madritensis ssp. rubens), ripgut brome (Bromus diandrus), and wild oats (Avena spp.) similarly threaten IKM populations, both by competing with seedlings for scarce soil resources and initiating a deleterious grass-fire cycle that can convert maritime chaparral to degraded grassland (D'Antonio and Vitousek 1992, Brooks 1999).

B.3.5.4 Recreation

The Indian Knob mountainbalm stand within the Bayview Unit of the Morro Dunes Ecological Reserve is located along a trail. In the absence of fire, the chronic disturbance due to recreational use may maintain the open canopy conditions required for IKM persistence within the otherwise closed-canopy central maritime chaparral and coast live oak woodlands. However, recreation can negatively impact remaining individuals through direct trampling and through soil compaction, which may preclude vegetative reproduction from roots. Due to the low density and senescence of remaining individuals, it is important that all potential threats be addressed to preclude population extirpations and ultimate extinction.

B.3.5.5 Wildfire

A large wildfire may threaten persistence of IKM if conditions of the fire reduce regeneration from seed and/or suckers. There is no current evidence to suggest the species is susceptible to decline as a result of fire; however, given the small geographic range and low density of remaining populations, a conservative approach to management should include prevention of wildfire.

B.4 Morro Bay Kangaroo Rat (*Dipodomys heermanni morroensis*)

B.4.1 Conservation Status and Planning

The Morro bay kangaroo rat (*Dipodomys heermanni morroensis*) is federally and state-listed endangered species (USFWS 1970) and is also a California fully-protected species (CDFW 2016). The USFWS released a Draft Revised Recovery Plan for the Morro Bay Kangaroo Rat (USFWS 1999). The USFWS also designated critical habitat for the Morro Bay kangaroo rat (USFWS 1977).

B.4.1.1 Recovery Plan

The objective of the draft revised recovery plan for Morro Bay kangaroo rat is to down list the species to threatened; the limited amount of remaining historic habitat will likely preclude delisting. The down listing criterion is to have effective genetic population size of 500, which equals approximately 2,000 individuals. Actions needed to achieve this include:

1. Establish a captive breeding program with 100 individuals removed from the wild;
2. Secure, manage, and improve habitat for all available areas of historic habitat; and
3. Reintroduce captive-bred individuals into the restored habitat.

These actions reflect the fact that the species has not been detected since 1991 (USFWS 1999) and has not been observed in the wild since 1986 (USFWS 2011b).

B.4.1.2 Critical Habitat

In 1977, the USFWS designated critical habitat for Morro Bay kangaroo rat within a single 689-acre unit that includes the southern portion of the Morro Bay sand spit and adjacent habitat west of Pecho Valley Road (Figure 4-3); specifically, the southern half of section 14 and portions of Sections 23 and 24 west of Pecho Valley Road in T30S R10E of the Mount Diablo Base and Meridian.

Of the 672 acres contained within parcels (the remainder is outside of the parcel GIS database), 629 acres (94%) of the critical habitat area is protected within the Morro Dunes Ecological Reserve and the northern portion of Montaña de Oro State Park, much of which is designated as part of the Morro Dunes Natural Preserve (Figure 4-3).

B.4.2 Description and Taxonomy

A member of the gopher family (Heteromyidae), Morro Bay kangaroo rat is a small rodent with external cheek pouches, large hind legs, relatively small front legs, a long tail, and a large head. It is one of nine subspecies of Heermann's kangaroo rat (*Dipodomys heermanni*); when compared with the other subspecies, Morro Bay kangaroo rat is small and more darkly colored (USFWS 1999).

B.4.3 Historic Distribution

The Morro Bay kangaroo rat is endemic to the Baywood fine sands ecosystem centered on the community of Los Osos in coastal San Luis Obispo County. Its range does not overlap that of the other nine subspecies of *D. heermanni*, the nearest of which occurs in eastern San Luis Obispo County (USFWS 1999).

In 1948, Morro Bay kangaroo rats were thought to occupy a 4.8 square-mile area, within which 2.2 square miles provided suitable habitat; the remaining area featured dense trees, thick chaparral, or were developed (Stewart 1958). By 1971, Morro Bay kangaroo rat was known from just six localities totaling 183 acres on the current perimeter of the community of Los Osos (Congdon 1971, and Congdon and Roest 1975). In 1989, the total area occupied by Morro Bay kangaroo rat was estimated to be 37 acres distributed within what is now the Bayview Unit of the Morro Dunes Ecological Reserve. The species was last observed there in 1990 and 1991 (USFWS 1999).

B.4.4 Habitat

Within the Baywood fine sands ecosystem, Morro Bay kangaroo rat habitat includes compacted sandy soils with slopes of less than 15 degrees, supporting a range of vegetation types (Gambs and Holland 1988). Morro Bay kangaroo rats are believed to have occupied a large portion of the area currently or historically covered by the coastal sage scrub on the older and more stabilized dunes. Within this community, Morro Bay kangaroo rat was preferentially observed in early successional areas characterized by lower plant species diversity, scattered areas of bare ground, greater cover of wedge-leaf ceanothus (*Ceanothus cuneatus*), deerweed (*Acmispon glaber*), and wedgeleaf horkelia (*Horkelia cuneata*), lower cover of yarrow (*Achillea millefolium*), iceplant (*Carpobrotus spp*.), California aster (*Corethrogyne filaginifolia*), and dudleya (*Dudleya caespitosa*), and moderately sparse cover of California sagebrush (*Artemesia californica*), black sage (*Salvia mellifera*), mock heater (*Ericameria ericoides*), and dune lupine (*Lupinus chamissonis;* USFWS 1999).

B.4.5 Activity and Behavior

Morro Bay kangaroo rats inhabit burrow systems that they use for nesting, escape, and caching seeds, their primary food source. They are largely solitary and share burrows only for purposes of mating or rearing pups. Nocturnal, they emerge from underground burrows immediately after dusk and then periodically throughout the night until one to two hours before dawn. Morro Bay kangaroo rats breed between March and August (Gambs and Holland 1988). They remain fairly close to their main burrows and rarely disperse. Observed dispersal distances have been less than 1,500 feet (USFWS 1999).

B.4.6 Feeding

The Morro Bay kangaroo rat primarily forages by shuffling its front feet through the sand in search of seeds; the species also grabs foliage, flowers, or fruits directly from plants. Food items are either eaten or placed into the cheek pouches, from which materials are either horded in the burrow or hidden in small surface-pit- caches.

B.4.7 Threats

Declines in Morro Bay kangaroo rat have been attributed to two primary factors: habitat loss due to development within the Los Osos and Baywood Park communities, and fire exclusion, which converts early-successional coastal sage scrub habitat to later successional communities that lack the preferred food plants and perhaps other important structural components of their habitat. Mowing, grading, off-road vehicles, equestrians, trail use, and invasive exotic species also degrade habitat. Predation by domestic and feral cats and dogs, fragmentation of larger populations into small subpopulations, and

perhaps inbreeding depression may have also contributed to the decline in the Morro Bay kangaroo rat (USFWS 1999). Morro Bay kangaroo rat may also be susceptible to mortality caused by rodenticides.

B.4.8 Results of Recent Surveys

Morro Bay kangaroo rat has not been detected during surveys conducted since 2004 (Table B-1). These surveys, which have included visual surveys for sign (e.g., tail drags marks, foot prints, and droppings), live trapping, and use of scent-detection dogs, have been conducted within the species historic range on public lands as well as private lands where access has been permitted. The species may persist in unsurveyed, privately-held parcels, at densities below detectable levels, or perhaps in sandy soil areas east and south of the LOHCP Area (Villablanca 2009, USFWS 2011a).

Table B-1: Recent surveys for Morro Bay Kangaroo rat in the LOHCP Area

Survey	Methods	Location(s)	Results
Pre-Project Surveys for the Los Osos Wastewater Treatment Plant (Villablanca 2004)	Habitat Assessment and Pedestrian Transect (Visual) Survey	Broderson and Midtown Sites	Suitable habitat present at Broderson but not Midtown (but see Villablanca 2010); no sign of MBKR detected at either site
Protocol Surveys for MBKR (Villablanca 2009)	Phased Approach: Habitat Assessment, then Visual Survey if habitat assessment positive, and the Live Trapping where visual survey positive.	Montaña de Oro State Park, Morro Dunes Ecological Reserve, Los Osos Oaks Preserve, Morro Bay State Park, and four private lands	Suitable habitat present, though fragmented and degraded; no MBKR observed in 948 trap night effort at 7 sites
Midtown Assessment and Survey (Villablanca 2010)	Habitat Assessment and Pedestrian Transect (Visual) Survey	Midtown	Suitable habitat present (previous assessment that habitat not suitable was revised) but no MBKR sign detected
Recovery Surveys (USFWS 2011c)	Live Trapping	Morro Bay State Park near Santa Ysabel, and Montaña de Oro State Park and Pecho Unit of the Morro Dunes Ecological Reserve	No MBKR observed in 1,668 trap nights
Scent-Detection Dog Searches (USFWS 2016)	Searches by scent-detection dogs trained to detect Lompoc kangaroo rat (*Dipodomys heermanni arenae*)	Montaña de Oro State Park, Morro Bay State Park, and the Morro Dunes Ecological Reserve	Two 'alerts' by scent dogs during the three-day search. Bait stations with cameras subsequently set at alert sites. No MBKR were detected in the belt/camera stations, which were operated for 12 non-consecutive weeks.

Appendix C Profiles of Additional Listed Species in the LOHCP Area

C.1 California red-legged frog (*Rana draytonii*)

C.1.1 Conservation Status and Planning

The California red-legged frog (*Rana draytonii*) is a federally-listed endangered species (USFW 1996) and designated as a Species of Special Concern by the California Department of Fish and Wildlife (CDFW 2016). The US Fish and Wildlife Service (USFWS) completed a recovery plan for the endangered frog in 2002 (USFWS 2002). The recovery plan identifies the Estero Bay area near Morro Bay as a core area, because it may serve as a source population, and it is important for maintaining connectivity (USFWS 2002).

In 2010, the USFWS designated final critical habitat for the species, which includes 1,636,609 acres in 27 California counties (USFWS 2010b). This includes an 116,515-acre area (SLO #3) that encompasses the foothills north of San Luis Obispo; this unit extends to the eastern portion of Morro Bay just north of the LOHCP Area.

Within the area of designated critical habitat, the primary constituent elements of California red-legged frog are (USFWS 2010b):

1. **Aquatic Breeding Habitat:** natural or manmade still or slow-moving water bodies that become inundated with water during winter months and hold water for a minimum of 20 weeks;
2. **Aquatic Non-Breeding Habitat:** water bodies as described above that hold water for a duration long enough to complete its aquatic life cycle and provide shelter, foraging, predator avoidance, and aquatic dispersal of juvenile and adult;
3. **Upland Habitat:** upland areas surrounding aquatic breeding and non-breeding habitat and riparian habitat up to a distance of 1 mile; and
4. **Dispersal Habitat:** Accessible upland or riparian habitat occupied or previously occupied that is located within 1 mile of each other.

C.1.2 Distribution

The California red-legged frog is endemic to California and Baja California, where the species' known elevation range is between sea level and approximately 5,200 feet (USFWS 2002). In California, California red-legged frog occurs along the Coast Range Mountains from Mendocino County to the California/Mexico border, in parts of the Cascade Range, and along the western Sierra Nevada foothills between Shasta and Fresno counties (Shaffer et al. 2004). It is believed to have been extirpated from approximately 70% of its range, including the Transverse and Peninsular ranges in the southern portion of California (USFWS 2002).

The central coast from San Francisco to Santa Barbara County supports the greatest number of drainages occupied by California red-legged frog (CNDDB 2016). In San Luis Obispo County, California red-legged frogs are found in streams, stock ponds, dune ponds, and springs on the coastal plain and western slopes of the Santa Lucia Range from San Carpoforo Creek in the north to the Santa Maria River in the south. The species has been observed in 30 streams (USFWS 2002) in San Luis Obispo County,

including Pico, Little Pico, Toro, San Simeon, Santa Rosa, Chorro, and Arroyo Grande creeks (Jennings et al. 1992, USFWS 1996).

There are no known occurrences of California red-legged frog within the LOHCP Area (CNDDB 2016); however, there are several records in surrounding areas including one approximately 0.50-mile north of the LOHCP Plan Area in Morro Bay State Park, just east of South Bay Boulevard. The second nearest occurrence is located on private property approximately 0.55-mile east of the LOHCP Plan Area associated with Warden Lake.

C.1.3 Habitat

The California red-legged frog inhabits ponds (including livestock ponds), marshes, springs, streams, and reservoirs as well as adjacent upland habitats (Hayes and Jennings 1988). The species preferentially occurs in deep pools with dense stands of overhanging willows (*Salix* spp.) and an intermixed fringe of cattails (*Typha* spp.); however, all life stages (eggs, larvae, juveniles, and adults) have been found in ephemeral drainages, and in ponds that do not have vegetation (Rathburn et al. 1993, USFWS 2002). Adults utilize dense, shrubby or emergent riparian vegetation closely associated with deep (>2.25 feet), still or slow-moving water (Hayes and Jennings 1988). Red-legged frogs require cold-water pond habitats (including stream pools) with emergent and submergent vegetation (Storer 1925).

Aquatic habitat lacking non-native predators including fish and bull frogs (*Lithobates catesbeianus*) and featuring aquatic and riparian vegetation provides the best, long-term habitat for California red-legged frog. The species appears to be closely tied to small drainage areas and their intermittent water flow as opposed to large drainage areas and their perennial water flow; this may reflect restricted access by aquatic predators (Hayes and Jennings 1988).

California red-legged frog also occurs in uplands adjacent to breeding habitat, and along intermittent drainages connecting wetlands, which they may use for seasonal migration and dispersal. Juveniles may also disperse locally between July and September (USFWS 2000). Adult migration away from breeding habitat occurs primarily at night during wet periods within the non-breeding season (e.g., November to April; Fellers and Kleeman 2007). Movements ranging from 0.25 to over 2 miles are known to occur without regard to topography or vegetation type, including through a diversity of intact and degraded habitats such as agricultural lands (Bulger et al. 2003, Fellars and Kleeman 2007). They can be found living more than 1.8 miles from breeding habitat (USFWS 2000).

C.1.4 Biology

C.1.4.1 Morphology

The California red-legged frog is a 2 to 5.25-inch long, reddish brown to gray frog that features many poorly defined dark specks and blotches, which are absent on the back and top of its head. It features a light stripe on its jaw, folds on its back and sides, and only partially-webbed toes; its underside is yellow with red on the lower abdomen and hind legs. Females are larger than males, which have enlarged forearms and swollen thumbs (USFW 1996).

C.1.4.2 Daily Activity

Although the species may hibernate in inland areas (Storer 1925), California red-legged frogs along the coast are rarely inactive (Jennings et al. 1992). They may aestivate in small-mammal burrows and moist leaf litter, where they have been found up to 100 feet from water in adjacent dense riparian vegetation for up to 77 days (Rathburn et al. 1993). Adults are largely nocturnal, whereas juveniles can be active either diurnally or nocturnally.

C.1.4.3 Diet

California red-legged frogs have a variable diet that includes primarily invertebrates, although larger frogs can consume Pacific tree frogs and California mice, which can constitute over half of the prey mass. Juveniles feed during both day and night, but adults and sub-adults feed primarily at night (Hayes and Tennant 1985).

C.1.4.4 Reproduction

California red-legged frogs breed from November through April, with earlier breeding records occurring in southern localities (Storer 1925). During a one-to-three-week period typically between late December and early April, females lay their loose, oval, floating clusters of about 2,000-5,000 eggs in still water (Storer 1925). Egg masses are generally attached to vertical emergent vegetation near the surface of the water (Hayes and Miyamoto 1984). Eggs hatch in 6-14 days, and metamorphosis occurs 3.5 to 7 months after hatching (Storer 1925, Jennings and Hayes 1990).

Developing eggs and embryos of this taxon are unable to survive salinities of >4.5 0/00 (Hayes and Jennings 1988). Larvae require cold water (<65 °F) to develop properly (Jennings 1988); and likely experience the highest mortality rates, with less than 1 percent of eggs laid reaching metamorphosis (Jennings et al. 1992). Two years after metamorphosis, males reach sexual maturity, while females require three years to attain sexual maturity (Jennings and Hayes 1985).

C.1.4.5 Survivorship

Predation by introduced fishes (Jennings 1988, Moyle et al. 1986, Hayes and Jennings 1986), bullfrogs (Jennings and Hayes 1985, Hayes and Jennings 1986), and crayfish, as well as disease, and parasites (Lefcort and Blaustein 1995) all have been known to affect California red-legged frogs. The species generally inhabits areas with dense vegetation, which limits use entry by other predators, such as birds and raccoons (*Procyon lotor*). Survival rates for California red-legged frogs from hatching to metamorphosis range from one to less than five percent for frogs co-occurring with bullfrogs and 30 to 40 percent for those without bullfrogs (USFWS 2000). Adults live 8 to 10 years (USFWS 2000, Jennings et al. 1992).

C.1.5 Threats

California red-legged frogs are threatened by habitat loss and degradation due to over-collecting, pesticides, herbicides, reservoir construction, stream channels development, urbanization, overgrazing, and drought (USFWS 2002). They are also impacted by competition with and predation by introduced species, particular bullfrogs and fish (Moyle 1976, USFWS 2002); like other California ranids, they evolved under conditions of limited fish predation since California possesses only a small number of

native fish species that prey on vertebrates (Moyle 1976). California red-legged frogs can also be infected by diseases including chytridiomycosis—a disease caused by chytrid fungi, which causes deformations and mortality (USFWS 2002).

C.2 California black rail (*Laterallus jamaicensis coturniculus*)

C.2.1 Conservation Status

California black rail (*Laterallus jamaicensis coturniculus*: Rallidae) is a fully-protected species that is also listed as threatened by the State of California (CDFW 2016).

C.2.2 Distribution

Historically, the breeding range of California black rail extended from Tomales Bay north of the San Francisco Bay area (including Sacramento/San Joaquin Delta) south along California's coast to northern Baja California; the species also occurred inland in San Bernardino and Riverside counties, the Salton Sea, and along lower Colorado River north of Yuma in Arizona and California (Zeiner et al. 1990). Presently, most individuals are found in the northern reaches of the San Francisco Bay estuary (including San Pablo and Suisun bays) and associated rivers; additional small, fragmented subpopulations persist at Tomales Bay, Bolinas Lagoon, Morro Bay, and in southeastern California and western Arizona (Evens et al. 1991).

Adults are largely non-migratory, although adults and juveniles have been observed as far as 20 miles from breeding habitat (Eddleman et al. 1994). The California population apparently is resident, though individuals are occasional observed away from wetlands in late summer and autumn, suggesting some post-breeding movement (Zeiner et al. 1990).

Within the LOHCP Plan Area, the California black rail has been recorded in three areas (CNDDB 2016):

- Sweet Springs Nature Preserve;
- the salt marsh habitat located between Los Osos Creek and the Elfin Forest approximately 0.25-mile west of South Bay Boulevard; and
- Los Osos Creek approximately 0.25-mile southeast of South Bay Boulevard.

The species likely inhabits additional suitable habitat along the edge of Morro Bay and Los Osos Creek.

C.2.3 Habitat

The California black rail primarily inhabits the upper zones of saline emergent wetlands and brackish fresh emergent wetlands. It is most commonly observed in tidal emergent wetlands in the immediate vicinity of tidal sloughs, which feature pickleweed (*Salicornia* spp.), bulrushes (*Bolboschoenus* spp. and *Schoenoplectus* spp.) and cattails *(Typha* spp.), though California black rail may take cover in upper wetlands and adjoining uplands during extremely high tides (Zeiner et al. 1990).

C.2.4 Biology

The California black rail is a small, blackish rail with a small, black bill and a chestnut-colored nape. Largely diurnal, the species primarily vocalizes at dusk and to a lesser extent at night. It forages on the ground primarily for insects and secondarily on crustaceans and aquatic plant seeds (Ehrlich et. al. 1988). Their primary predators are herons and domestic cats (Zeiner et al. 1990).

The California black rail breeds between March and June. Nests are deep, loose cups located in or along the edge of marshes, usually on a mat of grass concealed by dense vegetation. Clutch sizes in this single-brooded species average six and range between three and eight (Zeiner et al. 1990). Both sexes incubate the eggs for approximately 16-20 days; young are precocial (Ehrlich et. al. 1988).

C.2.5 Threats

California black rail are endangered primarily as a result of loss of coastal wetlands and inland freshwater marshes (Ehrlich et. al 1988), as well as incompatible water-management practices for agriculture and salt production in coastal. Additional threats may include marsh subsidence due to groundwater removal, diking of salt marshes, water level fluctuation, wildfires, grazing, and cultivation, and the spread of non-native predators including domestic cats (Eddleman et al. 1994).

C.3 California seablite (*Suaeda californica*)

C.3.1 Conservation Status

California seablite (*Suaeda californica*: Chenopodiaceae) is a federally-listed endangered species (USFWS 1994) and is ranked as most threatened and endangered according to the California Rare Plant Ranking (List 1B.1; CNPS 2016). The species was addressed in the Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California (USFWS 2013b).

C.3.2 Distribution

California seablite is endemic to central coastal California where it historically occurred in two disjunct locations: San Francisco Bay and Morro Bay and nearby Cayucos. It was extirpated from the San Francisco Bay, though was reintroduced into four areas between 1999 and 2008 (USFWS 2013b). Today, the species is known from three reintroduction locations along San Francisco Bay, four estuarine beach locations near Cayucos, and seven areas on the Morro Bay shoreline, including two areas within the LOHCP Area:

1. Along the peninsula of Baywood Park, and
2. And along the bay between the sand spit to the west, and Sweet Springs Preserve, to the east (CNDDB 2016).

The species also occurs along the sand spit, immediately west and north of the LOHCP Area (CNDDB 2016).

C.3.3 Habitat

California seablite is found in a narrow zone in the upper edge of tidal marsh at the ecotone between salt marsh and the adjacent coastal sage scrub (USFWS 2010a). There it occurs within coarse, well-drained marsh substrates on sandy wave-built berms or ridges along marsh banks, and on estuarine beaches (USFWS 2013b).

In the Los Osos Area, California seablite co-occurs with salt grass (*Distichlis spicata*), saltbush (*Atriplex* spp.) pickleweed (*Salicornia virginica*), alkali-heath (*Frankenia salina*), fleshy jaumea (*Jaumea carnosa*), and the federally-endangered salt marsh bird's beak (*Cordylanthus maritimus* ssp. *maritimus*; USFWS 2010a). In estuarine beach habitat near Cayucos, California seablite occurs with many of the same species as well as sea rocket (*Cakile maritima*), beach-bur (*Ambrosia chamissonis*), beach heliotrope (*Heliotropium curassavicum*), and sand verbena (*Abronia* spp.; USFWS 2010a).

C.3.4 Biology

California seablite is a succulent-leaved perennial plant in the goosefoot family (Chenopodiaceae). The species blooms July through October (CNPS 2016). Though the plant spreads laterally, reproduction appears to be entirely sexual; plants do not reproduce vegetatively. Isolated plants have been observed to produce viable seed, suggesting the species is self-compatible to at least a certain degree (USFWS 2010a). The hard-coated seeds are enclosed in fleshy calyces that are remain attached after dehiscence and may promote dispersal (USFWS 2010a).

California seablite seedlings have been observed in drift-lines and vegetation gaps along the high-tide line in Morro Bay. Plants reach reproductive maturity in as little as one year (USFWS 2010a). Though the life-span is unknown, 10-year-old plants were observed in stabilized habitat within Morro Bay State Park (USFWS 2010a).

C.3.5 Threats

The Morro Bay occurrences of California seablite are threatened by shoreline development, storm erosion, recreational activity on tidal flats, and nonnative plants including ice plant (*Carpobrotus edulis*; USFWS 2010a, 2013). California seablite is also threatened by sea-level rise, especially where populations abut development or other conditions that might preclude landward migration of wetland habitat (USFWS 2013b).

C.4 Salt marsh bird's-beak (*Chloropyron maritimum* ssp. *maritimum*)

C.4.1 Conservation Status

Salt marsh bird's-beak (*Chloropyron maritimum* ssp. *maritimum*) is listed as endangered under both the California and federal endangered species acts (USFWS 1978, CDFW 2016); the taxon's name at the time of the species' listing was *Cordylanthus maritimus* ssp. *maritimus*. Salt marsh bird's beak is ranked as moderately threated (List 1B.2) according to the California Rare Plant Ranking system (CNPS 2016). A Recovery Plan was prepared for salt marsh bird's beak in 1984 (USFWS 1984); the species' recovery is also addressed in the Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California (USFWS 2013b).

C.4.2 Distribution

Historically, salt marsh bird's-beak was widespread in coastal salt marshes from Morro Bay in San Luis Obispo County to San Diego County and northern Baja California, Mexico. Currently, the species is known from seven coastal salt marshes between San Diego County and San Luis Obispo County (USFWS 2009), including the southern shore of Morro Bay in the LOHCP Area. There it has been recorded in three, disjunct patches, two of which are west of Cuesta-by-the-Sea, and the other that is just east of it (CNDDB 2016).

The Consortium of California Herbaria database features five specimens of salt marsh bird's-beak that were collected in the Morro Bay region between 1973 and 2000; of these, three were collected from within the LOHCP Area (CCH 2014):

- two from the Sweet Springs Nature Preserve, and
- one in Cuesta-by-the-Sea northwest of the intersection of Pecho Valley Road and Binscarth Road along the margin of Morro Bay.

The other two specimens were collected outside of the LOHCP Area along the margin of Morro Bay: one on the east side of the Morro Bay Sand Spit and the other west of the terminus of Howard Street (CCH 2014).

C.4.3 Habitat

Salt marsh bird's-beak grows in the upper portions of coastal and brackish marshes, in the region generally above most tidal flows and subject only to high tides; the clay and silt soils in these areas are drier than lower-elevation areas, particularly during the summer drought. Its distribution appears to be tied to areas that receive inflows of fresh water, which may influence germination (USFWS 2009). Co-occurring species include pickleweed, salt grass, seaheath (*Frankenia* spp.), saltbush, and California seablite (USFWS 2009).

C.4.4 Biology

Salt marsh bird's-beak is an annual with densely hairy grey-green leaves that are tinged purple. The branched plants grow up 16 inches tall and feature spiked inflorescences. The flowers, which are bee-pollinated, have yellow-tipped upper petals and purple lower petals. The species flowers between May and October; each capsule (fruit) produces 15-40 seeds (Baldwin et al. 2012).

As with other members of the broom rape family (Orobanchaceae), salt marsh bird's beak is a hemiparasite; it features green tissue and can produce sugars through photosynthesis yet obtains at least some water and dissolved nutrients from the roots of their host plants. In laboratory trials, salt marsh bird's beak parasitized saltgrass, pickleweed, fleshy jaumea, and other species; these as well as other species may serve as hosts (USFWS 2009).

This short-lived annual germinates in March and April and flowers between May and October; some plants have been observed to senesce as early as July (USFWS 2009). Flowers are self-compatible and pollinated by bees. Seeds are buoyant and can float for up to 50 days, perhaps enabling long-distance dispersal (USFWS 2009).

C.4.5 Threats

Salt marsh bird's-beak has been endangered primarily due to habitat loss, resulting from development and agricultural conversion, which contributed to the loss of over 90 percent of coastal salt marshes and tidal freshwater marsh (Callaway et al. 2007). In remaining habitat, salt marsh bird's-beak is threatened by channelization and water diversions as well as other factors that affect hydrology, including freshwater inflow, such as climate change. Notably, sea-level rise can alter tidal flows in ways that impact coastal marshes supporting salt marsh bird's-beak and its host plants (USFWS 2009). The species may also be impacted by factors that convert or degrade upland habitat supporting native pollinators including bees. Several non-native competitors are displacing salt marsh bird's beak from their habitat, including sea lavender and several exotic grasses. Finally, salt marsh bird's-beak is also vulnerable to impacts resulting from loss of genetic variation, which is very low (USFWS 2009).

C.5 Marsh sandwort (*Arenaria paludicola*)

C.5.1 Conservation Status

Marsh sandwort (*Arenaria paludicola*) is listed as endangered under both the California and federal endangered species acts (USWS 1993, CDFW 2016,); it is ranked as seriously threatened (List 1B.1) according to the California Rare Plant Ranking system (CNPS 2016). The USFWS finalized a recovery plan for the species in 1998 (USFWS 1998b).

C.5.2 Distribution

Marsh sandwort has been documented along the Pacific coast from Washington to southern California (CCH 2007 and CASH 2007); however, it is believed to have been extirpated from Washington and there are no known collections from Oregon (CASH 2007, OSUH 2007, Oregon Plant Atlas 2007).

Though historically known from numerous locations throughout coastal California, at the time of listing in 1993, marsh sandwort was known to be extant in only one area: Black Lake Canyon in southwestern San Luis Obispo County, where it has since become extirpated. In 1998, marsh sandwort was rediscovered at Osos Flaco Lake in southern San Luis Obispo County; this is the only known wild population for this species (USFWS 2014).

Within the LOHCP Area, marsh sandwort occurs in a single location, where it was planted into the northeast marshy portion of the within Sweet Springs Nature Preserve (USFWS 1998b; CNDDB 2016).

C.5.3 Habitat

A coastal species, marsh sandwort historically inhabited marshes and other perennially mesic areas including streams and creeks (USFWS 2008). It can grow in saturated acidic bog soils and soils that are sandy with a high organic content (USFWS 2014).

C.5.4 Biology

Marsh sandwort is a perennial herb in the pink family (Caryophyllaceae). Between May and August, it produces small, solitary, white flowers on long stalks that arise from the leaf axils. Fruits, which are capsules, contain 15-20 seeds (USFWS 1998b).

C.5.5 Threats

Marsh sandwort is threatened by loss of coastal wetland habitat, as well habitat degradation due to altered hydrologic conditions, sedimentation, and competition from exotic plants. Additionally, its small populations, including those resulting from reintroductions, may face reduced fitness due to pollinator deficiencies, excessive inbreeding, and loss of genetic diversity.

C.6 Steelhead (*Oncorhynchus mykiss irideus*)

C.6.1 Conservation Status

The South-Central California Coast Distinct Population Segment (DPS) of steelhead (steelhead), or coastal rainbow trout (*Oncorhynchus mykiss irideus*: Salmonidae) is a federally-threatened species (USFWS 2005) that is also designated as a Species of Special Concern by the California Department of Fish and Wildlife (CDFW 2016). The National Marine Fisheries Service (NMFS) published a recovery plan for this species in December 2013 (NMFS 2013). In 1996, the California Department of Fish and Game (Wildlife) developed a Steelhead Restoration and Management Plan for California (CDFW 1996).

In addition, NMFS has designed critical habitat for steelhead (NMFS 2005); this includes a total of 1,240 stream miles and three square miles of estuarine habitat. The Estero Bay Hydrologic Unit, which contains critical habitat within the Los Osos Hydrologic Subarea, is one of five hydrologic units identified for the South Central California Coast Steelhead DPS. The extent of the Los Osos Hydrologic Subarea is described in the Final Rule as being: Outlet(s) = Los Osos Creek (Lat. 35.3379, Long. –120.8273) upstream to endpoint(s) in: Los Osos Creek (35.2718, –120.7627; NMFS 2005), approximately 4 miles southeast of the LOHCP Area.

The primary constituent elements of critical habitat for steelhead are those sites and habitat components that support one or more life stages, including:

- **Freshwater spawning sites** with water quantity and quality conditions and substrate supporting spawning, incubation and larval development;
- **Freshwater rearing sites** with: (i) Water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility; (ii) Water quality and forage supporting juvenile development; and (iii) Natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.
- **Freshwater migration corridors** free of obstruction and excessive predation with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival.

- **Estuarine areas** free of obstruction and excessive predation with: (i) Water quality, water quantity, and salinity conditions supporting juvenile and adult physiological transitions between fresh- and saltwater; (ii) Natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels; and (iii) Juvenile and adult forage including aquatic invertebrates and fishes, supporting growth and maturation.

C.6.2 Distribution

Steelhead, the anadromous form of the species *Oncorhynchus mykiss*, which also includes inland rainbow trout, historically occupied streams along the west coast of North America. The South-Central California Coast DPS extends from the Pajaro River at the border of Santa Cruz and Monterey counties, south to Arroyo Grande Creek in southern San Luis Obispo County. Streams further north and south support steelhead within the Central California Coast DPS and the Southern California Coast DPS, respectively.

Within the LOHCP Area, steelhead historically occurred in Los Osos Creek, which flows on the eastern perimeter of the Plan Area. In the recovery plan, Los Osos Creek has been identified as a Core 2 population; such populations and Core 1 populations are the focus of the recovery plan (NMFS 2013). Steelhead may be present in reaches of Los Osos Creek along the eastern perimeter of the LOHCP Area.

C.6.3 Habitat

Steelhead inhabit perennial coastal streams with clear, cool to cold, fast flowing water with high dissolved oxygen content and abundant gravels and riffles. Streams must contain spawning gravels of certain size and free of sediment, and cool, clean, and well-oxygenated water to allow egg incubation and development (NMFS 2013). Steelhead prefer habitat with relatively good water quality that has low suspended sediment and contamination loads, and minimal pollution levels (Leidy 2000). They require sufficient flows and habitat characteristics for spawning, rearing, and migration, such as shallow riffles for spawning and deep pools with well-developed cover for rearing (Leidy 2000).

C.6.4 Biology

C.6.4.1 Taxonomy

Steelhead are the anadromous (ocean going) form of rainbow trout. In California, steelhead is classified as the coastal subspecies, *Oncorhynchus mykiss irideus* (Behnke 1992). Steelhead populations have been divided into Evolutionarily Significant Units and Distinct Population Segments. The ESA defines a "species" to include any distinct population segment of any species of vertebrate fish or wildlife. For Pacific salmon, NOAA Fisheries Service considers an evolutionarily significant unit, or "ESU," a "species" under the ESA. For Pacific steelhead, NOAA has delineated distinct population segments (DPSs) for consideration as "species" under the ESA (NMFS 2011). Within the LOHCP Plan Area is the South-Central California Coast Steelhead DPS.

C.6.4.2 Morphology

Besides having a larger size at spawning, steelhead are nearly indistinguishable from the resident rainbow trout that also live in the same streams in which they spawn (Moyle 1976). They are usually

silver with black spots on the back; they have an adipose fin, dorsal fin, and a slightly forked tail and a pink to red lateral band (Moyle 2002). They also have pinkish colored cheeks, an iridescent blue to nearly brown back, and silver, white, or yellowish sides and belly. Adults that have returned from the ocean can reach approximately 23 inches in length (Leidy 2000). Freshwater juveniles or smolts range between 5-10 inches in length (Moyle 2002).

C.6.4.3 Diet

Juvenile steelhead feed on aquatic insects and their larvae, snails, amphipods, opossum shrimp, and small fish (Moyle 1976). Adults may also feed on newly emergent fry (Leidy 2000). Steelhead usually do not eat when migrating upstream and therefore lose body weight (Pauley and Bortz 1986). In the ocean, steelhead are drift feeders (Leidy 2000).

C.6.4.4 Reproduction

Following the first substantial rainfall in fall and winter, steelhead migrate to freshwater habitat where they spawn between December and April (Leidy 2000). Steelhead spawn in beds constructed by the female over a gravel and cobble substrate, where females lay eggs that are then fertilized by the males. Eggs incubate for approximately 3 to 4 weeks, and then hatched fry rear within the gravel interstices for an additional 2 to 3 weeks. Emergent fry rear at the stream margins near overhanging vegetation. Juveniles (smolts), after rearing for 1 to 3 years within freshwater and post-spawning adults migrate out to the ocean from March to July, depending on stream flows. Steelhead will migrate upstream after 1-4 growing seasons at sea (Burgner et al. 1992). After spawning, steelhead may return to the ocean and spawn the following year (Leidy 2000).

C.6.5 Threats

Steelhead are threatened by a variety of factors that have altered their habitat and affected populations directly; these include barriers to migration, water diversions, flow fluctuations, sub-optimal water temperatures for incubation and juvenile rearing, sedimentation of spawning habitat, and low summer flows for emigration (Leidy 2000). Land development, dams, and degradation of estuaries have also decreased steelhead juvenile rearing areas.

In San Luis Obispo County, streams and riparian corridors have been modified to increase conveyance for flood control, minimize bank erosion, and increase areas available for development and agricultural uses. These activities often change in the natural channel geometry (i.e., loss of complexity, meanders are lost) in ways that can reduce the ability of the habitat to support steelhead. Large woody debris (tree trunks, large limbs) is considered important for steelhead and other anadromous fish because it provides overhead cover, creates calm or lower velocity waters for resting, and creates greater habitat complexity. Large woody debris is typically removed from streams because it can create flooding hazards, blocks flow through culverts or damage culverts and bridges, and increases bank erosion.

Natural and man-made barriers in streams can prevent adult steelhead from reaching suitable spawning habitats causing the fish to breed in sub-optimal habitats where survival of the young is unlikely or creating traps where predators have easier access to concentrations of fish. Barriers can be caused by drop structures in streams or flood control channels, under–sized or poorly designed culverts and bridges, and under-grounding of streams.

Water quality and stream flows can also be affected by urbanization and cultivation; these factors may limit steelhead in Los Osos Creek (NMFS 2013).

C.7 White-tailed kite (*Elanus leucurus*)

C.7.1 Conservation Status

The white-tailed kite (*Elanus leucurus*: Accipitridae) has been designated a fully-protected species by the California Department of Fish and Wildlife (CDFW 2016).

C.7.2 Distribution

The white-tailed kite is found year-round in California from the coast to the eastern edge of the Central Valley and the western edge of the Mojave Desert. White-tailed kites are resident through most of their breeding range in California, though may disperse in response to changes in prey abundance (Dunk and Cooper 1994). Globally, the species occurs in portions of Washington and Oregon, as well as Central America and South America.

There are no recorded occurrences of the white-tailed kite within the LOHCP Area (CNDDB 2016); the two nearest occurrences are located approximately 4.8 and 5.1 miles east of the LOHCP Area. However, a colony of white-tailed kites has been observed in the LOHCP Area near Eto Creek, north of Nipomo and east of South Bay Boulevard. The birds are winter resident, with occasional summer presence (J. Chesnut, pers. comm.). The Plan Area features suitable nesting and foraging habitat.

C.7.3 Habitat

White-tailed kite inhabits herbaceous and open stages of most lowland habitats with variable growth of trees, which they use for cover, and dense population of voles (*Microtis* spp.), which are their preferred prey (Waian and Stendell 1970). The species are rarely found away from agricultural areas and are often found in association with riparian areas.

C.7.4 Diet

The white-tailed kite primarily feeds during the day on voles and other small, diurnal mammals, though occasionally eats birds, insects, reptiles, and amphibians. It forages in grasslands, meadows, farmlands, emergent wetlands, and other habitats by soaring, gliding, and hovering within 100 ft. of the ground in search of prey.

C.7.5 Reproduction

The white-tailed kite breeds from February to October, with a peak from May to August. Nests are built near the top of a dense oak, willow, or other trees near open foraging areas; nests are constructed from loosely-piled sticks and twigs that are lined with grass, straw, or small roots. Nest site availability can be limiting where prey availability is not (Dunk and Cooper 1994). The average clutch of this monogamous species is 4-5 eggs, with a range of 3-6. White-tailed kites roost communally in the non-breeding seasons (Waian and Stendell 1970).

C.7.6 Threats

White-tailed kites are threatened by conversion of natural and agricultural lands to urban uses, which reduces foraging and nesting habitat. Additionally, declines in the species have also been attributed to interspecific competition for nest sites, human disturbance at nests, and farming techniques that reduce prey populations (Dunk 1995). Other threats may include the robbing of nests by jays, crows, yellow-billed magpies, raccoons, and opossums and the predation by great horned owls.

C.8 Golden eagle (*Aquila chrysaetos*)

C.8.1 Conservation Status

Golden eagle (*Aquila chrysaetos*: Accipitridae) has been designated a fully-protected species by the California Department of Fish and Wildlife (CDFW 2016). Golden eagle is also afforded protection by the federal Bald and Golden Eagle Protection Act.

C.8.2 Distribution

The golden eagle occurs year-round in all areas of California except the Sacramento and San Joaquin valleys, the Los Angeles Basin, the Mojave and Colorado desert regions, where it is found only during the winter, and in the coastal Klamath Mountains, where it does not occur (Zeiner et al. 1990). The known elevational range of this species extends from near sea level to approximately 11,500 feet (Grinnell and Miller 1944). Within California, golden eagles are mostly resident, but may move south during the winter, and north following the breeding season. Globally, the species has a holarctic distribution, and occurs as far south as North Africa, Arabia, and the Himalayas in the Old World, and as far south as Mexico in North America.

Within the LOHCP Area, suitable nesting habitat for golden eagle is present on the perimeter of the Plan Area; however, there are no records in this area. The nearest record of occurrence is approximately 10.2 miles northeast of the LOHCP along Eagle Creek south of the city of Atascadero (CNDDB 2016).

C.8.3 Habitat

Within California, golden eagles are most often associated with sage-juniper flats, deserts, grasslands, savannahs, and early successional stages of shrub habitats and forests on rolling hills (Zeiner et al. 1990). They are often found in areas with cliffs with overhanging ledges or near large trees, which they use for cover (Zeiner et al. 1990). Golden eagles are typically not found in heavily forested areas or on the immediate coast and are rarely detected in urban areas (Grinnell and Miller 1944, Garrett and Dunn 1981).

C.8.4 Diet

Golden eagles primarily prey upon rabbits, hares, and rodents but will periodically eat other mammals, as well as birds, reptiles, and carrion (Zeiner et. al, 1990). They forage during the day by soaring above open habitat, making low, quartering flights; golden eagles also occasionally search for pretty from a perch (Carnie 1954).

C.8.5 Reproduction

During their breeding season, which occurs between January through August, with peak activity between March and July (Beebe 1974), golden eagles nest on platform nests located on cliffs, large trees, or other tall landscape features, such as power transmission line towers, within otherwise open areas. Breeding pairs often show high site fidelity and may reuse nests from previous years (Kochert et al. 2002). Clutches usually consist of two eggs that are laid in early February to mid-March and require approximately six weeks of incubation (Beebe 1974).

C.8.6 Threats

Golden eagles are primarily threatened by habitat loss due to urban and agricultural land conversion. Pesticide and lead poisoning, as well as electrocution on powerlines, are also significant causes of mortality (DeLong 2004), while collisions with wind-turbine blades may be of concern in areas where such power generating structures are present (Hunt et al. 1997). Land management practices that affect prey abundance can also have effects on golden eagle populations. For example, conversion of shrublands to grassland may reduce rabbit abundance, which can have important effects of golden eagle demography (Knick and Dyer 1997).

Appendix D Priority Management and Restoration Issues

This appendix integrates the best available biological information to aid in the development of specific restoration and management programs and projects for the LOHCP Preserve System. The information will be used in the development of the LOHCP Preserve Adaptive Management and Monitoring Plan (AMMP) that will guide implementation of management and restoration projects.

This appendix addresses management of three main factors that can impact habitat within the Bayview fine sands ecosystem: exotic plant species, incompatible recreation, and fire.

D.1 Exotic Plant Species Management

Exotic plants have been identified as one of the current stresses to the sensitive species and communities of the Baywood fine sands (USFWS 1994, Tyler and Odion 1996, JSA 1997, USFWS 1998a, 1999). In addition, future invasions are likely to greatly impact this endangered system and influence the ability of the Los Osos Habitat Conservation Plan to attain its biological goals.

This section is intended to:

1. Outline the approaches to exotic plant management;
2. Identify the techniques currently available to treat exotic plant populations;
3. Describe the distribution, ecology, and impacts of exotic plant species presently within lands that are anticipated to be included within the LOHCP Preserve System.

This information will be used to develop the specific management strategies, targets, and techniques for exotic plant management within the LOHCP Preserve System AMMP, which will also be informed by a baseline inventory of exotic plants within the preserves conducted early during implementation of the LOHCP conservation program.

D.1.1 Introduction

Though the Baywood fine sands are relatively droughty and low in nutrients (USDA 1984), exotic plant species have successfully colonized the plant communities they support. Primarily originating in regions experiencing Mediterranean climates, these species are termed “exotic” because they were not present in the region prior to the arrival of Europeans in the 1700s; instead, their presence is due to direct or indirect effects of human activity.

Though exotic plants of the LOHCP Area vary in aspects of their ecology which influence their impacts, in general, they likely compete with populations of native plants and reduce the diversity of the plant communities. In doing so, they likely degrade habitat required by native animal species, including populations of sensitive species, including the four covered species. Certain types of exotic species, such as the perennial grasses, have the potential to further degrade habitat by altering ecosystem processes including disturbance regimes, and water and nutrient cycling (D'Antonio and Vitousek 1992, Haubensak 2001). The known and hypothesized impacts of exotic plant species presently found in the LOHCP Area are further discussed in Section D.1.5.

Exotic plant species will likely present a continuing stress and challenge for management in the LOHCP Preserve System. New exotic plants will likely invade the region as a result of additional introductions (Janzen 1986, Levine and D'Antonio 2003); in additions, alterations in conditions (e.g., climate change, nutrient deposition, fire) can create new opportunities for existing species in the region to invade habitat within the LOHCP Preserve System. Once exotic plants become established, the costs of eradication and control efforts can be high; hence prevention programs will be a critical component of LOHCP Preserve System Management.

Because exotic plants can have large negative impacts on the ecosystem, plant communities, and populations of the covered species and other rare plants and animals in the LOHCP Area, they will be actively managed to reduce their distribution and abundance, as well as prevent new introductions. This section outlines the general approaches to exotic plant management which are designed to facilitate the biological goals and objectives of the LOHCP (Section 5.1).

D.1.2 Exotic Plant Management Planning

During the first three years of implementation of the LOHCP, the LOHCP Preserve System AMMP will be developed. The plan will include an exotic plant management component that will:

1. Provide baseline data documenting the current distribution and abundance of each species;
2. Outline management strategies, targets, and techniques for exotic plant management;
3. Identify a coordinated program for exotic plant management, which includes a prioritized list of exotic plant control and eradication projects, timelines and budgets for project implementation, and a detailed program for exotic plant prevention.

The Exotic Plant Management component of the LOHCP Preserve System AMMP will be developed by inventorying the exotic plants, assessing the significance of their impacts, evaluating the feasibility of their control, and ranking exotic species and specific occurrences according to the urgency of management.

D.1.2.1 Inventorying Exotic Plants

Through a systematic survey of the LOHCP Preserve System, a qualified biologist will document the distribution of all exotic species. The occurrence of exotic plants adjacent to the Preserve System should also be recorded, as feasible. For purposes of the initial evaluation of species, relative abundance categories will be assigned to facilitate assessment of impact and likelihood of control. Ultimately, a quantitative sampling regime will be used to estimate density or percent cover, which can be provide baseline data for tracking changes through time and evaluating effectiveness of management. The resulting distribution and abundance data should be incorporated into the LOHCP Preserve System geographic information system (GIS).

D.1.2.2 Assessing Impact Significance

The significance of impact of each exotic species found within the LOHCP Preserve System will be assessed based on its current impacts and the potential for it to increase in impact at a later date (Hiebert and Stubbendieck 1993). Current impact determinations will consider the distribution, abundance, and known or likely effects on species (incl. sensitive species) and ecosystem processes

(e.g., succession, nutrient cycling, fire, etc.). Future impacts will be evaluated by assessing the species' reproductive ability, dispersal ability, habitat requirements, competitive ability, and known impacts in natural areas that might be similar in characteristics (e.g., soils, climate, vegetation structure, etc.) to those in the Baywood fine sand communities (e.g., Guadalupe-Nipomo Dunes).

Section D.1.5 outlines the type of information that will be incorporated in an impact assessment, which should be greatly expanded following the detailed assessment of the species distribution and abundance as part of the inventory.

D.1.2.3 Determining Feasibility of Management

For each exotic plant species, the feasibility of successful management will be evaluated. Specific management goals (prevention, eradication, and control) are discussed in the next section. In general, feasibility would be the function of four main factors:

Distribution: Narrowly distributed plants, including those limited to specific microhabitats and those that have only recently invaded, will be more feasible to manage than widespread plants.

Abundance: Plants which occur in low abundance (low population densities) may be easier to control than those that occur at high density (recognizing that impacts of exotic species can be greater at higher densities).

Biology: Several aspects of exotic species biology can reduce susceptibility to control, including presence of a seedbank, and ability to regenerate vegetatively (i.e., from stems, roots, and other structures).

Treatments: Several aspects of management treatments that will influence feasibility include (Hiebert and Stubbendieck 1993):

1. Whether effective treatments have been developed;
2. The cost of treatments; and
3. Collateral damage and potential for unintended negative impacts of treatments.

Feasibility of management will be based on a complete review of the most recent scientific literature and conversations with experienced land managers in the region.

D.1.2.4 Ranking Exotic Plants and Occurrences for Management

Based on their impact and management feasibility, exotic plant species will be ranked according to the urgency for management. A ranking system based on quantitative assessments of species impact and the management feasibility such as that developed for the National Park System (Hiebert and Stubbendieck 1993) could be used to objectively rank species; such an objective program can avoid inadvertent bias which could reduce effectiveness of the overall program.

Within the LOHCP Preserve System, habitat differs in ways that will influence the specific exotic plant management strategies, targets, and techniques. These include:

1. The species richness, distribution, and abundance of exotic plants present;

2. Exotic plant species and land use in areas adjacent to the preserve;
3. The structure and composition of the native communities, including the distribution and abundance of sensitive species; and
4. Other management projects to be implemented (i.e., recreation, fire, etc.).

D.1.2.5 Prioritize Exotic Plant Management Projects

Exotic plant management will likely consume a large portion of the budget allocated for monitoring and management within the LOHCP Preserve System. Though this is justified, given the current and potential future negative impacts of exotic plants, it is critical that the funds be used judiciously. One critical component of this is proper use of adaptive management methods to ensure that exotic plant projects are indeed effective. If project goals are not attained and/or the project does not appreciably advance the conservation goals of the LOHCP, future projects should be modified, as needed, or not conducted at all. The successful design and evaluation of projects can be facilitated by the scientific approaches to management.

Within the exotic plant management program, funds will not be sufficient to conduct all projects. An objective system of prioritizing exotic plant management will be established to facilitate the best use of funds. Within projects, cost-benefit analysis will be used to weigh to relative merits of different targets and techniques. A schedule of exotic plant management projects will be developed to reflect the priorities. Scheduling exotic plant management will also be important to address the crucial role in the season often plays in influencing treatment effects.

The priorities, schedules, and budgets, will be subject to critical review by landowners and trustee agencies, and amendment per results of LOHCP management projects, availability of new information (e.g., science, new techniques), and new stresses and threats (within exotic plant management, new priorities in overall management).

D.1.3 Exotic Plant Management Goals and Approaches

Exotic plant management will follow carefully established goals, each with one or more specific, quantitative objectives. Outlined in the exotic plant component of the LOHCP Preserve System AMMP, these goals and objectives will be developed in consideration of the biological goals and objectives of the LOHCP (Section 5.1). Both long term and short-term goals will be developed and, as with all aspects of the LOHCP Preserve System management, an adaptive framework will be used to evaluate and promote goal attainment.

Three main types of goals for exotic plant management will be pursued: prevention, eradication, and control. The following sections identify the criteria that will be used to assign exotic plant species occurrences to one of each of these main treatment goals, based on the comprehensive assessment of exotic plants conducted as part of the baseline survey for exotic plants in the LOHCP Preserve System (Section E.7).

D.1.3.1 Prevent Exotic Plant Establishment

The communities of the Baywood fine sands will inevitably be subject to further invasion, as aggressive exotic plants continue to become established and spread within California, and as habitat conditions

change in ways that promote invasion. Given the strong negative impacts of exotic plants on species and communities, and the large effort required to control these species, the invasion of new exotic plants will be prevented if at all possible. The opportunity costs of focusing on eradication and control efforts to the deficit of prevention will be considered in overall exotic plant management prioritizations (described below).

New invasions will be prevented through implementation of an exotic plant prevention program that will:

1. Reduce or eliminate invasive exotic plant occurrences adjacent to the Preserves;
2. Limit introduction of foreign material into Preserves;
3. Conduct education and outreach;
4. Establish methods for early detection; and
5. Plan for early eradication.

Reduce Exotic Plants Adjacent to the Preserves

Though transportation and recreation can bring seed from long distances, most exotic plant introductions will result from short-distance dispersal from areas adjacent to the LOHCP Preserves. Targeted outreach and individual coordination with adjacent landowners can be used to reduce the likelihood that new invasive exotic plants will become established within the Preserve System.

Limit introduction of foreign material into Preserves

The following steps will reduce the likelihood that new exotic plants will be introduced into the Preserve System.

1. Restoration projects will use gravel, fill, mulch, straw, and propagated plants that are 'weed free', wherever possible (Tu et al. 2001).
2. Any vehicles will be washed prior to entering Preserves.
3. Recreational trails will be managed to minimize dispersal opportunities, including by:
    a. Not connecting Preserves areas to highly invaded habitats;
    b. Removing exotic plants from parking lots, staging areas, and trailheads;
    c. Encouraging visitors to monitor themselves and their stock for weed seed; and
    d. Requiring that equestrians use only weed-free hay when recreating in Preserves.

Education and Outreach

Outreach should be used to educate adjacent landowners and Preserve visitors about the detrimental impacts of exotic plants and the steps people can take to help prevent new invasions. Residential landowners adjacent to Preserves will be encouraged not to grow invasive species including jubata grass, iceplants, and eucalyptus.

Early Detection

The Preserve System will be examined annually to detect occurrences of new exotic species. Heightened vigilance will prevent establishment following events known to promote invasion including:

1. disturbances, such as fire, roads or trails creation, landslides, or restoration projects;
2. very wet years (e.g., El Niño years); and
3. soil amendment and fertilization, including application of herbicides.

Early Eradication

Any new exotic plant species detected within the LOHCP Preserve System will be eradicated during the first year following initial detection.

D.1.3.2 Exotic Plant Eradication

Complete elimination of an exotic species from the Preserve System will be the goal of management where doing so is feasible. Species that should be considered for eradication include:

1. recently invaded exotic plant species;
2. narrowly distributed exotic species; and
3. exotic species that occur at relatively low density.

Recent invasions

Most invasions begin with one or a few individuals in a single area. Removal efforts focused on such new invasions can be successful due to the limited geographic area and the low number of individuals requiring treatment. Moreover, recent invasions of species requiring more than one season of growth prior to reproduction (shrubs, trees, and many perennial herbs) can be successfully eradicated if removed before they have the opportunity to reproduce. This can be especially important for species that develop seedbanks (populations of dormant seed) or other belowground dormant structures (e.g., bulbs, tubers) that can be difficult to locate and remove.

Narrowly Distributed Species

All else being equal, species can be more easily eradicated if they occur in a smaller geographic area, where focused treatments can successfully remove every individual. Several exotic species have narrow distributions and can be eradicated, including:

1. Species that were deliberately planted (e.g., many tree species and ornamentals); and
2. Species that are restricted to narrow microhabitats within the Preserves (e.g., along roads or creeks, near structures, etc.).

Less Abundant Species

Small populations oftentimes comprised of just a few, sparsely distributed individuals can be more readily eradicated than large populations. Presumably conditions are not conducive to their widespread

establishment; however, these species will be eradicated before they can build up potentially explosive seed banks or proliferate in response to changing conditions, such as a fire, drought, series of wet years, or global climate change.

D.1.3.3 Exotic Plant Control

Exotic plants that have strong impacts yet cannot feasibly be eradicated will be the subject of control efforts, which will be designed to reduce their current negative impacts and potential for future impacts on communities and covered species by:

1. preventing their spread;
2. reducing their abundance (e.g., density);
3. reducing their distribution; and
4. reducing their vigor.

The following guidelines will be followed to enhance effectiveness of exotic plant control projects:

1. remove individuals or isolated patches of plants which are geographically isolated from larger patches;
2. remove exotic plants along trails, which can act as corridors for invasion to intact habitat;
3. prevent the spread of populations by controlling patches at their perimeters, then working inward;
4. prevent the spread of wind-dispersed species including grasses and Asters, among others, by working from upwind (where the sources are) to downwind (where seeds are landing).

Depending on the species and community, exotic plant control will proceed via one or more approaches:

1. **Ecosystem-Level Approaches:** In these approaches, management efforts focus on controlling exotic plant species by addressing ecological processes that influence their distribution, abundance, and population performance. Such approaches may be the most cost-effective for controlling widespread and abundant exotic species over large spatial and temporal scales. Fire management, which includes both prescription burning and wildfire suppression, and grazing are two common ecosystem approaches.
2. **Functional Group Approaches:** Exotic plant species with similar ecologies can be targeted with similar methods, perhaps increasing efficiency over single species efforts. In the LOHCP Preserves, the same control methods might be used for various species of iceplants.
3. **Single-species approaches:** A single species approach will be used in cases where a species has large impacts and/or a unique ecology which requires specialized treatment, including in the case of veldt grass.

D.1.4 Exotic Plant Management Techniques

Numerous techniques have been developed to kill or damage exotic plants; these techniques are often combined to enhance their effectiveness (Bossard et al. 2000), sometimes synergistically so (Tu et al.

2001). This section describes physical, biological, and chemical techniques will be used as part of an integrated pest management strategy to manage exotic plants in the LOHCP Preserve System, by describing the basic technique, discussing its effective use, then evaluating the benefits and potential negative impacts of its use. During implementation of the LOHCP, the available scientific literature and expertise of invasive species biologists, weed scientists, and land managers in the region will be used to select the appropriate techniques for management.

D.1.4.1 Physical Control Methods

Exotic plant species can be physically controlled using manual and mechanical removal, fire, mulching, and soil solarization.

Manual and Mechanical Removal

A wide variety of techniques have been developed to remove plants or plant biomass by hand, with or without hand tools (manual removal), or using mechanized tools (mechanical removal). These include various types of cutting and girdling as well as pulling.

Cutting: Cutting exotic plants at their base using saws (manual or chain), machetes, loppers, brush cutters, weed whackers, mowers, and brush hogs (which twist off aboveground biomass) can sometimes effectively kill them. Many exotic species resprout when cut, such that physical treatments, such as stump grinding, or chemical treatments with herbicide, are required to kill them.

Girdling: An incision cut into the trunk of a tree around its circumference can sever water and nutrient transport conduits in the trunk, thus killing the tree. While left standing in many systems, girdled trees and shrubs should be removed as standing dead trees will continue to produce shade and litter and, once they fall, will negatively impact native plants directly, through crushing, and indirectly, by usurping space as the process of decomposition will be slow, leaving the dead tree on the soil surface for decades.

Pulling: Because cutting often allows plants to resprout, pulling exotic plants out by their roots is often more effective. The loose sand soil conditions in most areas of the LOHCP Preserve System will render it fairly easy to hand-pull seedlings as well as adults of many species. Pulling can be aided by weed wrenches and similar devices that feature a lever connected to a clamp which, when attached to the base of the plant, allows one to leverage the shrub out of the ground using one's weight. The disadvantage of pulling is that some species may be facilitated by the soil disturbances that results from removing the root mass from below the soil surface.

D.1.4.2 Fire

Fire can be used to control populations of fire-sensitive exotic plant species through two main mechanisms.

Blowtorches and flamethrowers: Flames can be used to kill exotic plant individuals or patches through incineration or heat-girdling. When used during wet weather, risk of fire through the process known as 'flaming' is greatly reduced (Tu et al. 2001).

Prescribed burning: Broadcast burning removes aboveground individuals, and for many species with dormant seed banks, either kills seeds or induces their germination, after which seedlings can be removed (Bossard et al. 2000). In fire management, aspects of the fire regime including seasonality and intensity of the burn, among other aspects, will influence fire impacts.

Oftentimes a single burn is not sufficient, but several consecutive burns are needed to control exotic plants. For example, an initial burn can be to kill aboveground individuals and stimulate germination from the seedbank, and a second (and sometimes third or fourth) burn used to kill the newly established seedlings.

Importantly, some exotic plants are promoted by fire, which stimulates seed germination, or creates open conditions that promote their establishment and growth (Bossard 2000). Thus, burning, especially in closed canopy communities, could inadvertently benefit exotic species (Section D.3.1.2).

D.1.4.3 Mulching

Litter or other cover on the soil surface that reduces light availability and thus photosynthesis can inhibit populations of many exotic plants. To prevent new seedling establishment or resprouting following removal of adult shrubs and trees, a variety of mulches including straw and hay, sawdust and wood chips, grass or other clippings (Tu et al. 2001).

Native plants and animals of the Baywood fine sands might also be inhibited by mulches, so mulches should not be widely applied within intact habitat but may be an effective way to control dense infestations of exotics in highly degraded areas lacking native populations. For example, in dense stands of eucalyptus (*Eucalyptus* spp.), which typically contain very low diversity and cover of native plant species, cut stumps could be covered with black plastic tarps to inhibit re-sprouting and thus killed trees. This approach, known as 'tarping', might be used to remove exotic plants in other degraded sites, but should not be used as a widespread treatment within intact habitat (Horowitz 2003).

D.1.4.4 Solarization

Increasing soil temperatures by placing clear plastic sheets over moist soils, causing a greenhouse effect, can kill many seeds and thus prevent their germination. As with mulching and tarping, this treatment will kill both native and exotic plant seeds and therefore should only be used in highly-degraded areas.

D.1.4.5 Biological Control Methods

Biological control methods use the natural enemies of exotic plants to reduce their abundance or vigor and thus their negative impacts on native species. Three types of biological control include biocontrol, competition through restoration, and grazing (Bossard 2000).

Biocontrol

Biocontrol is the process by which natural enemies of target species including animals, fungi, and other microbes are released into the wild to predate upon or parasitize exotic plants. Prior to their release, biocontrol agents are rigorously tested to ensure that they do not negatively impact native species and must be approved for use by the USDA. This extensive process precludes the use of biocontrol agents on all but a few of the worst pest plants.

Competition through Restoration and Management

Native plants can compete with exotic plant species, thus reducing their performance and ultimately their populations. Typically, exotic plants are problematical because they are strong competitors for resources and thus 'out compete' native plants. Restoration techniques that 'tip the balance' (Corbin et al. 2004) towards native species might enhance native biodiversity. Such techniques can include: propagating and reseeding native species, reducing the availability of nutrients through carbon addition, and facilitating succession.

Planting and seeding native species: In highly degraded areas where native plant propagule supply is limited, control of exotic plant species may be facilitated by sowing or planting native plants in conjunction with exotic plant removal or other control techniques. A very conservative protocol for procuring, propagating, and out planting plant material must be adhered to in order to protect the genetic diversity of plants within the site. In general, sowing seeds and planting seedlings or cuttings of native species into intact, preserved habitat should be limited. Preserves should maintain native biodiversity and natural community structure, and management should simply counteract, where possible, the negative impacts of anthropogenic alterations to habitat, not engineer desired landscapes. Ecological research relies heavily on examination of natural distribution and abundance patterns of species and assemblages. Planting will reduce the ability of researchers to investigate the species and community ecology in the preserves.

Reducing soil nutrient availability: Many exotic plant species in the Baywood fine sands may require higher nitrogen availability. For example, rip gut brome (*Bromus diandrus*), is found in high density in the recently abandoned pea fields where soil nitrogen is likely higher than within intact habitat. Facilitating uptake of nitrogen by soil microbes including bacteria by adding carbon via sugar (e.g., sucrose) or sawdust has been shown to reduce plant-available soil nitrogen. Such restoration may return the competitive advantage to native plants that are adapted to the low availability of soil nutrients in the Baywood fine sands (Haubensak 2001, Corbin et al. 2004).

Succession: Many exotic plants in the communities of the Baywood fine sands are early successional species that require environmental conditions characteristic of post-disturbance environments, including high availability of light and soil resources. Over time, the natural successional trajectory in coastal sage scrub and Morro manzanita chaparral communities recovering from disturbance (e.g., clearing and tillage) will likely render conditions less suitable for these species. Unfortunately, succession will also reduce suitability of habitat for native early successional species, including sensitive plants and animals such as the Morro Bay kangaroo rat. Thus, widespread late successional conditions should not be a goal in preserve management, though succession might be effective in reducing some species including veldt grass, which observations suggest decreased in abundance in coastal sage scrub at Montaña de Oro State Park (M. Walgren, pers comm.).

Grazing

Recent efforts to decrease exotic plant abundance at large spatial scales in other systems have focused on the role of grazing animals. Livestock including goats, sheep, and cattle as well as chickens have been used to control exotic plants; however, the impacts of grazers on plant communities have been mixed. Grazing has been proven effective in enhancing diversity of native forbs in mesic grasslands (Hayes and Holl 2003); however, grazing has also been shown to facilitate, rather than reduce, populations of some

exotic plant species and increase the distribution of exotic plants by vectoring weed seed through animal droppings (Tu et al. 2001).

As with all management in the LOHCP Preserve System, techniques that match natural processes to which the native species are adapted are more likely to have beneficial effects. It is not known whether the native communities of the Baywood fine sands are evolved under a regime of native grazers (e.g. elk, antelope) and therefore might benefit from grazing to reduce exotic plants.

Grazing may degrade native communities by reducing populations of sensitive species and causing soil disturbance which can cause soil erosion and enhance invasion and spread of exotic species such as veldt grass and jubata grass. As a result of the strong potential for such negative impacts, grazing is only recommended as a method of removing dense infestations of exotic plants (and low native plant cover) in areas for which there is no other conceivable removal method. Grazing should avoid areas with populations of sensitive plants and animals, where soils remain intact (i.e., have not been mechanically disturbed), and where the topography is steep. In these cases, the smallest effective grazers (e.g., sheep and goats, not cattle) should be penned into the designated area and removed immediately following treatment.

D.1.4.6 Chemical Control Methods

In chemical control, herbicides are used to kill exotic plants or inhibit their growth. Herbicide use has been evaluated as a control technique for many exotic species that occur in LOHCP Preserve (Bossard et al. 2000), with some tests by State Parks staff having been conducted in the communities of the Baywood fine sands (M. Walgren, pers comm.).

The following herbicides were identified as appropriate for use as part of an integrated pest management strategy, to control exotic plant species in the Morro Dunes Ecological Reserve based on consultation with Joel Trumbo, California Department of Fish and Wildlife Senior Environmental Scientist (Lands Program, Wildlife Branch) who serves as a pest control advisor (J. Trumbo, pers. comm. 2018). The list was developed based on review of the exotic plant species subject to management (Section D.1.5), the special-status species and other sensitive resources in the reserve and broader LOHCP region, and the risk-assessment analysis prepared by the United States Forest Service (USFWS 2018).

- Glyphosate: non-specific herbicide recommended for annual herbs, grasses, perennials, and trees;
- Imazapyr: non-specific herbicide recommended for perennial herbs and trees;
- Triclopyr amine: broadleaf-specific herbicide recommended for annual and perennial broadleaf species, and trees;
- Triclopyr ester: broadleaf-specific herbicide recommended for trees and Himalaya blackberry;
- Aminopyralid: broadleaf-specific herbicide recommended for perennial herbs, especially asters, and trees;
- Chlorsulfuron: broadleaf-specific herbicide recommended for perennial broadleaf species, especially mustards;
- Fluazifop-p-butyl: grass-specific herbicide recommended for annual grasses; and
- Sethoxydim: grass-specific herbicide recommended for annual and perennial grasses.

These herbicides can be applied to trees using a cut stump, frill cut, or basal bark techniques, and foliar application for herbs, grasses, and vines.

Information about their use and risk-assessment analyses (except for triclopyr and triclopyr ester) are provided by the United States Forest Service (USFWS 2018). These pesticides are anticipated to be appropriate for upland habitats in other LOHCP Preserves. Additional herbicides developed during the anticipated 25-year period of LOHCP implementation should be evaluated for use based on analysis of their effectiveness at controlling exotic plants, risk to special-status species and other sensitive resources, and cost-effectiveness.

Potential negative impacts of herbicide use to control exotic plants in the LOHCP Preserve System include:

1. collateral damage to native species, including sensitive plants and animals;
2. facilitation of additional exotic plant invasions, due to disturbance and/or increase nutrient availability associated with the die-off and herbicides themselves;
3. contamination of groundwater due to the porous nature of the Baywood fine sand soil.

In general, the risks of herbicide use can be reduced by using one or more of the following precautions (Hoshovsky and Randall 2000):

1. selecting chemicals that are selective (kill only one or a few species), are non-toxic to animals, degrade rapidly under environmental conditions of the region, are immobilized on soil particles and therefore unlikely to reach groundwater, and are not easily volatilized; and
2. applying the herbicide so as to minimize inadvertent spread, including by spot treating the narrowest area possible, using a dye to determine where the application is going, and applying only in appropriate weather conditions (no rain, low wind).

Additional precautions that can be used in the LOHCP Preserve System include avoiding areas occupied by sensitive species and relocating sensitive species such as Morro shoulderband snail from the treatment area prior to herbicide application.

Like all potential management techniques, chemical control methods can have both positive and negative effects via direct and indirect mechanisms, all of which should be considered in evaluating the potential use of herbicides. Chemicals will be used to control exotic plant species through an integrated pest management approach and will be the follow the manufacturer's label.

D.1.5 Exotic Plant Species in the LOHCP Preserve System

This section outlines the current and potential future impacts of exotic plant species based on the current available information. This information will be updated and augmented based on the exotic plant inventory conducted early during implementation of the LOHCP (Section D.1.2.1).

Table D-1 lists the exotic plant species that are known or likely to occur in land anticipated to be included within the LOHCP Preserve System. Based on current information, proactive management is currently recommended for a subset of these (Table D-2). Table D-3 lists control techniques which may be effective in managing these aggressive exotic species.

D.1.5.1 Perennial Veldt Grass (*Ehrharta calycina*; Poaceae)

Distribution and Abundance

Perennial veldt grass is the most abundant and widespread exotic plant in land proposed for inclusion in the LOHCP Preserve System. It is found in all of the coastal sage scrub communities and occurs in disturbed areas, including along trails, in the central maritime chaparral communities. Though veldt grass is widespread, the species is generally absent from areas of dense canopy cover in central maritime chaparral and coast live oak woodland. Though patchily very abundant, veldt grass occurs very sparsely in some areas (i.e., <10% cover). The factors that limit its distribution and abundance are poorly understood.

Impacts

Perennial veldt grass invades coastal sage scrub and central maritime chaparral communities in areas of soil disturbance, including roads and trails, then establishes in gaps between shrubs. It attains high cover (>50%) in disturbed coastal sage scrub found on the Baywood fine sands, where it likely reduces the cover and species richness of native plants by competing for limiting soil resources. In addition, the dense thatch it produces may preclude native plant establishment. Perennial veldt grass is credited with transforming shrublands (e.g., central maritime chaparral and coastal sage scrub) into grasslands through the grass-fire cycle (Pickart 2000)—the process through grasses invade shrublands and promote frequent fire, through their highly flammable fuel, which then eliminates shrubs, resulting in type conversion (D'Antonio and Vitousek 1992)

Potential Future Impacts

Though perennial veldt grass is already relatively widespread and abundant, it too may increase in distribution and abundance in the absence of exotic plant management. Seedling establishment is facilitated by disturbances. Within central maritime chaparral, the species is primarily restricted to open, chronically disturbed areas including trails. Management designed to facilitate native shrub establishment, including fire and fire surrogates, as well as wildfire, could facilitate the spread of veldt grass into these relatively uninvaded communities.

In areas where perennial veldt grass is already abundant, its abundance may decrease through time. Many of these areas were disturbed as a result of agriculture (clearing and tillage) which facilitate the invasion and proliferation of perennial veldt grass. Though the species may slow the rate of shrub recolonization following disturbance, succession may ultimately create conditions which are unsuitable for perennial veldt grass persistence, including greater shrub canopy. This process of succession reducing veldt grass abundance (but not distribution) has been observed in the dune lupine community at Montaña de Oro State Park (Walgren 2004).

Proposed Treatments

The treatments proposed for perennial veldt grass control vary, depending on characteristics of the habitat area to be treated. In small, outlying patches consisting of a few sparsely distributed perennial veldt grass plants, plants should be pulled, with care given to reduce the amount of soil disturbance to the extent possible. Plants should be removed from the site using plastic bags in order to prevent seed

dispersal when plants are in fruit. Treated areas should be revisited to pull seedlings which may recruit (Nowell 2004).

Many areas anticipated to be included in the LOHCP Preserve System contain perennial veldt grass infestations which are large and dense. In these areas, manual removal will likely prove ineffective at controlling the invasive plant which instead will require chemical control. In larger areas where veldt comprises less than 90% of the relative cover, the grass specific herbicide Fusilade, mixed with a 0.5% no foam surfactant, should be applied to the leaves of plants during the active growth phase prior to seed head development (approximately November-April; Nowell 2004). Where veldt grass comprises more than 90% of the relative plant cover, and there are no sensitive plant species, veldt grass can be chemically controlled using a 2% solution of Roundup (glyphosate) broadcast sprayed over the treatment area.

D.1.5.2 Iceplants

Species

Land anticipated to be included within the LOHCP Preserve System supports two species of iceplant (species in the family Aizoaceae):

1. fig marigold (*Carpobrotus edulis*); and
2. round-leafed iceplant (*Conicosia pugioniformis*).

Sea fig (*Carpobrotus chilensis*) may also be present in the area.

Distribution and Abundance

Both round-leafed iceplant and fig marigold occur in gaps between shrubs within the coastal sage scrub and central maritime chaparral communities, where they are fairly widely distributed, due to their ability to colonize soil disturbances and gaps (Albert 2000, Albert and D'Antonio 2000).

Impacts

Owing to their rapid lateral growth (shoots can grow up to 1 m per year; D'Antonio 1990b), the long-lived perennial fig marigold can form large, impenetrable mats that compete with native seedlings (D'Antonio 1993) and reduce shrub growth (D'Antonio and Mahall 1991). Fig marigolds can also lower soil pH and increase soil organic matter (D'Antonio 1990a); in doing so, can increase the invasibility of sandy soils such as the Baywood fine sands (Albert 2000).

Though shorter-lived that fig marigold, round-leafed iceplant readily colonizes disturbances and gaps and grows very rapidly, allowing it to compete with native plants for space and resources. Round-leafed iceplant may similarly alter soil conditions and facilitate invasion, though this has not been examined (Albert and D'Antonio 2000).

Potential Future Impacts

In the absence of careful, targeted management efforts, iceplant species will likely increase in distribution and abundance. Individuals will persist within the gaps that are maintained in the open canopy conditions of the coastal scrub communities. In addition, fire management to maintain and

enhance native communities and populations of fire-adapted species will create opportunities for establishment (D'Antonio 1993, D'Antonio et al. 1993). Herbicides and die off associated with control can increase soil nutrient available and facilitate invasion. Thus, careful management of these two species will be essential to attaining the conservation goals of the LOHCP.

Proposed Treatments

Physical treatments are recommended for round leaved iceplant and small patches of fig marigold. Both species can be manually removed through pulling and cutting. Because remaining roots and pieces of branches can reestablish, care must be taken to completely remove the roots and all branches from the site. Follow up monitoring and treatment will be needed to remove new recruits and other exotic plants that invade the site.

Manual removal of fig marigold may be very time consuming and costly in the many areas of the Preserves where it has formed large patches. In these virtual monocultures, the application of glyphosate (i.e., Roundup) is recommended as a 2% solution of foliar spray. Since Morro shoulderband snail can inhabit ice plant mats, pre-treatment surveys should be used to locate, capture, and relocate to the nearest protected soil habitat outside of the treatment area to reduce take in the form of injury and mortality to individuals that could result from manual or chemical treatment of iceplants.

D.1.5.3 Jubata Grass (*Cortaderia jubata;* Poaceae)

Distribution and Abundance

Jubata grass presently has a narrow distribution and occurs at low abundance within land anticipated to be included in the LOHCP Preserve System. At the Bayview Unit of the Morro Dunes Ecological Reserve, jubata grass occurs in the Morro manzanita community in and around an area of extensive soil erosion associated with the old Broderson Road on the western edge of the reserve.

Current Impacts

An extremely large bunchgrass, jubata grass competes with native plants for space and soil resources.

Potential Future Impacts

In the absence of management, jubata grass will likely expand its distribution and abundance. The species produces up to 100,000 mature seeds per individual inflorescence, and windborne seed can disperse more than miles (DiTomaso 2000). The distribution and abundance of jubata grass within the natural communities of the LOHCP Preserve System is likely currently limited by the lack of appropriate conditions for seedling establishment, which appear to be created by disturbance. Such events that remove established biomass including activities associated with management, such as fire and other exotic plant removal efforts, may enhance the distribution and abundance of this plant.

Proposed Treatments

Pampas grass adults should be removed through cutting using a chain saw or weed eater. Seedlings should be removed through hand pulling or with a shovel. Manual removal may facilitate establishment

of seedlings or other exotic plants, necessitating that the site be monitored and follow up treatments be applied as needed.

D.1.5.4 Annual grasses

Species

Land anticipated to be included in the LOHCP Preserve System supports several species of annual grasses including:

1. oats (*Avena* spp.);
2. rip-gut brome (*Bromus diandrus*); and
3. red brome (*Bromus madritensis* ssp. *rubens*).

Distribution and Abundance

Annual grasses primarily occur at low abundance in a few localized habitats, including along trails and underneath isolated coast live oaks. The primary exception is the high-density populations of rip-gut brome that are found in a recently abandoned pea field in the northeastern portion of the Plan Area.

Impacts

Dense patches of annual grasses compete with native plants in the Baywood fine sands, especially native herbs, because their fibrous, shallow roots can take up limited soil resources. This competition can be greatest for native seedlings, which experience reduced establishment in dense patches of annual grasses.

Potential Future Impacts

Abiotic conditions in the Baywood fine sand communities including low soil moisture and nitrogen availability may restrict the distribution and abundance of annual grasses to specific microhabitats, or as in the case of the abandoned pea field, areas of greater nutrient availability. Any factor that might alter these conditions, including nitrogen deposition (Brooks 2003), a series of years with above average rainfall, or fire or other disturbance (Brooks 1999), could enhance the spread of these species. With increase abundance, these species would not only compete with native species on a larger spatial scale but could also increase the density of fine fuels in the dry season, and thus promote wildfire.

In other systems, fire has promoted establishment of annual grasses, including red brome (Brooks 1999)and cheat grass (*Bromus tectorum*; Young et al. 1987) which in turn have reduce establishment of perennial herb and shrub seedlings. The resulting dominance of annual grasses further promotes wildfire which again favors grasses, thus resulting in the type conversion of shrublands to grasslands (D'Antonio and Vitousek 1992).

Proposed Treatments

In areas where annual grasses occur in low abundance, manual removal through hand pulling is recommended. Care should be used to reduce the soil disturbance and thus potential to enhance the

spread of other exotic plants. Annual grasses should be pulled prior to setting seed during early spring (i.e., by April). All biomass should be removed from the site.

In areas where rip-gut brome or other annual grasses have become abundant, application of the monocot-specific herbicide Fusilade, with a 0.5% no foam surfactant can be applied during the growing season (January-March) but before seed head development.

D.1.5.5 Exotic Trees

Species

Non-indigenous tree species presently found within land anticipated to be included within the LOHCP Preserve System include:

1. Eucalyptus (*Eucalyptus camaldulensis* and *E. globulus*; Myrtaceae)
2. Monterey pine (*Pinus radiata*; Pinaceae)
3. Monterey cypress (*Hesperocyparis macrocarpa*; Cupressaceae)

Distribution and Abundance

Exotic trees occur with a very limited distribution at very low abundance, relative to other exotic plants. Of the tree species, *Eucalyptus* spp. are the most widespread. Monterey pine and Monterey cypress occur in only a few, isolated stands.

Current Impacts

The native communities of the Baywood fine sands are dominated by shrubs and herbs and contain only short statured trees such as coast live oaks (*Quercus agrifolia*). The exotic trees are much larger than the native trees; as a result, they compete with native plants for light and soil resources, and produce a dense layer of litter (leaves, bark, and small limbs). Eucalyptus bark, leaves, and roots also feature phenolic acids and volatile oils that have deleterious effects on other plants species (Sasikumar et al. 2002, Florentine and Fox 2003). Through these mechanisms, exotic trees reduce the diversity and cover of native plants, and alter habitat conditions for native animals, including Morro shoulderband snail which was negatively associated with eucalyptus (Walgren and Andreano 2012).In addition, the fuels they produce increases the risk of wildfire (Tyler and Odion 1996).

Potential Future Impacts

Originating in fire-prone communities, these species are adapted to fire, and produce high densities of seedlings following fire. As a result, they have the potential to spread during management designed to enhance the native communities (Section D.3; Tyler and Odion 1996, Tyler 1996). Even in the absence of fire, eucalyptus seedlings establish readily on the periphery of current groves, which have thus expanded over the past century and will likely continue to expand in the absence of management.

Proposed Treatments

Adult exotic trees should be removed through by cutting. To avoid soil disturbance and management costs, the stump and roots of large trees can be left intact. The stumps of species likely to resprout should be covered with thick black plastic tarps and/or a topical herbicide (e.g., Triclorpyr) to kill the tree. In many cases, removal of adult trees will facilitate establishment of seedlings, which should be removed with hand pulling. All tree biomass should be removed from the site. The site should be monitored to ensure other exotic plants such as iceplant and veldt grass to not invade the site.

D.1.5.6 Ornamental Plants

Species

A variety of ornamental plants have been deliberately planted in land anticipated to be included within the LOHCP Preserve System; specifically, adjacent to homes on the south side of Highland Drive in the Bayview Unit of the Morro Dunes Ecological Reserve. Species include exotic pines (*Pinus* sp.) and succulents (*Agave* spp.)

Current Impacts

Due to their very limited distribution and abundance, the impacts of the ornamental plants are likely limited. However, these species can compete with native plants and alter habitat for native animals; they may also promote wildfire.

Potential Future Impacts

While their narrow distribution and low abundance suggests that the ornamental plants may not be prone to spreading, changes in environmental conditions associated with disturbances (incl. fire and recreation), climate variation or change (e.g., El Nino years, greater precipitation), or other alterations associated with succession (soil development, etc.) might provide these species with opportunities to invade the natural community and displace native species.

Proposed Treatments

Ornamental plants will be targeted for removal through physical means, with the specific techniques varying depending on the habit of the plant. Trees and shrubs should be cut using a chain or hand saw. Herbs and succulents should similarly be cut or potentially pulled, with care given to avoiding soil disturbance associated with removing roots where possible. All biomass from these plants should be removed from the site. Follow up treatment may be required to kill or remove stump sprouts, seedlings, or other new recruits. However, physical mechanisms should successfully eradicate the ornamental plants of the LOHCP Preserve System.

D.1.5.7 Native Invaders

Plants native to California but not to the Bayview fine sands communities of Los Osos may also negatively impact communities and covered species of the LOHCP Preserve System. Though naturally occurring in California, such species might occur within the Los Osos communities solely due to

anthropogenic factors. As a result, native Baywood fine sand soil species are not adapted to competition with neither these species nor the habitat conditions they create.

Presently, it is not known whether there are any native invaders within land anticipated to be included within the LOHCP Preserve System. Such species will be documented during the exotic plant inventory, after which management will be designed and implemented to eradicate or control them, as appropriate.

Genetic erosion, or the loss of native genetic diversity, can result when non-local genes are introduced as a result of the translocation of plant materials. In the LOHCP Preserves, the threat of genetic erosion is most acute for the Morro manzanita, as species of the genus *Arctostaphylos* are known to readily hybridize. If manzanita species other than those which naturally occur in the Baywood fine sands (*Arctostaphylos cruzensis* and *A. tomentosa*) are transplanted into areas within or near the LOHCP Preserve System, they might hybridize with the *A. morroensis,* thus altering the genetic structure of the populations. This can reduce the fitness of native species by disrupting locally adapted gene complexes required for persistence in the unique environment. To prevent the risk of genetic erosion, landowners should be apprised of the potential impacts of planting manzanita species not native to the Los Osos region, as may be sold in local nurseries.

D.1.5.8 Exotic Plant Management Resources

Techniques available for exotic plant management efforts are continually being developed, evaluated, and refined. Specific treatments for exotic plant management projects will be developed based on the most up to date information available. Recent references available including Bossard et al. (2000), the *Weed Control Methods Handbook* (Tu et al. 2001) and the Weed Society of America's *Herbicide Handbook* (Weed Society of America 2002). Numerous organizations share their information regarding exotic plant management on the World Wide Web. These include: The Nature Conservancy Wildland Invasive Species Team (http://tncweeds.ucdavis.edu/about.html) and the California Invasive Plant Council (CalIPC.org). Searching the web for "exotic plant control" will bring these as well as well as hundreds of other websites containing invaluable information to inform exotic plant management including examples of weed control plans and methods of prioritizing exotic plants for control efforts, among others.

D.1.6 Techniques to Avoid Impacting Sensitive Species

Exotic plant management will be a crucial component of LOHCP Preserve System management. Indeed, when evaluating the conservation benefit of the LOHCP, the four scientists of the Scientific Advisory Committee cited effective control of exotic plant species as *the* main factor which will likely determine whether the biological goals and objectives for the Preserve System will be attained. Of particular concern is the control of veldt grass and iceplant species.

Though designed specifically to enhance habitat for sensitive species, many exotic plant management techniques have the potential to cause inadvertent, short-term negative impacts to sensitive species. Many types of physical, chemical, and biological techniques could cause short-term declines in plant and animal populations due to the impacts of trampling alone. Such impacts are not limited to exotic plant management; instead, many projects designed to enhance habitat have the potential to cause inadvertent negative effects.

As with all management projects, the goal of exotic plant management is to maximize the beneficial effects for the covered species, other sensitive species, and the natural communities, while reducing the potential for such inadvertent negative impacts due to management. The main technique that will be used to accomplish this goal is the pre-project survey, in which the area proposed for treatment is carefully examined for the presence of sensitive species. Depending on the project, the species, and the extent of the occurrence within the treatment area, sensitive plants and animals can be avoided or translocated (i.e., safely relocated to nearby suitable habitat out of harm's way).

In the absence of studies evaluating the impacts of herbicides on sensitive species, the resource agencies are understandably concerned about their potential negative effects, especially given the large areas of the LOHCP Preserve System which have become infested and merit treatment. Steps can be taken to prevent exposure of sensitive animals to the chemicals during treatment. Pre-project surveys can be used to determine whether sensitive species such are present. If they are and cannot be avoided or translocated, the occupied habitat can be treatment using non-chemical methods that are appropriate. These and perhaps other steps should be described in a memorandum of understanding or other formal agreement between land managers and agencies concerned about potential herbicide impacts, to allow their use in the LOHCP Preserve System.

Experienced resource managers and weed specialists have developed herbicide treatment protocols which are designed to reduce or prevent impacts to non-target plants. Using low-pressure backpack sprayers equipped with large droplet nozzles to spray only when winds are less than 10 miles per hour and ground moisture is minimal greatly reduces the potential for herbicides to land on non-target species (Nowell 2004) Monocot specific herbicides (e.g., Fusilade) can further reduce potential impacts to broad leaved plants when treating veldt grass or annual grasses.

There is growing consensus among experienced resource managers and weed specialists that veldt grass and iceplant species cannot be effectively controlled in over large areas such as the LOHCP Preserve System without the use of herbicides. In large infestations, physical techniques including cutting and hand pulling are regarded as ineffective or painstakingly slow at best. At worst, these methods have been found to increase the growth, distribution, and/or abundance of veldt grass and iceplant, owing their adaptations to grazing and disturbance (Sarafian 2004, Walgren 2004, and Nowell 2004).

Table D-1: Exotic plant species known or likely to occur within the LOHCP Preserve System

Species	Common name	Life form
Anthemis cotula	stinking chamomile	annual herb
Arundo donax	giant reed	perennial herb
Avena barbata	slender wild oats	annual grass
Avena fatua	common wild oats	annual grass
Brassica nigra	black mustard	large annual herb
Bromus diandrus	rip-gut brome	annual grass
Bromus madritensis ssp. *rubens*	red brome	annual grass
Cardaria draba	hoary cress	perennial herb
Carpobrotus chilensis	sea fig	succulent perennial herb
Carpobrotus edulis	fig marigold	succulent perennial herb
Chenopodium murale	sowbane	annual herb
Conicosia pugioniformis	round-leaved iceplant	succulent perennial herb
Conium maculatum	poison hemlock	perennial herb
Cortaderia jubata	jubata grass	large perennial grass
Cortaderia selloana	pampas grass	large perennial grass
Datura stromonium	jimsonweed	large annual herb
Delairea odorata		
Dipsacus fullonum	Fuller's teasel	biennial herb
Ehrharta calycina	veldt grass	perennial grass
Eucalyptus camaldulensis	Red River gum	tree
Eucalyptus camaldulensis	red gum	tree
Eucalyptus globulus	Tasmanian blue gum	tree
Foeniculum vulgare	fennel	large perennial herb
Helminthotheca echioides	bristly ox-tongue	annual/perennial herb
Hesperocyparis macrocarpa	Monterey cypress	tree
Malva neglecta	common or dwarf mallow	annual or perennial herb
Marubium vulgare	horehound	perennial herb
Melilotus spp.		annual/perennial herb
Myoporum laetum	lollypop tree	shrub/tree
Oxalis spp.	woodsorrel	perennial herb
Pennisetum clandestinum	kikuyu grass	perennial grass
Pinus radiata	Monterey pine	pine
Piptatherum miliaceum	millet mountain rice	perennial grass
Polygonum sp.	knotweed	herb
Polypogon sp.	beard grass	grass
Ricinus communis	castor bean	shrub
Rubus discolor	Himalayan blackberry	vine/shrub
Rumex acetosella	sheep sorrel	herb
Sonchus asper ssp. *asper*	prickly sow thistle	thistle
Tetragonia tetragonioides	New Zealand spinach	herb
Vicia spp.	vetch	herb/vine
Vinca major	periwinkle	ground-covering vine

Table D-2: Characteristics of invasive plant species currently found within the LOHCP Area

Life Form	Species	Common Name	CalIPC Rating[1]	Relative[2]			Initial Preserve System Strategy
				Distribution	Abundance	impact	
Trees	*Hesperocyparis macrocarpa*	Monterey pine	*Not rated*	narrow	low	low	eradication
	Eucalyptus camaldulensis	red gum	Limited	narrow	low	low	eradication
	Eucalyptus globulus	Tasmanian blue gum	Moderate	narrow-moderate	low	moderate	eradication
	Pinus radiata	Monterey pine	*Not rated*	narrow	low	low	eradication
iceplants	*Carpobrotus edulis*	fig marigold	High	moderate-high	moderate-high	moderate-high	control
	Conicosia pugioniformis	round-leaved iceplant	Limited	moderate-high	moderate-high	moderate-high	control
perennial grasses	*Cortaderia jubata*	jubata grass	High	narrow	low	low	eradication
	Ehrharta calycina	veldt grass	High	high	high	high	control
annual grasses	*Avena* spp.	wild oat	Moderate	narrow	low-moderate	low	control
	Bromus diandrus	rip gut brome	Moderate	moderate	low-moderate	moderate	control
	Bromus madritensis	fox tail brome	High	narrow	low-moderate	low	control

[1] California Invasive Plant Council (2016) Invasive Plant Inventory (2016)

High: These species have severe ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal and establishment. Most are widely distributed ecologically.

Moderate: These species have substantial and apparent—but generally not severe—ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal, though establishment is generally dependent upon ecological disturbance. Ecological amplitude and distribution may range from limited to widespread.

Limited: These species are invasive, but their ecological impacts are minor on a statewide level or there was not enough information to justify a higher score. Their reproductive biology and other attributes result in low to moderate rates of invasiveness. Ecological amplitude and distribution are generally limited, but these species may be locally persistent and problematic.

[2] Relative ranking compared to other exotic plant species based on current distribution, abundance, and likely impacts

Table D-3: Exotic Plant Management Strategies and Techniques

Strategy	Plants	Management Techniques			References
		Physical	Biological	Chemical	
1.1: Eradicate from the Preserve System	Non-Indigenous Trees: *Eucalyptus* spp., *Hesperocyparis macrocarpa, Pinus radiata,* others	Adults: cut using chain saw, pile burn or remove biomass; apply a tarp or Seedlings: hand pull individually or mulch (tarp)	none	herbicide (e.g., Triclopyr) can prevent stump sprouting	Boyd 2000
	jubata grass (*Cortaderia jubata*)	Adults: cut (chain saw/weed eater); remove or burn biomass incl. inflorescences (prior to seed maturation) Seedlings: pulling, shoveling	increase in shrub/tree canopy due to succession	spot treatment, post emergence glyphosate or fluazifop-p (a graminicide)	DiTomaso 2000
1.2: Control (reduce abundance and distribution) within the Preserve System	round-leafed iceplant (*Conicosia pugioniformis*)	hand pulling or slicing taproot with tool; removal of biomass	none	glyphosate by foliar spray kills seedlings and mature plants	Albert and D'Antonio 2000
	fig marigold (*Carpobrotus edulis*)	hand pulling and removal biomass	none	glyphosate (2%) in mid-winter	Albert 2000
	European Annual grasses (*Bromus* spp., *Avena* spp.)	hand pulling (on small scale)	increase in shrub/tree canopy due to succession; grazing	glyphosate fluazifop-p	Boyd 2000
	Veldt grass (*Ehrharta calycina*): dense (>75% relative cover)	mechanical clearing followed by hand pulling of seedlings	sheep grazing; active revegetation	glyphosate (2%) in early spring fluazifop-p	Chesnut 1999, Pickardt 2000

D.2 Recreation Management

Many properties anticipated to be managed as part of the LOHCP Preserve System allow access for passive recreation, including hiking and horseback riding. When well-managed, such passive recreational uses can be compatible with the LOHCP biological goals and objectives (Section 5.1). Therefore, lands protected through implementation of the LOHCP may similarly allow recreational use.

However, observations of historical aerial images and current site conditions of several lands anticipated to be included in the LOHCP Preserve System suggest that historic uses, including more intensive historic unauthorized use by off-highway vehicles, as well as perhaps some current uses, have negatively impacted habitat by removing native plants, causing large-scale soil erosion, and promoting the invasion and spread of exotic plants. In doing so, recreation may reduce the amount of quality of habitat available to native plants and animals, and threaten populations of sensitive species, including the LOHCP covered species. By its very nature, even low-intensity forms of recreation, including hiking, can result in take of the covered species, including the Morro shoulderband snail; therefore, recreation within the LOHCP Preserve System is a covered activity of the LOHCP (Section 2.2).

This section integrates the best available biological information to:

1. evaluate the factors that influence recreation impacts in the Baywood fine sand communities;
2. describe the potential benefits and negative effects of different types of recreation; and
3. outline recommendations for managing recreation within the LOHCP Preserve System to enhance native biodiversity and facilitate persistence of the covered species.

This information can help inform development of the recreation management component of the LOHCP Preserve System AMMP, which will be prepared early during implementation of the LOHCP.

D.2.1 Potential Recreation Impacts

Authorized and unauthorized recreation on lands anticipated to be incorporated in the LOHCP Preserve System primarily consists of pedestrian use (hiking, running, and dog walking), equestrian use, and off-highway vehicle use (OHV). In addition, dune sliding occurs in Montaña de Oro State Park, just west of the LOHCP Area.

Recreation impacts natural habitat by three main mechanisms: removing biomass (i.e., killing animals, killing or reducing the cover of plants), causing soil erosion, and promoting exotic plant invasion. These impacts can directly and indirectly affect the covered species and communities negatively and positively, depending on the component of the system being evaluated and the temporal or spatial scale being addressed. As a result, it is not possible to state '*the* effect' of recreation. Instead, evaluating different types of recreation according to their specific characteristics can facilitate objective assessment of recreation impacts that should influence recreation management.

D.2.1.1 Characteristics of Recreation that Influence Impacts

Like all disturbances, recreation impacts communities and species in various ways which depend on the magnitude (intensity and severity), areal extent, shape, and return interval of use. The following assessment is based on observations and research from the Santa Cruz sandhills—an endemic

community restricted to sand soil outcrops that is subject the recreational use of concern for the persistence of endangered plants and animal species (McGraw 2004a, McGraw 2004b)

Magnitude

The magnitude of the disturbance (biomass removal) depends on two factors: 1) the intensity of the recreational activity, which measures the strength of the force (pressure, sheering) and 2) the severity of the disturbance, which measures the degree to which biomass is removed. The magnitude of disturbance caused by recreation appears to follow the general basic gradient: walking < horse riding<=mountain bicycling< OHV use.

Trails used solely by wildlife are typically narrow. Trails used infrequently by pedestrians are also typically narrow. More intense recreational use including horse riding, mountain biking, and OHV use tend to create wider trails. At the Bayview Unit of the Morro Dunes Ecological Reserve, a main east-west trail just south of and parallel to Highland Drive is greater than 2 m wide and exceeds 5 m in width in several locations. While pedestrian trails are rarely incised, trails used by equestrians, mountain bikes, and OHVs, are more likely to become incised due to the intensity of the force, and the alterations to drainage that result (described below).

Areal Extent

Wider trails disturb a greater area than narrow trails. Trail width appears to be related to disturbance intensity, as recreation causing greater force, loosens more soil, and causes greater erosion; this leads to use of the adjacent, previously undisturbed area, and thus widening of the trial. Single-track trails, as they are referred to by recreation planners, invariably become wider over time if there are no barriers (i.e., fences, woody vegetation) or symbolic fences lining the trail corridor.

Shape

The shape or spatial configuration of the disturbed area, specifically the perimeter to area ratio, influences recreation impacts on habitat by affecting recolonization following disturbance. Arenas have a low perimeter to area ratio compared to trails, and wider trails characteristic of higher intensity uses (equestrians, OHVs) have lower perimeter to area ratios than narrow trails. This ratio influences the rate of recolonization following disturbance by determining the disturbance plants (and then animals) must disperse from adjacent, undisturbed habitat. Seedbanks can facilitate recovery of disturbances; however, ongoing erosion and lack of plant cover on disturbances results can reduce seed supply over time, as was observed in the Santa Cruz sandhills (McGraw 2004b).

Return Interval

The time between successive disturbance events (i.e., recreational uses) determines the amount of time the system has to recover from the perturbation and therefore the impact of recreation. The same type of trampling will result in greater impacts at higher frequencies (shorter return intervals). Due to the erosive nature of the sandy Baywood fine sand soils, even low frequency use will likely denude trails.

Type

Unique characteristics of the different types of recreation also can influence their impacts. Due to their weight, the locomotion of horses can cause churn soil. This disturbance has been found to promote the invasion and spread of exotic plants, including veldt grass and ice plants (Walgren 2004). The tracks created by both mountain bikes and motorcycles can provide a conduit for water and, depending on the slope of the trail, the resulting drainage can cause substantial erosion which impacts adjacent habitat and necessitates higher maintenance costs. If not leashed and picked up after, dogs can impact wildlife including through their feces, which can spread disease.

D.2.1.2 Characteristics of Habitat that Influence Recreation Impacts

Recreation use impacts can vary depending on the habitat conditions where they occur, in ways that should be considered in planning recreational use within the LOHCP Preserve System.

Soil Conditions

The course texture of the Baywood fine sand soils found throughout much of the LOHCP Preserve System renders them inherently susceptible to erosion when disturbed. In areas of sparse plant cover, there is minimal root area to bind soil and as well as limited plant cover aboveground to intercept splash rain drops that can cause splash erosion. Direct trampling associated with recreation exacerbates soil erosion by removing plant cover and creating channels for storm water runoff, with the magnitude of these effects likely proportional to the intensity of the recreation. Once trails become incised, they channel runoff which, in turn, causes increased erosion. This positive feedback loop between recreation and erosion appears to have created the 5 m deep gully on the old Broderson Road located on the western edge of the Bayview Unit of the Morro Dunes Ecological Reserve.

Sensitive Species Distributions

Recreation may have greater impacts in the Baywood fine sand communities due to the populations sensitive species found in the habitats traversed by trails. In the absence of designated recreational trails at most sites, wildlife trails are often utilized for recreation. Recreation was observed to collapse burrows of the rare Santa Cruz Kangaroo in the Santa Cruz sandhills (Bean 2003), and might similarly affect burrows of the Morro Bay kangaroo rat (USFWS 1999), although no such burrows have been observed in recent decades. Though Morro shoulderband snails might not typically be found on recreation trails, which are denuded, their low vagility would make them susceptible to mortality by direct trampling, especially by fast-moving recreationalists.

Topography

Following biomass removal, wind, gravity, and water can move loosened sand particles and cause erosion. During high rainfall events, the permeable soil may saturate, causing water to flow overland, carrying the loosened soil with it. The extent of erosion is positively correlated with the slope of the terrain. Baywood fine sands can occur with a lope of up to 30% (USFWS 1994). Other soils in the LOHCP Preserve System, including the Santa Lucia Shaly Clay Loam, occur on slopes up to 75%, such as in the Bayview Unit of the Morro Dunes Ecological Reserve where erosion has been extensive.

Steep slopes enhance erosion by increasing the speed of water and thus its ability to transport sediment; as speed increases, the ability of water to dislodge and transport soil particles increases exponentially (McGraw 2004b). The result of such erosion is rilling and gullying of the trail, and deposition of potential deep sediment in alluvial fans where the slope becomes more gradual and water slows and thus infiltrates, leaving the sediment behind. The deposition buries and typically kills herbaceous plants, creating a disturbance that will be recolonized over time, provided deposition is not ongoing. In the area where the sediment originates, ongoing erosion will prevent new plant establishment and thus continue to erode.

Though erosion presents more of a concern on steeper slopes, even trails that follow the contour of the habitat can eventually become incised and channel water. If there is even the slightest grade, the run-off will cause erosion into adjacent habitat and require trail maintenance to avoid continued down cutting.

Vegetation

Vegetation can interact with soils and topography to influence the effects of recreational use on habitat, by determining the degree of biomass removal and subsequent erosion. Plant material including leaf litter and moss as well as dense herbaceous cover can cushion the force caused by low intensity recreation occurring at low to moderate frequency.

D.2.1.3 Potential Benefits of Recreation for the LOHCP Preserve System

Recreational access can increase public exposure to and appreciation of the Baywood fine sand communities and species; in doing so, it can facilitate conservation support and conservation action on their behalf. Public support of the LOHCP has resulted in part from community members motivated to preserve open space for recreation, which provides a way for many to experience the unique ecosystem. Thus, recreation will likely increase support for and effectiveness of the LOHCP. Land management entities may have additional reasons to allow recreation access, including that it is a key component of their mission or regulations governing management of the land, or a condition of the property's acquisition.

Like any disturbance, recreation can promote disturbance-adapted species and help maintain open habitat conditions required by early successional species. Like wildlife trails, recreational trails can feature populations of native herbs adapted to disturbance or the open habitat it creates. These species may be important components of habitat for sensitive animals, including the Morro Bay kangaroo rat.

D.2.2 Recreation Management Strategies

The following guidelines for recreation management are designed to minimize its negative impacts on the covered species and communities. All proposed recreation within the LOHCP Preserves must be consistent with the existing regulations and policies of the landowners. For the Morro Dunes Ecological Reserve, recreational use and other access must be consistent with Title 14 of the California Code of Regulations. The HCP cannot allow uses other than those allowed in Title 14, nor can it allow uses that are prohibited in the title.

D.2.2.1 Extent of Recreation

In many properties anticipated to be managed as part of the LOHCP Preserve System, *de facto* trail use has resulted in an extensive network of trails which have removed habitat required by the sensitive species and fragmented remaining habitat. A first step in recreation management will be to close all unauthorized trails. The following series of measures can be used to promote compliance with trail closures:

1. Post interpretive signs that provide the public with the rationale for trail closure, the location of trails designated for ongoing use, and the types of use allowed;
2. Create small impediments at the entrances to closed trails (e.g., fencing that will not obstruct wildlife movement);
3. Conduct targeted outreach through presentations to user groups, and on-the-ground interactions with visitors as part of trail patrols;
4. Erect more permanent barriers; and
5. Enlist the help of law enforcement officials, when applicable.

D.2.2.2 Types of Recreation

Recreation should be limited to trail use by hikers. Limited access for equestrians and leashed dogs can be provided in very limited instances with the approval of the resource agencies.

Mountain bike riding is not feasible in the area, due to the friable nature of the fine sand soil, in which tire tracks can lead channel water and lead to gullying. Off-highway vehicle use, which is illegal within protected lands in the LOHCP Area, creates high levels of disturbance and associated impacts and will impede attainment of the biological goals and objectives of the LOHCP Preserve System.

D.2.2.3 Trail Planning

Recreation management should be carefully planned to reduce its potential negative impacts. The following are some initial guidelines that should be considered.

Trail Location

The route of a trail for recreation should be carefully selected by a team of experts including scientists, erosion control specialists, trail designers, and others experienced in designing, constructing, and managing trails. Specific objectives of the trail design should include:

1. Minimizing impacts to sensitive species including the covered species;
2. Minimizing erosion and therefore costly maintenance;
3. Minimizing the potential for the trail to facilitate exotic plant invasion by avoiding linking areas infested by exotic species to relatively uninvaded habitat; and
4. Linking trails to established trails in areas adjacent to the preserve, where possible.

Existing trails that meet these criteria should be used rather than creating new trails, in order to avoid additional disturbance and unnecessary costs. Trails that do not meet these criteria should be either modified to do so or evaluated for closure and restoration.

New trails should be sited following completion of the detailed Preserve System inventory and baseline monitoring studies, which will establish the distribution and relative abundance of covered species. Trails should be located in areas that lack the covered species, where possible, in already degraded habitat. Within the area determined by the biologists to be *least* likely to have impacts, other members of the trail design team should determine a location that will minimize the need for maintenance to control erosion.

Trail Length

The length of trail located within the sensitive communities should be limited. Trails designed to traverse the Preserve, as to link trails on both sides, should do so in a narrow portion of the property. If the trail is designed to provide for interpretation, the length should be no more than one mile.

Trail Width

To limit the area of habitat within Preserves that is lost due to recreation, trails should be no more than 6 feet wide, with hiker only trails limited to 3 feet wide. Post-and-cable fencing should be placed along the edges of trails to prevent trail widening, which tends to occur in the sandy soils, especially where only sparse plant cover occurs adjacent to the trails (e.g., in coastal sage scrub).

Trail Substrate

Permanent substrates such as boardwalks can prevent trail widening and incision while facilitating wheelchair access and should be installed, as funds allow, where equestrian use is prohibited. Artificial substrate such as rock (e.g., decomposed granite) and wood chips might be added to equestrian trails. Over time, these will likely become less effective due to displacement and decomposition and present some risk of introducing exotic plant species.

Interpretation

Trails in the LOHCP Preserve System should educate users about the uniqueness and rarity of the ecosystem, both to enhance their experience and to promote compliance with the recreational use regulations. Interpretive signs along the path or numbered posts which reference information contained in a brochure available at the trailhead can enhance the recreational experience for many visitors. Large format interpretive signs or “kiosks” posted at the trail entrance may similarly provide information and increase compliance with rules.

Trail Patrols

To reduce the amount of management and monitoring funds needed for recreation management, a volunteer trail patrol group should be established to enhance compliance with the trail use provisions in the LOHCP Preserve System. The group could conduct one or more of the following tasks:

- Conduct outreach to the public through presentations to user groups (e.g., trail riding groups);

- Patrol trails and conducts outreach to users; and
- Provide information about the use and the status of trails to land managers.

As discussed below, patrols be law enforcement officials, such as the County Sheriff, California Department of Fish and Wildlife Wardens, or others with the ability to issue citations, can enhance compliance with the recreation and other access provisions.

D.2.2.4 Trail Monitoring and Maintenance

Trails should be carefully monitored and maintained to ensure that their impacts are limited to the analysis provided in this document. The following are monitoring and maintenance recommendations to inform development of the recreation component of the LOHCP Preserve System AMMP.

Monitoring

Quarterly monitoring will be conducted to detect problems associated with trail use including:

1. Regulation compliance problems (including inappropriate uses);
2. Trail widening, incision, and erosion;
3. Creation of new (spur) trails; and
4. Invasion of exotic plants.

Maintenance

Spur trails should be closed, by obscuring their entrance with limbs or other natural coverings, and by posting signs, as needed. Erosion should be repaired, and exotic plants should be removed immediately. If one or more problems persist, and the trail fails to meet the goals of reducing impacts to the sensitive species and communities, modifications to the trail use will be needed, including limiting the types of use (e.g., hikers only) or closing the trail completely. If an alternative location could resolve the problems, the trail could be rerouted.

Enforcement

If persistent, unlawful trail use continues, enforcement action may be needed. The Department of Fish and Wildlife has law-enforcement personnel who can enforce regulations relating to recreation on their respective lands; likewise, the San Luis Obispo County Sheriff can enforce regulations on County-owned lands.

D.2.2.5 Regional Recreation Management

Recreational use should be examined at the regional level in order to enhance effectiveness of recreation management. Recreators may desire access to LOHCP Preserves to access other destinations where they recreate, including local State and Regional Parks, other open space preserves, and equestrian centers. Efforts to identify a few regional trails which can be carefully managed may limit impacts to a few isolated areas and facilitate the biological goals and objectives of the LOHCP Preserve System.

D.3 Fire Management

Fire is a natural ecosystem process in the Baywood fine sands ecosystem, and an important component of the disturbance regime in the upland communities therein. During the past century, fires have been actively suppressed in order to protect lives and property. This widespread fire exclusion will likely decrease native biodiversity and populations of covered species, by reducing or extirpating species that require fire or the habitat conditions it creates. On the other hand, fire has the potential to reduce populations of the covered species directly, by killing individuals, and indirectly, by promoting the invasion and spread of exotic plant species. Because of this conundrum, fire presents many important concerns for effective long-term management of the LOHCP Preserve System.

More information is needed about the factors that influence the effectiveness of fire as a management technique for attaining the biological goals and objectives of the LOHCP Preserve System. Filling these data gaps will require scientific examination of the fire ecology of the system prior to large scale implementation of fire management. In the intervening time, management efforts will be needed to reduce the threat of arson and wildfire, which have the potential to degrade habitat and threaten the persistence of sensitive species.

This section synthesizes the available scientific information relevant to fire management in this system, including empirical studies from the Baywood fine sand communities, empirical studies from ecologically similar systems, and current ecological theory. This information is used to:

1. Describe the known and potential positive and negative impacts of fire;
2. Recommend approaches to fire management for the LOHCP Preserve system; and
3. Recommend approaches for the fire management component of the LOHCP Preserve System AMMP to be developed early during implementation of the LOHCP.

D.3.1 Fire Ecology of the Baywood fine sand Communities

Fire is a component of the natural disturbance regime in central maritime chaparral communities in California, including the Morro manzanita chaparral communities (Tyler and Odion 1996, Tyler et al. 2000, Odion and Tyler 2003). Previous research in this and other maritime chaparral communities of the Central Coast suggests the following aspects of fire regime (Greenlee and Langenheim 1990, Tyler and Odion 1996, Odion and Tyler 2002):

1. Return interval (time between burns): 80-100 years;
2. Fire season: summer (when fuels are dry); and
3. Severity: complete stand replacement.

During periods of drought, fires may have naturally occurred during the winter as well.

Due to the differences in plant species and thus fuel availability, the plant communities of the Baywood fine sands may have experienced somewhat different fire regimes—characteristics of fire including type, severity, areal extent, and return interval (Sousa 1984). For example, the persistence of bare sand soil between shrubs in coastal sage scrub may reduce the frequency of ignition and fire spread rates when compared with the central maritime chaparral communities and perhaps oak woodlands, which feature

greater woody plant cover. More information is needed to identify potential differences in the fire ecology of these systems.

D.3.1.1 Potential Ecological Benefits of Fire

The native species of these communities are adapted to aspects of the fire regime, and many may require recurring fire for their persistence. It has been suggested that fire has been a dominant force in chaparral communities for the past two million years (Axelrod 1958). As a result of their long evolutionary history with fire, plant and animal species in the region have likely adapted to fire and the conditions it creates, as described below.

For many species, prescription fire may only be beneficial if it mimics critical aspects of the natural fire regime. These species may have evolved specific life history or other ecological traits as adaptations to particular aspects of fire, such as the seasonality of occurrence, the return interval, the severity, and the intensity, among other factors. As a result, deviations from the natural fire regime might reduce the effectiveness of prescribed fire and, in some cases, negatively impact the sensitive species and communities it is designed to enhance.

The following describes the known and hypothesized effects of fire.

Removes Established Vegetation, Litter, and Woody Debris

Fire is an agent of disturbance which removes established plant cover over large spatial scales. In addition to live plants, fire can consume leaf litter and woody debris that can build up on the soil surface between fires. In Morro manzanita chaparral, a prescription burn killed all live plants and consumed the dense litter accumulation, though burned shrub skeletons of Morro manzanita persisted (Tyler et al. 2000).

Facilitates Native Plant Establishment

Fire can facilitate native plant establishment by a variety of mechanisms, including:

1. reducing competition and allowing establishment of species that have been competitively excluded by the dominant shrubs and trees which can form a contiguous canopy during the course of succession;
2. reducing herbivory by small mammals that inhabit shrub canopies and can prevent seedling establishment; and
3. stimulating seed germination through the heat and/or the charate (chemical products of fire) (Keeley et al. 1985, Keeley and Keeley 1987, Swank and Oechel 1991, Tyler 1995, Baskin and Baskin 2001).

These effects of fire might facilitate success of the biological goals and objectives of the LOHCP Preserve System by: enhancing native plant species diversity, facilitating establishment of sensitive species, including Morro manzanita and Indian Knob mountainbalm, and increasing habitat quality for Morro Bay kangaroo rat, by enhancing populations of three hypothesized food plants *Acmispon glaber, Croton californicus,* and *Horkelia cuneata* (USFWS 1999)

Reduces Exotic Plant Abundance

In other systems, fire has been shown to reduce the abundance of exotic plant species (Smith and Knapp 2001, Bebawi and Campbell 2002, Alexander and D'Antonio 2003). Indeed, fire is often used as a control strategy for many invasive species in California (Hastings and DiTomaso 1996, Bossard et al. 2000, Bebawi and Campbell 2002), as discussed in Section D.1.4.2. By disproportionately reducing the abundance of exotic species, fire has been shown to facilitate populations of sensitive plants (Pavlik et al. 1993, McGraw 2004a).

It is not known whether the effects of fire on exotic plant abundance were examined in the prescription burn conducted to examine fire effects on Morro manzanita regeneration at Montaña de Oro State Park. Prior to the burn, veldt grass averaged 13% cover while red brome averaged less than 1% cover (Tyler et al. 2000). These data were derived from permanent plots which may have been sampled since the fire in 1998, though these data are not available.

Several exotic plant species presently found in the LOHCP Area including perennial veldt grass are facilitated by fire in other systems, leading to acute concern that fire will enhance their invasion and spread (Section D.3.1.2).

Alter Soil Conditions

Fire can reduce soil nutrients (Christensen 1977, Clark 1989, Johnson et al. 1998), organic matter (Perry 2000), and microorganisms in the soil (Clark 1989). By reducing soil fertility, fire resets the process of soil succession. This may prevent establishment of aggressive, exotic plants which might be able to invade the Baywood fine sands as they become more amenable to plant growth during the absence of fire.

In other maritime chaparral systems, fire has been shown to increase available nitrogen and phosphorus, which are important nutrients that limit plant growth. In doing so, it may enhance plant recolonization.

Fire also volatizes chemical compounds in soils, including those derived from the decomposition of plant litter and root exudates (Clark 1989). Many such compounds, including those from *Arctostaphylos* spp. are hypothesized to be allelochemicals—chemicals that inhibit the germination, establishment and/or growth of other plant species (Keeley et al. 1985). Though the pattern of plant distributions with respect to dominant woody vegetation including *Arctostaphylos* suggest that chemical compounds may restrict plant establishment, careful experiments would be required to implicate allelochemicals as the cause of these patterns.

Fire can also create hydrophobic polymers in the soil that reduce water infiltration, thus influencing soil moisture availability and plant growth. Fire severity, soil texture, and soil moisture influence the extent to which fire renders soils hydrophobic (Huffman et al. 2001, MacDonald and Huffman 2004).

D.3.1.2 Potential Negative Ecological Consequences of Fire

Fire may also have direct and indirect negative consequences for the covered species and communities of the Baywood fine sands. Not restricted to fire alone, these impacts likely also pertain to fire surrogates—disturbance treatments designed to simulate the effects of fire. Three potential negative impacts of fire are:

1. Facilitate exotic species invasion and spread;
2. Reduce sensitive species populations; and
3. Cause soil erosion.

Facilitate Exotic Species Invasion and Spread

Fire might promote the invasion and spread of exotic plant species into the communities of the Baywood fine sands. Like many of the native plant species that prescribed fire would be intended to facilitate, many exotic plants presently found in the LOHCP Preserve System establish readily following fire. These include including veldt grass, red brome, jubata grass, Eucalyptus, Monterey pine, Monterey cypress, and the two iceplant species, fig marigold and round-leaved iceplant (Bossard et al. 2000).

The risk of exotic plant spread following fire is most pronounced in the closed-canopy communities, including the Morro manzanita chaparral and the coast live oak woodland. In these areas, exotic plant species are primarily restricted to old road, trails, and gaps between shrubs adjacent to roads and trails; this distribution pattern suggests that they are limited by competition from dominant shrub and tree cover. As in other closed canopy communities, fire might promote expansion of exotic plants currently present at low abundance or in high light available microhabitats, and create opportunities for new species to invade (Zedler and Scheid 1988, Hobbs and Huenneke 1992, Haidinger and Keeley 1993).

Fire could also enhance the abundance of exotic plants where they are already disturbed within open canopy communities, such as coastal sage scrub. For example, veldt grass has been observed to resprout vigorously and releases seed into the burned area often the first spring after the fire (Walgren 2004

Cause soil erosion

Fire can increase soil erosion by removing established vegetation and other ground cover, including litter (Clark 1989). Water erosion can by increased as a result of a reduction in the roots binding the soil, increased erosive effects of rain drops landing directly on the loose sand soil lacking ground cover, and increased overland flow of water during high rainfall events. In some cases, fire can alter soil chemistry rendering it hydrophobic and thus resistant to infiltration, further exacerbating water erosion (Clark 1989). Wind and gravity can also cause erosion in the absence of dense vegetation cover following fire.

Erosion caused by water, wind, and gravity can uproot plants, bury plants in soil deposition, and inhibit new plant establishment on the thin soil that remains; these effects may be more pronounced on slopes. In the Bayview Unit of the Morro Dunes Ecological Reserve, recreation (and perhaps historical vehicle use) removed established vegetation on the old Broderson Road on the west end of the Preserve. Originating on the steep slopes (50-75%) to the south, soil erosion has led to the formation of a deep (>5 m) gully in the Baywood fine sand soils which support dense stands of Morro manzanita.

Reduce Covered Species Populations

Fire will kill individual plants and many animals and thus have immediate direct negative effects on many populations, including the covered species. However, for most species in these fire-prone communities, short-term population reductions will be offset by longer term population increases resulting from enhanced establishment and growth, in the case of plants, or greater survivorship and reproduction, in the case of animals. Presently, populations of Indian Knob mountainbalm and Morro

Bay kangaroo rat are precariously small, due in part to habitat destruction, fragmentation, and degradation (Appendix B); as a result, the population reductions might threaten their persistence. In addition, habitat fragmentation may restrict recolonization of the enhanced habitat by many of the animal species.

Current available information suggests that populations of Morro manzanita, Indian Knob mountainbalm, and Morro Bay kangaroo rat require fire to persist (USFWS 1994, Tyler and Odion 1996, USFWS 1999, Tyler et al. 2000). Management fires used to enhance populations of the two endangered plants would be located in senescent stands where removal of dense woody vegetation, including adults of the two sensitive species, would facilitate seedling establishment. Management burns could also be used to create the characteristics of habitat preferred by Morro Bay kangaroo rats, including open vegetation comprised of early successional subshrubs and perennial herbs thought to provide the seeds needed by the small mammals (i.e., *Croton, Horkelia,* and *Lotus*). Burns conducted in areas occupied by Morro Bay kangaroo rat might also kill individuals unable to escape the fire.

In contrast, fire provides no current known benefits for the endangered Morro shoulderband snail, which is killed by fire. Following arson in Morro Strand State Park, no live snails were not found in an where they were previously known to occur (Walgren 2003a). Based on evidence suggesting other historical colonization events (Walgren 2003a), Morro shoulderband snail may be able to recolonize the burned areas from adjacent unburned areas once habitat conditions are appropriate (Section B.1).Other sensitive species that might be negatively impacted by fire include Morro blue butterfly (*Icaricia icarioides moroensis*) and splitting yarn lichen (*Sulcaria isidifera*), which is endemic to the LOHCP Area.

By enhancing habitat conditions as described above, fire's positive effects may outweigh the direct negative effect and result in increased population size and greater likelihood of persistence. Aspects of the prescription burn including its location, size, shape, severity, seasonality, and return interval should be carefully planned to minimize direct negative impacts to the covered species and other sensitive species. As described in greater detail below, fires during the wet season, or fires which occur in stands which are too young in age may reduce populations of sensitive species, including Morro manzanita (Odion and Tyler 2002),

D.3.2 Fire Management

Effective fire management in the LOHCP Preserve System will require implementation of a carefully planned, cautious fire management program utilizing a scientifically rigorous approach to attain the conservation goals of the LOHCP. Selection of proposed treatment areas will be developed in coordination with the USFWS and CalFire. Due to the risk of fire promoting the invasion and spread of exotic plant species, fire management and exotic plant management must be carefully coordinated. This section outlines guidelines for development of the fire management component of the LOHCP Preserve System AMMP, which will be prepared early during implementation of the LOHCP.

The LOHCP Preserve System AMMP will integrate the anticipated fuel reduction and fire hazard abatement treatments envisioned as part of implementation of the Los Osos Community Wildfire Protection Plan (CWPP; SLOCCFSC 2009). These treatments, which will be covered by the incidental take permit issued based on the LOHCP (Section 2.2.7), must be implemented following the avoidance and minimization measures (Section 5.2.4, Table 5-4). Within the LOHCP Preserve System, CWPP projects must be designed and implemented to ensure that they limit their short-term negative impacts on, and

maximize their ecological benefits for, the covered species and natural communities within the Baywood fine sands ecosystem.

D.3.2.1 Goals

Fire management in the LOHCP Preserve System will focus on two main goals:

1. Enhancing the covered species populations and native plant communities using fire and fire surrogates; and
2. Reducing the risk of wildfire which can degrade habitat, imperil the covered species, and threaten human communities.

Oftentimes, both goals might be facilitated by the same strategies and projects.

D.3.2.2 Methods

Two general approaches to fire management are the use of prescribed fire and fire surrogates.

Prescribed Fire

In prescription burning, fires are deliberately ignited, actively monitored and managed, and extinguished following a specific burn plan. The burn plan describes the management goals of the treatment, the treatment area, the constraints of burn treatments, and the plan for the burn, including thorough safety information. The burn plan also contains the burn prescription—a specific statement of the desired fire behavior, smoke production, and environmental conditions that are required for safe and effective execution of the treatment.

Prescription fire can be used in the LOHCP Preserve System to enhance populations and communities while simultaneously reducing the threat of wildfire. In 1998, a prescription burn was conducted in the Morro manzanita chaparral and adjacent coastal sage scrub communities at Montana de Oro State Park.

Fire Surrogates

Fire surrogates are management treatments designed to mimic fire by removing or reducing plant cover. Treatments can involve the use of mechanized equipment, including masticators, tractors, and bulldozers, or be conducted manually, using chainsaws or other equipment. Following removal, biomass can be laid flat and burned, piled and burned, chipped and left on site, or hauled away. The specific treatments for removing and dealing with the plant cover are often determined by the following:

1. Intended goals of the project (i.e., biological, fuel reduction, etc.);
2. Resulting conditions (i.e., all fuel removed vs. plant cover thinned);
3. Size of the area to be treated;
4. Budget for the project; and
5. Technical staff available to implement the project.

The extent to which various fire surrogates will be successful in enhancing population growth of native species and facilitating native community structure and composition is unknown; instead, experimental examination is required to evaluate the effectiveness of these treatments. Just as with prescribed fire, the specific characteristics of the fire surrogate techniques can likely greatly influence the management outcomes.

Treatment Characteristics

Based on the best available scientific information, the following aspects of fire management treatments are likely to maximally benefit native species and communities. Most mimic known or hypothesized aspects of the natural fire regime, to which the species are evolutionarily adapted. Though primarily devised in terms of prescription burning, many of these design elements could be applied to fire surrogates as well.

Seasonality

Fire management should ideally occur during the dry season (July to November), as this is the most likely natural burn season in the system (Langenheim and Greenlee 1983, Greenlee and Langenheim 1990). In other systems where their effects have been examined, wet-season burns have failed to regenerate stands of chaparral shrubs and promote fire-following herbaceous species, due in part to increased mortality caused by heat when seeds are moist (Parker 1987, Moreno and Oechel 1991). Morro manzanita seeds soaked in water for 24 hours germinated at significantly lower rates than dry seed when subjected to a simulated fire treatment (Tyler et al. 1998).

Implementing prescribed burns during the dry season in shrublands can be logistically very difficult owing to increased risk of fire escape. Burning in the fall, when air temperatures are lower, and humidity is higher, relative to the summer season, can reduce the risk of fire escape while oftentimes still affecting the goals of the prescribed burn for chaparral species.

The prescription fire at Montaña de Oro State Park to evaluate fire effects on Morro manzanita was conducted in early November 1998, under mild temperatures and moderate humidity 10 days following 1 cm of rainfall. Though establishment of Morro manzanita seedlings was lower than required to replace the stand, the researchers attributed the lack of sufficient germination to low seed availability, and not inappropriate fire conditions (Tyler et al. 2000, Odion and Tyler 2002).

Areal Extent

Fire management should focus on creating several small (e.g., one acre) patchy disturbances rather than a single large disturbance. Small fires are less likely to extirpate populations of sensitive species and increase opportunities for recolonization by both plants and animals (Simmons et al. 1995). In addition, the variability in species composition and fuel load between communities of the Baywood fine sands suggests that fire may have been naturally patchy. The central maritime chaparral communities have a dense canopy of shrubs including chamise (*Adenostoma fasciculatum*), which is known for its flammable fuel. In contrast, the shrub cover in coastal sage scrub is sparser and interspersed by bare ground and herbaceous plant cover, which is less likely to carry a fire. Historically, fires that originated in one community type may not have burned adjacent types, thereby creating a patchier disturbance.

Creating several small disturbances rather than conducting a single large fire can be less effective for two reasons. First, individual small disturbances may not be large enough to sustain sensitive species populations, such as Morro Bay kangaroo rats which might require relatively larger areas of contiguous, early-successional habitat to sustain their populations. Second, the proximity of adjacent, unburned habitat may reduce the value of the burned habitat. For example, herbivory by small mammals that predate upon chaparral shrub seedlings, including Morro manzanita and perhaps Indian Knob mountainbalm, would be greater in small disturbance areas, owing to the proximity of mature shrubs that house the small mammals (Tyler and Odion 1996). Impacts of herbivory could also be unnaturally high in small fire treatments, because small mammal populations will have fewer seedlings to predate upon in small burns compared to large burns.

Some of the negative aspects of small, patchy burns can be mitigated, such as by using exclosures to protect target species (e.g., Morro manzanita, and Indian Knob mountainbalm) from unnaturally herbivory. Unless small burns are proven ineffective for attaining the biological goals and objectives of the Preserve System and the individual management projects, they will provide the preferred fire management approach in the LOHCP Preserve System.

Treatment Area Shape

Long, narrow disturbances may reduce their direct negative impacts to sensitive species, especially animals with low vagility (Simmons et al. 1995). Treatment areas with greater perimeter-to-area ratios can be more readily colonized as well. As described above, herbivore pressure and other negative edge effects could also be greater in such long, narrow disturbances.

Severity

Severity is a measure of the degree of disturbance impact; specifically, the extent to which biomass is removed. To enhance diversity, multiple treatment areas should be designed to have different levels of severity, such that different environmental conditions will result from the burn. Such patchiness can be promoted *within* each treatment area as well, by allowing areas that do not burn to remain unburned and/or creating patches that will resist burning in advance (Simmons et al. 1995).

Return Interval

Attaining the biological goals and objectives through the use of prescribed fire will require management with the appropriate return interval—the time between successive disturbances. In fire-adapted communities, aspects of the species biology, including their life history, have been shaped by their response to fires recurring with a range of frequencies. If the return interval is shortened or lengthened, fire may negatively impact even fire-adapted species.

Because it is difficult to accurately reconstruct the historical fire regime, determining the return interval for fire in the system is challenging. To further complicate things, the different communities of the Baywood fine sands likely burned at different frequencies, owing to differences in their plant species composition and thus fuels. Hypotheses for appropriate return intervals must be developed through research examining the available fire history, the composition of communities, the age structure of species populations, and consideration of ecologically-similar systems. The hypothesized return intervals should then be tested using small-scale experiments to evaluate impacts on the species and communities.

Based on their research evaluating the effects of a fire in a 40-year-old stand of central maritime chaparral, Odion and Tyler (2002) concluded that the return interval was too short; the researchers attributed insufficient Morro manzanita seedling establishment to insufficient accumulation of viable seed since the last fire. As a result, a longer return interval, such as 80 years, is recommended for Morro manzanita chaparral (Odion and Tyler 2002). The other communities of the Baywood fine sands may have historically burned at different frequencies, however. Thus, future research and cautious fire management as outlined above is needed to avoid the potential negative impacts of burning too frequently or infrequently.

D.3.2.3 Evaluating Fire Management Alternatives

The negative impacts and logistical difficulties potentially associated with using fire necessitate careful consideration of alternatives to fire management. First, as discussed above, it may be possible to use mechanical or manual removal of plant material (i.e., dead material and live shrubs and trees) to attain the biological goals of management (i.e., enhancing chaparral plant species diversity, regenerating Morro manzanita, etc.) and to reduce the threat of wildfire. Even if proven effective through experimental trials, high implementation costs and degrading effects of soil disturbance caused by work crews might render such treatments infeasible for widespread use in the LOHCP Preserve System. Such techniques will require further evaluation.

Another alternative to fire management is simply “no management”. This approach is used in wildland areas throughout the region. Because the vegetation structure (i.e., fuels) and climate of the region predispose the system to natural wildfire and render it highly susceptible to human-induced fire, preventing fire within the LOCHP Preserve Systems will not likely be possible in the long term. The consequences of wildfire in the LOHCP Preserve System could be grave, as many of the potential negative impacts associated with fire could not be prevented.

1. Negative impacts to sensitive species:
    - Even moderate sized fires could extirpate important remaining populations.
    - The return interval could be too short for sufficient Morro manzanita regeneration.
    - The season could be inappropriate (i.e., wet season) for the life history of species.
2. Invasion of exotic plants:
    - Pre-treatment to remove exotic plants would not likely have occurred.
    - The wildfire might create a larger disturbance more susceptible infestation.
    - The wildfire might occur adjacent to a highly-invaded area.

Thus, a more proactive approach to fire management will likely be essential to attaining the conservation goals of the LOHCP Preserve System and will be incorporated in the LOHCP Preserve Management Plan.

Appendix E Biological Effectiveness Protocols

This section provides draft biological effectiveness monitoring protocols to evaluate progress of the LOHCP toward attaining the biological goals and objectives (Section 5.1). Specifically, these protocols are designed to examine the status and trends in populations of the covered species, and the distribution, structure, and species composition of the plant communities of the Baywood fine sands ecosystem. Monitoring protocols are also provided to track general habitat conditions and map populations of invasive plants within the Preserves and facilitate evaluation of the effectiveness of the LOHCP at achieving the Plan's biological goals and objectives (Section 5.1, Table 5-1).

Monitoring is an essential component of the adaptive management framework which will be used to promote long-term effectiveness of the LOHCP conservation program (Section 5.5). These draft protocols can be used to develop the monitoring component of the LOHCP Preserve Management Plan early during implementation of the LOHCP to guide monitoring within lands managed as part of the LOHCP Preserve System (Section 5.3.3.2).

Many of the draft biological effectiveness monitoring studies are based on sampling, in which the state of the entire system of interest (i.e., community or population) is inferred based on statistical analysis of a random sample. Sampling can provide a cost effective and accurate means of detecting and tracking biologically meaningful changes. To be effective, sampling studies must be carefully planned and implemented considering valid sampling techniques, the biology of the species, and the monitoring goals and objectives. These protocols should be refined based on the biological inventory of the Preserve System, and then refined through implementation of a pilot study, as well as any new scientific information.

Each quantitative monitoring protocol contains five main elements:

1. Sampling Objectives: These specific objectives of the study, including the minimum detectable change, statistical power, and false-change error rate. Sampling objectives link specific aspects of the sampling design to the conservation objective(s) which they are designed to track.
2. Sampling Design: Other critical elements of the study, including the universe of interest (statistical population), the variables measured, the sample unit, the sample size and shape, the manner in which samples are allocated, whether samples are temporary or permanent, and the sample size.
3. Implementation: specific guidelines for implementing the study, including aspects of seasonality, duration, and frequency.
4. Analysis: the analyses and statistical tests appropriate for data collected.
5. Potential Modifications: A list of potential changes in the event that the monitoring protocol as drafted does not achieve the sampling objectives.

E.1 Plant Community Monitoring

Two proposed monitoring studies have been designed to track the ecosystem and community goals of the LOHCP (Table 5-1):

1. Areal mapping of the plant communities; and
2. Plant community structure and species composition sampling.

The plant community structure and species composition monitoring can also greatly inform work to monitor populations of the covered species, by quantifying important habitat conditions.

E.1.1 Areal Mapping of Plant Communities

This study is designed to track the distribution and extent of the different plant community (vegetation) types within the LOHCP Area. In spring 2004, plant communities within the LOHCP Area were delineated using a combination of aerial imagery interpretation and ground reconnaissance (J. Legato, pers. comm. 2004). As part of work to expand the Plan Area in the current LOHCP, the mapping was expanded through examination of high-resolution aerial imagery. The resulting GIS-based map reveals a mosaic of 23 different plant associations or 'series' (Section 3.1.5). These communities vary in their structure and species composition in ways that influence their use as habitat for the covered species.

E.1.1.1 Monitoring Objective

The objective of monitoring is to detect biologically meaningful shifts in the distribution and extent of the plant associations within lands managed as part of the LOHCP Preserve System.

E.1.1.2 Study Design

Using the same protocol as implemented to develop the GIS vegetation layer in 2004 (CMCA 2004), the distribution of plant communities will be mapped within the LOHCP Preserve System. Specifically, new high-resolution aerial imagery of the region should be used to delimit the boundaries of the series based on their described differences in structure and species composition, which are discernible based on their unique 'signature' in the imagery. Field-based verification should be conducted for at least 5% of the mapped patches, with areas of identified change being most important for ground truthing.

E.1.1.3 Implementation

Areal extent mapping should be conducted approximately every 10 years in perpetuity. This is the anticipated temporal scale during which changes in plant communities will occur, as a result of:

- natural dynamics, including new disturbances (e.g., fire and erosion) and succession;
- anthropogenic factors, including management and restoration projects (e.g., vegetation management) and recreational use; and
- climate change, which can cause shifts in plant community composition.

The precise timing of the monitoring may depend on the availability of new, high-resolution aerial imagery of the Preserve System.

Spatial analyses in geographic information system should be used to determine the location and extent of changes in plant community types. For each area where a shift is detected, the original aerial photographs should be examined to determine whether the putative change is due to mapping error

(i.e., the accuracy or precision with which communities are mapped) or represents an actual transition in plant community structure and species composition.

E.1.1.4 Analyses

Descriptive statistics can be used to examine the number of patches, the mean and total patch area, and the percent of each community type, which changed in the monitoring interval. Assembling a matrix depicting the percent change each community type to every other type will enable evaluation of trends due to succession, management, and climate change.

E.1.1.5 Potential Modifications

The monitoring protocol used to track this objective will be adjusted if biologically important differences between plant communities cannot be adequately distinguished through interpretation of vegetation signatures using aerial photographs. For example, if coastal sage scrub with high cover of veldt grass (*Ehrharta calycina*) is found to support lower diversity of herbaceous native plants or abundance of Morro shoulderband snail relative to uninvaded coastal sage scrub, then the communities should be split. If the two types of coastal sage scrub cannot be distinguished via examination of aerial photographs, then additional ground mapping may be required.

E.1.2 Plant Community Structure and Species Composition Monitoring

This study is designed to evaluate changes in the structure and species composition of the plant communities within the LOHCP Preserve System and detect changes in habitat conditions that should trigger management. It can be used to evaluate effectiveness of the community goals of the LOHCP, as well as help achieve the objectives for the covered species, by tracking the conditions of their habitat. The study details should be refined based on results of the pilot study.

E.1.2.1 Sampling Objectives

The objectives of the monitoring protocol are to have 90% power to detect 20% declines in habitat conditions relevant to long-term viability of the covered species, including the diversity and relative cover of exotic plants and the diversity and relative cover native plant species, with a 10% chance of indicating a statistically significant decline occurred when one did not.

E.1.2.2 Sampling Design

In this study, the percent cover of each plant species will be estimated visually using cover classes in permanent square quadrats (5 m x 5 m). In addition to plant cover, relevant habitat variables including the cover of litter, the cover of dead woody vegetation, and the amount of soil disturbance (e.g., percent of the quadrat disturbed by trails or animal diggings) will be estimated.

The quadrats will be located throughout the LOHCP Preserve System using a stratified-random sampling regime in which the main plant community types (i.e., coastal sage scrub, central maritime chaparral, etc.) are the strata within which the number of samples allocated to each community type is proportional to their acreage within the Preserve System. There are presently no current estimates for the mean or variability in diversity and relative plant cover within the community types, upon which the

initial sample size could be based. It is estimated that 100 quadrats in total, with at least 5 per stratum (community type) will be needed to attain the sampling objectives.

E.1.2.3 Implementation

Sampling should be conducted every five years when annual plant species are in flower (mid-March through mid-May). Because cover estimates can vary depending on the phenology of the system and the observer, sampling should occur during a 1 to2-week period during peak phenology each year, rather than during a consistent calendar time. Sampling should be conducted by the same observer or team of observers, which has standardized their visual estimates to the greatest degree possible.

E.1.2.4 Analyses

The species data will be used to calculate the following composite variables:

1. Cover and richness of exotic plants; and
2. Cover and richness of native plants.

Paired t-tests can be used to evaluate whether a decline of 20% has occurred in native plant cover and richness, or an increase of 20% has occurred in exotic plant cover and richness, between the current sample and the baseline. Least squares regression or route regression can be used to determine whether a significant decline in gamma richness (a measure among samples) has occurred over a minimum of a five sampling periods. Similar statistical tests can be used to evaluate changes in other relevant habitat variables, including litter cover and disturbance.

E.1.2.5 Potential Modifications

The proposed monitoring protocol should be modified to increase its efficiency for attaining the sampling objectives based on results of the pilot study and during the course of implementation, as necessary. The following are potential modifications that might promote success toward the sampling objectives.

1. Sampling Method: If high variability results from visual estimation of plant cover, line intercept or point intercept sampling may be used to estimate cover within the quadrats. In these methods, plant cover is estimated by sampling plants intersecting the length of a series of transect (line intercept) or specific points along transects (point intercept) traversing the quadrat. Because these methods will likely miss rare species, richness (number of plant species) should be counted within the entire quadrat.

2. Sample size: Increasing the number of quadrats will increase the statistical power and thus facilitate the sampling objectives. This must be weighed against other methods of reducing standard deviation, such as quadrat size and shape, and other sampling objectives, including maintaining low costs.

E.1.2.6 Thresholds

The thresholds to trigger remedial management for communities are a 20% decline in native diversity or cover, and a 20% increase in exotic diversity or cover compared to the baselines measured during initial sampling.

E.2 Morro Shoulderband Snail Population Monitoring

The proposed study is designed to detect declines in Morro shoulderband snail (MSS) distribution and abundance that exceed the designated threshold. Such declines should be evaluated along with the results of other monitoring studies, including monitoring of the plant communities, in order to evaluate the potential causes and determine the need for remedial habitat management. Details of the protocol should be refined based on results of an initial MSS inventory and pilot monitoring study.

E.2.1 Sampling Objectives

The objectives of the monitoring protocol are to have 90% power to detect 20% declines in frequency (a measure of distribution) and density (a measure of abundance) of MSS, with a 10% chance of indicating a statistically significant decline occurred when one has not.

E.2.2 Sampling Design

The density (number of individuals) of MSS will be measured in square permanent quadrats (5 m x 5 m) located within the LOHCP Preserve System using a stratified-random sampling regime in which the individual lands managed (i.e., the Preserves) are the strata in which an equal number of samples are randomly located. There are presently no density estimates for MSS, nor frequency estimates for this sized quadrat, upon which the initial sample size could be based. It is estimated that a minimum of 80 quadrats in total, with 10 per stratum (Preserve) will be needed to attain the sampling objectives.

Within each quadrat, the vegetation, litter, and top one inch of soil should be carefully searched for a specified period of time to standardize the level of effort; this approach is designed to avoid inadvertent bias (e.g., searching plots located in perceived 'good habitat' longer). The number of live snails in each class (juvenile, adult) should be recorded. The number of empty shells in each age class (Roth 1985) should also be recorded then removed from the quadrat so that they are not counted in future monitoring. If MSS searches are too destructive or time consuming in a 5 m x 5 m area, five to 10, 1 m x 1m quadrats randomly located (i.e., nested) within the larger quadrat could be subsampled.

E.2.3 Implementation

Sampling should be conducted during the rainy season (November-March) during or immediately following precipitation. All plots should be sampled within a 1-to-2-week period.

Pilot (Years 1 and 2): Sampling will be conducted following the identical protocol in the first two years, after which analyses of the data, including power analyses, will be used to determine whether the monitoring protocol attains the sampling objectives and, if not, develop necessary modifications.

First 10 Years Post-Pilot: Sampling will then be conducted every two years during the next 10 years of LOHCP implementation. At each sampling interval, data will be analyzed to determine whether declines in frequency and density exceed the threshold. Such declines will be evaluated in the context of other available information, including climate data, and results of other monitoring studies, to determine whether remedial management is necessary.

In Perpetuity: Once sampling has occurred using the same protocol five times, trend analysis will be used to detect significant declines in frequency or density over a minimum of five consecutive sampling intervals. Power analysis will again be required to determine whether the objectives of a trend analysis can be met with the sampling study. The frequency of sampling following the first ten years should be determined in consideration of the variability observed due to natural fluctuations, but an interval of 3 years is suggested preliminarily.

E.2.4 Analyses

Paired t-tests can be used to evaluate whether a decline of 20% has occurred between the current sample and the baseline. Significant declines in the frequency of occurrence between two intervals can be tested using a G-test. If more than one-time step is evaluated at the same time, repeated measures ANOVA to detect significant declines in density, and Cochrane's Q test to determine whether frequency has declined through time.

Over longer time intervals, least squares regression or route regression can be used to determine whether a significant decline in density or frequency exceeding the threshold (20%) has occurred over a minimum of a five sampling periods.

E.2.5 Potential Modifications

The proposed monitoring protocol should be modified to increase efficiency at attaining the sampling objectives based on results of the initial MSS inventory and the pilot study. The following are potential modifications that might promote success of the sampling objectives.

E.2.5.1 Narrowing the Universe of Interest

The present protocol calls for randomly locating samples within the Preserves, irrespective of habitat conditions. This is done to initially evaluate the community types in which the species occurs; it also renders monitoring results be generalizable throughout the Preserve System. If the initial inventory for MSS or future research reveals that the species do not occur within certain areas of the LOHCP Preserve System, such as specific community types, these areas could be excluded from the universe of interest; remaining samples could be relocated within the suitable habitat, increasing the precision of the estimates and likely statistical greater power. If sampling is limited to in the absence of conclusive evidence for the MSS restricted distribution, monitoring results will not necessarily be generalizable to the true universe of interest.

E.2.5.2 Quadrat Size and Shape

Quadrat size will be increased if the initial MSS frequency of occurrence is too low (<50%) or if the standard deviation of the difference between density in a given sampling interval is too high. Alternative quadrat shapes might be used to reduce these parameters; however, a square or perhaps circular

quadrat is recommended to reduce the variability due to MSS locomotion that would likely results from narrow, rectangular quadrats. Previous research found a correlation between the abundance of live MSS and their shells in 20m^2 quadrats (Adams et al. 2000), suggesting these 100m^2 should be effective in tracking occurrences.

E.2.5.3 Sample size

If the standard deviation of the difference between sample intervals is too high, an increase in sample size might also increase power and thus facilitate the sampling objectives. This must be weighed against other methods of reducing standard deviation (sample size) and other sampling objectives, including maintaining low costs.

E.2.6 Thresholds

The thresholds to trigger evaluation of remedial management for Morro shoulderband snail are: 1) 50% decline in distribution in any one Preserve, or 2) a 20% decline in distribution (frequency) or abundance (density) compared to the baseline measured in the LOHCP Preserve System as a whole.

E.3 Morro Manzanita Population Monitoring

Two complementary monitoring studies are recommended to track effectiveness of the LOHCP at achieving the biological goals and objectives for Morro manzanita:

1. Areal extent mapping of Morro manzanita, to track the species distribution and general abundance; and
2. Demographic monitoring of Morro manzanita, to evaluate plant performance including survivorship.

The following outlines general aspects of the monitoring studies, for which detailed protocols should be developed based on pilot studies conducted during initial implementation of the LOHCP.

E.3.1 Areal Extent Mapping of Morro Manzanita

Conducted as part of the areal mapping of plant communities (Section E.1.1), this protocol is designed to track the distribution and extent of the Morro manzanita within the LOHCP Area. The range-wide areal extent of Morro manzanita was mapped first on paper by Mullany (1990) and then updated and incorporated into a GIS by Tyler et al. (2000).

E.3.1.1 Monitoring Objective

The objective of this monitoring protocol is to detect declines in the distribution of Morro manzanita within the Preserve System that exceed 20% of the baseline acreage or result in extirpations from individual Preserve Areas.

E.3.1.2 Study Design

Following the methods of Mullany (1990) and Tyler et al. (2000), patches of habitat occupied by Morro manzanita will be delimited using GIS based on aerial image analysis and field verification, as necessary.

The distinctive shape (round or oval) and color (grey-green) of Morro manzanita canopy can be used to be distinguished the covered species from co-occurring shrubs and trees by a biologist or another trained observer. The polygons developed by Tyler et al. (2000) can be updated and used as a baseline for the distribution of Morro manzanita in the LOHCP Preserve System. New, high-resolution aerial photographs will be used to evaluate changes in the distribution of Morro manzanita through time.

E.3.1.3 Implementation

Areal extent mapping should be conducted approximately every 10 years in perpetuity, with the exact interval dependent upon the availability of new, high resolution aerial photographs of the LOHCP Area. This is the anticipated temporal scale during which changes in the distribution of the species are anticipated to result from:

1. natural dynamics, including new disturbances (e.g., fire and erosion) and succession;
2. anthropogenic factors, including management and restoration projects (e.g., vegetation management) and recreational use; and
3. climate change, which can cause mortality events directly or indirectly, by increasing vulnerability to pathogens.

Spatial analyses in GIS can be used to quantify changes in the acreage of habitat occupied by Morro manzanita. For each area in which a change is detected, the original aerial photographs and polygons should be examined to determine whether the change is due to mapping error (i.e., the accuracy or precision with which patch boundaries are delimited) or represents an actual change in the extent of this covered species.

E.3.1.4 Analyses

The percent change in the areal extent (acres) of Morro manzanita can be calculated simply as:

$$[\text{Acres}_{(t)} - \text{Acres}_{(\text{baseline})}]/\text{Acres}_{(\text{baseline})}.$$

where t represents the year in which subsequent mapping occurs and baseline represents the acreages mapped during the initial monitoring early during implementation of the LOHCP. Additional statistics will be used to describe the changes that are observed, in terms of the percentage change in the distribution by patch and by Preserve (individual property) to assess the extent to which changes are occurring range-wide or in discrete areas.

E.3.2 Demographic Monitoring of Morro manzanita

Demographic monitoring is designed to detect declines in survivorship of Morro manzanita, which may signal the need for management to promote population persistence.

E.3.2.1 Monitoring Objective

The objective of demographic monitoring is to track the survivorship of Morro manzanita individuals to detect increases in mortality that would signal the need for management to promote stand regeneration and thus avert the 'senescence risk' posed by fire suppression in the region.

E.3.2.2 Study Design

Monitoring will be used to evaluate the demographic performance of Morro manzanita located throughout the LOHCP Preserve System. A sample of individual shrubs will be chosen using a stratified-random sampling regime in in which an equal number of plants will be randomly chosen for monitoring in each LOHCP Preserve. At least 20 shrubs should be monitored in each Preserve where the species is located.

Each randomly chosen Morro manzanita individual will be permanently marked using a discrete, permanent identifier (e.g., numbered metal tag), and their location recorded in the GIS. At each monitoring event, plant canopy height, width, and percentage of dead cover will be recorded, along with any observations regarding the plant's condition, such as evidence of disease, desiccation stress, senescence, herbivory, or other factors that could influence performance. The community type, approximate stand age (based on historical aerial photographs), and any other factors hypothesized to influence performance will also be recorded for each individual.

E.3.2.3 Implementation

Demographic monitoring will be conducted early during the implementation of the LOHCP and at 10-year intervals. The interval can be shortened if observations suggest a decline in individual plant vigor or survivorship of the population that should be further evaluated for management.

E.3.2.4 Analyses

Morro manzanita survivorship, size (volume calculated using the formula for a cylinder), and percentage dead or damaged canopy will be tracked through time. Paired t-tests can be used to test for differences in size and canopy cover between sampling intervals. Logistic regression can be used to evaluate factors influencing survivorships, including community type, stand age, size, and percent dead foliage, among other factors measured for each individual during the study.

E.3.2.5 Thresholds

The thresholds to trigger remedial management for Morro manzanita are: 1) 1 50% decline in areal cover, canopy cover, or survivorship in any one Preserve, or 2) a 10% decline in distribution (areal extent), abundance (cover), or survivorship compared to the baselines measured in the Preserve System as a whole.

E.4 Indian Knob Mountainbalm Population Monitoring

Indian Knob mountainbalm population monitoring is designed to detect changes in the distribution, abundance, and demographic performance of Indian Knob mountainbalm. Details of the protocol should be refined based on results of the initial inventory of lands to be managed as part of the LOHCP Preserve System and then again based on results of the pilot study. If management projects are implemented to enhance Indian Knob mountainbalm populations, detailed experimental management project monitoring will also be used to evaluate the status of the narrowly distributed and rare plant.

Presently, Indian Knob mountainbalm has a very limited distribution and abundance in the LOHCP Area. Thus, census and demographic monitoring are proposed rather than sampling. If the distribution and/or

abundance are found to exceed a level for which the entire population can be efficaciously monitored, it may be necessary to conduct demographic monitoring on a sample of the population.

E.4.1 Monitoring Objective

The objectives of the monitoring protocol are to track changes in the areal extent, density, survivorship, and reproduction (flowering and seedling establishment) of Indian Knob mountainbalm to evaluate success of management designed to increase population abundance and distribution.

E.4.2 Study Design

Within each discrete patch (occurrence, colony) of Indian Knob mountainbalm located within the LOHCP Preserve System, the following will be conducted:

1. The perimeter of the patch will be delimited using a global positioning system (GPS) and the area of the resulting polygon calculated;
2. All individual plants (ramets) will be permanently marked with a unique identifier (e.g., numbered metal tag) and geolocated using a GPS; and
3. The life stage (seedling/juvenile/adult), and number of flowers produced by each adult plant will be recorded.

Additional information about individuals (e.g., height) or the habitat patch in which they occur (community, successional stage, disturbance, etc.) will also be recorded.

E.4.3 Implementation

Sampling will be conducted when Indian Knob mountainbalm is in flower, in approximately June and July. Demographic monitoring should be conducted at 5-year intervals and continue until the distribution and abundance of the species within the LOHCP Preserve System necessitates population sampling. It is anticipated that this will occur as a result of successful experimental management designed to enhance populations of this very rare plant.

E.4.4 Analyses

Census data should be analyzed using descriptive statistics to track changes in patch size, density, survival, and seedling establishment. Lefkovitch matrix models can be used to calculate the population growth rate based on survivorship and fecundity estimates, which can be used to generate population density protections based on current density values. These useful tools of demographic monitoring can also be used to determine the life history transitions (e.g., seedling survivorship to become a juvenile) are most influential on the population growth (e.g., seedling survivorship, etc.) through sensitivity analyses (Caswell 2000, Parker 2000).

Demographic models can continue to be used once sampling is initiated, at which time univariate statistical tests including paired t-tests can be used to determine whether the population has increased significantly compared to the baseline distribution and density established during the initial year of the study.

E.4.5 Thresholds

The threshold to trigger remedial management for Indian Knob mountainbalm is a 10% decline in areal extent or number of ramets compared to the baseline inventory.

E.5 Morro Bay Kangaroo Rat Monitoring

Because the distribution of Morro Ban kangaroo rat within the LOHCP Area is currently unknown (USFWS 2011b), a presence/absence survey for the species will be conducted as part of the initial inventory of all lands anticipated to be included within the LOHCP Preserve System. Additional private lands where the species is most likely to occur, based on occurrence of suitable habitat and historical sightings, will also be surveyed, if permission is granted by the landowners.

Results of the initial inventory will determine the approach to monitoring this covered species. If Morro Bay kangaroo rat not detected, presence/absence surveys will continue to be conducted at 5-year intervals. Once the species is detected, a monitoring protocol will be developed to monitor the population of this very rare animal. The details of this monitoring protocol will depend on the distribution and abundance of the species revealed through the presence/absence survey and will be developed in close coordination with the USFWS and CDFW.

The following initial protocol for the presence/absence survey is based on the Survey Protocol for the Morro Bay Kangaroo rat (USFWS and CDFW 1996). The details of the methods that will be used to inventory the preserve will be developed early during implementation of the LOHCP, in close coordination with the USFWS and CDFW.

Presence/absence survey will consist of two, tiered components:

- Visual surveys for diagnostic sign, including burrows, tail drag marks, dust bath sites, and surface seed pit caches; and
- Live trapping.

Positive identification of sign can be used to document presence of the species; however, for species present at very low abundance, there is a low probability of detecting sign. If potential sign of kangaroo rats is detected, such as a scat or burrow, tail drag, or other tracks, that resembles that of a kangaroo rat, then live trapping will be conducted when conditions are appropriate, as described below.

E.5.1 Visual Surveys

E.5.1.1 Monitoring Objectives

The objective of the visual survey is to detect known or potential sign of Morro Bay kangaroo rat within the LOHCP Area, including all lands managed as part of the LOHCP Preserve System, as well as other suitable and potentially occupied habitat.

E.5.1.2 Study Design

In the visual survey, a qualified biologist will traverse each Preserve using a series of transects that are close enough to allow comprehensive visual examination of the ground surface.

E.5.1.3 Implementation

Surveys will be conducted by a qualified biologist approved in advance by the USFWS and CDFW. As the timing of surveys can greatly influence the likelihood of detection, surveys will be conducted during the following time periods:

- between April 1 and June 30, or in March if weather conditions are warm and dry for three days prior to initiation of the visual survey;
- during the week preceding or the week following a new moon, when the species is expected to be generally more active;
- when conditions allow sign from daily activity of other small mammals to be visible; and
- during the morning or late afternoon, if there has been no wind, when shadows make tail drag easier to detect.

E.5.1.4 Reporting

Reports from visual surveys will document all relevant information, including:

- The survey area, providing a map and GPS coordinates;
- The survey dates and times;
- The weather and other abiotic conditions during the surveys that could influence activity, including temperature, wind speed, moon phase, and the preceding week's weather conditions;
- The number of person-hours per acre spent searching for sign; and
- A description of the results, including all species sign detected, including that of other species, as feasible.

E.5.2 Live Trapping

E.5.2.1 Monitoring Objectives

The objective of the live trapping is to definitively document the presence of Morro Bay kangaroo rat when potential sign is detected during visual surveys.

E.5.2.2 Study Design

Trapping will be conducted for a minimum of three nights. Traps will be located:

- in areas where sign was detected, including near active burrows, dust baths, or apparent runways, as well as other suitable habitat;
- at 10-to15-meter intervals along potential movement corridors, with at least two traps per station.

Traps will be baited with a mixture of food items including crimped oats, wild bird seed, applies, walnuts, and peanut butter, provided the latter does not attract ants. They will be opened and baited in the late afternoon and checked two to four hours after sunset and again at dawn, with a maximum interval of six hours between trap checks. Traps will be closed after then are checked a dawn.

If Morro Bay kangaroo rats are trapped, the biologist will notify the US Fish and Wildlife Service immediately. Any trapped Morro Bay kangaroo rats will be removed from the wild and placed in the captive breeding facilitate at UC Berkeley, unless the USFWS provides other authorization.

E.5.2.3 Implementation

Surveys will be conducted by a qualified biologist approved in advance by the USFWS and CDFW. As the timing of surveys can greatly influence the likelihood of detection, surveys will be conducted during the following time periods:

- during the week preceding or the week following a new moon; and
- during periods lacking increment weather (e.g., rain or high wind), and at least 3 days following inclement weather, when small mammals are less active.

E.5.2.4 Reporting

Reports from visual surveys and live trapping will document all relevant information, including:

- The trap numbers, locations, and number of nights operated (providing a map);
- The survey dates and times;
- The weather and other abiotic conditions during the surveys that could influence activity, including temperature, wind speed, moon phase, and the preceding week's weather conditions; and
- A description of the results, including all species observed in the traps.

E.6 General Habitat Condition Monitoring

This monitoring protocol will be used to evaluate habitat conditions within the LOHCP Preserve System, in order to detect new threats or impacts to habitat for the covered species. It is designed to complement the other monitoring protocols, by providing more general data collected across a broader area. Results of the study can be used to inform habitat maintenance activities as well as help interpret results of the community and species monitoring protocols, such as provide information about potential causes of declines in species diversity or increases in populations.

E.6.1 Monitoring Objective

The objective of the general habitat monitoring is to evaluate changes in the condition of the land within the LOHCP Preserves over time.

E.6.2 Study Design

In this study, observational data will be collected and photomonitoring will be conducted in each area managed as part of the LOHCP Preserve System. Large or heterogeneous Preserves will be subdivided into management units—contiguous areas featuring similar habitat conditions—for purposes of the assessment.

E.6.2.1 Qualitative Assessment of Habitat Conditions

In each area, observations will be made to assess the habitat conditions based on the factors that affect the covered species populations, which include:

- **native plant cover**: assess native plant cover to detect issues that might reduce it, including disease, senescence due to fire exclusion, trampling due to incompatible uses, or other factors that might necessitate management;
- **exotic plant species:** assess the general distribution and abundance of exotic plants to detect rapid spread or new invasions that necessitate management, including eradication of new species as part of an early detection-rapid response program for the Preserve System (Section D.1.3.2);
- **erosion**: assess condition of eroded areas being restored or managed, and identify new erosion issues early, so that they can be corrected before they damage habitat; and
- **use:** assess user compliance with the recreation provisions of each preserve, and identify habitat impacts associated with trespass, unauthorized uses, and vandalism.

For each factor, detailed qualitative observations will be recorded on data sheets designed to characterize habitat conditions and inform management treatments. The narrative descriptions will be used to assign numerical scores to facilitate tracking changes in each factor over time. Table E-1 identifies initial factors, criteria, and scores to illustrate the protocol.

These elements of the protocol will be refined through work to prepare the LOHCP Preserve System AMMP to ensure that they reflect the results of the Preserve System inventory and baseline monitoring, and address the factors affecting the covered species and their habitats. The final monitoring protocol will include success criteria designed to trigger remedial actions in response to observed degradation of habitat conditions. For example, any Preserve receiving a score of 3 or less will be subject to remedial management actions to address the factor(s) degrading habitat.

E.6.2.2 Photomonitoring

In addition to the qualitative assessments, photomonitoring will be used to evaluate changes in habitat conditions over time. At each Preserve or management unit therein, permanent photomonitoring points will be established in locations that will complement observations that can be made through analysis of high-resolution aerial imagery, to collectively enable comprehensive examination of the habitat conditions. Photopoint locations will be established in areas that are prone to changes in habitat conditions, including areas of authorized and unauthorized uses and along boundaries of Preserves, as well as any highly-sensitive habitat areas.

Photomonitoring points will be permanently monumented on the ground (e.g., using a stake) and their locations recorded using a resource-grade GPS. At each point, the general subject and view direction (azimuth) will be recorded for each photograph. The digital photographs will be stored in files that enable comparisons.

Table E-1: Habitat Condition Assessment Factors, Criteria, and Scores

Factors	Criteria	Score
Native Vegetation	Native plant cover intact	4
	Native plant cover reduced somewhat (up to 10%) as a result of factors that are subject to management	3
	Native plant cover reduced fairly substantially (up to 50%) as a result factors that are subject to management	2
	Native plant cover greatly reduced (>50%) as a result of factors that are subject to management	1
Exotic Plants	Exotic plants limited in distribution and cover (<5%)	4
	Exotic plants limited in distribution and only patchily abundant (5-15%)	3
	Exotic plants fairly widespread and patchily abundant	2
	Exotic plants dominate vegetation, at least in some areas	1
Erosion	No erosion or erosion causing no habitat impacts	4
	Limited erosion causing limited habitat impacts	3
	Moderate erosion causing moderate habitat impacts	2
	Severe erosion causing severe habitat impacts	1
Use	No habitat impacts caused by unauthorized uses.	4
	Limited habitat impacts caused by unauthorized uses	3
	Moderate habitat impacts caused by unauthorized uses	2
	Severe habitat impacts caused by unauthorized uses	1

E.6.3 Implementation

The general assessment of habitat conditions will be conducted annually during the spring (e.g., May), when annual plant growth is at its peak. Preserves or management units prone to habitat management issues, including unauthorized use and erosion, will be assessed at additional times during the year. These follow-up assessments will be timed to evaluate impacts; for example, areas of erosion will be examined in the winter rainy season, while areas prone to unauthorized uses might best be examined during the summer.

E.6.4 Reporting

Results of the qualitative monitoring will be presented in annual reports included as part of the overall LOHCP Annual Report. Tables and graphs will be used to depict changes in the factor scores over time in each preserve; mean scores will be used to characterize changes in habitat conditions across the Preserve System. The reports will identify management actions and other measures designed to address any negative habitat impacts; these recommendations will be integrated into the work plan for the Preserve System in the subsequent year.

E.7 Exotic Plant Species Mapping

This monitoring protocol is designed to track changes in the distribution and abundance of exotic plant species over time within the LOHCP Preserve System. Results will be used to evaluate effectiveness of exotic plant management efforts, as well update the prioritized list of future treatments. Importantly, project-specific monitoring will be necessary to evaluate the effectiveness of specific exotic plant control treatments (Section 5.4.2.2). To enable comparisons of the results as well as enhance cost-effectiveness of the monitoring program, this protocol will be conducted in conjunction with the plant community mapping (Section E.1.1).

E.7.1 Monitoring Objective

Track changes in the richness and relative abundance of exotic plant species within the LOHCP Preserve System that will be used to inform management to control, and eradicate species, where possible.

E.7.2 Study Design

Exotic plant species will be tracked within the Preserve System by characterizing their distribution and relative abundance within each of the plant community (vegetation) patches mapped in the Preserve System. This approach is recommended over mapping the areal extent of each exotic plant species independently for the following reasons:

1. Accurately mapping the thousands of individual polygons needed to depict individual patches of each exotic plant species in the LOHCP Preserve System and differentiating them according to their abundance (e.g., covered classes) as needed to evaluate changes would be extremely time consuming.
2. Mapping individual polygons depicting relatively homogenous cover for each species would be extremely difficult to replicate, thus precluding accurate evaluation of changes over time.

In contrast, plant community patches delineate areas of relatively homogeneous species composition. Using the existing polygons not only facilitates accurate and repeatable field mapping, but also enables examination of exotic plant distribution and abundance patterns with respect to the plant communities, which can be helpful in informing management.
During the initial mapping, many of the larger vegetation polygons will need to be split into two or more new patches in order to:

1. **Delineate relatively homogeneous areas:** Where the cover of one or more exotic plant species varies dramatically within a patch, the patch will be split to delimit relatively homogeneous patches of exotic plant cover.
2. **Subdivide large polygons into smaller areas to facilitate field evaluation**: Polygons that are too large for field examination will be divided into two or more areas in which cover could be accurately assessed.

Within each plant community patch (i.e., polygon), the abundance of each exotic plant species will be estimated using one of ten cover classes (Table E-2). These classes enable rapid and repeatable estimation of exotic plant abundance based on their absolute cover: the percent of the area of the polygon they occupy. The greater resolution in the lower portion of the range (<25%) enables detection of more subtle, yet biologically-meaningful, changes in exotic abundance.

Table E-2: Exotic Plant Species Cover Classes

Cover Class	Range of Percent Cover (%)	Midpoint of Percent Cover Range (%)
0	0	0.0
1	<1	0.5
2	1-5	3.5
3	6-10	8.0
4	11-15	13.0
5	16-26	20.5
6	27-50	38.0
7	51-75	63.0
8	76-90	83.0
9	91-110	95.5

E.7.3 Implementation

Exotic plant mapping will be conducted during the spring when most plant species are in flower and annual plant species are at their peak.

It will be conducted every 5 years, in order to provide updated information needed to evaluate effectiveness of the exotic plant management program and reprioritize species and treatment areas, where needed. General habitat condition monitoring (Section E.6) will be conducted annually to detect new invasions or other changes in exotic plant abundance on a shorter time frame, that merit more immediate management actions. Project-specific monitoring will be conducted to track effectiveness of specific exotic plant treatment projects (Section 5.4.2.2).

During initial implementation, and every ten years thereafter, this protocol will be implemented in conjunction with the areal extent mapping of communities. This will enable results of the two studies to be evaluated (e.g., examine communities that are more or less invaded), and also reduce overall monitoring costs.

E.7.4 Analysis

The abundance (cover class) of each exotic plant observed in each vegetation patch (polygon) will be entered into MS Excel using the midpoint of the range (Table E-2). This will enable the following quantitative analyses:

1. Exotic species abundance, frequency, and area: the mean cover, mean frequency (number of polygons), and total area occupied by each species;
2. Exotic species richness: the mean number of annual, perennial, and all exotic species;
3. Exotic species cover: the mean cover of annual, perennial, and all exotic species.

The data can be integrated into the GIS which can be used to produce maps illustrating exotic plant species distribution, cover, and richness patterns.

Appendix F Covered Animal Avoidance and Minimization Surveys

This section describes the pre-project surveys that must be conducted prior to implementation of covered activities within portions of the Los Osos Habitat Conservation Plan (LOHCP) area that have potential to support Morro Bay kangaroo rat (Figure 5-3), to ensure avoidance of this fully-protected, endangered animal.

It also describes the process that must be used to capture and relocate Morro shoulderband snails out of harm's way prior to and during initial stages of covered activities in designated portions of the LOHCP Area (Figure 5-2), to minimize impacts of the covered activities on this species.

F.1 Morro Bay Kangaroo Rat Pre-Project Survey

In portions of the LOHCP Area (Figure 5-3), pre-project surveys must be conducted prior to implementation of covered activities to prevent impacts to the Morro Bay kangaroo rat (*Dipodomys heermanni morroensis*). This species is not only federally and State endangered, it is also a State of California fully protected species; therefore, during implementation, steps must be taken to ensure the species is not present in these areas before they are disturbed by the covered activities.

The survey methods were developed by the California Department of Fish and Wildlife (CDFW) and the U.S. Fish and Wildlife Service (USFWS) based on the 1996 presence/absence survey protocol for Morro Bay kangaroo rat (MBKR) and modified to address current conditions and circumstances in the LOHCP.

This section identifies the following aspects of the surveys:

1. **Survey Areas:** Areas where pre-project surveys must be conducted prior to County issuance of certificates of inclusion under the LOHCP;
2. **Qualification**s: the qualifications and agency approval requirements for biologists conducting the surveys;
3. **Protocol:** the methods that will be used as part of a two-step process to evaluate presence/absence MBKR through a habitat assessment, and then conduct track plate/diagnostic surveys and live trapping, if warranted;
4. **Reporting**: requirements for reporting results of surveys; and
5. **Survey Results:** the length of time during which the survey results will be applicable to project permitting.

F.1.1 Survey Areas

Surveys will be required prior to implementation of covered activities within the area depicted in Figure 5-3. Biologists from the USFWS and the CDFW (the wildlife agencies) determined that MBKR has some likelihood of occurring in these areas, based on habitat conditions and historical observations. The survey must be completed prior to vegetation removal or any ground-disturbing activities in the mapped areas.

F.1.2 Survey Protocol

The survey consists of three elements which are conducted in two consecutive phases. The first phase consists of a visual survey. If the wildlife agencies determine results of the visual survey necessitate a more detailed evaluation of MBKR presence within the site, project proponents will be required to conduct the second phase of the protocol, which consists of two elements: track plate and camera stations, and live trapping.

F.1.3 Phase 1: Visual Survey

The first phase of the survey protocol consists of a visual survey to assess suitability of habitat for MBKR and also to look for sign. The following outlines the visual survey protocol.

- The visual survey shall occur between April 1 and August 31, with surveys conducted in the later portion of this season being preferable.
- The property shall be subject to a 100 percent visual examination by a biologist pre-approved by the wildlife agencies. The property shall be traversed in a series of transects close enough together so that all of the ground surface can be visually assessed. In open areas with short vegetation, transect spacing may be up to 10 m apart, while habitats with heavy shrub cover will require spacing as close as three meters. To avoid missing areas, transect routes may be temporarily marked.
- The biologist(s) will evaluate habitat for all types of diagnostic sign for kangaroo rats including burrows, tail drag marks, tracks, scat, dust baths, and surface seed pit caches. The biologist(s) shall thoroughly evaluate the soil surface to determine the likelihood of diagnostic sign being obliterated and thus hiding the presence of MBKR sign.
- Conditions during the visual surveys must allow sign from the daily activity of other small mammals and even tenebrionid beetles to be clearly evident. Visual surveys shall be conducted only during the morning or during late afternoon if there has been no wind; during these times, shadows make tail drag marks easier to detect.
- The wildlife agencies shall be notified immediately if scat considered to be potential sign of MBKR is observed. This scat shall be collected and submitted to CDFW for analysis to determine if it is that of MBKR.
- Areas where potential diagnostic sign is observed shall be mapped and the locations recorded with a global position system (GPS) so that track plate/camera stations may be placed in that location.

The results of the visual survey will be provided to the wildlife agencies within 10 working days of survey completion. for a written determination regarding the need for track plate/camera station and trapping surveys. The wildlife agencies will provide a written determination regarding the need for Phase 2 survey work within 30 days.

F.1.4 Phase 2: Track Plate/Camera Station and Live Trapping Survey

The following two elements of a phase 2 survey must be conducted if the wildlife agencies determine that a more thorough evaluation of MBKR presence is merited, following review of the report of the Visual Survey conducted as part of phase 1.

F.1.4.1 Track Plate/Camera Station Protocol

Track plate and camera station surveys will be conducted as follows:

- The track plate and camera station surveys shall be conducted between April 1 and August 31. It is preferable that this survey work be conducted during the latter portion of this designated season, rather than earlier.
- Track plate and camera stations will be located in the area where the potential sign was found during the habitat assessment. After stations are assigned to areas with potential sign, other stations shall be established in a grid pattern with distance between any two stations or a station and parcel boundary no greater than 200 feet. Should any selected sampling site fall outside of potential kangaroo rat/coastal sage scrub habitat (e.g., within horse paddocks, roads, or other areas of human habitation) the station shall be moved to the nearest location where suitable habitat is present. The location of each track plate/camera station shall be recorded using a GPS.
- Each track plate and camera station shall include a track plate which has been smoked or treated to detect small mammals, and a wildlife motion-detection camera suitable for the detection of kangaroo rats and other small mammals.
- Equipment shall be set up at sunset with data collected as soon after sunrise as practical. Equipment may be removed during the day to avoid vandalism or theft.
- Track plate and camera stations shall be deployed and checked each night for seven (7) days; the survey days shall be consecutive, except that track plate and camera stations shall not be deployed if weather and ground conditions are not appropriate for their use, such as during rain or high winds.

F.1.4.2 Live Trapping

Live trapping shall be conducted as outlined below.

- Unless otherwise approved in writing by the CDFW and the USFWS, trapping will be conducted between June 1 and August 31.
- Traps will be established at the location of each track plate/camera station, the locations of which shall again be recorded using a GPS.
- Trapping shall begin on the first afternoon when weather and ground conditions are appropriate. Trap response is variable depending on extraneous factors such as weather conditions and availability of natural forage. To maximize trap response, trapping shall not be performed within three (3) days following inclement or extreme weather (e.g., rain, high winds) when animals are either less active or vulnerable to hypothermia.
- Trapping shall be conducted for a minimum of three consecutive nights. If traps are vandalized or otherwise inappropriately disturbed, trapping may need to be extended to compensate for any lost trapping opportunity.
- Traps shall be concentrated in areas with potential sign. At least one trap shall be placed at each active burrow or dust bath. Traps shall be placed near any tracks, particularly along apparent runways; this may mean 10 or more traps are located in a relatively tight cluster. Trap stations

shall also be set in evenly spaced intervals of 10 to 15 meters with two traps per station along potential movement corridors between areas exhibiting kangaroo rat sign. Where two traps are placed, one of the traps may be of mesh construction.

- Traps shall be baited with a mixture of food items such as crimped oats, wild bird seed, apples, walnuts, and peanut butter, provided that the peanut butter does not act as an ant attractant.
- Traps shall be opened and baited in late afternoon and checked approximately 2 to 4 hours after sunset and again at dawn. Traps may be checked once again during the night. No intervals between checks of any traps shall exceed six (6) hours. Traps shall be closed after they are checked at dawn.
- Unless otherwise notified by CDFW and the USFWS, any captured MBKR individuals will be documented with photos and hair samples collected for analysis by the wildlife agencies. The location of the capture will be recorded with a GPS. Animals will be released back to the wild at the trap location.

F.1.5 Surveyor Qualifications

Biologists must meet the qualifications outlined below and be approved by CDFW and USFWS (the wildlife agencies) prior to conducting surveys for MBKR. The Implementing Entity will maintain a list of biologists that the wildlife agencies have identified as qualified to perform MBKR surveys.

1. **Visual Assessments and Track Plate/Camera Station Surveys:** The visual assessments, track plates, and camera station work shall only be conducted by biologists with extensive, demonstrable experience with kangaroo rats (*Dipodomys* spp.).
2. **Live Trapping:** Trapping surveys can only be conducted by biologists with a federal recovery permit, issued pursuant section 10(a)(1)(A) of ESA, for Morro Ban kangaroo rat, and who have received authorization from the CDFW. Biologists in possession of a recovery permit for another species of listed kangaroo rat and/or demonstrable small mammal trapping experience that includes work with kangaroo rats may be considered by the wildlife agencies on their individual merit; however, such individuals must be approved, in advance, by both CDFW and the USFWS.

The same biologist shall conduct all of the elements deemed necessary to constitute a complete survey unless otherwise approved in advance and in writing by CDFW and the USFWS.

F.1.6 Reporting

Reports for the Phase 1 Visual Survey shall be submitted to the wildlife agencies within 10 working days following completion.

A final report shall be prepared following the completion of all elements of survey to incorporate all survey results for the property. This final report shall be submitted within 15 working days of the completion of the Phase 2 surveys.

The report for will include the following information: the survey date(s) and time(s), survey location on a map, day and night time weather conditions including temperature and wind speed, moon phase, the preceding week's weather conditions, names of biologist(s), number of person-hours spent searching for

sign per hectare searched (i.e., survey effort), a copy of the field notes that list trap check times by date, photographs, and a description of the survey methods and results, including any capture location(s).

All reports should be submitted to the wildlife agencies at the addresses below:

Field Supervisor
U.S. Fish and Wildlife Service
Ventura Field Office
2493 Portola Road, Suite B
Ventura, California, 93003

Habitat Conservation Planning Branch
Department of Fish and Wildlife
1234 E. Shaw Avenue
Fresno, CA 93710

F.1.7 Survey Result

If the survey is conducted as described in this protocol and the results are negative, as no diagnostic sign is found and no MBKR are trapped, these negative results are considered valid for one year unless otherwise extended, in writing, by the wildlife agencies. If results indicate MBKR is present, the project proponent shall contact the CDFW and USFWS regarding how to proceed.

The wildlife agencies reserve the right to reject the results of Morro Bay kangaroo rat surveys as inadequate if: (1) specific methods described above are not implemented and prior written exception has not been obtained per for any requested modification or (2) survey methods used are inconsistent with this protocol.

F.2 Morro Shoulderband Snail Minimization Measure

This section describes the pre-project surveys that will be conducted to minimize take in the form of injury and mortality of Morro shoulderband snail (*Helminthoglypta walkeriana*; MSS, a federally endangered species, by ensuring that identified individuals are captured and moved out of harm's way into Preserve lands prior to site disturbance that would result from covered activities. The methods were developed by the USFWS to address current conditions and circumstances in the LOHCP.

F.2.1 Survey Areas

Surveys will be required in the portions of the LOHCP Area depicted in Figure 5-2. Biologists from the USFWS determined that larger numbers of MSS are expected to occur in these areas, based on habitat conditions, current and historical observations, and proximity to known occupied areas.

F.2.2 Morro Shoulderband Survey Methods

F.2.2.1 Search

Preconstruction surveys and minimization measures must be conducted in advance of ground-disturbance in the designated areas (Figure 5-2). A qualified biologist (Section F.2.3) will be present during site disturbance activities and initial grading and excavation including clearing of vegetation and stripping of the surface soil layer to monitor for the presence of MSS.

Surveys for MSS will also include cutting at ground level any native or exotic shrubs that are to be removed as part of site preparation to allow for careful inspection of branches and understory litter to detect any MSS individuals that may be present. Veldt grass (*Ehrharta calycina*) clumps will be carefully inspected and all iceplant species (*Carpobrotus* spp., *Conicosia* spp., and *Mesembryanthemum* spp.) will be removed and stems and duff carefully inspected for individual MSS as well as their egg masses. As vegetation is removed, it will not be stockpiled onsite but rather moved to an offsite location where there is no chance of its re-occupation by the species.

Measures shall be taken during vegetation removal, grading, and excavation to avoid trampling patches of iceplant or perennial veldt grass. The biologist will have the authority to order any reasonable measure necessary to avoid injury or mortality of MSS and stop any work or activity that is not in compliance with the conditions set forth in the ITP. The USFWS will be notified of any "stop work" order and this order will remain in effect until the issue has been resolved.

F.2.2.2 Relocation

Live MSS in any life stage that are encountered during these monitoring surveys will be captured and moved by the biologist to suitable habitat located within a LOHCP Preserve. The biologist will identify the most suitable receptor site and obtain consent from the receptor-site land owners or managers prior to relocating individuals to the site. To the extent possible, individuals should be relocated to suitable conserved habitat within the LOHCP Preserve closest to the capture site. Within the designated receptor site, MSS shall be placed in or near the center of a habitat patch to maximize chance of survival; habitat edges should be avoided.

Capture of individuals should be done carefully and with a light touch, will time in hand kept to the minimum time necessary. Between the point of capture and the receptor site, individuals should be placed in a protective, secure container contains a layer of duff comprise of native leaf litter.

Individual MSS should be kept in the protective container for the minimum amount of time necessary to move them to the receptor site. In any case, individuals will not be kept in the container for more than an hour. During this period, the biologist must take measures to keep individuals out of the direct sunlight and situations of excessive heat.

Individuals MSS shall be gently transferred from their protective container to the base of a native shrub species with low-lying branches that can provide cover. The aperture (main opening of the MSS shell) should face the ground surface. The biologist shall gently cover the MSS with one to two inches of leaf litter (duff).

F.2.2.3 Construction Monitoring

Upon completion of site preparation and grading activities, the biologist will periodically visit the project site throughout the remainder of the project construction period. During periods of rain or heavy fog/dew, the biologist will conduct pre-activity surveys to ensure that no Morro shoulderband snails have migrated into the work area. Any MSS observed during this period shall be relocated as outlined in Section F.2.2.2. No construction work will be initiated until the biologist determines that the work area is clear of Morro shoulderband snails.

F.2.3 Surveyor Qualifications

Biologists who conduct surveys for Morro shoulderband snail shall be in possession of a valid section 10(a)(1)(A) recovery permit for the species that allows for the handling in association with species identification and capture or has been otherwise approved by the USFWS and CDFW. The Implementing Entity will maintain a list of biologists that the USFWS has identified as qualified to perform surveys for Morro shoulderband snail.

F.2.4 Reporting

Reports for monitoring and clearance surveys will be submitted to the USFWS and CDFW within 30 working days following completion and will include the following information: survey date(s) and time(s), parcel identification (street address and APN), names of biologist(s) and permit number(s), number of person-hours spent, number of individuals captured and relocated, location of the receptor site, any take that may have occurred during capture, and a copy of the field notes.

All reports should be sent to the wildlife agencies at the following addresses:

Field Supervisor
U.S. Fish and Wildlife Service
Ventura Field Office
2493 Portola Road, Suite B
Ventura, California 93003

Habitat Conservation Planning Branch
Department of Fish and Wildlife
1234 E. Shaw Avenue
Fresno, California 93710

Appendix G California Department of Fish and Wildlife Mitigation Policy Consistency Analysis and Morro Dunes Ecological Reserve Management Obligation Assessment

This appendix documents the results of an analysis that concluded that enrollment of the California Department of Fish and Wildlife's Morro Dunes Ecological Reserve is consistent with the CDFW *Policy for Mitigation on Public Owned, Department Owned, and Conserved Lands* (CDFW 2012), which is provided at the end of this appendix. For each of the guidelines within the CDFW mitigation policy, Table G-1 evaluates whether the use of the MDER is consistent.

This appendix also lists CDFW's management obligations for the MDER based on a review of the existing management plan for the reserve (CDFW 1982). At the time that the management plan was developed, the reserve consisted only of the 48-acre Pecho Parcel, located west of Pecho Valley Road. A plan has not yet been developed for the 237-acre Bayview Unit of the MDER.

The management recommendations in the plan, outlined in order of priority, were to:

1. Complete a flora and invertebrate survey by competent biologists;
2. Delineate the most important habitat areas for habitat enhancement for Morro Bay kangaroo rat;
3. Delineate the areas critical for protection of the banded dune snail (Morro shoulderband snail) and various endemic plants, so they can be left 'as is';
4. Conduct periodic monitoring of the efficacy of the management practices, including population sampling for the kangaroo rat; and
5. Meeting twice a year with the State Parks, the USFWS, and Cal Poly staff to review the progress of management and determine the course of future management efforts.

These existing recommendations, which represent the management obligation for the property (R. Stafford, pers. comm. 2016), could be greatly expanded upon to address management issues and threats to the covered species, and enhance and restore habitat at the site as part of the LOHCP Preserve System AMMP. Specifically, efforts to control exotic plants, address the impacts of historic land use including old roads, restore areas that have been denuded as a result of intense trail use, and conduct vegetation management to simulate the beneficial effects of fire and promote fire-adapted species, as outlined in Section 5.3.3 and discussed in greater detail in Appendix D, could restore or enhance the coastal sage scrub and maritime chaparral habitat in the MDER and in doing so, promote populations of the covered species all of which have current or historic occurrences within the site. Specific management and restoration activities and the methods of crediting them as mitigation in the LOHCP will be identified in the Preserve System AMMP, which will be developed during the first three years of Plan implementation (Section 5.3.3.2). Based on the framework for management and monitoring outlined in Appendix D, the Department believes that the enhanced management and restoration of the MDER proposed by the LOHCP is above and beyond CDFW's existing responsibility for management of the ecological reserve (R. Stafford, pers. comm. 2016).

Table G-1: Consistency of Enrollment of the Morro Dunes Ecological Reserve in the LOHCP Preserve System with CDFW Mitigation Policy Guidelines

CDFW Mitigation Policy Guideline	Evaluation of Consistency of LOHCP with the Guideline
Mitigation is consistent with the current and future uses of the land including any encumbrances, easements or public use values, as evaluated through a site visit and described in CDFW documents including: • Land management plan (LMP) for the property; • Any Conceptual Area Protection Plans (CAPP) or Land Acquisition Evaluations (LAE) written for the property; and • Easement; and • Titles.	Restoration and management of habitat within the MDER is consistent with the objectives for the reserve as outlined in the current LMP, which are: protection and enhancement of Morro Bay kangaroo rat habitat, protection of Morro shoulderband snail habitat, and protection of the endemic plants (CDFW 1982). Specifically, restoration projects will be designed to promote habitat for the covered species (MBKR, MSS, IKM, and MM) by addressing factors that degrade it, including exotic plants, erosion, and unnatural succession due to fire exclusion. There are no easements or provisions on the title for the properties that preclude their use as mitigation.
Mitigation is consistent with the purpose for which the land was acquired, and the funding source used for acquisition.	Restoration and management will promote the rare species and endemic communities that properties within the MDER were acquired to protect. CDFW confirmed that state funds used to purchase the property (Proposition 50 and state license plant funds) do not preclude their use as mitigation. Likewise, USFWS found that land purchased in part using federal threatened and endangered species program funds and Section 6 funds can be restored or managed as mitigation.
Mitigation will not preclude, diminish or interfere with encumbrances, or the management plan for the property.	Restoration and management will promote the goals of the management of the property, which are: protection and enhancement of Morro Bay kangaroo rat habitat, protection of Morro shoulderband snail habitat, and protection of the endemic plants (CDFW 1982). There are no known encumbrances for the property for which restoration and management would interfere.
Mitigation maintains and or enhances the current ecological and public use values of the land. The entity proposing mitigation needs to provide documentation of how placing the mitigation on the land is going to maintain or enhance these values.	Restoration and management will promote the ecological goals for the property, as outlined above. The current LMP does not identify public use goals; however, the property is open for public access consistent with California Code of Regulations Title 14, Chapter 11, *Section 630, which includes horseback riding and hiking.* Recreational use will be enhanced by efforts to restore habitat in areas

Table G-1: Consistency of Enrollment of the Morro Dunes Ecological Reserve in the LOHCP Preserve System with CDFW Mitigation Policy Guidelines

CDFW Mitigation Policy Guideline	Evaluation of Consistency of LOHCP with the Guideline
	where historic roads and trails that have become deeply incised and are impassible, while leaving more suitable trails in place.
The full cost of the mitigation is accounted for (this includes but is not limited to all capital improvements, restoration, enhancement, monitoring, long term management and maintenance and reimbursement for any CDFW staff time including enforcement, on all lands).	The LOHCP mitigation fees were calculated to fund the habitat restoration, management, and monitoring of the MDER. Fees will fund Implementing Entity staff or contractors who will implement the conservation activities in coordination with CDFW staff responsible for MDER management.
A Memorandum of Understanding (MOU) is in place prior to the project sponsors undertaking the project. The MOU will be developed in cooperation with the land manager, reviewed for statewide consistency by the CDFW's Lands Program in the Wildlife Branch and signed by the District Assistant Chief and the CDFW Regional Manager and the County. The MOU will define the mitigation purpose, permit requirements, agreement term, scope of work, schedule, management and/or maintenance requirements, monitoring, and responsibilities of the parties to the agreement.	The County and CDFW have developed a MOU to establish the terms and conditions upon which the CDFW will authorize the County to conduct habitat management, restoration, and monitoring activities on CDFW lands enrolled within the LOHCP Preserve System including the MDER (Appendix K). As required in the MOU, the LOHCP Implementing Entity will prepare a Mitigation Plan which will describe the specific management and/or restoration actions that will be implemented and the monitoring that will be used to evaluate their effectivieness, consistent with the AMMP. The Mitigation Plan must be approved by the CDFW prior to issuance of the Special Use Permit (SUP) which will allow the LOHCP Implementing Entity access to CDFW lands to conduct the mitigation activities outlined in the Mitigation Plan.

California Department of Fish and Wildlife Policy for Mitigation on Publicly Owned, Department Owned, and Conserved Lands

The following pages contain the California Department of Fish and Wildlife Policy for Mitigation on Publicly Owned, Department Owned, and Conserved Lands (CDFW 2012).

Appendix H Certificate of Inclusion

The United States Fish and Wildlife Service (USFWS) has issued to the County of San Luis Obispo (County as the Permittee) an incidental take permit (ITP) pursuant to Section 10(a)(1)(B) of the Federal Endangered Species Act (ESA). The ITP is issued for a term of 25 years and authorizes incidental take of certain species (Covered Species) (hereafter take coverage) within the area covered by the ITP. Under the ITP, the County is authorized to take the Covered Species incidental to certain activities (Covered Activities) as defined in the LOHCP, provided all of the terms and conditions of the ITP and the LOHCP are being met. In accordance with 50 CFR. § 13.25(d), County may extend take coverage granted to it to third parties, provided such third parties are under the County's direct control for purposes of implementing the requirements of, and complying with the terms and conditions of the ITP and LOHCP. The ITP and LOHCP provide that the County may extend take coverage to third parties by executing a Certificate of Inclusion (COI) with such third parties. Through execution of this COI, the County extends take coverage under the ITP [*provide permit number*] to [*fill in name of project proponent*].

You, _____, are the owner/operator of the property depicted on Exhibit 1 attached hereto and incorporated herein by this reference and desire to engage in _____, which is one of the Covered Activities under the ITP. By executing this COI, you consent to the County's direct control over your actions under the ITP and to its enforcement of compliance with the terms and conditions of the ITP and commit to implement all of the mitigation and take avoidance and minimization measures set forth in detail in Exhibit 2 to this Certificate of Inclusion. By executing this COI, you further acknowledge and consent to enforcement against you of all of the terms and conditions and applicable requirements of the ITP and LOHCP and consent to allow access to your property in accordance with any condition regarding such in the ITP, by the USFWS, the County, and/or the Implementing Entity, for purposes of monitoring your compliance with the ITP and LOHCP. If you fail to abide by the terms and conditions of the ITP and LOHCP in carrying out the Covered Activity, the take coverage granted to you through the COI will lapse and/or may be revoked and you may also be subject to civil and criminal liability under the ESA.

Take coverage extended to you under the ITP will become effective following execution of this COI by you and Implementing Entity. In the event the Covered Activity is assumed by another, you agree to immediately notify Implementing Entity and the County. Any subsequent owner/operator will not be insulated from liability for incidental take until and unless such subsequent owner/operator and Implementing Entity execute a new COI. The County, as the sole Permittee, remains liable for compliance with all of the terms and conditions and applicable requirements of the ITP and LOHCP, including those implemented by [*name of owner/operator*] pursuant to this COI.

_____ _____

Name Signature

_____

Address

_____ _____

Telephone Number e-mail address

_____

Implementing Entity Representative

_____
Date

Appendix I Template Conservation Easement

This appendix contains template for a conservation easements that would be used to permanently protect the conservation values of habitat protected as part of the LOHCP. It is designed to be used in the following three habitat protection scenarios that are envisioned to occur as part of the conservation strategy:

1. Private landowners grant easements to the Implementing Entity to protect habitat set asides established when the landowners develop vacant land is inside the Priority Conservation Area;
2. Private landowners dedicate additional easements to the Implementing Entity to protect habitat inside the Priority Conservation Area; and
3. The County of San Luis Obispo grants an easement to the Implementing Entity to permanently protect land acquired in the Priority Conservation Area in fee title from willing sellers.

There are two separate conservation easement templates. The first is to be used when just a portion of a property is being covered by the easement (Section I.1). The second is to be used when the entire property is to be protected by the easement (Section I.2).

Details of the conservation easements will be developed as part of each habitat protection project, to ensure the conservation values of the land for the covered species are protected. Conservation easements will be subject to the review and approval by the USFWS (Section 6.2.2.2).

I.1 Consesrvation Easement Template for Protection of a Portion of a Property

RECORDING REQUESTED BY AND
WHEN RECORDED MAIL TO:

Name and Address of Grantee

With Copies to:
County of San Luis Obispo
Planning and Building Department
976 Osos Street
San Luis Obispo, CA 93408

Attn:

Add FWS addressees

Space Above Line for Recorder's Use Only

CONSERVATION EASEMENT DEED

THIS CONSERVATION EASEMENT DEED ("Conservation Easement") is made this _____ day of _____, 20____, by the County of San Luis Obispo ("County" or "Grantor"), in favor of the [Name of the Implementing Entity] ("Grantee"), with reference to the following facts:

R E C I T A L S

A. Grantor is the sole owner in fee simple of certain real property located in the County of San Luis Obispo, State of California, designated Assessor's Parcel Number _____ ("Property"). The Property is legally described in Exhibit "A" attached hereto and incorporated herein by this reference. Grantor intends to grant a conservation easement over a ____-acre portion of the Property which is the Property described in Exhibit "A" (the "Easement Area"). The Easement Area is legally described in Exhibit "B" attached hereto and incorporated herein by this reference.

B. The Easement Area possesses wildlife and habitat values of great importance to Grantee, the United States Fish and Wildlife Service (USFWS), and the people of the United States.

C. The Easement Area provides high quality habitat for [*list plant and/or animal species*] and contains [*list habitats; native and/or non-native, restored, created, enhanced and/or preserved jurisdictional water of the United States including wetlands*]. Individually and collectively, these wildlife and habitat values comprise the "Conservation Values" of the Property. D. The Easement Area supports habitat required to be preserved and managed in perpetuity by Federal Endangered Species Act Incidental Take Permit TE -_____ ("Permit") as mitigation for certain impacts of development and associated infrastructure (collectively "County Projects") located in the County of San Luis Obispo, according to the Los Osos Habitat Conservation Plan ("LOHCP"), the terms of which are incorporated by reference into this Conservation Easement. Grantor, Grantee, and USFWS each has a copy of the LOHCP and Permit.

E. Grantee is the entity selected by the County to implement certain terms and conditions of the LOHCP. Grantee is authorized to hold this conservation easement pursuant to California Civil Code Section 815.3 and Government Code Section 65967. Specifically, Grantee is a tax-exempt nonprofit organization qualified under section 501(c)(3) of the Internal Revenue Code of 1986, as amended, and qualified to do business in California which has as its primary purpose the preservation, protection or enhancement of land in its natural, scenic, forested, or open space condition or use.

F. The United States Fish and Wildlife Service ("USFWS"), an agency within the United States Department of the Interior, has jurisdiction over the conservation, protection, restoration and management of fish, wildlife, native plants, and the habitat necessary for biologically sustainable populations of these species within the United States pursuant to the Endangered Species Act, 16 U.S.C. 1531, *et seq.*, the Fish and Wildlife Coordination Act, 16 U.S.C. §§661-66c, the Fish and Wildlife Act of 1956, 16 U.S.C. §724(f), *et seq.*, and other provisions of federal law.

G. USFWS approved the Final LOHCP Preserve System Adaptive Management and Monitoring Plan ("Management Plan") for the Property, which provides the conservation requirements for and authorized activities within the Easement Area. The Management Plan is incorporated by this reference into this Conservation Easement as if fully set forth herein. A final, approved copy of the Management Plan, and any amendments thereto approved by the USFWS, along with additional specific requirements or modifications applicable to the Property, if any, approved in the future by the USFWS, will be kept on file at the addresses listed in Paragraph 12. If the Grantor, or any successors or assigns, require an official copy of the Management Plan, they may request a copy of the current Management Plan from the Agencies at the addresses listed in Paragraph 12.

COVENANTS, TERMS, CONDITIONS AND RESTRICTIONS

For good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, and pursuant to California law, including Civil Code Section 815, *et seq*., Grantor hereby voluntarily grants and conveys to Grantee a conservation easement in perpetuity over the Easement Area under the terms and conditions set forth herein.

1. Purposes. The purposes of this Conservation Easement are to ensure the Easement Area will be retained forever in its natural, restored or enhanced condition consistent with the habitat protection requirements of the LOHCP, and Permit and to prevent any use of the Easement Area that will impair or interfere with the Conservation Values of the Easement Area. Grantor intends that this Conservation Easement will confine the use of the Easement Area to such activities that are consistent with those purposes, including, without limitation, those involving the preservation, restoration and enhancement of native species and their habitats. Grantor represents and warrants that there are no structures or improvements existing on the Property at the time this Conservation Easement is executed, except for any structures or improvements identified in the survey attached as Exhibit "C" and incorporated herein by this reference. Grantor further represents and warrants that to Grantor's knowledge there are no other previously granted easements existing on the Property that interfere or conflict with the purposes of this Conservation Easement as evidenced by the title report attached at Exhibit "D" and incorporated herein by this reference.

2. Grantee's Rights. To accomplish the purposes of this Conservation Easement, Grantor hereby grants and conveys the following rights to Grantee:

(a) For the purpose of restoring, enhancing or improving the health of the natural resources and habitats located on the Property, the right to enter the Property, along with Grantee's agents and contractors at reasonable times and upon not less than ten (10) days' prior notice, in order to and carry out management and restoration activities or to monitor the effects of the restoration activities, all in accordance with the Management Plan. Grantee's habitat management and restoration activities shall not unreasonably limit or interfere with Grantor's access to and use of the Property and shall be at Grantee's sole cost and expense and Grantor shall not be responsible for upkeep and maintenance of Grantee's restoration projects.

(b) To enter the Property, along with Grantee's agents and contractors, at reasonable times and upon not less than ten days' notice to conduct surveys of the covered species, to monitor the natural communities, or to evaluate the condition of other natural resources. Grantee's scientific research and monitoring activities shall not unreasonably limit or interfere with Grantor's use of the Property and shall be at Grantee's sole cost and expense.

(c) To preserve and protect the Conservation Values of the Easement Area;

(d) To enter upon the Easement Area at reasonable times in order to monitor compliance with and otherwise enforce the terms of this Conservation Easement, and for scientific research and interpretive purposes by Grantee or its designees, provided that Grantee shall not unreasonably interfere with Grantor's authorized use and quiet enjoyment of the Easement Area or the Property. Grantor shall provide Grantee access to the Easement Area by crossing the Property, if necessary;

(e) To prevent any activity on or use of the Easement Area that is inconsistent with the purposes of this Conservation Easement and to require the restoration of such areas or features of the Easement Area that may be damaged by any act, failure to act, or any use that is inconsistent with the purposes of this Conservation Easement;

(f) To require that all mineral, air and water rights as Grantee deems necessary to preserve, protect, and to sustain the biological resources and the Conservation Values of the Easement Area shall be put to beneficial use upon the Easement Area, consistent with the purposes of this Conservation Easement; and

(g) All present and future development rights appurtenant to, allocated, implied, reserved or inherent in the Easement Area are hereby terminated and extinguished, and may not be used on or transferred to any portion of the Easement Area, nor any other property adjacent or otherwise.

3. Prohibited Uses. Any activity on or use of the Easement Area inconsistent with the purposes of this Conservation Easement is prohibited. Without limiting the generality of the foregoing, the following uses and activities by Grantor, Grantor's agents, and third parties, are expressly prohibited:

(a) Unseasonal watering; use of fertilizers, pesticides, biocides, herbicides or other agricultural chemicals; weed abatement activities; incompatible fire protection activities; and any and all other activities and uses which may adversely affect the purposes of this Conservation Easement, except as otherwise specifically provided in the Management Plan;

(b) Use of off-road vehicles and use of any other motorized vehicles except on existing roadways other than as otherwise specifically provided in the Management Plan;

(c) Agricultural activity of any kind, except that grazing is permitted if done in accordance with the Management Plan or other grazing or management plan approved by Grantee and USFWS;

(d) Recreational activities including, but not limited to, horseback riding, biking, hunting or fishing, except as otherwise specifically provided in the Management Plan;

(e) Commercial or industrial uses;

(f) Any legal or de facto division, subdivision or partitioning of the Easement Area, including a request for a certificate of compliance pursuant to the Subdivision Map Act (California Government Code section 66499.35);

(g) Construction, reconstruction or placement of any building, billboard or sign, or any other structure or improvement of any kind, except as otherwise specifically provided in the Management Plan;

(h) Deposit or accumulation of soil, trash, ashes, refuse, waste, bio-solids or any other materials;

(i) Planting, introduction or dispersal of non-native or exotic plant or animal species;

(j) Filling, dumping, excavating, draining, dredging, mining, drilling, removing or exploring for or extraction of minerals, loam, soil, sands, gravel, rocks or other material on or below the surface of the Easement Area, except as otherwise specifically provided in the Management Plan;

(k) Altering the surface or general topography of the Easement Area, including building of roads, except as otherwise specifically provided in the Management Plan;

(l) Removing, destroying, or cutting of trees, shrubs or other vegetation, except as required by law and in conformance with the Management Plan approved by Grantee and the USFWS for (1) fire breaks, (2) maintenance of existing foot trails or roads that are otherwise permitted under this Conservation Easement, (3) prevention or treatment of disease; or (4) utility line clearance for existing utilities;

(m) Manipulating, impounding or altering any natural water course, body of water or water circulation on the Easement Area, except as otherwise specifically provided in the Management Plan, and activities or uses detrimental to water quality, including but not limited to degradation or pollution of any surface or sub-surface waters; and

(n) Landscaping and hardscaping.(o) Without the prior written consent of Grantee and the USFWS, which Grantee and the USFWS each may withhold for any reason, transferring, encumbering, selling, leasing, or otherwise separating the mineral, air, or water rights for the Easement area; changing the place or purpose of use of the water rights; abandoning or allowing the abandonment of, by action or inaction, any water or water rights, ditch or ditch rights, spring rights, reservoir or storage rights, wells, ground water rights, or other rights in and to the use of water

historically used on or otherwise appurtenant to the Easement Area, including but not limited to: (1) riparian water rights; (2) appropriative water rights; (3) rights to waters which are secured under contract with any irrigation or water district, to the extent such waters are customarily applied to the Easement Area; and (4) any water from wells that are in existence or may be constructed in the future on the Easement Area; and

(p) Any activity or use that may violate or fail to comply with relevant federal, state, or local laws, regulations, or policies applicable to Grantor, the Easement Area, or the activity or use in question.

4. Grantor's Duties. Grantor shall undertake all reasonable actions to prevent unlawful entry and trespass by persons whose activities may degrade or harm the Conservation Values of the Easement Area or that are otherwise inconsistent with this Conservation Easement, including but not limited to posting signs prohibiting such unlawful entry and trespass. In addition, Grantor shall undertake all necessary actions to perfect the right of Grantee under Section 2 of this Conservation Easement, including but not limited to, Grantee's water rights, and all necessary actions to fulfill its responsibilities as identified in the USFWS Permit.

5. Reserved Rights. Grantor reserves to itself, and to its personal representatives, heirs, successors, and assigns, all rights accruing from its ownership of the Easement Area, including the right to engage in or to permit or invite others to engage in all uses of the Easement Area that are not expressly prohibited or limited by, and are consistent with the purposes of, this Conservation Easement. Notwithstanding anything set forth herein, in the event of any third-party claim against Grantor arising from the actions of Grantee or any of its employees, agents, contractors or representatives with respect to the Property, Grantor reserves any rights that Grantor may have at law or in equity to seek contribution or reimbursement from Grantee for such third-party claim.

6. Grantee's Remedies. If Grantee determines that a violation of the terms of this Conservation Easement has occurred or is threatened, Grantee shall give written notice to Grantor of such violation and demand in writing the cure of such violation. At the time of giving any such notice, Grantee shall give a copy of the notice to USFWS. If Grantor fails to cure the violation within fifteen (15) days after receipt of written notice and demand from Grantee, or if the cure reasonably requires more than fifteen (15) days to complete and Grantor fails to begin the cure within the fifteen (15)-day period or fails to continue diligently to complete the cure, Grantee may bring an action at law or in equity in a court of competent jurisdiction to enforce the terms of this Conservation Easement, to recover any damages to which Grantee may be entitled for violation of the terms of this Conservation Easement or for any injury to the Conservation Values of the Easement Area, to enjoin the violation, *ex parte* as necessary, by temporary or permanent injunction without the necessity of proving either actual damages or the inadequacy of otherwise available legal remedies, or for other equitable relief, including, but not limited to, the restoration of the Easement Area to the condition in which it existed prior to any such violation or injury. Without limiting Grantor's liability therefor, Grantee may apply any damages recovered to the cost of undertaking any corrective action on the Easement Area.

If Grantee, in its sole discretion, determines that circumstances require immediate action to prevent or mitigate damage to the Conservation Values of the Easement Area, Grantee may pursue its remedies under this Section 6 without waiting for the period provided for cure to expire, provided, however, that (a) Grantee shall use reasonable efforts to give Grantor notice thereof, which notice may be by email or telephone, and (b) Grantor shall have the right to have a representative present while Grantee is present on the Property. Grantee's rights under this section apply equally to

actual or threatened violations of the terms of this Conservation Easement. Grantor agrees that Grantee's remedies at law for any violation of the terms of this Conservation Easement are inadequate and that Grantee shall be entitled to the injunctive relief described in this section, both prohibitive and mandatory, in addition to such other relief to which Grantee may be entitled, including specific performance of the terms of this Conservation Easement, without the necessity of proving either actual damages or the inadequacy of otherwise available legal remedies. Grantee's remedies described in this section shall be cumulative and shall be in addition to all remedies now or hereafter existing at law or in equity, including but not limited to, the remedies set forth in Civil Code Section 815, *et seq.*, inclusive. The failure of Grantee to discover a violation or to take immediate legal action shall not bar Grantee from taking such action at a later time.

If at any time in the future Grantor or any subsequent transferee uses or threatens to use the Easement Area for purposes inconsistent with this Conservation Easement then, notwithstanding Civil Code Section 815.7, the California Attorney General or any entity or individual with a justiciable interest in the preservation of this Conservation Easement has standing as interested parties in any proceeding affecting this Conservation Easement.

6.1. Costs of Enforcement. Any costs incurred by Grantee, where Grantee is the prevailing party, in enforcing the terms of this Conservation Easement against Grantor, including, but not limited to, costs of suit and attorneys' and experts' fees, and any costs of restoration necessitated by Grantor's negligence or breach of this Conservation Easement shall be borne by Grantor.

6.2. Discretion of Grantee. Enforcement of the terms of this Conservation Easement by Granteeshall be at the discretion of the enforcing party, and any forbearance by Grantee, to exercise their rights under this Conservation Easement in the event of any breach of any term of this Conservation Easement shall not be deemed or construed to be a waiver by Grantee, of such term or of any subsequent breach of the same or any other term of this Conservation Easement or of any of Grantee's rights under this Conservation Easement. No delay or omission by Grantee, in the exercise of any right or remedy shall impair such right or remedy or be construed as a waiver.

6.3. Acts Beyond Grantor's Control. Nothing contained in this Conservation Easement shall be construed to entitle Grantee to bring any action against Grantor for any injury to or change in the Easement Area resulting from (i) any natural cause beyond Grantor's control, including, without limitation, fire not caused by Grantor, flood, storm, and earth movement, or any reasonable and prudent action taken by Grantor under emergency conditions to prevent, abate, or mitigate significant injury to the Easement Area resulting from such causes

7. Fence Installation and Maintenance. Grantor shall install fencing in accordance with the Management Plan to protect the Conservation Values of the Easement Area, including but not limited to wildlife corridors.

8. Access. This Conservation Easement does not convey a general right of access to the public or a general right of access to the Property. Grantor or its designees shall install signage at all likely points of entry informing persons of the nature and restrictions on the Easement Area. This Conservation Easement will allow for the Agencies' access to the Easement Area. Such access may be at specific locations if so designated in easements and reservations of rights recorded in the chain of title to the Property at the time of conveyance.

9. Costs and Liabilities. Grantor retains all responsibilities and shall bear all costs and liabilities of any kind related to the ownership, operation, upkeep, and maintenance of the Easement Area except as specifically required of the Grantee under the Management Plan. Grantor agrees that neither the Grantee nor the USFWS shall have a duty or responsibility for the operation, upkeep or maintenance of the Easement Area, except as specifically required of the Grantee under the Management Plan, or Property, the monitoring of hazardous conditions thereon, or the protection of Grantor, the public or any third parties from risks relating to conditions on the Easement Area or Property. Grantor and Grantee each remains solely responsible for obtaining any applicable governmental permits and approvals for any activity or use permitted by this Conservation Easement, including those required from the USFWS acting their regulatory capacities, and any activity or use shall be undertaken in accordance with all applicable federal, state, local and administrative agency statutes, ordinances, rules, regulations, orders and requirements.

9.1. Taxes; No Liens. Grantor shall pay before delinquency all taxes, assessments (general and specific), fees, and charges of whatever description levied on or assessed against the Easement Area or Property by competent authority (collectively "Taxes"), including any Taxes imposed upon, or incurred as a result of, this Conservation Easement, and shall furnish Grantee and the USFWS with satisfactory evidence of payment upon request. Grantor and Grantee shall each keep the Easement Area free from any liens (other than a security interest that is expressly subordinate to this Conservation Easement as provided in Section 14(k) and(l)), including those arising out of any obligations incurred by Grantor for any labor or materials furnished or alleged to have been furnished to or for Grantor at or for use on the Easement Area or Property.

9.2. Hold Harmless. Grantor shall hold harmless, protect, and indemnify Grantee and its directors, officers, employees, agents, contractors, and representatives and the heirs, personal representatives, successors and assigns of each of them (each a "Grantee Indemnified Party" and, collectively, "Grantee's Indemnified Parties") from and against any and all liabilities, penalties, costs, losses, damages, expenses (including, without limitation, reasonable attorneys' fees and experts' fees), causes of action, claims, demands, orders, liens or judgments (each a "Claim" and, collectively, "Claims"), arising from or in any way connected with: (1) injury to or the death of any person, or physical damage to any property, resulting from any act, omission, condition, or other matter related to or occurring on or about the Property, regardless of cause, except that this indemnification shall be inapplicable to Grantee's Indemnified Parties with respect to any Claim due solely to the negligence or willful misconduct of Grantee's Indemnified Parties; (2) the obligations specified in Sections 5, 10, and 10.1 and (3) the existence or administration of this Conservation Easement.

Grantor shall hold harmless, protect, and indemnify the USFWS, and their directors, officers, employees, agents, contractors and representatives, and the heirs, personal representatives, successors and assigns of each of them (each a "USFWS Indemnified Party" and, collectively, "USFWS Indemnified Parties") from and against any and all Claims arising from or in any way connected with: (1) injury to or the death of any person, or physical damage to any property, resulting from any act, omission, condition, or other matter related to or occurring on or about the Property, regardless of cause; and (2) the existence or administration of this Conservation Easement. Provided, however, that this indemnification shall be inapplicable to a USFWS Indemnified Party with respect to any Claim due solely to the negligence or willful misconduct of that USFWS Indemnified Party. If any action or proceeding is brought against any of either USFWS Indemnified Parties by reason of any Claim to which the indemnification in this Section 10.22 applies, then Grantor shall, at the election of and upon written notice from the USFWS Indemnified Party, defend such action or proceeding by counsel

reasonably acceptable to the USFW Indemnified Party or reimburse the USFWS Indemnified Party for all charges incurred for services of the U.S. Department of Justice in defending the action or proceeding.

9.3. Extinguishment. If circumstances arise in the future that render the purposes of this Conservation Easement impossible to accomplish, this Conservation Easement can only be terminated or extinguished, in whole or in part, by judicial proceedings in a court of competent jurisdiction. Grantor shall provide written notice to Grantee and the USFWS at least forty-five (45) days prior to taking any action to extinguish this Conservation Easement and prior to extinguishment shall provide a conservation easement at an alternative site to Grantee, or another entity or organization authorized to acquire and hold conservation easements under California Civil Code section 815.3 (or any successor provision then applicable) or the laws of the United States, that has been approved in writing by the USFWS, or shall provide alternative mitigation acceptable to the USFWS and determined in writing by the USFWS to be adequate to mitigate for the impacts to the species covered under the Permit. No such extinguishment shall affect the value of Grantee's interest in the Easement Area, and if the Easement Area, or any interest therein, is sold, exchanged, or taken after such extinguishment, Grantee shall be entitled to receive its pro-rata share of the proceeds of such sale, exchange or taking. The amount of the compensation to which Grantee shall be entitled from any sale, exchange, or taking of all or any portion of the Property subsequent to such extinguishment shall be based on the respective fair market values of the interests of Grantee and Grantor extinguished as determined in the judicial extinguishment proceedings, and Grantee shall use any proceeds received in a manner determined in writing by the USFWS to be consistent with the purposes of this Conservation Easement and Grantor's mitigation obligations under the Permit

9.4. Condemnation. This Conservation Easement is a "conservation easement" as defined in California Code of Civil Procedure section 1240.055(a)(1) and constitutes "property appropriated to public use" as defined in California Code of Civil Procedure section 1240.055(a)(3). USFWS is a public entity that imposed conditions upon issuance of the Permit that were satisfied, in whole or in part, by the creation of this Conservation Easement, as described in California Code of Civil Procedure section 1240.055(a)(3). A person authorized to acquire property for public use by eminent domain shall seek to acquire the Easement Area, if at all, *only* as provided in California Code of Civil Procedure section 1240.055. The purposes of this Conservation Easement are presumed to be the best and most necessary public use as defined at California Code of Civil Procedure section 1240.680, notwithstanding California Code of Civil Procedure sections 1240.690 and 1240.700. If any person seeks to acquire the Easement Area for public use, Grantee shall immediately provide written notice to the USFWS and comply with all obligations of the holder of a conservation easement under California Code of Civil Procedure section 1240.055. Grantee shall use any proceeds received from condemnation of the Property in a manner determined by the USFWS in writing to be consistent with the purposes of this Conservation Easement and Grantor's mitigation obligations under the Permit. If the Conservation Easement is condemned, the net proceeds from the condemnation shall also be used in compliance with California Government Code section 65966(j).

10. Transfer of Easement. This Conservation Easement may only be assigned or transferred by Grantee with the prior written approval of the USFWS. Grantee may assign this Conservation Easement only to an entity or organization approved in advance in writing by Grantor and the USFWS that is authorized to acquire and hold conservation easements pursuant to California Civil Code section 815.3 ***and*** California Government Code section 65967 (and any successor or other provisions then applicable) or the laws of the United States. Grantee shall require the transferee to record the assignment in the county where the Property is located. The failure of Grantee to perform any act

provided in this Section 19 shall not impair the validity of this Conservation Easement or limit its enforcement in any way.

11. Transfer of Property. Grantor agrees to incorporate the terms of this Conservation Easement by reference in any deed or other legal instrument by which Grantor divests itself of any interest in all or any portion of the Easement Area, including, without limitation, a leasehold interest. Grantor agrees that the deed or other legal instrument shall also incorporate by reference applicable provisions of the Permit, and any amendments thereto, and the Management Plan and any amendment(s) to that document. Grantor agrees to give written notice to Grantee and the USFWS of the intent to transfer any interest at least thirty (60) days prior to the date of such transfer. Grantee or the USFWS shall have the right to prevent subsequent transfers in which prospective subsequent claimants or transferees are not given notice of the covenants, terms, conditions and restrictions of this Conservation Easement, including the documents incorporated by reference in it. The failure of Grantor, Grantee, or the USFWS to perform any act provided in this section shall not impair the validity of this Conservation Easement or limit its enforceability in any way.

12. No Merger. The doctrine of merger is not intended, and shall not operate to extinguish this Conservation Easement if the Conservation Easement and the Easement Area become vested in the same party. If, despite this intent, the doctrine of merger applies to extinguish the Conservation Easement then, unless Grantor, Grantee, and the USFWS otherwise agree in writing, a replacement conservation easement or restrictive covenant containing the same protections embodied in this Conservation Easement shall promptly be recorded against the Easement Area by Grantee, or its successor in interest, in favor of a third party approved in writing by the USFWS to ensure that the mitigation obligations required under the Permit identified in Recital D, which include conservation of the Easement Area in perpetuity through execution and recordation of a conservation easement or equivalent legal mechanism, and the purposes of California Civil Code section 815, are fulfilled. Until such replacement conservation easement or equivalent legal mechanism is executed and recorded, Grantee or its successor in interest shall continue to protect the Easement Area in accordance with the terms of the original Conservation Easement. Any and all terms and conditions of this Conservation Easement shall be deemed covenants and restrictions upon the Easement Area, which shall run with the land according to California law and otherwise exist in perpetuity.

13. Covenant Running with the Land. This Conservation Easement and covenants contained herein (1) are imposed upon the Easement Area; (2) shall run with and against the same and shall be a charge and burden thereon for the benefit of Grantee, or any successor in interest, and the USFWS; and (3) are perpetual and irrevocable.

14. Notices. Any notice, demand, request, consent, approval, or communication that a party desires or is required to give to the other party shall be in writing with copies to the USFWS, and be served personally or sent by recognized overnight courier that guarantees next-day delivery or by first class mail, postage fully prepaid, addressed as follows:

To Grantor:

County of San Luis Obispo
Planning and Building Department
976 Osos Street
San Luis Obispo, CA 93408

Attn:
Telephone:
email:

With a copy to:

Attn:
Telephone:
email:

To Grantee:

To USFWS:

U.S. Fish and Wildlife Service
Ventura Fish and Wildlife Office
2493 Portola Road, Suite B
Ventura, CA 93003
Attn: Field Supervisor
Telephone: 805-644-1766

or to such other address as either party shall designate by written notice to the other. Notice shall be deemed effective upon delivery in the case of personal delivery or delivery by overnight courier or, in the case of delivery by first class mail, five (5) days after deposit into the United States mail.

15. Amendment. This Conservation Easement may be amended by Grantor and Grantee only by mutual written agreement and subject to the prior written consent of the USFWS. Any such amendment shall be consistent with the purposes of this Conservation Easement, the requirements of the Permit, and California law governing conservation easements and shall not affect its perpetual duration. Any such amendment shall be recorded in the official records of San Luis Obispo County, State of California, and Grantee shall promptly provide a conformed copy of the recorded amendment to Grantor and the USFWS.

16. General Provisions.

(a) Controlling Law. The interpretation and performance of this Conservation Easement shall be governed by the laws of the State of California, disregarding the conflicts of law principles of such state.

(b) Liberal Construction. Despite any general rule of construction to the contrary, this Conservation Easement shall be liberally construed to affect the purposes of this Conservation Easement and the policy and purpose of Civil Code Section 815, *et seq*. If any provision in this instrument is found to be ambiguous, an interpretation consistent with the purposes of this Conservation Easement that would render the provision valid shall be favored over any interpretation that would render it invalid.

(c) Severability. If a court of competent jurisdiction voids or invalidates on its face any provision of this Conservation Easement, such action shall not affect the remainder of this Conservation Easement. If a court of competent jurisdiction voids or invalidates the application of any provision of this Conservation Easement to a person or circumstance, such action shall not affect the application of the provision to other persons or circumstances.

(d) Entire Agreement. This instrument, including the documents incorporated by reference in it, sets forth the entire agreement of the parties with respect to the Conservation Easement and supersedes all prior discussions, negotiations, understandings, or agreements relating to the Conservation Easement. No alteration or variation of this instrument shall be valid or binding unless contained in an amendment in accordance with Section 13.

(e) No Forfeiture. Nothing contained herein will result in a forfeiture or reversion of Grantor's title in any respect.

(f) Successors. The covenants, terms, conditions, and restrictions of this Conservation Easement shall be binding upon, and inure to the benefit of, the parties hereto and their respective personal representatives, heirs, successors, and assigns and shall constitute a servitude running in perpetuity with the Property.

(g) Termination of Rights and Obligations. A party's rights and obligations under this Conservation Easement terminate upon transfer of the party's interest in the Conservation Easement, Easement Area, or Property, except that liability for acts, omissions or breaches occurring prior to transfer shall survive transfer.

(h) Captions. The captions in this instrument have been inserted solely for convenience of reference and are not a part of this instrument and shall have no effect upon its construction or interpretation.

(i) Counterparts. The parties may execute this instrument in two or more counterparts, which shall in the aggregate be signed by all parties. Each counterpart shall be deemed an original instrument as against any Party who has signed it. In the event of any disparity between the counterparts produced, the recorded counterpart shall be controlling.

(j) No Hazardous Materials Liability.

(1) Except as disclosed in any Phase 1 report provided to Grantee prior to the recordation of this Conservation Easement, Grantor represents and warrants to Grantee and the that it has no knowledge or notice of any Hazardous Materials (defined below) or underground storage tanks existing, generated, treated, stored, used, released, disposed of, deposited or abandoned in, on, under, or from the Easement Area, or transported to or from or affecting the Easement Area.

(2) Without limiting the obligations of Grantor under Section 10.2 of this Conservation Easement, Grantor hereby releases and agrees to indemnify, protect and hold harmless Grantee's Indemnified Parties and USFWS Indemnified Parties (each as defined in Section 10.2 from and against any and all Claims (as defined in Section 10.2 arising from or connected with any Hazardous Materials or underground storage tanks present, alleged to be present, released in, from, or about, or otherwise associated with the Easement Area at any time, except that this release and indemnification shall be inapplicable to the Grantee's Indemnified Parties or the USFWS Indemnified Parties with respect to any Hazardous Materials placed, disposed, or released by Grantee's Indemnified Parties or the USFWS Indemnified Parties. This release and indemnification includes, without limitation, claims for (a) injury to or death of any person or physical damage to any property; and (b) the violation or alleged violation of, or other failure to comply with, any Environmental Laws (defined below). If any action or proceeding is brought against any the USFWS Indemnified Parties by reason of any such Claim, Grantor shall, at the election of and upon written notice from the USFWS Indemnified Party, defend such action or proceeding by counsel reasonably acceptable to the USFWS Indemnified Party or reimburse the USFWS Indemnified Party for all charges incurred for services of the U.S. Department of Justice in defending the action or proceeding.

(3) Despite any contrary provision of this Conservation Easement, the Parties do not intend this Conservation Easement to be, and this Conservation Easement shall not be, construed such that it creates in or gives to Grantee or the USFWS any of the following:

(A) The obligations or liability of an "owner" or "operator," as those terms are defined and used in Environmental Laws (defined below), including, without limitation, the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended (42 U.S.C. section 9601 *et seq*.; hereinafter, "CERCLA"); or

(B) The obligations or liabilities of a person described in 42 U.S.C. section 9607(a)(3) or (4); or

(C) The obligations of a responsible person under any applicable Environmental Laws; or

(D) The right or duty to investigate and remediate any Hazardous Materials associated with the Easement Area; or

(E) Any control over Grantor's ability to investigate, remove, remediate or otherwise clean up any Hazardous Materials associated with the Easement Area.

(4) The term "Hazardous Materials" includes, without limitation, (a) material that is flammable, explosive or radioactive; (b) petroleum products, including by-products and fractions thereof; and (c) hazardous materials, hazardous wastes, hazardous or toxic substances, or related materials defined in CERCLA, the Resource Conservation and Recovery Act of 1976 (42 U.S.C. section 6901 *et seq*.; hereinafter "RCRA"); the Hazardous Materials Transportation Act (49 U.S.C. section 5101 *et seq*.; hereinafter "HTA"); the Hazardous Waste Control Law (California Health & Safety Code section 25100 *et seq*.; hereinafter "HCL"); the Carpenter-Presley-Tanner Hazardous Substance Account Act (California Health & Safety Code section 25300 *et seq*.; hereinafter "HSA"), and in the regulations adopted and publications promulgated pursuant to them, or any other applicable Environmental Laws now in effect or enacted after the date of this Conservation Easement.

(5) The term "Environmental Laws" includes, without limitation, CERCLA, RCRA, HTA, HCL, HSA, and any other federal, state, local or administrative agency statute, code, ordinance, rule, regulation, order or requirement relating to pollution, protection of human health or

safety, the environment or Hazardous Materials. Grantor represents, warrants and covenants to Grantee and the USFWS that activities on and use of the Easement Area by Grantor, its agents, employees, invitees and contractors will comply with all Environmental Laws. Grantee represents, warrants and covenants to Grantor and the USFWS that activities upon and use of the Easement Area by Grantee, its agents, employees, invitees and contractors will comply with all Environmental Laws.

(k) Warranty. Grantor represents and warrants that Grantor is the sole owner of fee simple title to the Easement Area; that the Easement Area is not subject to any other conservation easement; and that there are no outstanding mortgages, liens, encumbrances or other interests in the Easement Area (including, without limitation, water and mineral interests) that may conflict or are otherwise inconsistent with this Conservation Easement and which have not been expressly subordinated to this Conservation Easement by a written, recorded Subordination Agreement approved in writing by Grantee and the USFWS.

(l) Additional Easements. Grantor shall not grant any additional easements, rights of way or other interests in the Easement area (other than a security interest that is expressly subordinated to this Conservation Easement), or grant, transfer, abandon, or relinquish (each a "Transfer") any mineral, air, or water right or any water associated with the Easement Area, without first obtaining the written consent of Grantee and the USFWS. Grantee or the USFWS may withhold such consent if it determines that the proposed interest or transfer is inconsistent with the purposes of this Conservation Easement or will impair or interfere with the Conservation Values of the Easement Area. This Section 14(l) shall not limit the provisions of Sections 2(f) and 4(o) nor prohibit transfer of a fee or leasehold interest in the Easement Area that is subject to this Conservation Easement and complies with Section 12.

(m) Recording. Grantee shall record this Conservation Easement in the Official Records of San Luis Obispo County, California, and may re-record it at any time as Grantee deems necessary to preserve its rights in this Conservation Easement.

[Signature Page Follows]

IN WITNESS WHEREOF Grantor and Grantee have executed this Conservation Easement the day and year first above written.

GRANTOR:	GRANTEE:
BY: _____	BY: _____
NAME: _____ _____	NAME: _____
TITLE: _____	TITLE: _____

Approved as to form:

XXX
County of San Luis Obispo

I.2 Conservation Easement Template for an Entire Property

RECORDING REQUESTED BY AND
WHEN RECORDED MAIL TO:

Name and Address of Grantee

With Copies to:
County of San Luis Obispo
Planning and Building Department
976 Osos Street
San Luis Obispo, CA 93408

Attn:

Add FWS address

Space Above Line for Recorder's Use Only

CONSERVATION EASEMENT DEED

THIS CONSERVATION EASEMENT DEED ("Conservation Easement") is made this _____ day of _____, 20____, by the County of San Luis Obispo ("County" or "Grantor"), in favor of the [Name of the Implementing Entity] ("Grantee"), with reference to the following facts:

R E C I T A L S

A. Grantor is the sole owner in fee simple of certain real property containing approximately [insert number] acres of land, located in the County of San Luis Obispo, State of California, designated Assessor's Parcel Number _____ ("Property"). The Property is legally described in Exhibit "A" attached hereto and incorporated herein by this reference.

B. The Property is in an unimproved [OR a predominately unimproved] natural condition and possesses wildlife and habitat values of great importance to Grantee, the United States Fish and Wildlife Service (USFWS), and the people of the United States.

C. The Property provides high quality habitat for [*list plant and/or animal species*] and contains [*list habitats; native and/or non-native, restored, created, enhanced and/or preserved jurisdictional water of the United States including wetlands*]. Individually and collectively, these wildlife and habitat values comprise the "Conservation Values" of the Property.

D. The Property supports habitat required to be preserved and managed in perpetuity by Federal Endangered Species Act Incidental Take Permit TE -_____("Permit") as mitigation for certain impacts of development and associated infrastructure (collectively "County Projects") located in the County of San Luis Obispo, according to the Los Osos Habitat Conservation Plan ("LOHCP") dated

____, the terms of which are incorporated by reference into this Conservation Easement. Grantor, Grantee, and USFWS each has a copy of the LOHCP and Permit.

E. Grantee is the entity selected by the County to implement certain terms and conditions of the LOHCP and MOU. Grantee is authorized to hold this conservation easement pursuant to California Civil Code Section 815.3 and Government Code Section 65967. Specifically, Grantee is a tax-exempt nonprofit organization qualified under section 501(c)(3) of the Internal Revenue Code of 1986, as amended, and qualified to do business in California which has as its primary purpose the preservation, protection or enhancement of land in its natural, scenic, forested, or open space condition or use.

F. The United States Fish and Wildlife Service ("USFWS"), an agency within the United States Department of the Interior, has jurisdiction over the conservation, protection, restoration and management of fish, wildlife, native plants, and the habitat necessary for biologically sustainable populations of these species within the United States pursuant to the Endangered Species Act, 16 U.S.C. 1531, *et seq.*, the Fish and Wildlife Coordination Act, 16 U.S.C. §§661-66c, the Fish and Wildlife Act of 1956, 16 U.S.C. §724(f), *et seq.*, and other provisions of federal law.

G. USFWS approved the Final LOHCP Preserve System Adaptive Management and Monitoring Plan ("Management Plan") for the Property, which provides the conservation requirements for and authorized activities on the Property. The Management Plan is incorporated by this reference into this Conservation Easement as if fully set forth herein. A final, approved copy of the Management Plan, and any amendments thereto approved USFWS, along with additional specific requirements or modifications applicable to the Property, if any, approved in the future by the USFWS will be kept on file at the addresses listed in Paragraph 12. If the Grantor, or any successors or assigns, require an official copy of the Management Plan, they may request a copy of the current Management Plan from the USFWS at the addresses listed in Paragraph 12.

COVENANTS, TERMS, CONDITIONS AND RESTRICTIONS

For good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, and pursuant to California law, including Civil Code Section 815, *et seq*., Grantor hereby voluntarily grants and conveys to Grantee a conservation easement in perpetuity over the Property under the terms and conditions set forth herein.

1. Purposes. The purposes of this Conservation Easement are to ensure the Property will be retained forever in its natural, restored or enhanced condition consistent with the habitat protection requirements of the LOHCP and Permit and to prevent any use of the Property that will impair or interfere with the Conservation Values of the Property. Grantor intends that this Conservation Easement will confine the use of the Property to such activities that are consistent with those purposes, including, without limitation, those involving the preservation, restoration and enhancement of native species and their habitats. Grantor represents and warrants that there are no structures or improvements existing on the Property at the time this Conservation Easement is executed, except for any structures or improvements identified in the survey attached as Exhibit "C" and incorporated herein by this reference. Grantor further represents and warrants that to Grantor's knowledge there are no other previously granted easements existing on the Property that interfere or conflict with the purposes of this Conservation Easement as evidenced by the title report attached at Exhibit "D" and incorporated herein by this reference.

2. Grantee's Rights. To accomplish the purposes of this Conservation Easement, Grantor hereby grants and conveys the following rights to Grantee:

(a) For the purpose of restoring, enhancing or improving the health of the natural resources and habitats located on the Property, the right to enter the Property, along with Grantee's agents and contractors at reasonable times and upon not less than ten (10) days' prior notice, in order to and carry out management and restoration activities or to monitor the effects of the restoration activities, all in accordance with the Management Plan. Grantee's habitat management and restoration activities shall not unreasonably limit or interfere with Grantor's access to and use of the Property and shall be at Grantee's sole cost and expense and Grantor shall not be responsible for upkeep and maintenance of Grantee's restoration projects.

(b) To enter the Property, along with Grantee's agents and contractors, at reasonable times and upon not less than ten days' notice to conduct surveys of the covered species, to monitor the natural communities, or to evaluate the condition of other natural resources. Grantee's scientific research and monitoring activities shall not unreasonably limit or interfere with Grantor's use of the Property and shall be at Grantee's sole cost and expense;

(c) To preserve and protect the Conservation Values of the Property;

(d) To enter upon the Property at reasonable times in order to monitor compliance with and otherwise enforce the terms of this Conservation Easement, and for scientific research and interpretive purposes by Grantee or its designees, provided that Grantee shall not unreasonably interfere with Grantor's authorized use and quiet enjoyment of the Property;

(e) To prevent any activity on or use of the Property that is inconsistent with the purposes of this Conservation Easement and to require the restoration of such areas or features of the Property that may be damaged by any act, failure to act, or any use that is inconsistent with the purposes of this Conservation Easement;

(f) To require that all mineral, air and water rights as Grantee deems necessary to preserve, protect, and to sustain the biological resources and the Conservation Values of the Property shall be put to beneficial use upon the Property, consistent with the purposes of this Conservation Easement; and

(g) All present and future development rights appurtenant to, allocated, implied, reserved or inherent in the Property are hereby terminated and extinguished, and may not be used on or transferred to any portion of the Property, nor any other property adjacent or otherwise.

3. Prohibited Uses. Any activity on or use of the Property inconsistent with the purposes of this Conservation Easement is prohibited. Without limiting the generality of the foregoing, the following uses and activities by Grantor, Grantor's agents, and third parties, are expressly prohibited:

(a) Unseasonal watering; use of fertilizers, pesticides, biocides, herbicides or other agricultural chemicals; weed abatement activities; incompatible fire protection activities; and any and all other activities and uses which may adversely affect the purposes of this Conservation Easement, except as otherwise specifically provided in the Management Plan;

(b) Use of off-road vehicles and use of any other motorized vehicles except on existing roadways other than as otherwise specifically provided in the Management Plan;

(c) Agricultural activity of any kind, except that grazing is permitted if done in accordance with the Management Plan or other grazing or management plan approved by Grantee and USFWS;

(d) Recreational activities including, but not limited to, horseback riding, biking, hunting or fishing, except as otherwise specifically provided in the Management Plan;

(e) Commercial or industrial uses;

(f) Any legal or de facto division, subdivision or partitioning of the Property, including a request for a certificate of compliance pursuant to the Subdivision Map Act (California Government Code section 66499.35);

(g) Construction, reconstruction or placement of any building, billboard or sign, or any other structure or improvement of any kind, except as otherwise specifically provided in the Management Plan;

(h) Deposit or accumulation of soil, trash, ashes, refuse, waste, bio-solids or any other materials;

(i) Planting, introduction or dispersal of non-native or exotic plant or animal species;

(j) Filling, dumping, excavating, draining, dredging, mining, drilling, removing or exploring for or extraction of minerals, loam, soil, sands, gravel, rocks or other material on or below the surface of the Property, except as otherwise specifically provided in the Management Plan;

(k) Altering the surface or general topography of the Property, including building of roads, except as otherwise specifically provided in the Management Plan;

(l) Removing, destroying, or cutting of trees, shrubs or other vegetation, except as required by law and in conformance with the Management Plan approved by Grantee and USFWS for (1) fire breaks, (2) maintenance of existing foot trails or roads that are otherwise permitted under this Conservation Easement, (3) prevention or treatment of disease; or (4) utility line clearance for existing utilities;

(m) Manipulating, impounding or altering any natural water course, body of water or water circulation on the Property, except as otherwise specifically provided in the Management Plan, and activities or uses detrimental to water quality, including but not limited to degradation or pollution of any surface or sub-surface waters; and

(n) Landscaping and hardscaping.

(o) Without the prior written consent of Grantee and USFWS, which Grantee and USFWS may withhold for any reason, transferring, encumbering, selling, leasing, or otherwise separating the mineral, air, or water rights for the Easement area; changing the place or purpose of use of the

water rights; abandoning or allowing the abandonment of, by action or inaction, any water or water rights, ditch or ditch rights, spring rights, reservoir or storage rights, wells, ground water rights, or other rights in and to the use of water historically used on or otherwise appurtenant to the Property, including but not limited to: (1) riparian water rights; (2) appropriative water rights; (3) rights to waters which are secured under contract with any irrigation or water district, to the extent such waters are customarily applied to the Property; and (4) any water from wells that are in existence or may be constructed in the future on the Property; and

(p) Any activity or use that may violate or fail to comply with relevant federal, state, or local laws, regulations, or policies applicable to Grantor, the Property, or the activity or use in question.

4. Grantor's Duties. Grantor shall undertake all reasonable actions to prevent unlawful entry and trespass by persons whose activities may degrade or harm the Conservation Values of the Property or that are otherwise inconsistent with this Conservation Easement, including but not limited to posting signs prohibiting such unlawful entry and trespass. In addition, Grantor shall undertake all necessary actions to perfect the right of Grantee under Section 2 of this Conservation Easement, including but not limited to, Grantee's water rights, and all necessary actions to fulfill its responsibilities as identified in the USFWS Permit.

5. Reserved Rights. Grantor reserves to itself, and to its personal representatives, heirs, successors, and assigns, all rights accruing from its ownership of the Property, including the right to engage in or to permit or invite others to engage in all uses of the Property that are not expressly prohibited or limited by, and are consistent with the purposes of, this Conservation Easement. Notwithstanding anything set forth herein, in the event of any third-party claim against Grantor arising from the actions of Grantee or any of its employees, agents, contractors or representatives with respect to the Property, Grantor reserves any rights that Grantor may have at law or in equity to seek contribution or reimbursement from Grantee for such third-party claim.

6. Grantee's Remedies. If Grantee determines that a violation of the terms of this Conservation Easement has occurred or is threatened, Grantee shall give written notice to Grantor of such violation and demand in writing the cure of such violation. At the time of giving any such notice, Grantee shall give a copy of the notice to USFWS. If Grantor fails to cure the violation within fifteen (15) days after receipt of written notice and demand from Grantee, or if the cure reasonably requires more than fifteen (15) days to complete and Grantor fails to begin the cure within the fifteen (15)-day period or fails to continue diligently to complete the cure, Grantee may bring an action at law or in equity in a court of competent jurisdiction to enforce the terms of this Conservation Easement, to recover any damages to which Grantee may be entitled for violation of the terms of this Conservation Easement or for any injury to the Conservation Values of the Property, to enjoin the violation, *ex parte* as necessary, by temporary or permanent injunction without the necessity of proving either actual damages or the inadequacy of otherwise available legal remedies, or for other equitable relief, including, but not limited to, the restoration of the Property to the condition in which it existed prior to any such violation or injury. Without limiting Grantor's liability therefor, Grantee may apply any damages recovered to the cost of undertaking any corrective action on the Property.

If Grantee, in its sole discretion, determines that circumstances require immediate action to prevent or mitigate damage to the Conservation Values of the Property, Grantee may pursue its remedies under this Section 6 without waiting for the period provided for cure to expire, provided, however, that (a) Grantee shall use reasonable efforts to give Grantor notice thereof, which notice may

be by email or telephone, and (b) Grantor shall have the right to have a representative present while Grantee is present on the Property. Grantee's rights under this section apply equally to actual or threatened violations of the terms of this Conservation Easement. Grantor agrees that Grantee's remedies at law for any violation of the terms of this Conservation Easement are inadequate and that Grantee shall be entitled to the injunctive relief described in this section, both prohibitive and mandatory, in addition to such other relief to which Grantee may be entitled, including specific performance of the terms of this Conservation Easement, without the necessity of proving either actual damages or the inadequacy of otherwise available legal remedies. Grantee's remedies described in this section shall be cumulative and shall be in addition to all remedies now or hereafter existing at law or in equity, including but not limited to, the remedies set forth in Civil Code Section 815, *et seq.*, inclusive. The failure of Grantee to discover a violation or to take immediate legal action shall not bar Grantee from taking such action at a later time.

If at any time in the future Grantor or any subsequent transferee uses or threatens to use the Property for purposes inconsistent with this Conservation Easement then, notwithstanding Civil Code Section 815.7, the California Attorney General or any entity or individual with a justiciable interest in the preservation of this Conservation Easement has standing as interested parties in any proceeding affecting this Conservation Easement.

6.1. Costs of Enforcement. Any costs incurred by Grantee, where Grantee is the prevailing party, in enforcing the terms of this Conservation Easement against Grantor, including, but not limited to, costs of suit and attorneys' and experts' fees, and any costs of restoration necessitated by Grantor's negligence or breach of this Conservation Easement shall be borne by Grantor.

6.2. Discretion of Grantee . Enforcement of the terms of this Conservation Easement by Grantee shall be at the discretion of the enforcing party, and any forbearance by Grantee to exercise their rights under this Conservation Easement in the event of any breach of any term of this Conservation Easement shall not be deemed or construed to be a waiver by Grantee of such term or of any subsequent breach of the same or any other term of this Conservation Easement or of any of Grantee's rights under this Conservation Easement. No delay or omission by Grantee or USFWS in the exercise of any right or remedy shall impair such right or remedy or be construed as a waiver.

6.3. Acts Beyond Grantor's Control. Nothing contained in this Conservation Easement shall be construed to entitle Grantee to bring any action against Grantor for any injury to or change in the Property resulting from (i) any natural cause beyond Grantor's control, including, without limitation, fire not caused by Grantor, flood, storm, and earth movement, or any reasonable and prudent action taken by Grantor under emergency conditions to prevent, abate, or mitigate significant injury to the Property resulting from such causes

7. Fence Installation and Maintenance. Grantor shall install fencing in accordance with the Management Plan to protect the Conservation Values of the Property, including but not limited to wildlife corridors.

8. Access. This Conservation Easement does not convey a general right of access to the public or a general right of access to the Property. Grantor or its designees shall install signage at all likely points of entry informing persons of the nature and restrictions on the Property. This Conservation Easement will allow for the USFWS access to the Property. Such access may be at specific locations if so

designated in easements and reservations of rights recorded in the chain of title to the Property at the time of conveyance.

9. Costs and Liabilities. Grantor retains all responsibilities and shall bear all costs and liabilities of any kind related to the ownership, operation, upkeep, and maintenance of the Property except as specifically required of the Grantee under the Management Plan. Grantor agrees that neither the Grantee nor USFWS shall have a duty or responsibility for the operation, upkeep or maintenance of the Property, except as specifically required of the Grantee under the Management Plan, or Property, the monitoring of hazardous conditions thereon, or the protection of Grantor, the public or any third parties from risks relating to conditions on the Property or Property. Grantor and Grantee each remains solely responsible for obtaining any applicable governmental permits and approvals for any activity or use permitted by this Conservation Easement, including those required from the USFWS acting its regulatory capacity, and any activity or use shall be undertaken in accordance with all applicable federal, state, local and administrative agency statutes, ordinances, rules, regulations, orders and requirements.

9.1. Taxes; No Liens. Grantor shall pay before delinquency all taxes, assessments (general and specific), fees, and charges of whatever description levied on or assessed against the Property or Property by competent authority (collectively "Taxes"), including any Taxes imposed upon, or incurred as a result of, this Conservation Easement, and shall furnish Grantee and USFWS with satisfactory evidence of payment upon request. Grantor and Grantee shall each keep the Property free from any liens (other than a security interest that is expressly subordinate to this Conservation Easement as provided in Section 17(k) and (l)), including those arising out of any obligations incurred by Grantor for any labor or materials furnished or alleged to have been furnished to or for Grantor at or for use on the Property or Property.

9.2. Hold Harmless. Grantor shall hold harmless, protect, and indemnify Grantee and its directors, officers, employees, agents, contractors, and representatives and the heirs, personal representatives, successors and assigns of each of them (each a "Grantee Indemnified Party" and, collectively, "Grantee's Indemnified Parties") from and against any and all liabilities, penalties, costs, losses, damages, expenses (including, without limitation, reasonable attorneys' fees and experts' fees), causes of action, claims, demands, orders, liens or judgments (each a "Claim" and, collectively, "Claims"), arising from or in any way connected with: (1) injury to or the death of any person, or physical damage to any property, resulting from any act, omission, condition, or other matter related to or occurring on or about the Property, regardless of cause, except that this indemnification shall be inapplicable to Grantee's Indemnified Parties with respect to any Claim due solely to the negligence or willful misconduct of Grantee's Indemnified Parties; (2) the obligations specified in Sections 5, 10, and 10.1**;** and (3) the existence or administration of this Conservation Easement.

Grantor shall hold harmless, protect, and indemnify the USFWS, and their directors, officers, employees, agents, contractors and representatives, and the heirs, personal representatives, successors and assigns of each of them (each a "USFWS Indemnified Party" and, collectively, "USFWS Indemnified Parties") from and against any and all Claims arising from or in any way connected with: (1) injury to or the death of any person, or physical damage to any property, resulting from any act, omission, condition, or other matter related to or occurring on or about the Property, regardless of cause; and (2) the existence or administration of this Conservation Easement. Provided, however, that this indemnification shall be inapplicable to a USFWS Indemnified Party with respect to any Claim due solely to the negligence or willful misconduct of that USFWS-Indemnified Party. If any action or proceeding is brought against any USFWS Indemnified Parties by reason of any Claim to which

the indemnification in this Section 10,2 applies, then Grantor shall, at the election of and upon written notice from the USFWS Indemnified Party, defend such action or proceeding by counsel reasonably acceptable to the USFWS Indemnified Party or reimburse the USFWS Indemnified Party for all charges incurred for services of the U.S. Department of Justice in defending the action or proceeding

9.3. Extinguishment. If circumstances arise in the future that render the purposes of this Conservation Easement impossible to accomplish, this Conservation Easement can only be terminated or extinguished, in whole or in part, by judicial proceedings in a court of competent jurisdiction. Grantor shall provide written notice to Grantee and USFWS at least forty-five (45) days prior to taking any action to extinguish this Conservation Easement and prior to extinguishment shall provide a conservation easement at an alternative site to Grantee, or another entity or organization authorized to acquire and hold conservation easements under California Civil Code section 815.3 (or any successor provision then applicable) or the laws of the United States, that has been approved in writing by the USFWS, or shall provide alternative mitigation acceptable to the USFWS and determined in writing by USFWS to be adequate to mitigate for the impacts to the species covered under the Permit. No such extinguishment shall affect the value of Grantee's interest in the Property, and if the Property, or any interest therein, is sold, exchanged, or taken after such extinguishment, Grantee shall be entitled to receive its pro-rata share of the proceeds of such sale, exchange or taking. The amount of the compensation to which Grantee shall be entitled from any sale, exchange, or taking of all or any portion of the Property subsequent to such extinguishment shall be based on the respective fair market values of the interests of Grantee and Grantor extinguished as determined in the judicial extinguishment proceedings, and Grantee shall use any proceeds received in a manner determined in writing by USFWS to be consistent with the purposes of this Conservation Easement and Grantor's mitigation obligations under the Permit.

9.4. Condemnation. This Conservation Easement is a "conservation easement" as defined in California Code of Civil Procedure section 1240.055(a)(1) and constitutes "property appropriated to public use" as defined in California Code of Civil Procedure section 1240.055(a)(3). USFWS is a public entity that imposed conditions upon issuance of the Permit that were satisfied, in whole or in part, by the creation of this Conservation Easement, as described in California Code of Civil Procedure section 1240.055(a)(3). A person authorized to acquire property for public use by eminent domain shall seek to acquire the Property, if at all, *only* as provided in California Code of Civil Procedure section 1240.055. The purposes of this Conservation Easement are presumed to be the best and most necessary public use as defined at California Code of Civil Procedure section 1240.680, notwithstanding California Code of Civil Procedure sections 1240.690 and 1240.700. If any person seeks to acquire the Property for public use, Grantee shall immediately provide written notice to USFWS and comply with all obligations of the holder of a conservation easement under California Code of Civil Procedure section 1240.055. Grantee shall use any proceeds received from condemnation of the Property in a manner determined by USFWS in writing to be consistent with the purposes of this Conservation Easement and Grantor's mitigation obligations under the Permit. If the Conservation Easement is condemned, the net proceeds from the condemnation shall also be used in compliance with California Government Code section 65966(j).

10. Transfer of Easement. This Conservation Easement may only be assigned or transferred by Grantee with the prior written approval of USFWS. Grantee may assign this Conservation Easement only to an entity or organization approved in advance in writing by Grantor and USFWS that is authorized to acquire and hold conservation easements pursuant to California Civil Code section 815.3 ***and*** California Government Code section 65967 (and any successor or other provisions then applicable)

or the laws of the United States. Grantee shall require the transferee to record the assignment in the county where the Property is located. The failure of Grantee to perform any act provided in this Section 11 shall not impair the validity of this Conservation Easement or limit its enforcement in any way.

11. Transfer of Property. Grantor agrees to incorporate the terms of this Conservation Easement by reference in any deed or other legal instrument by which Grantor divests itself of any interest in all or any portion of the Property, including, without limitation, a leasehold interest. Grantor agrees that the deed or other legal instrument shall also incorporate by reference applicable provisions of the Permit, and any amendments thereto, and the Management Plan and any amendment(s) to that document. Grantor agrees to give written notice to Grantee and USFWS of the intent to transfer any interest at least thirty (60) days prior to the date of such transfer. Grantee or USFWS shall have the right to prevent subsequent transfers in which prospective subsequent claimants or transferees are not given notice of the covenants, terms, conditions and restrictions of this Conservation Easement, including the documents incorporated by reference in it. The failure of Grantor, Grantee, or USFWS to perform any act provided in this section shall not impair the validity of this Conservation Easement or limit its enforceability in any way.

12. No Merger. The doctrine of merger is not intended, and shall not operate to extinguish this Conservation Easement if the Conservation Easement and the Property become vested in the same party. If, despite this intent, the doctrine of merger applies to extinguish the Conservation Easement then, unless Grantor, Grantee, and USFWS otherwise agree in writing, a replacement conservation easement or restrictive covenant containing the same protections embodied in this Conservation Easement shall promptly be recorded against the Property by Grantee, or its successor in interest, in favor of a third party approved in writing by USFWS to ensure that the mitigation obligations required under the Permit identified in Recital D, which include conservation of the Property in perpetuity through execution and recordation of a conservation easement or equivalent legal mechanism, and the purposes of California Civil Code section 815, are fulfilled. Until such replacement conservation easement or equivalent legal mechanism is executed and recorded, Grantee or its successor in interest shall continue to protect the Property in accordance with the terms of the original Conservation Easement. Any and all terms and conditions of this Conservation Easement shall be deemed covenants and restrictions upon the Property, which shall run with the land according to California law and otherwise exist in perpetuity.

13. Covenant Running with the Land. This Conservation Easement and covenants contained herein (1) are imposed upon the Property; (2) shall run with and against the same and shall be a charge and burden thereon for the benefit of Grantee, or any successor in interest, and the USFWS; and (3) are perpetual and irrevocable.

14. Notices. Any notice, demand, request, consent, approval, or communication that a party desires or is required to give to the other party shall be in writing with copies to USFWS, and be served personally or sent by recognized overnight courier that guarantees next-day delivery or by first class mail, postage fully prepaid, addressed as follows:

To Grantor:	County of San Luis Obispo Planning and Building Department 976 Osos Street San Luis Obispo, CA 93408 Attn: Telephone: email:
With a copy to:	
	Attn: Telephone: email:
To Grantee:	
To USFWS:	U.S. Fish and Wildlife Service Ventura Fish and Wildlife Office 2493 Portola Road, Suite B Ventura, CA 93003 Attn: Field Supervisor Telephone: 805-644-1766

or to such other address as either party shall designate by written notice to the other. Notice shall be deemed effective upon delivery in the case of personal delivery or delivery by overnight courier or, in the case of delivery by first class mail, five (5) days after deposit into the United States mail.

15. Amendment. This Conservation Easement may be amended by Grantor and Grantee only by mutual written agreement and subject to the prior written consent of USFWS. Any such amendment shall be consistent with the purposes of this Conservation Easement, the requirements of the Permit, and California law governing conservation easements and shall not affect its perpetual duration. Any such amendment shall be recorded in the official records of San Luis Obispo County, State of California, and Grantee shall promptly provide a conformed copy of the recorded amendment to Grantor and USFWS.

16. General Provisions.

(a) Controlling Law. The interpretation and performance of this Conservation Easement shall be governed by the laws of the State of California, disregarding the conflicts of law principles of such state.

(b) Liberal Construction. Despite any general rule of construction to the contrary, this Conservation Easement shall be liberally construed to affect the purposes of this Conservation Easement and the policy and purpose of Civil Code Section 815, *et seq*. If any provision in this instrument is found to be ambiguous, an interpretation consistent with the purposes of this Conservation Easement that would render the provision valid shall be favored over any interpretation that would render it invalid.

(c) Severability. If a court of competent jurisdiction voids or invalidates on its face any provision of this Conservation Easement, such action shall not affect the remainder of this Conservation Easement. If a court of competent jurisdiction voids or invalidates the application of any provision of this Conservation Easement to a person or circumstance, such action shall not affect the application of the provision to other persons or circumstances.

(d) Entire Agreement. This instrument, including the documents incorporated by reference in it, sets forth the entire agreement of the parties with respect to the Conservation Easement and supersedes all prior discussions, negotiations, understandings, or agreements relating to the Conservation Easement. No alteration or variation of this instrument shall be valid or binding unless contained in an amendment in accordance with Section 13.

(e) No Forfeiture. Nothing contained herein will result in a forfeiture or reversion of Grantor's title in any respect.

(f) Successors. The covenants, terms, conditions, and restrictions of this Conservation Easement shall be binding upon, and inure to the benefit of, the parties hereto and their respective personal representatives, heirs, successors, and assigns and shall constitute a servitude running in perpetuity with the Property.

(g) Termination of Rights and Obligations. A party's rights and obligations under this Conservation Easement terminate upon transfer of the party's interest in the Conservation Easement, Property, or Property, except that liability for acts, omissions or breaches occurring prior to transfer shall survive transfer.

(h) Captions. The captions in this instrument have been inserted solely for convenience of reference and are not a part of this instrument and shall have no effect upon its construction or interpretation.

(i) Counterparts. The parties may execute this instrument in two or more counterparts, which shall in the aggregate be signed by all parties. Each counterpart shall be deemed an original instrument as against any Party who has signed it. In the event of any disparity between the counterparts produced, the recorded counterpart shall be controlling.

(j) No Hazardous Materials Liability.

(1) Except as disclosed in any Phase 1 report provided to Grantee prior to the recordation of this Conservation Easement, Grantor represents and warrants to Grantee and USFWS that it has no knowledge or notice of any Hazardous Materials (defined below) or underground storage tanks existing, generated, treated, stored, used, released, disposed of, deposited or abandoned in, on, under, or from the Property, or transported to or from or affecting the Property.

(2) Without limiting the obligations of Grantor under Section 10.2 of this Conservation Easement, Grantor hereby releases and agrees to indemnify, protect and hold harmless Grantee's Indemnified Parties and USFWS Indemnified Parties (each as defined in Section 10.2 from and against any and all Claims (as defined in Section 10.2 arising from or connected with any Hazardous Materials or underground storage tanks present, alleged to be present, released in, from, or about, or otherwise associated with the Property at any time, except that this release and indemnification shall be inapplicable to the Grantee's Indemnified Parties or the USFWS Indemnified Parties with respect to any Hazardous Materials placed, disposed, or released by Grantee's Indemnified Parties or USFWS Indemnified Parties. This release and indemnification includes, without limitation, Claims for (a) injury to or death of any person or physical damage to any property; and (b) the violation or alleged violation of, or other failure to comply with, any Environmental Laws (defined below). If any action or proceeding is brought against any the USFWS Indemnified Parties by reason of any such Claim, Grantor shall, at the election of and upon written notice from the USFWS Indemnified Party, defend such action or proceeding by counsel reasonably acceptable to the USFWS Indemnified Party or reimburse the USFWS Indemnified Party for all charges incurred for services of the U.S. Department of Justice in defending the action or proceeding.

(3) Despite any contrary provision of this Conservation Easement, the Parties do not intend this Conservation Easement to be, and this Conservation Easement shall not be, construed such that it creates in or gives to Grantee or USFWS any of the following:

(A) The obligations or liability of an "owner" or "operator," as those terms are defined and used in Environmental Laws (defined below), including, without limitation, the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended (42 U.S.C. section 9601 *et seq*.; hereinafter, "CERCLA"); or

(B) The obligations or liabilities of a person described in 42 U.S.C. section 9607(a)(3) or (4); or

(C) The obligations of a responsible person under any applicable Environmental Laws; or

(D) The right or duty to investigate and remediate any Hazardous Materials associated with the Property; or

(E) Any control over Grantor's ability to investigate, remove, remediate or otherwise clean up any Hazardous Materials associated with the Property.

(4) The term "Hazardous Materials" includes, without limitation, (a) material that is flammable, explosive or radioactive; (b) petroleum products, including by-products and fractions thereof; and (c) hazardous materials, hazardous wastes, hazardous or toxic substances, or related materials defined in CERCLA, the Resource Conservation and Recovery Act of 1976 (42 U.S.C. section 6901 *et seq*.; hereinafter "RCRA"); the Hazardous Materials Transportation Act (49 U.S.C. section 5101 *et seq*.; hereinafter "HTA"); the Hazardous Waste Control Law (California Health & Safety Code section 25100 *et seq*.; hereinafter "HCL"); the Carpenter-Presley-Tanner Hazardous Substance Account Act (California Health & Safety Code section 25300 *et seq*.; hereinafter "HSA"), and in the regulations adopted and publications promulgated pursuant to them, or any other applicable Environmental Laws now in effect or enacted after the date of this Conservation Easement.

(5) The term "Environmental Laws" includes, without limitation, CERCLA, RCRA, HTA, HCL, HSA, and any other federal, state, local or administrative agency statute, code, ordinance, rule, regulation, order or requirement relating to pollution, protection of human health or

safety, the environment or Hazardous Materials. Grantor represents, warrants and covenants to Grantee and USFWS that activities on and use of the Property by Grantor, its agents, employees, invitees and contractors will comply with all Environmental Laws. Grantee represents, warrants and covenants to Grantor and USFWS that activities upon and use of the Property by Grantee, its agents, employees, invitees and contractors will comply with all Environmental Laws.

(k) Warranty. Grantor represents and warrants that Grantor is the sole owner of fee simple title to the Property; that the Property is not subject to any other conservation easement; and that there are no outstanding mortgages, liens, encumbrances or other interests in the Property (including, without limitation, water and mineral interests) that may conflict or are otherwise inconsistent with this Conservation Easement and which have not been expressly subordinated to this Conservation Easement by a written, recorded Subordination Agreement approved in writing by Grantee and USFWS.

(l) Additional Easements. Grantor shall not grant any additional easements, rights of way or other interests in the Property (other than a security interest that is expressly subordinated to this Conservation Easement), or grant, transfer, abandon, or relinquish (each a "Transfer") any mineral, air, or water right or any water associated with the Property, without first obtaining the written consent of Grantee and USFWS. Grantee or USFWS may withhold such consent if it determines that the proposed interest or transfer is inconsistent with the purposes of this Conservation Easement or will impair or interfere with the Conservation Values of the Property. This Section 14(l) shall not limit the provisions of Sections 2(f) and 4(o) nor prohibit transfer of a fee or leasehold interest in the Property that is subject to this Conservation Easement and complies with Section 12.

(m) Recording. Grantee shall record this Conservation Easement in the Official Records of San Luis Obispo County, California, and may re-record it at any time as Grantee deems necessary to preserve its rights in this Conservation Easement.

[Signature Page Follows]

IN WITNESS WHEREOF Grantor and Grantee have executed this Conservation Easement the day and year first above written.

GRANTOR:	GRANTEE:
BY: _____	BY: _____
NAME: _____ _____	NAME: _____
TITLE: _____	TITLE: _____

Approved as to form:

XXX
County of San Luis Obispo

STATE OF CALIFORNIA
COUNTY OF SAN LUIS OBISPO

On _____, before me, the undersigned, a Notary Public in and for said State, personally appeared _____ and _____, personally known to me to be the persons whose names are subscribed to the within instrument and acknowledged to me that they executed the same in their authorized capacities and that by their signature on the instrument the persons, or the entity upon behalf of which the persons acted, executed the instrument.

Witness my hand and official seal.

Notary Public in and for
said County and State

STATE OF CALIFORNIA

COUNTY OF SAN LUIS OBISPO

On _____, before me, the undersigned, a Notary Public in and for said State, personally appeared _____ and _____, personally known to me to be the persons whose names are subscribed to the within instrument and acknowledged to me that they executed the same in their authorized capacities and that by their signature on the instrument the persons, or the entity upon behalf of which the persons acted, executed the instrument.

Witness my hand and official seal.

Notary Public in and for
said County and State

Appendix J Cost Burden Analysis

This cost burden analysis provides a planning-level evaluation of the effects of the LOHCP habitat mitigation fee on the feasibility of new development in Los Osos. It identifies existing fees for five prototype projects (Section J.1), evaluates the cost burden based on the Plan's habitat mitigation fees (Section J.2), and then assesses the cost burden under the "Alternative 3: Greater Mitigation Requirement" (Greater Mitigation Alternative) in which mitigation requirements and the corresponding fees are assumed to be doubled (Section J.3).

While the analysis is designed to assess expected, generalized implications for new development, it is important to note that every development project faces unique and different conditions and the actual cost burdens that can be feasibly borne by new development will vary by project.

J.1 Development Prototypes and Existing Fees

The five prototypes selected for this analysis reflect the different types of development that are anticipated to be covered by the LOHCP based upon the existing land use designations and the covered activity eligibility criteria (Section 2.2). The prototypes include two types of single-family development (estate and standard), a multi-family apartment building, and two types of commercial development, retail and offices. More specifically, the prototypes are:

1. 5,000-square-foot, "estate" single-family home on a 20,000-square foot lot;
2. 1,850-square-foot, "standard" single-family home on a 5,000-square foot lot;
3. 950-square-foot multifamily unit (as part of a 25-unit multifamily building on one acre);
4. 10,000-square-foot single story retail building on a one-acre lot; and
5. 10,000-square-foot, single-story office building on one acre.

Table J-1 summarizes the existing capital facilities/ infrastructure fees that apply to these five prototypes in Los Osos. The fees include capital/ public facilities, water, and sewer fees charged by the County and relevant special districts. Capital facility, road/traffic, and school fees are charged on a per-unit and/or per-square-foot basis, while water and sewer fees are charged based on meter size and per parcel, respectively. For the purposes of this analysis, water capacity and connection charges reflect current fees charged by the Los Osos Community Service District based upon standard meter sizes for the various prototypes. Implementation of the recently adopted Basin Plan (County et al. 2015) may result in additional fees; however, the fee levels have not yet been determined and therefore are not included in this analysis. Sewer fees reflect newly established charges under the Los Osos Wastewater Project. The footnotes in Table J-1 identify additional assumptions associated with determining the existing fees.

Under the assumptions described above, existing capital facilities/ infrastructure fees for the "estate" single family home would about $50,800, existing fees for the "standard" single family home would be $43,600, existing fees for multifamily development would be $30,100 per unit, existing fees for new office development would be about $11,100 per 1,000 building square feet, and existing fees for new retail development would be $12,800 per 1,000 building square feet.

J.2 Cost Burden Analysis of the Required Habitat Mitigation Fees

Cost burden analysis considers the overall capital facilities/ infrastructure fee burden relative to development value for each development prototype. Fees are calculated as a percentage of the development value and compared to standard thresholds that allow for a general assessment of development feasibility. While these thresholds provide helpful planning-level guidance for assessing development feasibility under typical circumstances, detailed project-specific feasibility analysis is required to determine the specific feasibility implications of different cost additions for individual projects. The planning-level thresholds include:

1. For residential development, a cost burden ratio of over 20 percent results in a high probability of feasibility challenges, a ratio of 15 to 20 percent suggests potential feasibility challenges, and a ratio of below 15 percent suggests low probability of feasibility issues.
2. For commercial development, a cost burden ratio of over 10 percent results in a high probability of feasibility issues, a ratio of 5 to 10 percent suggests potential feasibility challenges, and a ratio of below 5 percent suggests lower probability of feasibility issues.

These thresholds, which have been developed based on the relationships between infrastructure and capital facilities costs and development value, do not include other development costs including land use and permit fees.

Table J-2 shows the cost burden analysis for each development prototype, including the following components:

3. **Development value**. Development values were estimated for each prototype based on available information about recent market transactions. All development prototypes reflect expected new development values with the exception of the multifamily development. Due to the limited market activity in apartment development, the apartment development value reflects two recent apartment building sales. As a result, the development value for the multifamily development may be underestimated.
4. **Cost/ Fees**. Total infrastructure/ capital facilities costs are shown for each development prototype with the capital facilities, water, and sewer fees (Table J-1). The proposed habitat mitigation fee for the LOHCP of approximately $0.89 per square foot or $38,688 per acre of disturbance (Section 7.3) was applied to the expected disturbance for each development prototype.[14] Disturbance envelopes were estimated to be 20,000 square feet for the single-family estate, 5,000 square feet for the standard single-family home, and one acre for the multifamily, office and the retail development prototypes.

Habitat mitigation fees for these projects are approximately $17,800 per unit for estate single-family development, $4,400 per unit for standard single family, and about $38,700 for the one acre of disturbance under the multi-family and commercial developments (Table J-2). As shown, the habitat mitigation fees represent between 0.9 percent and 1.9 percent of the estimated development value for the different development prototypes.

[14] The fees will be calculated to the nearest hundredth of a cent (Table 7-8); they are rounded to the nearest cent in the text for simplicity.

Taken together, the total capital facilities/ fee burden on single family estates is about 5.5 percent of development value, on standard single family is 9.6 percent, on the multi-family development is 25.3 percent, on the office development is 7.5 percent, and on the retail development is 8.4 percent. Based on the thresholds described above, this overall fee burden indicates that single-family residential, commercial retail, and commercial office development are unlikely to face feasibility challenges due to fees. The multifamily cost burden ratio is high, reflecting both the low development value in this analysis, but also real potential development feasibility challenges. Some projects might require additional investments in infrastructure and capital facilities than captured in these fee-based analyses, thus increasing their cost. The required habitat mitigation fee represents a real cost to new development though does not substantially alter the results of the threshold feasibility analysis.

J.3 Cost Burden Analysis of the Greater Mitigation Alternative

Table J-3 illustrates the cost burden analysis under the Greater Mitigation Alternative, in which mitigation requirements are doubled and the associated habitat mitigation fees are assumed to double to $1.78 per square foot of land disturbed, or $77,376 per disturbed acre). As shown, the resulting habitat mitigation fees for the development prototypes include $35,500 per estate single family unit, $8,900 per standard single-family unit, and $77,400 for the one acre of disturbance under the multifamily and commercial developments. The habitat mitigation fee level represents 2.8 percent of development value for the single-family estate prototype, 1.8 percent for the standard single-family prototype, 2.5 percent for the multifamily building prototype, and 3.9 percent for both the office and retail building prototypes.

Taken together, the total capital facilities/ fee burdens on the development prototypes under the Greater Mitigation Alternative are about 6.9 percent of single family estate value, 10.5 percent of standard single-family value, 26.6 percent of multi-family development value, 9.4 percent of office development value, and 10.3 percent of retail development value. The fees remain within typical feasible ranges for the single -family residential development prototypes. For commercial development, the mitigation fee increases push the commercial office development closer to the high probability of feasibility challenge benchmark of 10 percent, while the cost burden on retail development marginally exceeds the 10 percent benchmark. For multifamily development, the development feasibility challenges are further increased relative to the proposed mitigation fee scenario.

Table J-1: Existing Fees for Prototype Projects in Los Osos

Prototype Project	Basis	Govt	Admin	Sheriff	Park	Library	Fire	Roads[1]	Water[2]	Sewer [3]	School[4]	Capital Facilities	Water & Sewer	Total
Single-Family Residential Estate	Per Unit	$533	$111	$280	$2,303	$454	$1,994	$4,147	$2,584	$25,000	$13,440	**$23,262**	**$27,584**	**$50,846**
Single-Family Residential Standard	Per Unit	$533	$111	$280	$2,303	$454	$1,994	$4,147	$2,584	$25,000	$6,216	**$16,038**	**$27,584**	**$43,622**
Multifamily Residential	Per Unit	$406	$72	$213	$1,753	$345	$902	$2,546	$1,938	$18,750	$3,192	**$9,429**	**$20,688**	**$30,117**
Office[5]	per 1,000 sf	$719	$45	$378	-	$239	$902	$4,637	$1,119	$2,500	$540	**$7,460**	**$3,619**	**$11,079**
Retail[5]	per 1,000 sf	$432	$34	$226	-	$143	$902	$7,546	$517	$2,500	$540	**$9823**	**$3,017**	**$12,840**

[1] The road fee is derived using a fee-per-peak-hour trip. Peak-hour trip by use type is calculated by the Institute of Transportation Engineers. The retail fee shown above reflects the trips per unit found for shopping centers, which best reflects the existing retail in Los Osos. Office reflects general, non-medical office.

[2] Fee level refers to the areas served by the Los Osos Community Services District (LOCSD), which primarily serves the Baywood Park neighborhood (Figure 2-6). Golden State Water Company, which services much of the remainder of the Los Osos area, does not charge for either connection or installation. For non-residential development, a 1.5"meter installation is assumed for office and a 1" meter is assumed for retail. In addition, separate 1" meters are often required for landscaping for commercial properties, which is assumed for this analysis. Note that no new development may occur in Los Osos without implementation of the recently adopted Basin Plan. Implementation of the Basin Plan will likely result in additional fees, which have not yet been determined and therefore are not included in this analysis.

[3] Under the Los Osos Wastewater Project, the newly established sewer fees are $25,000 per single family unit or any commercial building and $18,750 per unit for multifamily (J. Waddell, pers. comm. 2016). Assumes a commercial building prototype of 10,000 square foot, which translates to $2,500 per 1,000 square feet.

[4] School fees for both residential and non-residential development are based on building square footage. For this analysis, it is assumed that an estate single family home is 4,000 square feet, a standard single-family home is 1,850 square feet and a multifamily unit is approximately 950 square feet. Both office and commercial uses are shown per 1,000 square feet.

[5] Fees are based upon a 10,000-sf commercial building and are shown on a per 1,000 square foot basis. Because minimum fees apply for certain categories and estimates values, different fees would be applied to different sized buildings.

Sources: San Luis Obispo County Planning and Building Department; Los Osos Community Services District; Golden Gate Water; Wallace Group; San Luis Coastal Unified School District; Economic & Planning Systems, Inc.

Table J-2:Cost Burden Analysis under Required Habitat Mitigation Fees

	Per Unit		Per Acre		
Fees and Values	**Single-Family Estate (20,000 sf Disturbance)**	**Single-Family Standard (5,000 sf Disturbance)**	**Multifamily[4] (25 Units)**	**Commercial Office (10,000 sf)**	**Commercial Retail[5] (10,000 sf)**
Developer Value	$1,250,000	$500,000	$3,125,000	$2,000,000	$2,000,000
HCP Fee [1]	$17,763	$4,441	$38,688	$38,688	$38,688
As % of Value	1.4%	0.9%	1.2%	1.9%	1.9%
Road & Capital Facilities Fees[2]	$23,262	$16,038	$235,718	$74,599	$98,228
As % of Value	1.9%	3.2%	7.5%	3.7%	4.9%
Water & Sewer Fees [3]	$27,584	$27,584	$517,200	$36,189	$30,168
As % of Value	2.2%	5.5%	16.6%	1.8%	1.5%
Total Fees	**$68,609**	**$48,063**	**$791,606**	**$149,476**	**$167,084**
As % of Value	**5.5%**	**9.6%**	**25.3%**	**7.5%**	**8.4%**

[1] Calculated on a per-acre basis. HCP fee assumed to be $38,688 per acre and approximately $0.89 per square foot (sf).

[2] Fee total includes public facility fees for government, administration, sheriff, parks, libraries, fire, schools, as well as a road fee based on peak hour trips (Table J-1).

[3] Based on interviews with representatives from Golden State Water, the Los Osos Community Services District, the Wallace Group (engineering consultant to LOCSD), and John Waddell with San Luis Obispo County's Los Osos Wastewater Project. Water fees reflect current LOCSD fee schedule for new development in the Baywood Park neighborhood. Note that no new development may occur in Los Osos without implementation of the recently adopted Basin Plan. Implementation of the Basin Plan will likely result in additional fees, which have not yet been determined and therefore are not included in this analysis.

[4] Valuation of multifamily prototype based on two recent sales in Los Osos, adjusted to represent a one-acre property. Valuation is likely below market value for new multifamily development.

[5] Assumed to be a retail shopping center.

Sources: San Luis Obispo County; Los Osos Community Services District; Golden Gate Water; Wallace Group; San Luis Coastal Unified School District; Economic & Planning Systems, Inc.

Table J-3:Cost Burden Analysis under the Greater Mitigation Alternative

	Per Unit		Per Acre		
Fees and Values	**Single-Family Estate (20,000 sf Disturbance)**	**Single-Family Standard (5,000 sf Disturbance)**	**Multifamily[4] (25 Units)**	**Commercial Office (10,000 sf)**	**Commercial Retail[5] (10,000 sf)**
Developer Value	$1,250,000	$500,000	$3,125,000	$2,000,000	$2,000,000
HCP Fee [1]	$35,526	$8,882	$77,376	$77,376	$77,376
As % of Value	2.8%	1.8%	2.5%	3.9%	3.9%
Road & Capital Facilities Fees[2]	$23,262	$16,038	$235,718	$74,599	$98,228
As % of Value	1.9%	3.2%	7.5%	3.7%	4.9%
Water & Sewer Fees [3]	$27,584	$27,584	$517,200	$36,189	$30,168
As % of Value	2.2%	5.5%	16.6%	1.8%	1.5%
Total Fees	**$86,372**	**$52,504**	**$830,294**	**$188,164**	**$205,772**
As % of Value	**6.9%**	**10.5%**	**26.6%**	**9.4%**	**10.3%**

[1] Calculated on a per acre basis. HCP fee assumed to be $38,688 per acre and approximately $0.89 per square foot (sf).

[2] Fee total includes public facility fees for government, administration, sheriff, parks, libraries, fire, schools, as well as a road fee based on peak hour trips (Table J-1).

[3] Based on interviews with representatives from Golden State Water, the Los Osos Community Services District, the Wallace Group (engineering consultant to LOCSD), and John Waddell with San Luis Obispo County's Los Osos Wastewater Project. Water fees reflect current LOCSD fee schedule for new development in the Baywood Park neighborhood. Note that no new development may occur in Los Osos without implementation of the recently adopted Basin Plan. Implementation of the Basin Plan will likely result in additional fees, which have not yet been determined and therefore are not included in this analysis s.

[4] Valuation of multifamily prototype based on two recent sales in Los Osos, adjusted to represent a one-acre property. Valuation is likely below market value for new multifamily development.

[5] Assumed to be a retail shopping center.

Sources: San Luis Obispo County; Los Osos Community Services District; Golden Gate Water; Wallace Group; San Luis Coastal Unified School District; Economic & Planning Systems, Inc.

Appendix K Memorandum of Understanding

MEMORANDUM OF UNDERSTANDING
BETWEEN THE
CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE
AND THE COUNTY OF SAN LUIS OBISPO

This Memorandum of Understanding (MOU) is entered into by and between the California Department of Fish and Wildlife (Department) and the County of San Luis Obispo (County) and sets forth the terms by which the County may access and undertake certain habitat enhancement, restoration, monitoring, and management activities (Mitigation) actions within the Morro Dunes Ecological Reserve (Property).

RECITALS

A. The County proposes to utilize the Property for Mitigation described in the Los Osos Habitat Conservation Plan (HCP) to mitigate take/impacts resulting from HCP covered activities (Project) to Morro shoulderband snail (*Helminthoglypta walkeriana*), Morro manzanita (*Arctostaphylos morroensis)*, Indian Knob mountainbalm (*Eriodictyon altissimum*), and Morro Bay kangaroo rat (*Dipodomys heermanni morroensis*), which are species listed pursuant to the federal Endangered Species Act.

B. The Department is owner in fee title to the Property in the community of Los Osos, within which all portions of the Property to be utilized by the County for Mitigation are included. The Property, which is composed of the Pecho and Bayview Units, is depicted on Exhibit A.

C. The Property is designated as an ecological reserve in California Code of Regulations, title 14, section 630, subdivision (b)(82), and is maintained for the primary purpose of developing a statewide program for protection of rare, threatened, or endangered native plants, wildlife, aquatic organisms, and specialized terrestrial or aquatic habitat types. As specified in California Code of Regulations, title 14, sections 550 and 630, certain uses within the Property are prohibited, including the removal of plants, bike riding, horseback riding, off-highway vehicle use, and camping. The County is dedicated to supplementing existing State resources to minimize the occurrence of these prohibited activities. Additional measures will include fencing, signage, physical barriers, and public outreach.

D. The Property is in an unimproved natural condition and possesses wildlife and habitat values of great importance to the Department and the people of the State of California. The Property provides high quality habitat for Morro shoulderband snail, Morro manzanita, Indian Knob mountainbalm and possibly Morro Bay kangaroo rat. The Property is also comprised of two sensitive vegetation communities – central maritime chaparral and coastal dune scrub. In addition, the Property supports habitat that is suitable for other wildlife species of special concern including California legless lizard (*Anniella pulchra*), Blainville's horned lizard (*Phyrnosoma blainvillii*), and Morro Bay blue butterfly (*Icaricia icarioides moroensis*).

E. The County wishes to enter upon the Property to conduct the activities necessary to mitigate for a portion of impacts related to the Project. The Project includes, but may not be limited to, the development of up to 701 vacant parcels in and adjacent to the community of Los Osos; capital improvement projects; facility operation and maintenance activities, conducted by the County, Los Osos Community Services District and two private water purveyors; road and trail creation and maintenance; park expansion and creation; and water system upgrades, operation, and maintenance.

F. The Department desires to accommodate the County's requested special use of the Property for the Purposes described in Section I of this MOU to the extent the Mitigation is compatible with the purposes and regulation of the Property and so long as the County bears the full cost of the Mitigation and associated long-term management and monitoring.

I. Purposes

A. The purpose of this MOU is to establish the terms and conditions upon which the Department would authorize the County to undertake Mitigation on the Property (Purposes). The Department by this MOU seeks to ensure the Mitigation:

B. Is consistent and not in conflict with the current and future uses of the Property, including the protection of rare, threatened, or endangered native plants, wildlife, aquatic organisms, and specialized terrestrial or aquatic habitat types and any encumbrances, easements, or public use values;

C. is consistent with the purposes for which the Property was acquired, the funding sourced used for acquisition, and the regulations for the Property, including California Code of Regulations, title 14, sections 550, 550.5, and 630;

D. will maintain or enhance the current ecological and public use values of the Property; and

E. will not preclude, diminish, or interfere with Property encumbrances or management of the Property, including the 1982 management plan for the Pecho Unit attached as Exhibit B.

II. TERM

A. Term. This MOU will become effective as of the date of last signature. It will remain in effect through December 31, 2023, unless terminated as provided for in this Section. This MOU may be extended by written mutual agreement for subsequent terms not to exceed five years each. The Parties to this MOU shall finalize a draft MOU for renewal on or before 90 days prior to the date of expiration of this MOU. Should the Parties fail to renew the MOU, and the MOU terminates upon the expiration date of this MOU, the County will remain responsible for all costs of the Mitigation under section III.F. and any requirement to reimburse the Department for restoration under section V.C.

B. Termination of MOU. The Department has the right to terminate this MOU in its sole discretion upon giving 90 days written notice of termination to the County as provided in Section V.I. below. If the Department or the County determines that a violation of a term of this MOU has occurred or is threatened, the Department or the County will give written notice of the violation to the other party as provided in Section V.I. below. The other party will have 30 days, or a longer period agreeable to the County and the Department, to cure the violation. If the violation is not timely cured, the notifying party may terminate the MOU by written notice.

III. HABITAT MANAGEMENT AND MONITORING

A. Mitigation Description. The Mitigation consists of the closure and restoration of trails, the control of nonnative plant species, long-term management, and monitoring as will be more fully described in a Mitigation Plan for the Property which will be developed consistent with subsection III.B., immediately below. The Mitigation will enhance and restore habitat with the goal of supporting populations of Morro shoulderband snail, Morro manzanita, Indian Knob mountainbalm, and Morro Bay kangaroo rat.

B. Mitigation Plan Development. The County, at its sole expense, will develop and provide the Department a draft Mitigation Plan for the Department's review and approval. The Mitigation Plan will identify individual Mitigation actions or distinct projects (each a Mitigation Action) that can be undertaken independently but contribute to the overall Mitigation. The Mitigation Plan must describe the specific management and/or restoration actions that will be implemented and the monitoring that will be used to evaluate their effectiveness, consistent with the Adaptive Management and Monitoring Plan (AMMP) for the Los Osos HCP Preserve System, which will be developed as outlined in Section 5.3.3 of the HCP

C. Department Approval of Mitigation Plan. The Mitigation Plan must be approved in writing by the Department prior to the Department's issuance of a Special Use Permit (SUP) to the County and the County's entry onto the Property to implement the Mitigation. The Department may authorize the County to enter the Property for investigative or planning efforts necessary to the development of the Mitigation Plan or to secure any required permits for the Mitigation.

D. Documentation. The County will provide the Department adequate documentation, subject to the review and approval of the Department, that the Mitigation will enhance current ecological values and maintain existing allowable public usesof the Property.

E. Property Modifications. The County must take only those Mitigation Actions on the Property necessary to implement the Mitigation as described in the Mitigation Plan, and as authorized under its Special Use Permit, and agrees to remove any and all facilities or other improvements that are not essential to the Mitigation Plan following completion of a Mitigation Action.

F. Mitigation Implementation, Management, and Monitoring. The County will be fully responsible for the costs, implementation, management, and monitoring of Mitigation.

The County will designate an Implementing Entity acceptable to the Department, such as a land trust or conservancy, to implement, manage, and monitor the Mitigation.

G. Long-term Funding. The County must provide for the full cost of implementation of the Mitigation Plan on the Property, including all capital improvements, restoration, enhancement, monitoring, long-term management and maintenance, and reimbursement for any Department staff time, including enforcement. Any SUP issued for a Mitigation Action will ensure that the County provides for such costs.

H. Damage to the Mitigation Beyond the Department's Control. The Department will not be liable for or required to restore any damage to the Mitigation resulting from (i) any natural cause beyond the Department's control, including, without limitation, fire not caused by the Department, flood, storm, and earth movement, or any prudent action taken by the Department under emergency conditions to prevent, abate, or mitigate significant injury to the Property resulting from such causes; or (ii) acts by the County or third parties not under the control of the Department.

IV. SPECIAL USE PERMIT

A. SUP Required. The County will apply for a Type 3 SUP for the Mitigation pursuant to California Code of Regulations, title 14, section 550.5, subdivision (d). The County and the Department recognize that separate Type 3 SUPs may be required for Mitigation Actions as appropriate given concerns related to implementation timing, location, and other specifics regarding the Mitigation that will be described in the Mitigation Plan.

B. SUP Fee. The County will pay the SUP fee, if applicable, specified at California Code of Regulations, title 14, section 730.

C. Release, Waiver, and Indemnity. To the maximum extent permitted by law, the County as a condition of the SUP will agree to waive all claims against the Department, its officers, agents, and employees for loss or damage caused by, arising out of, or in any way connected with the Mitigation or exercise of the SUP, and the County will agree to protect, save harmless, indemnify, and defend the Department, its officers, agents, employees, and contractors from any and all loss, damage, or liability, which may be suffered or incurred by the Department, its officers, agents, employees, or contractors, caused by, arising out of, or in any way connected with the exercise by the County of the rights granted in the SUP or for the Mitigation, except those arising out of the sole active negligence or willful misconduct of the Department. The County will further cause such indemnification and waiver of claims in favor of the Department to be inserted in each contract that the County executes for the provision of services in connection with the Mitigation.

D. Additional SUP Terms and Conditions. The Department may incorporate any or all of the terms and conditions of this MOU in the SUP. The Department may include additional terms and conditions in the SUP necessary to protect and maintain the Property in accordance with its purposes and corresponding regulations.

V. GENERAL TERMS AND CONDITIONS

A. Compliance with Laws. The County will be responsible for California Environmental Quality Act compliance and must obtain and maintain all state, federal, and local permits, licenses and approvals applicable to the Project. The County must comply with all current laws, ordinances, orders, rules, regulations and permits with respect to its use of the Properties pursuant to this Agreement.

B. As-Is Condition and Assumption of Risk. The County will accept the condition of the Property as-is with any and all defects or hazards, whether or not known or suspected, and acknowledges that the Department is under no obligation to provide any additional preparations or improvements to the Property prior to use by the County, and the County's use of the Property is entirely at its own risk. Prior to commencing a Mitigation Action on the Property, the County, or its Implementing Entity, and the Department shall do a walk-through of each area where the Mitigation Action will occur and document, in writing and/or pictures, any existing damage, defects or hazards in the work area (Baseline Condition) to ensure that both parties acknowledge the existing, baseline conditions of the area prior to mitigation work.

C. Restoration of Properties. If the County or its officers, employees, agents or contractors cause any damage to the Baseline Condition of the Property in connection with the implementation of this MOU or the Mitigation, the County must notify the Department of the damage within 48 hours and then fully restore the Property to its Baseline Condition in accordance with a restoration plan approved by the Department. If the County has not provided the Department with a restoration plan and a schedule for the restoration work acceptable to the Department within 60 calendar days from the date the Department received notice from the County, or from the date the Department notifies the County that the Baseline Condition was damaged, the Department will have the right, but not the obligation, to perform the necessary restoration and the County will be responsible for reimbursing the Department for any costs of such restoration. Upon receipt of the notice of restoration costs, the County will promptly reimburse the Department for the restoration costs incurred, plus an additional amount equal to the Department's then current rate for administrative overhead. The demand for payment by the Department will be prima facie evidence that the expense incurred was necessary and reasonable and that such expense was incurred by the Department on behalf of the County.

D. Advance Notification. Following receipt of its SUP, the County will give the Department 60 days advance notice of its anticipated Mitigation start, timing, and completion. The Department and the County will schedule the walk-through to establish the Baseline Condition at least 30 days prior to the start of any Mitigation Action. Any proposed changes to the schedule will be communicated promptly. Such notice shall be via email or telephone. The County will notify: California Department of Fish and Wildlife via email or telephone to the person specified in subsection I below.

E. No Grant. Nothing in this MOU will be construed as a grant of title or any interest in the Property.

F. No Admission of Liability. Nothing in this MOU or the SUP will be construed as an admission of liability by the Department of its responsibility as to any Hazardous Materials which may be found on the Property, nor, except as expressly provided in the SUP, as an admission of liability by the County as to any Hazardous Materials which may be found on the Property.

G. Access to Property. The County will have the right to use and access the Property for Mitigation as specified in the Mitigation Plan, AMMP, and SUP, but may be subject to reasonable use restrictions. The Department will continue to have the right to use and access the Property in its entirety and to grant use and access rights to third parties, where such use or access does not interfere with Mitigation.

H. Entire Understanding. This MOU constitutes the entire and integrated understanding of the County and the Department with respect to Mitigation on the Property by the County and may not be altered, modified or amended except in writing with the approval of the County and the Department.

I. Notices. All notices given in conjunction with this MOU, except the Advance Notice for entry specified in Section V.C., must be written, and will be effective upon personal delivery to the other party or, if by mail, three days after deposit in the U.S. Mail, first class postage prepaid to the applicable address stated below, or to such other address as the party may designate by written notice:

DEPARTMENT	[Name] [Address] [Email] [Phone] With copies to: [if any]
County	[Name] [Address] [Email] [Phone] With copies to: [if any]

IN WITNESS WHEREOF, the parties have executed this MOU as of the date of last signature below.

COUNTY
County of San Luis Obispo

_____ _____
By: Trevor Keith Date
Director
County of San Luis Obispo
Department of Planning and Building

DEPARTMENT
California Department of Fish and Wildlife

_____ _____
By: Julie Vance Date
Regional Manager
Central Region

_____ _____
By: Sheree Christensen Date
Assistant Chief
North Coast Law Enforcement District