MENIFEE RV

90-DAY WET AND DRY SEASON VERNAL POOL BRANCHIOPOD SURVEY REPORT 2020-2021

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1. Summary

Huffman Environmental, LLC. (Huffman Environmental) and L&L Environmental were contracted to conduct United States Fish and Wildlife (USFWS) Protocol 2020-2021 dry and wet season, vernal pool branchiopod (herein fairy shrimp) surveys for the Menifee RV Project (herein Project) in Riverside County, California. This project site supports eight identified ponding locations capable of supporting branchiopods. Approximately 155 dry season samples were also collected from eight features and processed for the presence of branchiopod cysts. During dry season sampling, one feature (M-07) came back positive for cysts and cultures confirmed the presence of Lindahl's fairy shrimp (*Branchinecta lindahli*). During wet season sampling, one feature (M-03) contained fairy shrimp and vouchered the species, *B. lindahli*. No federally-listed, Endangered or Threatened, species were detected in the processing of dry samples.

2. Introduction

2.1 *Project Location*

L&L Environmental was contracted during 2020 to provide environmental services for the Project, including dry and wet season fairy shrimp sampling in any features that pond long enough to support their life cycle. The Project is a 21.38-acre site located in Riverside County, California. The site is located within the city of Menifee, southeast of the Grand Ave and Briggs Road junction. The site falls within the Romoland, United States Geological Survey (USGS) 7.5-minute series quadrangle map (Figure 1).

2.2 *Historical Occurrences*

There are currently no recorded sensitive fairy shrimp within the Project boundaries per the California Natural Native Database (CNDDB) and United States Fish and Wildlife Services (USFWS) National GIS Database. The nearest recorded observation identified Riverside fairy shrimp (*Streptocephalus woottoni*) occurred within the city of Menifee's boundaries on a residential community development, approximately 1.67 miles south of the project site (CDFG 2020).

2.3 *Natural History*

USFWS currently has listed six branchiopod species as Endangered or Threatened: Conservancy fairy shrimp (*Branchinecta conservatio*), longhorn fairy shrimp (*Branchinecta longiantenna*), vernal pool tadpole shrimp (*Lepidurus packardi*), vernal pool fairy shrimp (*Branchinecta lynchi*), Riverside fairy shrimp (*Streptocephalus woottoni*), and the San Diego fairy shrimp (*Branchinecta sandiegonensis*). These species collectively are commonly referred to as the "Listed Large Brachiopods" These species have all been listed by USFWS primarily due to the acceleration of human expansion and urban construction in vernal pool habitat. Additionally, vernal pool hydrology has been impacted through the alteration of water flow by a variety of infrastructure development, such as roads, trails, canals and so forth (USFWS Oregon 2020).

Vernal pools are formed from restrictive substrate layers that occur just under the ground surface, reducing water percolation. Once these layers within the subsoil become inundated, the basin will begin to fill. This allows for ponding to occur, creating habitat for fairy shrimp (CDFW 1998). Specific plant species have become endemic to these features and can be used to aid in the identification of vernal pools.

Habitat for fairy shrimp can naturally form or be created by other artificial, topographic features mimicking the aquatic habitat of the natural vernal pools (Sutter 1998). These vernal pool mimics may include such anthropogenic features as tire ruts, agricultural and construction ditches, cement culverts and so forth.

All of the above mentioned brachiopods have limited life spans for no longer than 150 days and can be completed in as little as 20 days with a relatively quick reproduction rate between 20 to 60 days (USFWS 1994). These species will deposit their embryos, enveloped by a protective shell known as cysts, into the substrate. These cysts protect the embryos during the dry seasons and are exposed to a variety of elements. Cysts have known to be viable for up to 15 years (Eriksen and Belk 1999). These cysts will break dormancy after environmental stimuli, such as precipitation, and restart the life cycle given the appropriate conditions.

3. Methods

3.1 *Habitat Assessment*

Huffman Environmental conducted a project wide assessment to determine habitat suitability for supporting fairy shrimp in September, 2020. The site consists of a combination of ornamental, disturbed and non-native grass habitat from previous

construction impacts via dozer ripping and grading. In addition to visual evidence from historical, aerial imagery, physical survey results identified eight features throughout the site with evidence of periodic ponding to support fairy shrimp habitat.

3.2 Wet Season Survey Methodology

Survey methodology was conducted in accordance with the USFWS *Survey Guidelines for Listed Large Branchiopods*, revised November 13, 2017, for wet season vernal pool branchiopod surveys. Per the Guidelines, the wet season generally occurs in California between October and June. Surveys were conducted November 14 2020 to March 9, 2021. Beginning on November 14, 2020, each feature was sampled at seven-day intervals until dry, and sampling was reinitiated within seven days of the feature becoming inundated again. Survey visits discontinued after the features went dry for the season.

Huffman Environmental biologist, Garrett Huffman (TE-20186A-3.1), conducted all wet season vernal pool sampling on the project site. Data collected for the feature included average and maximum water depth, water and air temperature, length, width, degree and form of disturbance, presence of fairy shrimp, and observations of any other benthic macroinvertebrates. The feature was sampled using a standard 50-micron hand-held net to sweep through the water and examine invertebrates. Within Menifee RV project boundaries, 8 locations (referred to collectively as "M" pools 1 through 8) were identified to be capable of ponding throughout the site. Common species, Lindahl's fairy shrimp (*Branchinecta lindahli*), was observed during one visit of sampling at pool M-3 on February 2nd, 2021. Vouchering of the species was conducted and delivered the LA History Museum per USFWS Protocol Guidelines.

3.3 Dry Season Survey Methodology

Dry season soil samples were collected in September, 2020 from the Menifee RV Project basins. Quantity of sample collections is determined by applying USFWS *Survey Guidelines for Listed Large Branchiopods* (USFWS 2017) formula by calculating approximate feature size in square meters. Five Project features were estimated to be in between 25 - 235 square meters (0.05 acres) requiring a minimum of 25 collected soil samples at a volume of 50 - 100 milliliters each. Three Project features were estimated to be in between 2.5 - 24 square meters (0.005 acres) requiring a minimum of 10 collected soil samples at a volume of 50 - 100 milliliters each. Each sample was

collected from the lowest topographic areas within the pool to maximize the detection of cysts, if present.

Dry sample collections were conducted by biologist Garrett Huffman and dry sample processing conducted by biologist, Chuck Black (TE-835549-7). All data compiled during dry sample processing can be reviewed at Appendix B.

3.4 Soil Processing for Cyst Presence

Samples were hydrated for approximately 1-12 hours in tap water, then washed through a set of sieves. Material was passed through a Number 45 (.0139") USA Standard Testing Sieve, A.S.T.M.E.-11 specification and caught on a Number 70 (.0083") Sieve. Filtered material was then rinsed into a container with approximately 50 millimeters of a saturated brine solution to float organic material, including fairy shrimp cysts. The material floating on the brine was decanted onto a paper filter on a filter funnel, and water was removed through the filter paper by vacuum suction. A 6.3-570x power Olympus SZX9 Zoom Stereo Microscope was used to examine the remaining material. Distinctive fairy shrimp cysts, if present, were individually counted (if less than approximately 50) or estimated (for larger numbers) by examining ¼ or ½ subsections of the filter and multiplying the subset by the appropriate factor. The presence and numbers of ostracod shells and cladoceran ephippia were also noted in samples.

3.5 Cyst Culturing

Individual samples were combined by pool number and hydrated in approximately 500 ml of Arrowhead Mountain Spring water. Plastic culture tubs were placed in a shady location in a San Diego outdoor location (night low temperatures in the low to mid 60's, daily highs in the low 70's to high 80s). Two days after hydration cultures were fed with several ml of a yeast culture produced by dissolving a gram of table sugar and a gram of instant dry yeast in 50 ml 95 F degree filtered water. Water was added daily to tubs to replace water lost to evaporation. Mature shrimp were removed periodically from each culture as they became large enough to identify and examined under an Olympus Zoom dissecting microscope.

4. Results

During the 2020-2021 wet season, only one feature, M-03, of the previously identified eight features were indundated adequately with water for a duration to support the hatching and maturity of fairy shrimp. Per USFWS Protocol, pond checks were conducted on all features 24 hours after recording precipitation events suitable enough to create pooling. Features dried within the first week on all visits with the exception of pool "M-03," which ponded for a two week period before becoming dry. Pool M-03 contained the common, Lindahl's fairy shrimp (*Branchinecta lindahli*). Cysts were not detected in pool M-03 during dry season collections. Cysts were detected in feature M-07 for *B. lindahli*, but the feature did not at any time pool for a duration that allowed the hatching of cysts during the wet season.

During the 2020 dry season, 155 soil samples from the Project features were processed with 44 *Branchinecta* cysts detected within one of the eight features, M-07. Ostracod shells and cladoceran ephippia were found in low to moderate numbers within feature M-08. *Branchinecta* cyst culturing produced nauplii in outside tub two days after hydration. Five fairy shrimp were counted during maturation producing three male and two female individuals. All were identified as Lindahl's fairy shrimp (*Branchinecta lindahli*).

Table 1: Wet Sample Processing Results

Wet FS Sampling (x = pool inundated)								
	M-01	M-02	M-03	M-04	M-05	M-06	M-07	M-08
14-Nov	dry	dry	dry	dry	dry	dry	dry	dry
4-Jan	dry	dry	dry	dry	dry	dry	dry	dry
11-Jan	dry	dry	dry	dry	dry	dry	dry	dry
18-Jan	dry	dry	dry	dry	dry	dry	dry	dry
26-Jan	dry	dry	x	dry	dry	dry	dry	dry
2-Feb	dry	dry	x	dry	dry	dry	dry	dry
9-Feb	dry	dry	dry	dry	dry	dry	dry	dry

9-Mar	dry	dry	dry	dry	dry	dry	dry	dry

Table 2: Dry Sample Processing Results

		Numbers per sample		Numbers per liter		*Branchinecta lindahli* identified males:females
Pool	Numbers of 50 ml samples	Branchinecta cysts	Ostrocods	Branchinecta cysts	Ostrocods	
M-01	25	*				
M-02	10					
M-03	25					
M-04	25					
M-05	10					
M-06	25					
M-07	10	2,4,3,1,1,4,3,2,2		44.0		3:2
M-08	25		5,4,6,5,1,5,3,10, 2,3,1		37.6	

5. Conclusion

2020/2021 wet and dry season sampling detected the presence of the common, Lindahl's fairy shrimp (*Branchinecta lindahli*). This was verified through the culturing of cysts during the dry season and vouchering of fairy shrimp during the wet season. No federally-listed, Endangered or Threatened, species were observed during either the wet and dry season surveying. These survey results fulfill both wet and dry season requirements to meet USFWS criteria for a complete survey.

6. Certification

All biologists working under Huffman Environmental for the 2020 fairy shrimp, wet and dry season Menifee RV Project were permitted to survey for this species under Section 10(a)(1)(A) of the ESA.

I certify that the information in this report and attached figures completely and accurately represent the work of the individual permittee.

Please feel free to contact me at (623) 238-1545 or garrett@huffmanenvironmental.com if you have any questions regarding the contents of this report.

Cordially,

Garrett Huffman

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7. Citations

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Figure 1: Project Location
Fairy Shrimp Wet & Dry Season Surveys

Menifee RV Project

2021

Coordinate System: NAD 1983 StatePlane California VI FIPS 0406 Feet

N

0 0.25 0.5 Mi

0 0.47 0.95 Km

Figure 2: Pool Locations
Fairy Shrimp Wet and Dry Season Surveys

Menifee RV Project

2021

Attachment A

Site Photos

Photo 1: Northwest view of basin feature M-01 bordered by block walls.

Photo 2: Gradual sloping feature M-02 with tamarisk in the center

Photo 3: Western view of M-03 feature that contained *B. lindahli*

Photo 4: Disturbed feature M-04 with evidence of tire tracks

Photo 5: View of M-05 feature and tire tracks.

Photo 6: Southeastern view of M-07 and debris scattered. This basin is positive for fairy shrimp cysts.

Photo 7: Wide, southeastern view of basin M-08

Attachment B

Dry Season Data and Notes

Processing of Dry Samples for the Presence of Fairy Shrimp Cysts and Culturing of Cysts for Species Determination at Menifee RV Project Site

18 October 2020

Chuck Black
Ecological Restoration Service
San Diego, CA 92103
(619) 944-1964

10(a)(1)(A) permit
TE835549-7
Good through April, 2021

Introduction

Ecological Restoration Service was contracted in September, 2020 by Garrett Huffman of Huffman Environmental, Julian, CA, for processing of dry samples for the determination of the presence of fairy shrimp cysts, and for culturing of *Branchinecta* cysts for identification to the species level of any cysts found for dry samples from project site Menifee RV.

Soil Processing for Cyst Presence

Methods

Samples were processed by Charles Black of Ecological Restoration Service, who is authorized by the U.S. fish and Wildlife Service to process dry samples for the presence of fairy shrimp cysts and to culture cysts to identify to species level as special conditions of his 10(a)(1)(A) permit. Samples were hydrated for approximately 1-12 hours in tap water, then washed through a set of sieves. Material passing through a Number 45 (.0139") USA Standard Testing Sieve, A.S.T.M.E.-11 specification and caught on a Number 70 (.0083") Sieve was rinsed into a container with approximately 50 ml of a saturated brine solution to float organic material, including fairy shrimp cysts. The material floating on the brine was decanted onto a paper filter on a filter funnel, and water was removed through the filter paper by vacuum suction. The material left on the paper was examined under a 6.3-57x power Olympus SZX9 Zoom Stereo Microscope. Distinctive fairy shrimp cysts, if present, were individually counted (if less than approximately 50) or estimated (for larger numbers) by examining ¼ or ½ subsections of the filter and multiplying the subset by the appropriate factor. The presences and numbers of ostracod shells were also noted in samples.

Results

Branchinecta cysts were found in low to moderate numbers in one basin at the Menifee project. Ostracod shells were found in low numbers in one of the basins' samples. No cladoceran ephippi were found in any of the basins.

Cyst Culturing

Methods

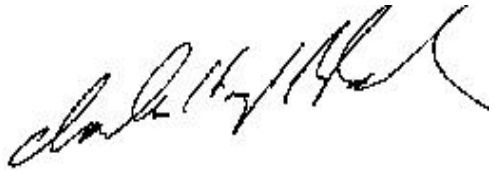
Individual samples were combined by pool number and hydrated in approximately 500 ml of Arrowhead Mountain Spring water. Plastic culture tubs were placed in a shady location in a San Diego outdoor location (night low temperatures in the low to mid 60's, daily highs in the low 70's to high 80s). Two days after hydration cultures were fed with several ml of a yeast culture produced by dissolving a gram of table sugar and a gram of instant dry yeast in 50 ml 95 F degree filtered water. Fairy shrimp were removed as they became mature and identified to species.

Results

Fairy shrimp nauplii were observed 2 days after hydration. Hatching of cysts at minimum temperatures in the mid-60s indicates that the species present on this site is *Branchinecta lindahli*, Lindahl's fair shrimp, since the alternate possibility species*, Branchinecta sandiegonensis*, San Diego fairy shrimp, does not hatch well at temperatures above 55 degrees F.

Fairy shrimp hatched and survived to maturity in one basin from the Menifee site. All of the fairy shrimp identified were Lindahl's fairy shrimp, *Branchinecta lindahli.*

I certify that the information in this survey report and attached exhibits fully and accurately represent my work.



Chuck Black