A.26 Longhorn Fairy Shrimp (*Branchinecta longiantenna*)

A.26.1 Legal Status

The longhorn fairy shrimp (*Branchinecta longiantenna*) was federally listed as endangered by the U.S. Fish and Wildlife Service (USFWS) on September 19, 1994 (59 FR 48136). On October 9, 2007, the USFWS published a 5-year review recommending that the species remain listed as endangered (USFWS 2007). Revised critical habitat was designated on February 10, 2006 (71 FR 7118) and species by unit designations were published for Contra Costa, Alameda, Merced, and San Luis Obispo Counties on February 10, 2006 (71 FR 7118). This species is covered by the December 15, 2005, Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon (USFWS 2005).

The longhorn fairy shrimp has no state regulatory status.

A.26.2 Species Distribution and Status

Range and Status

The historical distribution of the longhorn fairy shrimp is not known, but probably did not extend into the northern portion of the Central Valley or into southern California (USFWS 2005, 2007). Currently, populations are known from Concord in Contra Costa County in the north to Soda Lake in San Luis Obispo County in the south (Figure A.26.1), including populations in Alameda and Merced Counties (USFWS 2007). The Contra Costa and Alameda County populations are located within the Livermore Vernal Pool Region while known populations in Merced County are at the Kesterson National Wildlife Refuge and in a roadside ditch just north of Los Banos in the San Joaquin Vernal Pool Region (USFWS 2005, 2007). Those in San Luis Obispo County are adjacent to Soda Lake in the Carrizo Vernal Pool Region (both immediately outside and within the Carrizo Plain National Monument). Occurrences are rare and highly disjunct with specific pool characteristics largely unknown (USFWS 2005, 2007). The Altamont Pass subunits of the species (Contra Costa and Alameda Counties) occur within clear-water depression pools in sandstone outcrops (Eng et al. 1990, Ericksen and Belk 1999, CNDDB 2008).

Distribution and Status in the Planning Area

The species is not known to occur in the BDCP Planning Area (Figure A.26.2) (CNDDB 2008). The closest populations are in Contra Costa County (Vasco Caves Preserve) and Alameda County (Brushy Peak Preserve) just southwest of the BDCP Planning Area. These occurrences are in seasonal pools filling sandstone depressions in rocky outcrops which are not present anywhere within the BDCP Planning Area. This species also occurs in pools within alkali sink vegetation in other parts of its known range (USFWS 2005, 2007, CNDDB 2008), but it has not been detected in similar pools in the BDCP Planning Area despite at least 14 years of extensive vernal pool surveys (USFWS 2005, 2007). While it has not been detected in the BDCP Planning Area, vernal pools that may support the species occur on alkaline soils from the DFG Tule Ranch Reserve southwest to the Montezuma Wetlands Mitigation Projects and from the Byron Airport to Discovery Bay.

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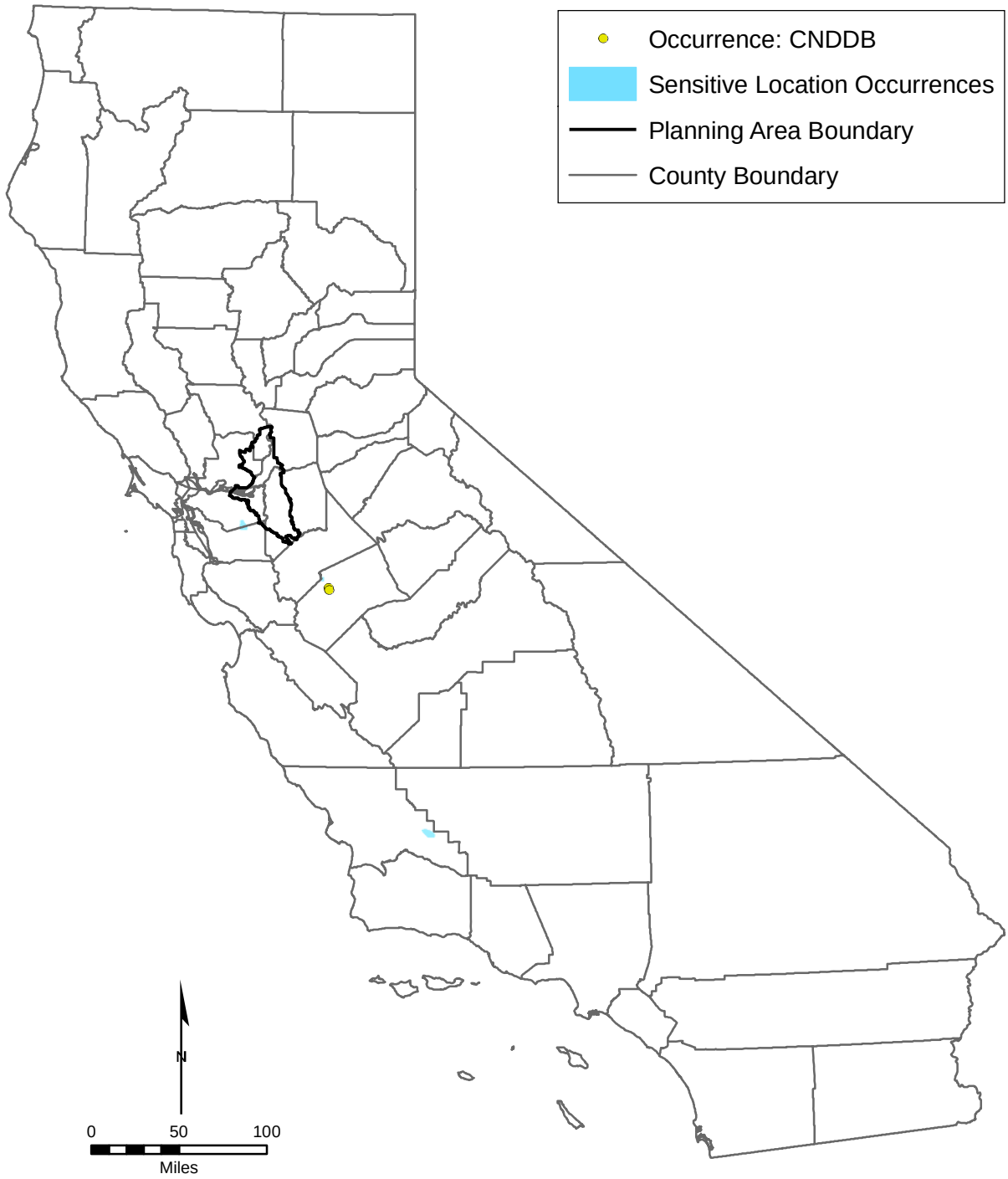

Source: Eriksen and Belk, 1999.
California Department of Fish and Game, CNDDB, 2008.

Figure A.26.1. Longhorn Fairy Shrimp Recorded Occurrences

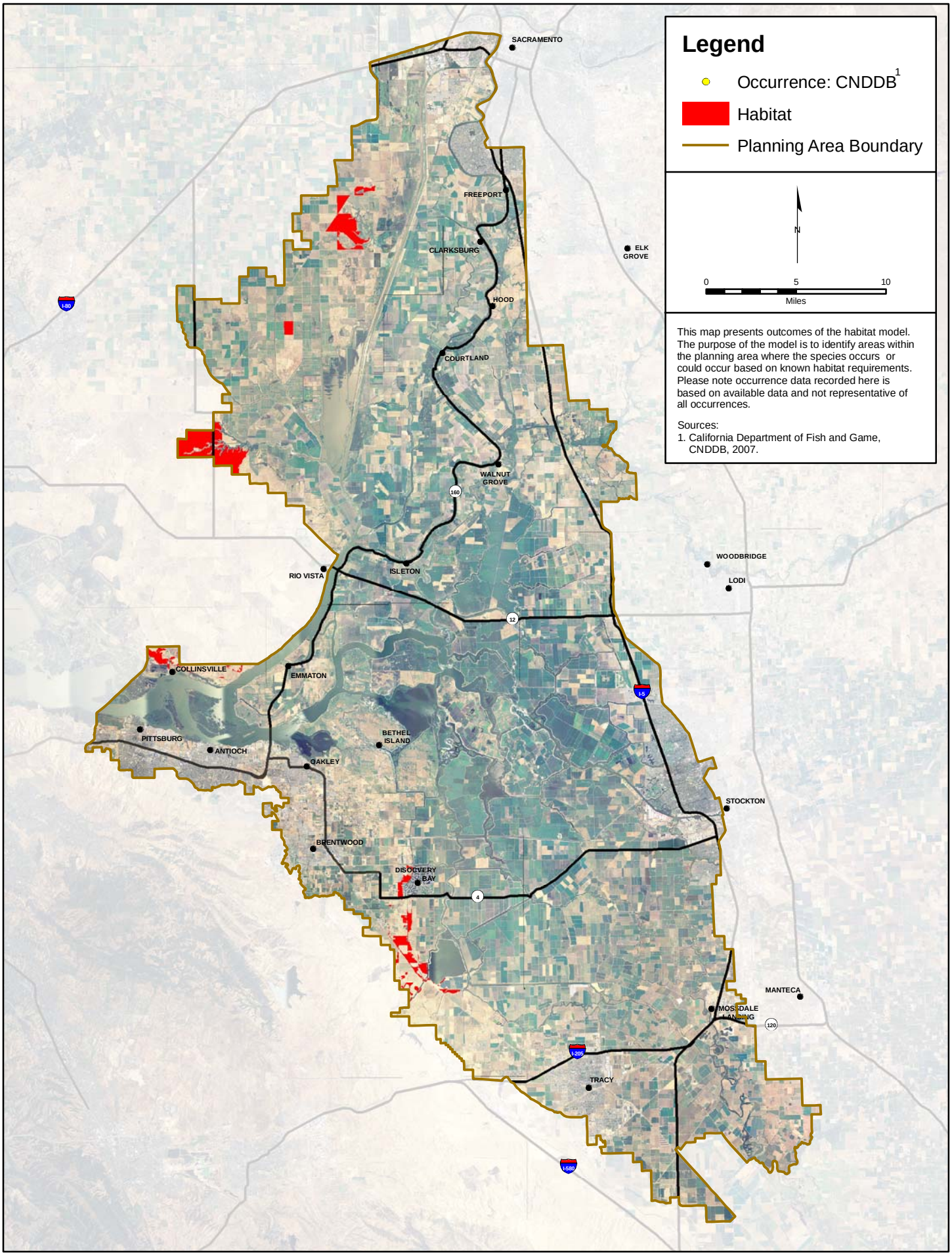

Figure A.26.2. Longhorn Fairy Shrimp Habitat Model and Recorded Occurrences

A.26.3 Habitat Requirements and Special Conditions

Longhorn fairy shrimp in Contra Costa and Alameda counties are primarily reported from small (less than one meter diameter) water filled sandstone depressions while those in the San Joaquin Valley and Carrizo Plain are found in shallow vernal pools within alkali sink vegetation in water with neutral pH (7.2) and a low chloride concentration (Helm 1998, USFWS 2005, 2007, CNDDB 2008). These vernal pool habitats are subject to seasonal variations in ponding and duration of ponding and this species has likely evolved adaptations to these variations (59 FR 48136). The longhorn fairy shrimp is capable of living in vernal pools of relatively short duration (ponding six to seven weeks in winter and three weeks in spring) (Eriksen and Belk 1999).

A.26.4 Life History

Feeding. Longhorn fairy shrimp is an omnivouous filter-feeder. In general, all fairy shrimp species indiscriminately filter particles that include bacteria, unicellular algae, and micrometazoa (Eriksen and Belk 1999). The precise size of items these fairy shrimp are capable of filtering is currently unknown. However, fairy shrimp species will attempt to consume whatever material they can fit into their feeding groove and do not discriminate based upon taste, as do some other crustacean groups (Eriksen and Belk 1999).

Ecology. Longhorn fairy shrimp is a component of the planktonic crustacea within seasonal temporary pools but nothing is known about its role in foodwebs. Beyond inundation, the specific cues for cyst hatching are unknown (Eriksen and Belk 1999), although temperature is believed to play a large role. When reared in plastic pools with their bottoms lined with soil excavated from vernal pools and without supplemental food some individuals of this species completed their lifecycle in 23 days but the average time was 43 days (Helm 1998). Longhorn fairy shrimp have been reported to co-occur in the same general area with the vernal pool fairy shrimp (*Branchinecta lynchi*) but the species did not occupy the same vernal pools (Eng et al. 1990).

A.26.5 Threats and Stressors

Longhorn fairy shrimp are not threatened by the same activities as other vernal pool invertebrates with the primary threat being habitat disturbances or losses through the construction of wind power equipment in the Altamont Pass area (USFWS 2007).

A.26.6 Relevant Conservation Efforts

The species was listed as endangered and critical habitat was designated as noted above. Vernal pool habitat on the Carrizo Plain has been partially protected in the Carrizo National Monument (USFWS 2007). Habitats in the San Joaquin Vernal Pool region are protected at the Kesterson National Wildlife Refuge (USFWS 2005, 2007). Known occurrences in sandstone depression pools in the Altamont area are protected in the Brushy Peak and Vasco Caves preserves which are on property owned and managed by the East Bay Regional Parks District (USFWS 2007).

The longhorn fairy shrimp is covered under the approved Natomas Basin, San Joaquin County, and East Contra Costa County Habitat Conservation Plans.

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A.26.7 Species Habitat Suitability Model

Habitat. Longhorn fairy shrimp habitat was identified in areas with alkaline soils as Natural Seasonal Wetlands and Grasslands on Antioch (AoA), Capay (Ca, Cc), Clear Lake (Ck), Diablo (DaC), Hillgate (HcA), Marcuse (Mb, Mc, Sb), Marvin (Mf), Pescadero (Pc, Pk), Rincon (Rg), Scribner (245), and Solano (Sh, Sk) soils (Figure A.26.2). For areas along the eastern border of the BDCP Planning Area that do not occur on alkaline soils habit was determined by the presence of vernal pool and swale microtopography. Vegetation types designated as species habitat in this model correspond to the mapped vegetation associations in the BDCP Geographical Information System (GIS) vegetation data layer (Hickson and Keeler-Wolf 2007). Aerial imagery (USDA 2005) and LiDAR elevation data (DWR 2007) were used to determine how intensively parcels included in the model had been farmed as the vegetation data included significant areas of fallow agricultural land that had been misclassified by DFG as various classes of natural vegetation. Parcels without natural vernal pool and swale vegetation signatures and microtopography were deleted from the area of predicted habitat. Additionally, habitat areas with known occurrences were digitized and included as habitat. The habitat in the southwestern portion of the BDCP Planning Area has the highest probability of occurrences of this species while the habitat in the northwestern and central portions represents a conservative prediction to include potential alkaline vernal pool habitat with a much lower probability of occurrence of this species.

Assumptions. There are no historical or current records of this species in the BDCP Planning Area, although occurrences in the San Joaquin Valley suggest that potential habitat in the BDCP Planning Area includes areas with intact vernal pool and swale microtopography along the upland edges of the BDCP Planning Area (CNDDB 2008). Artificial impoundments such as stock ponds or roadside ditches, that are known to provide habitat for this species, were not included in the model.

A.26.8 Recovery Goals

The Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon was finalized by the USFWS in 2005. With an overall recovery goal to delist the species and ensure its long-term conservation, interim goals include: (1) stabilize and protect populations, (2) conduct research to refine reclassification and recovery criteria, and (3) downlist endangered species to threatened. Vernal pool habitats used by the species as well as historical and potential habitats need to be protected, and habitat management plans for these habitats need to be developed and implemented. Recovery criteria have been established in the Recovery Plan. The criteria to downlist the species are: protect 100 percent of the present occurrences and protect 95 percent of its suitable habitat in the North Carrizo Plain, South Carrizo Plain, Altamont Hills, and Grassland Ecological Area Core Areas. The criteria to delist the species are: protect 100 percent of newly discovered/reintroduced populations, reintroduce the species into vernal pool regions and soil types from which surveys indicate the species has been extirpated, and discover or establish additional populations (USFWS 2005).

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