

10. SANTA BARBARA VERNAL POOL REGION

The vernal pool fairy shrimp and Conservancy shrimp are both known to occur within the Santa Barbara Vernal Pool Region. The vernal pool tadpole shrimp is not known to occur within this region.

10.1. Vernal Pool Habitat

Holland (2003) mapped the vernal pool complexes of the Central Coast of California based on 1994 aerial imagery. The study area consisted of 9,574,099 acres and encompassed all of San Benito, Monterey, San Luis Obispo, Santa Barbara, and Ventura Counties; this encompasses most of the Santa Barbara Vernal Pool Region, as well as the Carrizo and parts of the Central Coast Vernal Pool Regions. The Service does not have a copy of the geodatabase for this study, so we cannot break down the exact acreage of vernal pool complexes in each of the vernal pool regions. In total, 42,488 acres of vernal pool complexes were mapped throughout the study area (see **Figure 10.1**; Holland 2003), though comparison with high-resolution vernal pool mapping at Camp Roberts indicated that Holland's broad scale map is almost certainly an underestimate of both the number and size of vernal pool complexes in the Central Coast. Most of the mapped habitat within the Santa Barbara Vernal Pool Region is within the low elevation areas of eastern and central Santa Barbara County.

As in the Central Valley, many vernal pool complexes along the Central Coast, including the Santa Barbara Vernal Pool Region, are found in older alluvial soils with a claypan/duripan layer (Holland 2003). However, vernal pools are also found in two additional geomorphic settings not well represented in the Central Valley: sag ponds along faults and active Quaternary landslides on structurally incompetent mountain slopes. Holland (2003) also compared the 1994 imagery with satellite imagery from 2000 and found that 4,931 acres had been lost, a loss of 11.6% over the 6-year interval. Subsequent ground truthing in 2001 of 27 of the remaining polygons found that 15 had been converted to other uses, a loss of more than half of the polygons in the ground truthing area in just a year.

Because the Service does not know the exact acreage of vernal pool complexes in this region and because there has not been a comprehensive assessment of all protected lands within this region, we cannot estimate the amount or percentage of vernal pool habitat that has been protected. Lands with some level of protection include Los Padres National Forest, Vandenberg Space Force Base, Burton Mesa Ecological Reserve, Del Sol Vernal Pool Preserve, and the Jack and Laura Dangermond Preserve (**Figure 10.2**).

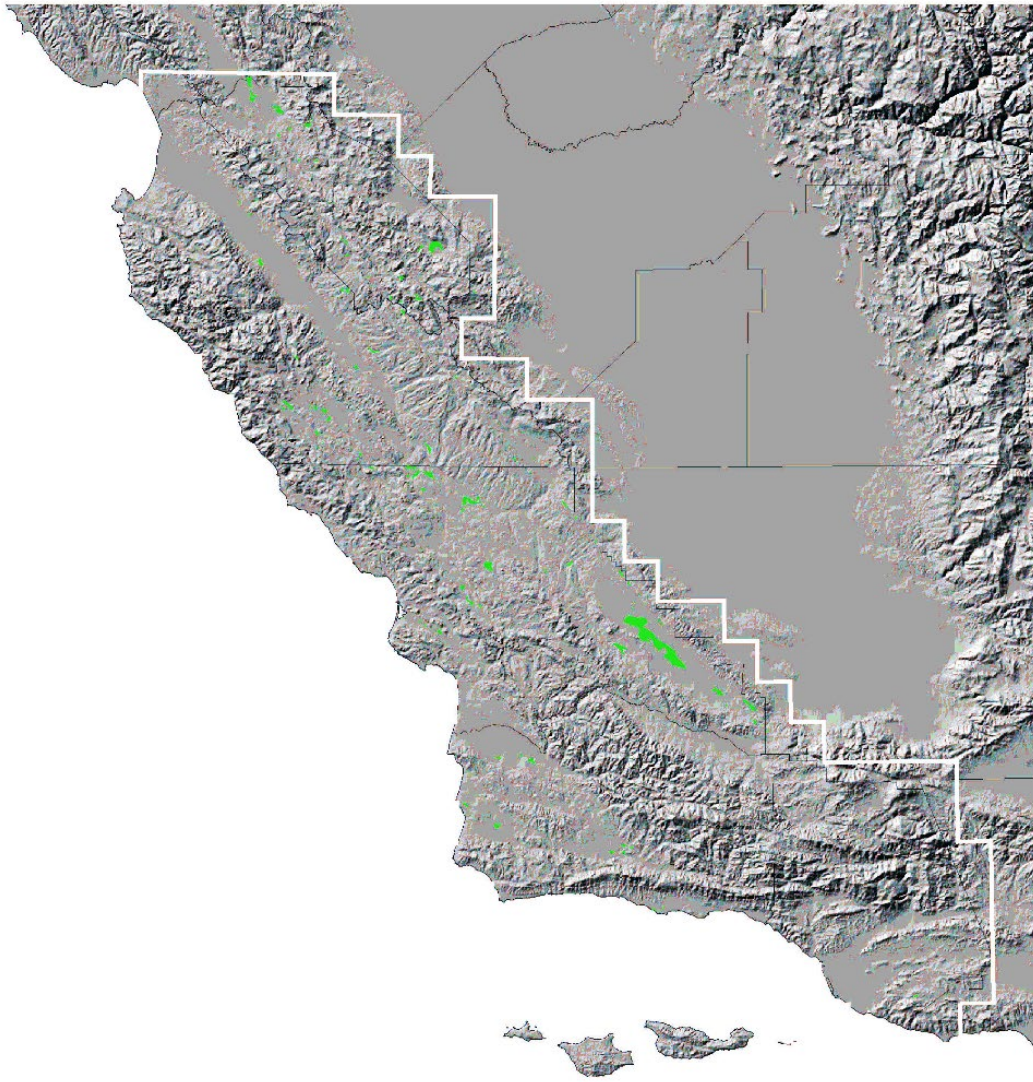


Figure 10.1. Map of vernal pool complexes in green along the Central Coast of California in 1994 mapped by Holland (2003). Taken from Figure 4 of Holland's report submitted to the Service.

Santa Barbara - Protected Lands

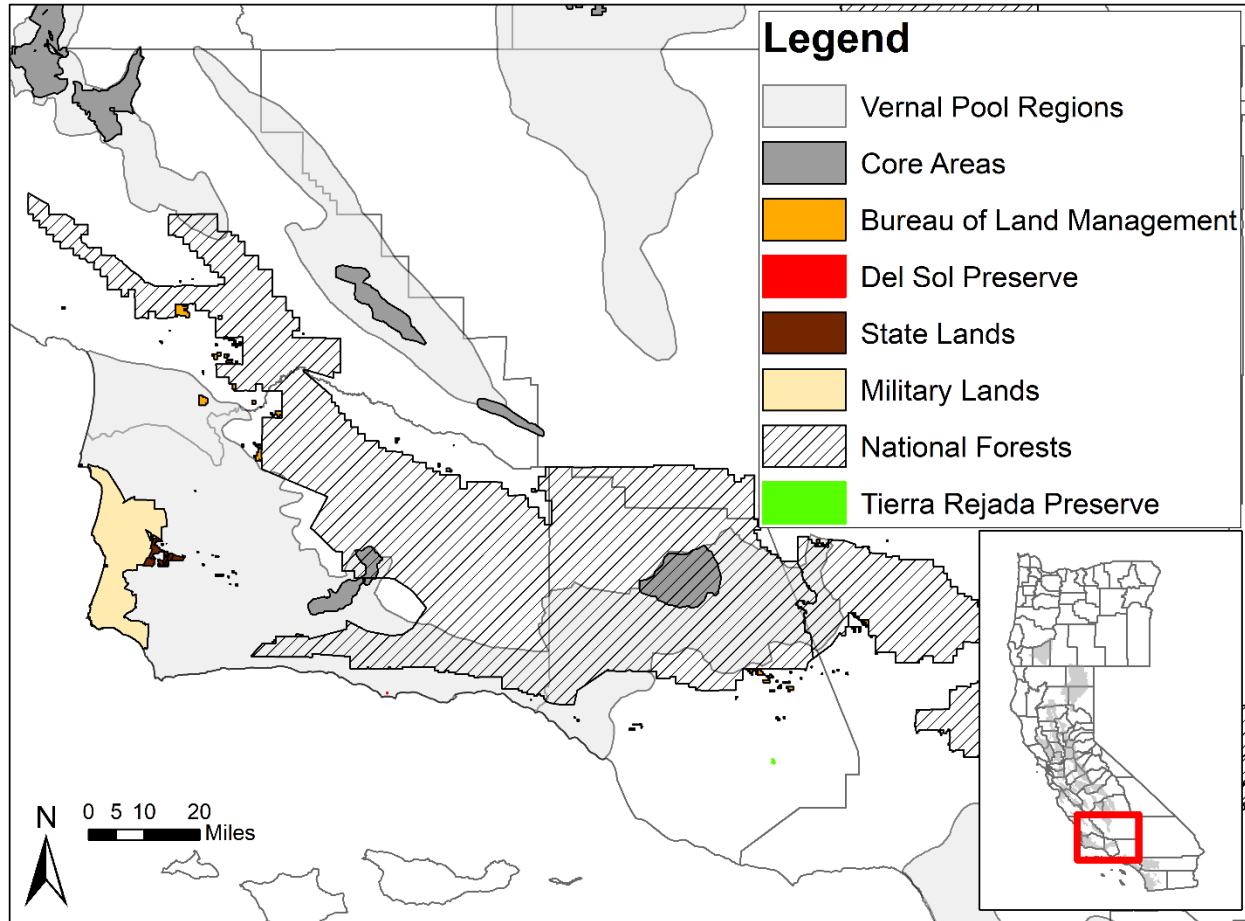


Figure 10.2. Map of protected areas that contain vernal pool grassland habitat and/or vernal pool fairy shrimp or Conservancy fairy shrimp within the Santa Barbara Vernal Pool Region. Zoom in for finer resolution. The Dangermond Preserve is not depicted.

Santa Barbara - Vernal Pool Fairy Shrimp

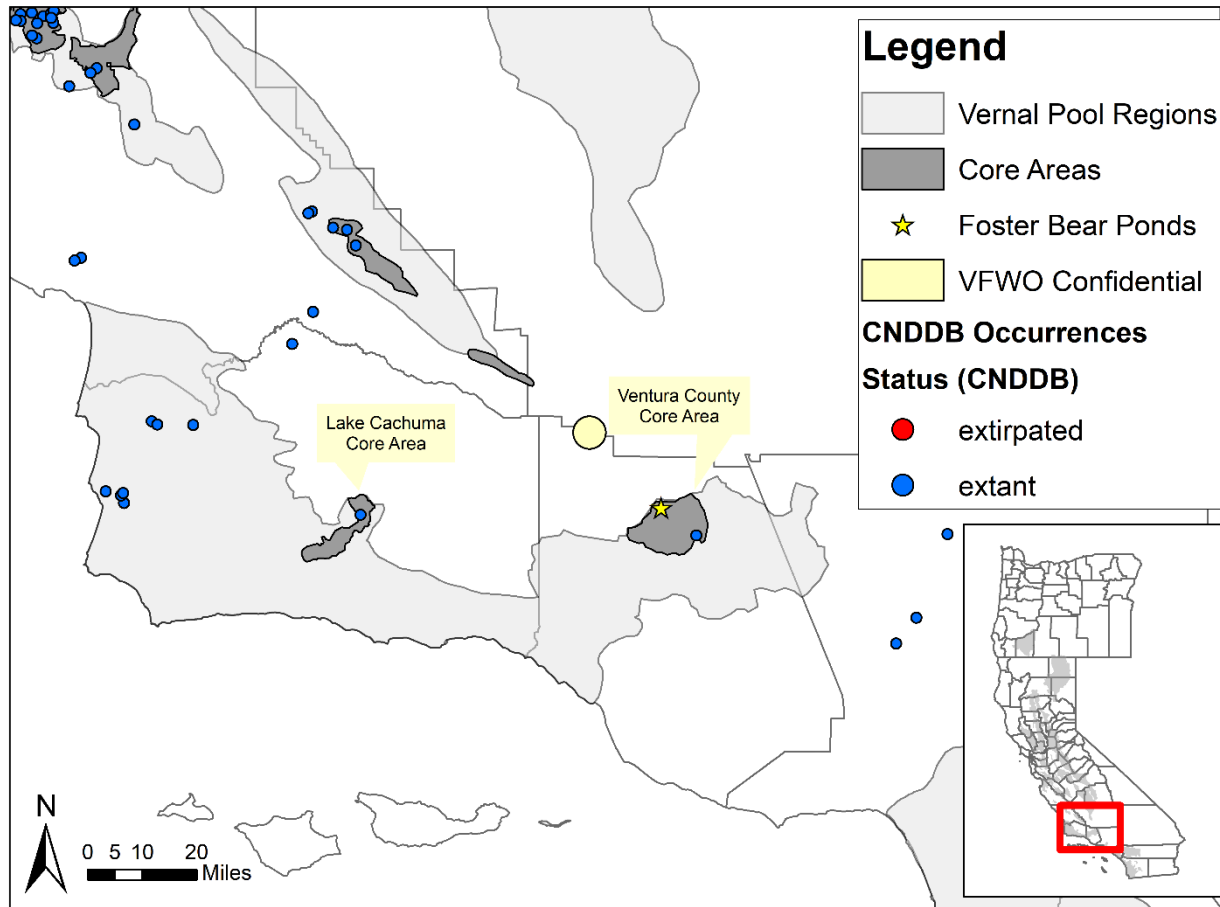


Figure 10.3. Map of known occurrences of vernal pool fairy shrimp recorded in the Diversity Database (2022) or provided by the Service’s Ventura Fish and Wildlife Office (VFWO) (Ogonowski, *in litt.* 2023a) in the Santa Barbara Vernal Pool Region. Points may represent individual pools, multiple pools, whole properties, or entire vernal pool grassland complexes.

10.2. Species Occurrences

10.2.1. Vernal Pool Fairy Shrimp

There are 15 occurrence records of the vernal pool fairy shrimp documented within, or immediately adjacent to, the Santa Barbara Vernal Pool Region in the Diversity Database (see **Figure 10.3**; Diversity Database 2022). Of these 15 occurrences, 7 are located on federal land, 3 on local government land, and 5 on private land or with landowner unknown (Diversity Database 2022). All occurrences are presumed extant by the Diversity Database, although it is possible that some of the 15 occurrences are no longer extant, but have not been surveyed recently. Only nine of these occurrences are actually within the defined boundary of the Santa Barbara Vernal Pool Region; three are to the east in Los Angeles County, one is to the north within the Los Padres National Forest between this region and the Carrizo Vernal Pool Region, and two are to the northwest just south of the City of San Luis Obispo. There is also one additional confidential occurrence location that was surveyed by the Ventura Fish and Wildlife Office in 2023 (Ogonowski, *in litt.* 2023a). This occurrence is between the Santa Barbara and Carrizo Vernal Pool Regions near Cuddy Valley Road to the northwest of the Ventura County Core Area.

Of the 15 Diversity Database occurrence records, 7 (47%) receive some level of protection by virtue of being located on federal land on Los Padres National Forest or Vandenberg Space Force Base (**Figure 10.2**).

10.2.2. Conservancy Fairy Shrimp

The Conservancy fairy shrimp is only known from a single location in the Santa Barbara Vernal Pool Region: a single vernal pool complex within the Los Padres National Forest known as Foster Bear Ponds (Diversity Database 2022). The exact location of the occurrence record in the Diversity Database does not align with the location of the Foster Bear Ponds due to the poor location data provided, but the Foster Bear Ponds are within the Ventura County Core Area. This single occurrence makes up the entirety of the Los Padres National Forest population. The Conservancy fairy shrimp was first identified at this site in 1989. See the Ventura County Core Area section for more details.

10.3. Federal Lands

10.3.1. National Wildlife Refuges

There are no National Wildlife Refuges with known occurrences of the vernal pool fairy shrimp or Conservancy fairy shrimp in the Santa Barbara Vernal Pool Region.

10.3.2. Military Lands

The 99,579-acre Vandenberg Space Force Base (previously Vandenberg Air Force Base) is located in western Santa Barbara County and is owned by the Department of Defense (DOD) (**Figure 10.2**). An update to the Base's Integrated Natural Resource Management Plan was finalized in 2015 and includes the vernal pool fairy shrimp (DOD 2015a). A large portion of the Base is managed as open space that acts as a security buffer and mostly persists in a natural state (ManTech SRS Technologies 2022). Vernal pools occur throughout the Base, including the

developed north Cantonment Area in the center of the Base; this cantonment overlaps a historical vernal pool complex and supports the largest extant vernal pool complex on the Base. Other pools that have known occurrences of the vernal pool fairy shrimp or may potentially be suitable for the species occur in the northwest and southeast of the Base.

The vernal pool fairy shrimp was first detected on the Base in 2004 (DOD 2015a), and at least 88 occupied pools have been documented since then (ManTech SRS Technologies 2022). The most recent survey effort occurred in February 2021 on the north Cantonment Area, as well as the El Rancho Oeste Area in the northwest and the Arguello Ridge Area in the southeast (ManTech SRS Technologies 2022). Of the 96 targeted pools in the north Cantonment Area, only 17 pooled water in 2021; 14 of these historically supported the vernal pool fairy shrimp, but only 4 were occupied in 2021. Of the 10 targeted pools in the El Rancho Oeste Area, only 4 pooled water in 2021. The vernal pool fairy shrimp has never been detected in this area, though five of the pools are potentially suitable. The species was not detected in 2021, though only two of the four ponded pools were considered suitable for the species. Of the 19 targeted pools in the Arguello Ridge Area, only 8 pooled water in 2021, and the vernal pool fairy shrimp was not detected. Seven of the 19 pools were historically occupied by the species, but the pools were no longer extant, either due to disturbance from burrowing mammals, infill by upland vegetation, or firebreak maintenance. Only one historically occupied pool remains in the Arguello Ridge Area.

There are no military lands with known occurrences of the Conservancy fairy shrimp in the Santa Barbara Vernal Pool Region.

10.3.3. Bureau of Land Management

There are several small parcels of BLM land, likely grazing allotments, throughout the Santa Barbara Vernal Pool Region, but there are no known occurrences of the vernal pool fairy shrimp or Conservancy fairy shrimp within them (Diversity Database 2022).

10.3.4. Other Federal Lands

There are two National Forests, owned and managed by the Forest Service, within the Santa Barbara Vernal Pool Region: Los Padres and Angeles (**Figure 10.2**). The Los Padres National Forest is 1,781,364 acres in size and is spread across Kern, Los Angeles, Monterey, San Luis Obispo, Santa Barbara, and Ventura Counties (USDA 2005a). This National Forest overlaps the eastern half of the Santa Barbara Vernal Pool Region and extends along the Coast Range mountains to the northwest between the Santa Barbara and Carrizo Vernal Pool Regions. Vernal pools are known to occur on the National Forest within the 197-acre Foster Bear Ponds area within the Piru Allotment (USDA 2005b). The Foster Bear Ponds, which are actually a vernal pool complex with one true pond, are a unique occurrence of vernal pool habitat in a montane environment surrounded by pine forest. The vernal pool fairy shrimp and Conservancy fairy shrimp were both documented within the Foster Bear Ponds in 1989 (Diversity Database 2022) and the Conservancy fairy shrimp was identified there again in 2023 (Ogonowski, *in litt.* 2023a). Outside of the Foster Bear Ponds area, the vernal pool fairy shrimp has also been documented in Cachuma Canyon in central Santa Barbara County, in two ranches on either side of the Santa Barbara-San Luis Obispo County border, and near Cuddy Valley Road near the border of Ventura and Kern Counties (Diversity Database 2022; Ogonowski, *in litt.* 2023a).

The Angeles National Forest is 662,983 acres in size and located in the northern portion of Los Angeles County, with small portions extending into Ventura and San Bernardino Counties (USDA 2005a). This National Forest overlaps the eastern edge of the Santa Barbara Vernal Pool Region and extends to the east. Vernal pools are never mentioned in the Angeles National Forest's most recent Land Management Plan (USDA 2005c), so the Service assumes that no vernal pool habitat is known to be present. However, there are three occurrences of the vernal pool fairy shrimp in Los Angeles County, all of which are within 2 miles of the Angeles National Forest (Diversity Database 2022).

10.4. Conservation Banks

There are no conservation or mitigation banks that provide credits for preserved vernal pools that support the vernal pool fairy shrimp or the Conservancy fairy shrimp in the Santa Barbara Vernal Pool Region. However, one outlying occurrence of the vernal pool fairy shrimp in Los Angeles County does occur on the Petersen Ranch Mitigation Bank (Diversity Database 2022). This bank sells credits for both preserved and created wetlands and streams (RIBITS 2021). Vernal pool fairy shrimp were first detected here in 2020 within depressional wetland feature "W62" in Area A of the bank (Diversity Database 2022). This area generally consisted of grassland with a series of seeps, swales, and depressions associated with fault lines with underlying Castaic-Balcom silty clay loam and Millsholm rocky loam soils (Diversity Database 2022).

10.5. Habitat Conservation Plans

There is one regional Habitat Conservation Plan (HCP) within the Santa Barbara Vernal Pool Region that includes the three shrimp species as Covered Species.

10.5.1. PG&E Multiple Region Operations and Maintenance HCP

See section 2.5.1 for a description of this HCP.

10.6. Other Preserves

The California Department of Fish and Wildlife (CDFW) owns the 5,186-acre Burton Mesa Ecological Reserve in western Santa Barbara County (**Figure 10.2**). The Ecological Reserve was acquired to preserve the rich botanical diversity of the area, particularly within the Burton Mesa Chaparral (Condor Environmental Planning Services 2007). There are two vernal wetland areas at the Ecological Reserve, both on the west side. The northern vernal wetland area is located southwest of Cabrillo High School in the Santa Lucia Management Unit. It occurs on a gently sloping drainage that was farmed in previous years, with many weeds in the area. The southern vernal wetland area is located south of Highway 1 in the Vandenberg Management Unit. The vernal pool fairy shrimp was documented in 2004 in several vernal pools on the Vandenberg Management Unit (Condor Environmental Planning Services 2007), though this occurrence is not recorded in the Diversity Database. The Land Management Plan, completed in 2007, includes a goal to protect the vernal pools on the Ecological Reserve. Specific associated tasks include installing fencing to prevent unauthorized vehicle access, retiring and restoring existing trails and roads, evaluating the existing habitat and the feasibility of vernal pool restoration/creation onsite, and coordinating with the Service on any activities that could adversely affect the vernal pool fairy shrimp (Condor Environmental Planning Services 2007).

The Del Sol Vernal Pool Preserve is an 11.8-acre preserve in the City of Isla Vista, approximately 10 miles west of the City of Santa Barbara (**Figure 10.2**). It is owned and managed by the Isla Vista Recreation and Park District and was one of the first areas of vernal pool preservation in California, being acquired in 1978–1979 (Pritchett and Ferren 1988; Ferren et al. 1998). Natural, restored, and created vernal pools exist on the preserve. The vernal pool fairy shrimp has not been recorded on the preserve despite various survey efforts.

The Jack and Laura Dangermond Preserve is a 24,364-acre preserve at Point Conception, the southwestern corner of Santa Barbara County, owned by The Nature Conservancy (TNC). Wetlands occur in a small portion of this preserve near Point Conception. Some of these wetlands were surveyed for vernal pool fairy shrimp in the 2022 dry season during planning for ice plant (*Carpobrotus* spp.) removal within a 310-acre portion of coastal terrace within the preserve (Ogonowski, *in litt.* 2023a). *Branchinecta* cysts were identified within two of the seven wetland features surveyed, but the cysts could not be successfully hatched to confirm species identification. Based on the location, these cysts likely belong to the vernal pool fairy shrimp or versatile fairy shrimp (*Branchinecta lindahli*).

The Tierra Rejada Preserve is an approximately 80-acre preserve in the City of Moorpark, Ventura County, about 20 miles southeast of the boundary of the Santa Barbara Vernal Pool Region (Ogonowski, *in litt.* 2023b). It is located on the west side of Moorpark Highway (State Road 23) between Los Angeles Avenue and Tierra Rejada Road. The preserve was protected in 2001 as mitigation for the adjacent residential development and is owned and managed by the Mountains Recreation and Conservation Authority. There is one large vernal pool within the southern portion of the preserve. The vernal pool fairy shrimp has not been observed within this pool, though the Riverside fairy shrimp (*Streptocephalus woottoni*) and California Orcutt grass (*Orcuttia californica*) both occur there (Diversity Database 2022; Ogonowski, *in litt.* 2023b). This preserve was designated as critical habitat unit 1A for the Riverside fairy shrimp in 2012 (Service 2012d).

There are no other protected lands for the Conservancy fairy shrimp within the Santa Barbara Vernal Pool Region.

10.7. Vernal Pool Core Areas

There are two Core Areas within the Santa Barbara Vernal Pool Region that are designated in the Recovery Plan for the vernal pool fairy shrimp: Lake Cachuma and Ventura County. The Ventura County Core Area is also designated for the Conservancy fairy shrimp. Because the Service does not know how much vernal pool habitat existed in this region in 2005, how much still exists today, and how much has been protected, we do not know if any of the core areas have met the target of 85% of vernal pool habitat protected.

10.7.1. Lake Cachuma

This is a zone 2 core area with a goal of protecting 85% of vernal pool habitat for the vernal pool fairy shrimp. The core area is located in central Santa Barbara County.

There is no estimate of how many acres of vernal pool complex existed in this core area in 2005 or today, and so the Service cannot assess what percentage of vernal pool habitat has been

protected. The northern third of the core area is within the Los Padres National Forest and there is a small parcel of BLM land in the core area as well. The Service generally assumes that vernal pool habitat and species occurrences receive some level of protection on all federal lands. However, given the lack of knowledge regarding vernal pool habitat within this area, any vernal pool habitat within these federal lands may not be adequately protected since it cannot be properly managed or monitored until survey or mapping efforts locate the habitat.

10.7.1.1. Vernal Pool Fairy Shrimp Occurrences

There is one occurrence record for the vernal pool fairy shrimp within this core area (see **Figure 10.4**; Diversity Database 2022). This record was collected in 1965 in the vicinity of Happy Canyon Road on the Los Padres National Forest. The location was described in the Diversity Database as “Cachuma Canyon Pond #2” in an area of “seasonally astatic ‘vernal earth-slump’ pools in canyon grassland.” The Service is not aware of any surveys or other records from the area since 1965.

Lake Cachuma Core Area - Protected Lands

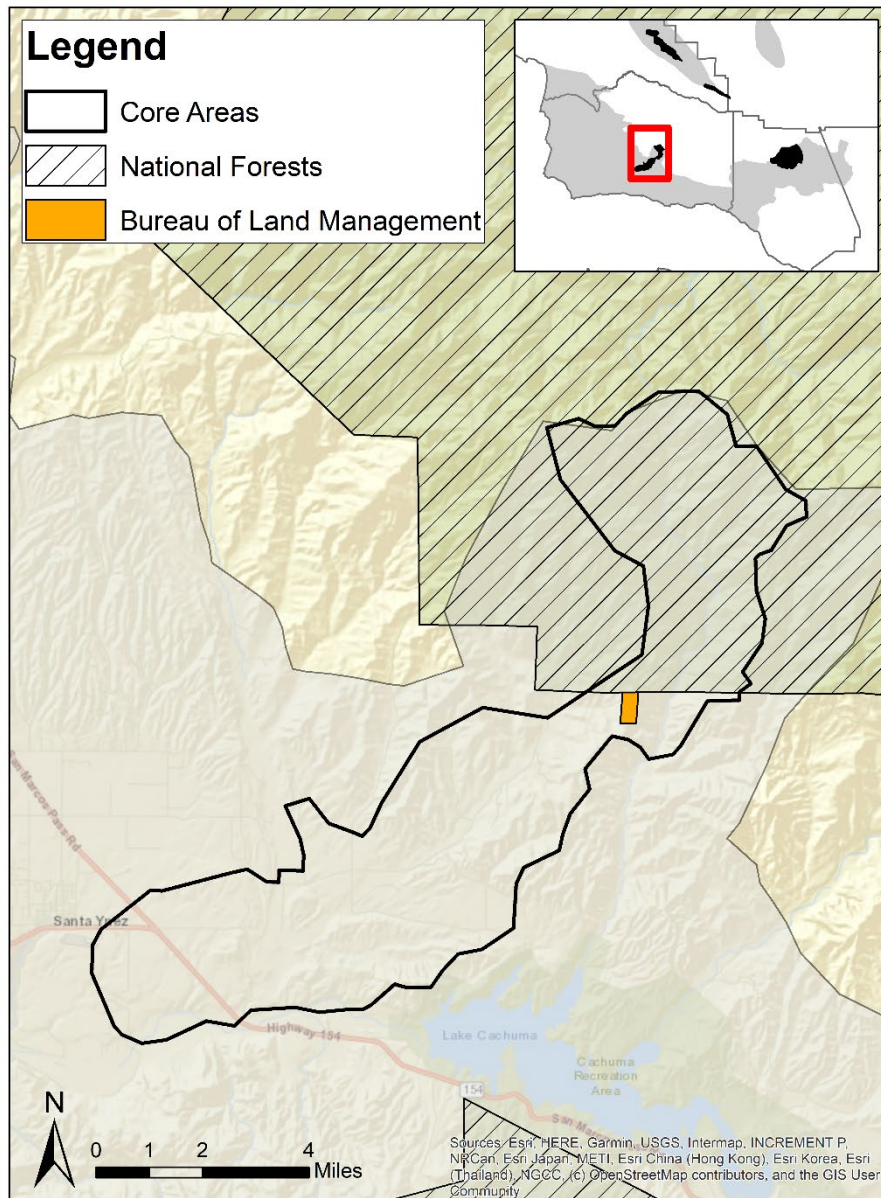


Figure 10.4. Map of all protected lands within the Lake Cachuma Core Area. Diversity Database (2022) records have been redacted from the map to comply with CDFW’s Diversity Database Data Use Guidelines.

10.7.2. Ventura County

This is a zone 2 core area with a goal of protecting 85% of vernal pool habitat for the vernal pool fairy shrimp and Conservancy fairy shrimp. The core area is located in Ventura County and is entirely within the Los Padres National Forest.

Known vernal pool habitat within this core area consists of the 197-acre Foster Bear Ponds area within the Piru Allotment of the National Forest (USDA 2005b). The Foster Bear Ponds, which are actually a vernal pool complex with one true pond, are a unique occurrence of vernal pool habitat in a montane environment surrounded by pine forest. Other isolated wetlands do occur within the core area, such as the seasonal wetland between Mutau Creek and Little Mutau Creek described in the vernal pool fairy shrimp occurrence record (Diversity Database 2022). The entire core area is within the Los Padres National Forest in a known environmentally sensitive area (USDA 2005b), so all vernal pool habitat within the core area should be protected.

10.7.2.1. *Vernal Pool Fairy Shrimp Occurrences*

There are two Diversity Database occurrence records for the vernal pool fairy shrimp within this core area, which is entirely protected within the National Forest (see **Figure 10.5**; Diversity Database 2022). However, only one occurrence is properly documented in the Diversity Database as a record for the vernal pool fairy shrimp. This occurrence was documented in 1989 in a seasonal wetland between Mutau Creek and Little Mutau Creek. There is also an occurrence record for the Conservancy fairy shrimp from 1989 in the Foster Bear Ponds area that states that the vernal pool fairy shrimp was also present (Diversity Database 2022). These occurrences are presumed extant by the Diversity Database. The Foster Bear Ponds were resurveyed by the Ventura Fish and Wildlife Service on May 17, 2023. The vernal pool fairy shrimp was not identified, though this does not demonstrate that the species no longer occupies these pools given the single day of surveys very late in the wet season (Ogonowski, *in litt.* 2023a). The Ventura Fish and Wildlife Office also documented a new occurrence of the vernal pool fairy shrimp in 2023 at a confidential location near Cuddy Valley Road to the northwest of the core area.

10.7.2.2. *Conservancy Fairy Shrimp Occurrences*

There is one Diversity Database occurrence record for the Conservancy fairy shrimp within this core area, which is entirely protected within the National Forest (see **Figure 10.6**; Diversity Database 2022). Note that the Diversity Database occurrence as mapped is incorrectly located due to the poor location data provided to the Diversity Database; as described in the location details, the correct location for the occurrence is the Foster Bear Ponds. This single occurrence represents the entire Los Padres National Forest population of the Conservancy fairy shrimp. The occurrence is presumed extant by the Diversity Database. It was first recorded in 1989 when it was cultured from mud samples (Diversity Database 2022). The Conservancy fairy shrimp was again identified in one of the three ponds at Foster Bear Ponds during surveys conducted by the Ventura Fish and Wildlife Office in 2023 (Ogonowski, *in litt.* 2023a).

Ventura County Core Area - Vernal Pool Fairy Shrimp

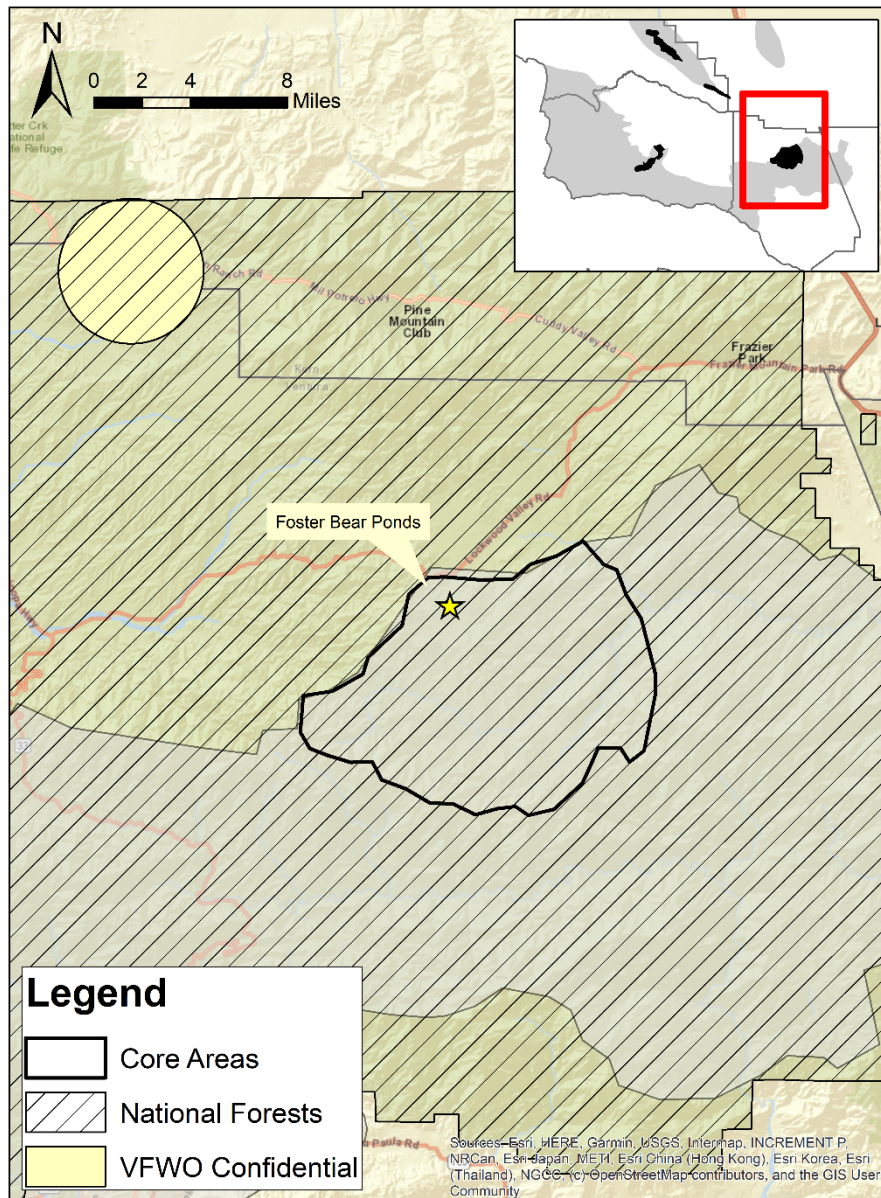


Figure 10.5. Map of known occurrences of vernal pool fairy shrimp provided by the Service’s Ventura Fish and Wildlife Office (VFWO) (Ogonowski, *in litt.* 2023a) within the Ventura County Core Area. The location of the Foster Bear Ponds in the northwest of the core area is highlighted. Diversity Database (2022) records have been redacted from the map to comply with CDFW’s Diversity Database Data Use Guidelines.

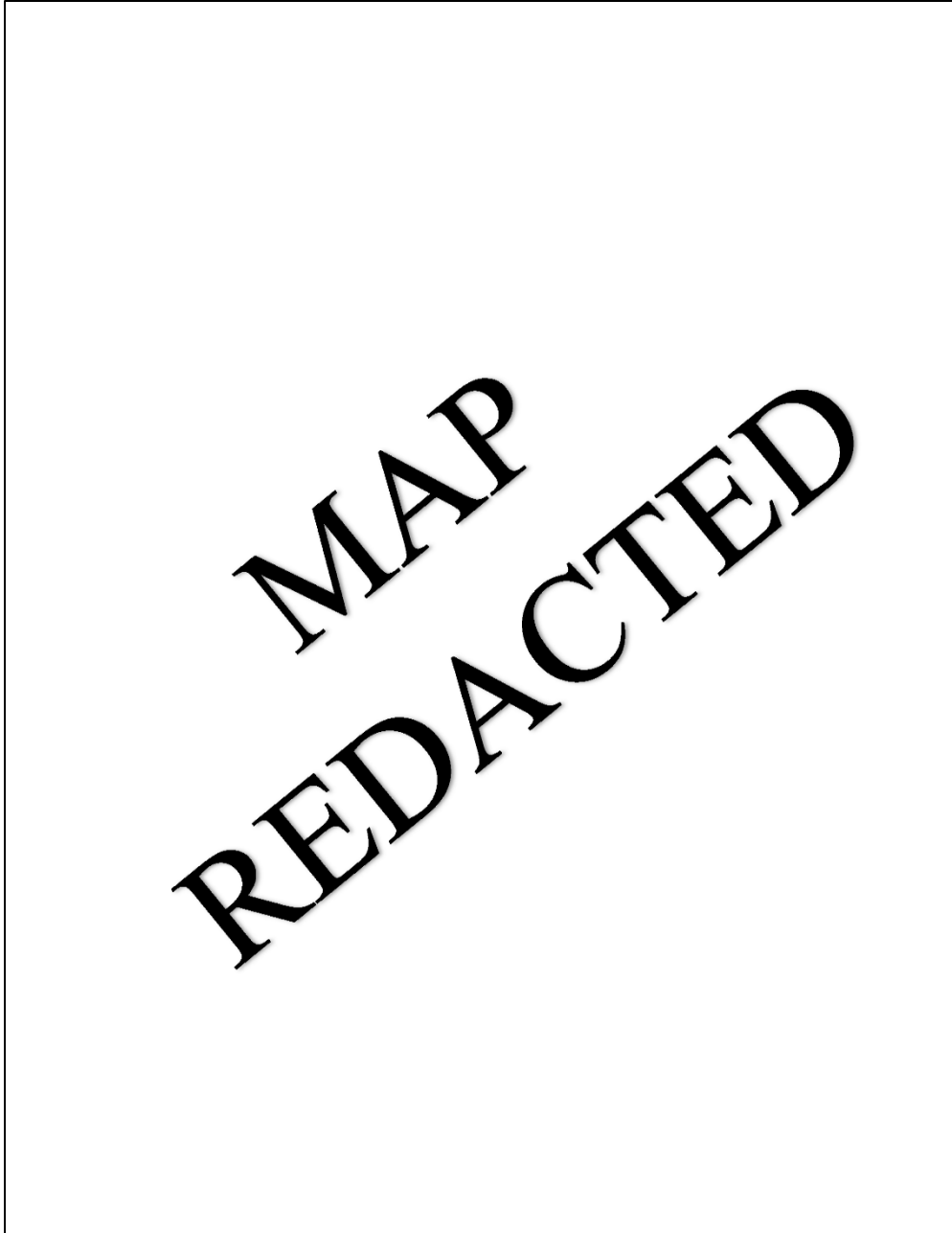


Figure 10.6. Map of known occurrences of Conservancy fairy shrimp recorded in the Diversity Database (2022) within the Ventura County Core Area. Polygons may represent individual pools, multiple pools, whole properties, or entire vernal pool grassland complexes. Occurrences are color coded as extant or extirpated based on the Diversity Database. The location of the Foster Bear Ponds in the northwest of the core area is highlighted. Note that the Diversity Database occurrence as mapped is incorrectly located due to the poor location data provided to the Diversity Database; as described in the location details, the correct location for the occurrence is the Foster Bear Ponds.