

3. CENTRAL COAST VERNAL POOL REGION

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

3.1. 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 Central Coast Vernal Pool Region, as well as the Carrizo and parts of the Santa Barbara 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 3.1**; 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 Central Coast Vernal Pool Region is within San Benito County or within southern Monterey County around Fort Hunter Liggett.

As in the Central Valley, many vernal pool complexes along the Central Coast, including the Central Coast 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 the Don Edwards San Francisco Bay National Wildlife Refuge, Fort Hunter Liggett, Bureau of Land Management land, Sans Topo Ranch, and Panoche Valley Preserve (**Figure 3.2**).

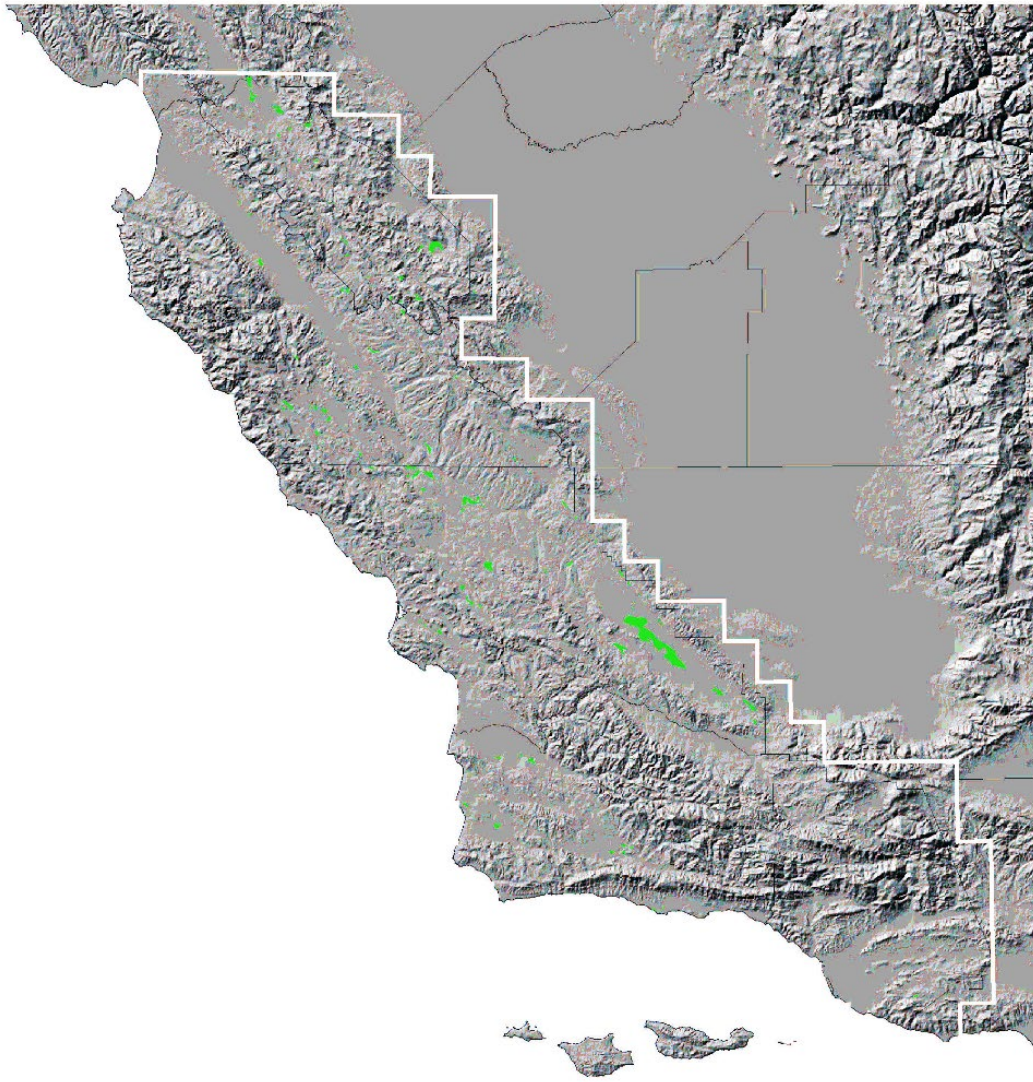


Figure 3.1. Map of vernal pool complexes in green along the Central Coast of California in 1994 mapped by Holland (2003). Taken from Figure 4 of Holland's report submitted to the Service.

Central Coast - Protected Lands

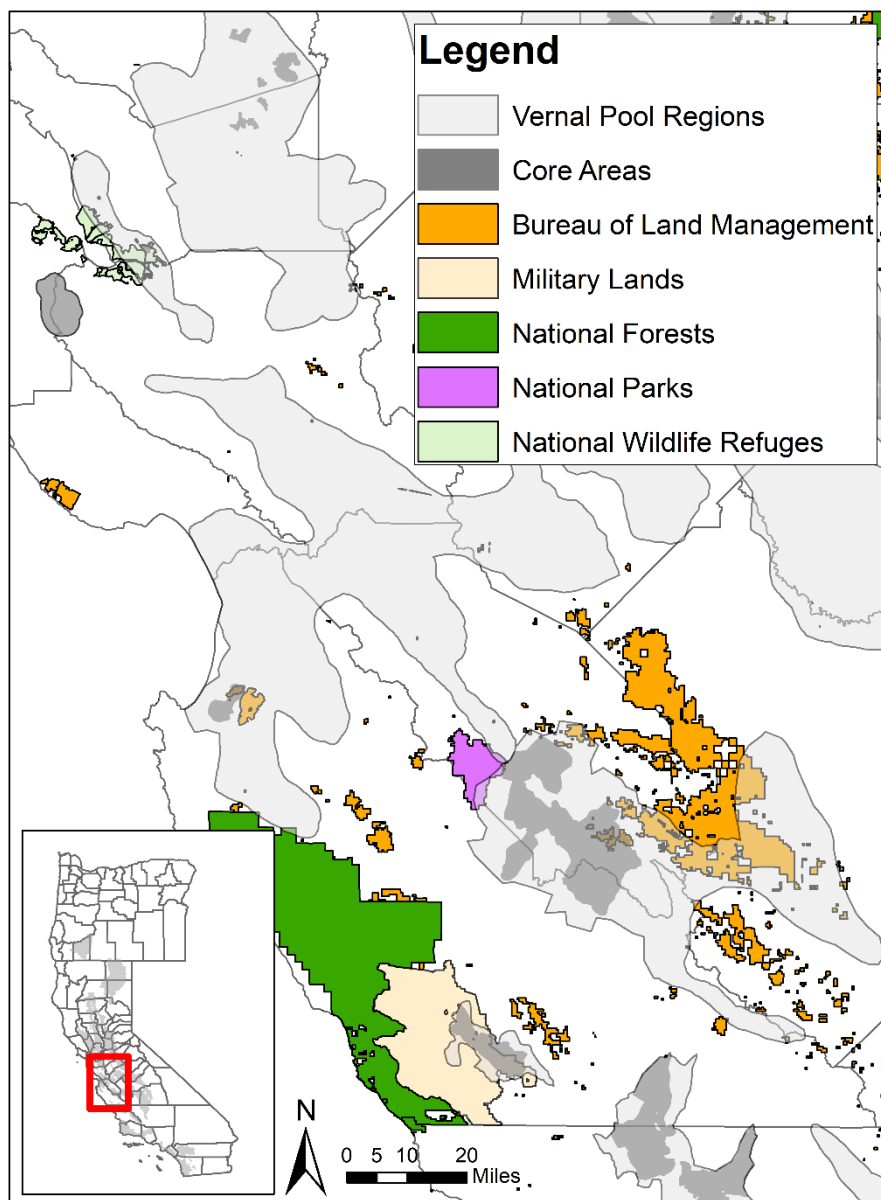


Figure 3.2. Map of protected areas that contain vernal pool grassland habitat and/or vernal pool fairy shrimp or vernal pool tadpole shrimp within the Central Coast Vernal Pool Region. Sans Topo Ranch is not depicted, but is located southeast of Pinnacles National Park. The Panoche Valley Preserve is not depicted, but is located in the Panoche Valley near the border of San Benito and Fresno Counties.

Central Coast - Vernal Pool Fairy Shrimp

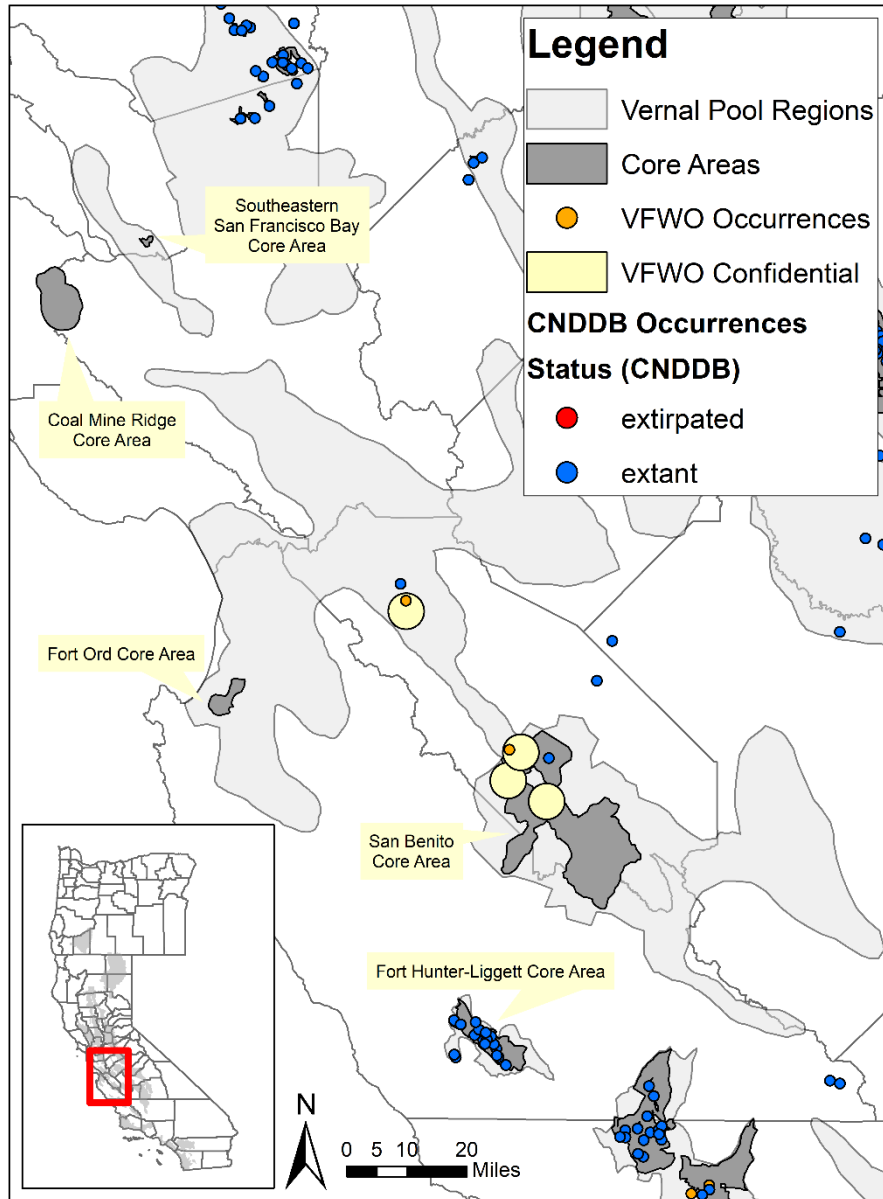


Figure 3.3. Map of known occurrences of vernal pool fairy shrimp recorded in the Diversity Database (2022) or provided by the Service’s Ventura Fish and Wildlife Office (VFWO) (Ogonowski, *in litt.* 2023a) in the Central Coast Vernal Pool Region. Points may represent individual pools, multiple pools, whole properties, or entire vernal pool grassland complexes. All five core areas in the region are displayed, though not all core areas are designated for the vernal pool fairy shrimp.

Central Coast - Vernal Pool Tadpole Shrimp

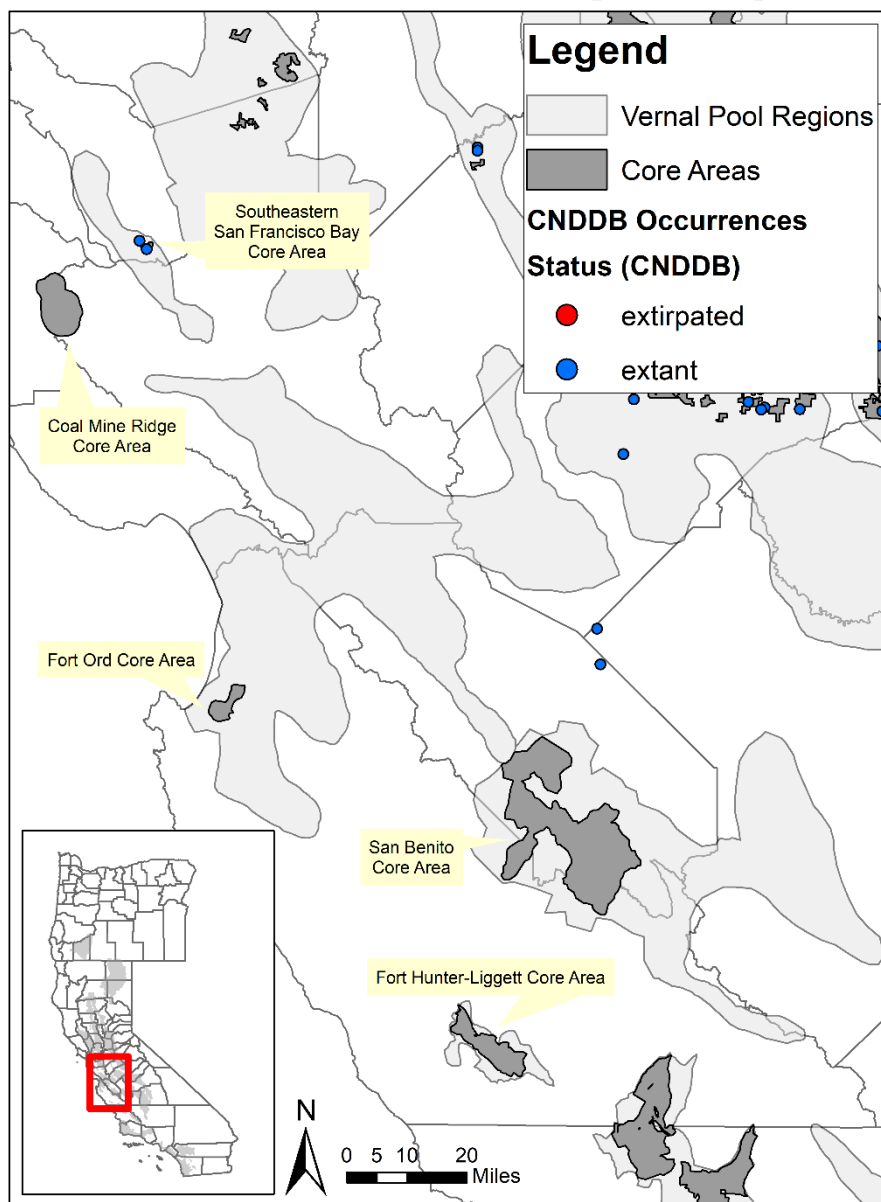


Figure 3.4. Map of known occurrences of vernal pool tadpole shrimp recorded in the Diversity Database (2022) in the Central Coast Vernal Pool Region. Points may represent individual pools, multiple pools, whole properties, or entire vernal pool grassland complexes. All five core areas in the region are displayed, though not all core areas are designated for the vernal pool tadpole shrimp.

3.2. Species Occurrences

3.2.1. Vernal Pool Fairy Shrimp

There are 21 occurrence records of the vernal pool fairy shrimp documented within, or immediately adjacent to, the Central Coast Vernal Pool Region in the Diversity Database (see **Figure 3.3**; Diversity Database 2022). Of these 21 occurrences, 17 are located on the Fort Hunter Liggett military installation and the other 4 are on private land (Diversity Database 2022). Two of these occurrences are outside of the vernal pool region; these were documented in 2010 in the Mercey Hot Springs/Little Panoche Valley area near the Merced-Fresno-San Benito County border. The southern of these occurrences is located in a solar development just outside of the Panoche Valley Preserve (Ogonowski, *in litt.* 2023a). All occurrences are presumed extant by the Diversity Database, although it is possible that some of the 21 occurrences are no longer extant, but have not been surveyed recently.

There are two additional occurrence records provided by the Ventura Fish and Wildlife Office that were not in the Diversity Database and four additional confidential locations that were surveyed by the Ventura Fish and Wildlife Office in the last 5 years (Ogonowski, *in litt.* 2023a). The two additional occurrences to the north are along Highway 25 south of the City of Hollister: one documented in 2018 in a proposed urban development and another in a confidential location documented by the Ventura Fish and Wildlife Office in 2023. The four additional occurrences to the south are along Highway 25 near Pinnacles National Park: one documented in 2022 and 2023 on APC Ranch just east of Pinnacles, two documented in 2023 by the Ventura Fish and Wildlife Office at confidential locations generally east of Pinnacles, and one documented in 2019 on the Sans Topo Ranch to the southeast of Pinnacles (exact location confidential, but a 4,500-acre portion of this ranch was protected with a conservation easement in 2023).

Of the 21 Diversity Database occurrence records, 17 (81%) receive some level of protection by virtue of being located on federal land on Fort Hunter Liggett (**Figure 3.2**). Of the additional occurrences, only one is protected on the Sans Topo Ranch.

3.2.2. Vernal Pool Tadpole Shrimp

There are four occurrence records of the vernal pool tadpole shrimp documented within, or adjacent to, the Central Coast Vernal Pool Region in the Diversity Database (see **Figure 3.4**; Diversity Database 2022). All occurrences are presumed extant by the Diversity Database. The two occurrences within the vernal pool region are located in the southern San Francisco Bay Area. One is within the Don Edwards San Francisco Bay National Wildlife Refuge and was first identified in 1993. The other occurrence, identified in 2016, is just outside of the Refuge on a PG&E substation less than 1 mile from the occurrence on the Refuge. There are also two occurrences from 2010 in the Mercey Hot Springs/Little Panoche Valley area near the Merced-Fresno-San Benito County border. The southern of these occurrences is located just outside of the Panoche Valley Preserve (Ogonowski, *in litt.* 2023a). The nearest vernal pool region is the Central Coast Vernal Pool Region (7–10 miles away), though the nearest occurrence of the vernal pool tadpole shrimp is 30 miles to the north along the San Luis Canal in the San Joaquin Vernal Pool Region (Diversity Database 2022). These two occurrences are approximately 100 miles away from the two Bay Area occurrences.

Of the four Diversity Database occurrence records, only the one (25%) on Don Edwards San Francisco Bay National Wildlife Refuge is protected (**Figure 3.2**).

3.3. Federal Lands

3.3.1. National Wildlife Refuges

Within the Central Coast Vernal Pool Region, the vernal pool tadpole shrimp is known to occur on the Don Edwards San Francisco Bay National Wildlife Refuge, part of the San Francisco Bay National Wildlife Refuge Complex. There are no National Wildlife Refuges with known occurrences of the vernal pool fairy shrimp in this region.

This Refuge was established with three major purposes: preserving the natural resources of the South Bay, including habitat of migratory birds, harbor seals, and endangered species, providing environmental education to Bay Area schools and residents, and protecting open space for the enjoyment of local residents and visitors. A Comprehensive Conservation Plan was prepared for the Refuge in 2012 that included the vernal pool tadpole shrimp (Service 2012a).

The Refuge is almost 30,000 acres in size and is located in a highly urbanized setting at the southern end of the San Francisco Bay and extends into Alameda, Santa Clara, and San Mateo Counties. Approximately 675 acres of vernal pool grassland has been mapped on the Mowry Unit, Warm Springs Seasonal Wetland sub-unit, in south Fremont (see **Figure 3.5**; Service 2012a). The initial 255 acres of the sub-unit was acquired in 1992 and contains natural vernal pools with a history of grazing and waterfowl hunting. In 2008, the Refuge added the Pacific Commons Preserve to the sub-unit, a 425-acre restored vernal pool grassland that had been highly disturbed but had been restored beginning in 1999 as mitigation for an adjacent development. There are approximately 250 individual vernal pools on the Warm Springs Seasonal Wetland sub-unit with a total wetted acreage of 145 acres (WRA Environmental Consultants 2012). Management of vernal pool grassland on the Refuge consists of grazing, monitoring of hydrology, invertebrates, and vegetation, and controlling invasive plant species (Service 2012a), with a specific monitoring plan designed for the Warm Springs Seasonal Wetland sub-unit (WRA Environmental Consultants 2012). Refuge staff and volunteers also lead vernal pool tours on the Refuge; the Warm Springs Seasonal Wetland sub-unit of the Refuge has been growing in popularity as one of the rare Bay Area locations to learn about and enjoy vernal pool grasslands (Service 2012a).

The vernal pool tadpole shrimp was identified in five vernal pools on the Warm Spring Seasonal Wetland sub-unit in 1993 and was consistently identified in surveys through 2004 (Diversity Database 2022) and during annual surveys from 2012 through 2023 (I. Loredó, Service, *in litt.* 2023). A total of 58 vernal pools are monitored each year, and the maximum number of pools where the species has been detected in one year is 52 pools in 2023 (Loredó, *in litt.* 2023).

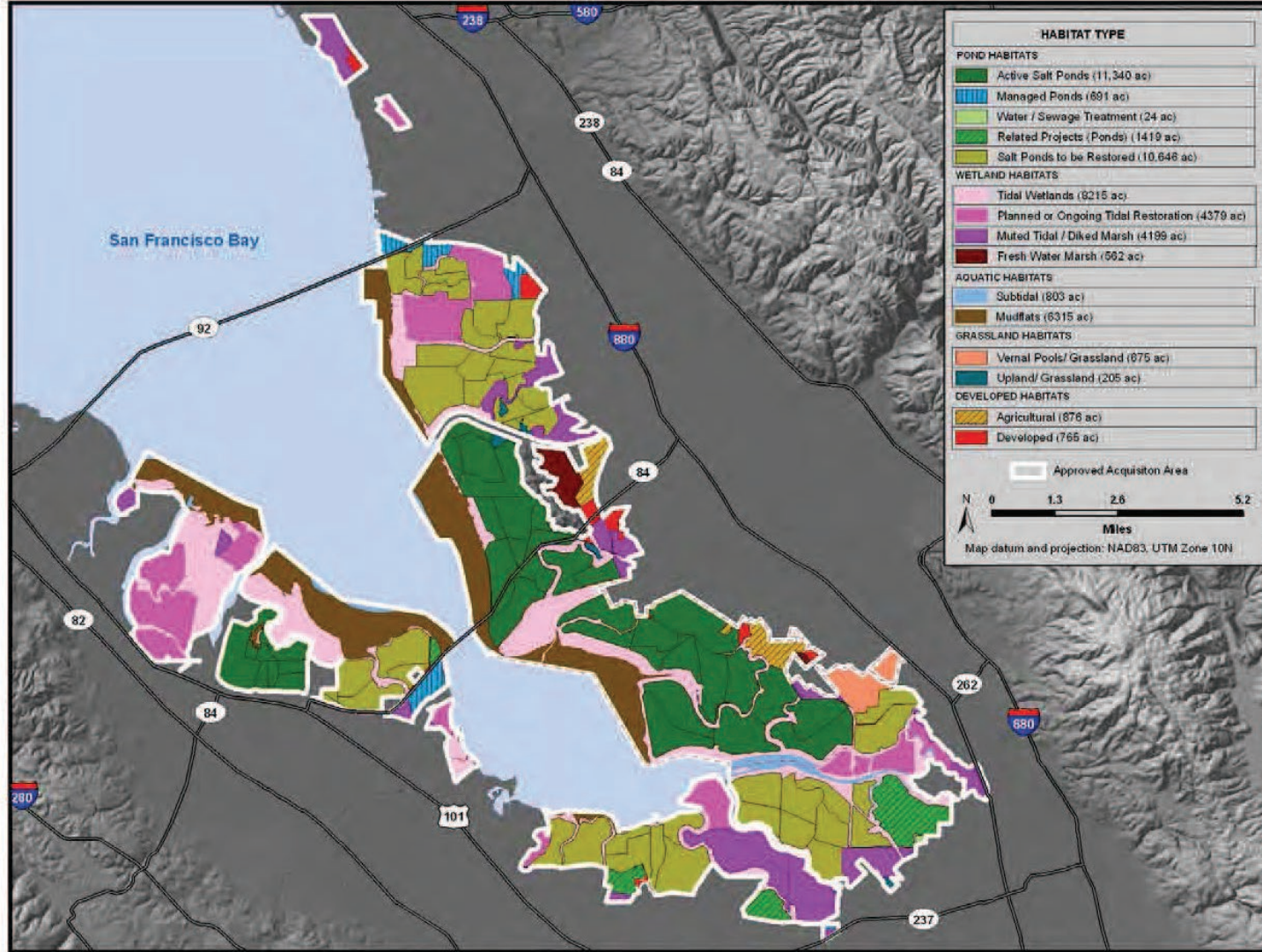


Figure 3.5. Map of habitat types mapped within the Don Edwards San Francisco Bay National Wildlife Refuge’s approved acquisition boundary. Vernal pool grasslands are present in the southeast on the Mowry Unit, Warm Springs Seasonal Wetland sub-unit. Taken from Figure 16 of the 2012 Comprehensive Conservation Plan for the Refuge (Service 2012a).

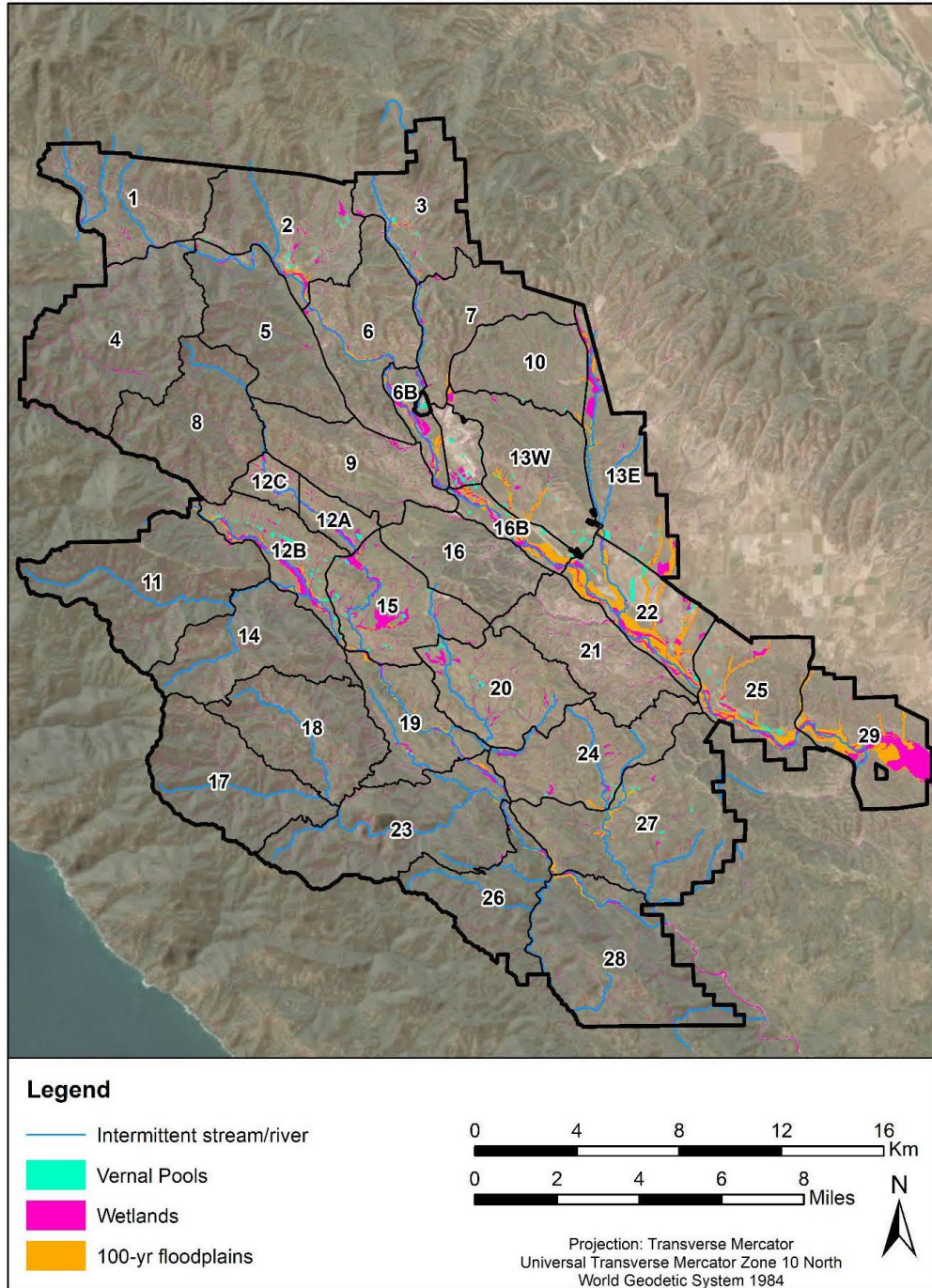


Figure 3.6. Map of the wetlands and various Training Areas within Fort Hunter Liggett. The cantonment is the unnumbered section near the center of the installation between Training Areas 13W, 16B, 6B, and 7. Taken from Figure 3 of the Integrated Natural Resource Management Plan for Fort Hunter Liggett (DOD 2023).

3.3.2. Military Lands

Within the Central Coast Vernal Pool Region, the vernal pool fairy shrimp is known to occur on the Fort Hunter Liggett military installation. There are no military lands with known occurrences of the vernal pool fairy shrimp in this region.

The approximately 167,000-acre Fort Hunter Liggett military installation is located in southwestern Monterey County and is owned by the Department of Defense (DOD). The most recent Integrated Natural Resource Management Plan for Fort Hunter Liggett was finalized in 2023 and includes the vernal pool fairy shrimp (DOD 2023). The Fort encompasses much of the headwaters of the Nacimiento and San Antonio River watersheds and there are a total of 8,620 acres of wetland features documented throughout the installation, though only a fraction of these wetlands are vernal pools (Figure 3.6; DOD 2023). A total of 306 vernal pools have been documented, though a majority of the vernal pools are somewhat artificial, being created by soil compaction in areas such as abandoned borrow sites and adjacent to roadways. There are 13 Diversity Database occurrences of the vernal pool fairy shrimp that were first documented in 1995 and 4 more first documented in 2000 (Diversity Database 2022). The vernal pool fairy shrimp was found in a total of 65 vernal pools during surveys in 2000, with 1 additional occupied pool discovered in 2008 (DOD 2023). Vernal pool fairy shrimp sites are concentrated in the San Antonio Valley in the cantonment area and Training Areas 13, 16B, 22, and 25, with two additional sites in the Nacimiento Valley in Training Area 20 (**Figure 3.6**). Approximately 1,800-acres of vernal pool fairy shrimp habitat have been designated as a Sensitive Resource Management Area in Training Areas 13E, 13W, and 22. Management of vernal pools on Fort Hunter Liggett includes annual monitoring for species presence, evidence of disturbance, adequacy of protection measures, exotic species encroachment, and evidence of succession (DOD 2023). In 2018, wet season disturbance monitoring found recent disturbance to twelve vernal pools, four of which were occupied by the vernal pool fairy shrimp. Some of the reported disturbance was caused by vehicles, but these appeared to be random incidents rather than a recurring problem (DOD 2023).

3.3.3. Bureau of Land Management

The Bureau of Land Management (BLM) owns a large block of land around the border of San Benito and Fresno Counties (**Figure 3.2**). This area includes many large grazing allotments as well as the San Benito Wilderness Study Area. There are also many small blocks of BLM land throughout and adjacent to the Central Coast Vernal Pool Region, particularly in the southern half of the region. However, the Service is unaware of any vernal pool habitat or occurrences of the vernal pool fairy shrimp or vernal pool tadpole shrimp within these areas.

3.3.4. Other Federal Lands

There are no other federal lands in this region with known occurrences of the vernal pool fairy shrimp or vernal pool tadpole shrimp. Both Pinnacles National Park and the northernmost part of Los Padres National Forest are immediately adjacent to the Central Coast Vernal Pool Region. On Pinnacles, two vernal pools, one drainage pool, and one artificial pond were surveyed in 2022–2023; neither vernal pool fairy shrimp or vernal pool tadpole shrimp were observed, though one vernal pool did contain the California fairy shrimp (*Linderiella occidentalis*) (M.

Ogonowski, Service, *in litt.* 2023b). The portions of Los Padres National Forest near the Central Coast Vernal Pool Region are not currently known to contain any vernal pool habitat.

3.4. Conservation Banks

There are no conservation or mitigation banks with known occurrences of the vernal pool fairy shrimp or vernal pool tadpole shrimp in the Central Coast Vernal Pool Region.

3.5. Habitat Conservation Plans

There are two regional Habitat Conservation Plans (HCPs) within the Central Coast Vernal Pool Region that include the three shrimp species as a Covered Species. Although the Conservancy fairy shrimp is not found in the Central Coast Vernal Pool Region, these HCPs spans multiple regions and therefore covers all three shrimp species.

3.5.1. PG&E Bay Area Operations and Maintenance HCP

The Pacific Gas & Electric Company's (PG&E) Bay Area Operations and Maintenance HCP covers PG&E activities within nine San Francisco Bay Area counties, spanning the Solano-Colusa, Lake-Napa, Livermore, and Central Coast Vernal Pool Regions (ICF 2017). This HCP was permitted in 2017 and has a 30-year permit term. The purpose of the HCP is to enable PG&E to continue to conduct current and future operations and maintenance activities within the nine Bay Area counties while avoiding, minimizing, and mitigating temporary and permanent impacts on threatened and endangered species habitat. The HCP's conservation strategy includes mitigation for permanent and temporary impacts to species habitat, which may be in the form of purchasing and/or placing easements on high quality habitat, purchase of conservation bank credits, contributions to existing conservation planning and recovery efforts, or habitat enhancement or restoration.

The HCP's Habitat Models estimated that 66,917 acres of vernal pool fairy shrimp habitat, 61,664 acres of vernal pool tadpole shrimp habitat, and 5,260 acres of Conservancy fairy shrimp habitat exists in the nine Bay Area counties (ICF 2017). Of this total habitat the HCP estimates that 4,963 acres, 4,382 acres, and 292 acres of habitat for each species, respectively, are within the HCP's Plan Area (PG&E lands, etc.) where Covered Activities will take place (ICF 2017). The HCP estimated permanent and temporary losses of vernal pool fairy shrimp habitat and vernal pool tadpole shrimp habitat to be 5 acres and 25 acres, respectively. The HCP estimated permanent and temporary losses of Conservancy fairy shrimp habitat to be 0.5 acres and 2 acres, respectively. Permanent loss of habitat will be mitigated at a 3:1 ratio and temporary habitat loss at a 1:1 ratio. Therefore, a total of 40 acres of vernal pool fairy shrimp habitat will be preserved in perpetuity; this mitigation is anticipated to occur in the Solano-Colusa and/or Livermore Vernal Pool Regions. Also, a total of 3.5 acres of Conservancy fairy shrimp habitat will be preserved in perpetuity; this mitigation is anticipated to occur in the Solano County. As of December 31, 2020, there have been no impacts to the three shrimp species from covered activities and no mitigation lands have been acquired for the three shrimp species (PG&E 2021).

3.5.2. PG&E Multiple Region Operations and Maintenance HCP

See section 2.5.1 for a description of this HCP.

3.6. Other Preserves

The Sans Topo Ranch is generally located southeast of Pinnacles National Park. The vernal pool fairy shrimp was documented by the Ventura Fish and Wildlife Office in two vernal pools during one day of surveys and may occur in additional pools (Ogonowski, *in litt.* 2023a). The ranch is approximately 5,000 acres and is almost entirely within the San Benito Core Area. In 2023, approximately 4,500 acres of the ranch were protected under a conservation easement with funding from a Section 6 Non-Traditional Recovery Lands Acquisition grant.

The Panoche Valley Preserve is a 26,419-acre preserve designated as compensatory mitigation for the Panoche Valley Solar Project in San Benito County near the border with Fresno County (Ogonowski, *in litt.* 2023a). It is outside of the defined boundary of the Central Coast Vernal Pool Region. Vernal pools mainly occur in the northwestern portion of the preserve, which is along Little Panoche Road and surrounds the solar development. California tiger salamanders (*Ambystoma californiense*) have been documented in several pools in the preserve, but the vernal pool fairy shrimp and vernal pool tadpole shrimp have only been documented in pools just outside of the preserve. The vernal pool fairy shrimp was documented in 2019–2021 in two pools in the center of the solar development, as well as in 2019 in one pool north of the preserve. The vernal pool tadpole shrimp was documented in 2019–2021 in one pool near the northwest corner of the preserve.

3.7. Vernal Pool Core Areas

There are two Core Areas within the Central Coast Vernal Pool Region that are designated in the Recovery Plan for the vernal pool fairy shrimp: Fort Hunter Liggett and San Benito. 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.

There is one Core Area within the Central Coast Vernal Pool Region that is designated in the Recovery Plan for the vernal pool tadpole shrimp: Southeastern San Francisco Bay. The core area has met the target of 85% of vernal pool habitat protected.

3.7.1. Fort Hunter Liggett

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 southwestern Monterey 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. Still, we can attempt to approximate the percentage of protected vernal pool habitat based on other available information. Approximately 81% of this core area is within Fort Hunter Liggett. There are a total of 8,620 acres of wetland features documented throughout the Fort, though only a fraction of these wetlands are vernal pools (DOD 2023). A majority of the vernal pools are somewhat artificial, being created soil compaction in areas such as abandoned borrow sites and adjacent to roadways. The majority of the Training Areas with vernal pool fairy shrimp sites are within the core area, which generally follows the San Antonio River. Vernal pool habitat has been protected within an 1,800-acre Sensitive Resource Management Area in

Training Areas 13E, 13W, and 22, which are in the northwestern half of the core area (**Figure 3.6, Figure 3.7**). Thus, a majority of vernal pool habitat is likely protected within this core area, though vernal pools in the southeastern portion of the core area, either within or outside of Fort Hunter Liggett, remain unprotected. However, these areas are not protected in perpetuity under a conservation easement or deed restriction, and could conceivably be subject to changes in management if Federal priorities shift or if the installation is ever closed and the land is transferred to a different landowner. In addition, vernal pool habitat within Fort Hunter Liggett is sometimes disturbed despite the protective measures in the Integrated Natural Resources Management Plan; in 2018, 12 vernal pools were found to be disturbed during routine monitoring efforts (DOD 2023).

3.7.1.1. Vernal Pool Fairy Shrimp Occurrences

There are 14 occurrence records from the Diversity Database for the vernal pool fairy shrimp within this core area and 3 other occurrences nearby, all of which are within the Fort Hunter Liggett military installation (see **Figure 3.7**; Diversity Database 2022). The vernal pool fairy shrimp was first detected at Fort Hunter Liggett in 1995 after the species was listed, and all 17 of the occurrences were known prior to 2005 when the Recovery Plan was published (Diversity Database 2022). All occurrences are presumed extant. The vernal pool fairy shrimp was found in a total of 65 vernal pools during surveys in 2000, with 1 additional occupied pool discovered in 2008 (DOD 2013). Vernal pool fairy shrimp sites are concentrated in the San Antonio Valley in the cantonment area and Training Areas 13, 16B, 22, and 25, with two additional sites in the Nacimiento Valley in Training Area 20 (**Figure 3.6**).

Fort Hunter-Liggett Core Area - Protected Lands

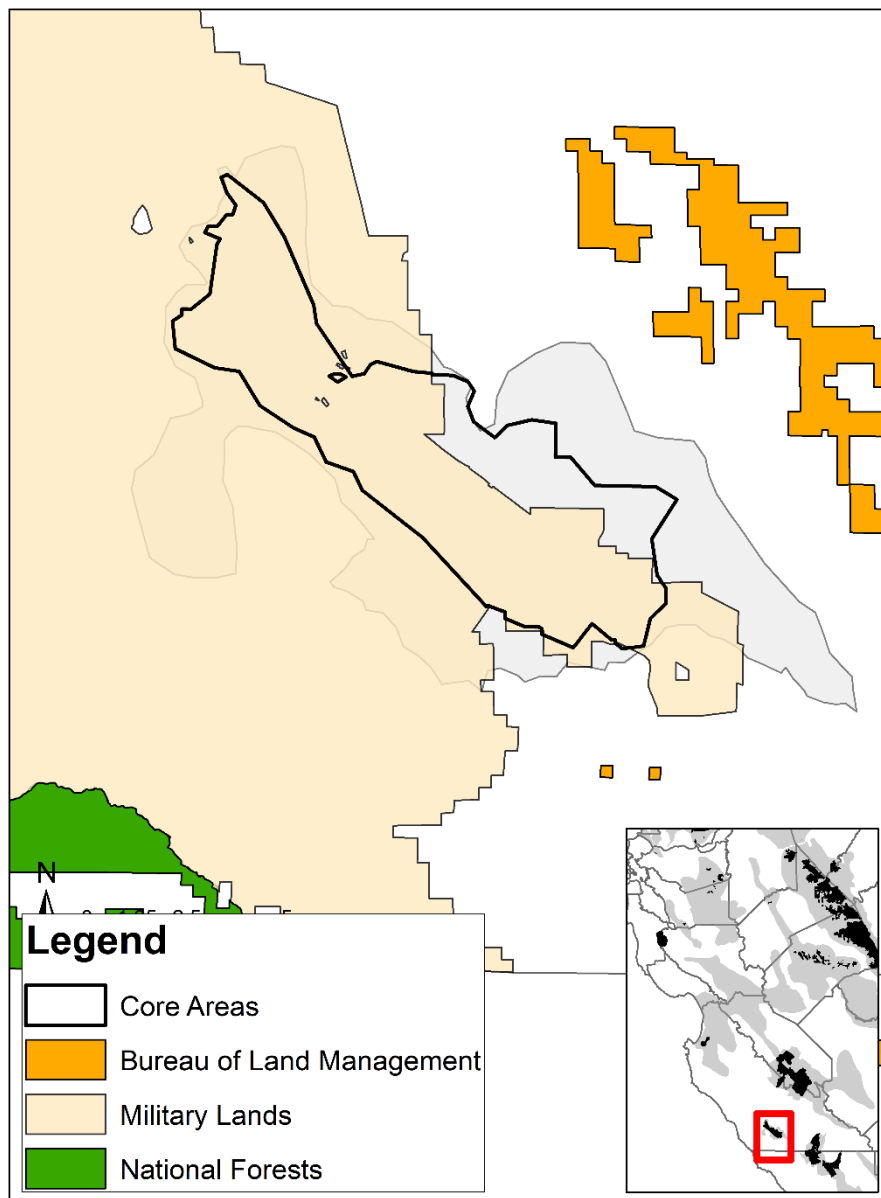


Figure 3.7. Map of all protected lands within the Fort Hunter Liggett Core Area. Diversity Database (2022) records have been redacted from the map to comply with CDFW's Diversity Database Data Use Guidelines.

3.7.2. San Benito

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 southwestern San Benito County, extending slightly into Monterey County.

There is no estimate of how many acres of vernal pool complex existed in this core area in 2005 or today. The Service's Ventura Fish and Wildlife Office is currently working with a number of landowners in San Benito County on a conservation easement effort through which the Service is identifying suitable/occupied vernal pool fairy shrimp habitat (M. Ogonowski, Service, *in litt.* 2021). As of 2023, one of these properties had been protected under a conservation easement: Sans Topo Ranch (Ogonowski, *in litt.* 2023a). Approximately 4,500 acres of Sans Topo Ranch has been protected within this core area, some of which contains vernal pool habitat that is known to support the vernal pool fairy shrimp. The APC Ranch has also been proposed as a conservation bank and may be protected in the future.

3.7.2.1. Vernal Pool Fairy Shrimp Occurrences

There is one occurrence record for the vernal pool fairy shrimp within this core area in the Diversity Database (see **Figure 3.8**; Diversity Database 2022). This record was recorded in 1987; the location data is very imprecise, being described only as "1.5 miles east of the junction of Smoker Canyon and the San Benito River." The occurrence is presumed extant, though it has not been surveyed since 1987 to the Service's knowledge. There are four additional occurrences within or immediately adjacent to the core area: Sans Topo Ranch southeast of Pinnacles National Park, and APC Ranch and two other ranches surveyed by the Ventura Fish and Wildlife Office east of Pinnacles National Park (Ogonowski, *in litt.* 2023a). These occurrences were all documented between 2019 and 2023.

San Benito Core Area - Vernal Pool Fairy Shrimp

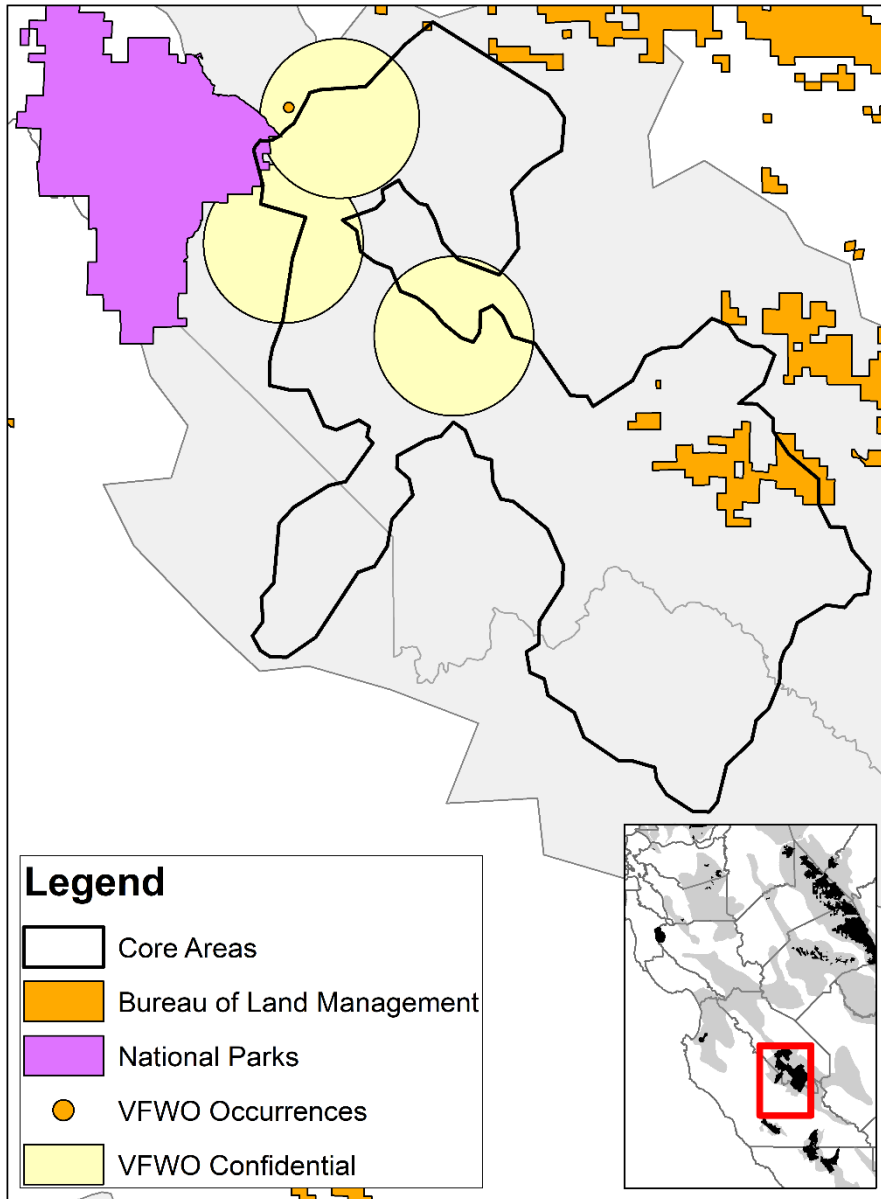


Figure 3.8. Map of known occurrences of vernal pool fairy shrimp provided by the Service’s Ventura Fish and Wildlife Office (VFWO) (Ogonowski, *in litt.* 2023a) and all protected lands within the San Benito Core Area. Sans Topo Ranch is not explicitly depicted, but is generally located within the southeasternmost confidential occurrence record. Diversity Database (2022) records have been redacted from the map to comply with CDFW’s Diversity Database Data Use Guidelines.

3.7.3. Southeastern San Francisco Bay

This is a zone 2 core area with a goal of protecting 85% of vernal pool habitat for the vernal pool tadpole shrimp. The core area is located in the City of Fremont, Alameda County, in the Don Edwards San Francisco Bay National Wildlife Refuge, Mowry Unit, Warm Springs Seasonal Wetland sub-unit.

The boundaries of this core area generally align with the Warm Springs Seasonal Wetland sub-unit of the Refuge. Approximately 675 acres of vernal pool grasslands have been mapped within the sub-unit (**Figure 3.5**), including 425 acres of restored vernal pool grasslands (Service 2012a). There are approximately 250 individual vernal pools on the Warm Springs Seasonal Wetland sub-unit with a total wetted acreage of 145 acres (WRA Environmental Consultants 2012). All of the extant vernal pool grassland within the core area has been protected within the Refuge.

3.7.3.1. Vernal Pool Tadpole Shrimp Occurrences

There is one Diversity Database occurrence record for the vernal pool tadpole shrimp within this core area, which is protected within the Refuge (see **Figure 3.9**; Diversity Database 2022). The vernal pool tadpole shrimp was identified in five vernal pools on the Warm Spring Seasonal Wetland sub-unit in 1993 and was consistently identified in surveys through 2004 (Diversity Database 2022) and during annual surveys from 2012 through 2023 (I. Loredo, Service, *in litt.* 2023). A total of 58 vernal pools are monitored each year, and the maximum number of pools where the species has been detected in one year is 52 pools in 2023 (Loredo, *in litt.* 2023). There is also a nearby occurrence, identified in 2016, just outside of the Refuge on a PG&E substation; this occurrence is on semi-natural, grazed grassland, with disturbance from grazing and occasional maintenance of the overhead powerlines (Diversity Database 2022).

SE San Francisco Bay Core Area - Protected Lands

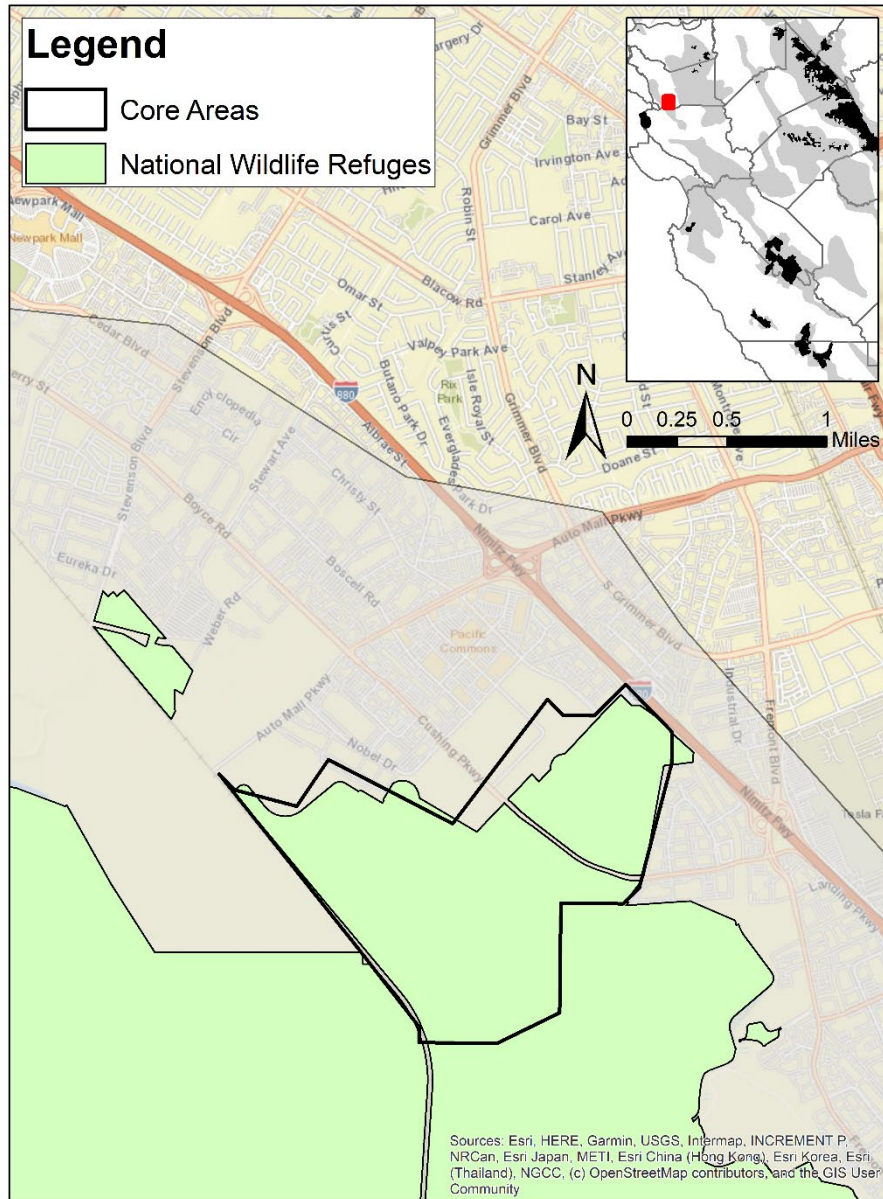


Figure 3.9. Map of all protected lands within the Southeastern San Francisco Bay Core Area. Diversity Database (2022) records have been redacted from the map to comply with CDFW’s Diversity Database Data Use Guidelines.