

14. WESTERN RIVERSIDE VERNAL POOL REGION

Only the vernal pool fairy shrimp is known to occur within the Western Riverside Vernal Pool Region.

14.1. Vernal Pool Habitat

The majority of the Western Riverside Vernal Pool Region is encompassed within the Western Riverside County Multi-Species Habitat Conservation Plan (Western Riverside HCP) (Dudek and Associates 2003a). Mapping of all vegetation types within the Western Riverside HCP Plan Area have occurred periodically. These mapping efforts have not been vernal pool specific, but one of the HCP's vegetation types is "playas and vernal pools." The first vegetation map was created in 1995 to provide information while preparing the Western Riverside HCP and was based on 1992-1993 aerial imagery (Dudek and Associates 2003a). The second vegetation map was created in 2005 after the HCP was permitted using different methodology and 2000-2001 aerial imagery; this map was updated in 2015 using 2012 aerial imagery (Aerial Information Systems 2015). For the most part, neither of these maps delineate entire vernal pool complexes that contain the pools and the specific upland areas that support them, and thus they cannot necessarily be used to assess recovery criteria success related to entire vernal pool complexes. Instead, individual pools and swales are typically delineated and surrounded by various vegetation communities (e.g., grassland, agricultural land, coastal sage scrub, chaparral, and woodland and forests).

The first vegetation map contains 42 polygons of playas and vernal pools for a total of 7,910 acres in 1992-1993, though most of this is in the area along Mystic Lake and the San Jacinto River where the vernal pool fairy shrimp is not known to occur (**Figure 14.1**; Dudek and Associates 2003a). The updated second vegetation map contains 78 polygons of playas and vernal pools totaling 2,655 acres in 2012 (**Figure 14.2**; Aerial Information Systems 2015). Differences are likely attributable mainly to methodological differences, though undoubtedly losses of vernal pools did occur during the 20-year gap between these two sets of aerial imagery. In some cases, there are known occurrence records of the vernal pool fairy shrimp that are not within the "playas and vernal pools" vegetation type or even adjacent grasslands, indicating that not all suitable habitat is captured by these vegetation maps.

The Western Riverside HCP mapped lands that were protected prior to the HCP being permitted and additional reserves protected by the HCP since being permitted (**Figure 14.3**). Not all of these protected lands contain vernal pool habitat.

14.2. Species Occurrences

14.2.1. Vernal Pool Fairy Shrimp

There are five occurrence records of the vernal pool fairy shrimp documented within the Western Riverside Vernal Pool Region in the Diversity Database (see **Figure 14.4**; Diversity Database 2022). All are presumed extant by the Diversity Database and all are within protected lands.

Western Riverside Habitat Conservation Plan Vegetation Types - 1994

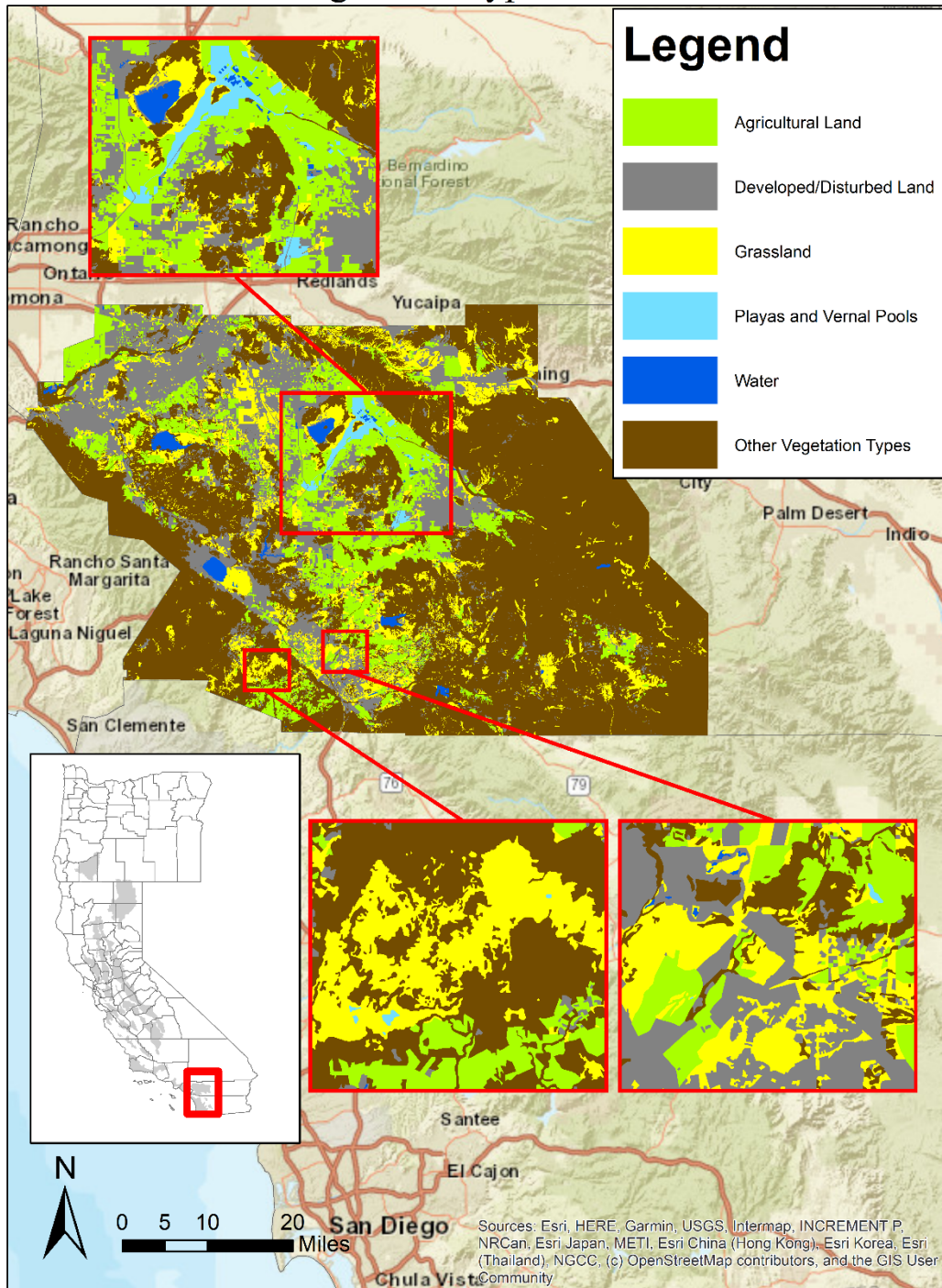


Figure 14.1. Map of vegetation types in western Riverside County in 1994, including playas and vernal pools (Dudek and Associates 2003a).

Western Riverside Habitat Conservation Plan Vegetation Types - 2012

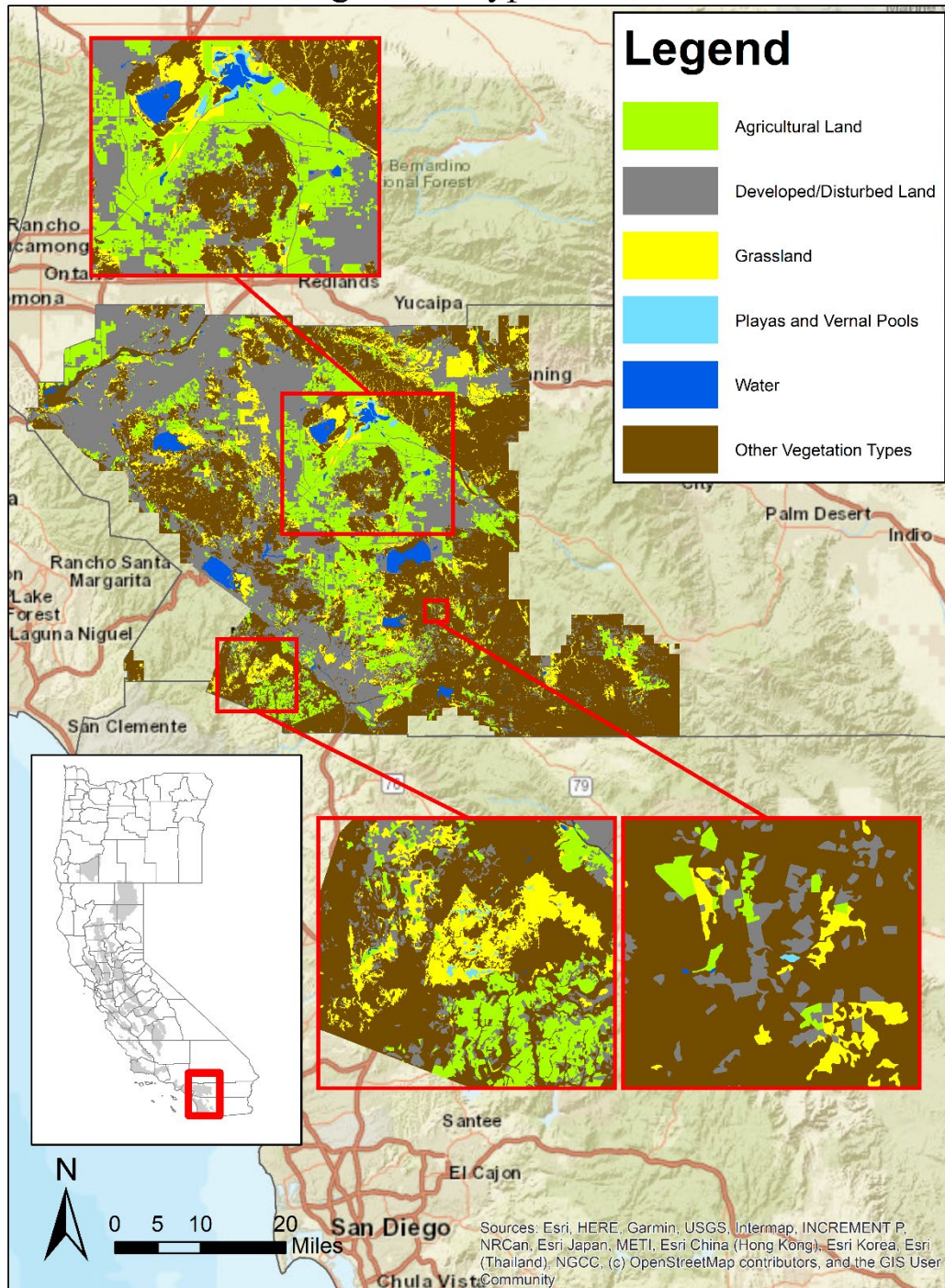


Figure 14.2. Map of vegetation types in western Riverside County in 2012, including playas and vernal pools (Aerial Information Systems 2015).

Western Riverside - Protected Lands

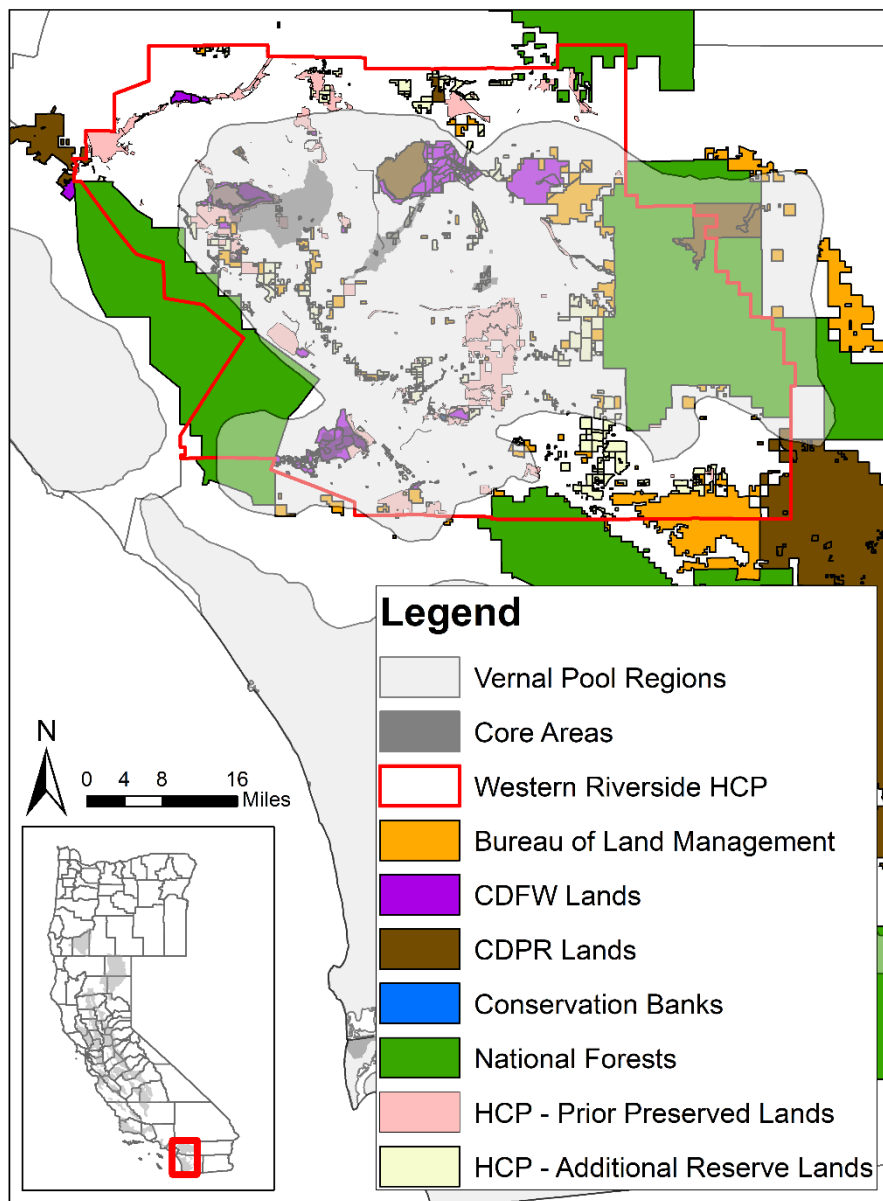


Figure 14.3. Map of protected areas and Habitat Conservation Plans (HCPs) within the Western Riverside Vernal Pool Region. Zoom in for finer resolution.

Western Riverside - Vernal Pool Fairy Shrimp

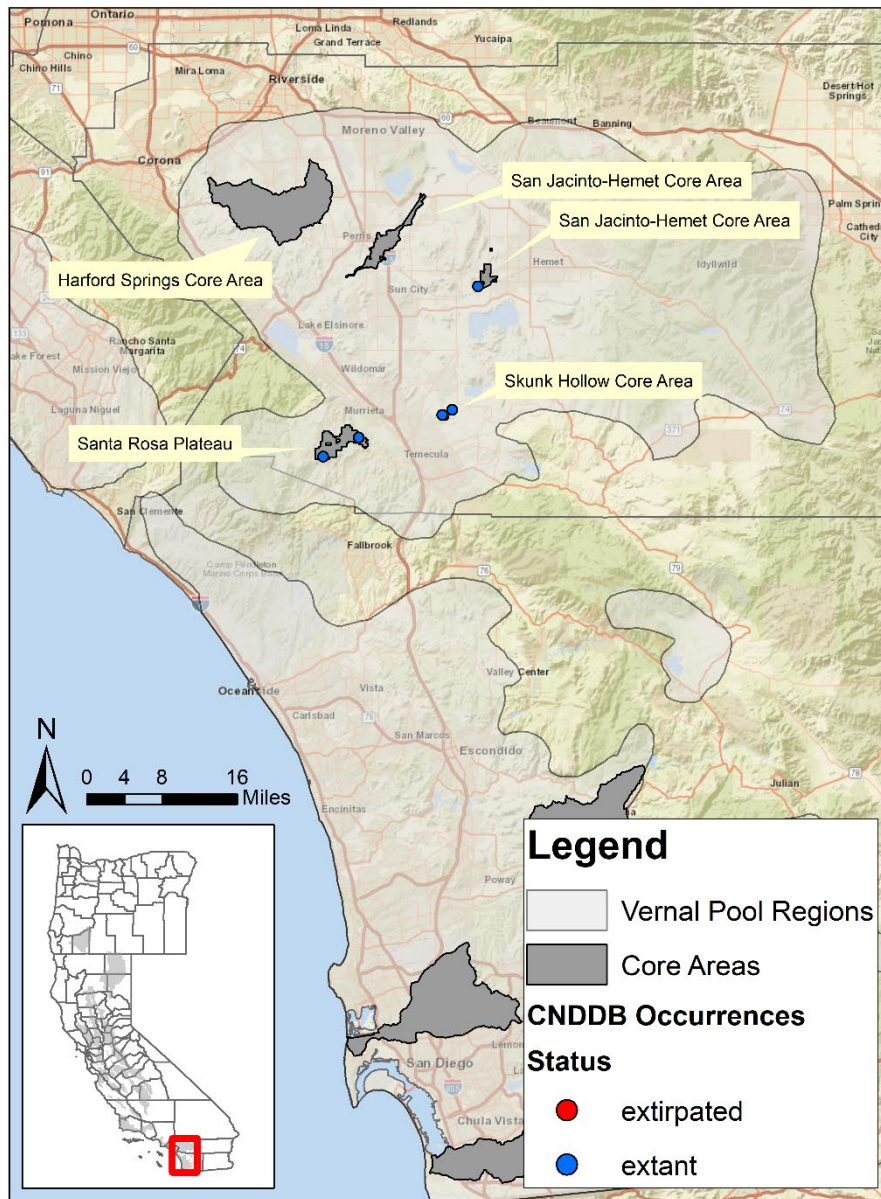


Figure 14.4. Map of known occurrences of vernal pool fairy shrimp recorded in the Diversity Database (2022) in the Western Riverside Vernal Pool Region. Points may represent individual pools, multiple pools, whole properties, or entire vernal pool grassland complexes. All four core areas in the region are displayed, though not all core areas are designated for the vernal pool fairy shrimp.

14.3. Federal Lands

14.3.1. National Wildlife Refuges

There are no National Wildlife Refuges with known occurrences of the vernal pool fairy shrimp in the Western Riverside Vernal Pool Region.

14.3.2. Military Lands

There are no military lands with known occurrences of the vernal pool fairy shrimp in the Western Riverside Vernal Pool Region.

14.3.3. Bureau of Land Management

The Western Riverside Vernal Pool Region is within the jurisdiction of the BLM's Palm Springs Office. Approximately 29,759 acres of BLM land occurs within the vernal pool region, though not in any of the areas with known occurrences of the vernal pool fairy shrimp.

14.3.4. Other Federal Lands

There are two National Forests, owned and managed by the Forest Service, within the Western Riverside Vernal Pool Region: Cleveland and San Bernardino (**Figure 14.3**). The Cleveland National Forest is 420,877 acres in size and is spread across Orange, Riverside, and San Diego Counties (USDA 2005a). A small portion of the northernmost unit of the Cleveland National Forest is within the Western Riverside Vernal Pool Region, and the southern units extend into the San Diego Vernal Pool Region. The only mention of vernal pools in the Cleveland National Forest's most recent Land Management Plan is in two potential management strategies: one to "survey wetlands, vernal pools, meadows, springs and stringer meadows for plant and wildlife species (e.g., spring snails, etc.)" and another to manage riparian conservation areas, which may include vernal pools (USDA 2005d). The San Bernardino National Forest is 665,753 acres in size and is spread across San Bernardino and Riverside Counties (USDA 2005a). A majority of the southern unit of the San Bernardino National Forest overlaps the eastern portion of the Western Riverside Vernal Pool Region. Vernal pools are never mentioned in the San Bernardino National Forest's most recent Land Management Plan (USDA 2005e), so the Service assumes that no vernal pool habitat is known to be present. There are no records of the vernal pool fairy shrimp within either the Cleveland or San Bernardino National Forests (Diversity Database 2022).

14.4. Conservation Banks

There is one mitigation banks with known occurrences of the vernal pool fairy shrimp in the Western Riverside Vernal Pool Region: Barry Jones Wetland Mitigation Bank (a.k.a., Skunk Hollow Vernal Pool Preserve) (**Figure 14.3**). This bank is located in the French Valley and was established in 1997 as mitigation for the adjacent Rancho Bella Vista development project (CNLM 2009). A CDFW conservation easement was placed over the property in 2002 and the Center for Natural Lands Management (CNLM) took fee-title and management responsibilities over the bank in 2003 (CNLM 2023). This bank protects one large vernal pool, the 33-acre Skunk Hollow pool, and 107 acres of uplands, which represents 90% of the pool's watershed

(CNLM 2009). There are seven additional smaller vernal pools within the watershed that can fill when precipitation is above average (CNLM 2023). The vernal pool fairy shrimp has been repeatedly documented within the Skunk Hollow pool (Diversity Database 2022). Management goals for the property include maintaining the vernal pool ecosystem function of the site, and management activities include monitoring and invasive species control (CNLM 2006). This property functions more like a preserve than a mitigation bank; the endowment was fully funded up front by the Rancho Bella Vista developer and the sale of mitigation credits simply allows some amount of financial return (CNLM 2006). There are a total of 136 credits available, which are Clean Water Act 404 credits for vernal pool preservation (RIBITS 2021).

14.5. Habitat Conservation Plans

There is one regional Habitat Conservation Plan (HCP) within the Western Riverside Vernal Pool Region that includes the vernal pool fairy shrimp as a Covered Species (**Figure 14.3**). One other HCP, the San Diego County Water Authority Subregional HCP, does not include the vernal pool fairy shrimp as a covered species, but does recognize the possibility of future projects that extend into Riverside County (SDCWA and RECON Environmental 2010). If take coverage for the vernal pool fairy shrimp is required in the future then a Major Amendment to the plan will be required.

14.5.1. Western Riverside County Multiple Species HCP

The Western Riverside County Multiple Species HCP covers the westernmost quarter of Riverside County and overlaps the vast majority of the vernal pool region (Dudek and Associates 2003a). This HCP was permitted in 2004 and has a 75-year permit term, and the permittees are the Regional Conservation Authority, Riverside County, Riverside County Flood Control, Riverside County Parks, Riverside County Department of Waste Resources, Riverside County Transportation Commission, the Cities (Banning, Beaumont, Calimesa, Canyon Lake, Corona, Hemet, Lake Elsinore, Moreno Valley, Murrieta, Norco, Perris, Riverside, San Jacinto, and Temecula), Caltrans, and the California Department of Parks and Recreation. The goal of the HCP is to allow Riverside County and its Cities to better control local land-use decisions and maintain a strong economic climate in the region while addressing the requirements of the state and federal Endangered Species Acts. The HCP's conservation strategy will result in a Conservation Area of over 500,000 acres for 146 Covered Species, including 347,000 acres of already existing public/quasi-public lands and 153,000 acres of additional reserve lands (56,000 acres from federal and state partners and 97,000 acres from local permittees).

The vernal pool fairy shrimp is known to be present in vernal pools at three locations within the Plan Area: Santa Rosa Plateau Ecological Reserve, Skunk Hollow, and Salt Creek in west Hemet (Dudek and Associates 2003b). Habitat for the vernal pool fairy shrimp was modeled as all playas and vernal pools (543 acres) and alkali soils from the floodplain of the San Jacinto River and West Hemet portion of Salt Creek (6,663 acres). Over the permit term, Covered Activities may affect up to 67 acres (12%) of playa and vernal pool habitat within the Plan Area and up to 4,016 acres (60%) of alkali floodplain soils within the Plan Area. The HCP has four specific objectives related to protecting the vernal pool fairy shrimp:

- 1) Include in the Conservation Area at least 476 acres of suitable habitat by conserving vernal pool and playa habitat (does not include watershed acreages) in the three known occupied areas.
- 2) Include in the Conservation Area at least 2,647 acres of alkali playa in the floodplains of the San Jacinto River and west Hemet portion of Salt Creek, which contains suitable habitat for the species.
- 3) Include in the Conservation Area at least three HCP Core Areas (blocks of habitat of appropriate size, configuration, and vegetation characteristics to support the species) that include the three known occupied vernal pools/vernal pool complexes and their watersheds in the West Hemet portion of Salt Creek (4,043 acres), Santa Rosa Plateau Ecological Reserve (17,188 acres), and Skunk Hollow (156 acres).
- 4) Include in the Conservation Area any additional areas within the Criteria Area identified as important for the vernal pool fairy shrimp. If suitable vernal pool fairy shrimp habitat is identified within the boundary of a proposed project, a wet-season or dry-season survey will be conducted. If the vernal pool fairy shrimp is found, 90% of the occupied portions of the property shall be conserved.

As of December 31, 2021, a total of 64,123 acres of additional reserve land had been preserved (Western Riverside County Regional Conservation Authority 2022). All of the known occurrences of the vernal pool fairy shrimp have been protected within the HCP's Conservation Area.

14.6. Other Preserves

There are a variety of other preserved areas throughout this region either owned or with conservation easements held by CDFW, CDPR, other public agencies, and private land trusts (**Figure 14.3**). This section will focus only on the preserves that are in the immediate vicinity of the five known occurrences of the vernal pool fairy shrimp.

CDFW owns two preserves in this region: Santa Rosa Plateau Ecological Reserve and French Valley Wildlife Area. The 7,589-acre Santa Rosa Plateau Ecological Reserve comprises most of the Santa Rosa Plateau Core Area and also extends west of the Core Area. Land owned by Riverside County Parks abut the eastern side of the Ecological Reserve. Vegetation types on the Ecological Reserve were mostly mapped as grassland with vernal pools throughout (**Figure 14.1, Figure 14.2**). The vernal pool fairy shrimp was detected at the western end of the Santa Rosa Plateau in 1972 and on both the eastern and western end of the Plateau in 1988 (Diversity Database 2022). The species has been detected repeatedly throughout the years, with the most recent detections in 2010 (Diversity Database 2022). The 671-acre French Valley Wildlife Area is adjacent to the Skunk Hollow Core Area. Vegetation types on the Wildlife Area were mostly mapped as agricultural land (**Figure 14.1, Figure 14.2**). The vernal pool fairy shrimp has not been documented on the Wildlife Area, though it is known to occur on the Johnson Ranch Preserve immediately to the north (CNLM 2019).

Also in the French Valley area is the 930-acre Johnson Ranch Preserve, which surrounds the French Valley Wildlife Area. This preserve was established in 2000 as mitigation for the Assessment District 161 project and is owned by Riverside County and managed by CNLM

(CNLM 2019). CNLM is required to conduct period surveys for the Riverside fairy shrimp (*Streptocephalus woottoni*), and the vernal pool fairy shrimp has been documented during these surveys as well. The preserve protects multiple natural and artificial vernal pool features. One natural pool and one stock pond on the preserve have been found to support the vernal pool fairy shrimp. The vernal pool fairy shrimp was most recently documented in both of these features in 2019 (CNLM 2019). Part of the preserve is adjacent to the Barry Jones Wetland Mitigation Bank (a.k.a., Skunk Hollow Vernal Pool Preserve) and protects an additional 8% of the Skunk Hollow pool's watershed, beyond the 90% protected within the bank.

In addition to these preserved areas, there are numerous other protected lands that are part of the Western Riverside County Multispecies HCP's Conservation Area, both public/quasi-public lands that were already preserved when the HCP permit was issued in 2004 and additional reserve lands that have been acquired since. Several of these additional reserve lands are located on or near areas known to be occupied by the vernal pool fairy shrimp, generally within or adjacent to the three Core Areas that were designated for the vernal pool fairy shrimp in the region.

14.7. Vernal Pool Core Areas

There are four Core Areas within the Western Riverside Vernal Pool Region that are designated in the Recovery Plan for the vernal pool fairy shrimp: San Jacinto-Hemet, Santa Rosa Plateau, and Skunk Hollow. Two of the three core areas have met the target of 85% of vernal pool habitat protected.

14.7.1. San Jacinto-Hemet

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 composed of two disjunct areas located in western Riverside County: the area around Salt Creek west of the City of Hemet and the area around the San Jacinto River between the Ramona Expressway and Canyon Lake near the City of Perris.

There is no precise 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. Mapping of vegetation types within the Western Riverside HCP Plan Area based on 1992-1993 aerial imagery (see **Figure 14.5**; Dudek and Associates 2003a) show approximately 990 acres of vernal pool or playa habitat around Salt Creek and 1,260 acres of vernal pool or playa habitat around the San Jacinto River floodplain. This represents approximately 73% and 30% of the total area of the Salt Creek and San Jacinto River portions of the core area, respectively. However, it is possible that some of the adjacent areas classified as agricultural land or grassland are also habitat for the vernal pool fairy shrimp, or that some of the alkali playas are not suitable habitat for the vernal pool fairy shrimp. These areas were almost entirely reclassified as agricultural land or grassland based on 2012 aerial imagery (see **Figure 14.6**; Aerial Information Systems 2015), but this was mostly due to changes in the methods of mapping and classification. Because of these methodological changes, we cannot compare the two maps to estimate losses of vernal pool habitat between 1994 and 2012.

Approximately 543 acres have been protected within the Salt Creek portion of the core area and 1,137 acres have been protected within or adjacent to the San Jacinto River portion of the core area. This represents 40% and 27% of the entire area of the portions of the core area around Salt Creek and the San Jacinto River, respectively. Of these protected areas, 482 acres and 436 acres are within areas that were mapped as vernal pool or playa habitat in 1994 within the Salt Creek and San Jacinto River portions of the core area, respectively. Although this information is not sufficient to estimate percentages of loss and protection of vernal pool habitat since 2005, we can conclude that the target of protecting 85% of vernal pool habitat in the core area has not yet been achieved.

Protected lands within this core area include various preserves that were acquired as additional reserve land for the Western Riverside HCP Conservation Area and the channel owned by the Riverside County Flood Control District connecting Perris Reservoir to the San Jacinto River (**Figure 14.7**, **Figure 14.8**).

14.7.1.1. Vernal Pool Fairy Shrimp Occurrences

There is one Diversity Database occurrence record for the vernal pool fairy shrimp within this core area, which is protected within additional reserve lands for the Western Riverside HCP donated by the Riverside County Transportation Commission (see **Figure 14.7**; Diversity Database 2022). The vernal pool fairy shrimp was detected in one vernal pool within the greater Salt Creek vernal pool complex in 1998 and 2005 (Diversity Database 2022). There are no known occurrences of the vernal pool fairy shrimp around the San Jacinto River (**Figure 14.8**), though the Western Riverside HCP does say that there are alkali playas in the river's floodplain that provide suitable habitat for the vernal pool fairy shrimp (Dudek and Associates 2003b).

San Jacinto-Hemet Core Area - HCP Vegetation Types 1994

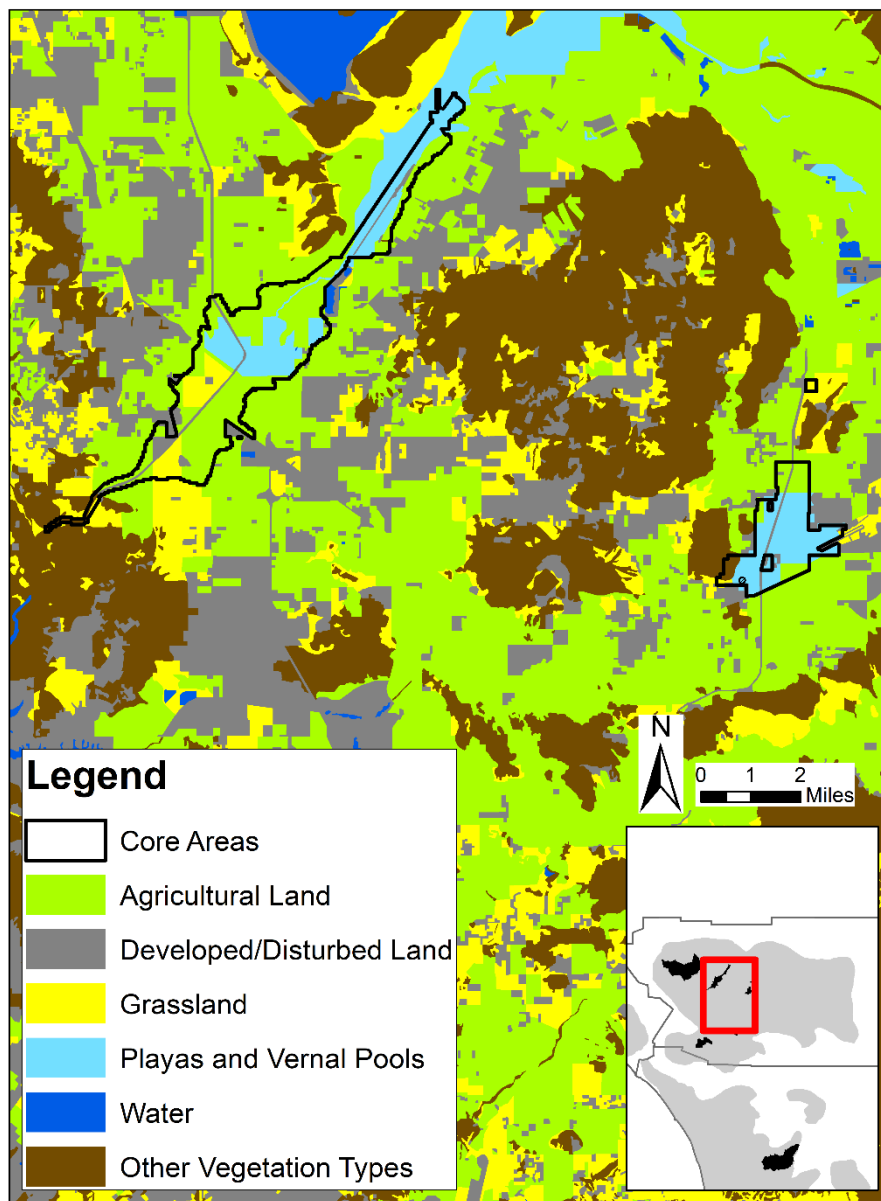


Figure 14.5. Map of vegetation types in the San Jacinto-Hemet Core Area in 1994, including playas and vernal pools, as mapped for the Western Riverside Habitat Conservation Plan (Dudek and Associates 2003a).

San Jacinto-Hemet Core Area - HCP Vegetation Types 2012

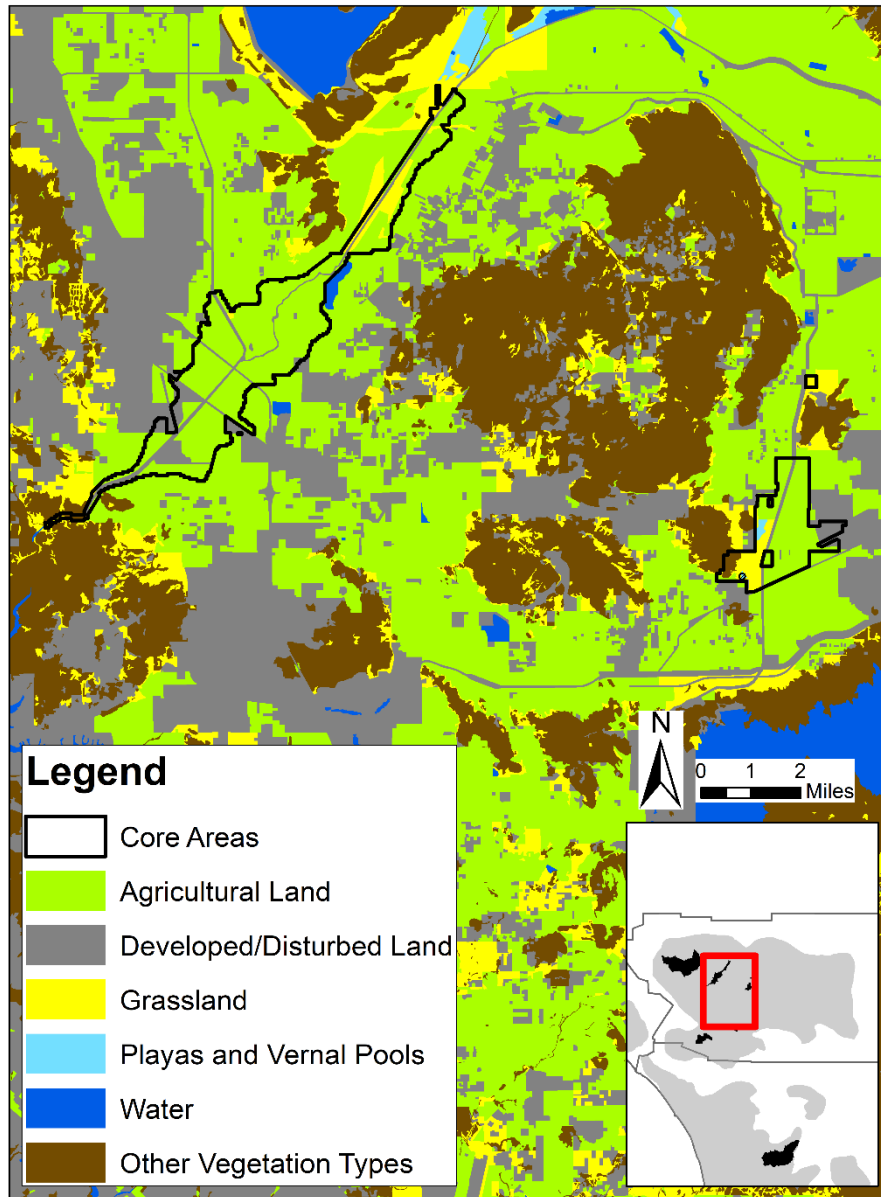


Figure 14.6. Map of vegetation types in the San Jacinto-Hemet Core Area in 2012, including playas and vernal pools, as mapped for the Western Riverside Habitat Conservation Plan (Aerial Information Systems 2015).

San Jacinto-Hemet Core Area (East) - Protected Lands

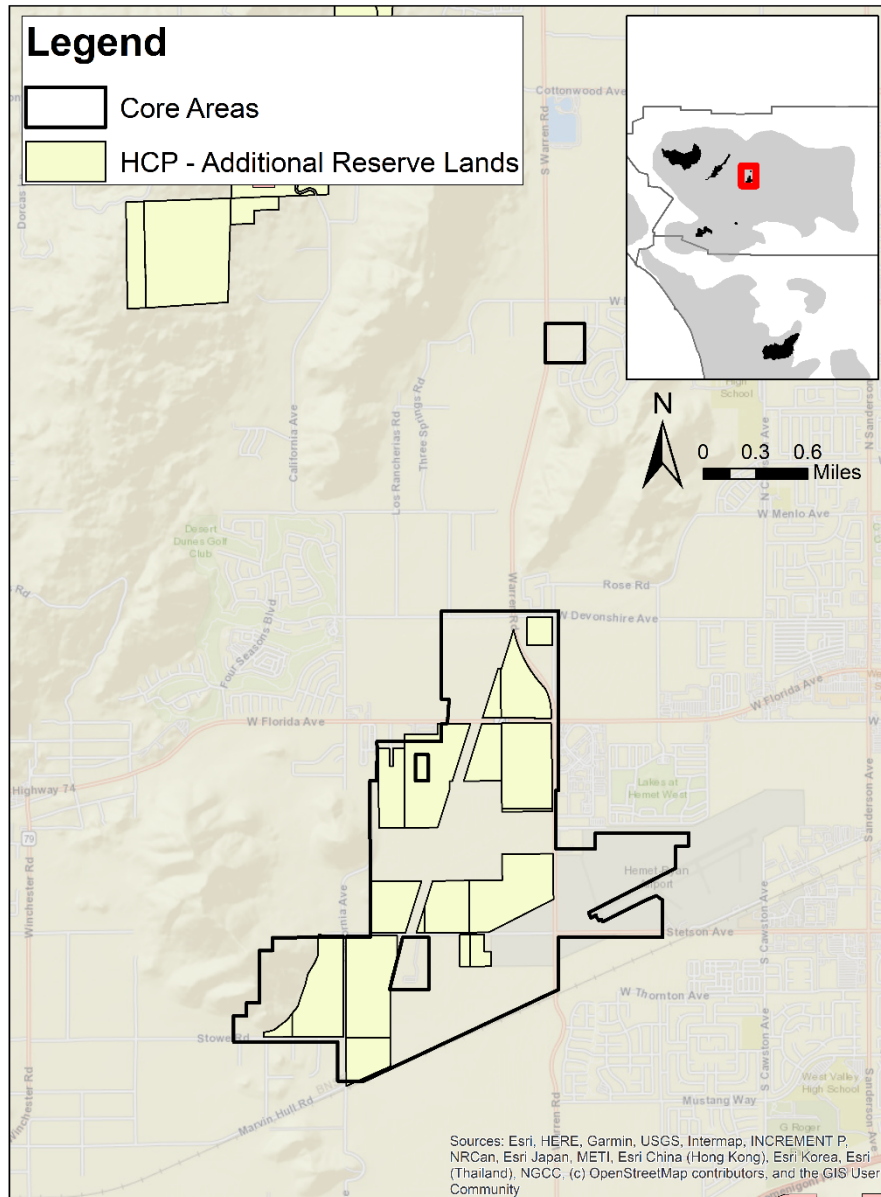


Figure 14.7. Map of all protected lands within the eastern portion of the San Jacinto-Hemet Core Area, which surrounds Salt Creek. Diversity Database (2022) records have been redacted from the map to comply with CDFW’s Diversity Database Data Use Guidelines. HCP = Habitat Conservation Plan.

San Jacinto-Hemet Core Area (West) - Protected Lands

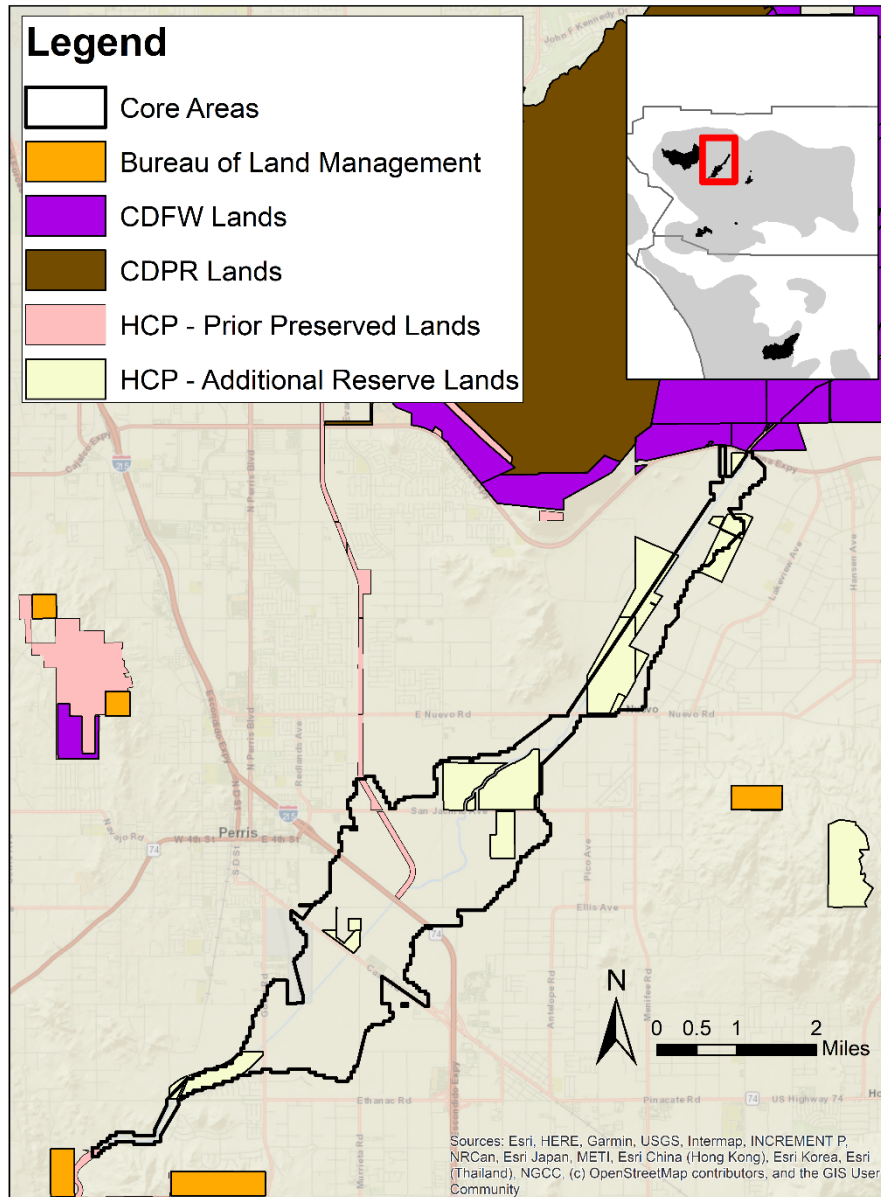


Figure 14.8. Map of all protected lands within the western portion of the San Jacinto-Hemet Core Area, which surrounds the San Jacinto River. There are no known occurrences of vernal pool fairy shrimp recorded in the Diversity Database (2022) in this portion of the core area. CDFW = California Department of Fish and Wildlife, CDPR = California Department Parks and Recreation, HCP = Habitat Conservation Plan.

14.7.2. Santa Rosa Plateau

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 Riverside County on the Santa Rosa Plateau southwest of the City of Murrieta.

There is no precise 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. Mapping of vegetation types within the Western Riverside HCP Plan Area based on 1992-1993 aerial imagery (see **Figure 14.9**; Dudek and Associates 2003a) and 2012 aerial imagery (see **Figure 14.10**; Aerial Information Systems 2015) both show that almost all of the core area is composed of grasslands, with playas or vernal pools in the southwestern and northeastern portions of the core area. However, not all of the grasslands on the Santa Rosa Plateau are vernal pool grasslands. Still, a comparison of these vegetation maps suggests that little to no losses of grasslands occurred within the core area between 1994 and 2012. Approximately 95% of the entire core area is within protected areas (**Figure 14.11**), including the areas occupied by the vernal pool fairy shrimp in the northeast and southwest. The only unprotected portion of the core area is a small bit of grassland in the southwestern corner of the core area. Therefore, it is very likely that the Recovery Plan's target of protecting 85% of vernal pool habitat in the core area has been achieved.

Protected lands within this core area include CDFW's Santa Rosa Plateau Ecological Reserve, several small preserves acquired by the Western Riverside HCP as additional reserve lands for the HCP's Conservation Area, and a small amount of Riverside County Parks land on the eastern edge of the Ecological Reserve (**Figure 14.11**).

14.7.2.1. Vernal Pool Fairy Shrimp Occurrences

There are two Diversity Database occurrence records for the vernal pool fairy shrimp within this core area, both of which are protected within CDFW's Santa Rosa Plateau Ecological Reserve (see **Figure 14.11**; Diversity Database 2022). The vernal pool fairy shrimp was detected at the western end of the Santa Rosa Plateau in 1972 and on both the eastern and western end of the Plateau in 1988 (Diversity Database 2022). The species has been detected repeatedly throughout the years, with the most recent detections in 2010 (Diversity Database 2022).

Santa Rosa Plateau Core Area - HCP Vegetation Types 1994

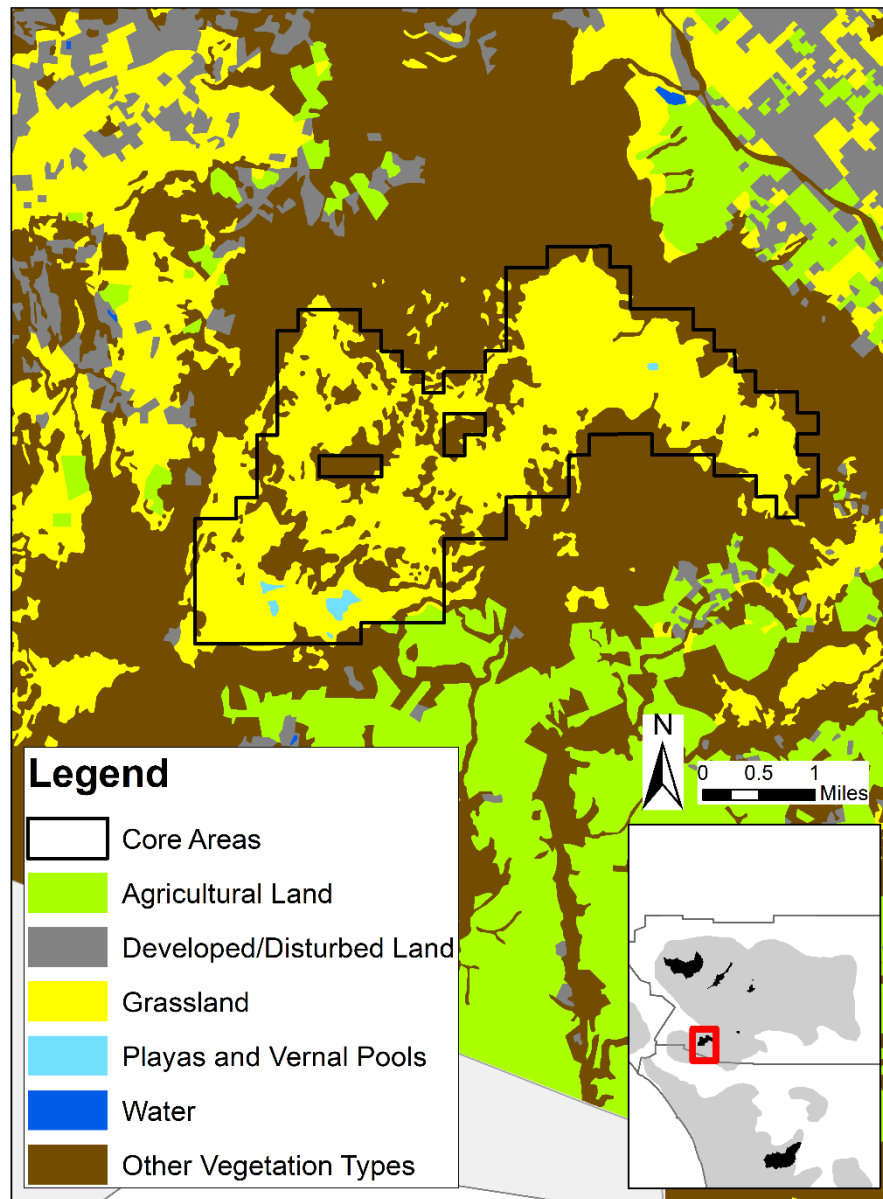


Figure 14.9. Map of vegetation types in the Santa Rosa Plateau Core Area in 1994, including playas and vernal pools, as mapped for the Western Riverside Habitat Conservation Plan (Dudek and Associates 2003a).

Santa Rosa Plateau Core Area - HCP Vegetation Types 2012

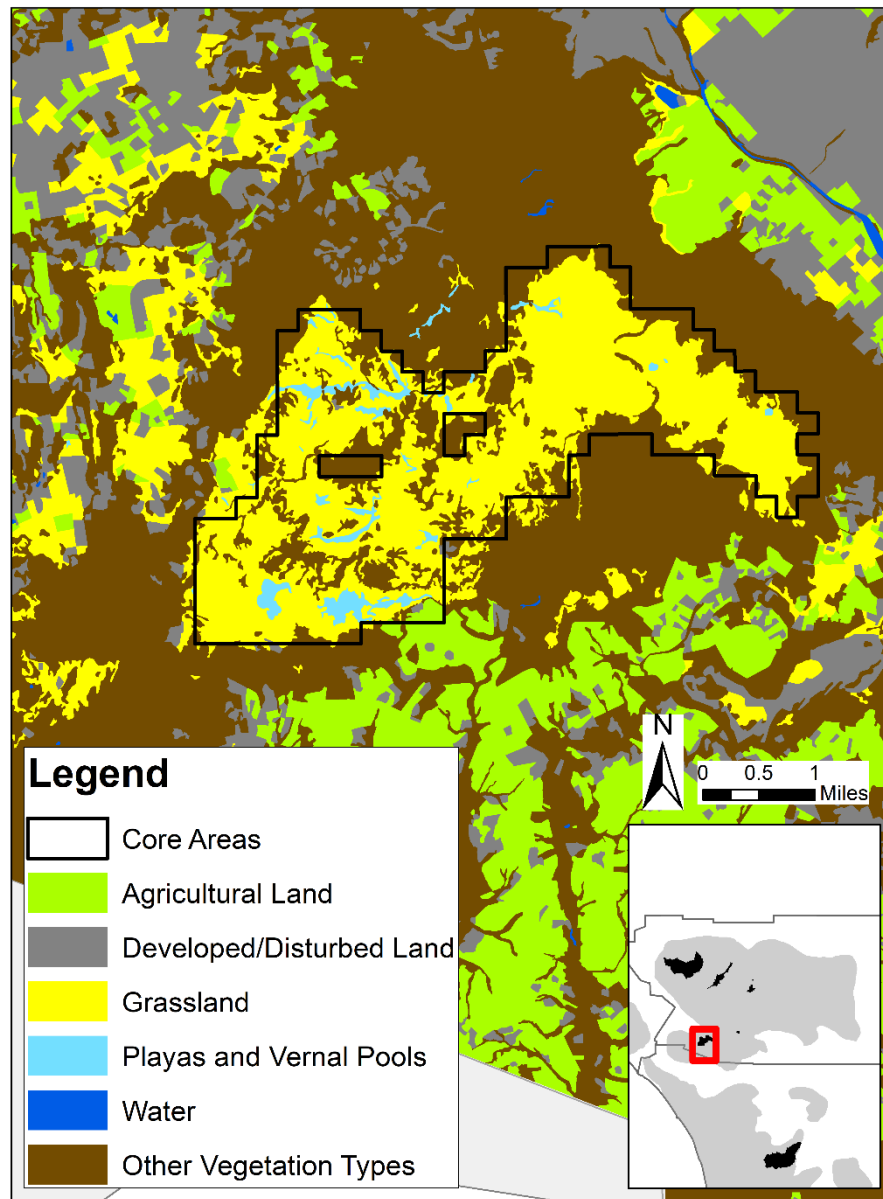


Figure 14.10. Map of vegetation types in the Santa Rosa Plateau Core Area in 2012, including playas and vernal pools, as mapped for the Western Riverside Habitat Conservation Plan (Aerial Information Systems 2015).

Santa Rosa Plateau Core Area - Protected Lands

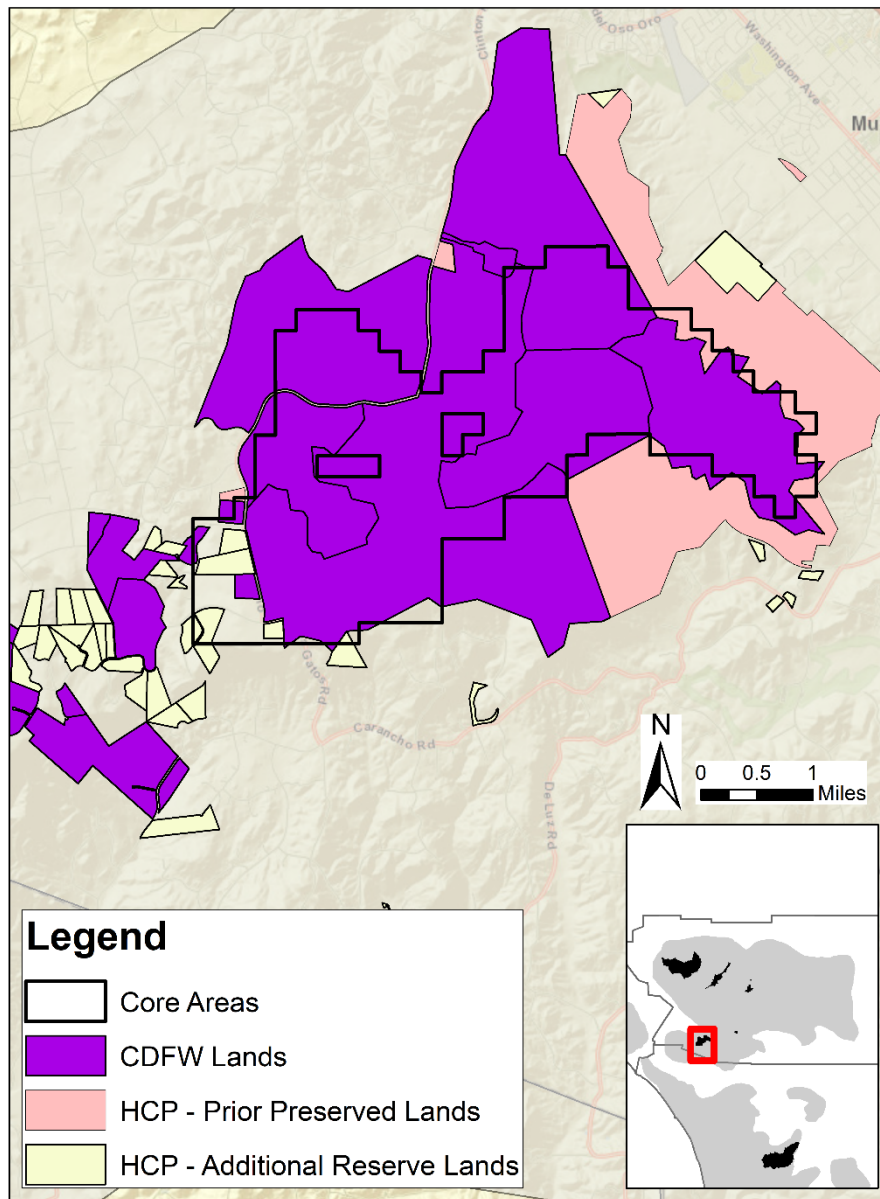


Figure 14.11. Map of all protected lands within the Santa Rosa Plateau Core Area. Diversity Database (2022) records have been redacted from the map to comply with CDFW's Diversity Database Data Use Guidelines. CDFW = California Department of Fish and Wildlife, HCP = Habitat Conservation Plan.

14.7.3. Skunk Hollow

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 Riverside County adjacent to the Rancho Bella Vista development project in the French Valley. The core area was clearly designed to encompass the 33-acre Skunk Hollow vernal pool (the second largest vernal pool in California) and its watershed.

Mapping of vegetation types within the Western Riverside HCP Plan Area based on 1992-1993 aerial imagery (see **Figure 14.12**; Dudek and Associates 2003a) and 2012 aerial imagery (see **Figure 14.13**; Aerial Information Systems 2015) both show that almost all of the core area is composed of grasslands or agricultural land, with the Skunk Hollow vernal pool visible in the northwestern portion of the core area in the first map. A small amount of habitat was lost between 1992-1993 and 2012 around the edges of the core area with the construction of the Rancho Bella Vista development, though this loss occurred prior to the Recovery Plan's 2005 baseline. The rest of the core area is within several protected areas, all of which were established prior to the Recovery Plan's 2005 baseline as well. The Skunk Hollow vernal pool and 90% of its watershed are protected within the Barry Jones Wetland Mitigation Bank, and another 8% of the watershed is protected within the adjacent Johnson Ranch preserve (CNLM 2006). Therefore, given that the vast majority of the core area is protected and the only unprotected habitat was lost prior to 2005, the Service considers 100% of the vernal pool habitat in the core area to be protected, meeting the 85% target for the core area.

Protected lands within this core area include the Barry Jones Wetland Mitigation Bank, Johnson Ranch Preserve, and CDFW's French Valley Wildlife Area (**Figure 14.14**).

14.7.3.1. Vernal Pool Fairy Shrimp Occurrences

There is one Diversity Database occurrence record for the vernal pool fairy shrimp within this core area located in the Skunk Hollow vernal pool, which is protected within the Barry Jones Wetland Mitigation Bank (a.k.a., Skunk Hollow Vernal Pool Preserve) (see **Figure 14.14**; Diversity Database 2022). The vernal pool fairy shrimp was first documented within the Skunk Hollow pool in 1988 and has been repeatedly detected since (Diversity Database 2022), most recently in 2020 (CNLM 2020). There is one additional Diversity Database occurrence record that was detected in 2010 on the adjacent Johnson Ranch Preserve approximately 0.5 miles northeast of the core area. The vernal pool fairy shrimp has been identified in one natural vernal pool and one stock pond on Johnson Ranch Preserve, most recently in 2019 (CNLM 2019).

Skunk Hollow Core Area - HCP Vegetation Types 1994

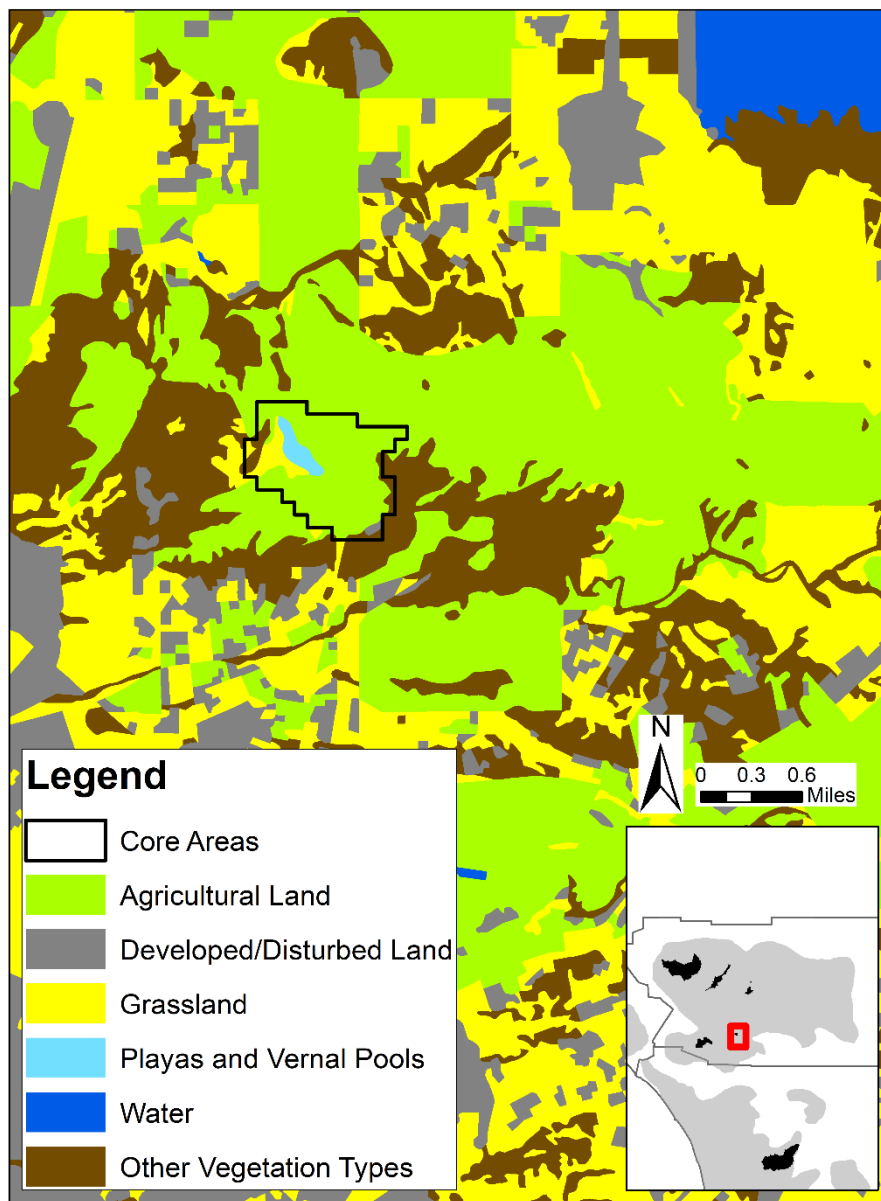


Figure 14.12. Map of vegetation types in the Skunk Hollow Core Area in 1994, including playas and vernal pools, as mapped for the Western Riverside Habitat Conservation Plan (Dudek and Associates 2003a).

Skunk Hollow Core Area - HCP Vegetation Types 2012

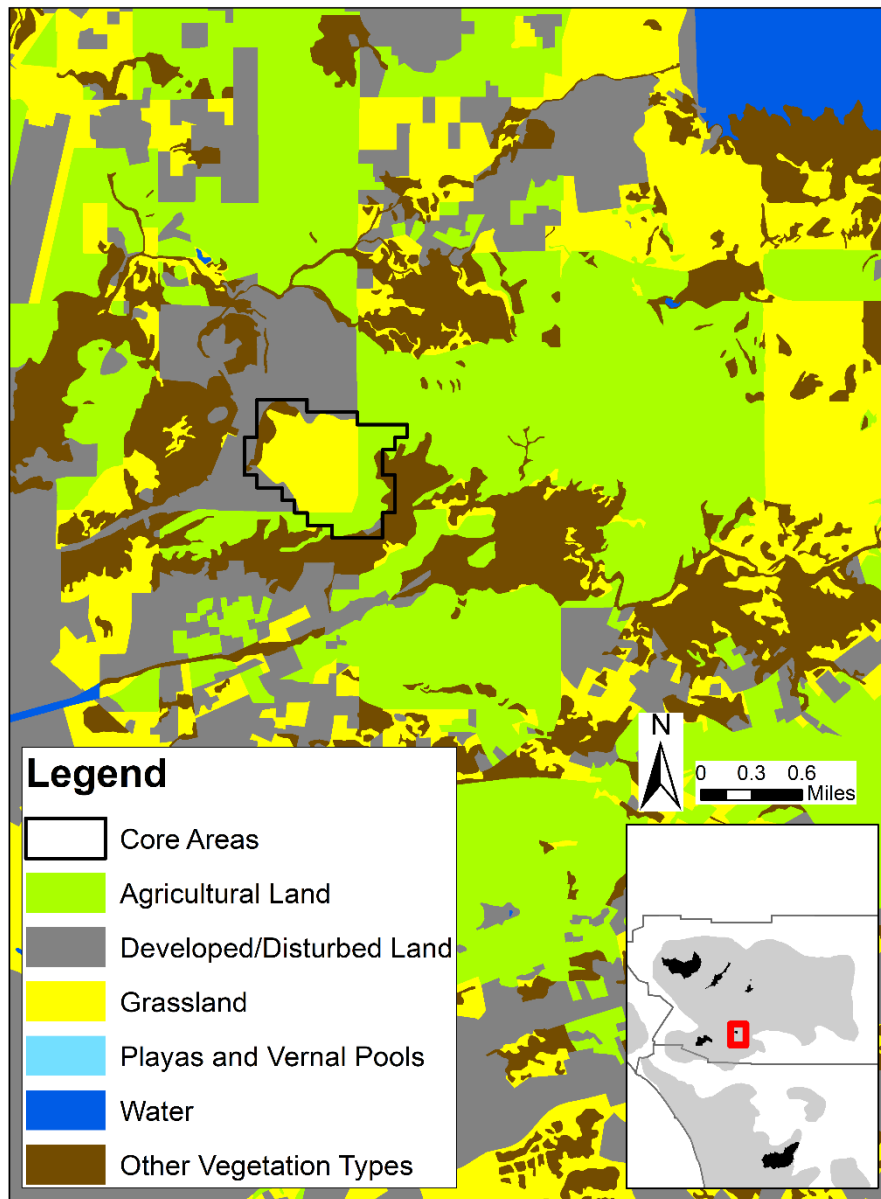


Figure 14.13. Map of vegetation types in the Skunk Hollow Core Area in 2012, including playas and vernal pools, as mapped for the Western Riverside Habitat Conservation Plan (Aerial Information Systems 2015).

Skunk Hollow Core Area - Protected Lands

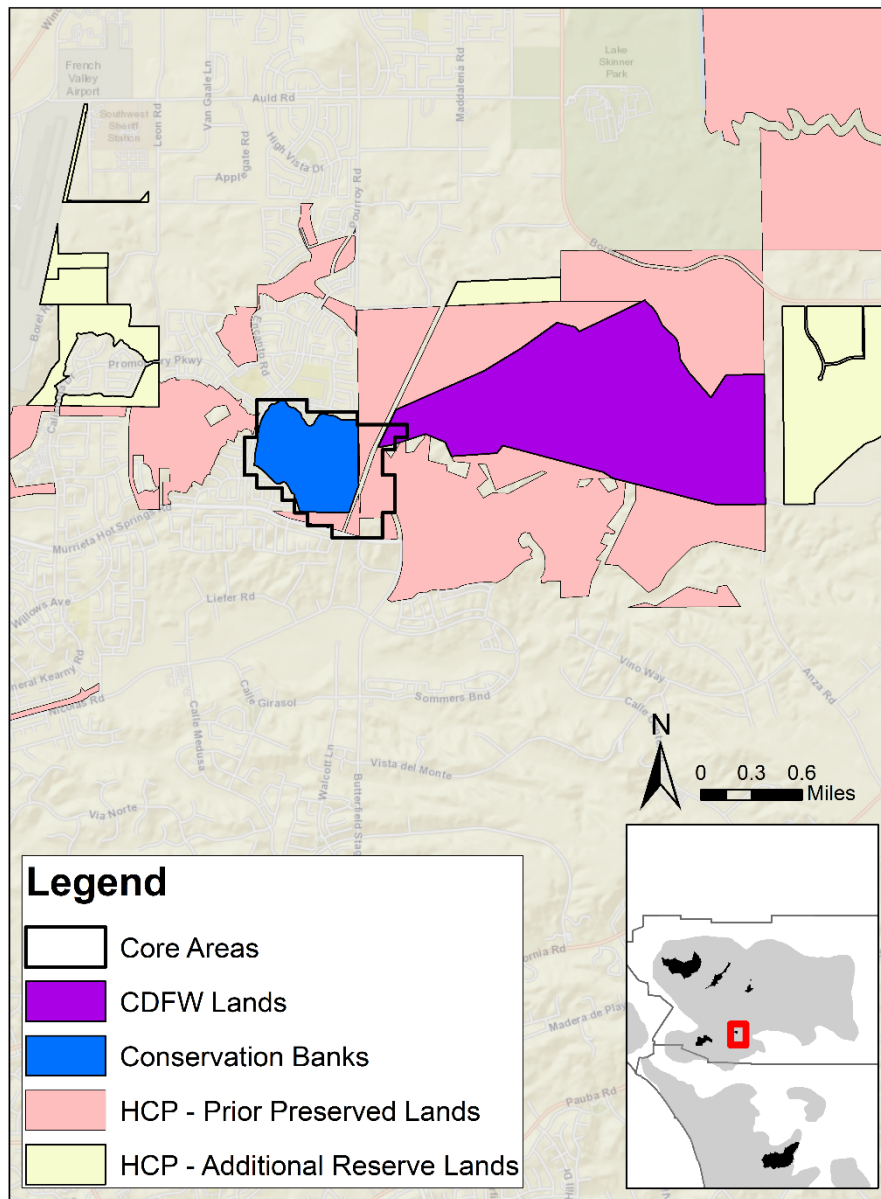


Figure 14.14. Map of all protected lands within the Skunk Hollow Core Area. Diversity Database (2022) records have been redacted from the map to comply with CDFW’s Diversity Database Data Use Guidelines. CDFW = California Department of Fish and Wildlife, HCP = Habitat Conservation Plan.