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CHAPTER 3
NATURAL RESOURCES

3.1. PHYSICAL ENVIRONMENT

3.1.1. Climate

The Base has several climatic zones that roughly coincide with the three geomorphic regions present: coastal plain, coastal valley, and mountain. In general, the Base has a semiarid Mediterranean climate with warm, dry summers and mild, wet winters. Daytime temperatures rarely exceed 95°F in the summer, and nighttime temperatures usually remain above freezing in the winter.

Seasonal rainfall along the Base’s coast averages between 10 and 14 inches per year. Average annual precipitation in the mountains on Base varies between 20 and 40 inches, depending upon slope and elevation. Approximately 75% of the Base’s precipitation falls between November and March, with the greatest annual average precipitation in January. Winds generally originate from the west or southwest, carrying in cool, moist offshore air.

Night and early morning overcast is common on Base throughout the spring and summer. Low clouds frequently extend inland over the coastal foothills and valleys but usually dissipate during the morning. Afternoons are generally clear. Coastal fog averages 29 days per year, being heaviest during the fall and winter months.

An important characteristic of local weather is its year-to-year variability. The native vegetation is adapted to periodic drought, flooding, and fire. “Fire season” occurs from May through November, with extreme fire conditions occurring when very dry, warm “Santa Ana winds” blow and there is a heavy fuel load of dry vegetation. Camp Pendleton’s geography creates up-canyon winds because its northeast-southwest trending canyons are able to pull in marine air each day as land surfaces heat-up. At night, the breezes are pulled back down-canyon and seaward as land surfaces cool (MCBCP 1992).

Local weather data is collected from six stations on Base: Case Springs, San Mateo Canyon at Tate Grade, Cristianitos, Las Flores, Lake O’Neill, and Range 408. The Cleveland National Forest (El Carrizo Station) and the National Weather Service (Oceanside and San Clemente) also maintain records.

The current global warming trend is anticipated to produce longer-drier summers, and shorter-wetter and more intense winters in the Southwestern U.S., with extreme weather events potentially rapidly degrading existing habitats. The distribution of species within ecosystems is predicted to shift along with increasing temperatures to new suitable habitats, especially in bird species which inhabit scrub-chaparral habitats, resulting in new combinations of species within habitats that usually do not interact, which will
consequently confront species with new competitors, predators and parasites. The proliferation of invasive species is also predicted. While animals will shift to new suitable habitats relatively rapidly, plant species are anticipated to shift much slower, if at all, potentially leading to permanent loss of many plants, which many animal species are currently dependent for their lifecycles (DOD 2010).

3.1.2. Topography

Camp Pendleton lies on the coastal plains at the southern end of the Santa Ana Mountains, within the Peninsular Range of southwestern California. The massive Peninsular Range completes the coastal mountain system of California, extending south from the Los Angeles Basin to the tip of the Baja Peninsula, and includes the steep, narrow, and northwest trending San Jacinto, Santa Rosa, Agua Tibia, and Laguna Mountains that plunge into the Coachella and Imperial Valleys.

The terrain of the Base is varied and includes sandy shores, seaside cliffs, coastal plains, rolling hills, canyons, and mountains rising to elevations of nearly 2,700 feet. Two major physiographic provinces occur on Base: coastal plains, which rise steeply from the coast inland into fairly level terraces, and the rolling foothills of the Santa Margarita Mountains. The break between these two provinces occurs generally along Basilone Road.

Characteristic of the Peninsular Range, natural erosion over time has formed a series of southwest trending stream valleys across the generally northwest-trending hills and mountains. Each stream has developed its own valley fill deposits, including an alluvial fan at its mouth near the coastline. The marine terraces, inland from the coast, slope uniformly to the southwest at inclinations of 5% or less with the majority of the rest of the Base exceeding 15% slope.

Part of the coastal area consists of steep, low-hills known as the San Onofre Hills, which are dissected by the major stream systems of the Base. The highest elevation of the range is 1,720 feet, atop San Onofre Mountain. Other areas contain low, wave-cut terraces that have distinct cliffs or escarpments along the seaward edge.

East of the San Onofre Hills is gently rolling topography with soils deep and level enough to support some agriculture. They give rise to the Santa Margarita Mountains, part of the Peninsular Range that extends from Orange and Riverside counties to the Mexican border. Margarita Peak, at 3,189 feet, is just east of the Base and about ten miles inland from the coast.

3.1.3. Geology and Soils

Camp Pendleton contains diverse geological units, ranging from the oldest metavolcanic rocks and granite of the southern California Batholith, to stream- or ocean-cut terrace sequences and recent alluvium. In general, the Base is underlain by Holocene to late
Pleistocene (recent to 1 million years before present [mybp]) unconsolidated sedimentary deposits that include alluvium in canyon bottoms and coastal terraces, Eocene to Pliocene (2 to 55 mybp) sedimentary rocks of marine and non-marine origin, and Cretaceous to Triassic (63 to 240 mybp) bedrock that includes highly consolidated and cemented sedimentary rock and plutonic and metamorphic crystalline rock.

Soil erosion and sedimentation are common on Camp Pendleton. Soil erosion and sedimentation patterns are largely influenced by the year-to-year climatic variability, with most soil loss occurring perhaps once in every 20 years. The pattern of winter storms determines whether there is enough antecedent soil moisture before an intense storm to cause significant soil loss. Intense storms have little impact if the soil is dry enough to absorb water quickly. Soil type, slope, and the frequency of fire occurrence also influence erosion rates. Slopes left denuded by fire are particularly susceptible to accelerated erosion. In addition, fires of a very high temperature can result in hydrophobicity of the soil surface, allowing less water to enter the soil and increasing the amount of runoff, resulting in more erosion and sedimentation.

Over fifty soil types are found on Camp Pendleton (Appendix G). Coastal plain soils are composed mostly of poorly consolidated marine sediments, while foothill soils are granitic with some metasedimentary and metavolcanic inclusions. A detailed description of Base soils can be found in the San Diego County Soil Survey (U.S. Soil Conservation Service 1973). The level of resolution for Soil Survey maps is appropriate for preliminary planning purposes only. For activities where soil properties are important, such as construction projects, remediation projects, or biological surveys where species with specific soil requirements are being surveyed for, testing should be done to confirm the nature of the soil on-site.

3.1.4. Hydrology

The hydrology of Camp Pendleton is influenced by several factors, including those that are natural (topographic, geologic, climatic, etc.) and human influenced (land use, dams, etc.). Proper management and stewardship of water resources are fundamental to natural resource and land use sustainability. This section provides a cursory overview of fundamental hydrologic features that characterize Camp Pendleton, including watersheds, precipitation, and runoff. Camp Pendleton’s water quality, supply and use programs are also introduced in this section.
3.1.4.1. Watersheds

Mountain ranges divide the Base into seven watersheds or drainage areas (Figure 3-2) and (Table 3-1): San Mateo, San Onofre, Coastal Drainage, Las Flores, Aliso, Santa Margarita, and San Luis Rey. The Las Flores watershed is often divided into two sub-watersheds, the Las Pulgas Canyon and Piedra de Lumbre Creek. The Coastal Drainage is located north and south of Las Flores Creek watershed. The San Luis Rey River drains the southern portion of the Base into the ocean just south of the Base.

The largest drainage, the Santa Margarita, is 742 square miles (474,880 ac). Over 90% of this watershed is located off Base. De Luz Creek is an important tributary to the Santa Margarita, and provides a significant quantity of water from off Base. Aliso Creek, Coastal Drainage (Horno Creek, French Creek, Cocklebur Creek, Hidden Creek), Las Flores (with tributaries Las Pulgas and Piedra de Lumbre), and San Onofre (with its Jardine Canyon tributary) are watersheds that are completely on Camp Pendleton and drain into the Pacific Ocean. San Mateo Creek drainage (with tributaries Cristianitos and Talega), includes areas of the Cleveland National Forest, San Onofre State Park, the City of San Clemente, and other private lands.

The two largest watersheds on Base, Santa Margarita and San Mateo, form broad alluvial plains as they approach the Pacific Ocean. As the streams reach the sea, sloughs or estuarine lagoons form due to sand bars or narrow tidal barriers. These impound low stream flows, but are breached during high-flows caused by storm events and normal tidal fluctuation. Based on water quality data, measurements, and observations for the Santa Margarita River Estuary, incoming tides are generally able to top the sandbar once or twice a day, while a small natural channel in the sandbar allows water to drain back out when the water level of the outgoing tide falls below the elevation of sand accumulated on the sandbar (Entingh pers. comm. 2009). The sandbar blockages subsequently reform by sedimentation and normal wave action. Gage height data for the SMR estuary indicates that the sandbar at the mouth of the estuary only isolates the estuary from the Ocean for approximately 25% of the time annually (Leedshill-Herkenhoff 1989).

The three largest estuaries on the Base are situated at the mouths of the Santa Margarita, Las Flores, and San Mateo streams. Review of USGS data for the period October 2007 – September 2008, indicates that the Santa Margarita River, Aliso Creek, and Hidden Creek estuaries are tidally influenced while the San Onofre and San Mateo estuaries are predominately isolated from the Ocean. The Cockleburrr and Las Flores estuaries are somewhere in-between (Entingh pers. comm. 2009).
### TABLE 3-1. **WATERSHEDS ACREAGE AND PERCENT OCCUPATION OCCURRING ON CAMP PENDLETON**

<table>
<thead>
<tr>
<th>Watershed</th>
<th>Approximate Acreage on Base</th>
<th>Approximate Total Acreage of Watershed</th>
<th>Percent of Watershed on Base</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aliso</td>
<td>11,400</td>
<td>11,400</td>
<td>100</td>
</tr>
<tr>
<td>Coastal Drainage</td>
<td>9,800</td>
<td>9,800</td>
<td>100</td>
</tr>
<tr>
<td>Las Flores</td>
<td>16,900</td>
<td>16,900</td>
<td>100</td>
</tr>
<tr>
<td>San Luis Rey</td>
<td>9,100</td>
<td>357,120</td>
<td>2</td>
</tr>
<tr>
<td>San Mateo</td>
<td>18,200</td>
<td>87,680</td>
<td>21</td>
</tr>
<tr>
<td>San Onofre</td>
<td>27,520</td>
<td>27,520</td>
<td>100</td>
</tr>
<tr>
<td>Santa Margarita</td>
<td>31,200</td>
<td>474,880</td>
<td>7</td>
</tr>
</tbody>
</table>

*a Only the major watershed groups are presented (several smaller systems may be lumped into a single watershed system).  
*b Santa Margarita watershed acreage includes the southernmost portion of the De Luz Creek watershed, which occurs on Base.

Headwaters for Camp Pendleton’s watersheds originate on the western slopes of the Peninsular Ranges. The Santa Margarita is the largest of these watersheds and the Santa Margarita River flows southwesterly to the Pacific Ocean from the Palomar, Santa Ana, and Santa Margarita Mountains, and the Santa Rosa Plateau. The watershed drains Murrieta and Temecula Creeks (or the upper Santa Margarita basin), and Rainbow, Sandia and De Luz Creeks (or lower Santa Margarita basin).

San Mateo Creek, although smaller than the Santa Margarita River, is the next largest basin draining through the Base. It also drains through nonmilitary land before flowing onto and through the Base. Off-Base activities from these drainages create significant water quality and sedimentation issues for the Base.

Two smaller watersheds, the San Onofre and Las Flores, are completely contained within the Base. Las Flores Creek is formed less than a mile from the Ocean where Las Pulgas Creek and Piedra de Lumbre Creek converge.

Domestic water for Camp Pendleton is supplied by wells that extract groundwater from four of the five aquifers on Base. These aquifers or groundwater basins are composed of saturated deposits of alluvium overlying impervious bedrock. The amount of water available for Base use is predicated upon the safe perennial yield of the groundwater stored in these basins. Safe perennial yield is defined as the rate at which groundwater may be extracted year after year without decreasing storage to the point where the rate of extraction becomes physically impossible to maintain, causes chemical deterioration of the groundwater, or becomes economically unfeasible to extract. Water is extracted for domestic use and agricultural activities. For Camp Pendleton, safe yield has been calculated in two basic reports, the U.S. Geologic Survey (USGS) by Worts & Boss in
1954 and Leedshill-Herkenhoff in 1989. The USGS reports determined basic hydrogeologic information for the Base, and the Leedshill-Herkenhoff report increased the USGS safe yield figures. Safe yield volumes from the Leedshill-Herkenhoff study were utilized for the current Base drinking water permit for the Santa Margarita (7,640 acre-feet/year) and Las Pulgas (700 acre-feet/year) groundwater basins (Khan & Teason pers. comm. 2009).

3.1.4.2. Precipitation and Runoff

Over one hundred and thirty-two years of precipitation records (initiated July 1876) for the lower area of the Base (Lake O’Neill weather station) reveal an average of 13.84 inches of precipitation per year, with a minimum of 4.51 inches (in 1960-61) and a maximum of 38.23 inches (1992-93). In the mountains at Case Springs (at 2,300 ft. elevation), the 1965 to 2005 records indicate an average precipitation of 21.86 inches, with a minimum of 6.08 (2001-02) and a maximum of 50.42 inches (1968-69). Table 3-2 shows precipitation data from weather stations located throughout the Base.

<table>
<thead>
<tr>
<th>Weather Station</th>
<th>Maximum Precipitation Year</th>
<th>Amount in Inches</th>
<th>Minimum Precipitation Year</th>
<th>Amount in Inches</th>
<th>Years of Record</th>
<th>Year of First Record</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lake O’Neill</td>
<td>1992-93</td>
<td>38.23</td>
<td>1960-61</td>
<td>4.51</td>
<td>132</td>
<td>1876</td>
</tr>
<tr>
<td>Case Springs</td>
<td>1968-69</td>
<td>50.42</td>
<td>2001-02</td>
<td>6.08</td>
<td>43</td>
<td>1965</td>
</tr>
<tr>
<td>San Mateo</td>
<td>2004-05</td>
<td>39.15</td>
<td>1960-61</td>
<td>5.38</td>
<td>51</td>
<td>1957</td>
</tr>
<tr>
<td>Cristianitos</td>
<td>1997-98</td>
<td>33.75</td>
<td>2001-02</td>
<td>4.87</td>
<td>26</td>
<td>1982</td>
</tr>
<tr>
<td>Las Flores</td>
<td>2004-05</td>
<td>20.54</td>
<td>2001-02</td>
<td>3.46</td>
<td>24</td>
<td>1984</td>
</tr>
<tr>
<td>Ammo Dump</td>
<td>2004-05</td>
<td>29.78</td>
<td>2003-04</td>
<td>7.51</td>
<td>6</td>
<td>2002</td>
</tr>
</tbody>
</table>

* Precipitation Year runs from 1 July to 30 June of the succeeding year -- OWR.

The potential for large floods on Camp Pendleton is particularly high because of the extreme variability of precipitation and runoff. Successive soil-saturating storms in early 1993, combined with intense rainfall (6.8 inches in 24 hours) in the upper watershed, led to record flooding in the Santa Margarita River on January 16th. At the damaged gauging station at Ysidora, the estimated peak discharge of 44,000 cubic feet per second (cfs) was the highest in 68 years of record keeping, exceeding the previous record (16 February 1927) by about 12,000 cfs or 34% (Bowers 1993).

The variability in annual runoff for the major streams on the Base can be seen by reviewing the minimum, maximum and average flows recorded in the annual hydrologic records.
maintained for each gauging station on or near Camp Pendleton and presented in Appendix H. A discontinuous collection of flow data, however, hinders the accuracy of some of these historical records.

Peak discharges will likely increase in future years due to the effects of expanded urbanization in the upper watershed. Since the Leedshill-Herkenhoff 1989 study, the Base reexamined these 100-year flow computations, particularly during the design of the Levee and Bridge project that was constructed from 1998 to 2001 to protect MCAS Camp Pendleton and the 22-Area Industrial Complex. The 100-year design was initially computed to be 57,000 cfs but a severe storm in 1998 caused a revaluation of the river’s hydrologic characteristics resulting in an increase in the estimation of the 100-year flow to 64,000 cfs.

During the summer months and periods of extreme drought, the frequency of extremely low-flows within unregulated streams is particularly high throughout Camp Pendleton. It is not unusual for the San Mateo, San Onofre, and Los Flores Creeks to be dry from July through October. Historical data shows that the Santa Margarita River fails to flow to the ocean approximately 25% of the time (Leedshill & Herkenhoff 1989).

3.1.4.3. Floodplains and Surface Waters

Camp Pendleton recently completed several hydrologic and hydraulic studies of the major stream systems on Base. The Santa Margarita River study was completed in July 2000 and the Las Flores, Horno, Aliso, San Mateo and San Onofre Creek studies were completed during 2004. These studies determined the flow rate that would predict 100-year flood conditions for each of the major streams on Base (Table 3-3).

<table>
<thead>
<tr>
<th>Drainage</th>
<th>100-year flow (cfs)</th>
<th>Author/Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Santa Margarita</td>
<td>64,000</td>
<td>WEST Consultants</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2000</td>
</tr>
<tr>
<td>Aliso</td>
<td>2,659</td>
<td>WEST Consultants</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2004</td>
</tr>
<tr>
<td>Las Flores</td>
<td>7,803</td>
<td>WEST Consultants</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2004</td>
</tr>
<tr>
<td>Horno</td>
<td>1,404</td>
<td>WEST Consultants</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2004</td>
</tr>
<tr>
<td>San Onofre</td>
<td>14,158</td>
<td>URS 2004</td>
</tr>
<tr>
<td>San Mateo</td>
<td>56,697</td>
<td>URS 2004</td>
</tr>
</tbody>
</table>
In the winter of 1978 severe channel-bed scour, to a depth of at least 10 feet below the riverbed of the Santa Margarita River, had previously removed one of the Basilone Road bridge footings during a 21,200 cfs flood (Chang 1988). Before the January 1993 flood, it was predicted that the existing bridges at Basilone Road and Stuart Mesa Road would be overtopped by a 100,000 cfs flood and that a non-damaging flood would have to be less than 11,000 cfs (Leedshill-Herkenhoff 1989). The 1993 flood was computed at 44,000 cfs at Ysidora and represented a 62-year flood event. The flow destroyed the bridge at Basilone Road and damaged the Stuart Mesa Road bridge.

Damage was exacerbated in 1993 because immense amounts of sediment and debris, estimated at 300,000 cubic yards, largely from off-Base sources, were deposited on the wide, flat floodplain of the Santa Margarita River, as the flood passed through Camp Pendleton (California RWQCB 1993). In addition to the loss of bridges, railroad tracks were washed-out and the Air Station was severely impacted by sedimentation. Drinking water quality was in question as a result of the flood’s impact on the water supply wells within the floodplain and some of the sewage treatment plants were flooded and oxidation ponds destroyed.

Concern has been raised about the possibility of more frequent and damaging flood events occurring on Base as a result of increased upstream urbanization in the Santa Margarita Watershed. Previous damaging floods have occurred at Camp Pendleton in 1951-52, 1956, 1968-69, 1978, and 1980 (Leedshill-Herkenhoff 1989).

While three major dams, at Vail Lake, Skinner and Diamond Valley Reservoirs, are located far upstream in the Santa Margarita watershed, Camp Pendleton has only a low-flow impoundment on this river that is used to divert water to Lake O’Neill and off-channel recharge ponds. Lake O’Neill, a small lake constructed across Fallbrook Creek in 1883, was historically used primarily to store water for farm irrigation. After the Base was purchased, the operation of the lake continued, but now the water is released to recharge downstream aquifers that are used to provide the majority of the Base’s water supply. An additional use of the water, before being released, is providing recreational benefits to the Marines. The capacity of the reservoir is 1,200 acre-feet, with its sources supplied by the Santa Margarita River (through the O’Neill Ditch diversion), Fallbrook Creek, and rainfall/runoff (Malloy pers. comm. 2008).

In addition, small ponds are located throughout the Base including: Case Springs and Whitman Pond (both in San Onofre watershed); Pulgas Lake (Las Flores watershed); Broodmare Pond, Pilgrim Creek Pond, Horseshoe Lake, and Windmill Lake (San Luis Rey watershed); and Wildcat Ponds and India Ponds (all in Santa Margarita watershed).

3.1.4.4. Water Quality, Supply, and Use

**WATER QUALITY**

Water quality has always been a high priority for Camp Pendleton since nearly all of the drinking water consumed by the Base is drawn from local aquifers. The quality of Camp Pendleton’s drinking water generally meets or exceeds State of California and federal health-related drinking water standards (MCBCP 2005).
Upstream users greatly affect the water quality of surface waters on Base since Camp Pendleton is the last water user on the extensive Santa Margarita River system and the San Mateo Creek. On the Santa Margarita River nutrient levels, particularly nitrogen, have increased in recent years due to intensive agricultural use of fertilizers in the upper watersheds. In addition, the dramatic expansion of residential, commercial, and industrial development during the past decade in the upper part of this drainage has produced more urban runoff and wastewater discharge. However, surface waters are not used as a potable water supply for the Base. Studies of water quality data for the groundwater supply at Camp Pendleton has indicated that groundwater is not directly influenced by surface water quality within the Santa Margarita River (Law and Crandall 1995).

In the past and continuing today, water samples are collected on Base and upstream from the Base within all watersheds, but especially from the Santa Margarita River and San Mateo Creek watersheds. This data is used as part of Camp Pendleton’s water quality monitoring program and supports the Base’s efforts with off-Base organizations and regulatory agencies, and as part of cooperative agreements to reduce the levels of contaminants that reach the Base in surface waters.

There is always concern about potential seawater intrusion into the Base wells resulting from water extraction exceeding the safe yield of the individual basins. For instance, by 1952 the Ysidora Narrows well in the Santa Margarita River basin showed evidence of seawater advance as far as 3-miles upstream due to pumping in the basin (California Department of Water Resources 1956). However, frequent monitoring and extraction control of key sentinel wells appears to have helped prevent such contamination from occurring in recent years. By maintaining a five-foot static water level at this critical well site, seawater intrusion has apparently been avoided (Leedshill-Herkenhoff 1989).

Excessive levels of sediment, particularly in the Santa Margarita River, is another water quality issue confronting the Base. Until the 1993 flood, studies had predicted that the Santa Margarita would be a low sediment producer due to its lower average rainfall and higher percolation rates compared to other large rivers in the region (Brownlie et al. 1981). In January 1993, intensive rainfall in the headwaters, combined with over 5,000 acres of bare-ground from unfinished and unprotected construction sites upstream, helped yield a river of virtually “liquid sandpaper” which scoured channels and left four- to eight-foot deposits of sand and gravel in the Camp Pendleton floodplain and estuary, despite several upstream dams trapping sediment (California RWQCB 1993 & Bell 1993).

Soil and groundwater contamination has been detected at various locations on Base. In 1989, Camp Pendleton was placed on the National Priorities List (NPL) for cleanup of hazardous waste (HW). Contamination from solvents, metals, petroleum, and other wastes were released on Base by past waste handling and disposal practices. A cleanup program is currently in operation (Battelle 2006), and groundwater monitoring indicates that contamination has not migrated to groundwater supplies at concentrations in excess of State drinking water standards at any location, nor has it migrated off Base (Entingh pers. comm. 2009). See Section 2.3.2.6. for additional details.
**WATER SUPPLY AND USE**

Camp Pendleton’s domestic, agricultural, and industrial water supply is produced from underground aquifers that are recharged by percolation from overlying rivers and streams. Unlike most other water systems in southern California, Camp Pendleton does not currently rely on imported water and only purchases less than 1% (100 ac-feet/year) of the Base total annually, for use in the San Mateo Point Housing area. Additionally, the State Park lease area is supplied potable water by the South Coast Water District, and therefore is not dependent upon Base groundwater supplies (Khan pers. comm. 2009).

Santa Margarita River wells provide water to the Headquarters Area, Naval Hospital, Camp Del Mar, and all points in-between, representing about 65% of the total water consumed on the Base. The Las Flores Creek wells produce water for Camp Pulgas and Camp Las Flores, while the San Onofre Creek well produces water for Camp Horno and Camp San Onofre. Camps Talega, Cristianitos, San Mateo, the San Onofre Housing and School, and the 51 Area Marine Corps Exchange complex are all served by wells from San Mateo Creek (MCBCP 1993a). Agricultural wells supply irrigation water for leased sites at an average of 1,300 ac-feet per year in the Stuart Mesa area (MCBCP 2007). Prior to 2006, agricultural water use in the northern portion of the Base was about 740 ac-feet/year. Since 2006, agricultural use has been discontinued; however, military consumption has increased. The net result has been a decrease in total consumption of about 400 ac-feet/year in the northern portion of the Base (Khan pers. comm. 2009).

Since complete well production records began in 1944, basewide total annual water use has ranged from a low of 5,850 ac-feet (1991) to a high of 9,891 ac-feet (2000), with a total annual average use of 8,531 ac-feet (Khan pers. comm. 2009). Military consumption represents an annual average of 6,398 ac-feet (65% of the total 2000 average annual use), while agricultural irrigation use (on leased sites) amounts to 2,100 ac-feet (21% of the total 2000 average annual use) (Khan pers. comm. 2009). Fluctuation in use is related to water conservation efficiency during drought years, troop mobilization levels, water system leaks, crop water needs, and other factors.

**3.1.5. Fire**

Fire has a strong influence on the biological structure and composition of Camp Pendleton’s vegetation. It can play a positive, even necessary, role in the maintenance of native vegetation and natural community structure. Fires can create a mosaic

**FIGURE 3-3. BASE BURNED AREA**

(PhoTo Source: CAMP PENDLETON)
of seral stages within a particular vegetation community that promotes habitat diversity. However, the fire frequency at some locations on Camp Pendleton is higher than other areas in southern California (MCBCP 1998). A high fire frequency can permanently change the vegetation type (type conversion) of a given site by suppressing it to an earlier seral stage. The use of pyrotechnics and live-fire ammunition during training creates an additional risk of increased fire occurrence relative to other areas of southern California.

Zedler, et al. (1997), states that anthropogenic causes of fire in southern California are not a recent phenomenon. In fact, it appears that prehistoric humans played an active and significant role in elevating fire frequency (Zedler et al. 1997). Early Native Americans, as well as the Spanish and Mexican settlers of the region, regularly used fire as a tool to clear brush to facilitate hunting and to promote grazing (Rasmussen & Woodman 1997).

While fire ignitions and burn frequency at Camp Pendleton are much higher today than at the time the military acquired the property, burn patterns may reflect prehistoric ones more closely than those resulting from fire suppression policies in southern California (Minnich, R. A. 1983). Vegetative, topographic, and climatic factors in the region have also favored fire since the emergence of the Mediterranean climate hundreds of thousands of years ago. “Fire weather” occurs from May through November, with extreme fire conditions occurring when very dry, warm Santa Ana winds blow over dry vegetation. The Base’s topography exacerbates the problem, because the northeast-southwest trending canyons can pull marine air inland each day as land surfaces warm, creating up-canyon winds. At night, when temperatures cool, the breezes are pulled back down-canyon and seaward. Compared to inland portions of California, the fire hazard is generally lower in the summer on Base because winds typically originate from the ocean, and are moisture laden (Steinitz 1996).

The Base has an active fire management plan, and its scheduled burning, when coordinated with training activities, assures the maintenance of fire-dependent habitat while simultaneously protecting property. However, fire does not recognize property boundaries. Increased risk caused by development near the Base will require the communities and public land agencies surrounding Camp Pendleton to coordinate fire management planning (Steinitz 1996).

3.2. BIOLOGICAL ENVIRONMENT

Southern California is one of the most biologically diverse regions in the continental U.S. It supports a variety of habitat types and contains the greatest number of plant and wildlife species in the nation identified by the federal government as threatened or endangered (Dobson et al. 1997). Natural resources on Camp Pendleton reflect the rich diversity of species and habitat types formerly present within the region. The great diversity and abundance of plant and wildlife resources on Camp Pendleton provide many ecological, aesthetic, recreational, and military values to the Base, its residents, and the general public.

This section provides an introduction to the diversity of plant and wildlife species (including descriptions of federally listed threatened and endangered species) found on Camp Pendleton. Plant communities are also introduced in this section; however, greater description of these is provided in Appendix I. Included in this section is a discussion of the importance, and present situation, of landscape linkages and corridors.
Nomenclature used within this document follows CalFlora (2009) for plants (unless State or federally listed under an alternative name), Holland (1986) for vegetation types (plant communities), and California Wildlife Habitat Relationships System (CDFG 2009e) and the California Natural Diversity Database (CDFG 2009f) for amphibians, birds, mammals, and reptiles (unless State or federally listed under an alternative name). References to basewide survey efforts assume exclusion of restricted areas (i.e., Quebec, Whiskey and Zulu impact areas for safety reasons) and depending upon the species, may assume efforts were focused within areas of potential habitat (e.g., surveys for beach species are conducted within beach habitats).

3.2.1. Ecosystems

Camp Pendleton views and approaches the management of its natural resources as ecosystems. Supporting this approach, Camp Pendleton has identified four major ecosystems on Base, and consolidated planning for and consultation on these ecosystems into three ecosystem conservation plans: estuary and beach, riparian, and uplands (Appendices B, C, and D). In taking this approach, the Base recognizes the following biological principles: 1) ecosystems are dynamic by nature; 2) the functioning of ecosystem components operate at different rates; 3) all components are interrelated, especially, the human component; 4) the ecosystem is a complex, dynamic system functioning as a whole, not as a collection of parts; and 5) ecosystem integrity may be disrupted by excessive “interference” of any single component.

Camp Pendleton recognizes that ecosystems observe no specific delineation, tending to merge together in a very fluid and continuous manner, and that whatever ecosystem boundaries it designates are artificial. However, to facilitate the consistent mapping, monitoring, assessment and management activities for each ecosystem, the following artificial boundaries were established in consultation with the USFWS. The riparian ecosystem aboard Camp Pendleton has been identified as those lands lying within the 100-year floodplain of the drainages flowing through the Base to the estuary and beach systems at the stream/river mouths junction with the Pacific Ocean. The estuary and beach ecosystem consists of those coastal areas and associated salt/fresh water marshes between the head of tidal action and the low tide line at the beach, which support unique estuarine species. Beaches included in this ecosystem are the coastal beaches with associated dune systems that border estuary and riparian regions of the Base and along the coast. The uplands ecosystem consists of the remaining undeveloped areas of Camp Pendleton.

3.2.1.1. Estuarine and Beach Ecosystems

Camp Pendleton’s estuarine/beach ecosystem includes 319 ac of habitat associated with beaches along the coastline, coastal lagoons and river estuaries. This includes the Santa Margarita River Estuary and the coastal lagoons located at Cocklebur, French, Aliso, Las Flores, San Onofre, and San Mateo Creeks.

Approximately 17 miles of undeveloped coastline exists within the borders of Camp Pendleton. The limited area of natural coastline left in southern California makes the Camp Pendleton shoreline of special interest. Habitats of the coast are divided roughly into four zones. The intertidal zone is regularly inundated by the ocean, while the strand or beach is
subject to wave action, and deposition and removal of sand and gravel. *Foredunes* are the first line of dunes subject to sand deposition, high winds, and salt deposition, but only rarely subject to wave action or overwash; *backdunes* may be stable (not subject to deposition or erosion by the wind) or moving (having sand deposited or removed). Where cliffs face the ocean, the exposure to high-winds and high salt deposition creates another distinctive habitat – coastal bluffs.

On Camp Pendleton, the coastal strip is mostly a relatively narrow stretch of sandy beach lying below a typically steep bluff cut into poorly consolidated sediments of the coastal mesas.

Foredunes on Camp Pendleton, consisting of shifting-sand substrate, are classified as southern foredune and are sparsely vegetated with plant cover ranging from 30% to 60%. On Base, this plant community is dominated primarily by *Ambrosia chamissonis* (beach-bur, 10% to 30% cover) and substantial populations of *Abronia maritima* (sand verbena), *Carpobrotus chilensis* (sea fig, nonnative), *Cakile maritima* (sea rocket, nonnative), and *Camissonia cheiranthifolia suffruticosa* (beach evening primrose) that cumulatively account for 5% to 15% of groundcover (Biosystems Analysis 1994). This community is estimated to occupy less than 25 ac on Base.

The regularity and extent of tidal flushing, the magnitude and frequency of freshwater runoff, sedimentation rates, soil types, salinity, nutrient relations, and human uses all influence the structure of the coastal wetland systems of the Base’s estuaries and lagoons. Watershed flows and natural tidal prism are important factors in maintaining the viability of these wetlands. A strong correlation exists between the regularity of tidal flushing and the diversity and abundance of the flora and fauna present in coastal wetland habitats. Interruption of tidal flow has dynamic ecological effects and can greatly influence the distribution and abundance of organisms within these coastal wetlands; openings and closures of river and creek mouths are allowed to occur naturally on Base to maintain a sound balance of biodiversity within the ecosystems. Tidal circulation provides moisture during periods of low precipitation typical of the southern California summer months. Nutrient concentrations, salinity, temperature, oxygen, strength of water currents, and light penetration all respond to the open or closed condition of river and creek mouths, allowing some species to flourish while others fade. For example, changes in these factors are stressful for many

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*FIGURE 3-4. SANTA MARGARITA RIVER ESTUARY*  
(PHOTO SOURCE: CAMP PENDLETON)
invertebrate species, which prefer a more stable estuarine environment. Because of their importance as a food source, the reduced abundance and diversity of invertebrate species within an estuary or lagoon adversely affects the populations of fish, birds, and mammals species, which are dependent upon invertebrates. However, without tidal influence, small fish such as anchovy and topsmelt, are prevented from entering the estuary or lagoon, which are important prey items for least terns and other birds. Mouth closure also prevents mudflat exposure during low tide conditions precluding the use of these prime foraging areas for resident and migratory shorebirds, including the western snowy plover.

The Santa Margarita River estuary is the Base’s largest estuary and supports four major habitat types: salt marsh, brackish marsh/willow swamp, salt flats, and coastal sand dunes. These habitats support about 148 plant species, 9 species of reptiles and amphibians, 24 fish species, 17 mammalian species, and 184 bird species, including several federal and State listed species, such as the California least tern, light-footed clapper rail, western snowy plover, tidewater goby, and Belding’s savannah sparrow.

Construction of the railroad and coastal highways necessitated filling in portions of these coastal wetlands, resulting in the constriction of the main river channels and their flows. During the 1930s, the southern portion of the Santa Margarita River estuary was used as a landing field. Farming also began during this time on the northerly bluffs adjacent to the estuary and still continues today. In 1942, 153 ac of salt marsh and approximately 4 miles of tidal channels were filled at the Santa Margarita River estuary to create a boat basin for Marine amphibious training. In subsequent years, the salt marsh and open salt pan were used for military training activities. Since 1981, vehicular traffic and military maneuvers have been restricted in the estuary due to the presence of significant biological resources (Salata 1981).

**ESTUARINE/BEACH CONSERVATION PLAN**

Management of estuarine and beach ecosystems is covered by the Base’s Estuarine and Beach Conservation Plan (Appendix B). The estuarine/beach conservation program is designed to sustain and enhance Camp Pendleton’s natural resources along its coastline, with an emphasis on nesting areas, coastal lagoons and the Santa Margarita River estuary. This includes conservation of listed species and their associated habitat, maintaining and enhancing the functionality and biodiversity of the Santa Margarita River estuary, and the coastal lagoons located at Cocklebur, French, Aliso, Las Flores, San Onofre, and San Mateo Creeks. This is done through the active management programs discussed in Chapter 4 and through application of programmatic instructions, avoidance measures and management activities contained in the Estuarine and Beach Ecosystem Conservation Plan (Appendix B). Further, the 319 ac of estuary and beach areas are managed to avoid future, permanent project impacts (other than transient training traffic or exercises) from construction. Permanent project impacts to this habitat are not covered by the Estuarine and Beach Ecosystem Conservation Plan (Appendix B) or its BO, and are consulted on separately with the USFWS.

The plan designates specific management zones along the coastline. Within these established zones, management activities focus on maintaining wetland values of coastal
lagoons, protecting and maintaining tern and plover nesting areas, and maximizing the probability of metapopulation persistence within the lagoon complex for tidewater gobies.

Beach/dune habitat management includes management activities for snowy plover and least terns, such as predator control management strategies and restricted access to nesting areas to protect least tern nesting colonies from vehicular and foot traffic along the beaches. For example, chick barrier fencing is employed to keep least tern chicks from escaping the enclosure into ongoing vehicle traffic, and programmatic instruction for traffic along the beach in the vicinity of the Santa Margarita River management zone (see Appendix B).

Foredunes can be particularly valuable, especially during high tides at the North Beach colony when hatchlings can be sandwiched between oncoming tides, vehicles and the fence. Fence construction activities are completed before the onset of the snowy plover breeding season (1 March) to avoid disruption of courtship, nest site selection, and desertion of nests already initiated. Breeding areas are protected by fencing, signage, monitoring and predator control and the French Creek lagoon in this area is virtually off-limits to Base activities and does provide forage utility.

The Conservation Plan establishes management objectives for the tidewater goby in estuary and lagoon habitats. The plan identifies a set of programmatic instructions that will contribute partially to achieve the desired end result, that is, the maintenance of suitable goby habitat (see Appendix F, Section F.22, for a detailed description of preferred goby habitat).

Implementation of the Estuarine and Beach Conservation Plan is expected to maintain and improve the integrity of the estuarine/beach ecosystem, to an extent that impacts resulting from military activities would not impede conservation and recovery of estuarine and beach species. Evidence of the plan’s success will be gauged by the abundance of the endangered California least tern and western snowy plover. In addition, the Estuarine and Beach Conservation Plan is intended to preclude the need for federal designation of critical habitat for the snowy plover on Base.

3.2.1.2. Riparian Ecosystems

Riparian ecosystems contain a wide variety of habitat types, including riparian woodlands, riparian scrublands, freshwater marsh, and open water/gravel and occur in drainages, seepages, and riverine areas where water availability is high. Because upland areas in southern California are generally moisture-limited, riparian vegetation is distinctly different, functionally and visually, from that of the surrounding more xeric vegetation. In contrast to the oak woodlands and the sage

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**Figure 3-5.** SANTA MARGARITA RIVER

(Photo Source: Camp Pendleton)
scrub, riparian vegetation is dominated by winter-deciduous trees – willows, cottonwoods, alders, and sycamores.

Riparian ecosystems are dynamic systems, depending upon periodic flooding to provide substrate, nutrients, and physical energy to cycle the community back to earlier successional stages. The stream and river channels that are central to riparian areas are subject to erosion and deposition every year and to seemingly devastating flooding periodically. These periodic floods of large magnitude, and migration of the river channel, are essential to the deposition of fresh alluvial sediments where seeds of willow and cottonwood can germinate and propagules of willow can take root. Adequate moisture and an absence of heavy flooding are particularly critical to the survival of young trees through their first year. As seedlings and resprouts mature into saplings, and eventually into mature trees, the river continues to deposit sediment on the floodplain. This process leads to the formation of river terraces, and as they rise other plant species colonize, resulting in further diversification in the floodplain community. All of the drainages are continually changing, and the plant populations shifting in response. The growth patterns and lifestyles of the plants are designed to tolerate and exploit this dynamic habitat. Willows and cottonwoods are fast-growing and regenerate readily when damaged; they can root from branches, and are capable of establishing millions of seedlings in a single year when conditions are right. This dynamic quality of the vegetation makes it difficult to classify geographic areas into fixed types.

When cottonwood-willow riparian scrub reaches 5 to 10 years of age, it begins to exhibit the structural diversity (i.e. dense thicket) required by breeding least Bell’s vireos (LBV); however, vegetation structure more than simply age, appears to be the important determinant of site use (USFWS 1998c). The vireo, along with southwestern willow flycatchers and many other species, may continue to use this diverse community for another 10 to 20 years if patches of understory exist (USFWS 1998c). Gradually, the canopy of the maturing willows and cottonwoods begins to shade out the dense diverse understory of vascular plants required by these birds for nesting and foraging (USFWS 1998c). While older riparian gallery forests are valuable to many other species, they do not provide suitable vireo and flycatcher habitat. Annual flooding and occasional large flood events contribute to maintaining the cycle of ecological succession needed for a mosaic of diverse natural riparian communities.

Of the approximately 9,800 ac of floodplain on Camp Pendleton, riparian habitats currently cover about 8,200 ac; disturbed/developed lands account for the remaining 1,600 ac of floodplain. When compared to the rest of coastal southern California, where more than 95% of the riparian habitat historically occurring has been lost to agriculture, development, flood control, channel improvements, and other human-caused impacts (Bell 1993), a high proportion (83.7%) of the riparian acreage on Camp Pendleton is still relatively intact.

The lower Santa Margarita River floodplain is approximately a mile wide in places and supports extensive riparian forest, woodland, and scrub habitats from the edge of the braided channel to the base of riverine terraces. The upper Santa Margarita River, from the confluence of Murrieta and Temecula Creeks (off Base) to the lower floodplain, is contained within a gorge varying from less than 100 to over 1,000 feet in width. The Santa
Margarita River is the most biologically intact riparian corridor remaining in southern California (USFWS 1995a). Other areas on Base that support riparian communities include the drainages of the San Mateo, San Onofre, Las Flores, Aliso, and French watersheds and portions of Pilgrim Creek (San Luis Rey).

**Riparian Ecosystem Conservation Program**

Management of riparian ecosystems is covered by the Base’s Riparian Conservation Plan (Appendix C). The riparian ecosystem conservation program is designed to sustain and improve the biological diversity of the riparian ecosystems on Base, as primarily evidenced by the abundance and distribution of threatened/endangered migrant birds like the least Bell’s vireo. The philosophy behind this conservation plan approach is to sustain and restore riparian ecosystem dynamics, such that natural plant and animal communities on Base are sufficiently resilient to withstand the array of disturbances and incursions occasioned by military training activities. The components of the ecosystem conservation program, particularly compliance with programmatic instructions and execution of management programs, are anticipated to offset current and planned training requirements and infrastructure maintenance activities. In the case of major construction projects, the ecosystem conservation program is supplemented by additional measures established in the reasonable and prudent measures and terms and conditions of the BO that covers the Plan. The Base has stated its commitment to achieving these goals through specific actions identified in the Branch programs in Chapter 4.

To achieve greater mission flexibility in the Santa Margarita River, the plan calls for the maintenance of suitable least Bell’s vireo habitat, not only in the Santa Margarita River basin, but also in the other major drainages on the Base, enhancement of degraded areas in these drainages, maintenance of the least Bell’s vireo population at a minimum of 400 singing males on Base, and promoting expansion of the southwestern willow flycatcher population above the 1994 level of 22 singing males, even though the species suffered a significant range-wide population decline in 2008.

The Riparian Conservation Plan has an established set of “programmatic instructions” to avoid and/or reduce and minimize adverse impacts to the ecosystem. Military training and facilities’ maintenance units follow the guidance given in the programmatic instructions such as scheduling activities during the non-nesting season if feasible or selecting construction sites that would impact the least amount of riparian habitat possible, to avoid incidental take and adverse impacts. When adverse impacts cannot be avoided, the Base offsets species/habitat loss of value and function by a program of habitat enhancements. Camp Pendleton also monitors habitat, species populations, predator control, and/or other management actions, as appropriate, and thereby establishes “baselines” from which to track progress toward goals.
The Riparian Conservation Plan includes compensation procedures that consist of a “Compensation Bank” to administer compensation for Base activities, formulas to determine compensation ratios for direct permanent losses of habitat, and specific methods of compensation, including out-of-kind mitigation and resource trade-offs. Compensation ratios and habitat management involving *Arundo* removal are conducted for 5 years. Creation of wetlands is not part of this program, although supplemental plantings in the exotic vegetation removal (habitat enhancement) areas are not precluded. The Base mitigates for “temporary impacts” by habitat enhancement (exotic vegetation removal) at an acreage ratio based on the number of breeding seasons. For instance, if the nature of the disturbance persists through four breeding seasons, then the enhancement ratio would be 1:1. If the duration of the activity covers between one and four breeding seasons, then the enhancement ratio would be 0.25-0.75:1. If the duration is less than one breeding season, then no mitigation is required. The Base also weeds the temporarily affected areas of disturbance for one year.

The Riparian Conservation Plan does not cover impacts to wetlands under the Clean Water Act (CWA). Wetland impacts under the CWA are covered under separate permits obtained from the Army Corps of Engineers (USACE) (see Section 4.4.1.3).

### 3.2.1.3. Upland Ecosystems

The upland ecosystem consists of the remaining undeveloped areas of Camp Pendleton and like the riparian ecosystem, contains a wide variety of vegetation types, including vernal pools, shrublands, oak woodlands and grasslands that occur from just inland of the coastal bluffs to the higher elevations of the Santa Margarita Mountains. Because upland areas in southern California are generally moisture-limited, receiving almost all of their moisture in the winter, upland vegetation differs distinctly, functionally and visually, from season to season.

#### SHRUBLANDS

Southern California is one of five regions in the world that share a Mediterranean climate characterized by hot, dry summers and cool, rainy winters. In all these areas – the lands around the Mediterranean Sea, central Chile, the Cape region of South Africa, the coastal regions of southeast and southwest Australia and in California – shrublands are a major component of the vegetation.
Shrublands in coastal southern California are not all of one kind. Two main types are recognized: shrublands dominated by evergreen species with small, thick, leathery, dark green, sclerophyllous leaves (chaparral types), and those dominated by species that lose all or most of their usually softer, larger, and grayish-green leaves over the summer (coastal sage scrub types). Chaparral types tend to be most abundant at higher elevations, particularly above 3,000 feet, where temperatures are lower and moisture supplies more ample. Coastal sage scrub types are more common at lower elevations with higher temperatures, lower rainfall, and a more pronounced summer drought. Camp Pendleton has both types of plants and both types of shrublands.

The coastal sage scrub vegetation on Camp Pendleton is categorized as Diegan coastal sage scrub (CSS) (Holland 1986), although dominant species may vary by site. The Base supports approximately 37,900 ac of CSS and its subtypes.

CSS was originally the dominant vegetation in San Diego County. Today, nearly 70% of its original area has been lost and much of what remains exists in small patches of isolated habitat (County of San Diego 2003). It can be found mostly on south- and west-facing slopes, from Camp Pendleton to the lower slopes of Palomar Mountain and around Escondido, the San Pasqual Valley, El Cajon and Jamul, to the area surrounding Otay Mountain. CSS habitat is important because it contains a variety of rare and endangered species (County of San Diego 2003).

**Grasslands**

Grasslands are an important feature of Camp Pendleton, with an estimated area of about 40,000 ac, or over 30% of the Base. At Camp Pendleton, fine-textured soils of coastal terraces are largely covered with grassland, as are the rolling hills with deeper soils at higher elevations. Trees or shrubs mostly cover the rocky and thinner soils where moisture can penetrate to depth. Like most of southern California, introduced grasses and forbs are now major components of the vegetation found in grasslands, and approximately 10,000 ac of non-native grasslands currently occupy the Base (Zedler et al. 1997). Generally, the areas on Base that have been most disturbed in the past (especially by cultivation) and that are at lower elevations tend to have the highest proportion of exotic annual grasses to native grasses (Zedler et al. 1997). Grasslands at higher elevations that have never been cultivated have higher proportions of native perennial grasses to exotic grasses (Zedler et al. 1997).

**Oak Woodlands**

The primary woodland communities on Camp Pendleton are oak woodlands. The southern California coastal climate is not, in general, favorable to tree growth, but oaks are particularly well adapted to survival in difficult conditions. Even so, tree-sized oaks are common only where some factor ameliorates drought conditions. Thus, oaks are most abundant on north-facing slopes protected from the maximum intensity of the sun, in drainages and below rock faces or boulder covered areas where runoff is concentrated, in areas of deep soil that can hold a moisture reserve through the summer, and at the higher elevations where it is cooler and rainfall is generally more abundant.
The two species of tree-sized oak found at Camp Pendleton, Engelmann oak (*Quercus englemanii*) and coast live oak (*Quercus agrifolia*), are drought-hardy and tolerant of fire. Both will resprout vigorously from the branches and the base when the crowns are severely burned or killed. Engelmann oak is a species restricted to southern California and adjacent Baja California. It is considered rare and though it is not in any immediate threat of extinction, its preservation is of special concern to land managers. Camp Pendleton contains one of the largest and healthiest populations in the region, with over 3,000 ac mapped as this type. Coast live oak is the most widely distributed of the evergreen oaks. It is capable of achieving large size and great age and the widely spreading crowns of old, open grown trees are one of the distinctive features of the natural California landscape and especially of Camp Pendleton. Coast live oak occurs at the fringes of riparian woodlands, scattered in grassland or CSS, and as an element of Engelmann oak woodlands.

**Wetlands**

Wetlands occur where there is standing water or continual seepage that maintains saturated soils. In upland areas on Base, wetlands are primarily vernal pools or isolated ephemeral wetlands (IEW), and to a lesser extent are thin fringe along riparian areas and margins along artificial (Lake O’Neill) and natural (Case Springs) standing bodies of water.

**Upland Ecosystem Conservation Program**

Management of upland ecosystems will be covered by the Base’s Listed Upland Species Management Program found in Appendix D (this section will be further updated upon issuance of the applicable BO by the USFWS). The upland conservation program is designed to sustain and enhance Camp Pendleton’s natural resources throughout upland areas, exclusive of dud-producing impact areas, which are not entered for safety reasons. This is done through the management programs discussed in Chapter 4 and through application of programmatic instructions, avoidance measures and management activities that will be contained in the Listed Upland Species Management Program (Appendix D). The emphasis of the upland ecosystem program is ecosystem-based, with special attention provided to threatened and endangered species and their habitats to prevent “jeopardy” and to assist in the conservation and recovery of those species, while not constraining the ability of operational commands to accomplish established military training requirements. The Base’s management plan is designed to complement regional plans and initiatives.

**3.2.2. Species and Communities**

Camp Pendleton supports high-quality and in some instances, the last, remaining intact stands of sensitive-habitat types in coastal southern California. Zedler et al. (1997) described and mapped 21 native and nonnative vegetation types on Camp Pendleton. Major vegetation types and descriptions are provided in Appendix I. Most of these vegetation types are recognized in the classification system developed by Holland (1986).
TABLE 3-4. NUMBER OF NATIVE AND NON-NATIVE PLANT SPECIES AT CAMP PENDLETON, GROUPED BY VEGETATION TYPE

<table>
<thead>
<tr>
<th>Vegetation Type a</th>
<th># Native Species</th>
<th># Nonnative Species</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grasses</td>
<td>80</td>
<td>48</td>
<td>128</td>
</tr>
<tr>
<td>Vines</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Ferns</td>
<td>17</td>
<td>0</td>
<td>17</td>
</tr>
<tr>
<td>Herbs b</td>
<td>399</td>
<td>109</td>
<td>508</td>
</tr>
<tr>
<td>Herb/Vine</td>
<td>19</td>
<td>6</td>
<td>25</td>
</tr>
<tr>
<td>Herb/Shrub</td>
<td>32</td>
<td>4</td>
<td>36</td>
</tr>
<tr>
<td>Shrubs</td>
<td>98</td>
<td>8</td>
<td>106</td>
</tr>
<tr>
<td>Shrub/Vine</td>
<td>7</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>Shrub/Tree</td>
<td>3</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>Trees</td>
<td>13</td>
<td>6</td>
<td>19</td>
</tr>
<tr>
<td>TOTAL</td>
<td>670</td>
<td>186</td>
<td>856</td>
</tr>
</tbody>
</table>

a Categories accommodate plant species that are classified as having more than one plant form (see Appendix J).

b Not including grasses.

Over the years, over 850 plant species have been identified on Camp Pendleton (Table 3-4). A comprehensive plant list is presented in Appendix J. Included in that list are numerous rare plant species (see Section 3.2.2.2.) and three federally listed threatened or endangered plant species: thread-leaved brodiaea (Brodiaea filifolia), spreading navarretia (Navarretia fossalis), and San Diego button-celery (Eryngium aristulatum var. parishii) (see Appendix F for detailed information of each federally listed species on Camp Pendleton).

Most of the plants on Base are considered native to the region, but as many as 22% (Table 3-4) are exotic (nonnative), often invasive species that were introduced during the period of European settlement. These nonnative species are believed to have displaced some native plant species in the region.

Some of the exotic invasive plant species that occur on Base include giant reed grass (Arundo donax), artichoke thistle (Cynara cardunculus), perennial pepperweed (Lepidium latifolium), mustard (Brassica spp.) fennel (Foeniculum vulgare), ice plant (Mesembryanthemum crystallinum, Carpobrotos spp. and Aptenia spp.), tamarisk (Tamarix parviflora), and tree tobacco (Nicotiana glauca). As additional invasive exotic species are identified, control and management activities are initiated. New additions to managed exotic invasive plant species since 2001 include bridal veil broom (Retama monosperma), scotch broom (Cytisus scoparius), yellow starthistle (Centaurea solstitialis), and cape ivy (Delairea odorata).
3.2.2.1. Vegetation Communities on Camp Pendleton

Vegetation distribution is primarily determined by climate, available moisture and soil nutrients. Thus rainfall, temperature, soil type, topographic position, and elevation are all important predictors of vegetation. All of these vary substantially on Base because of its coastal location, diverse geology, and pronounced topography. Elevation on Base ranges from sea level to 3,189 ft. Precipitation is lowest at the coast, around 10 inches average, increasing to the east to a high of 24 inches near Case Springs. Most rain, 70%, falls from February to March. Temperature varies from the low 100’s °F in summer to just below freezing in some areas during the winter, with mean temperature decreasing with elevation (Zedler et al. 1997).

The coastal communities receive the lowest average rainfall, however, they benefit from frequent fog and the moderating influence of the ocean, which reduces heat and moisture stress during the summer. Along the immediate beach a unique set of species making up the southern foredune community occupies the actively moving sand dunes (two locations). Salt marsh is found where low topography combines with freshwater inflow and tidal influence to support salt marsh and brackish marsh. On the stable drier soils along the coast there are CSS-covered foothills, and a mixture of native and non-native grasslands in the central valleys. Chaparral is found in the higher foothills, back ranges and open woodlands along the peaks (Zedler et al. 1997).

3.2.2.2. Rare and Sensitive Plants

The first comprehensive botanical survey on Camp Pendleton was completed in 1986. Since then, more than 10 surveys for rare and endangered plants have been conducted on Base. Some of these surveys were conducted basewide, while others focused on selected portions of the Base or specific plants. Surveys focusing on rare and sensitive plants were conducted in: 1987 (PSBS 1987), 1988 (PSBS 1988), 1990 (PSBS 1990), 1993-1996 (Dudek & Associates 1994, 1996; Zedler & Bliss 1993), 1997 (RECON 1999) and 2000 (Tierra Data Systems 2000a). Since 2001, rare plant surveys have become more species-specific, with as many as three separate surveys conducted in any one year. RECON, AMEC, EDAW, North State Resources, and Dudek have completed rare plant surveys; San Diego State University students working for SDSU’s Soil Ecology Restoration Group (SERG), under professor guidance, have also supported some of these survey efforts. The number and intensity of rare plant surveys are dependent upon annual funding (Lucas pers. comm. 2008).

As a result of these surveys, a total of 39 sensitive plant species have been located on Camp Pendleton including one new species, Camp Pendleton button-celery (Eryngium pendletonense), and two species whose locations represented a 45-mile (Brand’s phacelia, Phacelia stellaris) and a 300-mile (La Purisima viguiera, aka Viguiera purissimae Brandegee) extension of their known range. Also these surveys specifically looked for other federal and State listed plant species that were known to occur in the region, including Encinitas baccharis (Baccharis vanessae), San Diego ambrosia (Ambrosia pumila) and San Diego thorn-mint (Acanthomintha ilicifolia), but to date have not been identified on Camp Pendleton. The Base continues to look for and document occurrences of rare plants through basewide and project-level survey efforts.
First identified on 13 June 1992, Camp Pendleton button-celery (*Eryngium pendletonense*) was described as a new species in 1999 and is only known to occur on Camp Pendleton (Marsden and Simpson 1999). Camp Pendleton button-celery was distinguished from the more widespread San Diego button-celery (*Eryngium aristulatum*), a federally endangered listed species that also occurs on Camp Pendleton.

Camp Pendleton uses the California Native Plant Society (CNPS) inventory and assessment to identify rare and sensitive plants that may require special surveys and/or management. The heart of the CNPS *Inventory* is their assessment of the current conservation status of each of California’s rare, threatened, and endangered plants, with an emphasis on plants that are rare in California. Table 3-5 below identifies rare and sensitive plants mapped on Base along with their State and federal listing status, which CNPS list they are on, the threat code, the habitat it is typically found in, and comments.

**Table 3-5. Rare and Sensitive Plant Species Found on Camp Pendleton**

<table>
<thead>
<tr>
<th>Species</th>
<th>State/Federal Status</th>
<th>CNPS List</th>
<th>CNPS Threat Code</th>
<th>Voucher Specimen</th>
<th>Typical Habitat/Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Ambronia maritima</em> Red sand-verbena</td>
<td>--/--</td>
<td>4</td>
<td>2</td>
<td>Yes</td>
<td>Coastal dunes</td>
</tr>
<tr>
<td><em>Arctostaphylos rainbowensis</em> Rainbow manzanita</td>
<td>--/--</td>
<td>1B</td>
<td>1</td>
<td>Yes</td>
<td>Chaparral</td>
</tr>
<tr>
<td><em>Brodiaea filifolia</em> Thread-leaved brodiaea</td>
<td>CE/FT</td>
<td>1B</td>
<td>1</td>
<td>Yes</td>
<td>Chaparral, cismontane woodland, CSS, playas, Valley and foothill grassland, and vernal pools</td>
</tr>
<tr>
<td><em>Brodiaea orcuttii</em> Orcutt’s brodiaea</td>
<td>--/--</td>
<td>1B</td>
<td>1</td>
<td>No</td>
<td>Closed-cone coniferous forest, chaparral, cismontane woodland, meadows and seeps, valley and foothill grassland, and vernal pools</td>
</tr>
<tr>
<td><em>Calandrinia maritima</em> Seaside calandrinia</td>
<td>--/--</td>
<td>4</td>
<td>2</td>
<td>Yes</td>
<td>Coastal bluff scrub, coastal scrub, and valley and foothill grassland</td>
</tr>
<tr>
<td><em>Caulanthus simulans</em> Payson’s jewelflower</td>
<td>--/--</td>
<td>4</td>
<td>2</td>
<td>Yes</td>
<td>Chaparral and CSS/sandy, granitic</td>
</tr>
<tr>
<td><em>Chamaetalia australis</em> Southern mountain misery</td>
<td>--/--</td>
<td>4</td>
<td>2</td>
<td>Yes</td>
<td>Chaparral</td>
</tr>
<tr>
<td><em>Comarostaphylis diversifolia ssp. diversifolia</em> Summer holly</td>
<td>--/--</td>
<td>1B</td>
<td>2</td>
<td>Yes</td>
<td>Chaparral, and cismontane woodland</td>
</tr>
<tr>
<td><em>Coreopsis maritima</em> Sea dahlia</td>
<td>--/--</td>
<td>2</td>
<td>2</td>
<td>Yes</td>
<td>Coastal bluff scrub and CSS</td>
</tr>
<tr>
<td><em>Corethrogyne filaginifolia var. incana</em> San Diego sand aster</td>
<td>--/--</td>
<td>1B</td>
<td>1</td>
<td></td>
<td>Coastal bluff scrub, chaparral, and CSS</td>
</tr>
<tr>
<td>Species</td>
<td>State/Federal Status</td>
<td>CNPS List</td>
<td>CNPS Threat Code</td>
<td>Voucher Specimen</td>
<td>Typical Habitat/Comments</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>----------------------</td>
<td>-----------</td>
<td>------------------</td>
<td>------------------</td>
<td>---------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Dichondra occidentalis</strong></td>
<td>--/--</td>
<td>4</td>
<td>2</td>
<td>Yes</td>
<td>Chaparral, cismontane woodland, CSS, and valley and foothill grassland</td>
</tr>
<tr>
<td>Western dichondra</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Dudleya blochmaniae ssp. blochmaniae</strong></td>
<td>--/--</td>
<td>1B</td>
<td>1</td>
<td>No</td>
<td>Coastal bluff scrub, chaparral CSS, and valley and foothill grassland/rocky, often clay serpentinite</td>
</tr>
<tr>
<td>Blochman’s dudleya</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Dudleya multicaulis</strong></td>
<td>--/--</td>
<td>1B</td>
<td>2</td>
<td>Yes</td>
<td>Chaparral, CSS, and valley and foothill grassland/often clay</td>
</tr>
<tr>
<td>Many-stemmed dudleya</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Dudleya viscosa</strong></td>
<td>--/--</td>
<td>1B</td>
<td>2</td>
<td>No</td>
<td>Coastal bluff scrub, chaparral, cismontane woodland, and CSS/rocky</td>
</tr>
<tr>
<td>Sticky dudleya</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Eryngium aristulatum var. parishii</strong></td>
<td>CE/FE</td>
<td>1B</td>
<td>1</td>
<td>Yes</td>
<td>Vernal pools, marshes, CSS, and, valley and foothill grassland</td>
</tr>
<tr>
<td>San Diego button-celery</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Eryngium pendletonensis</strong></td>
<td>--/--</td>
<td>1B</td>
<td>1</td>
<td>No</td>
<td>Coastal bluff scrub, valley and foothill grassland/land, and vernal pools/clay, vernal mesic</td>
</tr>
<tr>
<td>Pendleton button-celery</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Erysimum ammophilum</strong></td>
<td>--/--</td>
<td>1B</td>
<td>2</td>
<td>No</td>
<td>Chaparral, coastal dunes, and CSS/sandy, openings</td>
</tr>
<tr>
<td>Sand-loving wallflower</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Harpagonella palmeri</strong></td>
<td>--/--</td>
<td>4</td>
<td>2</td>
<td>No</td>
<td>Chaparral, CSS, and valley and foothill grassland/land</td>
</tr>
<tr>
<td>Palmer’s grapplinghook</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Horkelia truncata</strong></td>
<td>--/--</td>
<td>1B</td>
<td>3</td>
<td>Yes</td>
<td>Chaparral, and cismontane woodland/clay, gabbroic</td>
</tr>
<tr>
<td>Ramona horkelia</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Juncus acutus ssp. leopoldii</strong></td>
<td>--/--</td>
<td>4</td>
<td>2</td>
<td>No</td>
<td>Coastal dunes, meadows and seeps, and marshes and swamps</td>
</tr>
<tr>
<td>Southwestern spiny rush</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Lilium humboldii ssp. ocellatum</strong></td>
<td>--/--</td>
<td>4</td>
<td>2</td>
<td>Yes</td>
<td>Chaparral, cismontane woodland, CSS, lower montane coniferous forest, and riparian woodland/openings</td>
</tr>
<tr>
<td>Ocellated Humboldt lily</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Lotus nuttallianus</strong></td>
<td>--/--</td>
<td>1B</td>
<td>1</td>
<td>Yes</td>
<td>Coastal dunes, and CSS</td>
</tr>
<tr>
<td>Nuttall’s lotus</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Monardella hypoleuca ssp. lanata</strong></td>
<td>--/--</td>
<td>1B</td>
<td>2</td>
<td>No</td>
<td>Chaparral, and cismontane woodland</td>
</tr>
<tr>
<td>Felt-leaved monardella</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Myosurus minimus ssp. apus</strong></td>
<td>--/--</td>
<td>3</td>
<td>1</td>
<td>No</td>
<td>Vernal pools, and valley and foothill grassland</td>
</tr>
<tr>
<td>Little mousetail</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Navaretia fossalis</strong></td>
<td>--/FT</td>
<td>1B</td>
<td>1</td>
<td>Yes</td>
<td>Chenopod scrub, marshes and swamps, playas, and vernal pools</td>
</tr>
<tr>
<td>Spreading navaretia</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Species</td>
<td>State/ Federal Status</td>
<td>CNPS List a</td>
<td>CNPS Threat Code b</td>
<td>Voucher Specimen</td>
<td>Typical Habitat/Comments</td>
</tr>
<tr>
<td>---------</td>
<td>---------------------</td>
<td>-------------</td>
<td>-------------------</td>
<td>-----------------</td>
<td>-------------------------</td>
</tr>
</tbody>
</table>
| *Nemacaulis denudata var. denudata*  
Coast woolly-heads | --/-- | 1B | 2 | Yes | Coastal dunes |
| *Phacelia stellaris*  
Brand’s phacelia | --/FC | 1B | 1 | Yes | Coastal dunes, and coastal scrub |
| *Polygala cornuta var. fishiae*  
Fish’s milkwort | --/-- | 4 | 3 | Yes | Riparian woodland, cismontane woodland, and chaparral |
| *Quercus dumosa*  
Nuttall’s scrub oak | --/-- | 1B | 1 | Yes | Closed-cone coniferous forest, chaparral, and CSS/sandy, clay loam |
| *Quercus engelmannii*  
Engelmann oak | --/-- | 4 | 2 | Yes | Chaparral, cismontane woodland, riparian woodland, and valley and foothill grassland |
| *Romneya coulteri*  
Coulter’s matilija poppy | --/-- | 4 | 2 | Yes | CSS, and chaparral |
| *Satureja chandleri*  
San Miguel savory | --/-- | 1B | 2 | No | Chaparral, cismontane woodland, CSS, riparian woodland, and valley and foothill grassland/rocky, gabroic or metavolcanic |
| *Viguiera laciniata*  
San Diego County viguiera | --/-- | 4 | 2 | Yes | Chaparral and CSS |
| *Viguiera purissimae*  
Brandegee La Purisima viguiera | --/-- | 2 | 3 |  | Coastal bluff and chaparral (Only known location in the US, represents a 300-mile range extension) |

**Note a:** The CNPS list plants on one of 5 “lists” in an effort to categorize degrees of concern. They are described as follows:

- **List 1A:** Plants Presumed Extinct in California
- **List 1B:** Plants Rare, Threatened, or Endangered in California and Elsewhere
- **List 2:** Plants Rare, Threatened, or Endangered in California, But More Common Elsewhere
- **List 3:** Plants about Which We Need More Information - A Review List
- **List 4:** Plants of Limited Distribution - A Watch List

A Threat Code has extension to the lists indication of the endangerment of the species. The extensions and their meaning are as follows:

1 – Seriously endangered in California
2 – Fairly endangered in California
3 – Not very endangered in California

### 3.2.2.3. California State Listed and ESA Candidate Plant Species Known to Occur on Camp Pendleton

Two California listed plant species have been found on Base: Thread-leaved brodiaea (California endangered), and San Diego button-celery (California endangered). Both of these species are also listed under the Endangered Species Act (ESA) and are further discussed in Section 3.2.4. and Appendix F.
Brand’s phacelia is the only Federal ESA candidate plant species found on Base. Base management programs do not focus specifically on candidate species, but programmatically manage the major ecosystems on the Base (riparian, beach, estuarine and upland), for the benefit of all species and military training activities that use those systems. Candidate species are included in monitoring and surveys that are conducted for rare and sensitive plants and are managed with the intention of helping to avoid the need for listing.

Brand’s phacelia (Phacelia stellaris) was listed as a Candidate on the ESA in 2004 and currently has a listing priority number of 5. Brand’s phacelia is included as a List 1B.1 plant (Rare, threatened, or endangered in California and elsewhere. Seriously endangered in California.) in the CNPS Inventory, but is not listed by California as Endangered or Threatened (CNPS 2008). The species is currently found at only 3 of the 15 historic sites within the U.S. known to support the species (NatureServe 2009). Three other historic locations occur in Mexico, but have not been confirmed since 1973 in Punta Banda, 1975 in Santa Maria, and 1988 in San Quintin (NatureServe 2009). Within the U.S. the species population is considered rapidly declining to declining 10-50%, and globally it is considered having a very large to large decline 75-90% (NatureServe 2009). See Appendix F, Section F.5 for detail on this species and its management.

3.2.3. Fish and Wildlife Species

Fish and wildlife species on Camp Pendleton are important to the functioning of ecosystems and provide many benefits to humans. Some animals disperse seeds, while others consume insects and rodents considered harmful to humans. Others provide recreational opportunities, such as hunting, fishing, and bird watching.

The large natural areas of Camp Pendleton support a variety of fish and wildlife species. In addition to hundreds of invertebrates, the Base has documented the presence of more than 50 mammalian, 30 reptilian, 10 amphibian, 300 avian, and 60 fish species. Also, State listed Species of Special Concern have been identified by various agencies and organizations on Base (see Appendix K for list of fish and wildlife species that have been identified on Camp Pendleton).

Many wildlife species are resident on the Base and can be found throughout the year. While other wildlife species visit the Base seasonally, such as migratory birds like the least Bell’s vireo, or periodically, like mountain lions that come-and-go as they travel throughout their large home ranges. Camp Pendleton is involved with Regional Conservation planning efforts (mostly by providing habitat and some protection for some non-listed Species of Special Concern). Benefits to non-listed wildlife species on Base include wildlife corridors that provide linkages between San Diego, Riverside and Orange Counties open space. This is an important regional conservation consideration for those species that use the Base for traveling between areas within their home ranges (Kershner pers. comm. 2007).

Most of the fish and wildlife species on Base are considered native to the region but many are also exotic. As with the plants, some exotic wildlife species are invasive and may be causing the decline or local extirpation of native species (e.g., as a result of competitive
exclusion, habitat alteration, predation, nest parasitism, etc.). Examples of nonnative wildlife species on Base include the beaver (*Castor canadensis*), brown-headed cowbird (*Molothrus ater*), bullfrog (*Rana catesbeiana*), red swamp crayfish (*Procambarus clarkii*), Argentine ants (*Iridomyrmex humilis*), and several exotic fish species e.g., mosquitofish (*Gambusia affinis*), carp (*Cyprinus carpio*), black bullhead (*Ameiurus melas*), and green sunfish (*Lepomis cyanellus*).

Among the many native fish and wildlife species for which Camp Pendleton provides habitat are 2 mammalian, 1 amphibian, 7 avian, 2 fish, and 2 invertebrate federally listed threatened or endangered wildlife species, and 2 avian candidate species for listing under the ESA (see Appendix F for a description of each species). A number of other federally listed threatened or endangered wildlife species are known to occur in the region, such as the Quino checkerspot butterfly (*Euphydra editha quino*), but have never been identified on Camp Pendleton. Other federally listed threatened or endangered wildlife species, such as the red-legged frog (*Rana draytonii*), have been historically recorded on Base but not recently, despite survey efforts. Most (96%) of the avian species on Base are included on the list of migratory birds (Code of Federal Regulations (CFR), Title 50, Section 10.13) and protected by the Migratory Bird Treaty Act (MBTA) and Executive Order 13186.

### 3.2.3.1. California State Listed Wildlife Species Known to Occur, Breed, or Migrate Through Camp Pendleton

Twelve California listed threatened and endangered animal species (see Table 3-6) and over 75 California listed animal Species of Special Concern are known to occur and breed on or migrate through the Base. Species of Special Concern include: Hammond’s two-striped garter snake, southwestern pond turtle, San Diego horned lizard, and orange-throated whiptail. For a complete listing of Species of Special Concern see notes in the Species Status column of Appendix K.

#### TABLE 3-6. STATE LISTED THREATENED AND ENDANGERED WILDLIFE SPECIES AT CAMP PENDLETON

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>State Status; Date Listed</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Birds</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>American Peregrine Falcon</td>
<td><em>Falco peregrinus anatum</em></td>
<td>Delisted; 2009</td>
</tr>
<tr>
<td>Bald Eagle</td>
<td><em>Haliaeetus leucocephalus</em></td>
<td>Endangered; 1971</td>
</tr>
<tr>
<td>Bank Swallow</td>
<td><em>Riparia riparia</em></td>
<td>Threatened; 1989</td>
</tr>
<tr>
<td>Belding Savannah Sparrow</td>
<td><em>Passerculus sandwichensis beldingi</em></td>
<td>Endangered; 1974</td>
</tr>
<tr>
<td>California Brown Pelican</td>
<td><em>Pelecanus occidentalis californicus</em></td>
<td>Delisted; 2009</td>
</tr>
<tr>
<td>California Least Tern</td>
<td><em>Sterna antillarum browni</em></td>
<td>Endangered; 1971</td>
</tr>
<tr>
<td>Least Bell’s Vireo</td>
<td><em>Vireo bellii pusillus</em></td>
<td>Endangered; 1980</td>
</tr>
<tr>
<td>Light-Footed Clapper Rail</td>
<td><em>Rallus longirostris levipes</em></td>
<td>Endangered; 1971</td>
</tr>
<tr>
<td>Southwestern Willow Flycatcher</td>
<td><em>Empidonax trailli extimus</em></td>
<td>Endangered; 1990</td>
</tr>
<tr>
<td>Swainson’s Hawk</td>
<td><em>Buteo swainsoni</em></td>
<td>Threatened; 1983</td>
</tr>
<tr>
<td>Western Yellow-Billed Cuckoo</td>
<td><em>Coccyzus americanus occidentalis</em></td>
<td>Endangered; 1988</td>
</tr>
<tr>
<td>Xantus’s Murrelet</td>
<td><em>Synthliboramphus hypoleucus</em></td>
<td>Threatened; 2004</td>
</tr>
</tbody>
</table>
Base management programs do not focus specifically on California listed species, but have been designed to programatically manage the major ecosystems on the Base (riparian, beach, estuarine and upland) for the benefit of all species and military training activities that use those systems. Monitoring and surveys are conducted with a focus on federally listed species at intervals and frequencies determined in consultation with the USFWS. Other species of interest (State listed Species of Special Concern, etc.) are noted during those surveys and other events such as the Christmas bird count, project-specific surveys, and other authorized research projects. The sporadic and limited focus of these events provides information on presence and location of these species, but little regarding population trends that can be compared with regional data. Each of the State listed threatened and endangered species that are known to occur on, breed within or migrate through the Base are discussed in Appendix F.

### 3.2.3.2. ESA Threatened, Endangered and Candidate Marine Species Known to Occur, Breed, or Migrate Offshore of Camp Pendleton

The Base’s jurisdictional responsibility for management of species ends at the mean high tide line, however, the ESA candidate, threatened and endangered species described below have been included for ecosystem-based management awareness when planning or performing coastal activities on Base (see Chapter 4, Section 4.3.6. for further details).

- **Pacific loggerhead turtle** (*Caretta caretta*) – federally threatened.
- **Green sea turtle** (*Chelonia mydas agassizii*) – federally threatened.
- **Leatherback sea turtle** (*Dermochelys coriacea*) – federally endangered.
- **Olive ridley sea turtle** (*Lepidochelys olivacea*) – federally threatened.

Four federally listed threatened or endangered sea turtles species are known to occur in the ocean waters off Camp Pendleton: Pacific loggerhead turtle (*Caretta caretta*) – federally threatened, green sea turtle (*Chelonia mydas agassizii*) – federally threatened, leatherback sea turtle (*Dermochelys coriacea*) – federally endangered, and Olive ridley sea turtle (*Lepidochelys olivacea*) – federally threatened. Since the Base ends at the mean high tide line, management of these species is under the jurisdictional responsibility of the National Marine Fisheries Service (NMFS) while in the water, and the USWFS while onshore (see 4.3.6. Marine Fisheries Issues). None of the listed turtles are known to breed or come ashore on Base, and any such occurrence would be rare and appropriately addressed on an individual basis if encountered. Any sightings of sea turtles along the coast should be reported to the AC/S Environmental Security Office, and this information forwarded to Dr. Scott Eckhart at Scripps and to the NMFS office in Long Beach. Any strandings – either as carcasses or live animals – should similarly be reported. Photos should be taken of the dorsal (carapace) and
ventral (plastral) surfaces, as well as the dorsal surface of the head whenever possible to assist in the identification of the species (Holland 1998b).

The Pacific loggerhead turtle is the least common aquatic reptile to pass through ocean waters off Base, and only a single record of observation is known (Holland 1998b). Loggerheads were named for their relatively large heads, which support powerful jaws and enable them to feed on hard-shelled prey, such as whelks and conch. The carapace (top shell) is slightly heart-shaped and reddish-brown in adults and sub-adults, while the plastron (bottom shell) is generally a pale-yellowish color. The neck and flippers are usually dull-brown to reddish-brown on top and medium to pale-yellow on the sides and bottom. Carapace length of adults is approximately 36 in (92 cm) long; corresponding weight is about 250 lbs (113 kg) (USFWS 2009c). The only known breeding locations in the North Pacific are in Japan (USFWS 2007g). On 22 September 2011, the USFWS issued a final rule which divided existing loggerhead turtle populations into 9 distinct population segments; the potential loggerhead habitat offshore of the Base is considered part of the Northern Pacific Distinct Population Segment (DPS) (USFWS 2011g).

There is a resident foraging population of green sea turtles in the San Diego Bay area that breed throughout Mexico; no known breeding sites are along the coast of California (USFWS 2007h). The species is known to pass through the ocean waters off Base, however, the quantity and frequency is unknown without further study (Holland 1998b). The green sea turtle grows to a maximum length of about 4 feet and a weight of 440 pounds. It has a heart-shaped shell, small head, and single-clawed flippers. Color is variable. Hatchlings generally have a black carapace, white plastron, and white margins on the shell and limbs. The adult carapace is smooth, keelless, and light to dark brown with dark mottling; the plastron is whitish to light-yellow. Adult heads are light-brown with yellow markings. Identifying characteristics include four pairs of costal scutes, none of which borders the nuchal scute, and only one pair of prefrontal scales between the eyes (USFWS 2009d).

Leatherback sea turtle records are scarce, but it is likely that the species passes through the offshore waters of the Base on a frequent basis; however, further study would have to be conducted to affirm the frequency of its presence (Holland 1998b). No known breeding sites are along the coast of California (USFWS 2007i). The leatherback is the largest, deepest diving, most migratory and widest ranging of all sea turtles. The adult leatherback can reach 4 to 8 feet in length and 500 to 2000 pounds in weight, and is the largest living reptile in the world. Its shell is composed of a mosaic of small bones covered by firm, rubbery, oil-saturated skin with seven longitudinal ridges or keels. The skin is predominantly black with varying degrees of pale spotting; including a notable pink spot on the dorsal surface of the head in adults. A toothlike cusp is located on each side of the gray upper jaw; the lower jaw is hooked anteriorly. The paddle-like clawless limbs are black with white margins and pale spotting (USFWS 2009e).

The olive ridley was named for the olive color of its heart-shaped shell, and is one of the smallest of the sea turtles, with adults reaching 2 to 2.5 feet in length and weighing 80 to 110 pounds. The species may be identified by the uniquely high and variable numbers of vertebral and costal scutes. Although some individuals have only five pairs of costals, in nearly all cases some division of costal scutes occurs, so that as many as six to nine pairs
may be present. In addition, the vertebral scutes also show frequent division, as do the scales on the dorsal surface of the head. The prefrontal scales, however, typically number two pairs. Reports suggest that the olive ridley's diet includes crabs, shrimp, rock lobsters, jellyfish, and tunicates. In some parts of the world, algae has been reported as its principal food. Olive ridleys are highly migratory, and largely pelagic. They do not nest on U.S. beaches and many environmental factors affecting them occur outside of U.S. jurisdiction (NMFS 2007b).

The white abalone (*Haliotis sorenseri*) was listed as federally endangered on 16 November 2005 from Point Conception, California to Punta Abreojos, Mexico. Abalones are marine gastropods belonging to the family Haliotidae and genus Haliotis, and are characterized by a flattened spiral shell. Abalone have separate sexes and are broadcast spawners, releasing millions of eggs or sperm during a spawning event. Fertilized eggs hatch and develop into free-swimming larvae, spending from 5 to 14 days as non-feeding zooplankton before development (i.e. metamorphosis) into the adult form. After metamorphosis, they settle onto hard substrates in intertidal and subtidal areas. Abalone grow slowly and have relatively long lifespans of 30 years or more. White abalone are typically found at subtidal depths of 20-60 m (66-197 ft) and were historically most “abundant” at depths of 25-30 m (80-100 ft). The results of a series of fishery-independent abalone surveys conducted in the early 1980s and 1990s indicated that white abalone density may have declined by several orders of magnitude in California since 1970. Over the last 30 years, white abalone abundance has declined from approximately 2.22 to 4.24 million animals (pre-exploitation) to approximately 1,613 to 2,540 animals throughout the species' range. This decline represents a decrease in white abalone abundance of over 99 percent since exploitation began in the late 1960s; review of the commercial landings data affirms the significant decline in white abalone abundance, from a peak of 144,000 lbs (65,318 kg) in 1972 to less than 1,000 lbs (454 kg) in 1979, after only a decade of commercial exploitation (NOAA 2001). Management of this species is under the jurisdictional responsibility of the NMFS.

Six federally endangered whale species potentially occur in the oceanic waters off the coast of Camp Pendleton: Sei whale (*Balaenoptera borealis*), Blue whale (*Balaenoptera musculus*), Finback whale (*Balaenoptera physalus*), Humpback whale (*Megaptera novaeangliae*), Killer whale (*Orcinus orca*), and Sperm whale (*Physeter catodon*); however, their frequency and abundance are unknown without further study, but likely only migrate seasonally offshore between primary mating, feeding, and wintering locations (USFWS 2009f). Management of these species is under the jurisdictional responsibility of the NMFS.

Guadalupe fur seals (*Arctocephalus townsendi*) are members of the "eared seal" family Otariidae, and were listed as a federally Threatened species throughout their range on 16 December 1985. They are also protected under the Marine Mammal Protection Act of 1972, as amended, and are managed by the NMFS. Guadalupe fur seals are sexually "dimorphic" with males reaching average lengths of about 7 ft (2 m) and weighing about 400 lbs (180 kg) while females average lengths and weights are much smaller at about 5 ft (1.5 m) and 110 lbs (50 kg). They have a narrow flat-head with a pointed, long and narrow snout. Their foreflippers are broad, with some hair, reaching slightly past their wrist. Their coloration is dark brown to black with adult males having tan or yellow hairs on the back
of the mane. Guadalupe fur seals are solitary, non-social animals. Males are polygamous, and may mate with 4 to 12 females during a single breeding season. Males form small territories that they defend by roaring or coughing. Breeding season is June through August, with females arriving in early June; pups are born a few days after their arrival. A female will mate about a week after giving birth to her pup. Weaning occurs at around 9 months. Guadalupe fur seals feed mainly at night on squid, mackerel, and lantern fish by diving up to depths of 65 ft (20 m). Guadalupe fur seals reside in the tropical waters of the southern California/Mexico region. During breeding season, they are found in coastal rocky habitats and caves. Little is known about their whereabouts during the non-breeding season (May to September). Guadalupe fur seals are non-migratory and their breeding grounds are almost entirely on Guadalupe Island, Mexico, which was declared as a pinniped sanctuary by Mexico in 1975. There are small populations off of Baja California on San Benito Island and off of southern California at San Miguel Island. Guadalupe fur seals are the only species of the *Arctocephalus* genus that occurs north of the equator (NOAA 2009).

The Xantus's Murrelet (*Synthliboramphus hypoleucus*) is a small black and white seabird with a small head and thin-sharp bill belonging to the family Alcidae, which includes murres and puffins. It was listed as a federal Candidate species on 4 May 2004 and Threatened by the CDFG on 22 December 2004. Murrelets spend most of their lives at sea, and eat a variety of fish and small crustaceans. They only come ashore to the California Channel Islands and six other islands off the coast of Baja California for nesting purposes, and are nocturnal in their nesting activities. They nest in crevices on steep slopes, under dense shrubs, and in sea caves. Chicks are incubated for about a month; they go to sea about two days after hatching and typically disperse north along the coast to feeding grounds. Chicks are accompanied and fed by a parent at sea until capable of supporting themselves. Predators include deer mice, barn owls, western gulls, rats, feral cats, and peregrine falcons (CDFG 2004a). Seabirds are under the jurisdictional responsibility of the USFWS.

### 3.2.4. Federally Listed Threatened and Endangered Species at Camp Pendleton

Sixteen (16) federally threatened or endangered species and three (3) candidate species are found on, or transit through Camp Pendleton (Table 3-7).

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>ESA Status; Date Listed</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Birds</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bald Eagle</td>
<td><em>Haliaeetus leucocephalus</em></td>
<td>Delisted; 2007</td>
</tr>
<tr>
<td>California Brown Pelican</td>
<td><em>Pelecanus occidentalis californicus</em></td>
<td>Delisted; 2009</td>
</tr>
<tr>
<td>California Least Tern</td>
<td><em>Sternula antillarum browni</em></td>
<td>Endangered; 1970</td>
</tr>
<tr>
<td>Coastal California Gnatcatcher</td>
<td><em>Polioptila californica californica</em></td>
<td>Threatened; 1993</td>
</tr>
<tr>
<td>Least Bell’s Vireo</td>
<td><em>Vireo bellii pusillus</em></td>
<td>Endangered; 1986</td>
</tr>
<tr>
<td>Light-footed Clapper Rail</td>
<td><em>Rallus longirostris levipes</em></td>
<td>Endangered; 1970</td>
</tr>
<tr>
<td>Southwestern Willow</td>
<td><em>Empidonax trailli extimus</em></td>
<td>Endangered; 1995</td>
</tr>
</tbody>
</table>
Management of federally listed threatened and endangered species is conducted through the implementation of habitat-based management plans for riparian, estuarine, coastal, and upland areas (Estuarine and Beach Ecosystem Conservation Plan [Appendix B], the Riparian Ecosystem Conservation Plan [Appendix C] and the Listened Upland Species Management Program [Appendix D]). These management plans are based on the concept of programmatically managing vegetation communities in a manner that balances the requirements of federally listed and other species, their habitats and human activities. These management plans were developed in consultation with the USFWS through the development of biological assessments (BA) and biological opinions (BO), which contain the goals, objectives, and terms and conditions for managing federally listed species and their habitats on Camp Pendleton.

Because federally listed threatened or endangered species present a special concern for wildlife management, Camp Pendleton regularly surveys and maps the location and distribution of these species and their related habitats. Information from these surveys is updated periodically and disseminated to Camp Pendleton land and resource managers, land users, and resource agencies to assist in the avoidance of impacts to the species. Surveys for listed wildlife species on Base are conducted to assist all parties in the avoidance of these species. Table 3-7 lists the special management seasons for federally listed threatened and endangered wildlife on Base. It is important to note that federally listed species are not surveyed within the Quebec, Whiskey, and Zulu impact areas due to safety concerns.
### TABLE 3-8. SPECIAL MANAGEMENT SEASONS OF FEDERALLY LISTED WILDLIFE SPECIES FOUND ON CAMP PENDLETON

<table>
<thead>
<tr>
<th>Species</th>
<th>Status</th>
<th>Habitat</th>
<th>Management Season</th>
</tr>
</thead>
<tbody>
<tr>
<td>California Least Tern</td>
<td>Endangered</td>
<td>Beach/Estuary</td>
<td>1 March - 15 September</td>
</tr>
<tr>
<td>Coastal California Gnatcatcher</td>
<td>Threatened</td>
<td>Upland-CSS</td>
<td>15 February - 31 August</td>
</tr>
<tr>
<td>Least Bell’s Vireo</td>
<td>Endangered</td>
<td>Riparian</td>
<td>15 March - 31 August</td>
</tr>
<tr>
<td>Light-Footed Clapper Rail</td>
<td>Endangered</td>
<td>Estuarine/Marsh</td>
<td>1 March - 15 September</td>
</tr>
<tr>
<td>SW Willow Flycatcher</td>
<td>Endangered</td>
<td>Riparian</td>
<td>15 March - 31 August</td>
</tr>
<tr>
<td>Western Snowy Plover</td>
<td>Threatened</td>
<td>Beach/Estuary</td>
<td>1 March - 15 September</td>
</tr>
<tr>
<td>Southern Steelhead Trout</td>
<td>Endangered</td>
<td>Anadromous</td>
<td>December - June</td>
</tr>
<tr>
<td>Tidewater Goby</td>
<td>Endangered</td>
<td>Estuarine/Lagoon</td>
<td>1 March - 15 September</td>
</tr>
<tr>
<td>Arroyo Toad</td>
<td>Endangered</td>
<td>Riparian</td>
<td>15 March - 15 August</td>
</tr>
<tr>
<td>Riverside Fairy Shrimp</td>
<td>Endangered</td>
<td>Vernal Pool/IEW</td>
<td>1 November - 31 May</td>
</tr>
<tr>
<td>San Diego Fairy Shrimp</td>
<td>Endangered</td>
<td>Vernal Pool/IEW</td>
<td>1 November - 31 May</td>
</tr>
</tbody>
</table>

#### 3.2.4.1. Bald Eagle (*Haliaeetus leucocephalus*)

The bald eagle (*Haliaeetus leucocephalus*), our national symbol and one of North America’s largest birds, weighs about 8 to 14 pounds and has a wingspan of 6½ to 8 feet (CDFG 2005). Adults are dark brown with a pure white head and tail. Younger birds are mostly brown, mottled with varying amounts of white. They acquire their adult plumage at 4 or 5 years of age. The bald eagle is commonly associated with aquatic habitat (coastal areas, rivers, lakes, and reservoirs). The decline in population was attributed to loss of habitat and environmental contaminants.

**MANAGEMENT STATUS**

**Federal Status**

The USFWS listed the bald eagle (*Haliaeetus leucocephalus*) as endangered in the lower 48 states on 11 March 1967 (USFWS 1967). On 12 July 1995, the USFWS reclassified the bald eagle from endangered to threatened as a result of a significant increase in numbers of nesting pairs, increased productivity and expanded distribution (USFWS 1995b). On 6 July
1999, the USFWS proposed to remove the bald eagle from the list of endangered and threatened species (USFWS 1999b). On 12 December 2006, the USFWS proposed another rule in the anticipation that the bald eagle would be delisted. The purpose of the proposed rule was to define the term “disturb” in a manner consistent with the existing Bald and Golden Eagle Protection Act (BGEPA) and provide a standard to guide bald eagle management following delisting (2006c). On 5 June 2007, the USFWS published a notice of availability for the final National Bald Eagle Management Guidelines, a notice of availability for the final environmental assessment on the definition of “disturb,” and a proposed rule for a new permit that would authorize limited take under BGEPA, and to grandfather existing Act authorizations. However, on 8 February 2007, the USFWS announced that it had reached a court-approved agreement allowing the agency to make a final determination on the eagle’s status no later than 29 June 2007. The population of bald eagles in the United States has increased from a low of 487 breeding pairs in 1963 to an estimated 9,789 breeding pairs today. The bald eagle was officially delisted (removed) from the ESA Threatened and Endangered Species List, effective 8 August 2007.

**California Status**

Although the bald eagle was removed from the federal Endangered species list, as of 2009, it remains Endangered on the California Endangered Species Act (CESA) list, Sensitive on the California Department of Fish list, and Fully Protected according to the California Department of Fish and Game (CDFG 2007 & 2009o).

**Regional Status**

The bald eagle is a covered species in the following southern California NCCP documents:

- Cal. Dept. of Corrections Statewide Electrified Fence Project.
- Lake Mathews.
- MSCP, City of Chula Vista Subarea Plan.
- MSCP, City of La Mesa Subarea Plan.
- MSCP, City of Poway Subarea Plan.
- MSCP, City of San Diego Subarea Plan.
- MSCP, County of San Diego Subarea Plan.
- Western Riverside MSHCP (One permit w/ 22 permittees).
- SDG&E.

The bald eagle is also a covered species in the North American Landbird Conservation Plan (Rich et al. 2004).

**MCBCP Status**

While DoD lands are managed primarily for military readiness, they have historically made significant, positive contributions to eagle conservation. Eagles have also adapted to many of the military activities on these lands (USFWS 2007a). The bald eagle is known to transit through the Base and occasionally nest near the Base. Any nesting sites or occurrences that are observed on Base are addressed on a case-by-case basis with avoidance and minimization measures implemented as necessary and in consultation with the USFWS. Programmatic instructions and habitat enhancement measures outlined in the Estuarine and Beach Ecosystem Conservation Plan (Appendix B) and Riparian Ecosystem Conservation...
Plan (Appendix C), guide the management of habitat and potential foraging areas including shallow estuaries and rivers/creeks, respectively. Additional information regarding the bald eagle on Camp Pendleton is located in Appendix F, Section F.2.

**DISTRIBUTION**

**Global**

The range of the bald eagle is wholly within North America, including Alaska, Canada, the lower 48 states, and northwest Mexico (CDFG 2005); however, similar species of sea/fish eagles within the genus *Haliaeetus* can essentially be found globally where appropriate habitat exists. In California, bald eagles winter at lakes, reservoirs, rivers, and some rangelands and coastal wetlands with a majority of the State’s wintering population (~50%) found in the Klamath Basin (CDFG 2009b). The State’s breeding habitats are mainly in mountain and foothill forests and woodlands near reservoirs, lakes, and rivers. Most breeding territories are in northern California, but the eagles also nest in scattered locations in the central and southern Sierra Nevada mountains and foothills, in several locations from the central coast range to inland southern California, and on Santa Catalina Island.

**Regional**

In San Diego County, the bald eagle is a rare but annual winter visitor to lakes in the foothills, mountains, and coastal lagoons. From 1997 to 2002 the number wintering in the county varied from 8 to 15 each year (Unitt 2004). The bald eagle has been sited at Lake Henshaw, Cuyamaca, Corte Madera, Morena, Sweetwater Lagoon and San Elijo Lagoon (Unitt 2004). They have also been observed near Whelan Lake and Windmill Lake in Oceanside (Bloom pers. comm. 2005).

**MCBCP**

On Camp Pendleton, the bald eagle is a rare raptor with sightings documented in the Santa Margarita estuary and in Cocklebur Creek in 1995 and 1996, respectively. No other sightings have been documented on Base since. It is an occasional wintering species and has been observed near the Whelan Lake and Windmill Lake vicinity in Oceanside. For detailed information on the bald eagle, survey information and its management on Base see Appendix F, Section F.2.
The California brown pelican (*Pelecanus occidentalis californicus*) is a large, grayish-brown bird with a long, pouches bill (CDFG 2005). The adult has a white head and dark body, but immature birds are dark with a white belly. They measure up to 54 inches long, weigh 8 to 10 pounds, and have a wingspan of 6.5 to 7.5 feet. Pelicans primarily eat fish, especially sardines and anchovies on the Pacific Coast, but are also known to eat some crustaceans. Their eyesight is very sharp, and they are able to spot single or schools of fish from 60 to 70 feet above. They dive steeply into the water in pursuit of prey, and may submerge partially or completely depending upon the height of the dive; air sacs beneath their skin cushion the impact and assist in surfacing. The pouched bill can hold up to three times as much fish as the pelican’s stomach can hold, and up to three gallons of water is squeezed-out after a catch before the prey is swallowed; it also serves as a cooling mechanism in hot weather, or a feeding-trough for the young (USFWS 2009j).

The *Pelecanus occidentalis californicus* subspecies ranges from California south to Colima, Mexico, which includes the Gulf of California (USFWS 2008k). The habitat of the California brown pelican is mainly coastal, and they are rarely seen inland (with the exception of the Salton Sea on the west coast) or far out at sea. Brown pelicans usually begin breeding at 3 to 5 years old in large gregarious colonies; males bring nesting materials to the females to build nesting sites which are typically placed in bushes, on the ground or in treetops. Along the west coast of North America, egg laying (typically 2 to 3 chalky white eggs) may occur from late winter to early spring (peak usually in March or April, but may vary among colonies and from year-to-year) (NatureServe 2005 & USFWS 2009j). Both parents share in incubating the eggs and raising the young. Eggs hatch in about a month and freshly hatched pelicans are born blind, featherless and altricial, but soon develop soft silky down and feathers; average first flight is at 75 days old (USFWS 2009j). Threats to populations include pesticide/chemical pollution, human disturbance, habitat degradation, oil-spills, disease and unpredictable food supplies (USFWS 2008k).

**Management Status**

**Federal Status**

The USFWS listed the California brown pelican (*Pelecanus occidentalis californicus*) as federally endangered on 2 June 1970 (USFWS 1970a, b). No critical habitat has been designated for the California brown pelican by the USFWS; however, a recovery plan was approved (USFWS 1983). On 24 May 2006, a 90-Day Finding on a Petition to Delist the
California brown pelican and Initiation of a 5-Year Review was approved by the USFWS. This finding was based upon significant scientific evidence of recovery of the subspecies throughout its range as presented in the petition (USFWS 2006h). On 20 February 2008, a 12-Month Petition Finding and Proposed Rule to delist the California brown pelican by the USFWS recommended that the species be removed from the Federal List of Endangered and Threatened Wildlife due to recovery; delisting was finalized on 17 December 2009. The California brown pelican remains protected under the MBTA, the Fish and Wildlife Coordination Act, and the Estuary Protection Act (USFWS 2008k & 2009i).

**California Status**
The CDFG listed the brown pelican as an endangered, fully protected species on 27 June 1971 (CDFG 2005). On 19 December 2008, the California brown pelican was recommended as a State Candidate for Delisting (SCD) by the CDFG, and on 5 February 2009 the recommendation for delisting was adopted (CDFG 2008 & SCFGC 2008). The CDFG finding was based upon the following criteria: 1) the breeding population size of the California brown pelican in the Channel Islands has increased from 1969 to the present, after the banning of DDT, and now exceeds the five-year mean 3,000 pair standard noted in the recovery plan (current Channel Islands population size for 2006 is roughly 8,500 breeding pairs); 2) California brown pelicans have gradually expanded their nesting sites in the Channel Islands to former breeding sites, and numbers on Santa Barbara Island have increased substantially since 2001; 3) productivity has increased to 0.7 and now meets or exceeds the five-year mean 0.7 standard noted in the recovery plan for downlisting; 4) relative to the five-year mean standard for fledged young in the recovery plan, brown pelicans at West Anacapa Island have achieved the 2,700 fledgling standard for delisting 9 times from 1997-2005; 5) in spite of known threats (e.g., oil spills, human disturbance, starvation events, domoic acid poisoning, fish hook/line mortality), the breeding population of brown pelicans in California has increased substantially; and 6) nesting sites are under generally-protective NPS ownership or management. The California brown pelican will remain a fully protected species under Fish and Game Code section 3511(b)(2) (SCFGC 2008).

**Regional Status**
The California brown pelican is a covered species in the following southern California NCCP documents:

- Cal. Dept. of Corrections Statewide Electrified Fence Project.
- MHCP, City of Carlsbad Habitat Management Plan.
- MSCP, City of Chula Vista Subarea Plan.
- MSCP, City of La Mesa Subarea Plan.
- MSCP, City of Poway Subarea Plan.
- MSCP, City of San Diego Subarea Plan.
- MSCP, County of San Diego Subarea Plan.
- SDG&E.
The California brown pelican is also a covered species in the Waterbird Conservation for the Americas: The North American Waterbird Conservation Plan, Version 1 (Kushlan et al. 2002).

**MCBCP Status**

Any nesting sites or occurrences that are observed on Base are addressed on a case-by-case basis with avoidance and minimization measures implemented as necessary and in consultation with the USFWS. Programmatic instructions and habitat enhancement measures outlined in the Estuarine and Beach Ecosystem Conservation Plan (Appendix B) guide the management of habitat and potential foraging areas including shallow estuaries. Management details, survey information, etc., for the California brown pelican are located in Appendix F, Section F.6.

**DISTRIBUTION**

**Global**

Brown pelicans range from the Pacific, Atlantic, and Gulf coasts north to Nova Scotia. They nest on offshore islands from Maryland down to Venezuela, and from California south to Chile. The only breeding population in U.S. waters is the Southern California Bight (SCB) population, which consists of breeding birds on the Channel Islands and several islands off Baja California: West Anacapa Island, Santa Barbara Island, Isla Coronado Medio, and Isla Coronado Norte (CDFG 2005). Between breeding seasons, pelicans from other populations join SCB birds in wandering along the west coast of North America as far north as British Columbia (CDFG 2005).

**Regional**

The California brown pelican is common along San Diego County’s coast, however, the nearest nesting colony to San Diego County is on Los Coronados Islands off Tijuana, Mexico (Unitt 2004). The California brown pelican uses shallow coastal wetlands for feeding and roosting and can be observed at Torrey Pines State Reserve, La Jolla, Point Loma, and North Island (Unitt 2004). In summer and fall they have also been observed at Sweetwater Reservoir, and occasionally in San Pasqual Valley and Lake Wohlford (Unitt 2004).

**MCBCP**

The California brown pelican does not use Camp Pendleton as a breeding ground, but is resident on Base and feeds in shallow estuary waters, and uses sand spits and offshore sandbars, for daily loafing and as nocturnal roost areas. For detailed information on the California brown pelican, survey information and its management on Base see Appendix F, Section F.6.
3.2.4.3. California Least Tern (Sterna antillarum browni)

The California least tern is a small bird about nine inches long with a 20-inch wingspan. It is mostly white and pale-gray, and the wingtips are black. The head of the adult has a black cap and white forehead, and the yellow beak is black-tipped. It lives and breeds in large beach colonies along the coastline. The Special Management Season of the California least tern on Base extends from 1 March through 15 September. California populations have diminished from loss of habitat and periodic weather disturbances (El Nino).

**MANAGEMENT STATUS**

**Federal Status**

The California least tern was federally listed as an endangered species by the USFWS on 13 October 1970 (CDFG 2008a). On 7 July 2005, the USFWS initiated a 5-year review of 58 species under section 4(c)(2)(B) of the ESA to ensure that the classification of the species listed as threatened or endangered was accurate and based on the best scientific and commercial data currently available. Included in the review was the California least tern, which has been recommended to be downlisted from endangered to threatened status in the notice of completion of the 5-year review on 14 February 2007; however, a final ruling on this action is currently pending (CDFG 2008a). No critical habitat has been designated for this species, and the recovery plan has been revised several times (USFWS 1980, 1985a). Additionally, the California least tern is further protected by the MBTA.

**California Status**

The CDFG listed the California least tern as endangered, fully protected on 27 June 1971 (CDFG 2005).

**Regional Status**

The California least tern is a covered species in the following southern California NCCP documents:

- MHCP, City of Carlsbad Habitat Management Plan.
- MSCP, City of Chula Vista Subarea Plan.
- MSCP, City of La Mesa Subarea Plan.
- MSCP, City of Poway Subarea Plan.
- MSCP, City of San Diego Subarea Plan.
- MSCP, County of San Diego Subarea Plan.
- SDG&E.
**MCBCP Status**

Programmatic instructions for the protection and management of the California least tern and its habitat is addressed in the Estuarine and Beach Conservation Plan as an attachment to the Riparian and Estuarine/Beach BO (1-6-95-F-02) signed on 30 October 1995. The Estuarine and Beach Conservation Plan is located in Appendix B and the terms and conditions to the BO are located in Appendix L. Camp Pendleton Base Order P3500.1M (Range and Training Regulations) provides direction to Base users that limits impacts to this species by restricting activities in and adjacent to this species’ habitat and breeding/nesting areas during its Special Management Season. Management details, survey information, etc., for the California least tern are located in Appendix F, Section F.7.

**DISTRIBUTION**

**Global**

The least tern, a migratory species, breeds throughout North America and winters in Central and South America. The California subspecies (*S. a. browni*) nests along the Pacific coast from the Tijuana River estuary, just north of the U.S.-Mexico border, to San Francisco Bay. The California least tern historically nested in large beach colonies along the coastline from southern Baja, Mexico to central coastal California. Nesting is currently limited to San Francisco Bay and areas along the coast, from San Luis Obispo County to San Diego County with the largest concentrations of breeding pairs nesting in Los Angeles, Orange, and San Diego Counties.

**Regional**

In southern California, California least terns nests in scattered aggregations on sandy beaches and salt flats along the coast. Active breeding areas in the San Diego County area include: Camp Pendleton, Buena Vista Lagoon, Agua Hedionda Lagoon, Batiquitos Lagoon, Whispering Palms, San Elijo Lagoon, San Dieguito Lagoon, FAA Island, North Fiesta Island, Stony Point, South Sea World Drive, Cloverleaf, Naval Training Center, San Diego International Airport, Sweetwater River, Mission Bay, Coronado Island, Tijuana River Mouth, Chula Vista Wildlife Reserve, North Island NAS, Delta Beach (Coronado Naval Amphibious Base), Coronado Cays, Saltworks and San Diego Bay (USFWS 1980).
MCBCP

On Camp Pendleton, California least tern nesting sites are located on the beaches at the mouths of the Santa Margarita River (Blue Beach), North Beach, French and Aliso Creeks (White Beach), and on the salt flats of the Santa Margarita River Estuary (see Figure 3-10). Since 2003, nesting sites have also been observed on Red Beach with an average of 4 to 5 nests per year. Breeding occurs during the Special Management Season from 1 March to 15 September. Least terns are opportunistic feeders known to capture more than 50 species of fish in relatively shallow, near-shore waters and coastal freshwater ponds, channels, and lakes. For detailed information on the California least tern, survey information and its management on Base see Appendix F, Section F.7.

3.2.4.4. Coastal California Gnatcatcher (Polioptila californica californica)

The coastal California gnatcatcher (Polioptila californica californica) is a small, insectivorous member of the thrush family (Muscicpidae). Its plumage color is dark blue-gray above and grayish-white below, and its long-tail is mostly black above and below. The male has a distinctive black cap that is absent during the winter. Both sexes have a distinctive white eye-ring. The coastal California gnatcatcher is most numerous in low, dense CSS habitat in arid washes, on mesas, and on slopes of coastal hills. The Special Management Season of the gnatcatcher on Base extends from 1 February through 31 August. Major threats for the coastal California gnatcatcher are loss and fragmentation of its habitat.

MANAGEMENT STATUS

Federal Status

The USFWS designated the coastal California gnatcatcher (Polioptila californica californica) as threatened on 30 March 1993 (USFWS 1993a). The USFWS designated critical habitat for the coastal California gnatcatcher in the southern California ecoregion, which includes federal lands, on 24 October 2000 (USFWS 2000b). In compliance with a court order critical habitat was re-proposed on 24 April 2003 (USFWS 2003b). MCB Camp Pendleton lands were fully exempted from critical habitat designation in a final ruling published on 19 December 2007 (USFWS 2007l). The USFWS found that, after review and approval of the Base’s 2007 INRMP, under section 4(a)(3)(B) of the ESA it provides a sufficient benefit to the species and its habitat on Base lands to qualify for exemption status. Currently, there is not a recovery plan for the California gnatcatcher. The gnatcatcher is protected by the MBTA.
California Status
The coastal California gnatcatcher is listed as a species of special concern by the CDFG (CDFG 2005).

Regional Status
The coastal California gnatcatcher is a covered species in the following southern California NCCP documents:

- 93-129 (Bear Brand Ranch) Low-Effect HCP.
- Antelope Road HCP.
- Assessment District 161.
- Bellota Landslide Repair and Shorecliff’s Mobile Home Park.
- Bennett Property, Lamco Housing, Inc.
- Cal. Dept. of Corrections Statewide Electrified Fence Project.
- Cornerstone Homes, Railroad Canyon/Lake Elsinore Tract 20704.
- Coyote Hills East (UnoCal).
- Deer Canyon Park Low-Effect HCP.
- El Sobrante Landfill.
- Evergreen Nursery.
- Fieldstone/La Costa & City of Carlsbad.
- Granite Homes/Lake Elsinore Tract 20705.
- Harley John Reservoir.
- Lake Mathews.
- MHCP, City of Carlsbad Habitat Management Plan.
- MSCP, City of Chula Vista Subarea Plan.
- MSCP, City of La Mesa Subarea Plan.
- MSCP, City of Poway Subarea Plan.
- MSCP, City of San Diego Subarea Plan.
- MSCP, County of San Diego Subarea Plan.
- Meadowlark Estates, SunCal Company.
- Mission View Estates.
- Newport Estates.
- North Peak Development Project.
- Ocean Trails (Palos Verdes Land Holdings Co./Zuckerman Building Co.).
- Ocean Trails Amendment and Permit Transfer.
- Orange County Central/Coastal NCCP/HCP.
- Orange County Southern Subregion NCCP/HCP.
- Rancho Bella Vista (Pacific Bay Properties).
- SDG&E.
- Shell Oil Company/Metropolitan Water District of Southern California.
- Temecula Ridge Apartments and Temecula Village Development.
- Van Daele.
- Western Riverside MSHCP.
The coastal California gnatcatcher is also a covered species in the North American Landbird Conservation Plan (Rich et al. 2004), and the Coastal Scrub and Chaparral Bird Conservation Plan (California Partners in Flight [CPIF] 2003).

**MCBCP Status**

The Base is in consultation with the USFWS regarding management of Upland habitats and species basewide, including the gnatcatcher and its habitat. Since this species was listed, the Base has instituted measures for avoidance and minimization of impacts to the gnatcatcher and its preferred habitat, especially during its Special Management Season. These programmatic instructions are provided to users and residents of the Base via Camp Pendleton’s Base Order P3500.1M (*Range and Training Regulations*). Management details, survey information, etc., for the coastal California gnatcatcher are located in Appendix F, Section F.8.

**Distribution**

**Global**

The coastal California gnatcatcher is restricted to coastal southern California and northwestern Baja California, Mexico, from Los Angeles County (formerly Ventura and San Bernardino Counties) south to El Rosario, Mexico (~30° north latitude) (USFWS 1993a). The coastal California gnatcatcher is a non-migratory bird. Gnatcatchers are typically found in stands of CSS that have moderate shrub canopy cover (40-80 percent). The relative density of CSS cover influences gnatcatcher territory sizes, with territory sizes increasing as shrub cover decreases, likely due to limited resource availability.

**Regional**

In San Diego County, the core population areas capable of supporting 30 or more pairs of coastal California gnatcatcher include Camp Pendleton/Fallbrook, Oceanside, north Carlsbad, southeast Carlsbad, southwest San Marcos, Rainbow/Pala, Olivenhain/Lake Hodges/San Pasqual, Poway, upper San Diego River/El Capitan Reservoir, Mission Trails Regional Park/Miramar, Lakeside/Dehesa, Sweetwater River/Reservoir, Jamal Mountains Otay Lakes/Mesa, west Otay Mountain, and Tijuana River mouth (Unitt 2004).

**MCBCP**

On Camp Pendleton, the coastal California gnatcatcher’s distribution is basewide primarily within CSS habitat (94% of territories are in areas that burned ten years or more
ago), in the less steeply sloped areas (95% of territories at less than 150 m in elevation) of the Base, with concentrations in the northern (State Park), coastal, and southern (inland) portions of the Base (Figure 3-13) (Griffith Wildlife Biology 2008a). The gnatcatcher occurs almost exclusively in the coastal sage community, but can also be found in chaparral and riparian habitats. The Special Management Season of the gnatcatcher extends from 1 February through 31 August, which coincides with peak nesting activities occurring from mid-March through May. For detailed information on the coastal California gnatcatcher, survey information and its management on Base see Appendix F, Section F.8.

3.2.4.5. Least Bell’s Vireo (Vireo bellii pusillus)

The least Bell’s vireo (Vireo bellii pusillus) is a small, migratory bird (4½ to 5 inches in length) with short, rounded-wings and a short, straight-bill. Plumage is mostly gray above and pale below, with a faint white-eye ring. Vireos primarily inhabit dense, willow-dominated riparian habitats with lush understory vegetation. The Special Management Season of the least Bell’s vireo extends from 15 March through 31 August. The decline of the least Bell’s vireo is mainly from loss of riparian habitat and nest parasitism by brown-headed cowbirds.

**Management Status**

**Federal Status**
The USFWS listed the least Bell’s vireo as an endangered species on 2 May 1986 (USFWS 1986b). On 2 February 1994, critical habitat for the LBV was designated in 6 southern California counties (USFWS 1994a). Camp Pendleton was excluded from this designation due to a Memorandum of Understanding (MOU) with the USFWS regarding management of LBVs and their habitat on Base; a draft recovery plan is available (USFWS 1998c). On 7 July 2005, the USFWS initiated a 5-year review of 58 species, which included the least Bell’s vireo, under section 4(c)(2)(B) of the ESA to ensure that the classification of the species as threatened or endangered on the List of Endangered and Threatened Wildlife and Plants was accurate and based on the best scientific and commercial data currently available. The least Bell’s vireo was recommended to be downlisted from endangered to threatened status at the completion of the 5-year review on 14 February 2007; however, a final ruling on this action is currently pending (CDFG 2008a).

**California Status**
The CDFG listed the least Bell’s vireo as endangered on 2 October 1980 (CDFG 2005).
Regional Status

The least Bell’s vireo is a covered species in the following southern California NCCP documents:

- Coachella Valley Multi-Species HCP.
- Fieldstone/La Costa & City of Carlsbad.
- Kern Water Bank.
- Lake Mathews.
- MHCP, City of Carlsbad Habitat Management Plan.
- MSCP, City of Chula Vista Subarea Plan.
- MSCP, City of La Mesa Subarea Plan.
- MSCP, City of Poway Subarea Plan.
- MSCP, City of San Diego Subarea Plan.
- MSCP, County of San Diego Subarea Plan.
- North Peak Development Project.
- Orange County Central/Coastal NCCP/HCP.
- Orange County Southern Subregion NCCP/HCP.
- Rancho Bella Vista (Pacific Bay Properties).
- SDG&E.
- Western Riverside MSHCP.

MCBCP Status

Protection and management of the least Bell’s vireo and its habitat is provided for in the Estuarine and Beach Conservation Plan as an attachment to the Riparian and Estuarine/Beach BO (1-6-95-F-02) signed on 30 October 1995. The Estuarine and Beach Conservation Plan is located in Appendix B and the terms and conditions to the BO are located in Appendix L. Programmatic instructions that provide basewide proscriptions for avoidance and minimization of impacts to the species and its habitat, especially during the Special Management Season, which coincides with its breeding season, are provided in Camp Pendleton’s Base Order P3500.1M (Range and Training Regulations). Management details, survey information, etc., for the least Bell’s vireo are located in Appendix F, Section F.9.

Distribution

Global

The entire range of the least Bell’s vireo consists of the southwestern coastline of California below Santa Barbara, extending inland approximately to the edge of the Imperial Valley. The breeding range for this species encompasses greater Los Angeles and other
metropolitan areas of southern California. The wintering habitat includes Baja California, Mexico and the western coastline of northern and central Mexico.

**Regional**
In San Diego County, the least Bell’s vireo population is concentrated within and along coastal rivers, tributaries and creeks. Major sites for the least Bell’s vireo include: the Santa Margarita River, San Luis Rey River, San Dieguito River, San Diego River, Sweetwater River, Windmill and Pilgrim Creeks, and several other smaller drainages throughout San Diego County (Unitt 2004).

**MCBCP**
The least Bell’s vireo inhabits riparian woodlands made up of willow-dominated habitats with a dense understory. On Camp Pendleton, the least Bell’s vireo is found on the following rivers, creeks and tributaries: the Santa Margarita River, Christianitos Creek, San Mateo Creek, San Onofre Creek, Piedra de Lumber, Las Flores Creek, Aliso Creek, French Creek, De Luz Creek, Fallbrook Creek, Pueblitos Canyon, Windmill Canyon, and Pilgrim Creek (Figure 3-14). The least Bell’s vireo arrives at Camp Pendleton from mid-March to early April and generally leaves for its wintering ground in southern Baja California in late September, although they may begin departing by late July (USFWS 1998c). Stragglers have been noted in October and November, and occasionally individuals overwinter in California (USFWS 1998c). For detailed information on the least Bell’s vireo, survey information and its management on Base see Appendix F, Section F.9.

3.2.4.6. **Light-Footed Clapper Rail (Rallus longirostris levipes)**
The light-footed clapper rail is a bird with a deep cinnamon breast, and darker flanks and back. It has long legs and bill, a short upturned tail, and barred flanks. It is a resident of salt marshes in coastal wetlands. It is a non-migratory species and the site tenacity of adults is high (Unitt 2004). The Special Management Season of the light-footed clapper rail on Base extends from 1 March through 15 September. The decline of the light-footed clapper rail is attributed to loss of habitat in coastal marshes and estuaries, human disturbance and predation.

**Management Status**

**Federal Status**
The light-footed clapper rail (Rallus longirostris levipes) was federally listed as an endangered species by the USFWS on 13 October 1970 (USFWS 1970b). No critical habitat has been designated for this species; however, a recovery plan is available (USFWS 1985b). The light-footed clapper rail is a species protected by the MBTA.
California Status
The CDFG listed the light-footed clapper rail as endangered, fully protected on 27 June 1971 (CDFG 2005).

Regional Status
The light-footed clapper rail is a covered species in the following southern California NCCP documents:

- MHCP, City of Carlsbad Habitat Management Plan.
- MSCP, City of Chula Vista Subarea Plan.
- MSCP, City of La Mesa Subarea Plan.
- MSCP, City of Poway Subarea Plan.
- MSCP, City of San Diego Subarea Plan.
- MSCP, County of San Diego Subarea Plan.
- SDG&E.

MCBCP Status
Protection and management of light-footed clapper rail habitat is provided for in the Estuarine and Beach Conservation Plan as an attachment to the Riparian BO signed on 30 October 1995. The Estuarine and Beach Conservation Plan is located in Appendix B and the terms and conditions to the BO are located in Appendix L. Programmatic instructions that provide basewide proscriptions for avoidance and minimization of impacts to the species habitat, especially during the Special Management Season are provided in Camp Pendleton’s Base Order P3500.1M (Range and Training Regulations). Potential impacts to the clapper rail are addressed on a case-by-case basis through individual consultations with the USFWS (Sullivan pers. comm. 2009). Management details, survey information, etc., for the light-footed clapper rail are located in Appendix F, Section F.10.

Distribution

Global
The light-footed clapper rail inhabits salt marshes along the coast between Santa Barbara, California, and the San Quintin Bay, Baja California Sur, Mexico (USFWS 2005a). In California, Newport Bay in Orange County supports the largest numbers of light-footed clapper rails, about 47% of the State breeding population in 2002 (Zembal and Hoffman 2002).

Regional
In San Diego County, the sites where Zembal has found the light-footed clapper rail, from north to south, are as follows: Cocklebur Canyon mouth, Santa Margarita River estuary, San Luis Rey River mouth, Guajome Lake Marsh, Buena Vista Lagoon, Agua Hedionda Lagoon, Batiquitos Lagoon, San Elijo Lagoon, San Dieguito River estuary, Los Penasquitos Lagoon, Kendall-Frost Marsh (Mission Bay), San Diego River flood-control channel, Famosa Slough, Paradise Creek marsh, Sweetwater River estuary (including E and F Street marshes), J Street marsh, Otay River mouth, South Bay Marine Biology Study Area, Tijuana River estuary and the Dairy Mart ponds (Unitt 2004).
MCBCP


3.2.4.7. Southwestern Willow Flycatcher (*Empidonax traillii extimus*)

The southwestern willow flycatcher (*Empidonax traillii extimus*) measures about 5.75 inches in length and weighs only about 0.4 ounces. Overall, it is roughly the size of a small sparrow. Both sexes look alike. The flycatcher’s appearance is overall greenish or brownish gray above, with a white throat that contrasts with a pale olive breast. The belly is pale yellow. Two white wing bars are visible, but the eye ring is faint or absent. The upper mandible is dark and the lower mandible light. The southwestern willow flycatcher inhabits riparian areas along rivers, streams, and other wetlands. It nests in typically evenly-aged, structurally homogeneous, dense stands of trees and shrubs approximately 13-23 feet tall with a high percentage of canopy cover and dense foliage from 0-13 feet above the ground (Brown 1988; Sedgewick & Knopf 1992). The southwestern willow flycatcher is a neotropical migrant. The Special Management Season of the southwestern willow flycatcher extends from 15 March through 31 August. Factors contributing to the decline of the southwestern willow flycatcher are attributed to loss and degradation of nesting habitat, nest parasitism by cowbirds and human disturbance.

**Management Status**

**Federal Status**

The southwestern willow flycatcher (*Empidonax traillii extimus*) was federally listed as an endangered species by the USFWS on 27 February 1995 (USFWS 1995c). On 22 July 1997, the USFWS designated critical habitat for this species (USFWS 1997a), but was later remanded and vacated. A second proposal for the designation of critical habitat has been
issuеd, and a final rule published 19 October 2005 (USFWS 2005c). The USFWS exempted lands owned by Camp Pendleton from the final critical habitat designation pursuant to Section 4(a)(3) of the ESA based on a legally operative INRMP that provides a benefit to the southwestern willow flycatcher. A recovery plan is available (USFWS 2002a). The flycatcher is protected by the MBTA.

**California Status**

The CDFG listed the southwestern willow flycatcher as endangered, fully protected on 2 January 1991 (CDFG 2005).

**Regional Status**

The southwestern willow flycatcher is a covered species in the following southern California NCCP documents:

- California Department of Corrections Statewide Electrified Fence Project.
- Coachella Valley Multi-Species HCP.
- Fieldstone/La Costa & City of Carlsbad.
  - Kern Water Bank.
  - Lake Mathews.
- MHCP, City of Carlsbad Habitat Management Plan.
- MSCP, City of Chula Vista Subarea Plan.
- MSCP, City of La Mesa Subarea Plan.
- MSCP, City of Poway Subarea Plan.
- MSCP, City of San Diego Subarea Plan.
- MSCP, County of San Diego Subarea Plan.
- Orange County Central/Coastal NCCP/HCP.
- Orange County Southern Subregion NCCP/HCP.
- SDG&E.
- Western Riverside MSHCP.

The southwestern willow flycatcher is also a covered species in North American Landbird Conservation Plan (Rich et al. 2004).
MCBCP Status
Guidance for protection and management of the southwestern willow flycatcher and its habitat is provided for in the Estuarine and Beach Conservation Plan as an attachment to the Riparian and Estuarine/Beach BO (1-6-95-F-02) signed on 30 October 1995. The Estuarine and Beach Conservation Plan is located in Appendix B and the terms and conditions to the BO are located in Appendix L. Specific programmatic instructions that provide basewide proscriptions for avoidance and minimization of impacts to the species and its habitat, especially during the Special Management Season, which coincides with its breeding season are located in the Estuarine and Beach Conservation Plan and Base Order P3500.1M (Range and Training Regulations). Management details, survey information, etc., for the southwestern willow flycatcher are located in Appendix F, Section F.18.

DISTRIBUTION

Global
The breeding range of the southwestern willow flycatcher includes southern California, Arizona, New Mexico, extreme southern portions of Nevada and Utah, far western Texas, perhaps southwestern Colorado, and extreme northwestern Mexico (USFWS 2002a). Between August and September, the southwestern willow flycatcher migrates to the wintering grounds in Mexico, Central America, and possibly northern South America.

Regional
In San Diego County, the population of the southwestern willow flycatcher is fewer than 90 pairs and fewer than 200 Statewide (Unitt 2004). There are two main colonies of southwestern willow flycatchers in the county: along 4.6 miles of the upper San Luis Rey River and on Camp Pendleton along the Santa Margarita River. Four newer colonies have recently formed and are located at: Whelan Lake, Guajome Lake Marsh, Couser Canyon, and Pala (Unitt 2004). Other pairs or unmated individuals are scattered in small numbers throughout the County.

MCBCP
Southwestern willow flycatchers inhabit riparian woodlands made up of mixed willow riparian habitat and riparian scrub with a dense understory. On Camp Pendleton, the southwestern willow flycatcher is found on the following rivers, creeks and tributaries: Santa Margarita River, Newton Canyon, Hidden Canyon, Cristianitos Creek, San Mateo Creek, San Onofre Creek, Piedra de Lumbre, Las Flores Creek, Aliso Creek, French Creek, De Luz Creek, Fallbrook Creek, Roblar Creek, Windmill Canyon, and Pilgrim Creek (Figure 3-17). In 2008, the number of southwestern willow flycatcher territories (singing males) recorded on Camp Pendleton was 9 (Howell and Kus 2009). For detailed information on the southwestern willow flycatcher and its management on Base see Appendix F, Section F.18.
3.2.4.8. Western Snowy Plover (Charadrius alexandrinus nivosus)

The western snowy plover (Charadrius alexandrinus nivosus) is a small shorebird (length 6 inches), pale in color, with a thin dark bill, dark or grayish legs, partial breast band and a dark ear patch. They forage above the mean high-water line of coastal beaches, gathering invertebrates from sand surface, kelp, marine-mammal carcasses, or low foredune vegetation (USFWS 2005a). Typical breeding season occurs within the Special Management Season from 1 March through 15 September. Factors contributing to the decline of the western snowy plover are attributed to predation, loss of habitat and human disturbance.

**Management Status**

**Federal Status**

The western snowy plover (Charadrius alexandrinus nivosus) was listed by the USFWS as threatened on 5 March 1993 (USFWS 1993b). Critical habitat for the western snowy plover was published on 7 December 1999 (USFWS 1999c), and no critical habitat was designated within the Base boundary at that time due to anticipated completion of the Base INRMP. On 17 December 2004, the USFWS published a proposal to designate critical habitat for the Pacific coast distinct population segment of the western snowy plover, pursuant to a court order issued in July 2003 (USFWS 2004d). The court order partially vacated critical habitat established for the Pacific coast population of the western snowy plover and remanded the previous designation of critical habitat for preparation of a new analysis of the economic impacts (Coos County Board of County Commissioners et al. v. Department of the Interior (DoI) et al.). On 29 September 2005, the USFWS published a final rule designating critical habitat for the Pacific coast population of the western snowy plover, and approximately 40 acres of critical habitat was designated on Base within State Park leased lands (Unit CA 24, San Onofre Beach) (USFWS 2005j). This unit stretches roughly 0.8 miles from the mouth of San Mateo Creek to the mouth of San Onofre Creek (USFWS 2005j). An additional 49 acres on Base, outside of the State Park lease area, were excluded from critical habitat designation pursuant to Section 4(a)(3) of the ESA because the USFWS review found that the Camp Pendleton INRMP provides a benefit for the species (USFWS 2005j). The snowy plover is protected by the MBTA.

On 20 February 2004, the USFWS announced a 90-day finding on a petition to remove the Pacific coast population of the western snowy plover from the Federal List of Threatened
and Endangered Wildlife and Plants (USFWS 2004e). The USFWS found that the petition presents substantial information that delisting the Pacific coast population of the western snowy plover may be warranted, and initiated a status review. On 21 April 2006, the USFWS announced a 12-month finding on the petition to remove the Pacific coast population of the western snowy plover from the Federal List of Threatened and Endangered Wildlife pursuant to the ESA of 1973, as amended. After reviewing the best scientific and commercial information, the USFWS found that the petitioned action was not warranted (USFWS 2006d). However, results of the USFWS 5-year review, signed June 2006, found that the Pacific coast population constitutes a valid Distinct Population Segment (DPS) (USFWS 2006f).

On 22 March 2011, the USFWS proposed to revise the critical habitat designation for the western snowy plover. All 441 ac considered for designation on Base are proposed to be exempted under 4(a)(3) of the ESA in the final rule (USFWS 2011e).

**California Status**
The western snowy plover (coastal population) is listed as a Species of Special Concern by the CDFG (CDFG 2008b).

**Regional Status**
The western snowy plover is a covered species in the following southern California NCCP documents:

- Cal. Dept. of Corrections Statewide Electrified Fence Project.
- Kern Water Bank.
- MHCP, City of Carlsbad Habitat Management Plan.
- MSCP, City of Chula Vista Subarea Plan.
- MSCP, City of La Mesa Subarea Plan.
- MSCP, City of Poway Subarea Plan.
- MSCP, City of San Diego Subarea Plan.
- MSCP, County of San Diego Subarea Plan.
- SDG&E.

**MCBCP Status**
Protection and management of the western snowy plover and its habitat is provided for in the Estuarine and Beach Conservation Plan as an attachment to the Riparian BO signed on 30 October 1995. The Estuarine and Beach Conservation Plan is located in Appendix B and the terms and conditions to the BO are located in Appendix L. Programmatic instructions that provide basewide proscriptions for avoidance and minimization of impacts to the species and its habitat, especially during the Special Management Season, which coincides with its breeding season, are provided in the Estuarine and Beach Conservation Plan and Base Order P3500.1N (Range and Training Regulations). Management details, survey information, etc., for the western snowy plover are located in Appendix F, Section F.23.
**Global**

The western snowy plover breeds on the Pacific coast from southern Washington to southern Baja California, Mexico, and in interior areas of Oregon, California, Nevada, Utah, New Mexico, Colorado, Kansas, Oklahoma, and north-central Texas, as well as coastal areas of Texas and possibly northeastern Mexico. The Pacific coast population of the western snowy plover is genetically isolated from western snowy plovers breeding in the interior (USFWS 1993b). The Pacific coast population of the western snowy plover is defined as those individuals that nest adjacent to or near tidal waters and includes all nesting colonies on the mainland coast, peninsulas, offshore islands, adjacent bays, and estuaries (USFWS 1993b). The coastal population of the western snowy plover consists of both resident and migratory birds; some birds winter in the same areas used for breeding (USFWS 1993b). Migratory individuals of the coastal western snowy plover travel either north or south within their coastal range. Typical breeding season occurs within its Special Management Season on Base from 1 March to 15 September.

**Regional**

The two main breeding sites for the western snowy plover in San Diego County are located at Camp Pendleton and Silver Strand (Unitt 2004). Other breeding sites include: Batiquitos Lagoon, San Elijo Lagoon, Mariner’s Point (Mission Bay), Sweetwater River Estuary, Chula Vista Wildlife Reserve, and the Tijuana River mouth (Unitt 2004). As a result of successful management on San Diego County military installations while accomplishing training missions, a majority of the western snowy plover population (approximately 65 percent) within Recovery Unit 6, which includes: Zuma Beach, Santa Monica Bay, Bolsa Chica area, Santa Ana River Mouth, San Onofre Beach, Batiquitos Lagoon, Los Penasquitos, and South San Diego are located on military installations (USFWS 2007j).

**MCBCP**

Nesting sites on Camp Pendleton include: Aliso Beach (White), Cocklebur Beach, North Beach (North), North Beach (South), South Beach, Red Beach, and Gold Beach (South) (see Figure 3-19) (Collier and Terp 2001 & Sullivan pers. comm. 2009). In 2004, the western snowy plover constructed 212 nests on Base (Foster 2006). Approximately 30 percent of the MCBCP nesting population stays over winter on Base (USFWS 2007j). For
detailed information on the western snowy plover and its management on Base see Appendix F, Section F.23.

3.2.4.9. Pacific Pocket Mouse (*Perognathus longimembris pacificus*)

The Pacific pocket mouse (PPM) is a small (4.3 to 6 inches total length), pink-buff pocket mouse. It specializes in harvesting and caching seeds for food reserves, however, some insects are consumed (San Bernardino County Museum 2010a). The species pouches are external to its body, and its coat is spineless and bristle-free. Distinguishing characteristics of the Pacific pocket mouse are its bicolored tail, ears tipped with patches of light-hairs, and hairy-soled hind feet (USFWS 2009c). Pocket mice tend to be found on soils of fine alluvial sands near the ocean. Loss of habitat from urban development, fire, and predation from domesticated cats are the primary threats to the Pacific pocket mouse.

**Management Status**

**Federal Status**
The USFWS emergency listed the Pacific pocket mouse (*Perognathus longimembris pacificus*) as endangered on 3 February 1994 (USFWS 1994b) and published the final listing on 29 September 1994 (USFWS 1994c). No critical habitat has been designated for this species; however, a recovery plan has been approved (USFWS 1998a).

**California Status**
The CDFG listed the Pacific pocket mouse as a Species of Special Concern, highest priority (CDFG 2009).

**Regional Status**
The Pacific pocket mouse is a covered species in the following southern California NCCP documents:

- Orange County Central/Coastal NCCP/HCP.
- SDG&E.

**MCBCP Status**
The Base is in consultation with the USFWS regarding Upland habitats basewide including the Pacific pocket mouse habitat. Programmatic instructions are provided to users and residents of the Base to avoid and minimize adverse impacts to the Pacific pocket mouse. Camp Pendleton’s Base Order P3500.1N (*Range and Training Regulations*) addresses this
species by providing measures for avoidance and minimization of impacts to the species and its habitat. The terms and conditions of the consultation and BO for the construction, operation and maintenance of the Crucible Challenge Course (Crucible) in the Oscar One and Edson Range areas of Camp Pendleton that was issued on 14 August 1996, provide monitoring and adaptive management for the Pacific pocket mouse population in the Oscar One and Edson Range training areas. Management details, survey information, etc., for the Pacific pocket mouse are located in Appendix F, Section F.12.

**DISTRIBUTION**

**Global**
Historically, the Pacific pocket mouse occurred within about 3 km of the coast of southern California, from Marina Del Rey and El Segundo in Los Angeles County south to the vicinity of the Mexican border in San Diego County. Within its range, the Pacific pocket mouse has a much-localized distribution on suitable habitat.

**Regional**
Currently, its only known localities include one population at Dana Point, California and populations on Camp Pendleton.

**MCBCP**
The Pacific pocket mouse occurs on Base in the following three areas: the Oscar One and Edson Range training areas, east of the San Onofre housing area (San Mateo South), and in the northwest corner of the Base between the Base boundary with the City of San Clemente and Cristianitos Road (San Mateo North) (Figure 3-21). For detailed information on the Pacific pocket mouse, survey information and its management on Base see Appendix F, Section F.12.
3.2.4.10. Stephens’ Kangaroo Rat (SKR) (*Dipodomys stephensi*)

The Stephens’ kangaroo rat is a nocturnal burrow-dwelling rodent, which physically resembles all other kangaroo rat species, in having long hind legs, small front legs and feet, brown upper parts, fur-lined cheek pouches, a white belly, and a long tufted-tail. The species reaches its highest densities in intermediate successional stage grassland communities characterized by moderate to high amounts of bare ground, high forb cover, moderate slopes, and well-drained soils (USFWS 2004k). It is commonly found in close association with dirt roads, previously and currently disturbed sites, and/or other areas with a high percentage of bare ground (USFWS 1997b & 2004k). Threats to the Stephens’ kangaroo rat are attributed to agricultural and urban development that reduce and fragment available habitat.

**Management Status**

**Federal Status**

The USFWS designated the Stephens’ kangaroo rat (*Dipodomys stephensi*) as federally endangered on 30 September 1988 (USFWS 1988). Per completion of the species 5-Year Review on 22 July 2011 the Stephens’ kangaroo rat was recommended to be downlisted to threatened; however the final determination is still pending (Berry pers. comm. 2012 & USFWS 2011i). Critical habitat has not been designated for this species, nor has a final recovery plan been approved; however, a draft recovery plan is available (USFWS 1997b).

**California Status**

The Stephens’ kangaroo rat was listed as a State threatened species on 27 June 1971 (CDFG 2008a).

**Regional Status**

The Stephens’ kangaroo rat is a covered species in the following southern California NCCP documents:

- Citation Builders Ridge at Cresta Verde.
- Corona Development Co.
- El Sobrante Landfill.
- Harley John Reservoir.
- Lake Mathews.
• Newport Estates.
• North Peak Development Project.
• Pacific Gateway Homes.
• Potrero Valley/Laborde Canyon Lockheed Martin Low-Effect HCP.
• Riverside County, SKR (Long-Term).
• SDG&E.
• Western Riverside MSHCP.

**MCBCP Status**
The Base is in consultation with the USFWS regarding management of Upland habitats and species basewide including the Stephens’ kangaroo rat and its habitat. Since this species was listed, the Base has instituted measures for avoidance and minimization of impacts to the SKR. These programmatic instructions are provided to users and residents of the Base via Camp Pendleton’s Base Order P3500.1N (Range and Training Regulations). Management details, survey information, etc., for the Stephens’ kangaroo rat are located in Appendix F, Section F.19.

**DISTRIBUTION**

**Global**
The geographic distribution of the Stephens’ kangaroo rat includes the San Jacinto Valley and adjacent areas of western Riverside, southwestern San Bernardino, and northwestern San Diego counties. The entire geographic range of the Stephens’ kangaroo rat is estimated to be 1,108 square miles (287,000 ha). Most of the range occurs in western Riverside County, and extends into northern San Diego County, and perhaps southwestern San Bernardino County. Although historically present, the Stephens’ kangaroo rat may no longer occur in...
San Bernardino County (see Figure 3-23) (USFWS 1997b). Since the Stephens’ kangaroo rat requires sparse CSS and grassland, moderate human disturbances (e.g., certain grazing regimes, brush removal, mowing, and fires) can benefit its habitat by maintaining sparse shrub growth; however, too much disturbance may also be detrimental to the species (USFWS 1997b & 2008a).

**Regional**
The Stephens’ kangaroo rat has an unusually small range for a rodent species in general, and kangaroo rats in particular, and therefore its regional distribution is equivalent to its rangewide distribution as shown in Figure 3-24 (USFWS 1997b).

**MCBCP**
The Stephens’ kangaroo rat occurs on Base in the following areas: Juliett, Kilo One, Kilo Two, Range 407-1, Range 407-2, Range 408-1, and Range 409-1 (see Figure 3-24). For detailed information on the Stephens’ kangaroo rat, survey information and its management on Base see Appendix F, Section F.19.

### 3.2.4.11. Southern California Steelhead Trout (*Oncorhynchus mykiss*)

Steelhead are sea-run rainbow trout (anadromous). They are typically a heavily speckled dark-olive color (dorsal), transitioning to silvery-white on the underside (ventral) with a distinct pink-stripe running along their sides. The body of the steelhead appears somewhat compressed with a rounded snout and a large mouth. They have an average length of 20 to 30 inches, but can reach up to 45 inches. A mature steelhead weighs approximately 8 to 9 pounds on average; however they can be as much as 55 pounds (NMFS 2009). The spawning male displays minor changes to its head, mouth and color. Usually, steelhead migrate to marine waters after spending one to four years in freshwater, and spawn between December and June in southern California when seasonal streams have adequate flow volumes. Steelhead are capable of spawning multiple times before dying at a maximum of about 11 years old (NMFS 2009). The major threats affecting the Southern California Steelhead DPS are introduction of non-native species, point and non-point source pollution, and loss of watershed habitat either from development, blocked access to headwater spawning areas, and/or dewatering of streams by diversions and groundwater pumping.
Management Status

Federal Status

The evolutionarily significant unit (ESU) of the Southern California Steelhead (Oncorhynchus mykiss) was federally listed as an endangered species by the National Marine Fisheries Service (NMFS) on 18 August 1997 (NMFS 1997), and by the USFWS on 17 June 1998 (USFWS 1998d). On 1 May 2002, the NMFS issued a final rule to extend the southern-most range of the steelhead from its then southern boundary of Malibu Creek, to the U. S./Mexico border (NMFS 2002). Critical habitat was designated for the original Southern California ESU of steelhead on 16 February 2000 (NMFS 2000a). As the result of a court-approved consent decree, the NMFS issued a final rule effective 30 April 2002, that removed critical habitat designations for 19 salmon and steelhead ESUs, which included the Southern California Steelhead DPS (NOAA 2003). On 2 September 2005, NOAA published a final rule designation of critical habitat for the steelhead (Oncorhynchus mykiss) in California (NOAA 2005). Critical habitat was not proposed for designation on Camp Pendleton because Base lands are subject to a qualifying INRMP prepared under Section 101 of the Sikes Act (16 U.S.C. 670a) (NOAA 2005). Currently, the NMFS is in the process of finalizing a draft recovery plan, with the assistance of public review and comment. The final recovery plan will serve as a guide for those interested in restoring steelhead runs within Southern California. It will not be a regulatory document, but a blueprint which describes the unique biological characteristics of Southern California steelhead (NCTimes 2010).

California Status

The southern steelhead trout is listed as a fish Species of Special Concern in California by the CDFG (CDFG 2005).

Regional Status

The southern steelhead trout is not a covered species in any of the southern California NCCP documents.

MCBCP Status

A programmatic BA for the steelhead on the Base is being drafted to initiate consultation with the NMFS. Until the BA is completed and the subsequent BO is issued, steelhead and its habitat receive protection from avoidance and minimization programmatic instructions and management efforts provided by the Estuarine and Beach Ecosystem Conservation Plan (Appendix B) and the Riparian Ecosystem Conservation Plan (Appendix C). Camp Pendleton’s Base Order P3500.1N (Range and Training Regulations) disseminates these instructions to users of the Base. Management details, presence/absence information, etc., for the steelhead are located in Appendix F, Section F.17.

DISTRIBUTION

Global

Historically, the steelhead ranged throughout the eastern Pacific Ocean from the Kuskokwim River in Alaska to the Rio del Presidio in Baja California. Southern steelhead
(those occurring south of San Francisco Bay) were formerly found in coastal drainages as far south as the Santo Domingo River in northern Baja California.

**Regional**

Southern steelhead were formerly found in streams and rivers of Los Angeles, Orange, and San Diego counties (McEwan & Jackson 1996). Steelhead were thought to be extirpated from much of their historic range in southern California south of Malibu Creek until 1999. Presently, the Southern California Steelhead DPS distribution extends from the Santa Maria River in San Luis Obispo County, to at least San Mateo Creek on Camp Pendleton.

**MCBCP**

The intermittent presence of *Oncorhynchus mykiss* on Base is noted until the mid to late 1940’s after which their presence is attributed to hatchery trout plants on- and off-Base. The few sightings post 1980 are likely a result of *Oncorhynchus mykiss* straying from other drainages. Whether planted rainbow trout survived and became steelhead can only be speculated upon; since hatchery rainbow stocks came from various mixtures of coastal steelhead their ability to spawn with native trout is likely, and has been reportedly observed by the CDFG (USFWS 1998g). In 1997, the first reoccurrence of steelhead on Base was observed in San Mateo Creek since 1993 (2 adults) and 1989 (some 38 cm trout) (NOAA 2000 & USFWS 1998g). Information compiled by CDFG is limited, but suggests that native adult steelhead that strayed from another watershed, entered San Mateo Creek and successfully spawned in 1997 (NOAA 2000). The juvenile progeny of those spawning adults were observed by CDFG during their field investigations in the spring and summer of 1999; between 3 March and 3 September 1999, 78 juvenile steelhead observations were made, and genetic testing by the CDFG determined that the steelhead observed were native to the region (Southern California ESU) and offspring of an andromous form (NOAA 2000). In 2000, the numbers of steelhead observed declined from 3 adults and 17 juveniles observed in June, to only 1 juvenile seen in November (Hovey 2000a-f). In cooperation with NMFS and CDFG, existing pools were monitored beginning in summer 2001 and throughout 2002 to determine if *O. mykiss* were able to survive in San Mateo Creek (MCBCP 2003b). The
most recent confirmed observation of steelhead on Base was of one individual within San Mateo Creek in December 2003. Extensive surveys conducted in June 2005 indicated no steelhead were present in existing pools on Base (Rouse pers. comm. 2009); however, the portion of the San Mateo Creek within Base boundaries serves only as a migration corridor (December – March) to suitable off Base habitat, so the continued presence of *O. mykiss* on Base was not expected (Figure 3-26 illustrates the general locations of recent steelhead observances).

### 3.2.4.12. Tidewater Goby (*Eucyclogobius newberryi*)

The tidewater goby is a small fish, rarely exceeding 2 inches in length and is characterized by large pectoral fins, a blunt elongated tail, and a ventral sucker-like disk formed by the complete fusion of the pelvic fins (USFWS 2005i). The male goby’s body is a mottled dark-olive color and is nearly translucent, while females develop darker colors, often black, on the body and dorsal fins (USFWS 2004f). Tidewater gobies are a California endemic species and are unique in that they are restricted to coastal brackish water habitats (USFWS 2000a). The spawning season of the tidewater goby extends from 1 March to 15 September, and possibly as late as November/December. The major threats affecting the tidewater goby are loss of wetland habitat, flooding and drought.

**Management Status**

**Federal Status**

The tidewater goby (*Eucyclogobius newberryi*) was federally listed as an endangered species by the USFWS on 4 February 1994 (USFWS 1994d). On 20 November 2000, the USFWS designated 10 coastal stream segments, totaling approximately 9 linear miles of rivers, streams, and estuaries in Orange and San Diego Counties as critical habitat for the tidewater goby (USFWS 2000a) including 1,014 ac on Camp Pendleton, 39 ac of which occur on lands leased from the Base. On 28 November 2006, the USFWS proposed to exclude critical habitat designation for the tidewater goby on Camp Pendleton (USFWS 2006b) in accordance with Section 4(a)(3)(B)(i) of the ESA. The USFWS has determined that conservation efforts on Base provide benefits to the tidewater goby occurring in habitats within or adjacent to the Base that are subject to this INRMP. A final recovery plan for the tidewater goby was published in 7 December 2005 (USFWS 2005i). The final ruling for the proposed re-designation of tidewater goby critical habitat was published in the Federal Register on 31 January 2008, and went into effect 3 March 2008 (USFWS 2007f). On 19 October 2011, the USFWS published a proposed rule to re-designate critical habitat, however, all 989 ac of critical habitat proposed on Base were excluded under 4(a)(3)(B) of the ESA (USFWS 2011d).
**California Status**
No special status has been designated for the tidewater goby by the State of California (CDFG 2008).

**Regional Status**
The tidewater goby is a covered species in the following southern California NCCP document:
- Dos Pueblos Golf Links.

**MCBCP Status**
Protection and management of the tidewater goby and its habitat is provided for in the Estuarine and Beach Conservation Plan as an attachment to the Riparian BO signed on 30 October 1995. The Estuarine and Beach Conservation Plan is located in Appendix B and the terms and conditions to the BO are located in Appendix L. Programmatic instructions that provide basewide prescriptions for avoidance and minimization of impacts to the tidewater goby and its habitat are provided to users of the Base in Base Order P3500.1N (Range and Training Regulations). Management details, survey information, etc., for the tidewater goby are located in Appendix F, Section F.22.

**DISTRIBUTION**

**Global**
Historically, the tidewater goby ranged from Tillas Slough (mouth of the Smith River, Del Norte County) near the Oregon border to Agua Hedionda Lagoon (northern San Diego County) (USFWS 1999d). Tidewater gobies appear to be naturally absent (now and historically) from three large (50 to 135 mi or 80 to 217 km) stretches of coastline where lagoons or estuaries are absent and steep topography or swift currents may prevent tidewater gobies from dispersing between adjacent localities. From north to south, the first gap is between the Eel River in Humboldt County and the Ten Mile River in Mendocino County. The second gap is between Lagoon Creek in Mendocino County and Salmon Creek in Sonoma County. The southernmost large natural-gap occurs between the Salinas River in Monterey County and Arroyo del Oso in San Luis Obispo County. Habitat loss and other anthropogenic-related factors have resulted in the tidewater goby now being absent from several locations where it historically occurred, which has created non-natural gaps in the species’ geographic distribution; the largest of these extends at least 70 mi (113 km) from northern Los
Angeles County to northern San Diego County (USFWS 2007b).

Regional
In San Diego County, the tidewater goby is present in Estuaries on Camp Pendleton. The species' southernmost known locality is currently Cockleburr Canyon, (USFWS 2008e).

MCBCP
Overall, gobies are not present in all habitats year-round, and their distribution and density may vary seasonally and spatially. On Camp Pendleton, the extirpation and recolonization of gobies fluctuate yearly between lagoons. Tidewater goby presence/absence surveys are conducted annually in the following lagoons: San Mateo, San Onofre, Las Flores, Hidden, Aliso, French, Cocklebur, and the Santa Margarita (Figure 3-28). Management details, presence/absence surveys, etc., for the tidewater goby are located in Appendix F, Section F.22.

3.2.4.13. Arroyo Toad (Anaxyrus californicus)

The arroyo toad is a light-brown to greenish-grey, blunt-nosed, and warty-skinned toad. The belly is buff or white and often lacks spots. A light-colored stripe outlines the bottom of the eye and glands (paratoid) behind the eyes are oval-shaped. Arroyo toads utilize a variety of habitats for breeding, foraging and hibernating. Sandy washes, dry streambeds, arroyos, and adjacent upland habitat (desert, shrubland, referred to as the upland component) are primarily used for burrowing (February – July) and hibernating (August/September – February/March) (AmphibiaWeb 2009). Breeding and egg laying occurs on rivers that have shallow, gravelly pools adjacent to sandy terraces (referred to as the riparian component) (NatureServe 2005). The riparian area Special Management Season of the arroyo toad extends from 15 March through 15 August.

Management Status

Federal Status
The arroyo toad (Anaxyrus californicus) was listed as a federally endangered species on 16 December 1994 (USFWS 1994e). The USFWS designated approximately 182,360 ac of critical habitat for the arroyo toad on 7 February 2001 (USFWS 2001b, c). A court order set aside the designation on 30 October 2002, and ordered a new critical habitat designation for the arroyo toad. On 28 April 2004, a proposed rule to designate approximately 138,713 ac of critical habitat in Monterey, Santa Barbara, Ventura, Los Angeles, San Bernardino, Riverside, Orange, and San Diego Counties, California was published (USFWS 2004g).
The final rule designating approximately 11,695 ac in 6 units as critical habitat for the arroyo toad was published on 13 April 2005 (USFWS 2005b). All essential lands in two units that include portions of Camp Pendleton: Unit 11- San Mateo Creek and San Onofre Creek Basins, San Diego and Orange Counties and Unit 12- Lower Santa Margarita River Basin, San Diego County, were either excluded from critical habitat designation under Section 4(b)(2) or Section 4(a)(3) of the ESA. A recovery plan has been approved for this species (USFWS 1999a).

On 13 October 2009, a revised critical habitat designation totaling 109,110 acres in Monterey, Santa Barbara, Ventura, Los Angeles, San Bernardino, Riverside, Orange, and San Diego Counties was proposed but not been finalized by the USFWS. All lands within MCB Camp Pendleton (including the leased lands) were excluded from the proposed revised critical habitat designation due to the benefits afforded to the arroyo toad by the management measures described in the approved INRMP (USFWS 2009i).

Since the toad was listed, analysis of allozyme data has been found to support the recognition of *Bufo californicus* as a separate species from *Bufo microscaphus*, and phylogenetic analysis of comparative anatomical and molecular genetic data for amphibians found that the Nearctic taxa of *Bufo* should be separated and renamed as the genus *Anaxyrus*. In turn, *Bufo californicus* was renamed *Anaxyrus californicus*. The revised scientific name has been accepted by the Committee on Standard English and Scientific Names of the American Society of Ichthyologists and Herpetologists, The Herpetologists' League, and the Society for the Study of Amphibians and Reptiles, however, official recognition by the USFWS has been proposed, but not finalized (USFWS 2009i).

**California Status**
The CDFG listed the arroyo toad as a species of special concern in California (CDFG 2005).

**Regional Status**
The arroyo toad is a covered species in the following southern California NCCP documents:

- Coachella Valley Multi-Species HCP.
- MHCP, City of Carlsbad Habitat Management Plan.
- MSCP, City of Chula Vista Subarea Plan.
- MSCP, City of La Mesa Subarea Plan.
- MSCP, City of Poway Subarea Plan.
- MSCP, City of San Diego Subarea Plan.
- MSCP, County of San Diego Subarea Plan.
- Orange County Central/Coastal NCCP/HCP.
- Orange County Southern Subregion NCCP/HCP.
- SDG&E.
- Western Riverside MSHCP.
**MCBCP Status**

The arroyo toad receives programmatic protection from training and other Base activities within the riparian component of its habitat through programmatic instructions provided to users and residents of the Base as part of the Riparian Ecosystem Conservation Plan (Appendix C) and Base Order P3500.1M (*Range and Training Regulations*). The Base is currently in consultation with USFWS regarding Upland habitat basewide including habitat occupied by the arroyo toad. Management details, survey information, etc., for the arroyo toad are located in Appendix F, Section F.1.

**DISTRIBUTION**

**Global**

Endemic to southern California, arroyo toads were found historically in coastal and some desert drainages from Monterey County, California south to San Quintin, Baja California, Mexico (Sweet 1993). Arroyo toad populations in California persist in headwater areas of streams in Santa Barbara, Ventura, Los Angeles, Riverside, and San Diego counties. The majority of the remaining populations in Santa Barbara and Ventura counties are in Los Padres National Forest (five viable populations); Sespe Creek in Ventura County has the largest known population; and other populations occur in the Sisquoc, Santa Ynez, and upper and lower Piru drainages (USFWS 1994e).

**Regional**

Arroyo toads occur in San Diego County along the Santa Margarita River, San Onofre Creek, San Mateo Creek, Sweetwater River, Vallecitos Creek, San Luis Rey River, San Dieguito River/Santa Ysabel Creek, Tijuana River/Cottonwood Creek, San Diego River, Otay River, and San Felipe Creek drainage basins. Arroyo toads are present in Orange County along the Santa Ana River, San Juan Creek, and San Mateo Creek drainage basins. Arroyo toads are found in Riverside County along the Whitewater River, Santa Ana River, San Juan Creek, San Mateo Creek, and Santa Margarita River drainage basins. The species is also found in San Bernardino County in the Mojave River drainage basin, and in Imperial County in the Pinto Wash drainage basin (USFWS 1999a).
MCBCP

Camp Pendleton contains three of the remaining 19 drainage basins where arroyo toads are reasonably believed to be extant: the Santa Margarita, San Onofre, and San Mateo (Figure 3-30). It is likely that some of the largest remaining populations of this species occur on Camp Pendleton (Holland & Goodman 1998a). For detailed information on the arroyo toad and its management on Base see Appendix F, Section F.1. Distribution of arroyo toads on Camp Pendleton are areas identified as believed to be required by the USFWS for recovery of the species in the recovery plan (USFWS 1999a).

3.2.4.14. Riverside Fairy Shrimp (*Streptocephalus woottoni*)

Riverside Fairy Shrimp (*Streptocephalus woottoni*) are free-swimming filter feeder crustaceans, which hatch from dormant cysts once hydrated under specific environmental conditions. Mature male Riverside fairy shrimp are approximately 0.5 to 1.0 inches long and the females are approximately 0.5 to 0.87 inches in total length (USFWS 2005). Riverside fairy shrimp generally occur in groups of vernal pools (aka IEW) referred to as vernal pool complexes, and are typically visible from January to March; however, the hatching period may be extended in years of late rainfall (USFWS 2008h). Vernal pool complexes tend to average between 5 and 50 vernal pools, although some contain as few as two vernal pools and others contain several hundred vernal pools (complexes containing Riverside fairy shrimp often contain only 1 or 2 pools; however, on MCB Camp Pendleton and Otay Mesa in San Diego County, complexes generally contain many pools). Vernal pools within a complex are generally hydrologically connected, such that water flows over the surface from one pool to another, and/or water flows and collects belowground such that the soil becomes saturated with water, thus filling the vernal pool (USFWS 2008h). For this reason, vernal pool complexes are best described from a watershed perspective (USFWS 2008h). The vernal pool watershed includes all areas around a vernal pool complex needed to collect rainfall and adequately fill the vernal pools within the complex. Vernal pools begin to fill following the onset of fall and winter rains and may remain hydrated until April or May. Some pools in a complex have substantial watersheds that contribute to filling the vernal pools, while others fill almost entirely from rainfall (USFWS 2008h). Additionally, subsurface inflows from surrounding soils may be an important factor in filling some vernal pools (USFWS 2008h). Riverside fairy shrimp are restricted to dilute vernal pools, having relatively low sodium (Na⁺) concentrations (below 60 millimoles per liter), low alkalinity (below 1000 milligrams per liter), and neutral pH (near 7) (USFWS 2008h). Riverside fairy shrimp are unable to regulate their internal ion levels and mortality increases at higher Na⁺ concentrations and alkalinity (USFWS 2008h).
**Management Status**

**Federal Status**
The USFWS listed the Riverside fairy shrimp (*Streptocephalus woottoni*) as federally endangered on 3 August 1993, because the species is significantly threatened by loss and degradation of habitat range-wide (USFWS 1993c). Final critical habitat was published for the Riverside fairy shrimp on 30 May 2001. On 30 October 2002, the DC Circuit Court vacated the published critical habitat. Critical habitat was then proposed again on 27 April 2004 (USFWS 2004h). On 19 October 2004, the comment period was reopened until 18 November 2004, and the draft economic analysis was made available. The proposed critical habitat excluded “mission-critical” training areas on Base. “Non-mission-critical” training areas within Camp Pendleton, including lands at the Cocklebur Sensitive Area and lands leased to the State Parks, were included within the North San Diego County Critical Habitat Unit (Map Unit 4). Final critical habitat was published on 12 April 2005. All areas owned and operated by Camp Pendleton were excluded from designation in accordance with Section (4)(a)(3) of the ESA. A recovery plan has been approved for the listed species of southern California vernal pools, which includes the Riverside fairy shrimp (USFWS 1998b). In 2008, a 5-year review of the species status was conducted and based on the most current scientific evidence no change in federal listing status was recommended, and a revision of the downlisting criteria presented in the 1998 Vernal Pools of Southern California Recovery Plan was recommended (USFWS 2008h).

**California Status**
No special status has been assigned to the Riverside fairy shrimp in the State of California.

**Regional Status**
The Riverside fairy shrimp is a covered species in the following southern California NCCP documents:

- Assessment District 161
- MHCP, City of Carlsbad Habitat Management Plan
- MSCP, City of Chula Vista Subarea Plan
- MSCP, City of La Mesa Subarea Plan
- MSCP, City of Poway Subarea Plan
- MSCP, City of San Diego Subarea Plan
- MSCP, County of San Diego Subarea Plan
- Orange County Southern Subregion NCCP/HCP
- Orange County Central/Coastal NCCP/HCP
- Rancho Bella Vista (Pacific Bay Properties)
- Redhawk Communities
- SDG&E
- Western Riverside MSHCP

**MCBCP Status**
The Base is in consultation with the USFWS regarding management of Upland habitats and species basewide, including the Riverside fairy shrimp and the pools it occupies. When this species was listed, the Base instituted measures for avoidance and minimization of impacts...
to the vernal pools that the Riverside fairy shrimp inhabit. These measures are published as programmatic instructions for users and residents of the Base via Camp Pendleton’s Base Order P3500.1N (Range and Training Regulations). Management details, survey information, etc., for the Riverside fairy shrimp are located in Appendix F, Section F.14.

**DISTRIBUTION**

**Global**

The Riverside fairy shrimp’s total range extends from coastal southern California south to northwestern Baja California, Mexico (USFWS, 2000c). The 3 August 1993, listing rule stated that Riverside fairy shrimp were known to inhabit 9 vernal pool complexes within Riverside, Orange, and San Diego counties, and Baja Mexico, including four vernal pools in Riverside County, one population in Orange County, two areas in San Diego County, and two locations in Baja California, Mexico. However, it is now thought the Murrieta Golf Course (Riverside County) location was likely already lost to development prior to listing. In addition, the one population in Orange County referenced in the listing rule has never been confirmed. Thus, at listing, it is likely that there were only three extant occurrences of Riverside fairy shrimp known from Riverside County, two occurrences known from San Diego County, and two occurrences known from Mexico (i.e., 5 in the United States and 2 in Mexico).

Since listing, as many as 52 additional occupied complexes have been identified, including one man-made complex at Johnson Ranch, however, about 9 of the total 57 complexes are known to have been extirpated, and the USFWS is unsure whether the species persists in 3 other complexes; hence, there are currently 45 known occupied vernal pool complexes (approximately 200 occupied pools) within the U.S., which includes the man-made complex at Johnson Ranch (USFWS 2008h). All but one of these additional occurrences were likely in existence at the time the species was listed, but had not been identified, and therefore were not included in the analyses that led to the listing of the species. The species has also been introduced into restored/enhanced vernal pools as part of vernal pool restoration projects: approximately 8 acres of habitat has been restored since

![Figure 3-33. Regional Vernal Pool Locations](image)
listing (compared to the approximately 7 acres which have been lost). The additional occurrences increase the conservation and recovery potential of Riverside fairy shrimp by contributing to the resilience of this species via population redundancy; i.e., more occurrences are known to be available to contribute to sustaining the species in the event some occurrences are extirpated.

**Regional**

Currently, there are 45 known occupied vernal pool complexes (approximately 200 occupied pools) within the U.S. (see Figure 3-32), which includes a man-made complex at Johnson Ranch (Mexico locations not included). Approximately 36 percent of the total 45 complexes identified as occupied by Riverside fairy shrimp are at least partially conserved and 27 percent are on military land where they are provided some protection (USFWS 2008h). More than 50 percent of all extant complexes known to contain Riverside fairy shrimp are in San Diego County. Approximately 24 percent of extant known occupied complexes are in Riverside County, and approximately 17 percent are in Orange County (USFWS 2008h).

**MCBCP**

An initial basewide survey conducted by RECON in the 1997/98 wet season identified the coastal mesas on Camp Pendleton as supporting one of the largest known populations of this species, with at least 81 pools occupied by fairy shrimp (73 with Riverside fairy shrimp, and 8 with both Riverside fairy shrimp and San Diego fairy shrimp) (RECON 1998a).

Comprehensive fairy shrimp surveys were scheduled to commence on Base during the 2004-2005 rainy season, however, due to higher-than-normal rainfall amounts, these surveys were modified to only map the location of vernal pools (Figure 3-33). Fairy shrimp presence and plant species were noted but fairy shrimp species identification did not take place. Subsequent surveys conducted concluded that a total of 111 pools on Base (56 percent of all known occupied pools range-wide) have Riverside fairy shrimp present (USFWS 2008h & Mabb pers. comm. 2009).

Additionally, the USGS has developed a genetic test for fairy shrimp cysts to distinguish between the species that can be utilized in wet or dry conditions, which should significantly aid future surveys and reduce impacts to vernal pools (USGS 2008g). Management details, survey information, etc., for the Riverside fairy shrimp are located in Appendix F, Section
The San Diego fairy shrimp is a small freshwater shrimp that occurs in vernal pools (also known as IEW). Vernal pools are seasonal shallow pools that are filled by winter and spring rains that usually begin in November and continue into April or May. The species is typically observed from January to March within 7 to 14 days of rainfall filling a pool depending on water temperature (USFWS 2008i). The San Diego fairy shrimp is a small, delicate freshwater shrimp with large stalked compound eyes, no carapace, and 11 pairs of swimming legs. Adult male San Diego fairy shrimp range in length from 0.4 to 0.6 inches and the females are 0.4 to 0.5 inches long. San Diego fairy shrimp are threatened by loss and degradation of habitat due to urbanization.

**MANAGEMENT STATUS**

**Federal Status**
The San Diego fairy shrimp was listed as federally endangered on 3 February 1997 (USFWS 1997c). Critical habitat (4,025 ac) for the San Diego fairy shrimp was designated on 23 October 2000 (USFWS 2000d). On 11 June 2002, the U.S. District Court for the Central District of California granted the Service’s request for a remand of the San Diego fairy shrimp critical habitat designation. Existing critical habitat designated for the San Diego fairy remained in place until such time as a new, final regulation became effective. The USFWS reproposed critical habitat for this species on 22 April 2003 (USFWS 2003c). Final critical habitat for the San Diego fairy shrimp was redesignated on 12 December 2007. The USFWS exempted all MCB Camp Pendleton lands from San Diego fairy shrimp critical habitat, citing San Diego fairy shrimp survey and monitoring efforts outlined in this INRMP as a sufficient benefit to the species (USFWS 2007e). Additionally, the San Diego fairy shrimp is included in the approved recovery plan for the listed species of southern California vernal pools (USFWS 1998b).

**California Status**
No special status has been assigned to the San Diego fairy shrimp by the State of California.

**Regional Status**
The San Diego fairy shrimp is a covered species in the following southern California NCCP documents:
• MHCP, City of Carlsbad Habitat Management Plan.
• MSCP, City of Chula Vista Subarea Plan.
• MSCP, City of La Mesa Subarea Plan.
• MSCP, City of Poway Subarea Plan.
• MSCP, City of San Diego Subarea Plan.
• MSCP, County of San Diego Subarea Plan.
• Orange County Central/Coastal NCCP/HCP.
• Orange County Southern Subregion NCCP/HCP.
• SDG&E.

**MCBCP Status**
The Base is in consultation with the USFWS regarding management of Upland habitats and species basewide, including the San Diego fairy shrimp and the pools it occupies. When this species was listed, the Base instituted measures to prevent and minimize impacts to the San Diego fairy shrimp and the vernal pools they inhabit. These measures are published as programmatic instructions for users and residents of the Base via Camp Pendleton’s Base Order P3500.1M (*Range and Training Regulations*). Management details, survey information, etc., for the San Diego fairy shrimp are located in Appendix F, Section F.16.

**Distribution**

**Global**
The San Diego fairy shrimp is restricted to vernal pools in southwestern coastal California and extreme northwestern Baja California, Mexico. All known localities are below 700 meters (2,300 feet) and within 65 kilometers (40 miles) of the Pacific Ocean, from Santa Barbara County south to northwestern Baja California (USFWS 1997c). They are also found in southern Orange County, California and in shallow pools on a mesa perched above the Santa Ana River (NatureServe 2005).

**Regional**
In 2003, approximately 22 ac of vernal pool habitat was mapped for the MHCP (AMEC et al., 2003). In 1998, approximately 78 ac of vernal pool habitat was mapped for the MSCP (City of San Diego 1998). During the 2002-2003 rainy season, a total of 2,516 vernal pool basins at 62 sites were mapped for the City of San Diego’s MSCP (City of San Diego 2004b). As of 2006, the City reported that approximately 54 percent (1,369 pools) of all currently identified vernal pool habitat within the boundaries of the City subarea plan were conserved by covenant of easement, conservation easement, or dedication in fee title to the City (USFWS 2008i). According to USFWS files, about 7 occupied complexes are covered by the County of San Diego’s subarea plan; 2 have been conserved, and development has been proposed on at least 2 others. Management goals set forth in the Regional plan have not yet been realized on the conserved lands in the County subarea plan (USFWS 2008i).

**MCBCP**
San Diego fairy shrimp occur primarily in Victor, Oscar One, and Oscar Two training areas and in the Wire Mountain housing area (Figure 3-33). Basewide survey efforts conducted since 2005 indicated that 279 pools were occupied by San Diego fairy shrimp (USFWS
For detailed information on the San Diego fairy shrimp, survey information and its management on Base see Appendix F, Section F-16.

Additionally, the USGS has developed a genetic test for fairy shrimp cysts to distinguish between the species that can be utilized in wet or dry conditions, which should significantly aide future surveys and reduce impacts to vernal pools (USGS 2008g).

3.2.4.15. **San Diego Button-Celery (Eryngium aristulatum var. parishii)**

San Diego button-celery is a perennial or biennial herb arising from a taproot, which occurs in vernal pools/IEWs. It has a spreading to erect habit and can grow to a height of 16 inches or more (USFWS 1998b). The flowers occur on short stalks with rigid spiny bracts, and the grey-green stems and leaves are toothed, which give it a prickly appearance (USFWS 1998b). The species is threatened region-wide by urbanization, foot traffic, off-road vehicles, grazing agriculture and watershed alteration (drainage).

**MANAGEMENT STATUS**

**Federal Status**
San Diego button-celery was listed as endangered on 3 August 1993 (USFWS 1993c). Critical habitat has not been proposed for this species. San Diego button-celery is included in the recovery plan for the listed species of southern California vernal pools (USFWS 1998b).

**California Status**
The CDFG listed San Diego button-celery as an endangered plant in California in July 1979 (CDFG 2005).

**Regional Status**
San Diego button-celery is a covered species in the following southern California NCCP documents:

- MHCP, City of Carlsbad Habitat Management Plan.
- MSCP, City of Chula Vista Subarea Plan.
- MSCP, City of La Mesa Subarea Plan.
- MSCP, City of Poway Subarea Plan.
- MSCP, City of San Diego Subarea Plan.
The CNPS list identifies San Diego button-celery as rare, threatened, or endangered in California and elsewhere (List 1B) and seriously endangered in California (Threat Code 1).

**MCBCP Status**
The Base is in consultation with USFWS regarding monitoring and management of upland habitats and species basewide including vernal pools/IEWs occupied by the San Diego button-celery. The Base has instituted measures for avoidance and minimization of impacts to vernal pools, IEWs and all vernal pools species including the San Diego button-celery. These measures are published as programmatic instructions for users and residents of the Base via Camp Pendleton’s Base Order P3500.1M (*Range and Training Regulations*). Management details, survey information, etc., for San Diego button-celery are located in Appendix F, Section F.15.

**DISTRIBUTION**

**Global**
San Diego button-celery ranges from Riverside County (Santa Rosa Plateau), California, south to northern Baja California, Mexico (Constance 1977). In 1979, San Diego button-celery was known from 65 pool groups, and by 1986, this species remained in 61 pool groups (USFWS 1993c).

**Regional**
Currently, San Diego button-celery occurs in northern San Diego County on Camp Pendleton and in San Marcos, Carlsbad, and Ramona. As part of the City of San Diego’s MSCP, a total of 2,516 vernal pool basins at 62 sites were mapped during the 2002-2003 rainy season (City of San Diego 2004b). Rare, threatened, and endangered plants were found at 1,142 vernal pools. San Diego button-celery was observed at 804 basins located in the San Diego City region which include: Del Mar, Mira Mesa, Novel Drive, Kearny Mesa, Otay Lakes, and Otay Mesa (City of San Diego 2004b).
MCBCP
On Camp Pendleton, San Diego button-celery has been found in a total of 72 GIS mapped locations south of the Santa Margarita River basin, inland near the Wire Mountain housing development (Figure 3-36). For detailed information on San Diego button-celery and its management on Base see Appendix F, Section F.15.

3.2.4.16. Spreading Navarretia (Navarretia fossalis)

Spreading navarretia is a low, spreading or ascending, annual herb that occurs in vernal pools. Stems are approximately 4 to 6 inches long and are mostly bare on the lower portions. Leaves are divided into linear segments. Flowers (April-June) are white to pale lavender, borne in small, flat-topped, leafy clusters. Spreading navarretia is threatened by urbanization, foot traffic, off-road vehicles, grazing agriculture and watershed alteration (drainage).

MANAGEMENT STATUS

Federal Status
Spreading navarretia was listed as threatened on 13 October 1998, and is included in the approved recovery plan for the listed species of southern California vernal pools (USFWS 1998e & 1998b). In response to a court order, critical habitat for this species was proposed on 7 October 2004 (USFWS 2004i). The USFWS proposed to designate 4,301 ac of spreading navarretia habitat as critical habitat in San Diego and Los Angeles Counties; the 128 ac of essential habitat on Camp Pendleton (see Figure 3-38) was excluded from the final critical habitat designation pursuant to Section 4(b)(2) of the ESA (USFWS 2005h). On 10 June 2009, the USFWS issued a proposed revised critical habitat designation for the species in order to include all areas essential to its conservation; the 145 ac of critical habitat on Base within the Stuart Mesa and Wire Mountain subunits were exempt under 4(a)(3)(B) of the Sikes Act. Comments on the proposed revised critical habitat designation were accepted until 10 August 2009 (USFWS 2009h). On 7 October 2010, a final critical habitat designation of 6,720 ac was made by the USFWS. On Base essential habitat was exempted from critical habitat designation due to the Base’s INRMP providing a sufficient conservation benefit to the species (USFWS 2010f).
**California Status**
No special status has been assigned to spreading navarretia by the State of California.

**Regional Status**
Spreading navarretia is a covered species in the following southern California NCCP documents:

- MHCP, City of Carlsbad Habitat Management Plan.
- MSCP, City of Chula Vista Subarea Plan.
- MSCP, City of La Mesa Subarea Plan.
- MSCP, City of Poway Subarea Plan.
- MSCP, City of San Diego Subarea Plan.
- MSCP, County of San Diego Subarea Plan.
- SDG&E.
- Western Riverside MSHCP.

The CNPS identifies spreading navarretia as rare, threatened, or endangered in California and elsewhere (List 1B) and seriously endangered in California (Threat Code 1) (CNPS 2008).

**MCBCP Status**
The Base is in consultation with USFWS regarding monitoring and management of upland habitats and species basewide including vernal pools occupied by spreading navarretia. The Base has instituted measures for avoidance and minimization of impacts to vernal pools and all vernal pools species including spreading navarretia. These measures are published as programmatic instructions for users and residents of the Base via Camp Pendleton’s Base Order P3500.1M *(Range and Training Regulations)*. Management details, survey information, etc., for spreading navarretia are located in Appendix F, Section F.11.
DISTRIBUTION

Global
Spreading navarretia is known from widely disjunct and highly restricted populations extending from the Santa Clarita region of Los Angeles County, east to the western lowlands of Riverside County, south through coastal and foothill San Diego County, and as far south as San Quentin in northern Baja California, Mexico. Fewer than 30 populations are known to exist in the U.S.

Regional
Of the 30 populations that are known to exist in the U.S., nearly 60 percent are concentrated in three locations in southern California: Otay Mesa in southern San Diego County, the San Jacinto River in western Riverside County, and Hemet in Riverside County.

MCBCP
On Camp Pendleton, spreading navarretia has been found in nine vernal pools basewide, seven pools in the Wire Mountain housing development area and two pools within the Oscar One training area (Figure 3-38). For detailed information on spreading navarretia and its management on Base see Appendix F, Section F.11.

3.2.4.17. Thread-Leaved Brodiaea (Brodiaea filifolia)

Thread-leaved brodiaea (Brodiaea filifolia) is a perennial herb with dark-brown, fibrous-coated corms. The flower stalks (scapes) are 8 to 16 inches tall with several narrow leaves that are shorter than the scape. The flowers bloom from May to June and are arranged in a loose flower cluster. The fruit is a capsule. Thread-leaved brodiaea can be distinguished from the other species of Brodiaea that occur within its range (B. orcuttii and B. terrestris ssp. kernensis) by its narrow, pointed staminodia, rotate perianth lobes (i.e., a saucer-shaped flower), and a thin perianth tube which is split by developing fruit (USFWS 1998e). Thread-leaved brodiaea is threatened by urbanization, foot traffic, off-road vehicles, grazing agriculture and watershed alteration (drainage).

MANAGEMENT STATUS

Federal Status
Thread-leaved brodiaea was listed by the USFWS as a threatened species on 13 October 1998 (USFWS 1998e). The USFWS found that “critical habitat” designation for this species was not prudent at that time because such designation would provide no benefit over that provided by listing on privately owned
lands (USFWS 1998e); however, on 8 December 2004 critical habitat for this species was proposed (USFWS 2004c). On Camp Pendleton, 917 ac of “mission-essential” training lands were proposed to be excluded from designation of critical habitat under Section 4(b)(2) of the ESA. On 13 December 2005, the USFWS issued its final critical habitat for thread-leaved brodiaea. A total of 597 ac in Los Angeles and San Diego Counties was listed. All locations on Camp Pendleton were excluded under Sections 4(a)(3) and 4(b)(2) of the ESA (USFWS 2005d). On 11 February 2011, a final revised critical habitat designation was reissued by the USFWS, and all known locations considered on Camp Pendleton for critical habitat designation were excluded under Sections 4(a)(3) of the ESA (USFWS 2011a). No recovery plan has been developed by the USFWS to date.

**California Status**
The CDFG listed thread-leaved brodiaea as an endangered plant species in January 1982 (CDFG 2005).

**Regional Status**
Thread-leaved brodiaea is a covered species in the following southern California NCCP documents:

- Fieldstone/La Costa & City of Carlsbad.
- MHCP, City of Carlsbad Habitat Management Plan.
- MSCP, City of Chula Vista Subarea Plan.
- MSCP, City of La Mesa Subarea Plan.
- MSCP, City of Poway Subarea Plan.
- MSCP, City of San Diego Subarea Plan.
- MSCP, County of San Diego Subarea Plan.
- Mission View Estates.
- Orange County Southern Subregion NCCP/HCP.
- SDG&E.
- Western Riverside MSHCP.

The CNPS identifies thread-leaved brodiaea as rare, threatened, or endangered in California and elsewhere (List 1B), and seriously endangered in California (Threat Code1) (CNPS 2008).

**MCBCP Status**
Camp Pendleton is in consultation with USFWS regarding monitoring and management of upland habitats and species basewide including thread-leaved brodiaea. The Base has instituted measures for avoidance and minimization of impacts to rare plant locations basewide, including thread-leaved brodiaea habitat. These measures are published as programmatic instructions for users and residents of the Base via Camp Pendleton’s Base Order P3500.1M (*Range and Training Regulations*). Management details, survey information, etc., for thread-leaved brodiaea are located in Appendix F, Section F.21.
DISTRIBUTION

Global
Thread-leaved brodiaea is a California endemic with a historic range that extends from the foothills of the San Gabriel Mountains at Glendora (Los Angeles County), east to Arrowhead Hot Springs in the western foothills of the San Bernardino Mountains (San Bernardino County), and south through eastern Orange and western Riverside Counties to Carlsbad in northwestern San Diego County, California.

Regional
A small, isolated population of thread-leaved brodiaea is situated just west of Rancho Bernardo in central San Diego County (Morey 1995; CDFG 1997). Fifty-one populations of thread-leaved brodiaea are presumed extant. These populations are clustered in the expanding cities of Vista, San Marcos, and Carlsbad (9 populations), in the vicinity of the Santa Rosa Plateau (6 populations), and the remaining 36 populations are scattered throughout Orange, Los Angeles, Riverside, San Bernardino, and San Diego counties. Thread-leaved brodiaea occupies an estimated 825 ac of habitat. Of this habitat, 40% is reported from a single area, Miller Peak just north of the Base. The majority of the populations are within 2- to 10-ac patches.

MCBCP
On Camp Pendleton, thread-leaved brodiaea has been found at 22 general localities, within which may be multiple sites. Thread-leaved brodiaea has been located in Alfa One, Bravo One, Bravo Two, Charlie, Golf, India, Kilo One, November and Oscar Two training areas, as well as the 52 Area and at the Rodeo Grounds (see Figure 3-40). For detailed information on the thread-leaved brodiaea and its management on Base see Appendix F, Section F.21.

3.2.5. Critical Habitat
When a species is proposed for listing as endangered or threatened under the ESA, the USFWS considers whether there are areas of habitat it believes are essential to the species’ conservation (i.e., recovery) and if those areas warrant designation as critical habitat. The term “critical habitat” for a threatened or endangered species is defined in Section 3(5)(A)
of the ESA as – “(i) the specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the provisions of Section 4 of the ESA, on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection; and (ii) specific areas outside the geographical area occupied by the species at the time it is listed in accordance with the provisions of Section 4 of the Act, upon a determination by the Secretary that such areas are essential for conservation of the species.”

According to USFWS policy (DoD 2002), if adequate special management or protection is provided by a legally operative plan that addresses the maintenance and improvement of the primary constituent elements important to the species and manages for the long-term conservation of the species, habitat identified as essential to the protection and recovery of a species may be omitted from federal critical habitat designation.


(1) Redesignating subparagraphs (A) and (B) as clauses (i) and (ii), respectively.
(2) Inserting “(A)” after “(3).”
(3) Adding at the end the following:

“(B)(i) The Secretary shall not designate as critical habitat any lands or other geographical areas owned or controlled by the DoD, or designated for its use, that are subject to an INRMP prepared under Section 101 of the Sikes Act (16 U.S.C. 670a), if the Secretary determines in writing that such plan provides a benefit to the species for which critical habitat is proposed for designation.

(ii) Nothing in this paragraph affects the requirement to consult under Section 7(a)(2) with respect to an agency action (as that term is defined in that section).

(iii) Nothing in this paragraph affects the obligation of the DoD to comply with Section 9, including the prohibition preventing extinction and taking of endangered species and threatened species.”

Section 4(b)(2) of the ESA of 1973 (16 U.S.C. 1533(b)(2)) was also amended by inserting “the impact on national security,” after “the economic impact.”

As noted above, critical habitat “shall not” be designated on an installation where the Secretary of Interior determines that the applicable INRMP provides a benefit to the species.

In making its assessment, on behalf of the Secretary of Interior, Region 1 of the USFWS developed the following guidance in 2001, to determine if a plan provides “benefit” to the species:
1. **The plan provides a conservation benefit to the species.** The cumulative benefits of the management activities identified in a management plan, for the length of the plan, must maintain or provide for an increase in a species’ population, or the enhancement or restoration of its habitat within the area covered by the plan (i.e., those areas deemed essential to the conservation of the species). A conservation benefit may result from reducing fragmentation of habitat, maintaining or increasing populations, insuring against catastrophic events, enhancing and restoring habitats, buffering protected areas, or testing and implementing new conservation strategies.

2. **The plan provides certainty that the management plan will be implemented.** Persons charged with plan implementation are capable of accomplishing the objectives of the management plan and have adequate funding for the management plan. They have the authority to implement the plan and have obtained all the necessary authorizations or approvals. An implementation schedule (including completion dates) for the conservation effort is provided in the plan.

3. **The plan provides certainty that the conservation effort will be effective.** The following criteria will be considered when determining the effectiveness of the conservation effort. The plan includes: 1) biological goals (broad guiding principles for the program) and objectives (measurable targets for achieving the goals); 2) quantifiable, scientifically valid parameters that will demonstrate achievement of objectives and standards for identifying these parameters by which progress will be measured; 3) provisions for monitoring and where appropriate, adaptive management; 4) provisions for reporting progress on implementation (based on compliance with the implementation schedule) and effectiveness (based on evaluation of quantifiable parameters) of the conservation effort; and 5) a duration sufficient to implement the plan and achieve the benefits of its goals and objectives.

Camp Pendleton’s INRMP meets these three criteria for all federally listed species except the California brown pelican, which is currently proposed for federal delisting.

3.2.5.1. **For Criterion 1 (The plan provides a conservation benefit to the species)**

While Camp Pendleton developed its management programs and INRMP to focus on ecosystems (riparian, beach, estuarine and upland) on the Base, these plans were developed in coordination with the USFWS and finalized with the issuance of BOs under Section 7 of the ESA for each species covered. The conservation plans that were consulted contain species-specific management requirements for individual species as well as the ecosystem that provides management benefit to multiple species using the same ecosystem. These plans are fully incorporated in and provide the backbone of Camp Pendleton’s INRMP. The objective of these plans is to increase the quantity and quality of habitat in these ecosystems that is available for use by species (especially but not exclusively, federally listed species). In the case of the LBV, southwestern willow flycatcher, California least tern and the western snowy plover, specific population minimums have been established for individual species (see Section 4.3.2.1, Table 4-2). Key aspects of these programs are the removal of exotic flora and fauna throughout the ecosystems on Base (and in some cases, off Base) in a systematic manner and the prevention of re-infestation. Additionally, usable
habitat is increased by minimizing fragmentation, by the judicious location of any
development or habitat-disturbing activities.

3.2.5.2. For Criterion 2 (The plan provides certainty that the management plan will be implemented)

As noted in the USFWS Region 1 Review Procedures, all INRMPs meet this criterion through the statutory requirement of the Sikes Act. Additionally, the DoD and the CMC have established, through published orders and regulations, the requirement that INRMPs be developed and implemented. INRMP implementation is tracked and reported to HQMC, the USFWS and CDFG annually. Implementation is also evaluated during triennial formal inspections (Marine Corps ECE) and annual self-audits conducted by each installation (see Sections 1.2.2 and 4.1.2.3).

Camp Pendleton’s INRMP is implemented under the authority of the Base’s CG. The INRMP has all approvals and concurrences required under the Sikes Act (signature page and Appendix A). Camp Pendleton’s AC/S ES has been assigned the responsibility for developing, programming, and implementing INRMP program requirements. The AC/S ES has direct control of environmental funding for the Base and is able to ensure that all environmental requirements, including actions and programs identified in the INRMP as “must fund,” are funded and executed. Additionally, because Camp Pendleton’s estuarine and beach ecosystems, riparian ecosystems, and upland species management plans (and their list of actions and management requirements) were included in BOs issued by the USFWS, they are legal requirements under the ESA and receive a high priority for funding which further ensures implementation of planned actions (see Section 1.7 and MCO P5090.2A, Chapter 3 for a discussion of funding).

3.2.5.3. For Criterion 3 (The plan provides certainty that the conservation effort will be effective)

Camp Pendleton’s management plan includes a habitat value system developed in coordination with the USFWS to allow for monitoring the habitat value of riparian systems basewide. Monitoring and survey requirements are specifically identified in the plan and have been fully incorporated as priority actions in the INRMP with their required schedule noted. An annual report to the USFWS providing specific information on surveys, monitoring, activities in the ecosystem and status of projects is provided. Additionally, an annual report on all actions proposed in INRMPs (including monitoring actions) is provided to the USFWS and CDFG. The results of these monitoring plans are incorporated into the INRMP in tables and narrative, so the results of management programs can be followed and effectiveness noted. The Base’s Ecosystem Conservation Plans and INRMP were established to provide long-term management of Base ecosystems and serve as the backbone of Camp Pendleton’s natural resources management program. As part of Camp Pendleton’s coordination with the USFWS and CDFG (see Sections 1.2.1 and 1.2.4), the INRMP is reviewed annually (with a more formal/document review every fifth year) along with monitoring plans established in consultation with the USFWS. Monitoring and survey activities will continue until after the species covered are delisted or such activities are revised through adaptive management in consultation with the USFWS.
3.2.5.4. Designated Critical Habitat

As of December 2008, critical habitat has been excluded, designated or proposed for eleven (11) of the seventeen (16) federally listed threatened or endangered species found on or that transit through Camp Pendleton. The Base was excluded from final USFWS critical habitat designation for ten (10) of the eleven (11) species. One (1) species has critical habitat designated aboard the Base within the State Park lease area (Table 3-8).

### TABLE 3-9  CRITICAL HABITAT DESIGNATION FOR THREATENED AND ENDANGERED PLANT AND WILDLIFE SPECIES ABOARD CAMP PENDLETON

<table>
<thead>
<tr>
<th>Species</th>
<th>Designation Status (Proposed/Final)</th>
<th>Federal Register # (Date of Proposed or Final Designation)</th>
<th>Acres on Camp Pendleton</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Birds</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>California Least Tern</td>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coastal California Gnatcatcher</td>
<td>Final</td>
<td>72 FR 72009-72213 (19 December 2007)</td>
<td>0 (Active)</td>
</tr>
<tr>
<td>Least Bell’s Vireo</td>
<td>Final</td>
<td>59 FR 4845-4867 (2 February 1994)</td>
<td>0 (Active)</td>
</tr>
<tr>
<td>Light-footed Clapper Rail</td>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Southwestern Willow Flycatcher</td>
<td>Final</td>
<td>70 FR 60885-61009 (19 October 2005)</td>
<td>0 (Active)</td>
</tr>
<tr>
<td>Western Snowy Plover</td>
<td>Final</td>
<td>70 FR 56969-57119 (29 September 2005)</td>
<td>40 (Active)</td>
</tr>
<tr>
<td><strong>Mammals</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pacific Pocket Mouse</td>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stephens’ Kangaroo Rat</td>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fish</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Southern Steelhead Trout</td>
<td>Final</td>
<td>65 FR 7764-7787 (16 February 2000)</td>
<td>0 (Active)</td>
</tr>
<tr>
<td>Tidewater Goby</td>
<td>Final</td>
<td>73 FR 5920-6006 (31 January 2008)</td>
<td>0 (Active)</td>
</tr>
<tr>
<td><strong>Amphibians</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arroyo Toad</td>
<td>Final</td>
<td>70 FR 19561-19633 (13 April 2005)</td>
<td>0 (Active)</td>
</tr>
<tr>
<td><strong>Crustacean</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Riverside Fairy Shrimp</td>
<td>Final</td>
<td>66 FR 29383-29414 (30 May 2001)</td>
<td>0 (Active)</td>
</tr>
<tr>
<td>San Diego Fairy Shrimp</td>
<td>Final</td>
<td>72 FR 70647-70714 (12 December 2007)</td>
<td>0 (Active)</td>
</tr>
<tr>
<td><strong>Plants</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>San Diego Button-Celery</td>
<td>None</td>
<td>70 FR 60658-60694 (18 October 2005)</td>
<td>0 (Active)</td>
</tr>
<tr>
<td>Spreading Navarretia</td>
<td>Final</td>
<td>70 FR 73819-73863 (13 December 2005)</td>
<td>0 (Active)</td>
</tr>
</tbody>
</table>
3.3. LANDSCAPE LINKAGES AND WILDLIFE CORRIDORS

Landscape (or habitat) linkages are open space natural areas that provide connectivity among and between habitat patches, and provide locations for native plants and seasonal or year-round habitat for wildlife. Linkages may also provide wildlife corridors (see below) for the movement of individuals or populations between habitat areas.

The identification, conservation, and protection of landscape linkages and wildlife corridors are essential to the long-term sustainability of many species in the southern California region. The increasing fragmentation of open space areas by urbanization has created small, isolated “islands” of habitat. Isolated populations marooned on islands of fragmented habitat show elevated rates of extinction as they succumb to environmental and genetic perturbations (Luke et al. 2004). In the absence of habitat linkages and wildlife corridors that allow movement to adjoining open space areas, various studies have concluded that some species, especially larger and more mobile mammals, will not likely persist over time (MacArthur & Wilson 1967; Soule 1987; Harris & Gallagher 1989; Bennett 1990). Corridors connecting the larger patches of natural habitat areas and open spaces mitigate the effects of this fragmentation, to some degree, by: 1) allowing gene flow (interbreeding and genetic exchange) between otherwise small and genetically isolated populations; 2) providing escape routes from fire, predators, human disturbances, and other potentially catastrophic events that could result in local extinction; and 3) serving as travel routes for individual animals as they move within their home ranges in search of food, water, mates, and other essential needs (Noss 1983; Farhig & Merriam 1985; Simberloff & Cox 1987; Harris & Gallagher 1989).

The largely undeveloped, contiguous stretches of habitat on Camp Pendleton function as one of the last remaining landscape linkages, and the only remaining coastal linkage, between the few remaining open spaces in Los Angeles and Orange Counties to the north, Riverside County to the northeast, and northern San Diego County to the south (Figure 3-41 shows utilization of an existing wildlife corridor by a radio collard mountain lion while traveling throughout its home-range from the Santa Ana Mountains southwest to the coast on Base, and highlights areas used as travel routes that are unpreserved wildlife corridors northeast of the Base (Brennan 2009). While Camp Pendleton may be large enough to maintain self-sustaining populations of some species for a reasonably long period of time, the long-term sustainability of most species (both within the region and on Base) will likely be threatened if habitat linkages and wildlife corridors
between the Base and surrounding preserved natural areas are removed by developmental projects.

### 3.3.1. Wildlife Corridor Definitions

Wildlife corridors are narrow connections among and between habitat patches that are intended to allow for wildlife movement and dispersal. Wildlife corridors can be viewed as being local (e.g., within Camp Pendleton) or regional. Local corridors are important because they allow resident wildlife access to resources and they function as connections to habitat patches in the surrounding region. Wildlife corridors often follow major drainages and open ridgelines. In general, wildlife corridors link together areas of suitable wildlife habitat that are otherwise separated by rugged terrain, changes in vegetation, or human disturbance.

Wildlife movement activities usually fall into one of three categories: 1) dispersal (e.g., juvenile animals from natal areas, individuals extending range distributions); 2) seasonal migration; and 3) movements related to home range activities (foraging for food or water, defending territories, searching for mates, breeding areas, or cover). A number of terms have been used in various wildlife movement studies, such as “travel routes,” “wildlife corridors,” “habitat linkages,” and “wildlife crossings,” to refer to areas in which wildlife move from one area to another. To clarify the meaning of these terms and facilitate discussions on wildlife movement in this document, these terms are defined as follows:

- **Travel routes:** A landscape (such as a ridgeline, drainage, canyon or riparian strip) within a larger natural habitat area that is used frequently by animals to facilitate movement and provide access to necessary resources (e.g., water, food cover, den sites). The travel route is generally preferred because it provides the least amount of topographic resistance in moving from one area to another; it contains adequate food, water, and/or cover while moving between habitat areas; and provides a relatively direct link between target habitat areas.

- **Wildlife corridor:** A piece of habitat, usually linear in nature, that connects two or more habitat patches that would otherwise be fragmented or isolated from one another. Urban land areas or other areas unsuitable for wildlife usually border wildlife corridors. The corridor generally contains suitable cover, food and/or water to support species and facilitate movement while in the corridor. Larger, landscape-level corridors (often referred to generally as “habitat or landscape linkages”) can provide both transitory and resident habitat for a variety of species.

- **Wildlife crossing:** A small, narrow area relatively short in length and generally constricted in nature, that allows wildlife to pass under or through an obstacle or barrier that otherwise hinders or prevents movement. Crossings typically are manmade and include culverts, underpasses, drainage pipes, and tunnels to provide access across or under roads, highways, pipelines, or other physical obstacles. These often represent “choke points” along a wildlife corridor.

It is important to note that within a large open space area in which there are few or no man-made or naturally occurring physical constraints to wildlife movement, wildlife corridors, as defined above, may not yet exist. Given an open space area that is both large enough to maintain viable populations of species and provide a variety of travel routes (canyons,
ridgelines, trails, riverbeds, and others), wildlife will use these “local” routes while searching for food, water, shelter, and mates, and will not need to cross into other large open space areas. Based on their size, location, vegetative composition, and availability of food, some of these movement areas (e.g., large drainages and canyons) are used for longer lengths of time and serve as source areas for food, water, and cover, particularly for small and medium-sized animals. This is especially true if the travel route is within a large open space area. However, once open space areas become constrained and/or fragmented as a result of urban development or construction of physical obstacles such as roads and highways, remaining landscape features or travel routes that connect the larger open space areas can “become” corridors, as long as they provide adequate space, cover, food, and water, and do not contain obstacles or distractions (manmade noise, lighting) that would generally hinder wildlife movement.

3.3.2. Camp Pendleton Wildlife Corridors

Many of the open space areas within and adjacent to Camp Pendleton, to the northeast within the Cleveland National Forest, are generally large enough to support varied and abundant resident plant and wildlife populations and provide for unrestricted movement between the Base and adjacent open space lands. Also the large habitat areas on Base generally allow unrestricted access to the north toward permanently designated open space areas of the Cleveland National Forest, Casper’s Wilderness Park, O’Neill Regional Park, Rancho Mission Viejo Land Conservancy, and Thomas F. Riley Wilderness Park.

While there are likely a number of preferred travel routes and landscape features that larger and more mobile wildlife species may use to move within and between permanent open space areas, wildlife “corridors” have not been formally studied and documented within the open space habitat areas on Camp Pendleton nor surrounding the Base, except for the Santa Ana – Palomar Mountain Linkage (see Section 2.4.3.4). This is essentially because Camp Pendleton and adjacent, permanently designated open space areas (parks and national forests) have generally not been constrained or reduced to the point of artificially creating or necessitating development of wildlife corridors. However, with current and proposed future development planned for many of the areas between the parks, national forests, Camp Pendleton and other permanently designated open space areas, any remaining landscape linkages could “become” wildlife corridors in the near future.

Wildlife movement on Base is facilitated by the fact that Camp Pendleton contains several watersheds and several small coastal drainages. Although water flows are intermittent across these drainages, they support abundant riparian woodland, scrub, and wetland vegetation communities within the floodplain areas, and coastal sage, chaparral or grassland vegetation on canyon slopes and along ridgelines. These areas provide food and cover for many wildlife species on the Base in addition to facilitating wildlife movement basewide. Potential east-west wildlife movement on Camp Pendleton can occur along the Santa Margarita River and Las Flores, Aliso, and San Onofre canyons, portions of the San Mateo and San Luis Rey Rivers, and along several small coastal drainages. San Onofre Creek, San Mateo Creek, and the Santa Margarita River offer the best direct connection for wildlife, albeit highly restricted by the I-5 corridor, to the beaches and coastal bluffs of Camp Pendleton.
Potential north-south wildlife movement occurs on Camp Pendleton through the inland mountains situated along the eastern half of the Base, and those of the coastal belt located just east of the I-5 corridor. Other potential north-south wildlife movement on Camp Pendleton may include the areas along the beaches, coastal benches/bluffs, and foothills that are, for the most part, unconstrained by development and other artificial barriers.

Urban development over the past 30 years has severely reduced the expanse of once-common, native vegetation and wildlife habitats that existed north of Camp Pendleton, in the foothills and valleys situated between the coast and the steep terrain of the Cleveland National Forest. Many remaining vegetation communities have become fragmented, isolated and constrained by regional development. This trend is expected to continue and even accelerate, given regional population projections unless regional conservation planning efforts and land set-asides are established.

At present, regional conservation efforts are focused on crafting remaining open space areas into reserve systems that are expected to provide larger, core biological areas and both landscape linkages and wildlife corridors that connect to other large areas of open space, including Base lands (see Section 2.4.2). The central/coastal Orange County NCCP Plan, approved in 1996, set aside more than 37,000 ac of open space lands as mitigation for anticipated future development in the region. The Orange County Southern Subregion HCP, approved by the USFWS in 2007, set aside 57,000 ac of natural habitat within a 91,000 ac planning area. The North San Diego County MSCP Subarea Plan, which encompasses a 313,777 ac planning area, is still undergoing development and approval by the USFWS and region stakeholders, and is expected to set aside tens of thousands of acres of open space lands as mitigation for anticipated future development. To the northeast of the Base, the Western Riverside County Multiple Species HCP, approved by the USFWS in 2004, set aside 500,000 ac within a 1.2 million ac planning area. Upon final approval of a collective reserve design for these Plans, lands will be incorporated into a regional network of wildlife preserves and mitigation set-asides. It is assumed that a majority of the remaining lands situated outside planned wildlife reserves and mitigation set-asides in southern Orange County and northern San Diego County, from the coast to inland Mountains, will be developed for residential, commercial or industrial uses.

Along the coast south of Camp Pendleton, open space lands are considered small, highly fragmented parcels, with little native vegetation. Many of these parcels are in an urban setting and are severely limited in their capacity to support movement (of any kind) by native wildlife species, beyond very localized movement.

The nearest available open space areas to the south that are contiguous with Camp Pendleton are situated immediately adjacent to the Base’s southern boundary along the floodplain and adjacent slopes of the San Luis Rey River. Larger open space areas south of the Base exist within the central part of the City of Oceanside, north of Oceanside Boulevard and east of El Camino Real. This site, however, is a former agricultural field that contains little in the way of native vegetation. Additional open space lands exist further south along State Route 78 and Buena Vista Creek and even further south, in the northeastern and southeastern portions of the City of Carlsbad. The only potential direct linkage corridor between Camp Pendleton and those isolated parcels to the south is
provided by the SDG&E’s transmission corridor easement, much of which is highly disturbed, cleared or heavily influenced by edge effects from nearby urban developments. The Draft Oceanside Subarea Plan to the MHCP proposes a “stepping-stone” landscape linkage to allow dispersal north and south across Oceanside, between Camp Pendleton and north Carlsbad, for CSS bird species.
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