4.0 BIOLOGICAL RESOURCES

4.1 Overview

The following descriptions of vegetation and landcover types are based on the Station-wide mapping effort completed by Tetra Tech (2014). Vegetation has recovered significantly since the 2003 Cedar Fire allowing detailed vegetation classifications to be accurately mapped for the Station. The 2014 mapping effort used the National Vegetation Classification (NVC) Standard to classify vegetation types in undeveloped areas of MCAS Miramar (Federal Geographic Data Committee [FGDC] 2008). Approximately 18,171 acres of MCAS Miramar are undeveloped and were classified into vegetation types, including disturbed polygons, using the descriptions within *A Manual of California Vegetation, Second Edition* (Sawyer *et al.* 2009) and the *Vegetation Classification Manual for Western San Diego County*, which was prepared for the San Diego Association of Governments (SANDAG) in 2011. All undeveloped areas were mapped to the alliance level (NVC level 7). Additionally, areas with willowy monardella (*Monardella viminea*) or riparian habitats were classified to the association level (NVC Level 8).

Vegetation types, such as sage and sagebrush scrub, are not discussed as a habitat type. Discussions of habitat are organism (*i.e.*, species) specific. Vernal pool habitat at MCAS Miramar is discussed separately because it occurs in more than one vegetation type. Nomenclature used throughout the document follows Jones *et al.* (1992) for mammals; American Ornithologists' Union (1983, 1996) for birds; Jennings (1983) for reptiles and amphibians; Baldwin *et al.* (2012) for plants; and vegetation types (plant communities) were selected from relevant descriptions within Sawyer *et al.* (2009) and SANDAG (2011). New vegetation types were also described by Tetra Tech (2014).

Also included in this chapter is a discussion of wildlife and wildlife habitat, habitat linkages and wildlife corridors, Special Status Species, other Species of Regional Special Concern, and a review of the Habitat Evaluation Model developed in the 2000 INRMP. As a result of ongoing biological studies at MCAS Miramar, this information is periodically updated.

4.2 Vegetation and Landcover Types

Tetra Tech (2014) mapped 144 native and non-native vegetation types within 44 alliances in the undeveloped areas on MCAS Miramar. Figure 4.2 is a consolidation of similar vegetation types for graphical purposes (*i.e.*, the vegetation type, grassland/herbaceous, includes 6 native and non-native alliances [NVC Level 7]). Scrub, chaparral, woodlands, freshwater marsh, and sage and sagebrush vegetation types were grouped based on the dominant species within each alliance.

Additionally, 104 acres were identified as disturbed from human activities outside of actively managed lands. These areas did not meet vegetation classification criteria at the time of mapping due to various disturbance types but could eventually become an established vegetation community if future efforts are taken to restore these areas to a natural vegetation community.

Appendix B contains the plant species known to occur on MCAS Miramar. Appendix C includes a table of all vegetation alliances, their associated acreage on MCAS Miramar, and the generic vegetation grouping (*i.e.*, scrub, chaparral, woodlands, freshwater marsh, sage and sagebrush) to which they were assigned.

4.2.1 Ceanothus Chaparral

Ceanothus tomentosus Shrubland Alliance

Chaparral consists of shrubs with small, hard, evergreen leaves that are adapted to prevent wilting during dry periods. Ceanothus chaparral is dominated by woollyleaf ceanothus (*Ceanothus tomentosus*) and wart-stem ceanothus (*Ceanothus verrucosus*). It consists of 4 alliances mapped during the 2014 vegetation mapping effort and covers approximately 2,870 acres of MCAS Miramar (Appendix C).

4.2.2 Chamise Chaparral

Chamise chaparral is dominated by chamise (*Adenostoma fasciculatum*) and chamise co-dominated with other shrubs, including black sage (*Salvia mellifera*) and mission manzanita (*Xylococcus bicolor*). Chamise chaparral composes approximately 6,124 acres of MCAS Miramar and consists of 3 alliances (Appendix C).

Adenostoma fasciculatum Shrubland Alliance

4.2.3 Scrub Oak Chaparral

Quercus berberidifolia/acutidens Shrubland Alliance

Scrub oak chaparral is dominated by California scrub oak (*Quercus berberidifolia*) and Nuttall's scrub oak (*Quercus dumosa).* However, oak species identification on MCAS Miramar is currently under review and preliminary DNA analyses indicate that Torrey's scrub oak (*Quercus acutidens*) may be present on MCAS Miramar instead of California scrub oak. Other trees and shrubs within scrub oak chaparral act as nurse plants, offering the saplings and seedling protection and regulating the environment. MCAS Miramar has approximately 683 acres of scrub oak chaparral. This vegetation type consists of 2 alliances (Appendix C).

4.2.4 Other Chaparral

Cercocarpus betuloides Shrubland Alliance

Other chaparral on MCAS Miramar is chaparral that is not dominated by ceanothus, chamise, or scrub oak. Plants occurring in other chaparral include mountain mahogany (*Cercocarpus betuloides*), hollyleaf cherry (*Prunus ilicifolia*), lemonadeberry (*Rhus integrifolia*), and mission manzanita. Other chaparral composes approximately 208 acres of MCAS Miramar and consists of 4 alliances (Appendix C).

4.2.5 Buckwheat Scrub

Scrub consists of sparsely to densely spaced, low-growing (generally less than 6 feet in height), drought deciduous shrubs. It frequently occurs on south-facing slopes and ridges where the rainfall, drainage, soil type, and exposure to the sun provide conditions necessary for the plant community. Buckwheat scrub at MCAS Miramar consists of shrubland dominated by California buckwheat (*Eriogonum fasciculatum*). Buckwheat scrub composes approximately 2,446 acres of MCAS Miramar and consists of 1 alliance (Appendix C).

Eriogonum fasciculatum Shrubland Alliance

4.2.6 Sage and Sagebrush Scrub

Salvia mellifera Shrubland Alliance

The sage and sagebrush scrub vegetation types consists of highly aromatic shrubs with pliable and thin leaves found in a variety of different soil types. In particular, it is dominated by California sagebrush (*Artemisia californica*), black sage, and white sage (*Salvia apiana*). MCAS Miramar consists of approximately 1,918 acres of sage and sagebrush scrub, which includes 5 alliances (Appendix C).

4.2.7 Riparian Scrub

Riparian scrub occurs in both seasonally and intermittently flooded habitats, and stands are variable depending on the amount of inundation. It typically occurs in open shrublands or thickets in riparian corridors and is generally less than 8 feet in height. This vegetation type is dominated by San Diego sagewort (*Artemisia palmeri*) and/or mule fat (*Baccharis salicifolia* ssp. *salicifolia*). This vegetation type covers approximately 28 acres of MCAS Miramar and consists of 2 alliances (Appendix C).

Baccharis salicifolia ssp. salicifolia Shrubland Alliance

4.2.8 Other Upland Scrub

Baccharis sarothroides Shrubland Alliance

Other upland scrub at MCAS Miramar consists of scrub vegetation that is not dominated by buckwheat or sage and does not occur in riparian habitats. The dominant species in these shrublands include broom baccharis (*Baccharis sarothroides*), deerweed (*Acmispon glaber*), and laurel sumac (*Malosma laurina*). MCAS Miramar contains approximately 1,981 acres of other upland scrub. This vegetation type consists of 7 alliances (Appendix C).

4.2.9 Riparian Woodland

Salix gooddingii Woodland Alliance

Woodlands are comprised of trees that are generally 8 feet in height or taller. Woodlands may include thickets, or dense stands of riparian trees or large shrubs. The shrub layer is generally open to intermittent in riparian woodlands. Riparian woodlands on MCAS Miramar include coast live oak (*Quercus agrifolia*) woodlands, California sycamore (*Platanus racemosa*) woodlands, black willow (*Salix gooddingii*) thickets, and arroyo-willow (*Salix lasiolepis*) thickets. These woodlands cover approximately 253 acres of MCAS Miramar and consist of 4 alliances (Appendix C). This vegetation type is generally associated with bodies of water, such as streams, lakes, or wetlands, or is dependent upon perennial, intermittent, or ephemeral surface or subsurface water drainage.

4.2.10 Freshwater Marsh

Freshwater marshes are flooded sites without significant water currents for extended periods of time. These marshes are dominated by perennial plants that are adapted to flooded conditions. Vegetation present in freshwater marshes at MCAS Miramar include rushes (*Juncus bufonis, J. arcticus* var. *mexicanus, J. dubius*), California bulrush (*Schoenoplectus californicus*), and cattails (*Typha* spp.). MCAS Miramar consists of approximately 26 acres of freshwater marshes with 3 alliances (Appendix C).

Typha (angustifolia, domingensis, latifolia)
Herbaceous Alliance

4.2.11 Grassland/Herbaceous

Avena (barbata, fatua)
Semi-Natural Herbaceous Stand

MCAS Miramar has approximately 1,477 acres of grassland/herbaceous stands consisting of 7 alliances (Appendix C). The most common native species in grasslands on MCAS Miramar is purple needlegrass (*Stipa pulchra*). Non-native grass species represented in this vegetation type are wild oats (*Avena barbata, Avena fatua*), bromes (*Bromus diandrus, B. hordeaceus, B. madritensis* ssp. *rubens*), and Italian rye grass (*Festuca perennis*).

4.2.12 Non-Native Tree

The non-native tree vegetation type on MCAS Miramar is dominated by eucalyptus (*Eucalyptus* spp.) and olive trees (*Olea europaea*). This vegetation type covers approximately 52 acres of MCAS Miramar and consists of 2 alliances (Appendix C).

Eucalyptus (globulus, camaldulensis)
Semi-Natural Woodland Stand

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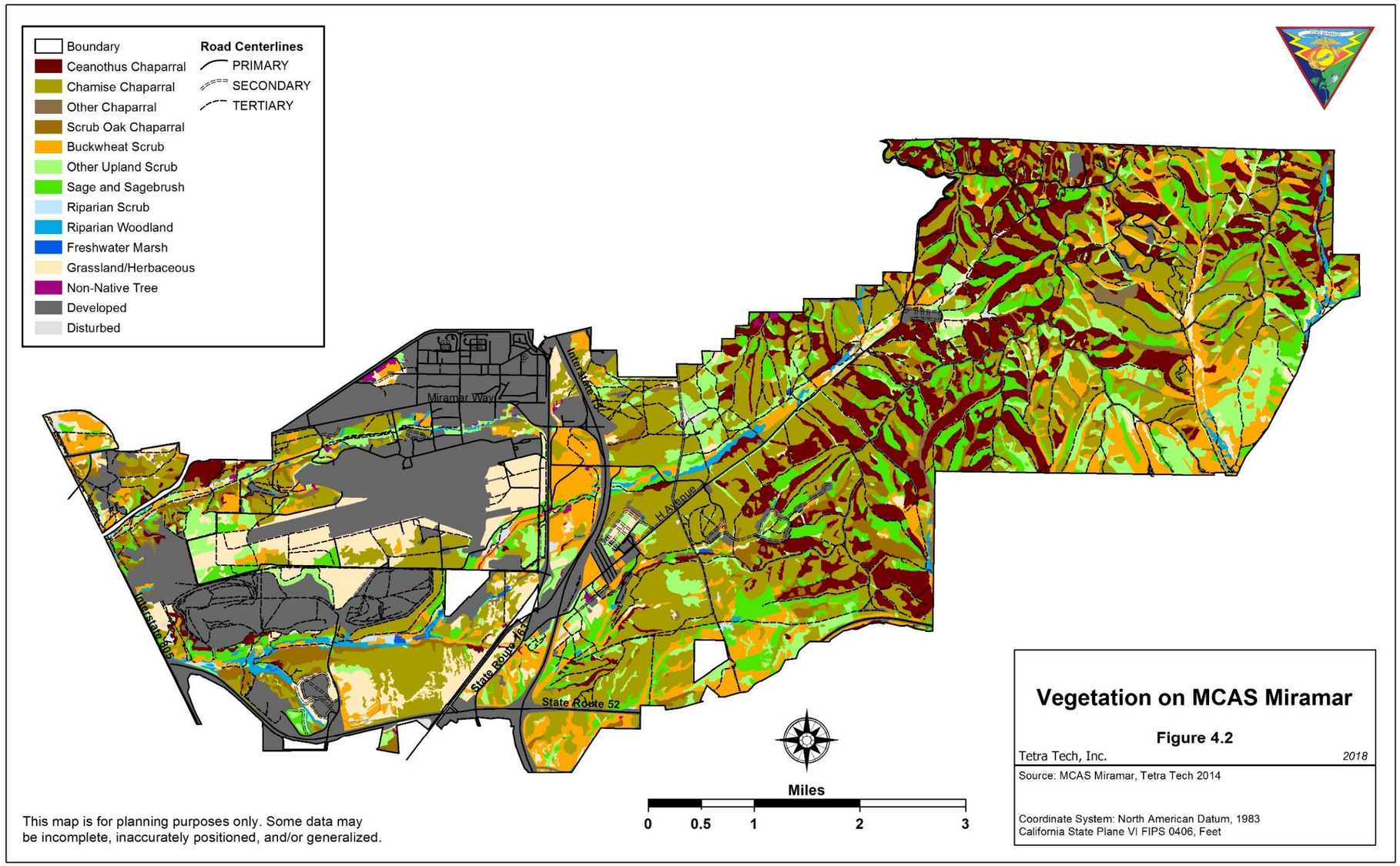
Figure 4.2. MCAS Miramar Vegetation and Landcover Types



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4.2.13 Disturbed Land

Areas classified as disturbed are those that have been impacted by human activities (*e.g.*, brushing, tilling, historic dumping, clearing, graded areas that have been abandoned, or vehicle disturbance), but have the potential to return to a natural vegetation type. This classification also includes active restoration sites (such as vernal pool, fuelbreak, and landfill restoration areas) that do not currently meet vegetation type descriptions but are actively being restored. In addition, this classification includes non-native species that are actively being treated on MCAS Miramar. Approximately 104 acres of MCAS Miramar have been characterized as disturbed land (Appendix C).

IR Site 5 Revegetation Effort

4.2.14 Developed

Developed areas are those that are routinely maintained and do not have the potential to be restored to a natural vegetation community. These include landscaped areas, buildings, pavement, recently graded areas, paved roads, and fuelbreaks that are actively being managed. Fuelbreaks are typically areas where flammable vegetation is reduced but not removed entirely (like in firebreaks) to reduce the heat-intensity of wildfires by reducing the amount of fuel that is available to burn. MCAS Miramar only uses fuelbreaks, not firebreaks. Approximately 4,894 acres of MCAS Miramar are developed (Appendix C).

4.3 Vernal Pool Habitat

4.3.1 General

Vernal pools are ephemeral wetlands that develop on a variety of soils. On MCAS Miramar most pools are found on the Redding soil series which is underlain by an iron-silica hardpan that retards natural rainwater percolation so that ponding occurs in depressions on the soil surface.

Vernal pools develop during the seasonal rainy period that begins in late fall or early winter and extends into the spring. Water rarely ponds before December 1 or remains after May 1. Year-to-year variation in the length and pattern of precipitation affects the depth and duration of standing water. After a heavy rainfall, pools may become interconnected either because of the high water level or shallow surface water flow. In dry years many pools do not fill.

Vernal Pool – Wet Season
Natural Resources Division

Vernal pools are non-tidal waters that are seasonal wetlands and may be subject to provisions of Section 404 of the Clean Water Act (CWA) administered by the Army Corps of Engineers (*Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region, September 2008)*. These pools may have all three wetland indicators (hydric soils, hydrophytic vegetation, and hydrology) during the wet season but may lack wetland indicators during much of normal rainfall years or throughout the entire year in drought years.

4.3.2 Regional Vernal Pool Habitat Issues

Vernal Pool – Dry Season Natural Resources Division

Extensive residential, commercial, agricultural, and infrastructure development has led to the loss of most of San Diego's vernal pool habitat and the endemic plants that grow in this specialized habitat. Bauder (1986) estimated that 93 percent of the original watershed acres of vernal pools had been lost; this estimate was based on Beauchamp and Cass' (1979) estimate of the historical distribution of pools. Oberbauer (1990), using a higher estimate for the original amount of vernal pool habitat, concluded that 97 percent of the pool habitat had been lost. In a report for the California Senate Committee on Natural Resources and Wildlife, Jones and Stokes (1987) stated, "*The severity of habitat loss and species endangerment makes the San Diego vernal pools one of the natural communities most urgently in need of site protection in California*."

Efforts to preserve vernal pool habitat in the private sector have been largely unsuccessful. Between 1979 and 1986, about 68 percent of vernal pools on privately-owned land within the City of San Diego were lost (Bauder and Wier 1991). According to a 2004 Vernal Pool Inventory (City of San Diego 2004), 30 percent of the vernal pools surveyed were on privately owned land (this inventory did not include vernal pools known to occur on military lands).

On the other hand, more intense regional field surveys, such as those done by Beauchamp (1979), Bauder (1986), and the City of San Diego (2004) have revealed pools that were previously unmapped.

Along with destruction of vernal pool habitat, overall habitat quality has declined -- partly from continuing disturbances, but also from fragmentation (Bauder 1986). Fragmentation has led to additional edge effects and altered hydrology. Its impact on animals associated with vernal pools is unknown (Bauder and Wier 1991).

4.3.3 Vernal Pool Ecosystem

Before modern development, the majority of San Diego vernal pools existed in mima mound-pool swale landscapes such as those found currently on the Miramar Mounds National Natural Landmark (Miramar's U North complex) and the EE complex found south of the Miramar runways. Remnant pools still exist in many areas on graded and highly disturbed surfaces. Many seasonally ponding features such as ditches, road ruts, artificial impoundments, etc. also serve as suitable habitat for vernal pool plant and animal species, though their functionality as true vernal pool ecosystems may be compromised by disturbance.

Vernal pool plant and animal communities, which Thorne (1976) labeled "*vernal pool ephemeral*," are unique. On initial fall or winter ponding, over-summering reproductive structures of vernal pool plants and animals in the soil hatch or sprout, grow, and relatively quickly mature and produce new reproductive structures ready to spend months, years, or even decades in dry soils until pools fill again. More than three-quarters of plant species characteristic of these pools are found only in the California Floristic Province (Thorne 1976), an area west of the Sierra Nevada and stretching from southern Oregon to northern Baja California, Mexico. Even within the California Floristic Province, some of the plant species' distributions are exceedingly restricted. San Diego mesa mint (*Pogogyne abramsii*) is found exclusively on the central mesas of San Diego County, and Otay mesa mint (*Pogogyne nudiuscula*) occurs only on the southern San Diego County mesas, extending south into Baja California, Mexico. Likewise, Orcutt's brodiaea (*Brodiaea*

orcuttii) is found only in San Diego County and Baja California. San Diego button-celery (*Eryngium aristulatum* var. *parishii*) is found only in southern and central San Diego County. On a local scale, distributions of many vernal pool species are patchy within pool clusters or "complexes" (Bauder and Wier 1991). In addition to the endemic vernal pool habitat species of restricted distribution, there are a number of plant species, such as California waterwort (*Elatine californica*), American pillwort (*Pilularia americana*), and hyssop loosestrife (*Lythrum hyssopifolium*), belonging to the subcosmopolitan aquatic flora (Thorne 1984).

Similar to the situation with vernal pool flora, pools support freshwater invertebrate assemblages of up to 25 species, some of which (e.g. *Branchinecta lindahli* and *Macrothrix hirsuticornis*) are cosmopolitan and some of which (*e.g*., San Diego and Riverside fairy shrimp) are endemic to Southern California. There are probably several undescribed species of ostracods (Branchiopod Research Group 2003) whose conservation status is unknown. The most widespread freshwater invertebrate in Miramar pools is San Diego fairy shrimp (*Branchinecta sandiegonensis*). The federally listed Riverside fairy shrimp (*Streptocephalus woottoni*) has been found as hatched individuals or cysts only in two large artificial impoundments adjacent to each other in East Miramar. Lindahl's fairy shrimp on Miramar is probably a recent invasive species. The currently known Miramar distribution of this widespread species is only in puddles on the western border of the Station on roads associated with regular utility (gas and electric, water, and sewer) vehicle traffic. This species hybridizes with San Diego fairy shrimp (Simovich *et al.* 2013), and one population (so far) of hybrids has been documented in a large impoundment in Rose Canyon near the Station west boundary.

On MCAS Miramar, vernal pool habitat is essential to the survival of six species protected under the ESA. Five vernal pool associated species are listed as endangered: the San Diego button-celery, California Orcutt grass (*Orcuttia californica*), San Diego mesa mint, Riverside fairy shrimp and San Diego fairy shrimp. Spreading navarretia (*Navarretia fossalis*) is listed as threatened. Table 4.3.4 indicates the presence of these species within MCAS Miramar vernal pool groups. Map 4.3.4 indicates locations of these management units and pool groups.

4.3.4 Vernal Pool Habitat at MCAS Miramar

Vernal pool habitats at MCAS Miramar constitute Southern California's largest, least disturbed, and most contiguous vernal pool landscapes supporting endangered and sensitive species (Bauder and Wier 1991).

Vernal pool habitat typically occurs on the coastal terraces of MCAS Miramar in the western half of the Station. Vernal pools are not uniformly distributed but occur in groups or clusters on mesas where soil and topographic conditions favor their development (*i.e*., presence of a durapan layer). Historically, vernal pool clusters were separated from each other by a system of canyons trending in a northeast/southwest direction and draining toward the ocean. Three of these large canyons drain MCAS Miramar: Rose Canyon, San Clemente Canyon, and Murphy Canyon. Varying degrees of land use (*e.g*., roads, buildings, landfill) have dissected remaining natural habitat into a number of separate parcels varying in size from large (>1,500 acres) to very small (< 1 acre).

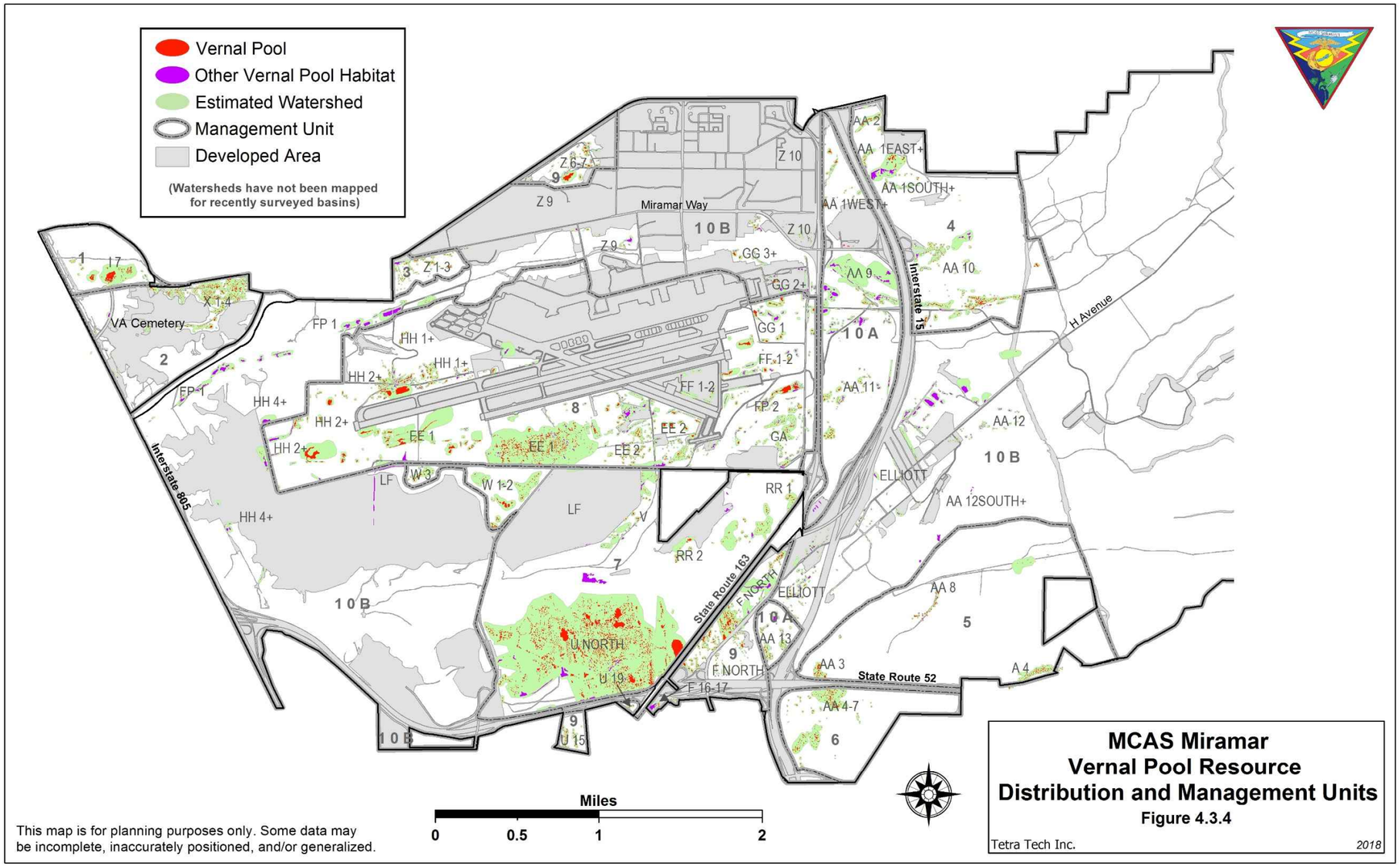
Table 4.3.4 Federal Listed Species Occurrence within MCAS Miramar Vernal Pool Groups*

Pool Groups	California Orcutt Grass	San Diego Button-celery	San Diego Mesa Mint	Spreading Navarretia	San Diego Fairy Shrimp	Riverside Fairy Shrimp	Total Basins in Group #
A	0	0	18	0	43	0	**83**
AA	1	59	165	0	509	2	**1,226**
EE	0	515	146	0	753	0	**1,364**
Elliott	0	1	0	0	73	0	**220**
F	0	12	51	0	162	0	**367**
FF	0	17	0	0	26	0	**59**
FP (Flood Plain)	0	1	0	0	87	0	**312**
GA	0	5	0	0	36	0	**252**
GG	0	26	0	0	60	0	**128**
HH	1	133	51	1	177	0	**400**
I	0	31	3	0	42	0	**68**
Landfill	0	0	1	0	23	0	**25**
RR	0	0	18	0	60	0	**141**
U	1	910	654	3	1,455	0	**1,702**
V	0	12	3	0	23	0	**79**
W	0	13	0	0	65	0	**105**
X	0	227	33	0	375	0	**646**
Z	1	62	32	1	104	0	**297**
Total All Groups	**4**	**2,024**	**1,175**	**5**	**4,073**	**2**	**7,474**

* Numbers of basins, including vernal pools and other seasonally ponded features.
# Total basins in group cannot be calculated by adding rows because some basins have more than one federal listed species, which would result in double counting them. Additionally, basins with no listed species would not be counted at all.

The NAS Miramar Vernal Pool Management Plan (Bauder and Wier 1991) grouped pools into units (Figure 4.3.4). This plan established Management Units that were delineated as geographical areas with similar management needs. For instance, all pools within the flightline security fence were placed in Management Unit 8. A number of pools east of I-15 were assigned to Unit 4, an area that was highly disturbed. Units 1, 2, and 5-7 have the potential for high quality conservation because they were large, contain varied topography and a number of vegetation types, and were distant from intense military activity. Unit 9 contains small groups suitable for public awareness and educational activities; however most groups requesting field trips have asked to visit the Unit 7 area within the Miramar Mounds National Natural Landmark due to the less disturbed and more extensive representation of a vernal pool landscape. Management Unit 10 contains pools which could not be placed logically into other units. This unit is divided into two sections: A) a number of isolated pools at risk for low to moderate disturbance, and B) isolated pools at risk for high disturbance (Bauder and Wier 1991). Current management unit designations continue to be based on Bauder and Wier (1991). Updated pool resource delineations have necessitated adjustment of management unit and group boundaries within units. New management groups have been created to acknowledge differences associated with less typical habitats occupied by San Diego fairy shrimp not recognized in the 1991 plan (*e.g.*, ponded areas of canyon floodplains and artificial drainage ditches in the Landfill area).

Figure 4.3.4. MCAS Miramar Vernal Pool Resource Distribution and Management Units



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Vernal pool habitat on MCAS Miramar has been mapped using several different methods. Initial vernal pool habitat mapping on Station was conducted in 1993 using 1 inch:400 feet, aerial photographs coupled with extensive field surveys. Typically, this method overestimated the surface area of vernal pool habitat basins.

In 1995, the Station began re-mapping individual vernal pool habitat basins using a sub-meter accuracy global positioning system (GPS). Between 1999 and 2010, essentially all of the Station has been resurveyed to precisely map vernal pool habitat basins, estimate watersheds, and determine species presence (Black 2004a, 2004b, 2006, 2007, 2009a, 2009b, 2010; Cobb 2003). As these resurvey efforts have occurred, discrepancies between previously mapped vernal pool habitat and those observed by newer surveys have been resolved by the Natural Resources Division to update the database that replaces previous information using a standardized format. Results from other projects, such as vernal pool habitat restoration and mitigation projects, surveys supporting NEPA analyses, and in-house staff surveys (primarily C. Black), also were used to update the vernal pool habitat database maintained by the Natural Resources Division.

Essentially all areas of the Station supporting both undisturbed natural vernal pools and other basins supporting fairy shrimp and typical vernal pool fauna and flora have now been carefully examined, and basins have been mapped with sub-meter accuracy and sampled for listed vernal pool fairy shrimp and listed pool plant species. More than 7,500 basins have been surveyed (Figure 4.3.4). Many basins surveyed have included puddles in dirt roads, ruts, and sites impounding water as a result of man-made conditions that may not have otherwise ponded sufficient water to warrant survey. Some basins did not support any vernal pool species. Mapping of pools using sub-meter accurate GPS equipment was largely completed in 2010. Since that time, the MCAS Miramar GIS layer for vernal pool resources has been maintained current to add newly identified or created basins and remove the few lost to developments. The current acreage of basin area is 147.2 acres (all basin types surveyed, including puddles, ruts, ditches, pools, etc.).

Based on field observations during surveys, the Station developed descriptive terms for various “types” of basins to provide an indication of apparent origin (natural or as a result of human activity) for mapping and assessment purposes. Use of these “type definitions,” by themselves, is not intended to indicate whether a site supports threatened/endangered species or is subject to Clean Water Act regulatory jurisdiction. “Type” identifiers have been used since 1999 when conducting vernal pool resource surveys and mapping, as a required data entry field in associated GIS layer attributes. Individuals conducting surveys assign the vernal pool “type” description while conducting fieldwork. “Type” definitions contribute to understanding vernal pool habitats and other seasonally ponded features at MCAS Miramar.

Pool: An apparently naturally occurring or purposely created/restored basin that holds water following a series of winter rainfall events. Some evidence of human disturbance may be present (*e.g.*, ruts), but a basin must be present that suggests an origin due to natural processes or purposeful creation/restoration activities. These will usually be very well vegetated with plants indicative of vernal pool conditions unless restoration is ongoing.

Marsh: A wetland frequently or continually inundated with water, characterized by emergent soft-stemmed vegetation adapted to saturated soil conditions following a series of winter rainfall events or urban runoff. On MCAS Miramar, this type is dominated by plants of the families Juncaceae and Cyperaceae; with lesser amounts of assorted forbs and graminoids such as *Lythrum hyssopifolium*, *Ambrosia psilostachya*, *Eleocharis* spp., and *Rumex acetosa* admixed. Use a dominance of Juncaceae and Cyperaceae to distinguish marshes from pools.

Puddle: A depression in an improved (*e.g.*, paved, graded), altered, or unimproved surface that holds water following a series of winter rainfall events apparently as the result of human activities (use and/or

maintenance). No reasonable indication exists of a naturally occurring basin. It will usually be sparsely vegetated, if at all, due to frequent disturbance. Examples of this type would include depressions in dirt roads, dirt parking/storage lots, potholes, and sub-base failures in improved surfaces.

Impoundment: An area of ponding water resulting from human actions that have obstructed natural drainage patterns or flow following a series of winter rainfall events or urban runoff. No evidence of the pre-existence of natural wetlands or other waters remains. The site may often be well-vegetated. Examples of conditions creating impoundments include deposited material "damming" a natural drainage swale, bermed areas, borrow sites, dozer windrows, and similar.

Ditch: A linear depression, often paralleling or extending from developments, including roads, runways, paths, etc. It may retain and hold water following a series of winter rainfall events or urban runoff if the grade of the ditch does not allow water to flow off-site. A ditch may be sparsely vegetated due to periodic maintenance but may be well vegetated if routine maintenance has not been required. If a ditch is wider than normal (*e.g.*, when borrow material was obtained alongside a road under construction), but no clear indication of a naturally occurring basin is present, the entire depressional area should be identified as part of the ditch.

Rut: Vehicle track in soil where there is no indication of a natural vernal pool basin present. These may hold water following a series of winter rainfall events or urban runoff. Older ruts may be vegetated with plants often found in vernal pool conditions.

N/A: This is a depression that has no MCAS Miramar vernal pool database plants, ACOE vernal pool indicator plants, other aquatic weed species, or hatched fairy shrimp or fairy shrimp cysts present. This is used to describe a site that ponded water sufficiently to be surveyed, but results were negative.

Excavation: A deliberate depression that is generally evidenced by rectangular shape when dug with heavy equipment or by abrupt and often deep (> .5 meter) hole. There is usually a pile of extracted material in the immediate vicinity of the excavation. Because of their depth and possibly because of their proximity to hardpan areas, excavations often pond for extended periods compared with shallow ruts, puddles, or natural pools found near them.

Building Foundation: A special class of excavation that is usually characterized by rectangular or angular shapes, and often has outside foundation walls and/or pilings of concrete. Occasionally, there is a concrete slab rather than bare soil within the interior walls.

Watercourse: This is a portion of an ephemeral watercourse/drainage that has a propensity to pond following cessation of storm flows. Duration of water flow varies depending on the associated watershed sizes and degree of topographical change along their lengths. The ponded areas may have fairy shrimp and other freshwater invertebrates present, as well as a wide range of vernal pool plant species.

Southern Pacific Rattlesnake
Natural Resources Division

4.4 Wildlife and Wildlife Habitat

MCAS Miramar provides important habitat for a wide variety of wildlife species. At a minimum, MCAS Miramar supports 7 species of amphibians, 30 species of reptiles, and 39 species of mammals. Well over 200 species of birds have been observed on the Station. A list of animal species observed or potentially occurring at MCAS Miramar is provided in Appendix D; the Station has a pamphlet,

Checklist of Birds, which has been reproduced for general dissemination. Chaparral and coastal scrub are the most common vegetation types on the Station, and many species of wildlife are adapted to both types.

The loss of coastal scrub throughout Southern California has resulted in the listing of the coastal California gnatcatcher as threatened under the federal ESA. Native grasslands, and the wildlife dependent on them, face a similar plight in coastal southern California. Some vegetation types, such as eucalyptus woodlands and disturbed non-native grasslands, provide relatively poor habitat for most native wildlife.

Riparian/wetland/open water areas at MCAS Miramar provide important resources to wildlife, especially amphibians. Even though these areas contribute only 1.3 percent of native vegetative cover on the Station, they are relatively diverse. Riparian vegetation is also important because it may be used as a preliminary indicator of potential wildlife corridors, in addition to being important habitat in its own right (Simberloff and Cox 1987).

Riparian corridors provide good structural diversity of vegetative cover (and sometimes topographic cover), a water source, an abundance of insects and plant food, and less intense temperature fluctuations than surrounding upland habitat (Doyle 1990). Ample cover allows wildlife using corridors to pass through undetected, and ephemeral streams that do not flow year-round may contain small ponds that provide enough water to reinforce the use of corridors in the future. Riparian vegetation generally maintains visual stimuli along the length of corridors, a characteristic that may keep animals moving through it (Ogden 1992). Since many areas within riparian corridors meet criteria of wetlands, they are subject to regulations of the CWA.

4.5 Habitat Linkages and Wildlife Corridors

The following definitions and designations of habitat linkages and wildlife corridors are consistent with those used in the development of the San Diego Multiple Species Conservation Plan (MSCP) (City of San Diego 1996a; Ogden 1993).

Habitat linkages are natural areas that not only provide connectivity among habitat patches, but also provide habitat for native plants as well as year-round foraging and reproduction habitat for resident wildlife. There is particular concern for habitat linkages because they are the key to maintaining contiguous occupied habitat for many species. Breaking the linkages would result in habitat fragmentation and isolated populations.

Wildlife corridors are narrower connections among habitat patches that are intended to allow for wildlife movement and dispersal. Wildlife corridors can be viewed as being local (*i.e.*, within MCAS Miramar) or regional. Local corridors are important because they allow resident wildlife access to resources within MCAS Miramar (Figures 4.5a and 4.5b), and they function as connections with habitat patches in the region (Figure 4.5c). Wildlife corridors generally follow major drainages and open ridgelines.

Work has been performed to assess wildlife movement between MCAS Miramar and adjacent areas. Wildlife movement occurs and has been shown to support genetic connectivity (Bohonak and Mitelberg 2014; City of San Diego 2010; U.S. Department of Transportation [DOT] and California Department of Transportation [CA DOT] 1989). Bohonak and Mitelberg (2014) identified high genetic connectivity within nine populations of southern mule deer (*Odocoileus hemionus fuliginatus*), corresponding to known corridors, preserves, and contiguous areas of open space in southern California and adjacent to MCAS Miramar. Mammal Monitoring and Habitat Assessment at San Diego Mission Trails Regional Park highlighted the importance of prioritizing enhancement and preservation of high quality corridor complexes to ensure long-term viability of diverse wildlife populations (City of San Diego 2010). The Final Environmental Impact Statement for construction of State Route 52 identified multiple wildlife corridors

that connect MCAS Miramar to adjacent areas and cross the proposed route; in addition to strategic fencing and crossing trail connections, a bridge crossing structure was constructed over the highway to permit continued passage of wildlife through these corridors (U.S. DOT and CA DOT 1989).

4.5.1 Habitat Linkages

The entire eastern portion of MCAS Miramar (*i.e.*, east of I-15) functions as an important habitat linkage with adjacent open spaces. Management of East Miramar for military field training and range firing is very compatible with this function as a habitat linkage. Unfortunately, the construction of State Route 52 south of MCAS Miramar fragmented this once open habitat linkage with the Mission Trails Regional Park to the south. Two large bridges of State Route 52, spanning Oak and Spring Canyons, now provide connectivity between MCAS Miramar and Mission Trails Regional Park. The conservation of habitat linkages is preferred over wildlife corridors, which are more constrained. As a result of the rapid urban development in the region, wildlife movement is frequently restricted to narrow corridors, as discussed below.

4.5.2 Wildlife Corridors

Methods Delineating Wildlife Corridors

The following descriptions of wildlife corridors are based largely on investigations conducted in 1992 by Ogden (1992) in an area encompassing MCAS Miramar, Torrey Pines State Reserve, and Los Penasquitos Canyon Preserve. Target species were the mountain lion (*Felis concolor*), bobcat (*F. rufus*), and mule deer.

Presumed corridors were surveyed for animal sign during April-June 1992. Animal sign (tracks and scat) was used as the primary indicator of wildlife use of corridors and was supplemented with other information gathered from more recent sightings. All data were mapped and used to determine major regional corridors in the area and whether they were being used by target species. Also evaluated were 34 road underpasses located within the corridors. Underpasses included box culverts, pipe culverts, bridges, and a freeway interchange. Wildlife use of these underpasses was evaluated based on signs as well as the likelihood of use based on the level of topographic and vegetative cover (Ogden 1992). This information has been supplemented by evaluations reported in the Final Environmental Impact Statement for the Realignment of NAS Miramar (Ogden 1996) and information provided by Station personnel.

MCAS Miramar Corridors

Primary east-west corridors on MCAS Miramar are Rose and San Clemente canyons (Figures 4.5a and 4.5b). Rose Canyon originates east of the Main Station and drains west under I-805 on MCAS Miramar's western boundary. This canyon provides connectivity to habitat patches west of the Station in Rose Canyon Open Space Park. Mule deer, bobcat, and mountain lion use has been documented in this portion of Rose Canyon. Water flows are intermittent in Rose Canyon, and coastal scrub and chaparral vegetation provide cover for wildlife.

San Clemente Canyon originates in northcentral East Miramar and flows south and west through MCAS Miramar before draining under I-805 in the southwestern corner of the property. This canyon also provides connectivity to habitat west of the Station, including that in Marian Bear Memorial Park, as described below in *Regional Corridors through Western Miramar*. Water flows are intermittent in this canyon, which supports coastal scrub, chaparral, wetland, and riparian vegetation. Wildlife traveling west through San Clemente Canyon must pass under I-15 and Kearny Villa Road. Passage under I-15 is through a narrow tunnel measuring 14 feet high, 18 feet wide, and 475 feet long. Passage under Kearny Villa Road is under a bridge. There is a fence along the entire western edge of the roadway at the under-crossing that may be passable by deer. While this portion of the corridor is quite constrained by the two roadways, there is evidence of mule deer use.

Figure 4.5a. Conceptual Wildlife Corridors on Western MCAS Miramar

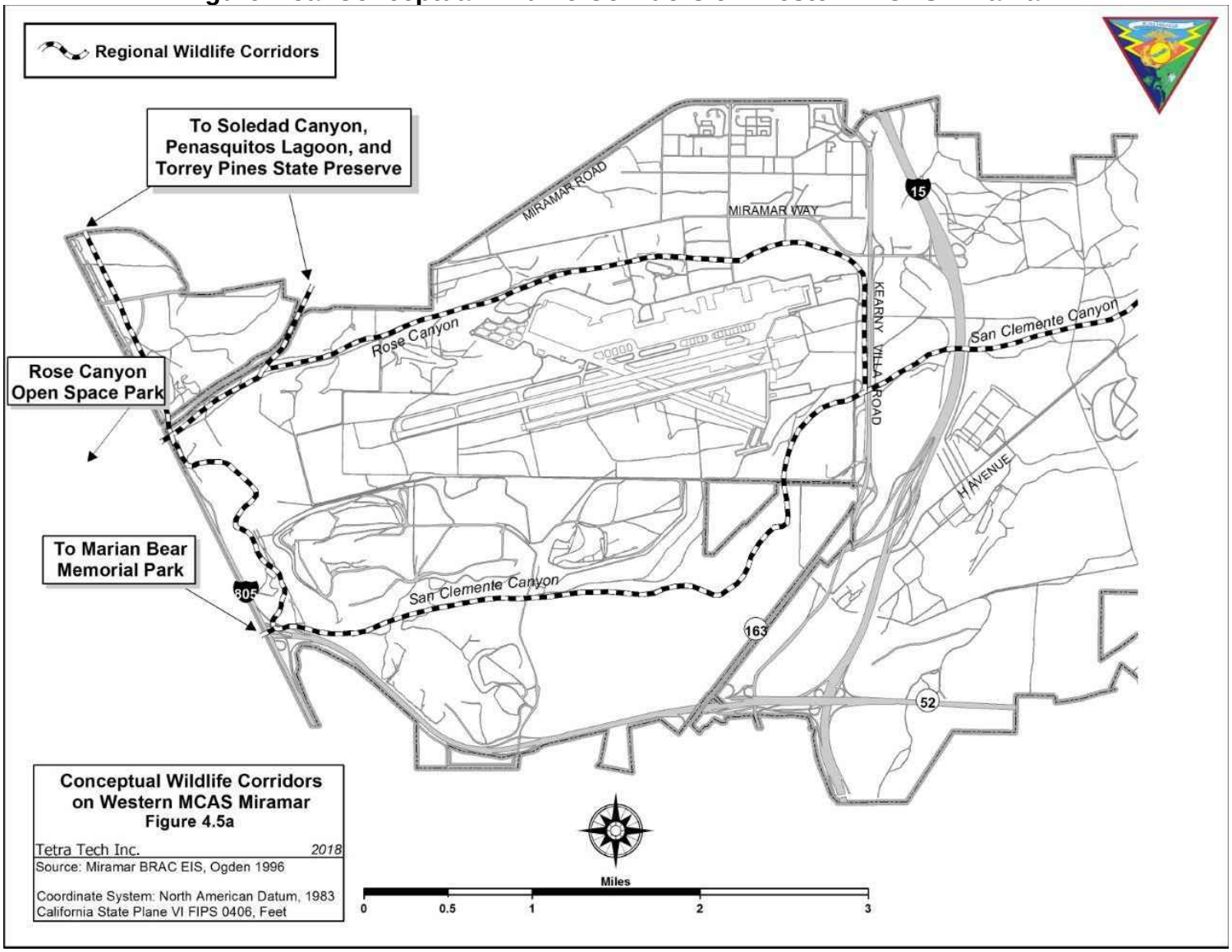

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Figure 4.5b. Conceptual Wildlife Corridors on Eastern MCAS Miramar

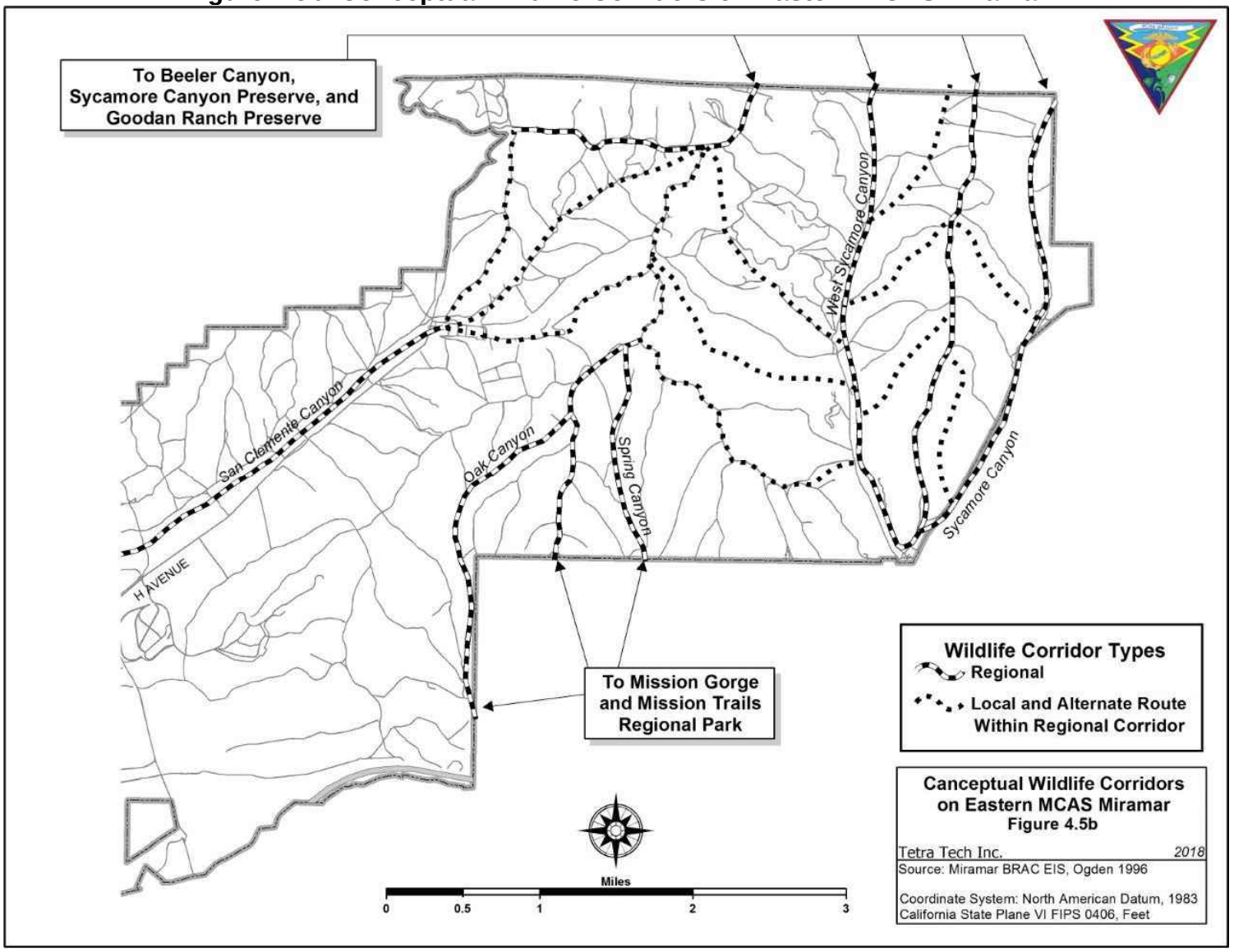

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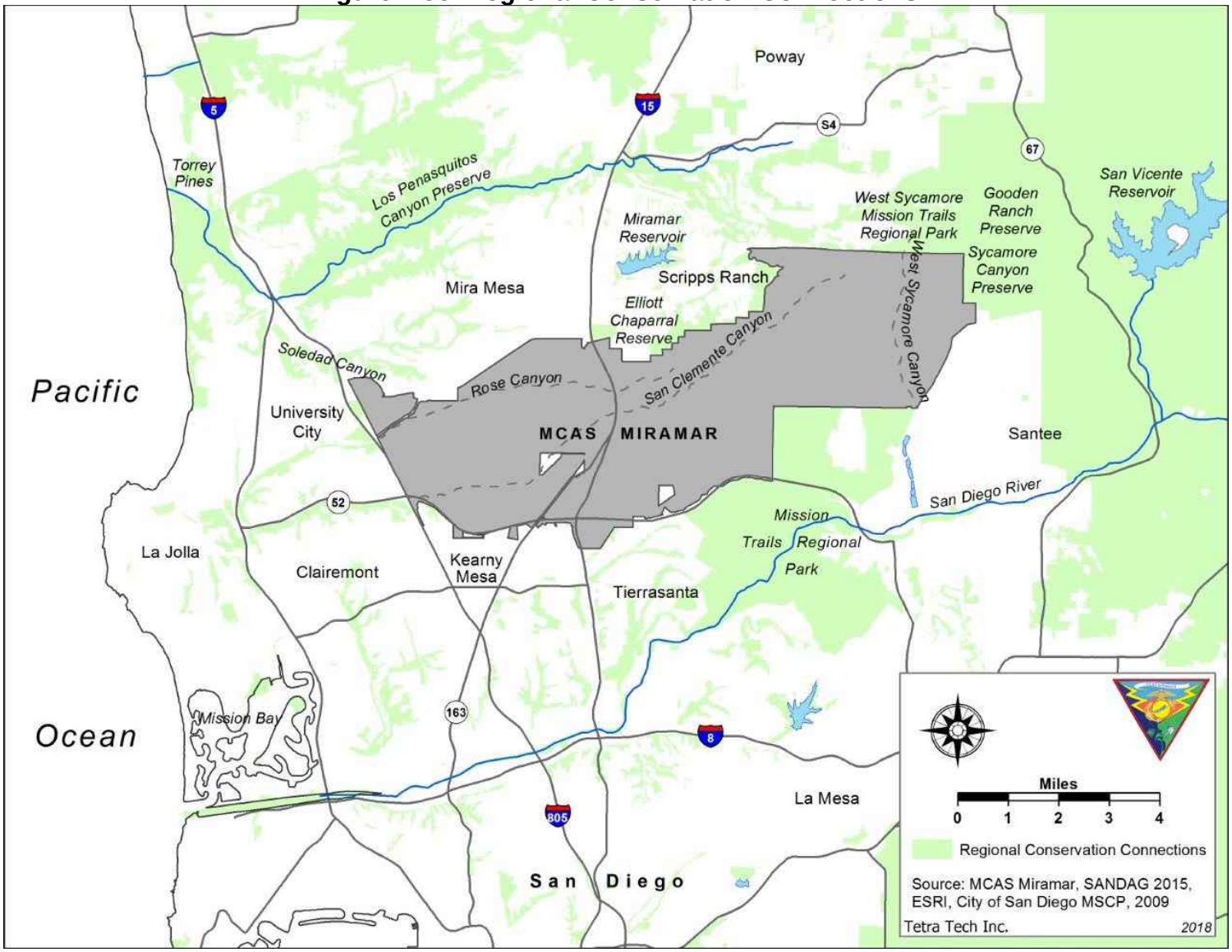
Figure 4.5c. Regional Conservation Connections



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North-south wildlife movement in East Miramar oriented with Oak, Spring, West Sycamore, and Sycamore canyons (Figure 4.5c) is relatively unconstrained where the area functions more like a large habitat linkage than narrower corridors. Along the western edge of MCAS Miramar, a north–south corridor exists along the eastern side of I-805 until the Station boundary is reached and developments substantially constrain the corridor. The following discussion of Regional Wildlife Corridors helps delineate the role of MCAS Miramar corridors within a larger context.

Regional Wildlife Corridors

Regional Corridors through Western Miramar

There are two corridors that link western MCAS Miramar to Los Penasquitos Canyon Preserve to the north (Figures 4.5a and 4.5c). These corridors are already highly constrained and limited in function. However, both were monitored by Ogden (1992) and determined to be functional at that time.

One corridor is the power line easement along the eastern side of I-805 between Los Penasquitos Canyon Preserve and MCAS Miramar. From Los Penasquitos Canyon Preserve, the corridor rises to the south onto a mesa at Lusk Boulevard. Animals must pass between business park developments by staying in the easement, which is bordered by landscaping, undeveloped areas, and parking lots. A ravine leads down to Mira Mesa Boulevard and to Soledad Canyon beyond. The power line easement extends south to Eastgate Mall and Miramar Road before entering the open spaces of MCAS Miramar. This corridor is 400 feet wide at its narrowest section where it crosses over Mira Mesa Boulevard. Several road kills of large mammals have been documented at the crossing of Eastgate Mall and Miramar Road (Ogden 1992). Recent completion of the Nobel Drive connection to Miramar Road has likely eliminated the viability of this connection to MCAS Miramar for large mammals. As development continues along I-805, this corridor may lose its value as a viable wildlife corridor to most wildlife.

A second wildlife corridor follows a railroad under Miramar Road. This short and very narrow corridor connects Rose Canyon on MCAS Miramar to Soledad Canyon, two areas of high-quality habitat. The railroad is situated in a gorge bordered on both sides by steep, 40-foot-high walls carved into the mesa extending for about 1,500 feet; the ridges and terraces are covered with chaparral and sage scrub. This gorge is 175 feet wide at the rim of the mesa. Topography and vegetation combine to completely obscure this corridor from surrounding commercial development.

Two additional corridors connect western Miramar with open space west of I-805. San Clemente Canyon, which runs from the northeastern corner of MCAS Miramar to the southwestern corner, apparently dead ends into the I-805 and State Route 52 interchange. However, there is a system of open drainages with dirt trails along the borders that provide access through the interchange into Marian Bear Regional Park on the west side of I-805. In spite of the apparent restriction, large mammals continue to move regularly in and out of the park through this portal.

Rose Canyon, another east-west corridor within the open space of MCAS Miramar, funnels the movement of wildlife under the I-805 bridge over the railroad easement within Rose Canyon. This is the same railroad easement that connects Rose Canyon to Soledad Canyon north of MCAS Miramar. On the western side of I-805 this wildlife corridor continues along the railroad easement to the west until it connects with Marian Bear Regional Park at the end of San Clemente Canyon and continues south.

Regional Connectivity through Eastern Miramar

Core biological resource areas and linkages maps for the MSCP illustrate two regional connections through eastern MCAS Miramar linking undeveloped lands in eastern San Diego County and the Mission Trails Regional Park to coastal areas. One is to the north of MCAS Miramar and the other is to the south (Figure 4.5c).

The northern connection relies on the linkage of eastern MCAS Miramar to Beeler Canyon to the north. Beeler Canyon eventually leads west to Los Penasquitos Canyon and finally on to Torrey Pines State Reserve and the coast. The wildlife corridor through Beeler Canyon and upper Los Penasquitos Canyon is highly constrained by development but eventually becomes more open as Los Penasquitos Canyon Preserve is reached.

The regional connection extending south from eastern MCAS Miramar requires wildlife to travel under State Route 52. Two travel routes are under large bridges spanning Oak and Spring canyons, and a third is a culvert located west of Oak Canyon immediately east of the aqueduct. These routes allow the safe movement for wildlife in eastern MCAS Miramar to Mission Trails Regional Park compared to movement over State Route 52. In general, bridges are preferred over culverts for wildlife movement. Site visits to the large culvert under State Route 52 indicate that while there is minimal wildlife use, the site is experiencing substantial human visitation, and as such, the Station has fenced this large culvert under State Route 52. The fence at this location contains bars spaced about 6 feet inches apart in the lower half to allow most wildlife passage. Otherwise, it is required for installation safety and security.

Mission Trails Regional Park, in turn, provides access to the San Diego River, which runs through Mission Gorge, Mission Valley, and finally out to Mission Bay. Nearly the entire length of this corridor outside of Mission Trails Regional Park to the southwest is restricted to the riparian vegetation associated with the San Diego River; the rest of the area has been developed.

4.6 Federal Special Status Species

Special Status Species are those listed by the federal government as threatened, endangered, or proposed for listing as threatened or endangered. Also included in this category are species protected by the Bald Eagle Protection Act. The Marine Corps is obligated to conserve Special Status Species under provisions of the federal ESA and Bald Eagle Protection Act. Information on the special status species that currently occur on MCAS Miramar is provided in Table 4.6, and information related to previous surveys conducted on Station is within Chapter 7. Information on federally listed species with the potential to occur that are not currently known to occur on MCAS Miramar is presented at the end of this section, after Table 4.6.

Table 4.6. Special Status Species Occurring on MCAS Miramar

No.	Species Name, Status*, Family	Habitat	Rangewide and MCAS Miramar Distribution	Comments
		Plants		
1	Del Mar manzanita (*Arctostaphylos glandulosa* var. *crassifolia*) Status: FE/None/1B Family: Ericaceae	Del Mar manzanita occurs in chaparral vegetation that is relatively low-growing with an eroding sandstone substrate.	The local distribution extends from Torrey Pines State Park inland to Rancho Santa Fe and Del Mar Mesa. It is infrequent in coastal San Diego County from Del Mar to Carlsbad. It has been identified at many locales in East Miramar by a station-wide census (Licon Engineering Co., Inc. & Garcia and Associates 2006).	This taxon was listed as endangered (USFWS 1996c) due to loss of habitat from urban sprawl. No critical habitat on Miramar has been designated for this species. Over-shading from nearby plants affects the plant's vigor and hybridization with the more common Eastwood manzanita has limited its population size. Genetic study of Del Mar manzanita is in progress to better understand its distribution on MCAS Miramar.
2	San Diego Button-celery/Coyote thistle (*Eryngium aristulatum* var. *parishii*) Status: FE/SE/1B Family: Apiaceae	San Diego button celery occurs in Redding gravelly loams in and around vernal pool habitat and its watersheds.	This taxon is distributed from Riverside and San Diego counties to Baja California, Mexico. Vernal pool habitat monitoring within Station boundaries has documented populations, west of Fuelbreak NS-4 (San Diego County Water Authority aqueduct easement).	Development, agriculture, and off-highway vehicle use are main threats (Skinner and Pavlik 1994) causing this species to be listed as a federally endangered plant (USFWS 1993b). No critical habitat has been designated for this species across its range.
3	Spreading navarretia (*Navarretia fossalis*) Status: FT/None/1B Family: Polemoniaceae	Vernal pool habitat and vernal swales provide habitat for spreading navarretia. Rarely found in shallow pools, population increases are correlated with heavier rainfalls and greatly reduced during drought (Reiser 1994).	This species' range extends from Riverside and San Diego counties to Baja California, Mexico. Populations exist at Camp Pendleton and Ramona with the largest concentration located on private parcels in the Otay Mesa area. Small populations, in a small number of pools on western Miramar, are documented from recent monitoring efforts	This plant was listed in 1998 (USFWS 1998). It is threatened by urbanization, grazing, road construction, and off-highway vehicle use (Skinner and Pavlik 1994). The USFWS published final critical habitat for this species on October 7, 2010 that identified essential habitat** on MCAS Miramar, but did not propose designation of critical habitat on the Station, based on protections provided by the INRMP (USFWS 2010a).

No.	Species Name, Status*, Family	Habitat	Rangewide and MCAS Miramar Distribution	Comments
4	Willowy monardella (*Monardella viminea*, Elvin and Sanders 2003; *Monardella linoides* ssp. *viminea*, *(*Abrams 1951) Status: FE/SE/1B Family: Lamiaceae	This perennial herb occurs in riverwash cobbly loams of ephemeral drainages and floodplains. It typically is found on sandbars or low benches in drainage beds intermingled with scrub, chaparral, or riparian scrub woodland vegetation.	The species is a San Diego County endemic. Populations reported on MCAS Miramar are primarily located in East Miramar canyons with a small population segment located in West San Clemente Canyon. In addition, willowy monardella populations occur off-Station in Lopez, Cemetery and Carroll canyons to the north, San Clemente canyon to the west, Sycamore canyon to the east, and Spring and Little Sycamore canyons to the south. (San Diego Natural History Museum 2004a)	It has been reported that about 95 percent of the domestic range of this taxon occurs within the MSCP region, with about 80 percent occurring on MCAS Miramar (USFWS 1998). The USFWS published final critical habitat for this species on November 8, 2006 that identified 1,863 acres of essential habitat** on MCAS Miramar, but did not propose designation of critical habitat on the Station, based on protections provided by the INRMP (USFWS 2006).
5	San Diego mesa mint (*Pogogyne abramsii*) Status: FE/SE/1B Family: Lamiaceae	San Diego mesa mint inhabits vernal pool habitat complexes in chaparral, scrub, and grassland habitats. It may also be found on coastal terraces and mesas in San Diego County (Hickman 1993; Skinner and Pavlik 1994).	This species has been reported from all 10 of the vernal pool habitat management units on MCAS Miramar (Bauder and Wier 1991).	This wetland species continues to be threatened by urbanization, off-highway vehicle use, and road maintenance (Bauder and Wier 1991; Skinner and Pavlik 1994). At completion of this INRMP, no critical habitat has been designated for this species across its range.
6	California Orcutt grass (*Orcuttia californica*) Status: FE/SE/1B Family: Poaceae	This annual grass is present exclusively in vernal pool habitat complexes, usually in wetter portions as pools are drying.	Orcutt's grass is distributed from Riverside and San Diego counties to Baja, California. On MCAS Miramar, it is reported from a few vernal pool habitats in Management Unit 7 and one vernal pool habitat in Management Unit 8 (Bauder and Wier 1991). Current vernal pool habitat survey efforts have not located any new Station distributions thus far.	California Orcutt's grass is known from fewer than 20 locations and is threatened by development, agriculture, non-native invasive plant species, and off-highway vehicle use (Skinner and Pavlik 1994). At completion of this INRMP, no critical habitat has been designated for this species.
Invertebrates				
7	San Diego fairy shrimp (*Branchinecta sandiegonensis*) Status: FE/None Family: Crustacea	San Diego fairy shrimp may be present in seasonally astatic vernal pools and many other seasonally ponded features in coastal areas within grassland, agriculture, coastal sage scrub, and chaparral habitats.	The San Diego fairy shrimp's range extends from Santa Barbara County south to northwestern Baja California, Mexico (USFWS 1997). It occurs throughout San Diego County and is known from all 10 vernal pool habitat management units on MCAS Miramar. A large proportion of the vernal pool habitats on MCAS Miramar contain San Diego fairy shrimp.	This species is threatened by habitat destruction and fragmentation from agricultural and urban development, alteration of wetland hydrology by draining, off-highway vehicle activity, and cattle and sheep grazing (USFWS 1997). The USFWS published a final rule to designate critical habitat for this species on December 12, 2007 that identified essential habitat not designated as critical habitat on MCAS Miramar (USFWS 2007b).

No.	Species Name, Status*, Family	Habitat	Rangewide and MCAS Miramar Distribution	Comments
8	Riverside fairy shrimp (*Streptocephalus woottoni*) Status: FE/None Family: Crustacea	The Riverside fairy shrimp is found in deep vernal pool habitat and ephemeral wetlands that retain water through the warmer weather of late spring.	This species is known from vernal pools near Temecula, Riverside County; one population in Orange County; vernal pool habitat on Otay Mesa and MCAS Miramar; and two locations in Baja California (USFWS 1993b. On MCAS Miramar, Riverside fairy shrimp are known from two impoundments east of Interstate 15 (Vernal Pool Unit 4, group AA1 south).	Eggs of this species will not hatch in pools that are shallow or receive cool waters from early winter rains. The USFWS published a final rule to designate critical habitat for this species on April 12, 2005 and a proposed rule on June 1, 2011 to revise this designation, both identifying essential habitat not designated as critical habitat on MCAS Miramar (USFWS 2005, 2011a).
9	Quino checkerspot butterfly (*Euphydryas editha quino*) Status: FE/None Family: Nymphalidae	The Quino checkerspot butterfly is restricted to open grassland and openings in chaparral and coastal sage scrub.	The Quino checkerspot ranges from the interior foothills of southwestern California to northwestern Baja California, Mexico. This species was detected in East Miramar in 2017 and 2018.	The USFWS published a final rule to designate critical habitat for this species on June 17, 2009, and no critical habitat was designated on MCAS Miramar (USFWS 2009). Surveys for the species were completed for the 2018 flight season with follow-up surveys to be completed during the 2019 flight season.
10	Hermes copper butterfly (*Hermelycaena* [*Lycaena*] *hermes*) Status: PE/None Family: Hermelycaena	Hermes copper butterfly occurs in coastal sage scrub and southern mixed chaparral containing its host plant, spiny redberry (*Rhamnus crocea*).	This species ranges throughout southern California where appropriate habitat is found. Populations have been found near Lakeside, Fallbrook, Pala, Bernardo Mountain, Harmony Grove, Del Dios, MCAS Miramar, and Northern Baja California. This butterfly was found in San Clemente Canyon and West Sycamore Canyon areas of East Miramar in 1996-1998. All sites were severely burned by the Cedar Fire in 2003. The nearest known location occupied by this species following the Cedar Fire is the southern part of Mission Trails Regional Park.	Although surveys during the 2010 flight season did not find the butterfly on MCAS Miramar, surveys for the species are scheduled for the 2018 flight season. It is anticipated that a proposed listing determination from USFWS will occur during 2018. The USFWS is preparing a species status assessment for listing determination to be published in the Federal Register.

No.	Species Name, Status*, Family	Habitat	Rangewide and MCAS Miramar Distribution	Comments
			Birds	
11	Golden eagle (*Aquila chrysaetos*) Status: BGEPA/SFP Family: Accipitridae	Golden eagles require large, open spaces for foraging and nesting. Foraging takes place over a wide variety of open habitats, such as desert scrub, grassland, rolling foothills, mountains, and sage scrub. Nest sites typically require large buffers from development.	Golden eagles are known from mountainous regions of the western hemisphere. They are uncommon residents of San Diego County. While not known to breed on MCAS Miramar, golden eagles are known to forage within its boundaries (Cox *et al.* 1994), possibly coming from nest sites on Cleveland National Forest. They are known from East Miramar above West Sycamore and Sycamore Canyon. A golden eagle was sited in April 1998, along "H" Avenue and along the Aqueduct Road in East Miramar by Station personnel.	The golden eagle is a large predatory bird that requires extensive open areas to forage for its prey. The loss of foraging and nesting habitat throughout southern California has resulted in a decline in the species' population.
12	Southwestern willow flycatcher (*Empidonax traillii extimus*) Status: FE Family: Tyrannidae	Preferred habitat of the southwestern willow flycatcher includes riparian habitat along rivers, streams, ponds, lakes, or other wetlands with dense of willows (*Salix* sp.) (USFWS 1995).	The breeding range of this species includes southern California, Arizona, New Mexico, southern parts of Utah and Nevada, southwestern Texas, and northwestern Mexico. Although there are no known nesting occurrences of the southwestern willow flycatcher on MCAS Miramar, it is likely that some of the transient willow flycatchers that have been observed on MCAS Miramar are the listed entity and are migrating through MCAS Miramar on their way to breeding locations in California.	Focused surveys are conducted for this species about every three years concurrent with those for least Bell's vireo (1998-2017). Project-specific surveys need not be conducted for this species. There is no designated critical habitat for this species on MCAS Miramar.

No.	Species Name, Status*, Family	Habitat	Rangewide and MCAS Miramar Distribution	Comments
13	Coastal California gnatcatcher (*Polioptila californica californica*) Status: FT/None Family: Muscicapidae	This subspecies is generally described as an obligate resident of coastal sage scrub communities; however, investigations suggest that California gnatcatchers also use chamise chaparral near coastal sage scrub as nesting habitat.	The coastal California gnatcatcher's range includes coastal southern California from Los Angeles, Orange, western Riverside, and San Diego counties south to northern Baja California, Mexico. This species is locally abundant on MCAS Miramar where suitable habitat exists; the pre-Cedar Fire (2003) population on Station was 24-62 pairs (1997-2001 surveys). Surveys in 2004, following the 2003 Cedar Fire, found 21 breeding pairs and 1 lone male in unburned areas. Surveys in 2007 found 34 breeding pairs and 3 territorial males with some recolonization of 2003 burned areas (RECON Environmental, Inc. 2008). Surveys in 2009 by Haas found 65 breeding pairs of gnatcatchers, similar to the highest densities recorded in earlier surveys; many were in areas burned by the Cedar Fire. Surveys in 2013 found 43 breeding pairs.	Focused surveys for this species are conducted about every three years to monitor the population and have presence/absence information to support activity planning. Urban and agricultural development, with associated habitat loss and fragmentation, threatens the coastal gnatcatcher's existence in California. The USFWS published a final rule to designate critical habitat for this species on December 19, 2007, that identified essential habitat not designated as critical habitat on MCAS Miramar (USFWS 2007a).
14	Least Bell's vireo (*Vireo bellii pusillus*) Status: FE/SE Family: Vireonidae	This species is found in remnant stands of riparian habitats, requiring willow-dominance with lush understory vegetation. The understory is particularly important since least Bell's vireos frequently nest within three feet of the ground (USFWS 1985).	The range of the least Bell's vireo extends from California to Baja California, Mexico. The bird winters only in Southern Baja. On MCAS Miramar, this bird has been found breeding in Sycamore Canyon, West Sycamore Canyon, San Clemente Canyon, and Murphy Canyon of East Miramar. This species has recently been found breeding in West Miramar along San Clemente Canyon near the Miramar Landfill and Rose Canyon in the Main Station area.	Focused surveys are conducted for this species about every three years. Project-specific surveys need not be conducted for this species. Informal least Bell's vireo surveys in all previously occupied areas and in suitable habitat areas were carried out by Miramar Natural Resources Division staff in the breeding seasons of 2014 and 2015. No attempts were made during these surveys to verify the presence of females or breeding attempts or breeding success. Factors that have led to the decline in least Bell's vireo populations include flood control and water development projects, crop production, livestock grazing, human disturbances, nest parasitism and general habitat degradation. There is no designated critical habitat for this species on MCAS Miramar.

* Federal Status Code/State Status Code/California Native Plant Code

Federal Species Status Codes:

FE = Federally endangered
FT = Federally threatened
PE = Proposed endangered (federal)
PT = Proposed threatened (federal)
FC = Federal candidate for listing
BGEPA = Protected by Bald and Golden Eagle Protection Act

California State Status Codes

SE = State listed endangered
ST = State listed threatened
SR = State listed rare (plants)
SFP = State fully protected species (animals)
SC = State candidate for listing
SCD = State candidate for delisting
SCE = State candidate for listing as endangered
SCT = State candidate for listing as threatened

California Native Plant Society Status Code (only code used is included)

List 1B = Rare, threatened, or endangered and eligible for listing under the California Endangered Species Act

****** While the term "Essential Habitat" has been used in some proposed and final rules for designation of critical habitat, no definition of this term is provided in Endangered Species Act implementing regulations or critical habitat designations where the term is use. Based on usage of the term, essential habitat are areas that have physical and biological features and habitat characteristics that are deemed essential to the conservation of the species involved. Essential habitat is not equivalent to formally designated critical habitat.

The federal classification system for Special Status Species is as follows:

- ***Endangered (FE):*** any species that is in danger of extinction throughout all or a significant portion of its range;
- ***Threatened (FT):*** any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range;
- ***Proposed (PT, PE):*** any species that has been proposed for listing as a threatened or endangered species;
- ***Bald and Golden Eagle Protection Act (BGEPA):*** the Golden Eagle is protected by the Bald and Golden Eagle Protection Act.

Coastal California Gnatcatcher

Distributions of the threatened coastal California gnatcatcher (*Polioptila californica californica*), endangered least Bell's vireo (*Vireo bellii pusillus*), endangered Quino checkerspot butterfly (*Euphydryas editha quino*), federally proposed Hermes copper butterfly (*Hermelycaena* [*Lycaena*] *hermes*), endangered Del Mar manzanita (*Arctostaphylos glandulosa* ssp. *crassifolia*), and endangered willowy monardella (*Monardella viminea*) are shown on Figure 4.6. Figure 4.6 shows the sensitive resources data including the most recent survey results that this Plan was based on at the time of preparation. The most recent Sensitive Resources Map for the Station can be found on the MCAS Miramar webpage, http://www.miramar-ems.marines.mil/Divisions/Natural-Resources-Division/Natural-Resources/.

Figure 4.3.4 shows locations of vernal pool habitat at MCAS Miramar. This habitat, collectively, supports five vernal pool species that are listed as endangered (*i.e.*, San Diego button-celery, California Orcutt grass,

San Diego mesa mint, Riverside fairy shrimp, San Diego fairy shrimp) and spreading navarretia, listed as threatened.

Some special status species are known to occur in the region surrounding MCAS Miramar, but have not yet been documented on the Station. Federally listed species that occur in the region of MCAS Miramar but have not yet been found on Station by surveys include the western yellow-billed cuckoo (*Coccyzus americanus*, federally threatened), San Diego ambrosia (*Ambrosia pumila*, federally endangered), Encinitas baccharis (*Baccharis vanessae*, federally threatened), San Diego thornmint (*Acanthomintha ilicifolia*, federally threatened), and Orcutt's spineflower (*Chorizanthe orcuttiana*, federally endangered).

The western yellow-billed cuckoo was recently listed by the USFWS as a federally threatened species. The western yellow-billed cuckoo is not known to occur on MCAS Miramar and likely observations of this species would have been detected during focused least Bell's vireo surveys if it was present on MCAS Miramar.

Focused surveys have also been performed for all four federally listed plant species, but no individuals have been observed at MCAS Miramar.

4.7 Other Species of Regional Concern

Species of regional Special Concern at MCAS Miramar include federal species of concern; State of California species of concern; state of California listed species; federal candidates for listing as a threatened or endangered species; Bird Species of Concern, defined in Section 6.1.2, *Migratory Bird Legal Instrumentalities*; and species listed by the California Native Plant Society (2010). These species are included for consideration during environmental planning at MCAS Miramar (Chapters 5 and 6).

The following species of regional concern are known to occur in the region surrounding MCAS Miramar, but have not yet been documented on the Station: big free-tailed bat (*Nyctinomops macrotis*), pallid bat (*Antrozous pallidus*), Townsend's big-eared bat (*Plecotus townsendii*), Mexican long-tongued bat (*Choeronycteris mexicana*), western small-footed myotis (*Myotis ciliolabrum*), and Mission Canyon bluecup (*Githopsis diffusa* ssp. *filicaulis*). A bat survey was conducted on the Station from winter 1992 until fall 1996 to determine whether bat species of regional concern were known to occur on MCAS Miramar (Hunsaker 2001). No natural habitat loss that would change bat populations has occurred since surveys were performed. Botanical surveys performed at MCAS Miramar cover multiple growing seasons. Surveys for willowy monardella, Del Mar manzanita, vegetation mapping, and wildlife are performed regularly and across the entire Station. Although focused surveys for plant species, such as Mission Canyon bluecup, that have not previously been observed on MCAS Miramar have not been performed, other survey work conducted on MCAS Miramar would be expected to identify these species.

The species range for the big free-tailed bat extends from north and central Mexico, most of South America, and the Caribbean Islands northward to southwestern U.S. (Nowak 1991). The species range for the pallid bat is from southern British Columbia and Montana to central Mexico and Cuba, including the western U.S. (Burt and Grossenheider 1976). The Townsend's big-eared bat is present in western North America from Wisconsin and Wyoming to Texas, Arizona, and California. The Mexican long-tongued bat is known to occur from the southern portions of California and Arizona to Honduras and Guatemala (Hunsaker 1997). The western small-footed myotis is found within a large portion of western North America, including southwestern Canada, east to western Oklahoma, and south to central Mexico (Nowak 1991). All of these species are not known to occur on MCAS Miramar.

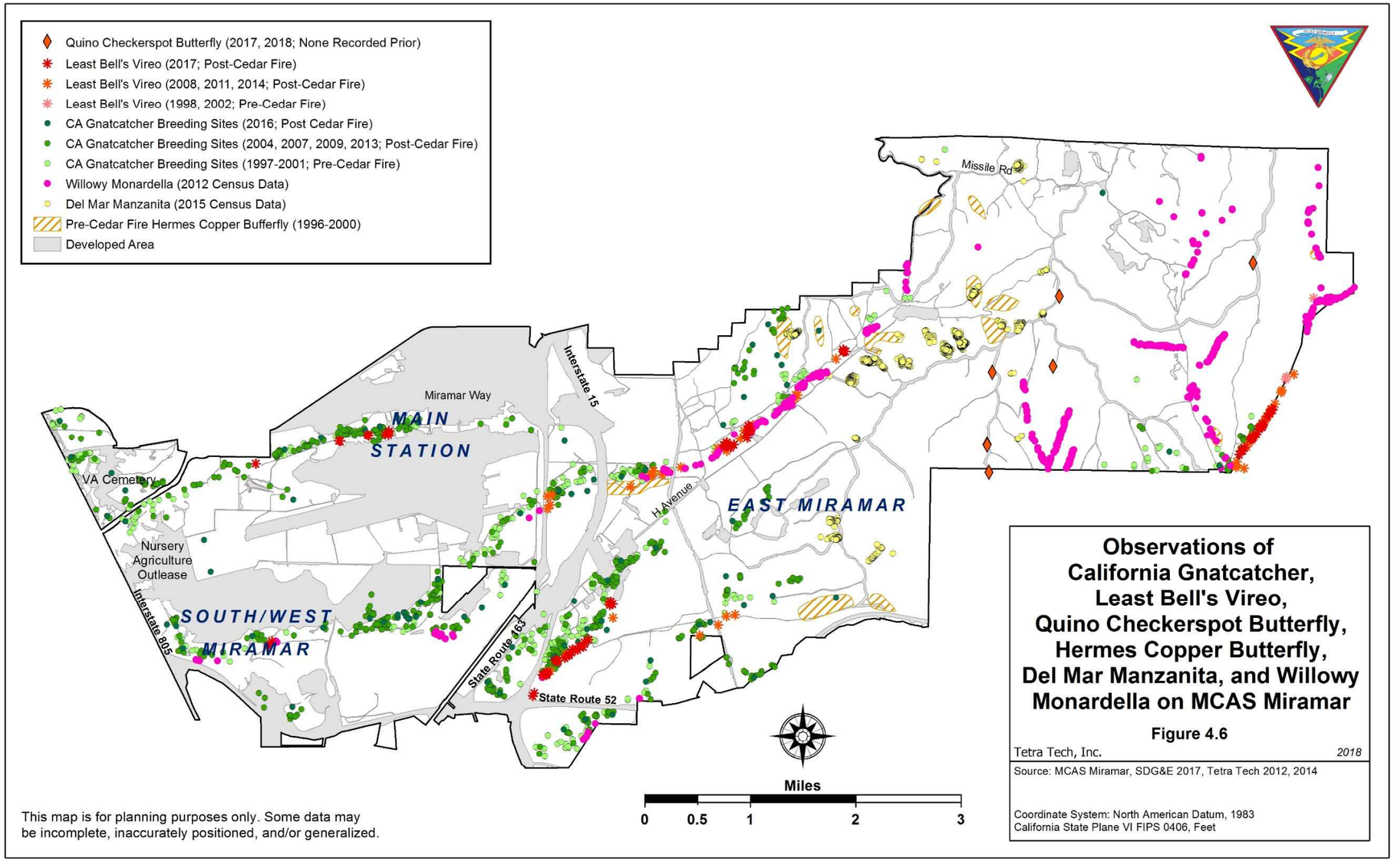
Mission Canyon bluecup has been documented in fewer than five locations in California and is limited to the El Cajon Mount and La Mesa USGS 7.5 minute quadrangles. Current rare and endangered plant surveys

performed on MCAS Miramar have not documented Mission Canyon bluecup on the Station.

Species that are federal listing candidates or whose status is currently under review by the USFWS that have been observed on MCAS Miramar include monarch butterfly (*Danaus plexippus*), western spadefoot toad (*Spea hammondii*), and tricolored blackbird (*Agelaius tricolor*).

The monarch butterfly is known to occur as a transient on MCAS Miramar. No overwinter roosts have been identified on the Station. Small amounts of narrow-leaved milkweed (*Asclepias fascicularis*) have been noted on MCAS Miramar from time to time, but no established patches have developed. This may be due to high temperatures and drought over the past several years that affect seed viability. Sites identified as having its milkweed host plant are located in canyon bottoms and floodplains which mostly occur within Level II Management Areas already identified for special conservation attention. The western spadefoot toad is known to be widely scattered throughout MCAS Miramar in low densities in a variety of habitats. The tricolored blackbird is a colonial nester and not known to breed on MCAS Miramar. It primarily inhabits wetland habitats. Although tricolored blackbirds are not known to breed on MCAS Miramar, individuals have been documented using wetland habitats during the non-breeding season. The USFWS has initiated a status review of these three species to determine whether listing is warranted.

Figure 4.6. Coastal California Gnatcatcher, Least Bell's Vireo, Quino Checkerspot Butterfly, Hermes Copper Butterfly, Del Mar Manzanita, and Willowy Monardella on MCAS Miramar



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Information on these species is in Table 4.7[6]. Applicable classifications for these species are as follows:

- ***Federal Candidate (FC):*** plants and animals for which the USFWS has sufficient information on their biological status and threats to propose them as endangered or threatened under the Endangered Species Act, but for which development of a listing regulation is precluded by other higher priority listing activities;
- ***State Endangered (SE):*** taxa in serious danger of becoming extinct throughout all, or a significant portion, of its range within the State of California due to threats to the taxa;
- ***State Threatened (ST):*** taxa likely to become endangered within the foreseeable future throughout all or a significant portion of its range within the State of California;
- ***State Candidate (SCE):*** animal species that is a State candidate for listing as endangered;
- ***State Candidate (SCT):*** animal species that is a State candidate for listing as threatened;
- ***State Fully Protected (SFP):*** species protected by the California Fish and Game Code which states that the species "...may not be taken or possessed at any time and no provision of this code or any other law shall be construed to authorize the issuance of permits or licenses to take any fully protected" species, although take may be authorized for necessary scientific research;
- ***California Species of Special Concern (SSC):*** potentially jeopardized taxa; the status of these taxa could possibly change to threatened or endangered, or be removed from the list when further data are available;
- ***State Rare (SR):*** a plant species, subspecies, or variety not presently threatened with extinction but found in such small numbers throughout its range that it may be endangered if its environment worsens; and
- ***Bird Species of Conservation Concern (BCC)*** in Bird Conservation Region 32 which includes species that are of concern because of (a) documented or apparent population declines, (b) small or restricted populations, or (c) dependence on restricted or vulnerable habitat. Bird Species of Concern for Bird Conservation Region 32 can be viewed at http://www.dodpif.org/downloads/BCC2008.pdf. These bird species are listed with the intent of avoiding future designations under the ESA. Due to the frequency at which these lists are updated, specific species data is not included in Table 4.7. However, this list should be reviewed against species known to occur on MCAS Miramar (Appendix D).

Rare plants in California are also listed in the California Native Plant Society's (CNPS) *Inventory of Rare and Endangered Plants of California* (CNPS 2010) as follows:

List 1B (CNPS-1B) plants are recognized by the CNPS as plants that are rare, threatened, or endangered in California and elsewhere. They are judged to be vulnerable under present circumstances or to have a high potential for becoming so because of their limited or vulnerable habitat, their low numbers of individuals per population, or their limited number of populations. All List 1B plants meet definitions of Section 1901, Chapter 10 of the California Fish and Game Code and are eligible for state listing. ***List 2*** includes taxa that are considered to be rare, threatened, or endangered in California but are more common elsewhere. ***List 3*** includes taxa that are probably rare or endangered, but there is insufficient data to make a determination. ***List 4*** indicates taxa that are rare but are found in sufficiently large numbers and distributed widely enough that the potential for extinction is low at this time.

These plants have been adopted by the CDFW as constituting the Special Plants List, which was formerly known as the "species of concern" list. The CNPS regularly updates its lists; these updated lists are accessible via the CNPS website, http://www.cnps.org/. The California Natural Diversity Database

[6]Table 4.7, due to its length, is located after Section 4.9, at the end of this Chapter.

(CNDDB) also provides the current listing status of endangered, threatened, and rare plants via the CNDDB website, https://www.wildlife.ca.gov/Data/CNDDB/Plants-and-Animals.

4.8 Cedar Fire

4.8.1 October 26, 2003, Ecosystem Havoc

On October 26, 2003, a wildfire, named the Cedar Fire, swept through MCAS Miramar and much of the region in general. Blown by strong Santa Ana winds, the Cedar Fire burned more than 280,000 acres extending from the Laguna Mountains and Julian in the east to MCAS Miramar at its westernmost point. The fire affected approximately 17,600 acres on the Station.

Most of the area was severely burned, and it left virtually no unburned areas within the general fire area. Below percentages provide examples of the degree of impacts of this wildfire on MCAS Miramar:

- 74.4% of total vernal pool habitat,
- 67.0% of total California gnatcatcher locations,
- 100% of total Hermes copper butterfly locations;
- 97.8% of total willowy monardella populations,
- 100% of total least Bell's vireo locations, and
- 100% of total Del Mar manzanita locations.

2003 Cedar Fire Impacts – Austin Bridge
Natural Resources Division

4.8.2 Ecosystem Recovery Status

Cedar Fire Area, Photograph taken in March 2016 – Austin Bridge Natural Resources Division

Sensitive species' and vegetation monitoring efforts within station boundaries reveal recovery and recolonization of these populations both within previously identified habitats/territories and some expanded areas. Typical native plant and animal populations for this region re-established according to current rainfall regimes. Immediately post-Cedar Fire, record rainfall eroded barren slopes and minimally re-arranged some drainage areas. This affected the locations of some plant populations (seed and plant clumps were washed downstream; larger populations of annual plants occurred; etc.) and competition intensified between recovering plants and opportunistic plant species. These opportunistic species were a combination of native annuals, known as 'fire followers' (*e.g.*, lupines, ceanothus, poppies), and exotic plant species (*e.g.*, grasses, thistles, mustards) able to quickly colonize an open area. In addition, established perennial natives resprouted vigorously (*e.g.*, manzanita, laurel sumac, lemonadeberry). The fauna component of the Station's ecosystems has fluctuated with the availability of the water and vegetation recovery. As areas have developed more layers and density of vegetation, animals have recolonized according to the resources

utilized. Thus far, Station observations have been similar to other post-fire recovery effects reported in other fire ecology literature (*e.g.*, Zouhar (2008), Cobb 2005, Brown and Smith (2000), Hunsaker and Awbrey 1999, Cox and Austin 1990).

However, regional drought conditions have affected plant vitality. Lifecycles of annuals (both native and exotic) have been shortened, while biennials and perennials show reduced growth. In retrospect, it appears drought conditions have had a more negative effect on the Station's plant population fire recovery than the fire itself. Monitoring efforts continue on a scheduled basis documenting vegetation and sensitive species recovery trends.

4.9 Habitat Evaluation Model

A Habitat Evaluation Model (HEM) was developed as a part of the 2000 INRMP (Section 4.8 within MCAS Miramar 2000)[7]. The primary purpose for initial development of the HEM was to identify and rank important biological resource areas within MCAS Miramar.

The HEM was a GIS model that used information collected on MCAS Miramar relative to the distribution of sensitive biological resources, habitats, and habitat linkages/corridors. Components of the HEM include: (1) vernal pool habitat and its associated watersheds, (2) non-vernal pool threatened and endangered species, and (3) a habitat evaluation index.

Vernal pool habitat watersheds were given a value of Very High in the development of the HEM.

Non-vernal pool species included locations of the coastal California gnatcatchers, willowy monardella, Del Mar manzanita, and least Bell's vireo nests. These locations were given a value of Very High in the development of the HEM.

The ***habitat evaluation index*** combined an evaluation of wildlife corridors and rarity of local and regional vegetation types (and associated habitats).

- Wildlife corridors, including connections to regional wildlife corridors and to adjacent open space areas (Ogden 1992, 1996) (Figures 4.5a-c), were assigned high point values in the HEM development.
- Locally rare vegetation types, that compose less than 100 acres, received a high value.
- Regionally rare vegetation types, used rankings adapted from the MSCP, which categorized habitats (*i.e.*, vegetation types) within four tiers for San Diego County. Tier I represents habitats of the highest value, and Tier IV represents those of the lowest value (City of San Diego 1996b).

Each component was developed as a separate GIS layer and then combined to produce a final HEM map that ranked the entire surface area as Very High, High, Moderate, or Low in terms of biological value. The final evaluation was based on the highest value on any one GIS overlay. Figure 4.9 (taken from MCAS Miramar 2000) shows the final map output of the HEM process. The HEM has not been revised as a result of the new 2014 Station vegetation map.

[7]This model has not been 'rerun' since 2000. All changes to update management layers since then due to changes in natural resources mapping have been done manually.

Use of the HEM

The HEM was used to identify high value areas relative to the known distribution of Special Status Species and associated habitats (*e.g.*, vegetation types, vernal pool habitat, wetlands) present at MCAS Miramar. The composite map assisted in delineating Management Areas on the Station (Chapter 5).

Value ratings of the HEM do not directly equate to levels of management or conservation concern at MCAS Miramar. Areas rated similarly (*e.g.*, high value) may not receive similar attention. This is a reflection of the nature of the resource of interest. For example, vernal pool habitat watersheds and California gnatcatcher territories will require different conservation and management measures. Although not the specific subject of this model, Species of Regional Special Concern will be conserved as part of MCAS Miramar's general vegetation and wildlife management program.

Figure 4.9. Habitat Evaluation Model Composite Map

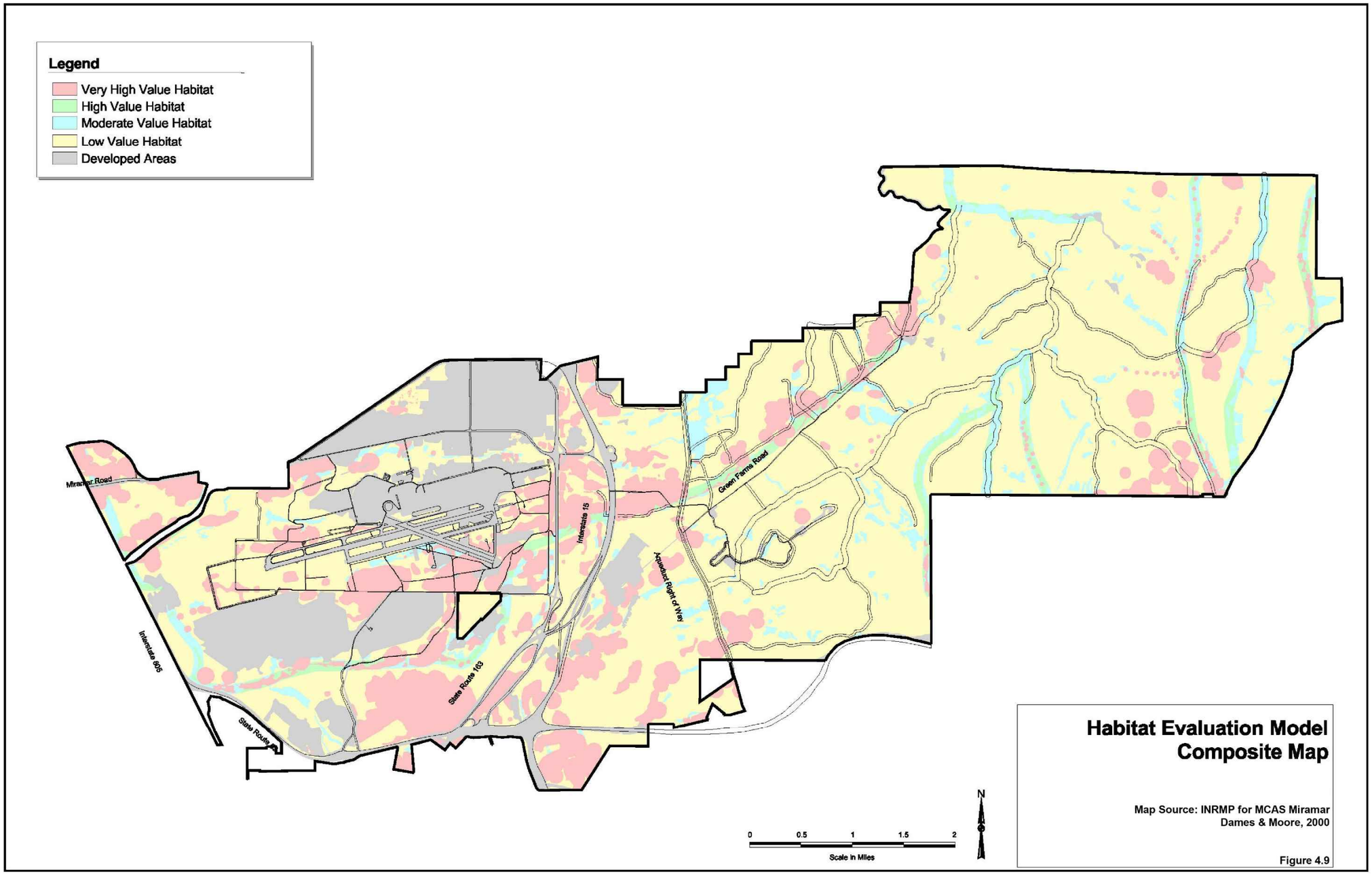

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Table 4.7. Other Species of Regional Concern on MCAS Miramar

No.	Species Name, Status*, Family	Habitat	Rangewide and MCAS Miramar Distribution	Comments
		Plants		
1	Little mousetail (*Myosurus minimus*) Status: S2/List 3 Family: Ranunculaceae	Little mousetail, an annual herb, occurs in vernal pool habitat and flowers from March to June (Munz 1974). It prefers Bosanko clay and Huerhuero loam soils.	Little mousetail is restricted to several vernal pool complexes on mesas north of San Diego and on Otay Mesa. It was observed in 3 of 10 vernal pool habitat management units on MCAS Miramar (Bauder and Wier 1991).	Populations have declined throughout the region due to urban expansion and its limited habitat range.
2	Nuttall's scrub oak (*Quercus dumosa*) Status: S3/List 1B Family: Fagaceae	Nuttall's (coastal) scrub oak is found in chaparral occurring along the coast of California.	This species is found in appropriate habitat along the coast of southern California and has been morphologically identified on western portions of MCAS Miramar (Station Rare and Endangered Plant Surveys).	Nuttall's scrub oak was once considered to be widespread in chaparral throughout cismontane California, but, that species is now called *Q. berberidifolia or Q. acutidens*. The identification of *Q. dumosa* is currently under review and a genetic study is being performed to verify the presence of this species on MCAS Miramar. Development threatens Nuttall's scrub oak (Skinner and Pavlik 1994).
3	Otay mountain ceanothus (*Ceanothus otayensis)* Status: S1/List 1B Family: Rhamnaceae	Otay mountain ceanothus grows in xeric chamise chaparral; the known soil type is mapped as San Miguel-Exchequer rocky silt loam. This shrub may be restricted to metavolcanic and gabbroic peaks (Reiser 1994).	Previous documented populations of Otay mountain ceanothus are primarily on the San Miguel and Otay Mountain areas of southern San Diego County and Baja, Mexico. The plants found on Miramar (2006) and confirmed (2008) are the northern-most known location for this plant.	H.E. McMinn (1942) recognized this entity as intermediate between *C. greggii* var. *perplexans* and *C. crassifolius*, naming it *C.X otayensis*. Since then, others (R.M. Beauchamp and R. Moran [Beauchamp 1986]) recognized its species status since the proposed parent species' are not nearby.
4	San Diego barrel cactus (*Ferocactus viridescens*) Status: S2S3/List 2 Family: Cactaceae	This species of cactus is found in San Diego County and Baja California, Mexico in scrub, chaparral, maritime succulent scrub, and grasslands (including vernal pool grasslands).	The species range extends from San Diego County to Baja California, Mexico. Numerous fragmented localities exist in San Diego County. It has been reported on south-facing slopes on MCAS Miramar (Station Rare and Endangered Plant Surveys).	The San Diego barrel cactus is threatened by urbanization, off-highway vehicle use, and horticultural collecting (Skinner and Pavlik 1994).

No.	Species Name, Status*, Family	Habitat	Rangewide and MCAS Miramar Distribution	Comments
5	Summer holly (*Comarostaphylis diversifolia* ssp. *diversifolia*) Status: S2/List 1B Family: Ericaceae	Summer holly occurs on dry slopes in chaparral habitat. It is found predominantly in low elevation situations, usually along the coast.	The species range extends from San Diego County southward to northern Baja California, Mexico. Summer holly has been documented on western portions of MCAS Miramar (Station Rare and Endangered Plant Surveys).	The species is threatened by development and gravel mining (Skinner and Pavlik 1994).
6	Variegated dudleya (*Dudleya variegata*) Status: S2/List 1B Family: Crassulaceae	Variegated dudleya, a perennial herb, is present in a variety of habitats including scrub, cismontane woodlands, grasslands, and chaparral on dry hillsides and mesas in San Diego County.	Variegated dudleya is known from southern San Diego County into Baja California, Mexico. Populations of variegated dudleya have been documented in eastern Miramar and G Parcel south of State Route 52 (Station Rare and Endangered Plant Surveys).	This species is considered threatened by urbanization and grazing (Skinner and Pavlik 1994).
7	Wart-stemmed ceanothus (*Ceanothus verrucosus*) Status: S2/List 2 Family: Rhamnaceae	The wart-stemmed ceanothus is an evergreen shrub that occurs in chaparral habitat on dry hills and mesas in San Diego County.	This species (along with *Ceanothus tomentosus* var. *olivaceus*) is a common component of the ceanothus chaparral distributed in coastal San Diego County and Baja California, Mexico. Wart-stemmed ceanothus has been observed on western portions of MCAS Miramar (Station Rare and Endangered Plant Surveys).	Wart-stemmed ceanothus flowers from January to April (Munz 1974) and is vulnerable to development, which is its primary threat (Skinner and Pavlik 1994).
8	Long-spined spineflower (*Chorizanthe polygonoides* var. *longispina*) Status: S3/List 1B Family: Polygonaceae	Long-spined spineflower is present in western Riverside and San Diego counties where it grows in dry places in chaparral habitat, close-coned coniferous forest, and scrub, usually below 5,000 feet (Munz 1974).	Populations of long-spined spineflower have been documented in western Miramar and portions of eastern Miramar (Station Rare and Endangered Plant Surveys).	The species is threatened by development and by competition with non-native grasses (Skinner and Pavlik 1994).
9	Palmer's grappling hook (*Harpagonella palmeri*) Status: S3/List 4 Family: Boraginaceae	This plant species may be found on dry slopes and mesas below 1,500 feet in clay soil with chaparral, scrub, and grassland habitats.	This species' distribution extends from Orange, Riverside, and San Diego counties southward and eastward to Baja California and Sonora in Mexico, and Arizona. This species has been documented in eastern Miramar (Station Rare and Endangered Plant Surveys).	Palmer's grappling hook flowers from March through April. It is susceptible to development activities and losses of habitat.
10	San Diego sagewort (*Artemisia palmeri*) Status: S3/List 4 Family: Asteraceae	This plant species prefers sandy soils, along drainages or in mesic chapparal (Reiser, 1994).	Although it is known from no more than 20 locations in California, it reportedly ranges from southwestern San Diego County to Baja California, Mexico. It has been documented in western Miramar (Station Rare and Endangered Plant Surveys).	CNPS previously listed San Diego sagewort as a List 2 plant. This species is impacted by projects that disrupt drainages or involve flood control efforts. (Reiser 1994).

No.	Species Name, Status*, Family	Habitat	Rangewide and MCAS Miramar Distribution	Comments
11	San Diego viguiera (*Bahiopsis [Viguiera] laciniata*) Status: S4/List 4 Family: Asteraceae	This shrub species occurs in chaparral and scrub on dry slopes.	Its range extends from Riverside and San Diego counties into Baja California and Sonora, Mexico. San Diego viguiera has been documented on MCAS Miramar (Station Rare and Endangered Plant Surveys).	San Diego viguiera is threatened by loss of habitat from development.
12	Orcutt's brodiaea (*Brodiaea orcuttii*) Status: S2/List 1B Family: Themidaceae	Orcutt's brodiaea is present in a variety of habitats, including clay soils, close-coned coniferous forest, chaparral, cismontane woodlands, meadows, valleys, grassland, and vernal pool habitat in southern California (Hickman 1993).	This species is known from all 10 vernal pool habitat management units on MCAS Miramar (Bauder and Wier 1991).	This species is threatened by development, road construction, and dumping (Skinner and Pavlik 1994).
13	San Diego goldenstar (*Bloomeria clevelandii*, formerly *Muilla clevelandii*) Status: S2/List 1B Family: Themidaceae	San Diego goldenstar is found in chaparral, scrub, and vernal pool grasslands on mesas in San Diego County.	It is known from San Diego County to Baja California, Mexico. Approximately 112 localities in San Diego County have been documented. It has been documented on MCAS Miramar (Station Rare and Endangered Plant Surveys).	This species is considered sensitive due to loss and degradation of habitat from road construction, urbanization, and off-highway vehicle use (Skinner and Pavlik 1994).
Invertebrates				
14	Monarch butterfly (*Danaus plexippus*) Status: Status under review by USFWS/None Family: Nymphalidae	Milkweed is the host plant for the monarch butterfly. Monarchs lay their eggs on milkweeds and the caterpillars feed on milkweed.	Monarch butterflies can be found throughout the United States, including Hawaii. Monarch butterflies that live west of the Rocky Mountains travel as far south as Baja California. Mexico. Monarch butterflies are known to pass through on MCAS Miramar; however, MCAS Miramar does not winter roost sites. One species of its egg and larval host plant (narrow-leaved milkweed, *Ascelpias fascicularis*) occurs on the Station as a few isolated plants in riparian floodplain areas. This species was not observed during Lepidoptera surveys performed on MCAS Miramar from 1995 through 1998 (Brown and Bash 1999).	This species is threatened by the use of pesticides, habitat loss, and climate change altering the timing of migration and rainfall patterns.

No.	Species Name, Status*, Family	Habitat	Rangewide and MCAS Miramar Distribution	Comments
Amphibians				
15	Western spadefoot toad (*Spea hammondii*) Status: Status under review by USFWS/SSC Family: Scaphiopodidae	The western spadefoot toad prefers grassland habitats in lowlands, foothills, and plains along the Coast Range from northern California to northern Baja California, Mexico.	Once widely distributed in California, this species has suffered significant extirpation from its previous range. This species is known from the Central Valley and adjacent foothills. This species has been documented on the Station in coastal scrub, disturbed areas, riparian forests, southern mixed chaparral, and vernal marsh habitat (Varanus Biological Services, Inc. and San Diego Natural History Museum 2001; CJSeto Support Services LLC 2012a).	The western spadefoot toad emerges from underground retreats following fall, winter, and spring rains and breeds in the temporary ponds that form.
Reptiles				
16	Southwestern pond turtle (*Emys marmorata pallida*) Status: SSC Family: Emydidae (box and water turtles)	This aquatic species occupies ponds, marshes, rivers, streams, and irrigation ditches. They prefer these habitats especially within woodland, grassland, and open forest (Stebbins 1985).	This species ranges from coastal California near the San Francisco Bay area to northern Baja California, Mexico. Indications are 6-8 viable populations of this species are located south of the Santa Clara River system in California. The southwestern pond turtle was reported on Station (Hunsaker and Cox 2000) but was not present/observed during recent surveys (Varanus Biological Services, Inc. and San Diego Natural History Museum 2001), nor has it been verified during 2009 surveys (CJSeto Support Services LLC 2012a).	Losses of habitat, use of insecticides, and development are major threats to this species.
17	San Diego horned lizard (*Phrynosoma blainvillii*) Status: SSC Family: Equanidae	This horned lizard may be present in coastal sage scrub, chaparral, oak, pine woodland and along washes.	The range of this horned lizard includes southern California west of the deserts, south into northern Baja California, Mexico. The San Diego horned lizard has been reported in chaparral, coastal sage scrub, and vernal pool habitat of the central and western portion of the Station (Hunsaker and Cox 1997).	Like other horned lizards, this species can be identified by the large horns that protrude from the back of its head. Steady declines in population numbers are attributed to habitat loss and fragmentation, as well as over-collecting.
18	Coronado Island skink (*Plestiodon skiltonianus interparietalis*) Status: WL Family: Scincidae	The Coronado skink, a subspecies of the western skink is most commonly associated with oak woodlands and coastal sage scrub habitats.	This skink is found from Los Angeles County into northwest Baja California, Mexico, including San Diego County (Stebbins 1985). This subspecies has been reported as common under pieces of wood and other objects in grasslands and open habitats throughout the Station (Hunsaker and Cox 1997; CJSeto Support Services LLC 2012a).	This small, secretive lizard is thought to be declining as a result of habitat loss due to development.

No.	Species Name, Status*, Family	Habitat	Rangewide and MCAS Miramar Distribution	Comments
19	Orangethroat whiptail (*Aspidoscelis hyperythra*) Status: WL Family: Teiidae	The orangethroat whiptail may be present in coastal sage scrub, chaparral, and along the borders of riparian zones and washes.	This whiptail is considered part of the endemic herpetofauna of Baja California that includes the entire length of the peninsular ranges from the Moreno Valley, California to the tip of Baja California, Mexico. This subspecies is common in spring and summer in sandy streambeds, open sycamore woodland, and coastal sage scrub areas of the canyons and mesas of the Station (Hunsaker and Cox 1997, CJSeto Support Services LLC 2012a).	The orangethroat whiptail is still relatively common where suitable habitat occurs (Leatherman unpublished data); however, vast areas of its former habitat have been lost to agriculture and urbanization.
20	Silvery legless lizard *(Anniella pulchra pulchra)* Status: SSC Family: Anniellidae	This species inhabits loose sandy soils that often have habitat containing little cover. Optimal conditions consist of a dry sandy layer overlaying damp soil with free movement between both.	This species is known to occur in the vicinity of Antioch, Contra Costa County, California, south through the Coastal Ranges, Transverse Ranges, and Peninsular Ranges into northwestern Baja California. Observations on MCAS Miramar consists of one individual in Sycamore Canyon (Varanus Biological Services, Inc. and San Diego Natural History Museum 2001). This species was not observed during 2009 surveys (CJSeto Support Services LLC 2012a).	The silvery legless lizard is a species of special concern due to habitat loss, possibly resulting from development, grazing practices and off-road vehicle use. Status evaluation has been difficult due to insufficient and incomparable species data.
21	Coast patch-nosed snake (*Salvadora hexalepis virgultea*) Status: SSC Family: Colubridae	This diurnal species is found in grasslands, chaparral, and desertscrub (Stebbins 1985). It is commonly associated with open grasslands with friable or sandy soils and enough cover to escape predation.	This snake may be found in coastal southern California and northern Baja California, Mexico. Five observations have been reported on MCAS Miramar (Hunsaker and Cox 2000) and (Varanus Biological Services, Inc. and San Diego Natural History Museum 2001). This species was not observed during 2009 surveys (CJSeto Support Services LLC 2012a).	The coast patch-nosed snake is a subspecies of the western patch-nosed snake present in coastal southern California and northern Baja California, Mexico.
22	Two-striped garter snake (*Thamnophis hammondii*) Status: SSC Family: Colubridae	The two-striped garter snake is found along permanent streams, creeks, and vernal pool habitat with protective cover. It may occasionally be present in chaparral or other habitats far from water.	This garter snake is known from coastal California near the Monterey Bay area south through northern Baja California, Mexico. This species has been reported in or near temporary ponds in throughout the Station (Hunsaker and Cox 1997; CJSeto Support Services LLC 2012a).	Urban development has greatly reduced the range of this species in southern California (Stebbins 1985), although it is locally common in creeks throughout San Diego County (Ogden 1996).

No.	Species Name, Status*, Family	Habitat	Rangewide and MCAS Miramar Distribution	Comments
23	Red-diamond rattlesnake (*Crotalus ruber*) Status: SSC Family: Viperidae	This rattlesnake prefers coastal sage scrub and chaparral, and may be found in oak woodland and canyon bottoms and along borders of riparian zones and washes.	Included in the range of this snake is the entire length of the peninsular ranges from the Moreno Valley, California area to the tip of Baja California, Mexico. This species has been commonly observed in brushy, rocky upland areas of central and eastern portions of the Station, and occasionally observed on stony slopes of lower San Clemente Canyon (Hunsaker and Cox 1997; CJSeto Support Services LLC 2012a).	Loss of habitat due to development is a continual threat to this species existence.
Birds				
24	Least bittern (*Ixobrychus exilis*) Status: SSC (nesting) Family: Ardeidae	This species is associated with freshwater marshes dominated by cattails and bulrush in San Diego County.		
25	Northern harrier (*Circus cyaneus*) Status: SSC (nesting) Family: Accipitridae	This species is fairly common in marshes and fields where it may be seen flying close to the ground in search of prey. The northern harrier breeds in marshes and grasslands and forages in grasslands, wetlands, fields, and open coastal sage scrub.	This species is widespread throughout temperate regions of North America and Eurasia. San Diego County is at the southwestern corner of the northern harrier's breeding range. T. Conkle (personal communication) has reported an observation of harriers nesting on the Station in East Miramar along the west side of West Sycamore Canyon.	This raptor is a species of concern because of the decline in nesting pairs in California. This decline is the result of continued loss and degradation of breeding and foraging habitat (Remsen 1978).
26	Peregrine falcon: (*Falco peregrinus anatum*) Status: SFP (nesting) Family: Falconidae	This species prefers open habitat, usually near water, which can be comprised of tundra, marsh, high mountain, more open forest, deserts, and urban settings.	The peregrine falcon breeds south of the tree line in Alaska and Canada, throughout most of the U.S., and from central to southern Mexico. Northern birds winter from Mexico south to southern South America.	
27	White-tailed kite (*Elanus leucurus*) Status: SFP (nesting)	This species forages in open grassland, emergent wetlands, and agricultural areas, often utilizing nearby trees with dense canopies for cover.		
28	Short-eared owl *(Asio flammeus)* Status: SSC (nesting) Family: Strigidae	The short-eared owls inhabits wide-open spaces, such as grasslands, prairie, agricultural fields, salt marshes, estuaries, mountain meadows, and alpine and Arctic tundra.	This species is distributed throughout much of the world. It was observed during reptile and amphibian surveys, but the location of the sighting/sightings was not discussed.	

No.	Species Name, Status*, Family	Habitat	Rangewide and MCAS Miramar Distribution	Comments
29	Long-eared owl *(Asio otus)* Status: SSC (nesting) Family: Strigidae	Long-eared owls inhabit open woodlands, forest edges, riparian strips along rivers, hedgerows, juniper thickets, woodlots, and wooded ravines and gullies.	Long-eared owls are widely distributed in North America, Eurasia, and northern Africa. Five to six pairs are known to nest regularly in Sycamore Canyon (Varanus Biological Services, Inc. and San Diego Natural History Museum 2001).	
30	Western burrowing owl (*Athene cunicularia hypugaea*) Status: SSC (burrowing sites & some wintering sites) Family: Strigidae	This species prefers open, level terrain within grassland or desert scrub vegetation (Johnsgard 1988). Farmland and airfields are among the Owl's preferred locations. Burrowing owls typically nest in holes made by ground squirrels and other burrowing animals.	A resident species in California, the breeding range of the burrowing owl includes southwestern Canada and much of the western U.S. into central Mexico. The species is uncommon and rapidly declining in California. One pair of burrowing owls was observed in San Clemente Canyon west of Kearny Villa Road in April 1994 (Ogden 1996). Several burrowing owls were sited on the Station during deer surveys conducted in fall 1997 (South and East Miramar). This species is a fall/spring migrant and an occasional winter resident. It can occur virtually anywhere on the Station; it is most frequently observed just east of Interstate -15 and on ridgetops of East Miramar (T. Conkle, personal communication). In 2012, one burrowing owl was detected off of fuelbreak road EW-4 in East Miramar, flushed from underneath wooden pallets close to the road (Naval Facilities Engineering Command Southwest 2013).	Continued loss and degradation of habitat have resulted in rapidly declining population numbers in California (Remsen 1978). CDFW believes this species is under imminent threat of extirpation in San Diego County. CDFW suggested survey methods, passive relocation guidelines, and mitigation measures are found in the CDFW 1995 and 2012 *Staff Reports on Burrowing Owl Mitigatio*n and the Burrowing Owl Consortium's *1993 Burrowing Owl Protocol and Mitigation Guidelines*. Effects to burrowing owls will be analyzed during NEPA analyses of proposed actions.

No.	Species Name, Status*, Family	Habitat	Rangewide and MCAS Miramar Distribution	Comments
31	Vaux's swift *(Chaetura vauxi)* Status: SSC (nesting) Family: Trochilidae	This species is often found in coniferous forested regions, but it forages and migrates over open country, rivers, and lakes.	The Vaux's swift breeds from southeastern Alaska, western Canada, northern Idaho, and western Montana, south to central California. It winters in southern portions of its breeding range, central New Mexico, southern Louisiana, and western Florida. It occurs on MCAS Miramar only as a migrant (Varanus Biological Services, Inc. and San Diego Natural History Museum 2001).	Habitat on Station is unsuitable, with exception of this species possibly utilizing buildings for roosting sites (Varanus Biological Services, Inc. and San Diego Natural History Museum 2001).
32	Black swift *(Cypseloides niger)* Status: SSC (nesting) Family: Trochilidae	The black swift is found in areas with rocky cliffs available for nesting, varying from ocean cliffs to mountain ledges, at elevations from sea level to 11,000 feet.	Breeding occurs from southeastern Alaska and western Canada, south to southern California, northwestern Montana, Colorado, Utah, northern New Mexico, and southeastern Arizona. It winters in Mexico and Costa Rica. This species was observed during reptile and amphibian surveys, but the location of the siting/sitings was not identified.	
33	Olive-sided flycatcher *(Contopus cooperi)* Status: SSC (nesting) Family: Tyrannidae	It inhabits montane and northern coniferous forests up to 10,000 feet. It prefers tall spruces, firs, balsams, and pines; groves of eucalyptus and Monterey cypress; taiga; subalpine coniferous forests; mixed woodlands near edges and clearings; and wooded streams and borders of northern bogs and muskegs.	It is distributed from Alaska to Canada south to southern California across to Texas and east of the Rocky Mountains to North Carolina. It winters in southern California and South America. This species was observed as a migrant in 1994 (Hunsaker and Cox 2000), during the Reptile and Amphibian Survey (Varanus Biological Services, Inc. and San Diego Natural History Museum 2001), and during the 2003 Long-Term Ecosystem Survey (Vararanus Biological Services, Inc. and San Diego Natural History Museum 2003).	One individual was observed during the 2000 survey. No details were provided in the 2001 or 2003 reports for numbers of individuals observed or distribution.
34	Willow flycatcher *(Empidonax traillii)* Status: SE (nesting)	The willow flycatcher is found in willow thickets and other brushy areas near streams, marshes, or other wetlands and in clear-cuts and other open areas with nearby trees or brush.	This species breeds from southern British Columbia, Alberta, North Dakota, New York, and Maine south to central California, Nevada, Southwest, Arkansas, and Virginia. It winters in the tropics. Flycatchers (unknown species) were observed on Station in 1993 (Hunsaker and Cox 2000), and willow flycatchers were observed on Station during the Reptile and Amphibian Survey (Varanus Biological Services, Inc. and San Diego Natural History Museum 2001). Willow flycatchers were not observed during surveys in 2014 or 2017 (San Diego Natural History Museum 2014 and 2017).	Willow flycathchers *(Empidonax traillii)* have been identified on Station, but the southwestern willow flycatcher *(Empidonax traillii extimus)* subspecies has not been found nesting on MCAS Miramar.

No.	Species Name, Status*, Family	Habitat	Rangewide and MCAS Miramar Distribution	Comments
35	Loggerhead shrike (*Lanius ludovicianus*) Status: SSC (nesting) Family: Laniidae	Loggerhead shrikes occupy a variety of habitats but are most common wherever bushes or trees are scattered on open ground.	The loggerhead shrike has a large distribution that includes much of the western portion of the U.S. Substantial declines in the eastern portion of its range have been observed. This species is known to breed from numerous locations on the Station.	
36	Coastal cactus wren (San Diego) (*Campylorhynchus brunneicapillus sandiegensis*) Status: SSC Family: Troglodytidae	San Diego (coastal) cactus wrens may be present in coastal sage scrub, chaparral, and grassland habitats.	This cactus wren is known from coastal areas in southern California. Vagrants may rarely occur on the Station; there is one record in the vicinity of the Station. One pair was a permanent resident in native grassland in the central portion of the Station. This subspecies is no longer known to breed on the Station (Hunsaker and Cox 1997).	One cactus wren was observed during 1999 (Varanus Biological Services, Inc. and San Diego Society of Natural History 2001). In 2013, one singing male near a partially built nest was observed in early spring near Sycamore Canyon by C. Black, Natural Resources Staff biologist. Nesting at this site did not subsequently occur.
37	Yellow warbler *(Setophaga [Dendroica] petechia brewsteri)* Status: SSC (nesting) Family: Parulidae	The yellow warbler prefers moist habitats, such as willow- and alder-lined streams and ponds, brushy bogs, and the edges of marshes, swamps, or creeks. It also utilizes dry sites, such as hedgerows, roadside thickets, orchards, farmlands, and forest edges.	This species is distributed from northwestern and north-central Alaska and northern Yukon to northern Ontario, central Quebec, and southern Labrador south to Mexico. This species was sighted four times in May 1999. These sightings may have consisted only of migrants due to the sighting occurring during the normal migration period (Varanus Biological Services, Inc. and San Diego Society of Natural History 2001).	
38	Yellow-breasted chat (*Icteria virens*) Status: SSC (nesting) Family: Parulidae	This species inhabits ravine or streamside thickets of vines, briars, small trees, tall shrubs, forest edges, hedgerows, overgrown pastures, scrub country, and early successional stages of forest regeneration.	The yellow-breasted chat ranges from southern British Columbia, North Dakota, southern Minnesota, southern Ontario, Vermont, and New Hampshire south through Central America and western Panama. This species is a summer resident in low numbers and localized populations (Varanus Biological Services, Inc. and San Diego Society of Natural History 2001).	

No.	Species Name, Status*, Family	Habitat	Rangewide and MCAS Miramar Distribution	Comments
39	Summer tanager (*Piranga rubra*) Status: SSC (nesting) Family: Thraupidae	It generally inhabits dry, open woodlands of oaks, pines, hickories, and willow, cottonwood, and streamside vegetation in canyons.	The species ranges from southeastern California and southern Nevada to central Oklahoma, and from southeastern Nebraska to New Jersey south to Mexico to Bolivia. This species was observed during the 2001 Reptile and Amphibian Survey (Varanus Biological Services, Inc. and San Diego Society of Natural History 2001). A description of numbers or distribution was not provided.	
40	Tricolored blackbird (*Agelaius tricolor*) Status: Status under review by USFWS/SCE Family: Icteridae	The tricolored blackbird nests in large colonies in marshes and pond edges, edges of fields, and in cattails throughout western California.	The tricolored blackbird ranges from the Central Valley of California, west of the Sierra Nevada Mountains. It is a common but localized resident in San Diego County. San Diego State University biologists have reported this species from Harris Pond, south of MCAS Miramar Way between Kearny Villa Road and the Main Station gate; near the horse stables north of Miramar Way; and in Sycamore Canyon near Santee Lakes (Ogden 1996). They are colonial nesters and are not known to breed at MCAS Miramar (T. Conkle, personal communication). Although they are not known to breed on MCAS Miramar, individuals have been documented using wetland habitats during the non-breeding season.	
Mammals				
41	Pocketed free-tailed bat (*Nyctinomops femorosaccus*) Status: SSC Family: Molossidae	Pocketed free-tailed bats inhabit pinon-juniper woodlands, desert scrub, mixed cacti, riparian woodland, and palm oasis. They are most often found in rocky areas with high cliffs, crevices, or rock outcrops (Hunsaker 1997). Artificial structures are also used for day and night roosts.	This species is known from southern California, Arizona, and New Mexico and south into northern and western Mexico (Nowak 1991). It is also thought to be widely distributed in the Trans-Pecos region of Texas. It is considered rare in California. This species has been observed foraging at several locations at MCAS Miramar but has not been observed roosting (D. Stokes, personal communication).	This species is not considered migratory; however, some populations seasonally migrate locally; some migrate short distances into Mexico; and others over-winter in their summer use areas (Hunsaker 1997, Nowak 1991).
42	San Diego black-tailed jackrabbit (*Lepus californicus bennettii*) Status: SSC Family: Leporidae (rabbits and hares)	The San Diego black-tailed jackrabbit prefers open grasslands or open shrublands, usually adjacent to sage scrub or chaparral habitats where it may find cover.	This coastal southern California subspecies occurs from southern Santa Barbara County to Baja California, Mexico. It is relatively common in open areas of San Diego County. It is common in suitable habitats on MCAS Miramar	Areas that are unsuitable for the San Diego black-tailed jackrabbit include densely vegetated areas that are overgrown with thick ground cover.

No.	Species Name, Status*, Family	Habitat	Rangewide and MCAS Miramar Distribution	Comments
43	Dulzura California pocket mouse (*Chaetodipus californicus femoralis*) Status: SSC Family: Heteromyidae	The Dulzura California pocket mouse occurs in coastal sage scrub, chaparral, oak woodland, and montane hardwood habitats. It is known from sea level to 7,900 feet.	This pocket mouse's range extends from the coastal slope and mountains of northern San Diego County southward into the mountains of Baja California, Mexico. This subspecies was reported as being observed at MCAS Miramar by Kellogg (1994). This subspecies has been observed at MCAS Miramar during the 2000 and 2009 Vertebrate Surveys.	The type specimen was described from the vicinity of Dulzura, San Diego County in 1891. The range of this taxon overlaps with that of the northwestern San Diego pocket mouse (see below); however, the Dulzura pocket mouse is larger and heavier.
44	Northwestern San Diego pocket mouse (*Chaetodipus fallax fallax)* Status: SSC Family: Heteromyidae	This pocket mouse is associated with open, arid habitats, including coastal sage scrub, annual grassland, and desert habitat.	This subspecies occurs on the coastal slope of southern California from southwest San Bernadino, western Riverside, eastern Los Angeles, and San Diego counties to northern Baja California, Mexico. It was detected in the eastern portion of MCAS Miramar, adjacent to I-15, and is expected to be present in suitable habitat throughout the Station (Hunsaker and Cox 2000). This species was detected during the 2009 Vertebrate Survey.	Population information is lacking for the northwestern San Diego pocket mouse.
45	Southern grasshopper mouse (*Onychomys torridus ramona*) Status: SSC Family: Muridae	The southern grasshopper mouse occurs in arid, open country with sandy or gravely soil; it is associated with grasslands, open sagebrush and chaparral.	This subspecies ranges from northern Los Angeles County along the coastal slope to extreme northwest Baja California, Mexico. This species was detected on MCAS Miramar during the 2000 Vertebrate Survey (Hunsaker and Cox 2000), but not during the 2009 Vertebrate Survey.	This large mouse is mainly carnivorous, eating insects, scorpions, lizards, and other mice, as well as some seeds (Burt and Grossenheider 1976). It lives in burrows of other rodents, including probably Botta's pocket gopher and California ground squirrel.
46	San Diego desert woodrat (*Neotoma lepida intermedia*) Status: SSC Family: Muridae	The San Diego desert woodrat favors xeric and coastal habitats. Preference is given to chaparral and coastal sage scrub, especially in rock outcrops.	This subspecies is restricted to the coastal slope of southern California. It inhabits arid portions of coastal California, mostly on south-facing slopes. Known locations include east of I-15 in the northern portion of the Station, it is expected to be present in suitable habitat throughout MCAS Miramar (Hunsaker and Cox 2000). This species was observed during the 2009 Vertebrate Survey.	A subspecies of the desert woodrat, the San Diego desert woodrat must be trapped to distinguish it from the sympatric dusky-footed woodrat (*Neotoma fuscipes*). Population data for this species is lacking.

* Federal Status Code (if applicable)/State Status (or Plant Ranking) Code/California Native Plant Code

Species Status Codes

FC = Federal candidate for listing
SE = State endangered
SCE = State candidate for listing as endangered
SSC = California species of special concern
WL = California watch list

California State Plant Ranking List

S1 = **Critically imperiled** in the state because of extreme rarity (often 5 or fewer populations) or because of factor(s) such as very steep declines making it especially vulnerable to extirpation from the state.
S2 = **Imperiled** in the state because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the state.
S3 = **Vulnerable** in the state due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation from the state.
S4 = **Apparently Secure**, uncommon but not rare in the state; some cause for long-term concern due to declines or other factors.
S5 = **Secure**, common, widespread, and abundant in the state.

California Native Plant Society Ranking List

List 1B = Rare, threatened, or endangered and eligible for listing under the California Endangered Species Act
List 2 = Rare, threatened, or endangered in California, common elsewhere
List 3 = Taxa about which more information is needed
List 4 = Rare, but low potential for extinction