
III. HABITAT AND SPECIES DESCRIPTIONS

Descriptions of existing biological conditions within HCWA are provided in this chapter. These descriptions are based on the results of multiple field surveys, including the following:

- General biological resources surveys conducted for the Conceptual Area Protection Plan and Grant Proposal for Hollenbeck Canyon (CDFG 1999); original acquisition area only.
- General wildlife surveys conducted by the South Coast Region of the Department during 2001-2002 (CDFG 2002d).
- Rare plant surveys conducted by the South Coast Region of the Department during 2004 (GIS data provided by CDFG).
- Baseline biological resources inventory for HCWA including ant, herptofauna, and small mammal pitfall trapping and bird point count surveys (USGS 2004a).
- Focused surveys for Quino checkerspot butterfly (*Euphydryas editha quino*) for Honey Springs Ranch (Mooney and Associates 2003).
- Focused surveys for Quino checkerspot butterfly and Hermes copper butterfly during 2005 by Marschalek (GIS data provided by CDFG).
- Bat surveys conducted by USGS during 2002-2004 as part of the bat inventory study for the San Diego County MSCP (USGS 2005a).
- Raptor monitoring surveys conducted during 2002 as part of the NCCP Raptor Monitoring Project associated with the MSCP (Wildlife Research Institute 2004).
- Detailed vegetation mapping (entire HCWA) and rare plant surveys (focus on Honey Springs Ranch) conducted by EDAW biologists during 2005 (EDAW 2005).
- General wildlife surveys (focus on Honey Springs Ranch) conducted by EDAW biologists during 2005.

Nomenclature for taxonomic and common species names for wildlife follows that Hickman (1993); Grenfell et al. (2003); Glassberg (2001); Sibley (2000); Stebbins (1985); and Whitaker (1998).

The following section summarizes the vegetation communities and the plant and animal species within HCWA and presents an overview of ecological conditions and requirements that are relevant to site management. This information is organized in the following manner: subsections A and B consist of a general description of the plant communities and wildlife in HCWA, including a discussion of representative non-sensitive species and their associated habitats; subsection C reviews the listed and other special status species known to occur or with the potential to occur within the property; subsection D discusses the non-native plant and animal species on the wildlife area; subsection E discusses wildlife-linked diseases and subsection F reviews regional habitat linkages and wildlife movement corridors.

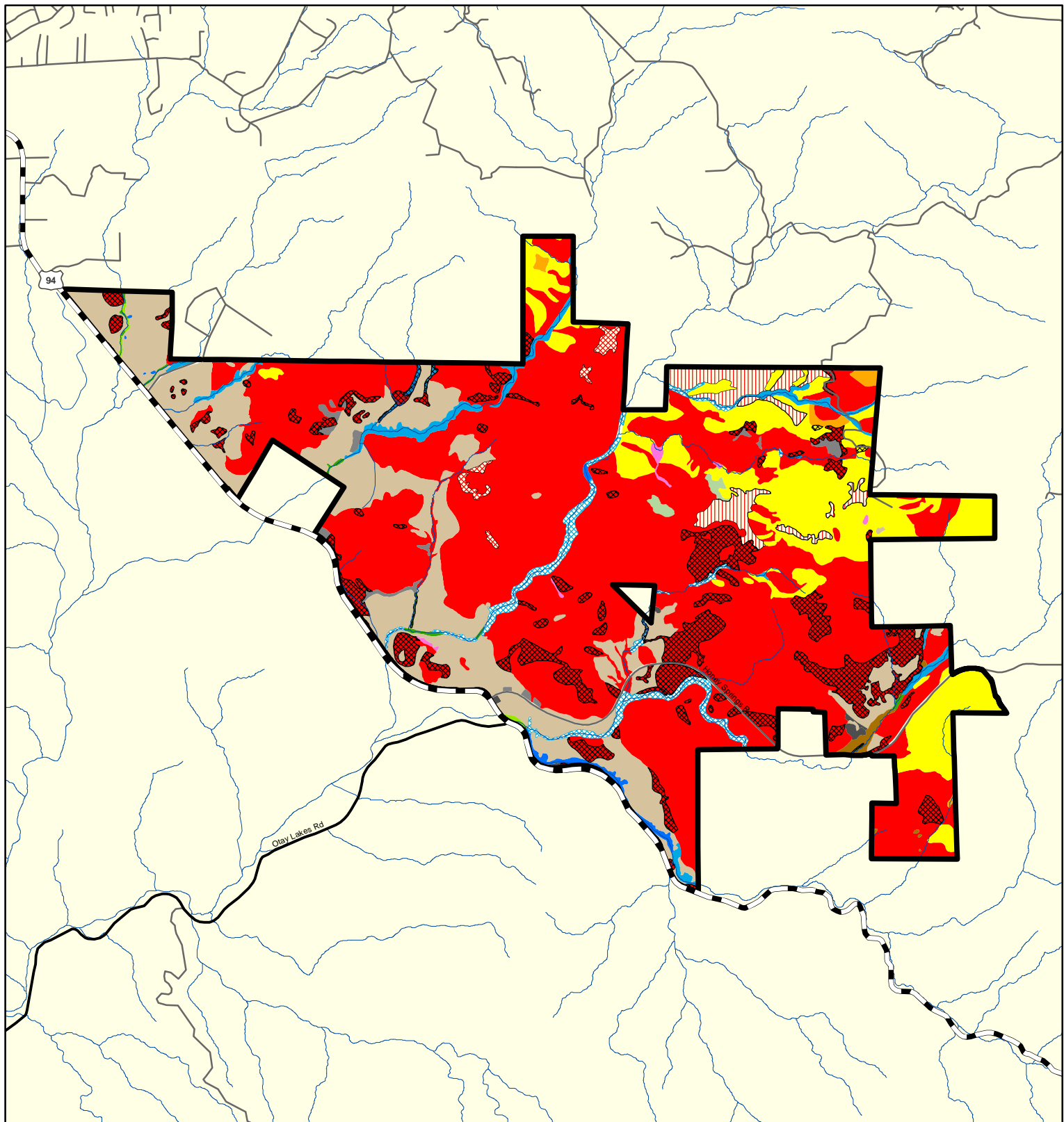
A. VEGETATION COMMUNITIES AND FLORA

1. Vegetation Communities

Vegetation types are assemblages of plants that coexist in space and time. Vegetation was mapped in the field by EDAW biologists on color aerial photographs with topography at a scale of 1"=400' (see Appendix B for survey dates and personnel). Vegetation classification was based on Dr. John O'Leary's *Mapping Rules for Vegetation and Land Cover Types for Marine Corps Air Station Miramar* (2001). These mapping rules were also employed by Dr. O'Leary and his graduate students for RJER (O'Leary 2002).

Twenty-three vegetation types and one land cover type (i.e., an area that does not support vegetation) were mapped for HCWA (Figure 12). Acreages for all vegetation and other land cover types are summarized in Table 9. As summarized in Table 9, HCWA is dominated by various types of scrublands and grasslands, which account for approximately 77 percent and 17 percent of the total cover within the wildlife area, respectively.

Below are descriptions of the vegetation types found on HCWA; the numerical code used by O'Leary is also noted. With several exceptions, the descriptions are based upon O'Leary's *Vegetation and Land Cover Mapping at Rancho Jamul Ecological Reserve, San Diego, California* (O'Leary 2002). Three vegetation types, southern mixed chaparral, coastal sage scrub-chaparral, and native grassland, occur on HCWA, but were not mapped by O'Leary on RJER. However, these three vegetation types have been described by O'Leary for other portions of the county (2001). O'Leary's *Mapping Rules for Vegetation and Land Cover Types on Marine Corps Air Station Miramar* (2001) was used to describe these additional three vegetation types. The vegetation type descriptions between these two O'Leary documents are identical. In addition, there are five vegetation types that occur on HCWA that could not be adequately described by either O'Leary's document for RJER or Marine Corps Air Station



Legend

- Diegan Coastal Sage Scrub
- Diegan Coastal Sage Scrub/Chamise Chaparral Ecotone
- Diegan Coastal Sage Scrub w/Clay Lenses
- Chamise Chaparral
- Southern Mixed Chaparral
- Native Grassland
- Non-Native Grassland
- Coast Live Oak Woodland
- Mulefat Scrub
- Southern Willow Scrub
- Riparian Woodland (Sycamore Woodland)
- Sycamore-Oak Riparian Forest
- Southern Coast Live Oak Riparian Forest
- Eucalyptus Woodland
- Disturbed Habitat
- Developed
- Disturbed Overlay

Basemap Legend

- HCWA Boundary
- State Highway
- Road
- Stream



Feet

0 4,000

Table 9
Vegetation Types and Acreages within the Hollenbeck Canyon Wildlife Area

Vegetation Type (Numerical Code #)*	Acreage	Percent of Wildlife area
Diegan coastal sage scrub (30)	2,763.0	
Disturbed Diegan coastal sage scrub (31)	431.5	
Diegan coastal sage scrub-clay lens (not in O'Leary)	23.1	
Chamise chaparral (50)	635.3	
Disturbed chamise chaparral (not in O'Leary)	2.1	
Scrub oak chaparral (54)	1.1	
Southern mixed chaparral (56)	19.6	
Coastal sage scrub-chaparral (72)	127.6	
<i>Subtotal Scrublands =</i>	<i>4,003.3</i>	<i>77.1</i>
Non-native grassland (80)	872.9	
Native grassland (82)	11.5	
Non-native/native grassland (84)	0.9	
<i>Subtotal Grasslands =</i>	<i>885.3</i>	<i>17.0</i>
Southern coast live oak riparian forest (110)	88.1	
Disturbed southern coast live oak riparian forest (111)	6.1	
Southern arroyo-willow riparian forest (112)	1.4	
Riparian woodland (sycamore woodland) (120)	23.3	
Sycamore-oak riparian forest (not in O'Leary)	97.9	
Disturbed sycamore-oak riparian forest (not in O'Leary)	1.2	
Southern willow scrub (130)	6.2	
Mulefat scrub (132)	10.4	
Disturbed mulefat scrub (133)	1.6	
<i>Subtotal Riparian Habitats =</i>	<i>236.2</i>	<i>4.6</i>
Coast live oak woodland (150)	9.0	
Eucalyptus woodland (not in O'Leary)	15.1	
<i>Subtotal Upland Woodland Habitats =</i>	<i>24.1</i>	<i>0.5</i>
Disturbed habitat (240)	30.9	
<i>Subtotal Disturbed Habitat =</i>	<i>30.9</i>	<i>0.6</i>
Developed (250)	9.2	
<i>Subtotal Developed =</i>	<i>9.2</i>	<i>0.2</i>
Totals	5,189.0	100.00

* Numerical code used by O'Leary (2001, 2002)

Miramar: Diegan coastal sage scrub with clay lenses, disturbed chamise chaparral, sycamore-oak riparian forest, disturbed sycamore-oak riparian forest, and eucalyptus woodland. These vegetation types were described for HCWA based upon the dominant species and the type physiognomy.

Diegan Coastal Sage Scrub (30)

Areas mapped as Diegan coastal sage scrub have greater than 50 percent ground cover of low, drought-deciduous, malacophyllous subshrubs (which contribute greater than 60 percent of the relative cover). California sagebrush (*Artemisia californica*), flat-topped buckwheat (*Eriogonum fasciculatum*), and San Diego viguiera (*Viguiera lacinata*) are the primary co-dominants within this vegetation type on HCWA. Wishbone plant (*Mirabilis laevis*) is a common shrub component, while laurel sumac (*Malosma laurina*) and yellow bush penstemon (*Keckiella antirrhinoides* ssp. *antirrhinoides*) are relatively uncommon throughout the wildlife area overall, although locally common in some areas. Common early season native annuals and herbaceous perennials include goldfields (*Lasthenia californica*), miniature lupine (*Lupinus bicolor*), blue dicks (*Dichelostemma capitatum*), popcorn flower (*Plagiobothrys* sp.), and cryptantha (*Cryptantha* sp.). This vegetation type lacks significant cover of bare ground and/or non-native herbs. Diegan coastal sage scrub occurs on most of the hillsides and slopes of HCWA. This is the most common vegetation type within HCWA occurring on approximately 2,763.0 acres.

Disturbed Diegan Coastal Sage Scrub (31)

Areas mapped as disturbed Diegan coastal sage scrub have from 20 to 50 percent ground cover of low, drought-deciduous, malacophyllous subshrubs (which contribute greater than 60 percent of the relative cover). Similar to the undisturbed sage scrub, California sagebrush, flat-topped buckwheat, and San Diego viguiera are the primary co-dominants within this vegetation type on HCWA. Wishbone plant, laurel sumac, and yellow bush penstemon are relatively uncommon throughout the wildlife area, although these species can be locally common in some areas. Common early season native annuals and herbaceous perennials, e.g., goldfields, miniature lupine, blue dicks, popcorn flower, and cryptantha, are still all present, however in much lower numbers. Indication of disturbance is present in the form of significant percentage cover of bare ground and/or non-native and native herbs, such as wild oats (*Avena* spp.), foxtail chess (*Bromus madritensis* ssp. *rubens*), mustard (*Hirschfeldia incana*), goldentop (*Lamarkia aurea*), fascicled tarweed (*Deinandra fasciculata*), and filaree (*Erodium* spp.). This vegetation type is scattered throughout HCWA occurring in areas that may have previously been grazed and/or burned, and

as such have lower cover values. This is the fourth most common vegetation type within HCWA, occupying approximately 431.5 acres.

Diegan Coastal Sage Scrub with Clay Lenses

This vegetation type is not recognized by O'Leary (2001, 2002). This vegetation type occurs on clay soils or inclusions. Shrub cover is relatively low compared to adjacent non-clay soils as it is thought that the shrinking/swelling capacity of clay soils damages the root systems of perennial woody species, hence limiting their occurrence on these types of soils. However, where this vegetation community was mapped, the lower shrub cover generally allows for a much higher cover and diversity of native forbs and grasses. Because of the inherent lower shrub cover, these areas would be classified as disturbed Diegan coastal sage scrub under O'Leary's classifications, even in the absence of physical disturbance. Because the lower shrub cover is due to the clay lenses, and not a physical disturbance, these areas were classified separately from O'Leary's other sage scrub vegetation types. Shrub species present are identical to those mentioned previously for the Diegan coastal sage scrub and disturbed Diegan coastal sage scrub vegetation types. The native forbs and grasses that were observed in these clay lens areas include San Diego golden star (*Muilla clevelandii*), red skin onion (*Allium haematochiton*), mock parsley (*Apiastrum angustifolium*), and both purple and foothill needlegrass (*Nassella pulchra* and *N. lepida*). Approximately 23.1 acres of this vegetation type are scattered through the north-central portion of HCWA.

Chamise Chaparral (50)

Areas mapped as chamise chaparral have greater than 70 percent ground cover attributable to evergreen sclerophyllous shrubs and drought-deciduous malacophyllous subshrubs (evergreen sclerophyllous shrubs constitute greater than 60 percent of the relative cover) with chamise (*Adenostoma fasciculatum*) contributing greater than 50 percent of the cover. Other species within this vegetation type include laurel sumac, mission manzanita (*Xylococcus bicolor*), California sagebrush, and flat-topped buckwheat. This vegetation type lacks significant cover of disturbance-specialist species or bare ground. This vegetation type is scattered within the northern and eastern portions of HCWA, typically occurring at the higher elevations. This is the third most common vegetation type within HCWA occurring on approximately 635.3 acres.

Disturbed Chamise Chaparral

This vegetation type is not recognized by O’Leary (2001, 2002). However, areas supporting less than 70 percent ground cover attributable to evergreen sclerophyllous shrubs and drought-deciduous malacophyllous subshrubs, dominated by chamise, do not accurately fit into other categories of O’Leary. As such these areas were classified as disturbed chamise chaparral. Prior mechanical disturbance is evident and these areas are recovering but still have relatively lower cover values. Very small areas of this vegetation type, totaling approximately 2.1 acres, occur in the northeastern portion of HCWA.

Scrub Oak Chaparral (54)

Areas mapped as scrub oak chaparral have greater than 70 percent ground cover attributable to evergreen sclerophyllous shrub species and drought-deciduous malacophyllous subshrubs (evergreen sclerophyllous shrubs constitute greater than 60 percent of the relative cover) with scrub oak (*Quercus berberidifolia*) contributing greater than 50 percent of the cover. A small area of this vegetation type (approximately 1.1 acres) occurs in the southeast corner of HCWA.

Southern Mixed Chaparral (56)

Areas mapped as southern mixed chaparral have greater than 70 percent cover attributable to evergreen sclerophyllous shrubs and drought-deciduous malacophyllous subshrubs (evergreen sclerophyllous shrubs constitute greater than 60 percent relative cover) with no single species contributing greater than 50 percent cover. Chamise, flat-topped buckwheat, yellow bush penstemon, laurel sumac, California sagebrush, mission manzanita, monkeyflower (*Mimulus aurantiacus*), and scrub oak are all well represented in this vegetation type. Though this vegetation type was not recognized on RJER, the description for southern mixed chaparral was taken from O’Leary’s *Mapping Rules for Vegetation and Land Cover Types on Marine Corps Air Station Miramar* (2001). Approximately 19.9 acres of this vegetation type occur within the far northern portion of HCWA.

Coastal Sage Scrub-Chaparral (72)

Areas mapped as coastal sage scrub-chaparral ecotone have greater than 70 percent ground cover attributable to evergreen sclerophyllous chaparral species and drought-deciduous malacophyllous sage scrub species (40 percent relative cover \leq coastal sage scrub species or chaparral species \leq 60 percent relative cover; where both types are intermixed). Chamise, California sagebrush,

mission manzanita, flat-topped buckwheat, and San Diego viguiera are the dominant shrub species present. This vegetation type is restricted to the northeastern portion of HCWA and totals approximately 127.6 acres.

Non-Native Grassland (80)

Areas mapped as non-native grassland have greater than 40 percent cover of grasses and forbs, with greater than two-thirds cover attributable to non-native annual grasses. Foxtail chess, wild oats, and ripgut grass (*Bromus diandrus*) are the dominant non-native grass species although purple needlegrass is sometimes present in very low numbers. Native/non-native annual forbs such as filaree, California burclover (*Medicago sativa*), wild radish (*Raphanus sativus*), and mustard may be intermixed. Some of the non-native grasslands, particularly in the west-central portion of the wildlife area, were obviously former pastures and agricultural areas. One of these areas is periodically seeded with cereal wheat (*Triticum aestivum*) and safflower (*Carthamnus tinctorius*) by the Department to encourage use by mourning doves (*Zenaida macroura*) for hunting. Non-native grassland is the second most common vegetation type within HCWA occurring on approximately 872.9 acres within the property. This vegetation type occurs at the lowest elevations within HCWA, predominantly along the western boundary adjacent to SR 94.

Native Grassland (82)

Areas mapped as native grassland have greater than 40 percent cover of grasses and forbs of which greater than two-thirds cover is attributable to needlegrass species, including foothill stipa (*Nassella lepida*) and purple needlegrass. Native and introduced annual herbs may be intermixed including goldfields, California poppy (*Eschscholzia californica*), and purple owl's clover (*Castilleja exserta* ssp. *exserta*). Approximately 11.5 acres of this vegetation type occur within the northeastern portion (Honey Springs Ranch) of HCWA.

Non-Native/Native Grassland (84)

Areas mapped as non-native/native grassland have greater than 40 percent ground cover of grasses and forbs, with greater than two-thirds relative overall ground cover attributable to native and non-native grasses. These areas exhibit no evidence of recent mechanical disturbance. Wild oats, foxtail chess, and purple needlegrass are the common grasses, with filaree the most common non-native forb. This vegetation type is scarce within HCWA. Approximately 0.9 acre of this vegetation type occurs along the western boundary of HCWA.

Southern Coast Live Oak Riparian Forest (110)

Areas mapped as southern coast live oak riparian forest have greater than 40 percent cover by the coast live oak (*Quercus agrifolia*). Other minor tree species in the overstory include western sycamore (*Platanus racemosa*) and Engelmann oak (*Quercus engelmannii*). Understory species include poison oak (*Toxicodendron diversilobum*), mulefat (*Baccharis salicifolia*), California mugwort (*Artemisia douglasiana*), and bull thistle (*Cirsium vulgare*). This vegetation type occurs along several of the drainages within HCWA including Jamul and Dulzura creeks, and several unnamed creeks including a tributary to the streamchannel that flows within Hollenbeck Canyon. Approximately 88.1 acres of this vegetation type occur along the drainages within HCWA.

Disturbed Southern Coast Live Oak Riparian Forest (111)

Areas mapped as disturbed southern coast live oak riparian forest have from 20 to 40 percent cover of coast live oak with a discontinuous understory of sage scrub shrub species and non-native grass species. This vegetation type is characterized by widely spaced coast live oaks along drainages that flow through old pastures. Portions of these drainages have some evidence of past mechanical disturbance, associated with grazing activities, and portions of this vegetation type contain a high cover of non-native species in the understory. Approximately 6.1 acres of this vegetation type occur along two of the unnamed tributaries to Jamul Creek along the northern boundary of HCWA.

Southern Arroyo-Willow Riparian Forest (112)

Areas mapped as southern arroyo willow riparian forest have greater than 60 percent cover of arroyo willow that average greater than 20 feet in height. Approximately 1.4 acres of this vegetation type occur along the streamchannel in upper Hollenbeck Canyon within the wildlife area.

Riparian Woodland (Sycamore Woodland) (120)

Areas mapped as sycamore woodland are characterized by a tall, open, broadleaved, winter-deciduous streamside woodland dominated by western sycamore, with an overstory cover greater than 25 percent. Coast live oak, poison oak, and California mugwort are the most common associates. Approximately 23.3 acres of this vegetation type occur within HCWA.

Sycamore-Oak Riparian Forest

This vegetation type is a modification of O’Leary’s (2001, 2002) riparian woodland (i.e., sycamore woodland). Areas mapped as sycamore-oak riparian woodland consist of riparian areas where both western sycamore and coast live oak were equally co-dominant. Understory species are typical of those described above for the southern coast live oak riparian forest. This vegetation type is dominant along Hollenbeck Canyon and the unnamed tributary that parallels Honey Springs Road and is sporadic along an unnamed tributary north of Honey Springs Road. Approximately 97.9 acres of this vegetation type occur within HCWA.

Disturbed Sycamore-Oak Riparian Forest

This vegetation type is a modification of O’Leary’s (2001, 2002) disturbed riparian woodland (i.e., sycamore woodland), which does not occur on HCWA. Areas mapped as disturbed sycamore-oak riparian woodland consist of riparian areas where both western sycamore and coast live oak were equally co-dominant but, due to evidence of past mechanical disturbance, the overstory tree cover is low, ranging from 15 to 25 percent. This vegetation type is restricted to an unnamed tributary just south of the private inholding. Approximately 1.2 acres of this vegetation type occur within HCWA.

Southern Willow Scrub (130)

Areas mapped as southern willow scrub have greater than 60 percent cover of broadleaved, winter-deciduous riparian thickets dominated by arroyo willow (*Salix lasiolepis*) that average less than 20 feet in height. This vegetation type is restricted to small areas along Dulzura Creek and an unnamed tributary to Jamul Creek. Approximately 6.2 acres of this vegetation type occur within HCWA.

Mulefat Scrub (132)

Areas mapped as mulefat scrub have greater than 50 percent cover of riparian scrub habitat strongly dominated by mulefat. This early seral vegetation type is maintained by frequent flooding and occurs on intermittent stream channels with fairly coarse substrate and moderate depth to water table. This vegetation type is common along the intermittent streams on HCWA, usually in association with the riparian woodland or coast live oak riparian forest communities. Mulefat scrub occurs between the patches of woodlands and forests along these streams and as an understory component within these patches. This vegetation type is scattered along several

drainages within HCWA, including Jamul Creek and some of its unnamed tributaries, the streamchannel that flows through Hollenbeck Canyon and some of its unnamed tributaries, Dulzura Creek, and the unnamed tributary that parallels Honey Springs Road. Approximately 10.4 acres of this vegetation type occur within HCWA.

Disturbed Mulefat Scrub (133)

Areas mapped as disturbed mulefat scrub have between 20 to 50 percent cover of riparian scrub habitat strongly dominated by mulefat. Similar to undisturbed mulefat, this vegetation type is also an early seral vegetation type maintained by frequent flooding, occurring on intermittent stream channels with fairly coarse substrate and moderate depth to water table. Disturbed mulefat scrub occurs in areas of relatively frequent disturbance, such as the drainages through the old pastures where erosion from unstable banks is now the primary disturbance event. The most common understory species in this vegetation type is dwarf nettle (*Urtica urens*), with California mugwort and ripgut grass. California sagebrush and flat-topped buckwheat occur on some of the drier banks. This vegetation type occurs along an unnamed tributary (possibly man-made ditch) to Hollenbeck Canyon and along an unnamed tributary near Honey Springs Road. Approximately 1.6 acres of this vegetation type occur within HCWA.

Coast Live Oak Woodland (150)

Areas mapped as coast live oak woodland have greater than 25 percent overstory cover of coast live oak. This vegetation type is found on north-facing slopes and in moist ravines. Associated species include Engelmann oak, toyon (*Heteromeles arbutifolia*), and poison oak. Approximately 9.0 acres of this vegetation type occur within HCWA.

Eucalyptus Woodland

Although not recognized by O'Leary (2002) for RJER, this vegetation type was recognized by O'Leary (2001) for MCAS Miramar and that description is used herein. Areas mapped as eucalyptus woodland contain greater than 25 percent of eucalyptus species (*Eucalyptus* sp.) in the overstory canopy. Ripgut grass is the primary understory species. This vegetation type is most conspicuous in the eastern portion of HCWA along the unnamed tributary near the abandoned structures of Honey Springs Ranch. Several scattered patches of eucalyptus woodland occur in the southeastern corner of HCWA. Eucalyptus also occurs along Jamul Creek in the north-central portion of the property. Approximately 15.1 acres of this vegetation type occur within HCWA.

Disturbed Habitat (240)

Areas mapped as disturbed habitat exhibit past or present prevalent physical disturbances (e.g., brushing, tilling, vehicular disturbance, etc.). These areas are typically composed of a mixture of grasses and forbs with grasses contributing less than two-thirds of the relative cover with non-native forbs. On HCWA, these areas are dominated by filaree, mustard, wild radish, California burclover, and foxtail chess. Substantial amounts of bare ground may exist but these areas do have the potential for colonization and succession of native plant communities. This vegetation type on HCWA corresponds to areas that have been previously disturbed by operations of the former Daley Ranch (e.g., vegetation clearing, gravel pits, etc.) as well as unauthorized off-road vehicle activity that has resulted in habitat conversion. Approximately 30.9 acres of this land cover type occur within HCWA.

Developed (250)

Areas mapped as developed include permanent features that provide little or no short-term potential for the colonization and succession of native plant communities. Developed areas within HCWA consist of roads, old buildings, barns, and domestic animal structures (corrals, etc.). Developed areas include the abandoned residential structures of the old Honey Springs Ranch and the residential property at the southeastern corner of the intersection of SR 94 and Honey Springs Road. Approximately 9.2 acres of this land cover type occur within HCWA.

2. Flora

A total of 215 species were observed during the 2005 surveys of HCWA. A complete floral inventory of the species detected is presented in Appendix C. Of these 215 species, 168 (78 percent) are native species and the remaining 47 (22 percent) are non-native species. This diversity of species and relative proportion of native and non-native species within HCWA parallels regional (i.e., San Diego County) patterns as well. The 215 taxa (including subspecies and varieties) observed during the surveys represent 10 percent of the documented flora of the county (2,147 taxa reported by Simpson and Rebman 2001), though the number of documented taxa in the county is increasing as a result of the comprehensive Plant Atlas Program that was recently initiated by the San Diego Natural History Museum. In addition, Simpson and Rebman (2001) state that 78 percent of the total taxa of San Diego County are native to the county, while 22 percent are non-native and naturalized. For its size, HCWA supports a relatively large representative sample of the county's flora. The two largest plant families in the county are also

the families with the most species present on HCWA with 41 taxa observed in the Asteraceae and 20 taxa observed in the Poaceae.

The high number of native species reflects the large amount of contiguous natural habitat within HCWA that would promote plant species diversity. In addition, a number of areas of HCWA are underlain by clay, gabbro, and metasedimentary soils, which would also contribute to plant diversity by providing a mosaic of different substrates for plant establishment.

Similar to the patterns observed for the native taxa, the highest number of non-native taxa also belongs to the Asteraceae (9 observed) and Poaceae (12 observed).

A list of the plant species observed during the surveys is included as Appendix C.

B. WILDLIFE

The following habitat-based descriptions of species diversity on HCWA represent a sampling of those species observed in the multiple field surveys listed at the beginning of this chapter. For a complete list of species known to occur on HCWA, see Appendix D. A discussion of threatened, endangered, or special status wildlife species known to occur or with a potential to occur is presented in subsection C.

1. Invertebrates

The LMP area has an abundant diversity of invertebrate species that utilize a variety of habitats. Fifty-two insect species were observed during surveys. USGS pitfall surveys in 2003-2004 documented 28 native species of ants, including several species of harvester ant (*Pogonomyrmex rugosus*, *Messor andrei*, and *M. stoddardii*). No non-native species of ants were observed during these baseline surveys. During 2003 surveys by Mooney and Associates (2003) and 2005 surveys by EDAW (2005), 23 species of butterflies were recorded, including red admiral (*Vanessa atalanta*), perplexing hairstreak (*Callophrys dumetorum perplexa*), Felder's orangetip (*Anthocaris cethura*), and Quino checkerspot butterfly. Additionally, one wasp species, the tarantula wasp (*Pepsis formosa*), one aquatic macroinvertebrate species, the red swamp crayfish (*Procambarus clarkii*), and two arachnid species were also identified.

2. Fish

No permanent water bodies capable of supporting fish populations occur in the wildlife area. Two focused fish surveys were conducted by Department personnel within the wildlife area in

2002 (Hovey, personal communication 2006). These focused surveys were conducted over 2 days and covered all wetted portions of the spring-fed creek from its intersection with SR 94 upstream until dense vegetation prevented access. At the time of the survey, the creek reach between SR 94 and the first road/creek crossing upstream on the wildlife area was mostly dry. Department personnel shocked and seined upstream of both road/creek crossings in the wildlife area. One fish species was observed during these surveys: the western mosquitofish (*Gambusia affinis*).

3. Amphibians

Four amphibian species have been detected during surveys, including the garden slender salamander (*Batrachoseps major*), Pacific tree frog (*Pseudacris regilla*), California tree frog (*P. cadaverina*), and western toad (*Bufo boreas*). The garden slender salamander was the most commonly captured amphibian during 2003-2004 pitfall surveys conducted by USGS and CDFG and was captured primarily in grassland habitat. These salamanders are also found in coastal sage scrub, chaparral, oak woodlands, and wooded riparian canyons. The garden slender salamander has a relatively slightly wider habitat tolerance and can also be found in coniferous forest and occasionally in salt marshes. The two species of frogs that have been detected, the Pacific and California treefrogs, generally require the presence of water (shallow pools, flowing streams, or marshes) during some or all of their life cycle. Thus, they are more often associated with riparian vegetation but may also be found in adjacent upland habitats such as grasslands, coastal sage scrub, and chaparral. The western toad frequents a wide variety of habitats including streams and springs associated with grassland, woodland, scrub, and desert communities, and within relatively disturbed/urbanized areas.

4. Reptiles

The high diversity of reptiles within HCWA is supported by the presence of large, contiguous blocks of undeveloped native habitat. A total of 21 species are known to occur, including 10 lizard species and 11 snake species.

Reptile species that are found in a wide variety of habitats (i.e., generalists) include the western fence lizard (*Sceloporus occidentalis*), San Diego gopher snake (*Pituophis catenifer annectens*), common garter snake (*Thamnophis sirtalis*), and western rattlesnake (*Crotalus viridis*). Other lizard species detected that occur in grassland, coastal sage scrub, chaparral, and disturbed habitats within the LMP area include San Diego coast horned lizard (*Phrynosoma coronatum blainvilli*), granite spiny lizard (*Sceloporus orcutti*), common side-blotched lizard (*Uta*

stansburiana), western banded gecko (*Coleonyx variegatus*), Gilbert's skink (*Eumeces gilberti*), western skink (*Eumeces skiltonianus*), western whiptail (*Cnemidophorus tigris*), orange-throated whiptail (*Cnemidophorus hyperythrus*), and southern alligator lizard (*Elgaria multicarinata*). Snake species associated with dry terrestrial habitats include common kingsnake (*Lampropeltis getulus*), striped racer (*Masticophis lateralis*), California black-headed snake (*Tantilla planiceps*), western long-nosed snake (*Rhinocheilus lecontei lecontei*), red-diamond rattlesnake (*Crotalus ruber ruber*), and coastal rosy boa (*Charina trivirgata*). During dryer than average climatic conditions, these species may also be found within riparian corridors. Other snake species have slightly more specific habitat requirements such as the western blind snake (*Leptotyphlops humilis*), which requires loose, sandy soil for burrowing, and the ringneck snake (*Diadophis punctuatus*) which is associated with moist habitats.

5. Birds

Approximately 84 native bird species and 2 introduced bird species have been identified through diurnal surveys, point counts, and incidental observations throughout the LMP area. The following habitat-based descriptions of avian species diversity on-site represent a sampling of those species observed. For a complete list of avian species known to occur on HCWA, see Appendix D.

Generalist avian species widely distributed and common throughout HCWA include birds such as the turkey vulture (*Cathartes aura*), phainopepla (*Phainopepla nitens*), American crow (*Corvus brachyrhynchos*), Bewick's wren (*Thryomanes bewickii*), mourning dove (*Zenaidura macroura*), black phoebe (*Sayornis nigricans*), Anna's hummingbird (*Calypte anna*), house finch (*Carpodacus mexicanus*), western kingbird (*Tyrannus verticalis*), blue grosbeak (*Passerina caerulea*), and lesser goldfinch (*Carduelis psaltria*). Wintering species common throughout HCWA include the white-crowned sparrow (*Zonotrichia leucophrys*) and yellow-rumped warbler (*Dendroica coronata*).

Birds associated with coastal sage scrub and chaparral habitats on HCWA include the California towhee (*Polioptila crissalis*), California quail (*Callipepla californica*), greater roadrunner (*Geococcyx californianus*), wrentit (*Chamaea fasciata*), western scrub jay (*Aphelocoma californica*), southern California rufous-crowned sparrow (*Aimophila ruficeps canescens*), Bell's sage sparrow (*Amphispiza belli belli*), and coastal California gnatcatcher (*Polioptila californica californica*). Summer visitors include Costa's hummingbird (*Calypte costae*). Mature chaparral on-site supports a variety of species, including birds such as the blue-gray gnatcatcher (*Polioptila caerulea*) and California thrasher (*Toxostoma redivivum*). Migratory species that have been detected within these habitats include Allen's hummingbird (*Selasphorus sasin*), Say's phoebe

(*Sayornis saya*), and hermit thrush (*Catharus guttatus*). Additionally, raptors such as the golden eagle (*Aquila chrysaetos*) may forage in scrub, chaparral, and grassland habitats on HCWA.

Riparian species found in marsh, riparian scrub, riparian woodland, and/or riparian forest on HCWA include three species of woodpeckers (*Colaptes auratus*, *Melanerpes formicivorus*, and *Picoides nuttallii*), oak titmouse (*Baeolophus inornatus*), bushtit (*Psaltiriparus minimus*), common yellowthroat (*Geothlypis trichas*), and red-winged blackbird (*Agelaius phoeniceus*). Migratory species found within this habitat include Lawrence's goldfinch (*Carduelis lawrencei*), American goldfinch (*C. tristis*), ruby-crowned kinglet (*Regulus calendula*), northern rough-winged swallow (*Stelgidopteryx serripennis*), Lazuli bunting (*Passerina amoena*), black-headed grosbeak (*Pheucticus melanocephalus*), barn swallow (*Hirundo rustica*), black-chinned hummingbird (*Archilochus alexandri*), Pacific-slope flycatcher (*Empidonax difficilis*), ash-throated flycatcher (*Myiarchus cinerascens*), Hutton's vireo (*Vireo huttoni*), and yellow warbler (*Dendroica petechia*).

Areas dominated by mature oaks on HCWA support bird species such as the house wren (*Troglodytes aedon*), western bluebird (*Sialia mexicana*), and Cassin's kingbird (*Tyrannis vociferans*). Migratory species include Swainson's thrush (*Catharus ustulatus*), hooded oriole (*Icterus cucullatus*), Bullock's oriole (*I. bullocki*), western wood-peewee (*Contopus sordidulus*), western tanager (*Piranga ludoviciana*), and cedar waxwing (*Bombycilla cedrorum*). The relatively large size of HCWA and oak woodland on-site provides suitable habitat for nesting and perching raptors including the red-tailed hawk (*Buteo jamaicensis*) and American kestrel (*Falco sparverius*). Also present and potentially nesting within the oak woodland habitat on-site are the white-tailed kite (*Elanus leucurus*), red-shouldered hawk (*Buteo lineatus*), and Cooper's hawk (*Accipiter cooperii*). Owl species detected within the LMP area and potentially nesting in the oak woodland habitat on-site include the barn owl (*Tyto alba*).

Grassland specialists include the western meadowlark (*Sturnella neglecta*) and grasshopper sparrow (*Ammodramus savannarum*). Grassland is also used as foraging habitat by a variety of raptors, particularly the white-tailed kite, northern harrier (*Circus cyaneus*), and red-tailed hawk. The northern harrier is known to also nest within grassland habitats. Two harrier nests/territories were documented by the Wildlife Research Institute (2004).

6. Mammals

Approximately 41 mammal species have been detected throughout the LMP area, including insectivores, bats, rabbits, rodents, carnivores, and ungulate species. The following habitat-

based descriptions of avian species diversity on-site represent a sampling of those species observed. For a complete list of mammal species known to occur on HCWA, see Appendix D.

HCWA supports a high diversity of bat species including 13 of the 16 species commonly found in San Diego County (USGS 2005a). These bats roost and forage in a wide diversity of habitats, depending upon species-specific requirements. Habitat generalists that utilize many habitats include the Mexican free-tailed bat (*Tadarida brasiliensis*), pocketed free-tailed (*Nyctinomops femorosacca*), big brown bat (*Eptesicus fuscus*), California myotis (*Myotis californicus*), Big free-tailed bat (*Nyctinomops macrotis*), and western small-footed myotis (*M. ciliolabrum*). Bat species known to forage within riparian areas include the Yuma myotis (*Myotis yumanensis*) and western red bat (*Lasiurus blossevillei*). Foraging activities of other species, such as the western mastiff (*Eumops perotis*), pallid bat (*Antrozous pallidus*), western pipistrelle (*Pipistrellus hesperus*), and long-eared myotis (*Myotis evotis*), occur within dryer terrestrial habitats, such as desert, chaparral, oak woodland, scrub, and grassland habitats. Bats commonly associated with roosting and foraging primarily within forested habitats and that may roost within oak woodlands on-site include the long-eared myotis and hoary bat (*Lasiurus cinereus*).

Other mammal species within HCWA are common residents of chaparral, coastal sage scrub, and/or grassland habitat. Species found within these habitats include the black-tailed jackrabbit (*Lepus californicus*), desert cottontail (*Sylvilagus audubonii*), California ground squirrel (*Spermophilus beecheyi*), Botta's pocket gopher (*Thomomys bottae*), San Diego pocket mouse (*Chaetodipus fallax fallax*), California pocket mouse (*C. californicus*), and San Diego kangaroo rat (*Dipodomys simulans*). Other small mammals identified on-site include 10 species of mice and voles, including desert woodrat (*Neotoma lepida*) and dusky-footed woodrat (*N. fuscipes*), and two species of shrew, *Notiosorex crawfordi* and *Sorex ornatus*. Only one non-native small mammal species was identified on-site, the house mouse (*Mus musculus*), which does not pose a threat to native fauna.

The small mammal assemblage and mule deer (*Odocoileus hemionus*) that are present on HCWA provide a solid prey base for the medium to large carnivores. The most common predators found in the LMP area are the coyote (*Canis latrans*), gray fox (*Urocyon cinereoargenteus*), bobcat (*Lynx rufus*), and mountain lion (*Felis concolor*). Although the long-tailed weasel (*Mustela frenata*), raccoon (*Procyon lotor*), and striped skunk (*Mephitis mephitis*) also eat small mammals, they have a more diverse diet preference and will scavenge for invertebrates, frogs, lizards, birds, eggs, acorns, and fruit. The ringtail (*Bassariscus astutus*) is another opportunistic species known to occur in the LMP area.

C. ENDANGERED, THREATENED, MSCP COVERED, AND OTHER SPECIAL STATUS SPECIES

Special status plant and wildlife species are species that are either legally protected under the federal ESA, California ESA, or other regulations, or species considered by the scientific community to be sufficiently rare to qualify for such listing. Special status species include species listed or proposed for listing as endangered or threatened under the federal ESA (USFWS 1999a), the California ESA (CDFG 2005b, c), or the California Native Plant Protection Act. Also included below are species that are of special concern to the Department (CDFG 2005d), are species of special concern to the USFWS (USFWS 2005), are considered “covered species” within the MSCP, are fully protected in California, are covered under the Migratory Bird Treaty Act, or are covered under the Bald Eagle Protection Act. Furthermore, it is mandatory that California Native Plant Society (CNPS) lists 1A, 1B, and 2 species be fully considered within this LMP as they meet the definitions of Section 1901, Chapter 10 (Native Plant Protection Act) or Sections 2062 and 2067 (California ESA) during the preparation of environmental documents relating to CEQA (CNPS 2001). All species identified through California Natural Diversity Database (CNDDDB) searches known to occur or to have occurred within the project vicinity are considered below. Finally, species listed on the National Audubon Society bluelist or on the Western Bat Working Group sensitivity ranking are considered below as well.

Sensitive plant and animal species that have been recorded as occurring within HCWA are summarized below. Also discussed is the potential for numerous other sensitive species to occur on HCWA that have not been recorded for the property, but are known to occur in the region surrounding the HCWA. The potential for these additional species to occur on the site, i.e., a high, moderate, or low potential, is based on various factors. These factors are summarized below.

High: Species with known recent (i.e., last 25 years) recorded occurrences/populations nearby (i.e., within the same USGS quadrangle map or an adjacent quadrangle map) and for which highly suitable habitat occurs within the survey area. Suitable habitat includes all necessary habitat elements to support the species (habitat type, soils, cover, food resources, etc.).

Moderate: Species with known recent (i.e., last 25 years) recorded occurrences/populations nearby (i.e., within the same USGS quadrangle map or an adjacent quadrangle map); however, suitable habitat within the survey area is moderately

disturbed. Suitable habitat for the species could be fragmented or small/limited in size. Additionally, a “moderate” assessment would be made for species for which suitable habitat occurs within the survey area, but the survey area is near the edge of the species’ range or there are no reported occurrences/populations from surveys of nearby areas.

Low: Species with few known recent (i.e., last 25 years) recorded occurrences/populations nearby (i.e., within the same USGS quadrangle map or an adjacent quadrangle map), but suitable habitat within the survey area is highly disturbed or extremely limited in area. Also, species with known historic (i.e., more than 25 years) recorded occurrences/populations from the site or nearby; however, the suitable habitat on-site has been severely reduced or disturbed since past documentation. Additionally, species for which potentially suitable habitat is present within the survey area, but the reported extant range is far outside the survey area. For plant species only, a low potential would be assigned to annual or perennial species that would have been detectable during a focused survey during the appropriate blooming period but were not found; however, small populations or scattered individuals are still considered to have a low potential to occur.

1. Sensitive Plants

Sensitive plant species known to occur or expected to occur are listed below in Table 10. A discussion of the federal and state listed species, and non-listed sensitive species detected on-site or with the potential to occur is also provided below.

Table 10
Sensitive Plant Species Known to Occur or
with a Potential to Occur within the Hollenbeck Canyon Wildlife Area

Scientific Name	Common Name	Sensitivity Status			Potential to Occur within HCWA ⁴
		USFWS/ CDFG Listing ¹	MSCP ²	CNPS ³	
<i>Acanthomintha ilcifolia</i>	San Diego thornmint	FT, SE	C, NE	List 1B	D
<i>Achnatherum diegoense</i>	San Diego County needlegrass			List 4	D
<i>Arctostaphylos otayensis</i>	Otay manzanita		C	List 1B	L
<i>Artemisia palmeri</i>	Palmer’s sagewort			List 4	D
<i>Astragalus deani</i>	Dean’s milkvetch			List 1B	L
<i>Astragalus oocarpus</i>	San Diego locoweed			List 1B	M
<i>Brodiaea orcuttii</i>	Orcutt’s brodiaea		C	List 1B	L-M
<i>Ceanothus cyaneus</i>	Lakeside ceanothus		C, NE	List 1B	L
<i>Chorizanthe leptotheca</i>	Ramona spineflower			List 4	D
<i>Clarkia delicate</i>	Delicate clarkia			List 1B	D

Scientific Name	Common Name	Sensitivity Status			Potential to Occur within HCWA ⁴
		USFWS/ CDFG Listing ¹	MSCP ²	CNPS ³	
<i>Comarostaphylos diversifolia</i> ssp. <i>diversifolia</i>	Summer holly			List 1B	L
<i>Convolvulus simulans</i>	Small-flowered morning-glory			List 4	D
<i>Cylindropuntia californica</i> var. <i>californica</i>	Snake cholla		C, NE	List 1B	D
<i>Deinandra conjugens</i>	Otay tarplant	FT, SE	C, NE	List 1B	L
<i>Deinandra floribunda</i>	Tecate tarweed			List 1B	L
<i>Dichondra occidentalis</i>	Western dichondra			List 4	H
<i>Dudleya variegata</i>	Variegated dudleya		C, NE	List 1B	L
<i>Ericameria palmeri</i> ssp. <i>palmeri</i>	Palmer's ericameria		C, NE	List 1B	L-M
<i>Fremontodendron mexicanum</i>	Mexican flannelbush			List 1B	L
<i>Harpagonella palmeri</i>	Palmer's grappling-hook			List 4	D
<i>Horkelia truncate</i>	Ramona horkelia			List 1B	L
<i>Isocoma menziesii</i> var. <i>decumbens</i>	Decumbent goldenbush			List 1B	L
<i>Iva hayesiana</i>	San Diego marsh elder			List 2	M-H
<i>Juncus acutus</i> ssp. <i>leopoldii</i>	Southwestern spiny rush			List 4	D
<i>Lepechinia ganderi</i>	Gander's pitcher sage		NE	List 1B	L
<i>Lepidium virginicum</i> var. <i>robinsonii</i>	Robinson pepper-grass			List 1B	M
<i>Machaeranthera juncea</i>	Rush-like bristle bush			List 4	D
<i>Monardella hypoleuca</i> ssp. <i>lanata</i>	Felt-leaved rock mint		C	List 1B	H
<i>Muilla clevelandii</i>	Cleveland's goldenstar		C	List 1B	L
<i>Myosurus minimus</i> ssp. <i>apus</i>	Little mousetail			List 3	L
<i>Quercus engelmannii</i>	Engelmann oak			List 4	D
<i>Ribes canthariforme</i>	Morena currant			List 1B	L
<i>Romneya coulteri</i>	Coulter's matilija poppy			List 4	M
<i>Saltugilia caruifolia</i>	Caraway-leaved gilia			List 4	L
<i>Satureja chandleri</i>	San Miguel savory		C	List 1B	M
<i>Senecio ganderi</i>	San Diego butterweed	SR	C	List 1B	L
<i>Stemodia durantifolia</i>	Blue streamwort			List 2	L
<i>Tetracoccus diocus</i>	Parry's tetracoccus		C	List 1B	L
<i>Viguiera lacinata</i>	San Diego viguiera			List 4	D

¹ U.S. Fish and Wildlife Service (USFWS) listings: **FT** - Federally Threatened

California Department of Fish and Game (CDFG) rankings: **SE** - State Endangered; **SR** - State Rare

² Multiple Species Conservation Program (MSCP): **C** - Covered under the MSCP; **NE** - Narrow Endemic

³ California Native Plant Society (CNPS) listing:

List 1B - Plants rare, threatened, or endangered in California or elsewhere

List 2 - Plants rare, threatened, or endangered in California but more common elsewhere

List 3 - Plants we need more information for

List 4 - Plants of limited distribution, a watch list

⁴ Potential to occur within the wildlife area: **D** - Detected; **H** - High potential to occur based on presence of highly suitable habitat and known occurrences within the vicinity of the wildlife area; **M** - Moderate potential to occur based on presence of moderately suitable habitat and/or known occurrences within the vicinity of the wildlife area; **L** - Low potential to occur, based on lack of, or minimal amount of suitable habitat and few known occurrences within the vicinity of the wildlife area.

Threatened and Endangered Plant Species

Only one federally threatened and state endangered plant species, San Diego thornmint (*Acanthomintha ilicifolia*), has been detected on-site. This species was observed in the same

location during surveys conducted in 2004 by the Department, and again during 2005 surveys conducted by EDAW (2005). Two additional listed species, Otay tarplant (*Deinandra conjugens*) and San Diego butterweed (*Senecio ganderi*), have a low potential to occur. These three species are described further below.

Species Detected On-site

San Diego thornmint, a federally threatened, state endangered, MSCP covered species, is the only listed plant species that was observed on HCWA during surveys. Several patches, totaling approximately 2,020 individuals, occur on the grassland/clay lens in the north-central portion of HCWA (Figure 13). This population occurs on a mesa between Jamul Creek (to the west) and Hollenbeck Canyon (on the east) on soils mapped as Bonsako stony clay. This small outcrop of this soil series measures approximately 5 to 10 acres in area and is the only locality for this soil type mapped for this USGS quadrangle (Bowman 1973). As such, this small area represents a very unusual and rare edaphic, ecological island. Additional information about the Bonsako stony clay soil is presented in Section II, Subsection C.

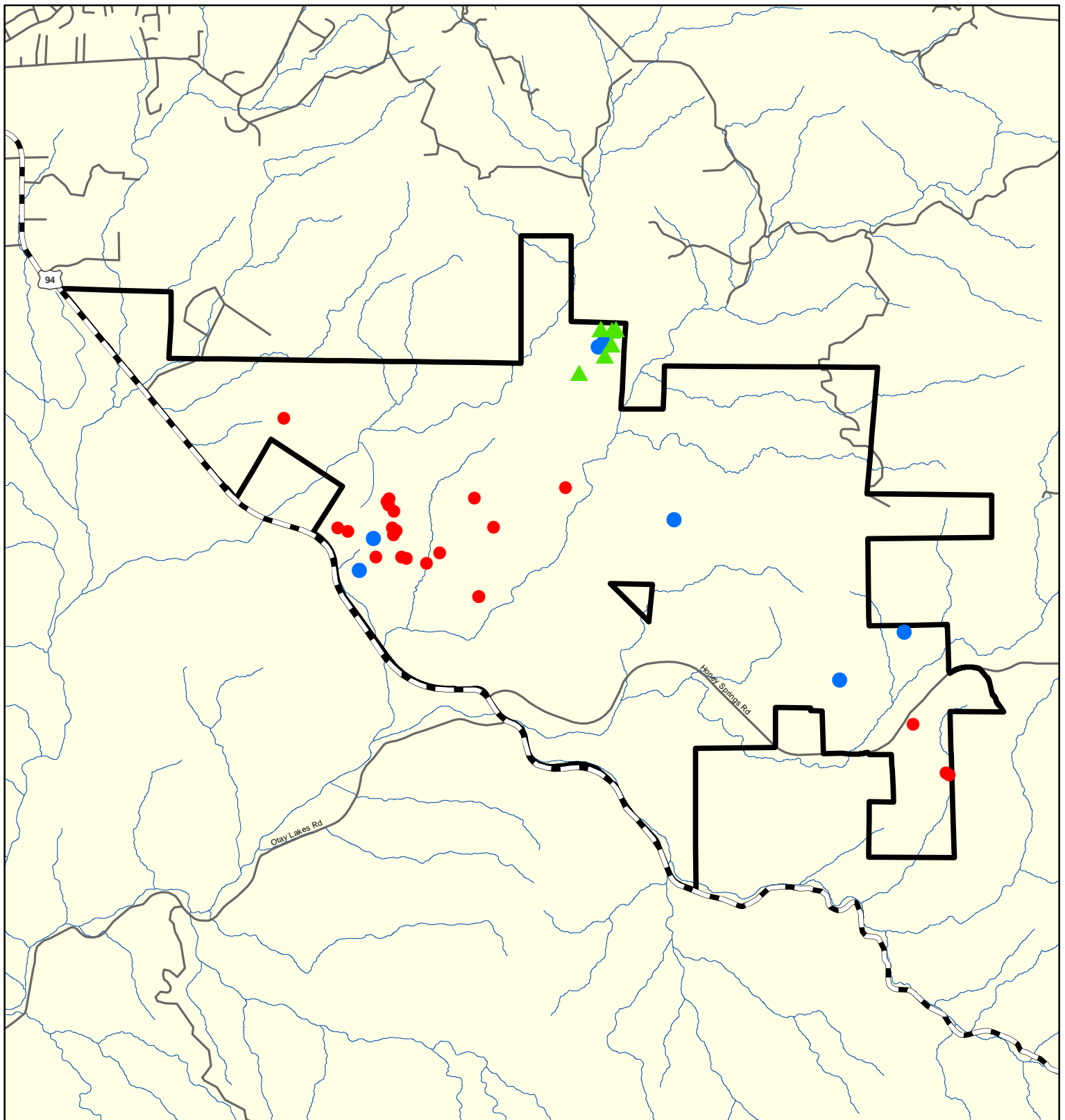
Species with Potential to Occur On-site

One federally threatened, state endangered plant species, Otay tarplant, is known to occur in the vicinity of HCWA. Otay tarplant is also an MSCP covered species that is documented from RJER. This species has not been documented from HCWA, though it has the potential to occur in the grasslands and the open sage scrub areas underlain by clay soils. The adjacent RJER population represents a bit of a range extension for this species, and there are no known populations east of RJER.

One state listed, MSCP covered species known within the vicinity of HCWA is San Diego butterweed, designated as a state rare species. San Diego butterweed is a gabbro endemic and is known from McGinty Mountain just north of HCWA. This species has not been documented from HCWA but could occur in areas of gabbro soil.

Non-listed, Sensitive Plant Species

In addition to the threatened and endangered species discussed above, an additional 36 plant species are known to occur or have a potential to occur within the LMP area.



- Legend**
- California Gnatcatcher
 - Quino Checkerspot
 - ▲ San Diego Thornmint

- Basemap Legend**
- HCWA Boundary
 - State Highway
 - Road
 - Stream

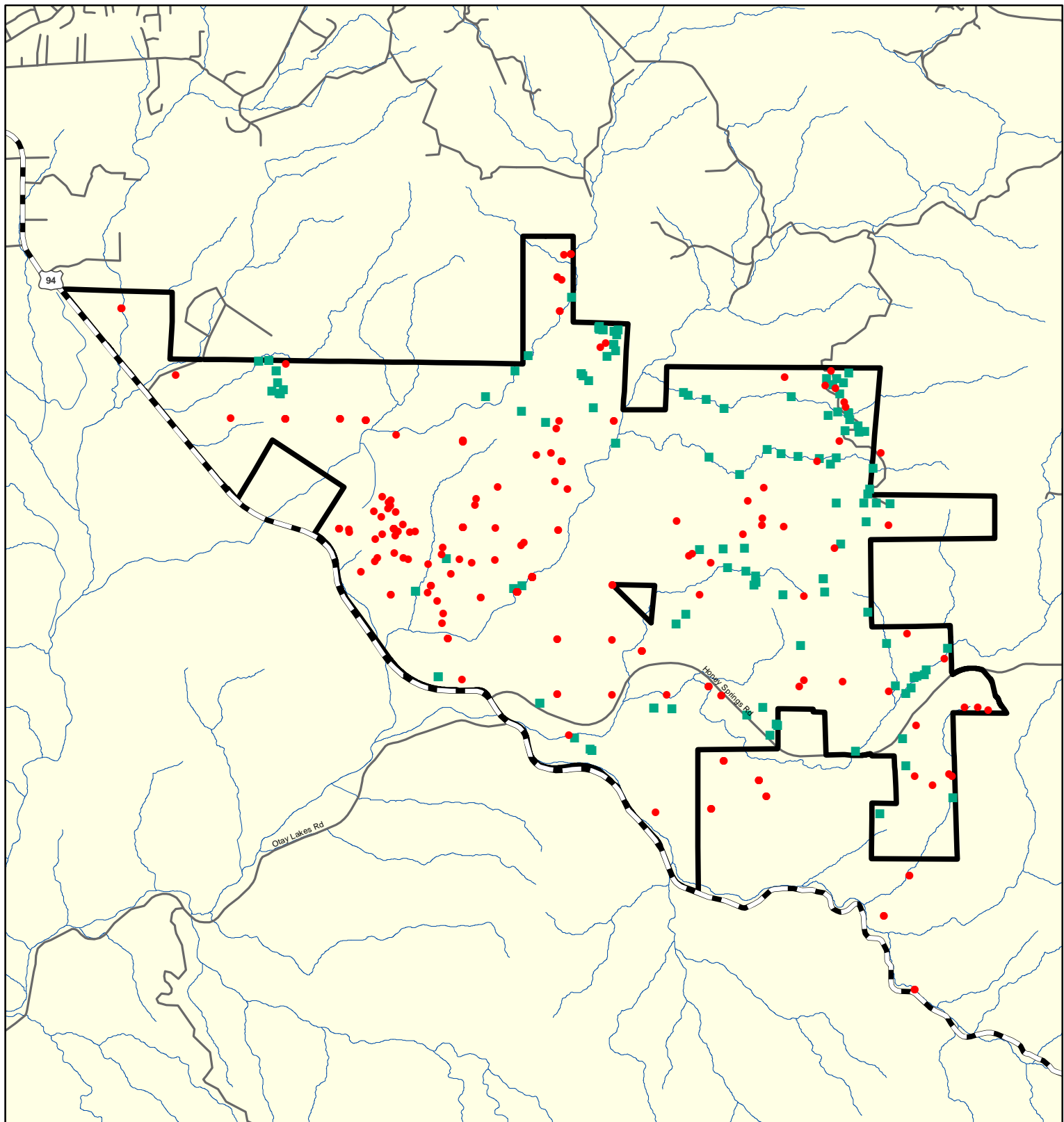


Feet
0 4,000

Species Detected On-site

A total of 11 non-listed sensitive plant species have been reported from HCWA. These consist of two CNPS List 1B species: delicate clarkia and snake cholla; and nine CNPS List 4 species: San Diego County needlegrass (*Achnatherum diegoense*), Palmer's sagewort, Ramona spineflower, small-flowered morning-glory, Palmer's grappling-hook, southwestern spiny rush, rush-like bristle bush, Engelmann oak, and San Diego viguiera (*Viguiera lacinata*). A brief description of the occurrence of these species within HCWA, including notes about their habitat affinities, is provided below. Additional information about the soil affinities associated with many of the sensitive plants is presented in Section II, Subsection C. Species-specific mapping for non-listed sensitive species is not provided in this LMP; however, the location of non-listed sensitive plants is generally shown in Figure 14.

- Delicate clarkia occurs in the understory of oak woodlands. Seven occurrences, totaling approximately 200 individuals, are known within the Honey Springs parcel area. Additional occurrences of this species are expected in HCWA.
- Snake cholla was observed in disturbed sage scrub on HCWA. Three individuals were observed and specimens were submitted to Dr. Jon Rebman at the San Diego Natural History Museum for positive identification.
- San Diego County needlegrass is documented from Jamul Butte. Additional occurrences of this species are expected in other portions of HCWA underlain by gabbro soils.
- Palmer's sagewort occurs in the understory of riparian habitats. Three small populations of this species occur along several drainages on the Honey Springs parcel. Additional occurrences of this species are expected along other drainages in HCWA.
- Ramona spineflower occurs in openings of sage scrub and chaparral communities. Eight occurrences, totaling approximately 6,475 individuals, are known within the Honey Springs parcel. Additional occurrences of this species are expected in HCWA.
- Small-flowered morning-glory occurs on heavy clay soils. This species is documented from near the historic homestead on the north side of Hollenbeck Canyon.
- Palmer's grappling-hook also occurs on heavy clay soils. Six occurrences, totaling approximately 4,200 plants, are known on HCWA. Some of these occurrences are sympatric with the San Diego thornmint occurrences.



Legend

- Amphibians, Reptiles, Birds, Mammals
- Plants

Basemap Legend

- HCWA Boundary
- State Highway
- Road
- Stream



Feet

0 4,000

-
- Southwestern spiny rush occurs along perennial streams. A small occurrence of three individuals is known from Hollenbeck Canyon.
 - Rush-like bristle bush occurs in open shrub habitats. Six occurrences, totaling approximately 37 individuals, are known on the Honey Springs parcel. Additional occurrences of this species are expected elsewhere on HCWA.
 - Engelmann oaks occur in oak woodlands and chaparral habitats. Approximately 300 to 350 individuals are scattered throughout HCWA.
 - San Diego viguiera is a co-dominant of the sage scrub habitats on HCWA. This is one of the most common shrub species on HCWA as it is estimated there are several hundred thousand individuals present. Because of the ubiquitous distribution, San Diego viguiera was not mapped.

One other plant species was observed that has the potential to be sensitive, but will require verification, i.e., Coulter's matilija poppy (*Romneya coulteri*).

- Approximately 26 individuals of matilija poppy (*Romneya* sp.) were observed within HCWA. Coulter's matilija poppy is a CNPS List 4 species that occurs in disturbed and/or burned areas. Positive identification could not be determined, as these individuals were not in bloom. However, subsequent encounters with any matilija poppy individuals when blooming stages were more optimal were determined to be the non-sensitive hairy matilija poppy (*Romneya trichocalyx*).

Species with Potential to Occur On-site

Besides the sensitive plant species documented from HCWA, an additional 26 non-listed sensitive species are known from the vicinity of HCWA but were not detected during the rare plant surveys. Table 10 addresses these species and summarizes their potential for occurrence on HCWA.

2. Sensitive Wildlife

Sensitive wildlife species known to occur or expected to occur are listed below in Table 11. A discussion of those federally and state listed species, and non-listed sensitive species detected on-site or with the potential to occur, is also provided below.

Table 11
Sensitive Wildlife Species Known to Occur or
with a Potential to Occur within the Hollenbeck Canyon Wildlife Area

Scientific Name	Common Name	Sensitivity Status			Potential to Occur within HCWA ⁴
		USFWS/ CDFG Listing ¹	MSCP ²	Other ³	
Invertebrates					
<i>Euphydryas editha quino</i>	Quino checkerspot butterfly	FE	NE	-	D
<i>Euphyes vestries harbisoni</i>	Harbison's dun skipper	-	NE	-	M
<i>Lycaena hermes</i>	Hermes copper	-	-	-	M
Amphibians					
<i>Bufo californicus</i>	arroyo toad	FE	C, NE	CSC	M
<i>Rana aurora draytonii</i>	California red-legged frog	FT	C, NE	CSC	L
<i>Scaphiopus hammondii</i>	western spadefoot toad	-	-	CSC	H
<i>Traicha torosa torosa</i>	California coast range newt	-	-	CSC	L
Reptiles					
<i>Anniella pulchra pulchra</i>	California legless lizard	-	-	CSC	M
<i>Charina trivirgata</i>	coastal rosy boa	-	C	CSC	D
<i>Clemmys marmorata pallida</i>	southwestern pond turtle	-	C, NE	CSC	L
<i>Cnemidophorus hyperythrus</i>	orange-throated whiptail	-	-	CSC	D
<i>Coleonyx variegatus</i>	western banded gecko	-	-	CSC	D
<i>Crotalus ruber ruber</i>	red diamond rattlesnake	-	-	CSC	D
<i>Eumeces skiltonianus</i>	western skink	-	-	CSC	D
<i>Phrynosoma coronatum blainvilli</i>	San Diego coast horned lizard	-	C	CSC	D
Birds					
<i>Accipiter striatus</i>	sharp shinned hawk	-	-	CSC	H
<i>Accipter cooperi</i>	Cooper's hawk	-	C	CSC	D
<i>Agelaius tricolor</i>	tricolored blackbird	-	C	CSC	M
<i>Aimophila ruficeps canescens</i>	southern California rufous-crowned sparrow	-	C	CSC	D
<i>Amphispiza belli</i>	Bell's sage sparrow	-	-	CSC	D
<i>Aquila chrysaetos</i>	golden eagle	-	C, NE	BEPA/FP	D
<i>Asio flammeus</i>	short-eared owl	-	-	CSC	H
<i>Asio otus</i>	long-eared owl	-	-	CSC	M
<i>Athene cunicularia hypugaea</i>	burrowing owl	-	C, NE	CSC	H
<i>Buteo regalis</i>	ferruginous hawk	-	C	CSC	M
<i>Buteo swainsoni</i>	Swainson's hawk	ST	C	-	M
<i>Campylorhynchus brunneicapillus</i>	coastal cactus wren	-	C, NE	CSC	M
<i>Circus cyaneus</i>	northern harrier	-	C	CSC	D
<i>Dendroica petechia</i>	yellow warbler	-	-	CSC	D
<i>Elanus leucurus</i>	white-tailed kite	-	-	FP	D
<i>Empidonax traillii extimus</i>	southwestern willow flycatcher	FE, SE	C, NE	-	L
<i>Eremophila alpestris actia</i>	California horned lark	-	-	CSC	H
<i>Falco columbarius</i>	merlin	-	-	CSC	H
<i>Falco mexicanus</i>	prairie falcon	-	-	CSC	M
<i>Falco peregrinus</i>	peregrine falcon	SE	C, NE	FP	M
<i>Haliaeetus leucocephalus</i>	bald eagle	FT, SE	-	BEPA	D
<i>Icteria virens</i>	yellow-breasted chat	-	-	CSC	M
<i>Lanius ludovicianus</i>	loggerhead shrike	-	-	CSC	H
<i>Otus flammeolus</i>	flamulated owl	-	-	Audubon Watchlist	M
<i>Pandion haliaetus</i>	osprey	-	-	CSC	L
<i>Poliophtila californica californica</i>	coastal California gnatcatcher	FT	C	CSC	D

Scientific Name	Common Name	Sensitivity Status			Potential to Occur within HCWA ⁴
		USFWS/ CDFG Listing ¹	MSCP ²	Other ³	
<i>Progne subis</i>	purple martin	-	-	CSC	H
<i>Sialia mexicana</i>	western bluebird	-	C	-	D
<i>Vireo bellii pusillus</i>	least Bell's vireo	FE, SE	C, NE	-	H
<i>Vireo vicinior</i>	gray vireo	-	-	CSC	M
Mammals					
<i>Antrozous pallidus</i>	pallid bat	-	-	CSC, WBWG	D
<i>Chaetodipus californicus</i>	California pocket mouse	-	-	CSC	D
<i>Chaetodipus fallax fallax</i>	San Diego pocket mouse	-	-	CSC	D
<i>Corynorhinus townsendii</i>	Townsend's big-eared bat	-	-	CSC, WBWG	H
<i>Eumops perotis</i>	western mastiff bat	-	-	CSC, WBWG	D
<i>Felis concolor</i>	mountain lion	-	C	-	D
<i>Lasiurus blossevillei</i>	western red bat	-	-	WBWG	D
<i>Lasiurus cinereus</i>	hoary bat	-	-	WBWG	D
<i>Lepus californicus bennetti</i>	San Diego black-tailed jackrabbit	-	-	CSC	D
<i>Myotis ciliolabrum</i>	western small-footed myotis	-	-	WBWG	D
<i>Myotis evotis</i>	long-eared myotis	-	-	WBWG	D
<i>Myotis yumanensis</i>	Yuma myotis	-	-	WBWG	D
<i>Neotoma lepida</i>	desert woodrat	-	-	CSC	D
<i>Nyctinomops femorosacca</i>	pocketed free-tailed bat	-	-	CSC, WBWG	D
<i>Nyctinomops macrotis</i>	big free-tailed bat	-	-	CSC, WBWG	D
<i>Odocoileus hemionus</i>	mule deer	-	C	-	D
<i>Onychomys torridus</i>	southern grasshopper mouse	-	-	CSC	M
<i>Taxidea taxus</i>	American badger	-	C	CSC	M

¹ U.S. Fish and Wildlife Service (USFWS) listings: **BEPA** - Protected under the Bald Eagle Protection Act;

FE - Federally Endangered; **FT** - Federally Threatened

California Department of Fish and Game (CDFG) rankings: **FP** - Fully Protected; **SE** - State Endangered;

ST - State Threatened

² Multiple Species Conservation Program (MSCP): **C** - Covered under the MSCP, **NE** - Narrow Endemic

³ National Audubon Society (**Audubon**) **watchlist** – species facing population declines and/or threats, or with limited geographic ranges.

Western Bat Working Group (**WBWG**) Sensitivity ranking

CDFG: **CSC** - State of California Species of Concern

⁴ **D** - Detected on-site, **L** - Low potential to occur, **M** - Moderate potential to occur, **H** - High potential to occur

Threatened and Endangered Animal Species

Two federally listed species, the federally endangered Quino checkerspot butterfly and the federally threatened coastal California gnatcatcher, are known to occur on-site. One federally threatened, state endangered species, the bald eagle (*Haliaeetus leucocephalus*) was detected on-site by the USGS (2004a) as an incidental observation and by the Wildlife Research Institute (2004) during the winter. Five additional threatened or endangered wildlife species have a potential to occur within the LMP area. These include the federally endangered arroyo toad (*Bufo californicus*); the federally and state endangered southwestern willow flycatcher (*Empidonax traillii extimus*); the federally endangered, state threatened least Bell's vireo (*Vireo*

belli pusillus); the state endangered peregrine falcon (*Falco peregrinus*); and the state threatened Swainson's hawk (*Buteo swainsonii*). These species are described further below.

Species Detected On-site

The federally endangered Quino checkerspot butterfly has been detected in at least five different areas throughout HCWA (Figure 13). Although it is not covered by the MSCP, it is proposed to be covered through an amendment (County of San Diego 2005). Within the original acquisition area, at least 20 individuals were observed by EDAW biologists near Department-monitored San Diego thornmint populations at the northern end of the wildlife area, during vegetation mapping surveys. Sightings elsewhere within the wildlife area were made by Marschalek during focused surveys in 2005. Outside of the LMP area, five individuals were incidentally observed north of SR 94, south of Honey Springs Road. During focused protocol-level surveys conducted by Mooney and Associates in 2003 for the Honey Springs parcel, numerous sightings of individuals and pairs of Quino checkerspot butterfly occurred near the western, southern, and southeastern boundaries of the acquisition area (Mooney and Associates 2003). Additionally, the primary larval host plant for Quino checkerspot butterfly, dot-seed plantain, along with various nectar sources occurs throughout the wildlife area. Thus this species is expected to occur in all suitable habitat within HCWA. Additionally, the wildlife area is an important component of the conservation efforts for this species because it lies within USFWS Designated Critical Habitat, within the San Diego Otay Unit (USFWS 2002), and within the Southwest San Diego Recovery Unit designated in the USFWS recovery plan (USFWS 2003).

Several known Quino checkerspot butterfly occurrence complexes identified by the USFWS occur adjacent to the LMP area (USFWS 2003). The closest known occurrence complexes are present to the west of HCWA, within Otay Lakes, and to the south, within Dulzura. The wildlife area functions as part of a regionally important area with regard to landscape connectivity for Quino checkerspot butterfly, and the various occurrence complexes that are present within this region.

The coastal California gnatcatcher, a federally threatened and MSCP covered species, is also known to occur within the wildlife area (Figure 13). Approximately eight pairs and two individuals were detected during 2002 monitoring surveys by the Department, near the southwestern portion of the property, just north of SR 94 (CDFG 2002d). This species was also detected during 2003-2004 avian point count surveys conducted by USGS. Additionally, this species was detected by EDAW biologists in 2005, during vegetation mapping surveys and general wildlife surveys (EDAW 2005). One individual was noted in the middle-western portion

of the wildlife area, west of the excluded Sweeney parcel and north of Honey Springs Road, and another individual was detected within a riparian drainage at the southeastern portion of the Honey Springs parcel.

Outside of the wildlife area, coastal California gnatcatcher is known to occur to the west, within the RJER (USGS 2004a). Breeding populations of this species have also been recorded for the Jamul Mountains, Otay Lakes, and Otay Mesa (Unitt 2004).

The federally threatened, state endangered, and MSCP covered bald eagle was detected during USGS baseline surveys (USGS 2004a) and during a winter survey conducted by the Wildlife Research Institute (2004). However, these observations occurred incidentally. Suitable foraging and breeding habitat does not occur on HCWA. The closest known nest site occurs within Lake Henshaw in Santa Ysabel, San Diego County.

Species with Potential to Occur On-site

The federally endangered and MSCP covered arroyo toad has not been located on the property to date. Focused surveys were completed in 2003 by CDFG and found no arroyo toads on-site. However, the species has a moderate potential to occur along Jamul and Dulzura creeks where suitable habitat exists. The arroyo toad is considered to have the most specialized habitat requirements of any amphibian species in California (Jennings and Hayes 1994). Because the arroyo toad requires very specific breeding habitat conditions, its distribution is very limited. The species breeds in slow-moving, low-gradient (usually less than 2 percent), shallow streams with a substrate of sand or gravel, a minimum silt load, and adjacent sand bars (Jennings and Hayes 1994; USFWS 1994; Lannoo 2005). Outside of the breeding season, during their terrestrial phase, arroyo toads require stable sandy terraces, consisting mainly of deep, fine sand with sporadic gravel or cobble features (e.g., Jennings and Hayes 1994). This soil type commonly occurs along the riparian corridors where breeding occurs. This species is known to historically occur within Dulzura Creek (USFWS 1999b). The closest known location for the arroyo toad is within Sweetwater National Wildlife Refuge approximately 8 miles to the west.

The federally endangered southwestern willow flycatcher is also an MSCP covered species that has a low potential to occur on-site within willow riparian habitat. Due to the very limited distribution of this species and limited suitable habitat on-site, there is a low potential for this species to occur. The closest known occurrence of this species is the Sweetwater Reservoir to the northwest of HCWA. Subsequent surveys would be required to confirm the presence or absence of this species on-site.

The federally and state endangered least Bell's vireo is also an MSCP covered species with a moderate potential to occur within suitable riparian willow habitat within HCWA. It is known from Jamul and Dulzura creeks on RJER and may be found within the LMP area. Subsequent surveys would be required to confirm the presence or absence of this species on-site.

In addition to the four federally and state listed species mentioned above, the state endangered peregrine falcon and the state threatened Swainson's hawk have the potential to occur on-site. The peregrine falcon is also state protected and is covered under the MSCP. The Swainson's hawk is also a federal species of concern. Both avian species have a moderate potential to occur on-site during periods of migration.

Non-listed, Sensitive Wildlife Species

In addition to the federally and state listed species discussed above, 54 sensitive wildlife species are known to occur or have the potential to occur within HCWA based on biological surveys and CNDDDB searches. Of these, 42 species are classified by the Department as California state species of special concern, 15 species are covered under the MSCP, 5 species are considered narrow endemics under the MSCP, and 16 species are covered under another sensitivity category (Table 11).

Species Detected On-site

Twenty-nine, non-listed, sensitive wildlife species have been detected on HCWA. Of these, 19 species are classified by the Department as California state species of special concern, 10 species are covered under the MSCP, 1 species is considered a narrow endemic under the MSCP, and 12 are covered under another sensitivity category (Table 11). Species-specific mapping for non-listed sensitive species is not provided in this LMP; however, the location of non-listed sensitive animals is generally shown in Figure 13.

Six state reptile species of special concern including two that are also covered by the MSCP have been recorded during pitfall trapping surveys conducted by the USGS and CDFG in 2003-2004. These include the coastal rosy boa, orange-throated whiptail, western banded gecko, red-diamond rattlesnake, western skink, and coast horned lizard. These species are associated with coastal sage scrub, chaparral, and oak woodland habitats.

The southern California rufous-crowned sparrow, a state species of special concern and also an MSCP covered species, was detected throughout sage scrub habitats during 2005 surveys of the

Honey Springs parcel. Another state species of special concern associated with these habitats and detected on-site is the Bell's sage sparrow.

The yellow warbler, a state species of special concern, has been observed in riparian and oak woodland habitats within HCWA. Also, the western bluebird, an MSCP covered species, was detected within eucalyptus woodland habitat during 2005 surveys conducted by EDAW biologists.

An additional sensitive avian species recorded within HCWA is the grasshopper sparrow, which is typically associated with grasslands or open scrub. This species lacks official sensitivity recognition but is recognized as being in decline on a local level and/or throughout their range.

Sensitive raptor species covered under the MSCP, the Cooper's hawk and northern harrier, are known to nest on-site. Oak woodland habitat on the wildlife area is highly suited to Cooper's hawks, and grassland habitats on-site are suitable to support the northern harrier. In addition, the state fully protected species, the white-tailed kite, was observed within oak woodland and foraging over chaparral during 2005 surveys.

A number of MSCP covered mammal species and state species of special concern are found within HCWA due to their association with sage scrub and sometimes chaparral vegetation. These species include the San Diego black-tailed jackrabbit, San Diego pocket mouse, California pocket mouse, and Diego desert woodrat. Several bats designated as state species of special concern and sensitive by the Western Bat Working Group (WBWG) detected during USGS surveys include the pallid bat, western mastiff bat, pocketed free-tailed bat, and big free-tailed bat. Other bats detected designated as sensitive under the WBWG include the western red bat, hoary bat, long-eared myotis, and Yuma myotis.

Sign of two large MSCP covered mammal species, the mule deer and mountain lion, are common throughout HCWA.

An additional sensitive species recorded within HCWA is the grasshopper sparrow, which is typically associated with grasslands or open scrub. This species lacks official sensitivity recognition but is recognized as being in decline on a local level and/or throughout its range.

Species with Potential to Occur On-site

In addition to the 29 non-listed sensitive wildlife species detected on-site, 25 non-listed sensitive species have a potential to occur on-site. Of these species, all 25 are considered state species of special concern, 6 are covered by the MSCP, 4 are considered narrow endemics under the MSCP, and 2 species are covered under another sensitivity category (Table 11).

D. NON-NATIVE SPECIES

1. Non-native, Invasive Plant Species

Non-native plant species that have the ability to outcompete native plants, and ultimately change the character of a native habitat, are of great concern to the HCWA managers. The California Invasive Plant Council (Cal-IPC) has identified the exotic plant species that are considered most invasive in its 2006 *Cal-IPC Invasive Plant Inventory*. The 2006 Inventory has been used to assess the potential non-native plant species threats to HCWA. The Inventory rates plants as High, Moderate, or Limited, based on scoring for three criteria: ecological impact, invasive potential, and ecological amplitude and distribution. It is important to note that even those species rated as Limited are invasive and should be of concern to land managers. Although the impact of each plant varies regionally, its rating represents cumulative impacts statewide. Therefore, a plant whose statewide impacts are categorized as Limited may have more severe impacts in a particular region. Conversely, a plant categorized as having a High cumulative impact across California may have very little impact in some regions. Table 12 identifies the level of infestation of each non-native invasive plant based on site surveys, and the Cal-IPC rating. The Cal-IPC ratings used in Table 12 are described below.

- **High** – These species have severe ecological impacts on ecosystems, plant and animal communities, and vegetational structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal and establishment. Most are widely distributed ecologically, both among and within ecosystems.
- **Moderate** – These species have substantial and apparent—but generally not severe—ecological impacts on ecosystems, plant and animal communities, and vegetational structure. Their reproductive biology is conducive to moderate to high rates of dispersal, though establishment is generally dependent upon ecological disturbance. Ecological amplitude and distribution may range from limited to widespread.

- **Limited** – These species are invasive but their ecological impacts are minor on a statewide level or there was not enough information to justify a higher score. Their reproductive biology and other attributes result in low to moderate rates of invasiveness. Ecological amplitude and distribution are generally limited, but these species may be locally persistent and problematic.

Currently, HCWA has a relatively moderate invasive exotic species problem. As mentioned previously, a total of 47 non-native species (22 percent of the flora) are reported from HCWA. As noted above, this local pattern (i.e., HCWA) parallels regional (i.e., San Diego County) patterns as well. Simpson and Rebman (2001) state that approximately 22 percent of the flora of the county is non-native and naturalized. The highest number of non-native taxa belongs to the Asteraceae (9 observed) and Poaceae (12 observed).

Table 12
Invasive Weeds Present within the Hollenbeck Canyon Wildlife Area

Species	Level of Infestation	Cal-IPC Rating
Giant reed (<i>Arundo donax</i>)	Fairly common	High
Australian saltbush (<i>Atriplex semibaccata</i>)	Uncommon	Moderate
Wild oat (<i>Avena barbata</i>)	Fairly common	Moderate
Wild oat (<i>Avena fatua</i>)	Uncommon	Moderate
Black mustard (<i>Brassica nigra</i>)	Fairly common	Moderate
Ripgut grass (<i>Bromus diandrus</i>)	Common	Moderate
Foxtail chess (<i>Bromus madritensis</i> ssp. <i>rubens</i>)	Uncommon	High
Tocalote (<i>Centaurea melitensis</i>)	Uncommon	Moderate
Bull thistle (<i>Cirsium vulgare</i>)	Scarce	Moderate
Blue gum (<i>Eucalyptus</i> sp.)	Scarce (locally common)	Moderate
Slender mustard (<i>Hirschfeldia incana</i>)	Fairly common	Moderate
California burclover (<i>Medicago polymorpha</i>)	Common	Limited
Tree tobacco (<i>Nicotiana glauca</i>)	Uncommon	Moderate
Bermuda buttercup (<i>Oxalis pes-caprae</i>)	Uncommon	Moderate
Castor bean (<i>Ricinus communis</i>)	Scarce	Limited
Russian thistle (<i>Salsola tragus</i>)	Uncommon	Limited
Peruvian pepper tree (<i>Schinus molle</i>)	Scarce	Limited
Mediterranean schismus (<i>Schismus barbatus</i>)	Common	Limited
Milk thistle (<i>Silybum marianum</i>)	Scarce	Limited
Tamarisk (<i>Tamarix parviflora</i>)	Scarce	High

Non-native species have their highest relative concentration in areas previously heavily grazed such as the pastures on the flatter terrain in the western portion of the site. In these areas extensive stands of non-native grasses and forbs such as wild radish, black mustard (*Brassica nigra*), mustard, ripgut grass, foxtail chess, California burclover, and filaree are dominant. The

dominance of these particular species in these areas along with their presence (to a lesser extent) in adjacent native communities would restrict the ability for their eradication or control.

Many of the large areas of grasslands and open habitats that were previously intensively grazed occur along the flatter portions of HCWA, immediately adjacent to SR 94 and Honey Springs Road. These areas are dominated by introduced grasses and forbs. Much of these habitats is being actively managed for dove hunting. Part of this management has involved seeding these areas with cereal wheat and safflower to attract doves. Minor habitat conversion, i.e., replacing the highly invasive species with less invasive species such as wheat and other species through this continued seeding, would reduce the extent of some of the source populations of the more aggressive invasives on HCWA.

Conversely, many of the hillsides that burned in the Honey Fire of 1996 are characterized by open shrubs with a dense understory of non-native grasses. It is anticipated that over time these hillsides will recover to a denser native shrub cover.

Within HCWA, the three invasive species of greatest concern, based on the Cal-IPC rating (i.e., High) are tamarisk (*Tamarix* sp.), giant reed (*Arundo donax*), and foxtail chess (*Bromus madritensis*). All of these species have the potential to expand the limits of their current populations and/or establish new satellite populations within HCWA.

Foxtail chess is most prevalent within the grasslands and open habitats on HCWA. Foxtail chess alters patterns of wildfire, microhabitat characteristics, nutrient cycling and light, negatively affecting annual native plant populations. Additionally, foxtail chess is especially well adapted to fire, recovering to pre-burn densities rapidly after a fire. Fire can actually contribute to its spread, raising fuel loads, which increases the intensity and spread of fires resulting in damage to native species (Bossard et al. 2000).

Tamarisk occurs infrequently along the perennial drainages within HCWA. Tamarisk is associated with dramatic changes in geomorphology, groundwater availability, soil chemistry, fire frequency, and plant community composition. High evapotranspiration rates by this species can result in the lowering of groundwater tables. Soil salinities increase as a result of inputs of salt from glands on this species' leaves. Increased salinity inhibits the growth and germination of native riparian plant species. High amounts of leaf litter can increase the frequency of fire where tamarisk is dominant in cover; moreover, this species resprouts vigorously following fires. These effects on the ecosystem from the presence of tamarisk can result in this species dominating riparian communities (Bossard et al. 2000).

Giant reed occurs within Dulzura Creek and a neighboring unnamed tributary on HCWA. It is a robust perennial that may grow 9 to 30 feet tall, spreading from horizontal rootstocks below the soil, and often forms large colonies (Bossard et al. 2000). This invasive species displaces native plants and associated wildlife due to the immense stands it forms, competing with native plant species by monopolizing soils moisture and shading. The result is a reduction in habitat and food supply to wildlife, particularly insect populations, which adversely affect special status aquatic and riparian species. Giant reed is also suspected of altering hydrological regimes, reducing groundwater availability, altering channel morphology, and potentially presenting fire hazards, especially near urbanized areas (Bossard et al. 2000).

Many of the species in Table 12, such as some of the annual grasses, are common or fairly common throughout HCWA. Because they are ubiquitous, their threat of expansion is considered low (i.e., there is no unoccupied habitat for them to expand into in the absence of large-scale natural or human-induced disturbances).

Disturbance events, natural or human-induced, can have a markedly significant effect on the expansion of non-native species. Many of the species identified in Table 12 would have a very high expansion threat post-disturbance (e.g., fire, floods, extensive grazing, etc.). However, though natural disturbances such as flooding and fires are a certainty over the long term, in an attempt to prioritize the threat for purposes of this LMP, the expansion threat assessment is based upon a species' perceived threat in the absence of a large-scale disturbance.

2. Non-native Wildlife Species

Eight non-native wildlife species have been recorded from HCWA, and many of these are considered invasive pests (Table 13). Non-native wildlife species are considered invasive when they threaten native biodiversity by disrupting or altering native ecological communities and have negative consequences for native species and habitats. Invasive animal species outcompete, prey upon, or disturb the habitat of native wildlife and may spread diseases. This section describes non-native wildlife in HCWA and how these species may impact the native fauna in the wildlife area.

Table 13
Non-native Wildlife Known to Occur in the Hollenbeck Canyon Wildlife Area

Common Name	Scientific Name
Invertebrates	
Red swamp crayfish	<i>Procambarus clarkii</i>
Fishes	
Mosquito fish	<i>Gambusia affinis</i>
Birds	
Brown-headed cowbird	<i>Molothrus ater</i>
European starling	<i>Sturnus vulgaris</i>
Mammals	
Domestic dog	<i>Canis familiaris</i>
House cat	<i>Felis cattus</i>
House mouse	<i>Mus musculus</i>
Virginia opossum	<i>Didelphis virginiana</i>

Non-native Invertebrates

The red swamp crayfish is a non-native species that often has an adverse impact on native populations of invertebrates, fishes, and frogs due to its highly predatory nature. In addition, burrowing activities of the swamp crayfish can cause damage to water control structures such as earthen dams and levees (NECIS 2004; USGS 2005b). The red swamp crayfish has been documented within creeks on HCWA by the Department. No invasive insects were observed during the 2004 USGS surveys (USGS 2004a), including the Argentine ant (*Linepithema humile*), a common pest that often occurs near urban fringes. This non-native ant can outcompete native ant species but is unpalatable to the coast horned lizard, resulting in a decline in food availability for this sensitive species.

Non-native Fish

One non-native fish species, the mosquito fish (*Gambusia affinis*), was observed in the streamchannel within Hollenbeck Canyon during focused fish surveys in 2002 and arroyo toad surveys in 2003 conducted by the Department and is also known to occur in many of the non-connected wildlife drinkers that occur within HCWA (Dillingham personal communication 2006). The mosquito fish has been nominated among 100 of the world's worst invasive species by IUCN's Invasive Species Specialist Group (Lowe et al. 2000). Although the mosquito fish may negatively impact native species, it is also commonly used as a non-chemical method of mosquito control. The potential impact to native species must be weighed against the need to control mosquitoes, which are the vector for West Nile and other viruses. The mosquito fish

population within HCWA is expected to thrive given the perennial condition of this streamchannel unless efforts to control or eradicate this species are taken. Mosquito fish that occur in non-connected waterways/ponds within HCWA are less of a concern; however, mosquito fish populations in connected natural streams should be eradicated. Mosquito fish are currently kept as brood stock in the main pond at the adjacent RJER to be used throughout the ecological reserve area for mosquito control.

Non-native Amphibians and Reptiles

No non-native amphibians or reptiles have been documented within HCWA.

Non-native Birds

Two non-native avian species, the European starling (*Sternus vulgaris*) and the brown-headed cowbird (*Molothrus ater*), have been reported from HCWA. Both species are tied to the urban landscape. The European starling was purposefully introduced by Europeans over 100 years ago. However, the European starling is known to venture a field into natural habitat and compete with native birds for nest cavities. This has had a devastating effect on populations of the purple martin (*Progne subis*), a sensitive species with the potential to occur in HCWA, as well as woodpeckers and bluebirds throughout the United States. The brown-headed cowbird is a brood parasite that has migrated to the west coast from its original distribution in the Great Plains. It is attracted to seeds, larvae, and insects that are associated with manure of horses and livestock. This species does not build its own nests but rather lays its eggs in the nests of native birds who then feed and care for the young. Eggs and young of the native species that are already in the nest are usually pushed out. The cowbird is a contributor to the decline of several sensitive species, including the least Bell's vireo, California gnatcatcher, yellow warbler, and southwestern willow flycatcher.

Non-native Mammals

Domestic dogs (*Canis familiaris*) and domestic cats (*Felis cattus*) are present on HCWA. Dogs have been detected throughout portions of the wildlife area, and house cat sign (tracks) were detected within the eastern portion of the wildlife area. These animals can have a devastating effect on the native populations of birds, mammals, lizards, and amphibians. For example, recent studies have shown that free ranging cats can kill hundreds of wild animals every year, and it is believed that the decline in native song sparrow population is partially due to predation

by the house cat (Coleman et al. 1997). The two other non-native species, the house mouse, and Virginia opossum (*Didelphis virginianus*), do not pose a major threat to native wildlife.

E. WILDLIFE-LINKED DISEASES

Wildlife-linked diseases are caused by harmful viruses or bacteria that can negatively impact wildlife, either directly or indirectly. These diseases present a threefold problem. First, they can weaken, sicken, or kill native wildlife thereby negatively impacting populations. This is especially worrisome in populations of rare or isolated species. Second, the infected wildlife can sometimes serve as vectors, passing the disease microorganisms on to humans, who may not have the appropriate immune response to fight off the infection. And third, vector control measures to protect humans can inadvertently harm native wildlife. The wildlife-linked diseases of greatest concern in the vicinity of HCWA are West Nile virus and Avian Influenza. Although neither has a high potential to occur on HCWA, these wildlife-linked diseases are discussed briefly below.

1. West Nile Virus

Originating in Uganda, the West Nile virus was first detected in the United States in 1999 (CDC 2005). It generally causes mild to moderate flu-like symptoms in humans but can also cause encephalitis (inflammation of the brain) or meningitis (inflammation of the lining of the brain and spinal cord). The virus is maintained through a complex life cycle involving wild birds and mosquitoes. Mosquitoes become infected with the virus by feeding on the blood of an infected bird. Humans, or other warm blooded animals, may become infected after being bitten by an infected mosquito, and there are records of infected reptiles as well (Boyce et al. 2004). The relevance of West Nile virus to the management of HCWA is that, in addition to impacting the health of people living nearby, this disease can potentially impact native wildlife directly through infected mosquito bites, or indirectly through vector control methods (Boyce et al. 2004). Rare or endangered birds may be especially at risk due to their limited population sizes and distribution. The Department routinely inspects HCWA for mosquito larvae in standing water and treats it as necessary. For more information on West Nile virus, go to the County of San Diego Vector Control website (<http://www.co.san-diego.ca.us/deh/chd/wnv/index.html>).

2. Avian Influenza

Avian Influenza (bird flu) is a viral infection in wild and domestic birds known as type A influenza. The Highly Pathogenic Avian Influenza (HPAI) H5N1 strain of the virus has not been found in North America as of June 2006. Wild waterfowl are the natural reservoirs of avian

viruses though most birds remain healthy and do not infect other birds or people. It is only when the virus mutates into the highly contagious strains that infected birds pose a health risk. Wild aquatic birds, especially of the orders *Anseriformes* (ducks, swans, and geese) and *Charadriiformes* (gulls, terns, and shorebirds) are carriers of the full variety of influenza A viruses (Harder and Werner 2006).

Avian influenza presents a threat to wild bird conservation in several ways. First, although most strains of avian influenza are relatively benign, HPAI H5N1 appears to be able to cause illness and death in many species of wild birds. Second, there may be speculation regarding wild birds spreading HPAI H5N1, resulting in calls for culling of wild birds to try to control or limit the spread of HPAI H5N1. Culling can be effective in controlling domestic animal diseases but there are no examples where culling of native wildlife has completely eradicated a wildlife disease (WCS 2005). Strategies that could help prevent the transmission of avian influenza, if detected in HCWA include monitoring, minimizing contact between domestic and wild bird populations, and educating people who regularly come in contact with bird populations. The Department is currently working with a multi-agency group to develop responses to various scenarios involving avian influenza (see the Department's website <http://www.dfg.ca.gov/avianflu/index.html> and associated fact sheets for more information).

F. HABITAT LINKAGES AND WILDLIFE MOVEMENT CORRIDORS

1. Habitat Linkages

Habitat linkages are patches of native habitat that serve as connections between other habitat patches and help reduce the adverse effects of habitat fragmentation. Although individual animals may not move through a habitat linkage, the linkage is a potential route for gene flow and long-term dispersal. Habitat linkages may serve both as habitat and avenues of gene flow for small animals such as reptiles, amphibians, and rodents. Habitat linkages may be represented by continuous patches of habitat or by nearby habitat "islands" that function as stepping stones for dispersal and movement (especially for birds and flying insects).

Several coordinated efforts have been made to identify critical wildlife movement corridors and habitat linkages throughout the state of California (CWC 2000), within San Diego County (Ogden 1996), and in the U.S./Mexican border region (CBI 2003a, 2004). Within the region of HCWA, the Otay Mountain-Cleveland National Forest linkage was identified by CWC (2000) as having a high priority for conservation. This linkage connects Otay Mountain and other federal and state protected lands near the Mexican border to the Cleveland National Forest, a large,

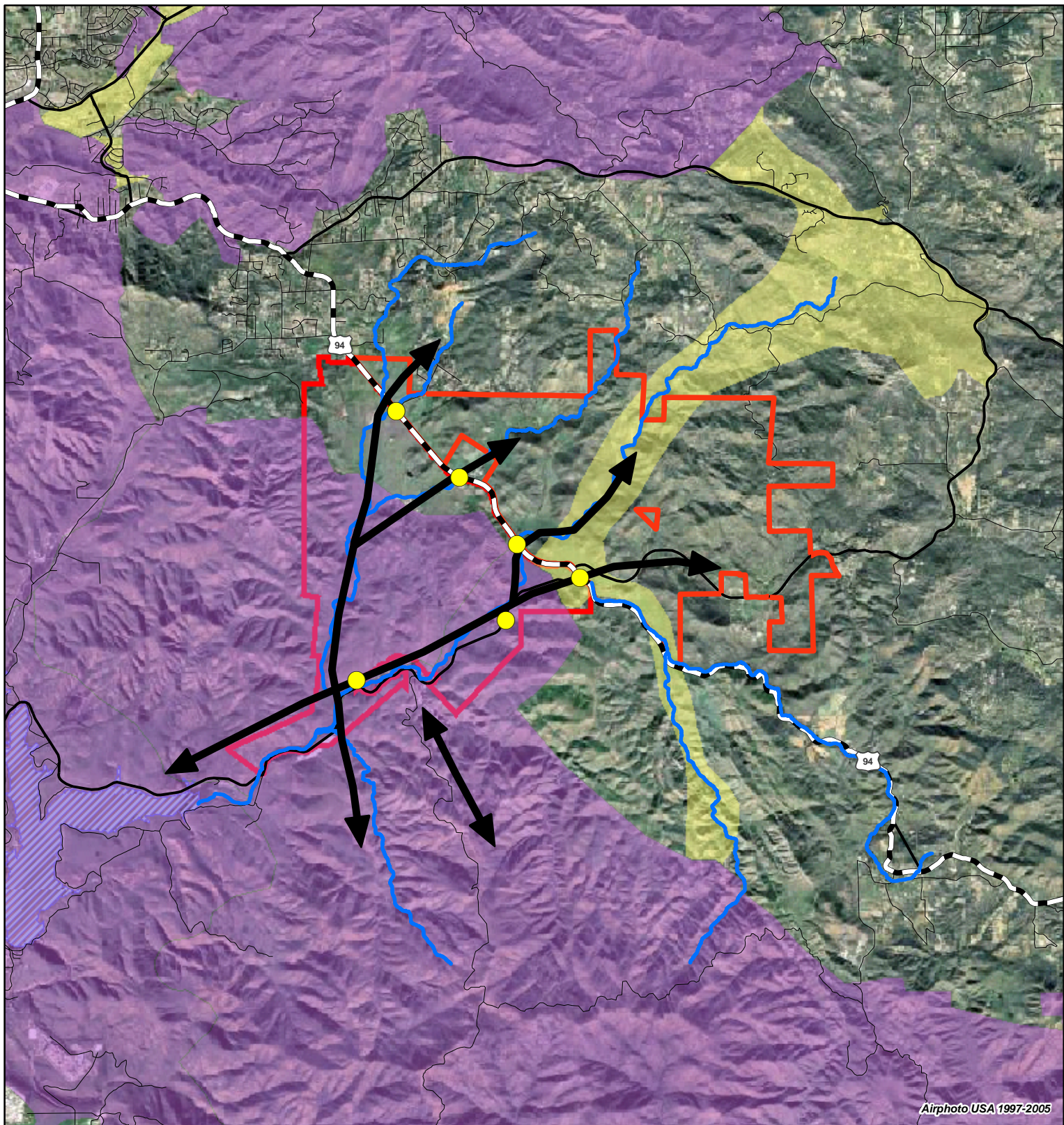
mostly contiguous area of federally protected land to the north. Taking a broader, bi-national perspective, this linkage fits within the Coastal Baja-Otay Mountain-Laguna Mountains critical linkage identified by CBI (2003a). The protected open space lands of HCWA and adjacent RJER are an important component of this regional linkage.

MSCP biological core and habitat linkage areas for the region surrounding HCWA are shown in Figure 15. A biological core area is land that is considered of great ecological importance to the MSCP. For example, it may contain biological resources that contribute to the survival of sensitive species, consist of a portion of a regional linkage/corridor, or contain large blocks of unfragmented habitat. Habitat linkages connect blocks of core areas to one another. Biological core and linkage areas were identified to assist local jurisdictions and special districts as one element to be considered in identifying their portion of the MSCP preserve system.

2. Wildlife Corridors

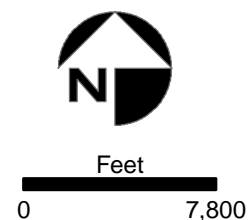
A wildlife corridor is a linear feature that allows animal movement between two patches of habitat. Corridors reduce the isolation of habitat fragments by providing a means for dispersal and genetic flow between habitats (CBI 2003b). Larger animals, such as the mountain lion and mule deer, tend to be more susceptible to habitat fragmentation due to their larger home ranges and, therefore, greater need for movement over a larger area of land. Smaller animals, such as the bobcat, although slightly less sensitive to habitat fragmentation, still require adequate movement corridors between habitat patches. However, some species, such as the coyote or raccoon, are fairly well adapted to disturbed habitat and are less vulnerable to changes in their environment. A chokepoint is a constricted segment of a corridor that restricts movement to some degree. A good example of this is a culvert underneath a highway that limits the functionality of wildlife movement by constricting the space through which wildlife can travel. As development continues to encroach upon rural southern California, maintaining wildlife corridors and habitat linkages will remain critical.

Wildlife movement corridors leading to and from HCWA are illustrated in Figure 15. Camera and track station surveys have shown that Dulzura Creek, including the tributary along Hollenbeck Canyon, and Jamul Creek are important movement corridors for a variety of medium- and large-sized mammals (USGS 2002; CBI 2003b). The wildlife moves in and out of the wildlife area through four culverts that cross underneath SR 94. SR 94 has been identified as a barrier to wildlife movement (CBI 2004), and the culverts act as a chokepoint in this area. Only one of these (at the southern branch of Jamul Creek) is large enough to accommodate the movement of mule deer (USGS 2002). Other species moving through the culverts include



- Legend**
- MSCP Biological Core Areas
 - MSCP Habitat Linkage Areas
 - Highway Undercrossings
 - Wildlife Movement Corridor

- Basemap Legend**
- HCWA and RJER Boundaries
 - State Highway
 - Major Road
 - Local Road
 - Stream
 - Lake/Reservoir



mountain lions, bobcats, coyotes, grey foxes, skunks, raccoons, and opossums. In addition to Dulzura and Jamul creeks, Little Cedar Creek to the south is considered a valuable movement corridor as well, facilitating north-south movement between the San Ysidro Mountains and the Jamul Mountains, Proctor Valley, and San Miguel Mountains via Jamul Creek (LMA 1994). An increase in development in the area will necessitate the enhancement of existing crossing structures, and the addition of new underpasses as traffic in the area increases. Wildlife fencing along SR 94 can also be used to reduce road kills.