1.0 INTRODUCTION

Live Oak Associates (LOA) is pleased to submit a biological resources background report for the Millerton Lake Resource Management Plan. Mr. Chuck Peck of the Sierra Foothill Conservancy authorized preparation of the report to discuss biodiversity and habitat as part of the Millerton Area Watershed Assessment.

1.1 BACKGROUND

The Millerton Area Watershed Coalition (Coalition) originally formed in 1998 as a collaborative organization with Pre-CALFED Program membership. Charter members included the Sierra Foothill Conservancy, Topping Ranch, California Department of Parks and Recreation, California Department of Fish and Game, US Bureau of Land Management, US Bureau of Reclamation, and the US Forest Service. More recently, agencies such as the State Water Resources Control Board and Department of Water Resources have joined the organization. The intent of the Coalition was to improve communications and to collaborate amongst each other regarding issues and opportunities that may be within the watershed area. The agencies focused on resource assessments and protection, of the Millerton Area Watershed around the San Joaquin River and into the foothills east of Fresno.

The study area consists of approximately 90 square miles and is located 10 to 20 miles northeast of Fresno, California, in the foothills of the central Sierra Nevada. Straddling the Madera and Fresno County line, the study area includes a significant reach of the San Joaquin River, Millerton Reservoir that was created in 1944, and the steeply rolling foothill terrain to the north and south that culminates in dramatic basaltic tabletop mesas (Figures 1 and 2).

The watershed encompasses the San Joaquin River drainage from Friant Dam for 26 miles up to Kerckhoff Dam. The total watershed is approximately 163,000 acres of which 115,000 acres are located in Madera County, and 48,000 acres are located in Fresno County. Demographically the area covers 4,040 total parcels-2,052 parcels in Madera County and 1,978 parcels in Fresno County. Approximately 30,000 acres of the watershed are currently under public ownership and may be considered conservation lands (public lands, research areas, conservation easements or conservancy lands).

Elevations in the watershed range from 400 feet below Millerton Lake to nearly 4,500 at the summit of Thornberry Mountain. The area is predominately covered with oak woodlands and some coniferous forest.

Figure 1 Millerton Lake Resource Management Plan Site/Vicinity Map

Figure 2 Millerton Lake Resource Management Plan U.S.G.S. 1:100,000 Quadrangle Series

Approximately 300 miles of rivers and streams, including man-made diversions, run through the watershed. It is estimated that each year, 1.8 million acre-feet of water flows through the watershed of which a maximum of 525,000 acre-feet is stored at Millerton Lake. Nearly 98% of that water is allocated and diverted through the Friant-Kern and Madera Canals at Friant Dam.

In June 2001, the Coalition received funds from the CALFED Bay-Delta Watershed Program to expand the organization to include local property owners as well as other public participants regarding future studies or activities within the watershed area. By expanding the Coalition to include private landowners, the general public, and public agencies, additional information about the Millerton Area Watershed could be obtained.

A Steering and Technical Advisory Committee (TAC) now governs the Coalition. There are currently 19 members with 4 alternates on the Steering Committee representing various stakeholder interests in the watershed. Such interests are varied and include: private property owners; environmental, educational and recreational advocates; the water community; local government, and tribal entities. The TAC is composed of State and Federal agencies, including the original charter members. The TAC serves as a source of technical and financial support to the Coalition, the Steering Committee and efforts undertaken by the group in general. TAC agencies are responsible for managing approximately 20% of the watershed area.

The mission of the Millerton Area Watershed Coalition is to "conduct a comprehensive assessment of the watershed to provide information that promotes the protection and enhancement of the watershed, including the economic and environmental well being of the communities within it and of its downstream users". The tasks that will accomplish this mission include:

- Community Outreach and Education-Conducting educational workshops and community presentations, writing press releases, and providing informational mailings.
- Comprehensive Watershed Assessment- Assessing the watershed by gathering and preparing individual studies (historic, future and current) of the area.
- Planning for Watershed Projects-Securing funding to continue the efforts of the Coalition, and developing an implementation plan for creation of a comprehensive watershed work plan.
- Collaboration with Other Similar Organizations-Sharing information and experiences with other watershed groups, agencies and organizations.
- Reporting of Findings and Results-Preparing monthly and annual reports to CALFED, and quarterly reports to the Bureau of Reclamation.
- Watershed Assessment Benefits-The assessment will serve as a repository of individual historic, current and future land studies. Specific benefits of the assessment include: quantifying existing conditions and improving the health of the watershed; establishing consistent and reliable data for

decision-makers with responsibilities in watershed management; opportunities to identify contaminants that may be affecting water quality; validating information in which to prioritize actions and activities for improving the health of the watershed; creating a baseline in which to measure improvements, and lastly management and use decisions based on scientific evidence. Samples of watershed assessment criteria will include stream and ecosystem data (natural and man-made), and social, cultural, and economic conditions.

Since its inception, the Coalition has been successful in completing land assessments and studies of land management practices such as cattle grazing. However, the focus of the Coalition has been and will continue to be on the enhancement of recreational opportunities.

The US Bureau of Reclamation awarded funding to the Coalition to conduct an extensive assessment of the Millerton watershed area. The assessment requires the involvement of various stakeholders, including property owners in order to successfully evaluate the area. In the future, it is expected the Coalition will be responsible for developing a comprehensive Watershed Management Plan for the Millerton area.

1.2 PUROSE OF THE BIOLOGICAL RESOURCES BACKGROUND REPORT

The biological resources background report is intended to support the US Bureau of Reclamation's Management Plan for Millerton Lake, as well as private and public lands around the lake. The specific study area is located in the Sierra Foothills of Fresno and Madera Counties, and encompasses, Sections 29 through 36 in Township 9 South, Range 22 East, all 36 sections in Township 10 South, Range 22 East, Sections 5 through 8 and 18 in Township 11 South, Range 22 East, Sections 1 through 18 in Township 11 South, Range 21 East and Sections 15 through 36 in Township 10 South, Range 21 East.

The purpose of the report is to address the following biological resource topics:

- ?? existing biotic habitats;
- ?? known native biological diversity;
- ?? occurrences of special status plant and animal species;
- ?? known locations of sensitive/special habitats;
- ?? threats to native biological diversity;
- ?? possible barriers to wildlife movement and;

The focus of the report is on the study area as it is framed within a broader regional context of the Sierra foothills as defined by Millerton Area Watershed Coalition's boundaries.

2.0 SETTING

The approximately 90-square-mile study area is located 10 to 20 miles northeast of Fresno, California, in the foothills of the central Sierra Nevada. Straddling the Madera and Fresno County line, the study area includes a significant reach of the San Joaquin River, Millerton Reservoir that was created when Friant Dam was completed in 1941, and the steeply rolling foothill terrain to the north and south that culminates in dramatic basaltic tabletop mesas.

Regionally, the study area is located within two topographic transition zones, one located east to west and the other north to south.

One is represented by the transition from the lowlands of the eastern San Joaquin Valley to the rugged foothills of the Sierra Nevada. Portions of the study area include the gently rolling terrain below Millerton Reservoir that arguably might be considered a portion of the eastern San Joaquin Valley. Elevations range from approximately 400 to 500 feet National Geodetic Vertical Datum (NGVD). Elevations, however abruptly increase to the north and east of the Millerton Reservoir where the San Joaquin River has cut through granite bedrock and the distinctive basaltic flow that meanders from the north to the southwest. The basaltic tabletops rise nearly 1,500 feet above the bed of the San Joaquin River in a span of 1-2 miles. The highest elevation of the study area can be found in its northeast corner at the location of Rock Mountain, the summit of which is 2, 869 feet NGVD.

The study area is also located in a physiographic transitional zone separating the gently sloping foothills of the northern Sierra from the much more vertical and rugged terrain of the southern Sierra foothills. North of the study area the foothills are somewhat attenuated from west to east, gradually ascending to the higher elevations of the Sierra without any single abrupt discontinuity in elevation. To the south, the foothills are compressed into a narrower band of steep ridges just west of the more precipitous slopes of the higher elevations of the Sierra itself.

2.1 GEOLOGY

The Sierra Nevada consists primarily of a large block of plutonic rocks (referred to as batholith) that formed deep within the earth during the past 65 million years (Veirs et. al 1988). These plutonic rocks formed when magma rose near the earth's surface and gradually cooled to form various types of granitic rock overlaid by sedimentary and metamorphic rock. This block of rock has been dramatically uplifted

by tectonic faulting along a fracture zone located at its eastern edge within the past 25 million years, thus creating the precipitous eastern escarpment of the Sierra with its relatively long gentle western slope. During the time of uplift, much of the sedimentary and metamorphic rock originally present has been eroded away, thus exposing the plutonic rocks. The range has been sculpted by stream erosion, and glaciation during the last 10 million years having created some of the most distinctive canyons and U-shaped valleys of both the east and west sides.

The plutonic rocks of the Sierra consist of many types of granitic rock containing various proportions of light and dark colored minerals. Light colored crystals of quartz and orthoclase and plagioclase feldspar are intermixed with dark colored minerals consisting primarily of horneblende and biotite (Poole 1997).

Three flat top mesas or tables, including Kennedy Table, McKenzie Table, and Table Mountain are located within the study area. These three mesas are the remains of a Miocene lava flow dating back some 10 million years (Poole 1997). Although the location of the vent from which this lava issued is not known with certainty, the likely location is near Kennedy Table where the flows are the thickest. The flows presumably followed the ancestral path of the San Joaquin River, burying the river's bed. Rounded cobbles typical of a Sierran River can be found under the basalt of the old flow. During the 10 million years since the last eruptions, the granite bedrock surrounding the lava flow has eroded away, leaving the more erosion-resistant basalt as the nearly level tabletops visible today.

2.2 SOILS

Most soils of the study area, particularly in the foothills north and east of the Millerton Reservoir, have formed in place from granite or basaltic bedrock (NRCS 1972). These soils are often shallow and consist of coarse decomposed granite relatively devoid of organic matter. Exposed rock outcrops are relatively common. Colluvial soils (formed from materials deposited in place by gravity) are found at the higher elevations within the study area under steep slopes. Typical examples of such soils include Ahwahnee, Coarsegold, and Vista soils.

Some soils have formed from material transported from the Sierra and deposited at the base of its foothills by running water. These alluvial deposits are found at the lower elevations of the study area on the rolling hills of the Friant and Millerton areas. Such soils consist of sandy loams and clay soils that have a wide range of quality and depth. Typical examples include soils of the Centerville, Raynor, Rocklin, San Joaquin, and Sesame Series. Not uncommonly these soils have developed a hummock and swale

topography underlain by a strongly cemented silica hardpan layer 12 to 36 inches below the surface. Drainage through these soils is impeded by the hardpan layer during the rainy winter months, resulting in a "perched" water table, and the formation of seasonal pools in depression swales. Since the time of the Pleistocene, the pools have developed a unique flora and fauna.

2.3 HYDROLOGY

The 90-square mile study area encompasses a 19.5 mile reach of the San Joaquin River, Millerton Lake, a 2.25-mile section of the Friant-Kern Canal, 1.0-mile section of the Madera Canal, a 2.5 mile reach of Cottonwood Creek, a 4.25-mile reach of Big Sandy Creek, a 1-mile reach of Finegold Creek and a 2.75-mile reach of North Little Dry Creek (Figure 3).

In early spring, the San Joaquin River carries the snowmelt from the Sierra Nevada Mountains, filling Millerton Lake Reservoir, which has a maximum storage capacity of 520,000 acre-feet. Through the growing season (spring and summer months) water is released, into the 36-mile Madera Canal and the 152-mile Friant-Kern Canal, and is delivered to farmers who irrigate over one million acres on the east side of the southern San Joaquin Valley.

When the thin soils of the study area have become saturated surface runoff leaves the site via sheet flow that collects in broad swales or seasonal drainages. Flows of surface runoff in the smaller swales appear to be ephemeral. That is, the flows occur during and immediately after heavy rainstorms, but do not persist for more than a few days. Flows of longer duration occur in larger seasonal drainages where there is a defined bed and bank. The upper reaches of the Fine Gold Creek are perennial, but within the study area this creek is typically dry in late summer and early fall where it joins Millerton Lake. Otherwise, the only perennial drainage is the San Joaquin River itself, which is fed through the summer by the melting snow of the highest elevations of the watershed.

2.4 CLIMATE

The study area is located in a region having a Mediterranean climate. Summers are dry and typically warm with daytime temperatures commonly exceeding 100^{o} Fahrenheit. Winters are rainy and cool with daytime temperatures rarely exceeding 65^{o} Fahrenheit. Annual precipitation in the general vicinity of the study area is highly variable from year to year. Average annual rainfall is approximately 20 inches,

Figure 3 Millerton Lake Resource Management Plan Hydrologic Features

almost 85% of which falls from late October through early April. Winter rainfall infiltrates the study area's soils through the early part of the winter. During winters of roughly average precipitation, the soils of the site reach field capacity by February or March, at which time flows in the seasonal drainage channels reach their maximum level.

3.0 BIOTIC HABITATS

Nine biotic habitats have been identified within the 90-square-mile study area as described by the California GAP analysis project (Davis et. al 1998) (Figure 4). The digital California GAP Vegetation layer used in this report provides the habitat name that is used by the California Natural Diversity Database (CNDDB) and the Wildlife Habitats Relationship (WHR) System (Table 1). Habitat names were used from both the CNDDB and WHR habitat classification systems in Figure 4 to describe the biotic habitats.

The California Gap Analysis Vegetation layer has a minimum mapping unit area of 247 acres and therefore did not map the Northern Basalt Flow Vernal Pools and Swales located on Table Mountain, McKenzie Table, and Kennedy Table. Instead these three areas were mapped as non-native grasslands.

TABLE 1. BIOTIC HABITATS OF THE STUDY AREA

CNDDB Habitat	WHR Habitat	Acreage	Percentage of Study Area
Foothill Pine Oak Woodland	Blue Oak-Foothill Pine Woodland	23,234	40.34%
Foothill Pine Oak Woodland	Blue Oak Woodland	16,166	28.07%
Non-Native Grassland	Annual Grassland	9,108	15.93%
Interior Live Oak Forest	Montane Hardwood	4,063	7.00%
Permanently-Flooded Lacustrine	Lacustrine	3,409	5.92%
Streams and Canals	Riverine	1,211	2.10%
Agricultural Land	Cropland	822	1.43%
Interior Live Oak Woodland	Montane Harwood	176	0.31%
Orchards and Vineyards	Orchard and Vineyards	87	0.15%
Vernal Pools (Northern Basalt Flow and Northern Claypan)		~ 70	0.14%

The three dominant habitats, comprising approximately 84.34% of the study area are the Blue Oak-Foothill Pine Woodland, Blue Oak Woodland and Non-Native Grassland.

Figure 4 CAL GAP Vegetation

3.1 BLUE OAK-FOOTHILL PINE WOODLAND

Blue Oak-Foothill Pine woodland occurs within the study area at an approximate elevation range of 1,100 to 2,100 feet NGVD. Frequently this habitat type occurs on steep rocky slopes with shallow soils. The canopy layer consists primarily of foothill pine (*Pinus sabiniana*) and the blue oak (*Quercus douglassi*), although a interior live oak (*Quercus wizlenzii*) is also present. The density of overstory trees is directly related to aspect and the resulting water stress that occurs in summer and fall. Accordingly, south-facing slopes support considerably fewer trees than do north-facing slopes. A shrub understory includes scattered stands of poison oak (*Toxicodendron diversilobum*), California buckeye (*Aesculus californica*), wedgeleaf ceonothus (*Ceonothus cuneatus*) and blue elderberry (*Sambucus mexicana*). Herbaceous species occurring beneath the trees and shrubs comprise a mixture of non-native grasses and forbs, most of European origin. The dominant grasses include (*Bromus diandrus*), soft chess (*Bromus hordeaceus*), wild oats (*Avena sp*.), and rattail fescue (*Vulpia myuros*). Common forbs include broadleaf fillaree (*Erodium botrys*), red-stemmed fillaree (*Erodium cicutarium*), and smooth cat's ear (*Hypochaeris glabra*).

A considerable number of native spring-flowering forbs are expected to occur in the study area during winters of average precipitation. Eastwood's fiddleneck (*Amsynckia eastwoodiae*), rusty popcorn flower (*Plagiobothrys nothofulvus*), red maids (*Calandrina ciliata*), and caterpillar phaecilia (*Phacelia cicutaria*) are commonly observed during late winter and early spring. As the spring-flowering annuals set seed and die, summer annuals become prominent. For example, Turkey mullein (*Eremocarpus setigerus*), nude buckwheat (*Eriogonum nudum*), and Heerman's tarweed (*Holocarpha hermanii*) are common in this habitat. The prevalence of native grasses and forbs can be highly variable from year to year, depending on winter rainfall, grazing regime, and periodicity of fires.

Animals living in this community are highly dependent on a seasonally available food supply in the form of acorns that can be a bonanza in some years and almost nonexistent in others. The acorns of blue oaks provide a food staple for regional fauna and contribute to a remarkable species richness and diversity. They are eaten by a variety of birds and mammals and formerly were a nutrition source for local Indians (Shoenherr 1983). However, this supply fluctuates wildly from year to year and causes periodic booms and crashes in regional fauna, particularly California gray squirrels (*Sciurus griseus*). Acorn woodpecker (*Melanerpes formicivorous)* populations are less susceptible to the potential devastating effects caused by poor acorn years because they are more able to move to zones where other species of oak are predominant.

The phenomenon of plant species such as blue oaks producing bumper crops of acorns in some years and a dearth of acorns in others, with no apparent biotic or abiotic causes such as drought or disease having occurred is called masting. The advantage of this strategy to oaks is that more seeds may be produced in some years than seed predators can possibly consume, thus increasing the odds that some acorns will produce trees that will mature and produce seed in turn (Schnurr et al. 2002).

Oak woodlands of the study area provide habitat for numerous amphibians and reptiles. Thick leaf litter and decaying logs provide the moist microclimate suitable for amphibians such as California Newt (*Taricha torosa*), black-bellied salamander (*Batrochoseps nigriventris*), and California slender salamander (*Batrachoseps attenuatus*). Seasonal pools and creeks provide possible breeding habitat for western toads (*Bufo boreas*) and Pacific treefrogs (*Pseudacris regilla*). Western fence lizards (*Scleroporus occidentalis*) are attracted to rocks, logs and tree trunks. Brush and piles of downed branches and leaves provide habitat for more reclusive lizards such as the Gilbert's skinks (*Eumeces gilberti*) and southern alligator lizards (*Gerrhonotus multicarinatus*). Common kingsnakes (*Lampropeltis getulus*), gopher snakes (*Pituophis melanoleuca*) and western rattlesnakes (*Crotalus viridis*) are common predators of lizards and small mammals.

Foothill pines and blue oaks provide food and shelter for a wide variety of resident bird species. California quail (*Callipepla californica*) use dense vegetation for cover at night and mid-day, and then forage in brush and open areas for seeds and insects. Acorns are consumed by band-tailed pigeons (*Columba fasciata*), scrub jays (*Aphelocoma coerulescens*), and acorn woodpeckers in the late fall when this food is abundant. Scrub jays and acorn woodpeckers cache acorns and subsist on them later in the season. Cavities in old oak trees provide homes for a variety of resident bird species. Large cavities may be used for nesting by barn owls (*Tyto alba*) and western screech owls (*Otus kenicottii*). Acorn woodpeckers, western bluebirds (*Sialia mexicana*), and white-breasted nuthatches (*Sitta carolinensis*) nest in smaller cavities. Other resident species common to these woodlands include northern flickers (*Colaptes auratus*), Nuttall's woodpeckers (*Picoides nuttallii*), oak titmice (*Baeolophus inornatus*), and bushtits (*Psaltriparus minimus*), to name just a few.

Blue oak woodlands of the study area are also visited by various migrant species. A number of species arrive in these woodlands in early fall and then remain through the winter and some of the spring. These species include white-crowned sparrows (*Zonotrichia leucophrys*), golden-crowned sparrows (*Zonotrichia atricapilla*), dark-eyed juncos (*Junco hyemalis*), and spotted towhee (*Pipilo maculates*). Neotropical migrants arrive in spring from South and Central America for the purpose of nesting and

raising one or more broods. Western kingbirds (*Tryannus verticalis*), which arrive at the lower elevations of the study area in late March or early April, can frequently be seen hawking insects from fences and power lines. Cliff swallows (*Petrochelidon pyrrhonota*) and barn swallows (*Hirundo rustica*) arrive at about the same time, and immediately begin constructing mud nests under the eaves of buildings or, more frequently, under bridges spanning creeks and canals. Other migrants nesting in oak woodlands of the study area include Bullock's orioles (*Icterus bullocki*), ash-throated flycatchers (*Myiarchus cinerascens*), and house wrens (*Troglodytes aedon*).

These woodlands are also home to resident and migrant raptors (i.e. hawks and owls). Turkey vultures (*Cathartes aura*) occur in the study area between the months of March and October. Winter migrants often include sharp-shinned hawks (*Accipiter striatus*) and merlins (*Falco columbarius*). Resident raptors that both forage and breed in oak woodlands of the study area include red-tailed hawks (*Buteo jamaicensis*), red-shouldered hawks (*Buteo lineatus*), golden eagles (*Aquila chrysaetos*), western screech owls (*Otus kennicottii*), and great horned owls (*Bubo virginianus*).

Oak woodlands of the study area also provide habitat to a great diversity of mammals. Small mammals found in the herbaceous and brushy understory commonly include up to four species of white-footed mice (*Peromyscus maniculatus, P. boylii*, *P. californicus*, and *P. truei*), California voles (*Microtus californicus*), and western harvest mice (*Reithrodontomys megalotis*). Broad-footed moles (*Scaphiopus latimanus*) and Botta's pocket gophers (*Thomomys bottae*) occur in grassy areas, as do the most conspicuous small mammals of the foothill oak woodlands, the California ground squirrel (*Spermophilus beecheyi*). Brush rabbits (*Sylvilagus bachmani*) are very common in areas where manzanita, buckbrush and poison oak are well-established. Mule deer (*Odocoileus hemionus*) are the most conspicuous large mammal. These herbivores feed in openings of the foothill pine-blue oak woodland where grasses, forbs, and browse (shrubs) are most abundant. They eat acorns when they are available in the fall. Their primary predator is the cougar (*Puma concolor*), whose tactic is to move into close range and ambush from cover. Other mammalian predators include gray foxes (*Urocyon cinereoargenteus*), badgers (*Taxidea taxa*), striped skunks (*Memphitis memphitis*), and bobcats (*Lynx rufus*). The black bear (*Ursus Americana*) is the largest mammal within this habitat. This species is also omnivorous, taking whatever food source is available. Suitable forage may include grubs, roots, berries, live prey such as fish and deer, and carrion. Acorns are taken when available in the fall, which help fatten them up for the winter, when high calorie forage is less available.

Numerous bats are associated with this habitat, because basalt cliffs, tree cavities, and buildings provide abundant roosting habitat. Bats common to the area include long-legged myotis (*Myotis volans*), California myotis (*Myotis californicus*), little brown myotis (*Myotis lucifugus*), and small-footed myotis (*Myotis leibii*), all of which often roost under tree bark. Hoary bats (*Lasiurus cinereus*) may roost under the foliage of large trees. Big brown bats (*Eptesicus fuscus*) and pallid bats (*Antrozous pallidus*) may find roosting opportunities in tree cavities. Townsend's big-eared bat (*Plecotus townsendii*) may forage here but would roost elsewhere. All of the bat species that occur regionally are insectivorous. Most take their prey in flight. However, the pallid bat takes hard-shelled prey such as scorpions and Jerusalem crickets off the ground.

3.2 BLUE OAK WOODLAND

As Described by Holland (1986), blue oak woodland varies from open savannahs with a non-native grassland understory (usually at lower elevations) to fairly dense woodlands with a shrub understory at higher elevations. The blue oak woodland of the study area is more like an open savannah than dense woodland with very little to no shrub understory. The blue oak woodland borders on both sides of the 19.5 mile reach of the San Joaquin River, occurring at an approximate elevation range between 600 feet NGVD to about 1,100 feet NGVD on rolling to hilly terrain. Widely spaced blue oaks and interior live oaks provide most of the overstory vegetation, although a few foothill pines at an elevation between 900 feet NGVD to 1,200 feet are present. At this elevation, a sparse shrub understory that includes poison oak, California buckeye, wedgeleaf ceonothus, and blue elderberry is also present. At elevations below about 900 feet NGVD, the non-native grasses and forbs, most of European origin, replaced the shrubby vegetation stratum. The dominant grasses and forbs included are the same species found in the non-native grassland. Other common forbs include dove's-foot geranium (*Geranium molle*), miner's lettuce (*Claytonia perfoliata*), and caterpillar phacelia. As the spring-flowering annuals set seed and die, summer annuals become prominent. Just as in the non-native grassland, the dried remains of dove weed and Heerman's tarweed are evident in the understory of the blue oak woodland. The blue oak woodland intergrades into the non-native grasslands at the lower elevations and the Blue Oak-Foothill Pine habitats at the higher elevations.

This habitat supports many of the same assemblages of wildlife as the foothill pine-blue oak woodland; however, owing to a slightly higher moisture regime, there is a greater diversity of plants as well as insects, which in turn support a somewhat richer fauna. Past studies of this habitat type indicate that as

many as 29 amphibian and reptile species, 57 bird species, and 10 mammal species find this mature habitat community suitable or optimum for breeding (DFG 1988).

Amphibians and reptiles typical also of the blue oak-foothill pine woodlands also occur in blue oak woodland.

Bird assemblages would also be similar to the foothill pine-blue oak woodland habitat, with the greater moisture regime of the blue oak woodland providing a slightly richer avian fauna. In addition to those species would be American robins (*Turdus migratorius*), which arrive in winter to feed on worms and insects in the soil, and cedar waxwings (*Bombycilla cedrorum*), which arrive in large flocks in the fall to eat berries. Near watercourses, cavities in blue oaks may be used by wood ducks (*Aix sponsa*) for nesting.

Mammals occurring in blue oak woodlands would be generally the same as those occurring in blue oak-foothill pine woodlands.

3.3 NON-NATIVE GRASSLANDS

Annual non-native grasslands occur within the study area at an elevation range between 300 feet NGVD to about 600 feet NGVD, occurring south and west of Millerton Lake. Vascular plants are limited to annual grasses and forbs, many of European origin. Trees and shrubs are for the most part, absent from this habitat. Common, non-native annual grasses include brome (*Bromus diandrus)*, soft chess (*Bromus hordeacous*), red brome (*Bromus madritensis* ssp. rubens), wild oats (*Avena fatua* and *A. barbata*), and rat-tail fescue (*Vulpia myuros*). Broad-leaf filaree (*Erodium botrys*), cut-leaf filaree (*Erodium cicutarium*), smooth cat's-ear (*Hypochaeris glabra*), and fiddleneck (*Amsinckia menziesii* var. *intermedia*) are the dominant non-native forbs within this habitat.

Native early-flowering forbs common to non-native grassland habitat include shooting star (*Dodecatheon hendersonii*), tidy tips (*Layia fremontii*), goldfields (*Lasthenia californica*), popcornflower (*Plagiobothrys nothofulvus*), lacepod (*Thysanocarpus curvipes*), and wild hyacinth (*Dichelostemma capitatum* ssp. *capitatum*). Frying pans (*Eschscholzia lobbii*), purple sanicle (*Sanicula bipinnatifida*), valley tassels (*Castilleja attenuata*), tomcat clover (*Trfolium willdenovii*), purple owl's clover (*Castilleja exserta* ssp. *exserta*), miniature lupine (*Lupinus bicolor*), and Ithuriel's spear (*Triteleia laxa*) are also common to this habitat and occur later in the spring. Summer annuals common to this habitat include

dove weed and Heerman's tarweed. Non-native grassland intergrades with Blue Oak Woodland at higher elevations.

Due to the poor cover provided by grasses, most terrestrial species associated with this habitat are fossorial (live in underground burrows) or are large, cursorial (fast running) mammals. Still others may forage in grassland habitats, but seek shelter in other habitats. In the non-native grasslands of the region, insects such as ants and grasshoppers are the most common animal species. Reptiles are the most common vertebrates.

Grasslands of the study area provide aestivation habitat for the California tiger salamander (*Ambystoma californiense*), western spadefoot (*Scaphiopus hammondi*) and the western toad, all of which breed in vernal pools. Western whiptails (*Cnemidophorus tigris*) and western fence lizards (*Sceloporus occidentalis*) occur in this habitat, especially along fence lines and grassland edges where cover is nearby. Gopher snakes (*Pituophis melanoleucus*) and common kingsnakes (*Lampropeltis getulus*) commonly hunt lizards and small mammals in grasslands.

Western meadowlarks (*Sturnella neglecta*) are among the most conspicuous resident birds of this habitat. These birds are highly vocal and can be observed singing from atop fenceposts, rocks and shrubs. Western meadowlarks forage on the ground for seeds and insects and nest in tall grass. California horned larks (*Eremophila alpestris actia*), a California species of special concern nests in open areas and lay eggs that are camouflaged by cryptic coloration. Other species that may be found in the open grasslands include savannah sparrows (*Passerculus sandwichensis*), and lark sparrows (*Chondestes grammacus*). Brambles and thickets interspersed within this habitat and along its edges are frequented by golden-crowned sparrows and white-crowned sparrows.

Killdeer (*Charadrius vociferous*) are another conspicuous species that may be found in portions of this habitat having low to no vegetation. Mountain plovers (*Charadrius montanus*), although somewhat rare can be found on upland habitats of the study area, far from water.

Loggerhead shrikes (*Lanius ludovicianus*) are a predatory passerine species common to non-native grasslands that have evolved to fill a niche similar to that of raptors. Their morphology is similar to a small raptor in that they have a sharp down-turned bill and long, sharp claws. They also hunt insects, small mammals, and occasionally songbirds. They are largely silent and perch conspicuously atop trees, fenceposts, and other structures.

The non-native grasslands provide foraging habitat for a number of raptor species including red-tailed hawks, which can be seen soaring on thermals as well as perching on telephone poles, trees, and fenceposts. This species takes intermediate to large sized small mammals ranging from Botta's pocket gophers to cottontails. They commonly nest in the adjacent blue oak woodland habitats and occasionally on high voltage transmission towers. Other grassland raptors include white-tailed kites (*Elanus leucurus*), which also nests in oak woodlands, and northern harriers (C*ircus cyaneus*) which nest in grassland habitats, often near water. Both of these species commonly take small mammals such as California voles, deer mic and reptiles.

American kestrels (*Falco sparverius*) are the most common falcon of this habitat and take small mammals, insects, and reptiles. Prairie falcons (*Falco mexicanus*) nest on cliffs on top of Table Mountain, Little Table Mountain, and Kennedy Table. Prairie falcons also hunt over grassland habitats and take small mammals and medium sized birds, including waterfowl.

Burrowing owls (*Athene cunicularia*) are the only fossorial owl in North America. Found in arid regions of the state, this species uses the dens of California ground squirrels for nesting and cover. Although they are more common in the Central Valley, biologists from LOA have occasionally observed them within the study area. These owls are active during crepuscular periods (dawn and dusk) consuming insects, lizards, small mammals, and amphibians. Development has significantly reduced their populations in recent years throughout their range in California. The status of populations within the study area is unknown.

Other owls that forage within the study area include great horned owls, western screech owls, barn owls, and short-eared owls. With the exception of short-eared owls, which nest in grasslands, all of these owls require large trees with cavities or large rocky crevices for nesting.

The grassland habitats of the study area also provide foraging opportunities for golden eagles, which hunt California ground squirrels, cottontail rabbits and black-tailed jackrabbits. Grassland habitats around the Millerton Reservoir appear to be an important resource for wintering bald eagles. Rhodehamel (1991) examined bald eagle castings and roost debris at Millerton state Recreation Area and determined mammalian prey to comprise 49 percent of the prey taken, with California ground squirrels (*Spermophilis beecheyi*) comprising 19 percent of the total sample. Cattle hair was found in 16 percent of the total samples. These results indicate rangelands to be important foraging habitats for wintering bald eagles in the vicinity of Millerton Lake. This is important information considering existing plans to develop much of the rangeland that is in private ownership.

Small mammals in this habitat are generally fossorial. California ground squirrels, Botta's pocket gopher, Deer mice, California voles, and western harvest mice are some of the more common species. San Joaquin pocket mice (*Perognathus inornatus*) as well as Heerman's kangaroo rat (*Dipodomys heermani*) also occur in lower numbers. All of these species provide forage for snakes, raptors, and carnivorous mammals such as striped skunks, raccoons, badgers, Virginia possums, gray foxes, coyotes, and bobcats.

Mule deer are also common in this habitat. This species tends to form herds, which due to the increased vigilance afforded by a large number of individuals, reduces the probability that a single deer will be selected as prey by their most common predator the cougar.

Rocky outcrops associated with this habitat are found on Kennedy Table, McKenzie Table and Table Mountain. All have extensive rocky outcrops with cliff ledges that support populations of cliff nesting raptors such as prairie falcons as well as turkey vultures. Rock wrens (*Salpinctes obsoletus*) are a highly vocal species that nest here as well.

These outcrops also support roosting and reproductive habitat for a wide variety of bat species including Western mastiff bats (*Eumops perotis*) (John Stebbins, pers. commun.). This species utilizes crevices in cliff faces, high buildings, trees, and tunnels for roosting (Howell 1920, Dalquest 1946, Barbour and Davis 1969). When this species roosts in rock crevices it needs vertical faces to drop off to take flight. Other bat species that could use the rocky outcrops of the study area for roosting include hoary bats, big brown bats, and Townsend's big-eared bats (*Plecotus townsendii*). Spotted bats (*Euderma maculatus*), long legged myotis and Yuma myotis (*Myotis yumanensis*) may roost in these outcrops as well.

3.4 INTERIOR LIVE OAK FOREST/WOODLAND

This habitat occurs in the northern part of the study area, near Kerchoff Lake, and in the east part of the study area, northwest of Prather and east of Table Mountain, adjacent to the western bank of Winchell Creek. The Interior Live Oak Woodland occurs at an elevation range between 1,200 feet NGVD to about 2,200 feet NGVD, generally on mesic, north facing slopes. Interior Live Oak is a broad densely branched evergreen oak. The vegetation structure is comprised of interior live oak forming a dense tree canopy that is either closed (Forest) or a partially open (Woodland). The closed tree canopy has only a few other trees interspersed that includes California buckeyes (*Aesculus californica*) and California bay laurels (*Umbellularia californica*) among the interior live oaks and no brushy understory. The partially open canopy has a shrub understory of buckbrush (*Ceanothus cuneatus*) and common manzanita (*Arctostaphylos manzanita* ssp. *manzanita*), with a patchwork herbaceous/forb ground cover layer.

Most of the wildlife species associated with this habitat have been described in Section 3.2; however, the virtual absence of shrubs and forbs, wildlife diversity and abundance is somewhat lower. As with the blue oak habitat, acorns provide a rich food source for wildlife when available. The dense canopy of this habitat also provides excellent cover for nesting passerine birds.

3.5 PERMANENTLY-FLOODED LACUSTRINE HABITAT

The Permanently-Flooded Lacustrine Habitat is Millerton Lake, which is at an elevation range between 300 feet NGVD to 600 feet NGVD. Lacustrine habitats are inland depressions or damned riverine channels containing standing water, including both the limnetic (near shore) and littoral (deep-water) habitat (Cowardin 1979). The minimum mapping unit for water bodies that the California VEG GAP Analysis project mapped is 100-acres and therefore it is possible that this habitat encompasses more acreage than what is represented in Figure 4. The vegetation structure includes submerged plants such as pondweeds (*Potamogeton sp*.) and algae in the littoral section of this habitat, while the limnetic section supports water lilies (*Nymphaea*) and smartweeds (*Polygonum sp.*) due to the sedimentation and the accumulation of organic matter near the shore.

Prior to completion of Millerton Lake Reservoir in 1948, the San Joaquin River supported one of the largest spring runs of Chinook salmon (*Oncorhynchus tshawytscha*) on the Pacific coast. In the late 1800's, runs in the San Joaquin River probably exceeded 200,000 fish (Moyle et al. 1995). Construction of the dam resulted in most of the San Joaquin River's water being diverted by the Friant-Kern Canal to the San Joaquin Valley where it is used for agriculture. By the early 1950's, the San Joaquin spring-run Chinook salmon run became extinct (Moyle et al. 1995). In 1955, the CDFG estimated that with proper management, the San Joaquin Drainage could still produce about 210,000 wild Chinook salmon per year, with fall-run Chinook (originally a minor portion of the San Joaquin salmon runs) replacing the spring-run populations lost to dam construction (CDFG 1955).

Today, instead of native Chinook salmon, people can fish on Millerton Lake for striped bass (*Roccus saxatilis*), which have been introduced for recreational purposes. In Millerton Lake, striped bass have been known to reach 55 lbs. Nearly all fish in the lake are non-native species that have that been planted for recreational purposes.

Millerton Lake is an important stopover for migrating waterfowl. Migrating ducks and geese stop for variable time periods at lakes throughout the hemisphere during migration periods in order to stock their body's fat stores in order to continue with their north and southward migrations. Most waterfowl using

Millerton Lake Reservoir are diving specialist, owing to the lake's depth in most areas. These include lesser scaup (*Athya affinis*), buffleheads (*Bucephala albeola*), ring-necked ducks (*Athya collaris*), redheads (*Athya americana*) and canvasbacks (*Athya valisinaria*), which take aquatic invertebrates. Hooded mergansers (*Lophodytes cucullatus*), and common mergansers (*Mergus merganser*) take small fish.

Resident waterfowl include western Canada geese (*Branta canadensis moffitti*) and mallards (*Anas platyrhinchos*). Populations of these species are artificially maintained through supplemental feeding by visitors.

Other resident birds that use the lake habitats include American coots (*Fulica americana*). This species is an important food source for wintering bald eagles on the lake. Various gulls (*Larus sp*.), ravens (*Corvus brachyrhinchos*), house sparrows (*Passer domesticus*) and scrub jays all forage in the ruderal areas around the lake and at least partially subsist on handouts from visitors.

Among the most spectacular wildlife to be seen in the Millerton Area are wintering bald eagles. This population has recently been the focus of several recent studies that have shed insight into the importance of the Millerton Areas biotic resources to the species. Bald eagles, attracted by winter-run salmon were possible winter residents of the San Joaquin River prior to the construction of Friant Dam (Conrad and Stillwell 1984). If so, bald eagle use of Millerton Lake has probably been continuous since its creation in 1944 to present. Surveys documenting their presence on the lake, however, did not begin until 1979. Information gathered since that time suggest that bald eagles generally arrive on the lake around mid-November and depart around mid-march (Rhodehamel 1991). Counts estimated an average wintertime population of 10-20 eagles on the lake during a given survey (Hartesveldt 2000). However, these studies did not involve marking or radio telemetry so it could not be determined whether or not researcher were counting the same or different eagles on each survey (Mike Smith, pers. commun).

Recent radio telemetry studies have provided new insight into the ecology of wintering bald eagles at Millerton Lake. Use of this technique has revealed that most wintering bald eagles are on the move, changing their roosting and foraging sites routinely. A bald eagle spotted at Millerton Lake one day can be picked up at Eastman, Hensley, or Rodinger Lake the following day. According to Smith, as many as 200 bald eagles may use Millerton Lake during a single winter.

In the wintertime, raptors and other migratory birds select locations where they can rest and put on vital stores in order to successfully reproduce the following season. Although survival through what may be a

lean period is crucial for any organism, putting on enough fat to be able to raise young and thus pass on genes is also vitally important. In order to avoid disturbance, wintering bald eagles at Millerton Reservoir tend to roost in the tallest trees, which are mostly foothill pines, in areas that are least accessible to watercraft (Rhodehamel 1991).

3.6 RIVERINE HABITAT

Intermittent or continually flowing water defines Riverine Habitat. Riverine Habitat within the study area includes major hydrological features including Big Sandy Creek, Friant-Kern Canal, North Fork Little Dry Creek, Cottonwood Creek, Fine Gold Creek, the Madera Canal and all their tributaries. Riverine Habitat in the study area includes approximately 140 hydrological features totaling approximately 121.5 miles. The vegetation structure is highly variable from no vegetation where there is a continuous flow of water to any assemblage of the nine habitats where there is intermittent flow structure.

Many of the birds of this habitat are wetlands adapted species that make their living hunting fish, amphibians and small reptiles. These include great egrets (*Ardea alba*), great blue herons (*Ardea herodias*), black-crowned night herons (*Nycticorax nycticorax*), and belted kingfishers (*Ceryle alcyon)*.

In the summertime, cliff swallows (*Petrochelidon pyrrhonota*) and barn swallows (*Hirundo rustica*) are numerous in this habitat feeding on flying insects.

Shrubs along the banks provide food and cover for various bird species depending on the season. In the late summer, lesser goldfinches (*Carduelis psaltria*), a resident species, are attracted to the seeds of thistles. Downy woodpeckers (*Picoides pubescens*), also a resident species forage on the small twigs of willows and weed stalks for insects. Black phoebe's can also be found hawking insects at any time of the year.

California quail and savannah sparrows forage on the ground and take cover in the dense thickets of this habitat year-round. In the winter, white and golden-crowned sparrows, which have similar adaptations, occur in mixed flocks.

Dusky-footed wood rats build large stick nests in this habitat. North American beavers (*Castor Canadensis*) and muskrats (*Odontra zibethicus*) are two aquatic mammal species that are common to the San Joaquin River. Desert cottontails (*Sylvilagus audubonii*) are common along the edge of this habitat.

Mule deer venture from the open grasslands and woodlands into this habitat in order to access the river, where they may encounter their main predator, the cougar.

3.7 AGRICULTURAL LANDS

Agricultural Lands Habitat includes orchards, row crops, and vineyards, which occur in the southwest corner of the study area near the Madera Canal and Friant-Kern Canal, at an elevation range between 300 feet NGVD to about 450 feet NGVD. The regular application of pesticides, herbicides, and mechanical disking for the control of weeds, prevents any native flora from becoming established in this habitat. The herbaceous and forb layer is the only vegetation layer present. The herbs and forbs are mostly of European origin and are considered alien or non-native and include common groundsel (*Senecio vulgaris)*, brome, henbit (*Lamium amplexicaule*), white-stemmed filaree (*Erodium moschatum*), prostrate pigweed (*Amaranthus blitoides*), red goosefoot (*Chenopodium rubrum*) and purslane (*Portulaca oleracea*). The quality of the vegetation and the routine maintenance activities prohibit regular use by any wildlife, with the possible exception of birds that may occasionally land on the site and terrestrial animals that may also occasionally wander onto the site and stay for only brief periods.

3.8 VERNAL POOLS AND SWALES

Two types of vernal pools occur in the study area. Northern basalt flow vernal pools and swales occurred as interconnected wetland complexes over large portions of the Kennedy Table, McKenzie Table, and Table Mountain (these are mapped as non-native grassland habitat on the habitat map, because they are too small to map at the scale of this figure). Northern hardpan vernal pools occur in scattered locations of the Friant and Millerton area. The vernal pool flora for both types of pools is similar, consisting of a mix of non-native grasses and plant species that are endemic to vernal pools. Early flowering species include meadowfoam (*Limnanthes douglasii* ssp. *rosea*), Fremont's goldfields (*Lasthenia fremontii*) and white-tip clover (*Trifolium variegatum*). Species flowering later in the season included Vasey's coyote thistle (*Eryngium vaseyi*), slender popcornflower (*Plagiobothrys stipitatus*), double horn downingia (*Downingia bicornuta*), dwarf woolly-heads (*Psilocarphus brevissimus*), slender woolly-heads (*Psilocarphus tenellus*), least spikerush (*Eleocharis acicularis*), pogogyne (*Pogogyne douglasii*), glassy onion (*Allium hyalinum*), checker mallow (*Sidalcea calycosa* ssp. *calycosa*), annual hairgrass (*Deschampsia danthonioides*), Mediterranean barley (*Hordeum marinum* ssp. *gussonianum*) and Pacific foxtail (*Alopecurus saccatus*).

Vernal pools provide habitat for a number of animal species. Invertebrates include early instar stages of various insect species. Also present are crustaceans of the genera *Linderiella*, *Branchinecta*, and *Lepidurus*. These pools provide breeding habitat for amphibians such as Pacific treefrogs and western toads. Vernal pools also attract various species of wintering waterbirds such as ducks and shorebirds. Although not observed in the pools of the site during the spring of 2000, Mallards (*Anas platyrhynchos*), Cinnamon Teal (*Anas cyanoptera*) and Greater Yellowlegs (*Tringa melanoleuca*) could all forage in pools of the site during the winter and spring.

4.0 SPECIAL HABITATS

There are four special habitats, one within the study area and four within a five-mile radius of the study area (Figure 5). The four special habitats include two types of vernal pools, the Sycamore Alluvial Woodland, and the Great Valley Mixed Riparian Forest.

4.1 VERNAL POOLS

As noted in 3.8 above two types of vernal pools occur in the study area.

4.1.1 Northern Hardpan Vernal Pools

Northern Hardpan Vernal Pools, according to the Heritage Network Ranking System are vulnerable to extirpation within the state of California (CDFG 2003). These types of vernal pools occur in scattered locations of the study area east of Friant Road and west of the Friant Kern Canal and within the Millerton Specific Plan Area south of Millerton Road. They also occur east of County Roads 206 and 211 and west of Lake Millerton in Madera County. These portions of the study area are within the area proposed for designation as critical habitat for state and federally listed endemic vernal pool plants and animals. Northern hardpan vernal pools generally occur on alluvial terraces in the depressions between well-developed mima mounds. Soils of the study area having a durpian/harpan necessary for vernal pool formation include the Alamo, Keyes, Redding, Rocklin and San Joaquin soil series. Live Oak Associates, Inc. has completed extensive surveys for vernal pools in the Friant and Millerton area (i.e. southern portion of the study area. These pools are vegetated with all the typical endemic vernal pool plants of the region. Some of these pools support populations of succulent owl's-clover (*Castilleja campestris* ssp. *succulenta*), a species listed as state endangered and federally threatened according to provisions of the state and federal endangered species acts respectively.

4.1.2 Northern Basalt Flow Vernal Pools

Table Mountain, McKenzie Table, and Kennedy Table are basalt plateaus within the study area in which northern basalt flow vernal pools have been identified (see discussion in Section 3.8). These portions of the study area, like the areas in which northern hardpan vernal pools occur, have been proposed for designation as critical habitat for state and federally listed endemic vernal pool plants and animals. The distribution of listed species on the above table tops is as follows:

?? Table Mountain and McKenzie Table: vernal pool fairy shrimp, vernal pool tadpole shrimp (*Lepidurus packardi*), California linderiella (*Linderiella californica*), molestan blister beetle (*Lytta molesta*), succulent owl's-clover, and Bogg's Lake hedge-hyssop.

?? Kennedy Table: vernal pool fairy shrimp (*Branchinecta lynchi*), succulent owl's-clover (*Castilleja campestris* ssp. *succulenta*), Bogg's Lake hedge-hyssop (*Gratiola heterosepala*), and San Joaquin orcutt grass (*Orcuttia inaequalis*).

The California Department of Fish and Game has given the northern basalt flow vernal pools its "highest inventory priority" designation, meaning that the unique habitat values associated with these pools make them among the most desirable of habitats to conserve. In addition, the Heritage Network Ranking System ranks this type of vernal pool as within the state of California (CDFG 2003).

4.2 SYCAMORE ALLUVIAL WOODLAND

The Sycamore Alluvial Woodland, according to the Natural Heritage Network Ranking System is critically imperiled within the state of California (CDFG 2003). As the name implies, Sycamore alluvial woodland habitat is created when soil material is deposited by water (alluvial) and for this particular habitat the source of water is Little Dry Creek, which is located within a five-mile radius of the study area. Little Dry Creek is an intermittent stream, relying on rainfall and to a lesser degree snowmelt for its water supply, resulting in Little Dry Creek having brief periods of flowing water generally after winter storms. There is an overstory, a shrub understory and a herbaceous layer associated with this woodland. The overstory is dominated by well-spaced, Western Sycamore (*Platanus racemosa*). Western sycamore is a winter-deciduous broadleafed tree, which results in an open to moderately closed overstory canopy. The shrub understory is comprised of arroyo willow (*Salix lasiolepis*), red willow (*Salix laevigata*) and mulefat (*Baccharis salicifolia*). The herbaceous layer is comprised of non-native grasses that include soft chess, ripgut brome and Mediterranean barley.

Figure 5 Special Status Habitats

4.3 GREAT VALLEY MIXED RIPARIAN FOREST

The Great Valley Mixed Riparian Forest, according to the Natural Heritage Network Ranking System, is imperiled within the state of California (CDFG 2003). Great Valley Mixed Riparian Forest is located on the San Joaquin River, south of Ledger Island, within a five-mile radius of the study area. This forest is occurring on the floodplain of the San Joaquin River, somewhat back from the active river channel, where overbank flooding occurs resulting in fine-textured alluvium. Growing on the alluvium is a tall, somewhat dense winter-deciduous broadleafed forest, with Western Sycamore, black willow (*Salix gooddingii*), white alder (*Alnus rhombifolia*) and Fremont cottonwood (*Populus fremontii*), which forms a closed overstory canopy. The understory is comprised of a few shade tolerant shrubs that include buttonbush (*Cephalanthus occidentalis*), Oregon Ash (*Fraxinus latifolia*), and blue elderberry (*Sambucus mexicanus*). Due to the periodic flooding there is no herbaceous/forb layer.

4.4 FAUNAL HISTORY

During the Pleistocene era, which ended 10,000 years ago, California had a much more diverse assemblage of fauna than it has today. Around this time period, the first humans appear in the California fossil record. This record of humans coincides with a major extinction period in which vast numbers of mammalian species disappeared from the landscape. These early hunters are believed by some to have contributed to the extinctions of many wildlife species through hunting, mainly of the continents large herbivores. The nest major extinction period coincided with the settlement of Europeans in the 1800's.

4.4.1 Recent Extinctions

The early European settlers in the Sierra contributed to the reduction of wildlife in California in several important ways. Livestock, which included horses, cattle, sheep and pigs reduced available forage and disturbed the land, which facilitate the introduction of exotic European weeds and grasses, which arrived with the introduced livestock. With their high-powered rifles, they were also able to kill large amounts of mammals and birds, often purely for sport.

During the gold rush of the 1850s, in order to feed the mass infiltration of people into the Sierra, huge flocks of sheep were introduced into what at the time were pristine grassland habitats. Also in this region, market hunting, particularly for mule deer (*Odocoileus hemonius*), went into full production, with camps of hunters taking deer from any age or sex, day and night. These were taken and shipped to restaurants and stores. Almost anything that was either large enough to be worth eating or with a fur pelt was

considered game. Beavers (*Castor Canadensis*) were taken along the San Joaquin River. Carnivores seen either as competition or dangerous to humans such as wolves (*Canis lupis*) and California grizzlies were systematically eradicated. Coyotes (*Canis latrans*) and bobcats (*Lynx rufus*), which are more adaptable to humans than the now extinct fauna survived this onslaught in spite of the early eradication efforts.

Native animal species that have either become extinct or no longer occur in the Sierra foothill region include the California grizzly (*Ursus arctos*), the California condor (*Gymnogyps californianus*), the least Bell's vireo (*Vireo bellii pusilus*), and the willow flycatcher (*Empidonax traillii*) (Thelander et al. 1994). The most prominent reasons for the demise of these species are loss of habitat, introduction of alien species, overhunting, and pollution.

In the late 1800's conservationists, realizing the threats to native wildlife began enacting laws to preserve native wildlife; these included the Lacey Act, Weeks-McLean Law, Migratory Bird Treaty Act, and ultimately the Endangered Species Act of 1973.

4.4.2 Lacey Act

The Lacey Act (passed on May 25, 1900) prohibited game taken illegally in one state to be shipped across state boundaries contrary to the laws of the state where taken. The Lacey Act has become a very effective tool for enforcing the wildlife protective laws of the States and the Federal government. However, in the early years of the 20th century the Act was ineffective in stopping interstate shipments, largely because of the huge profits enjoyed by market hunters and the lack of officers to enforce the law. These early failures of the Lacey Act led to the passage of the Weeks-McLean Law.

4.4.3 Weeks-McLean Law

The Weeks-McLean Law (which became effective on March 4, 1913) was designed to stop commercial market hunting and the illegal shipment of migratory birds from one state to another. The Act boldly proclaimed that:

> All wild geese, wild swans, brant, wild ducks, snipe, plover, woodcock, rail, wild pigeons, and all other migratory game and insectivorous birds which in their northern and southern migrations pass through or do not remain permanently the entire year within the borders of any State or Territory, shall hereafter be deemed to be within the custody and

protection of the Government of the United States, and shall not be destroyed or taken contrary to regulations hereinafter provided therefore.

The Weeks-McLean Law rested on weak constitutional grounds, having been passed as a rider to an appropriation bill for the Department of Agriculture, and it was soon replaced by the Migratory Bird Treaty Act of 1918.

4.4.4 Migratory Bird Treaty Act of 1918

Following close on the heels of the Lacey Act and the Weeks-McLean Law, the framers of the Migratory Bird Treaty Act were determined to put an end to the commercial trade in birds and their feathers that, by the early years of the 20th century, had wreaked havoc on the populations of many native bird species.

The Migratory Bird Treaty Act decreed that all migratory birds and their parts (including eggs, nests, and feathers) were fully protected.

The Migratory Bird Treaty Act is the domestic law that affirms, or implements, the United States' commitment to four international conventions (with Canada, Japan, Mexico, and Russia) for the protection of a shared migratory bird resource. Each of the conventions protect selected species of birds that are common to both countries (i.e., they occur in both countries at some point during their annual life cycle).

4.4.5 Endangered Species Act of 1973

The 1973 Endangered Species Act provided for the conservation of ecosystems upon which threatened and endangered species of fish, wildlife, and plants depend, both through Federal action and by encouraging the establishment of State programs. The Act:

- ?? authorizes the determination and listing of species as endangered and threatened;
- ?? prohibits unauthorized taking, possession, sale, and transport of endangered species;
- ?? provides authority to acquire land for the conservation of listed species, using land and water conservation funds;
- ?? authorizes establishment of cooperative agreements and grants-in-aid to States that establish and maintain active and adequate programs for endangered and threatened wildlife and plants;

?? authorizes the assessment of civil and criminal penalties for violating the Act or regulations; and

?? authorizes the payment of rewards to anyone furnishing information leading to arrest and conviction for any violation of the Act or any regulation issued thereunder.

5.0 SPECIAL STATUS SPECIES

Several species of plants and animals within the state of California have low populations, limited distributions, or both. Such species may be considered "rare", and are vulnerable to extirpation as the state's human population grows and the habitats these species occupy are converted to agricultural and urban uses. The California Department of Fish and Game (CDFG) and the U.S. Fish and Wildlife Service (USFWS) have laws and regulations that provide a mechanism for conserving and protecting the diversity of plant and animal species native to the state. A sizable number of native plants and animals have been formally designated as threatened or endangered under state and federal endangered species legislation. Others have been designated as "candidates" for such listing. Still others have been designated as "species of special concern" by the CDFG. The California Native Plant Society (CNPS) has developed its own set of lists of native plants considered rare, threatened or endangered in California and elsewhere (CNPS 2001). Collectively, these plants and animals are referred to as "special status species".

A number of special status plants and animals occur in the vicinity of the study area. These species, and their potential to occur in the study area, are listed in Tables 2 and 3 of the following pages. Locations of known occurrences of special status species in the vicinity of the study area are represented in Figures 6 and 7. These two figures only represent occurrences documented in CNDDB. Therefore, it is likely that additional occurrences of special status plants and animals are present in a five-mile radius of the study area. Sources of information for this table included 1) *California's Wildlife, Volumes I, II, and III* (Zeiner et. al 1988), 2) *California Natural Diversity Data Base* (CDFG 2002), 3) *Endangered and Threatened Wildlife and Plants* (USFWS 1994), 4) *Annual Report on the Status of California State Listed Threatened and Endangered Animals and Plants* (CDFG 1995), 5) *The California Native Plant Society's Inventory of Rare and Endangered Vascular Plants of California* (CNPS 2001) and 6) the personnel of the CDFG and USFWS. A more detailed discussion of special status species, and their potential to occur on the site, can be found in Appendix A.

Figure 6 Special Status Plants

TABLE 2. LIST OF SPECIAL STATUS PLANTS POTENTIALLY OCCURING WITHIN THE MILLERTON AREA WATERSHED COALITION STUDY AREA

PLANTS

Species Listed as Threatened or Endangered under the State and/or Federal Endangered Species Act

Species	Status	Habitat	*Occurrence in the Study Area
Bogg's Lake Hedge-Hyssop (*Gratiola heterosepala*)	CE CNPS 1B	Shallow water and margins of vernal pools.	**Present.** There are documented populations occurring within the study area on Kennedy Table, McKenzie Table and Table Mountain (see Figure 6). (CDFG 2003).
Greene's Tuctoria (*Tuctoria greenei*)	FE, CR CNPS 1B	Vernal pools of California's Central Valley. Requires deep pools with prolonged periods of inundation.	**Possible.** Vernal Pool Habitat that is required for this species is present in the study area, but to date this species has not been documented in any vernal pools of the study area. (CDFG 2003).
Hairy Orcutt Grass (*Orcuttia pilosa*)	FE, CE CNPS 1B	Vernal pools California's Central Valley. Requires deep pools with prolonged periods of inundation.	**Possible.** There are no documented populations occurring within the study area. There are, however, documented populations occurring within 5 miles or less of the study area along state Highway 41 in Madera County (CDFG 2003).
Hartweg's Golden Sunburst (*Pseudobahia bahiifolia*)	FE, CE, CNPS1B	Occurs in grasslands of the western foothills of the Sierra Nevada in heavy clay soils of the Rocklin sandy loams, pumiceous variant	**Present.** The largest known population in the state occurs in rangeland just east of County Road 206 in Madera County. Other populations west of Rd. 206 were extirpated when a large pistachio orchard was planted in the late 1970's. Several small populations persist in Fresno County, one in the community of Friant at the location of the water tank east of town, the others in scattered locations to the south. (Harteseveldt 2000)
Mariposa Pussypaws (*Calytridium pulchellum*)	FT, CNPS 1B	Fewer than 10 populations in Mariposa, Madera and Fresno Counties; primarily in coarse granitic sands of decomposing outcrops.	**Possible.** Some of the soils occurring within the study area are coarse granitic sands. The closest documented occurrence is Sugarloaf Hill in the Sierra National Forest, approximately 10 air miles east of the study area (CDFG 2003).
San Joaquin Adobe Sunburst (*Pseudobahia peirsonii*)	FT, CE	Occurs in grasslands of the western foothills of the Sierra Nevada in heavy clay soils of the Porterville, Cibo, Mt. Olive and Centerville series.	**Possible.** Centerville Clay soil series are present within the study area. The nearest documented occurrence is along Academy Ave. near its intersection with state Highway 168 (Stebbins 1991). Another large population is located near Round Mountain, which is about 10 air miles south of the study area (Hartesveldt 1996).
San Joaquin Orcutt Grass (*Orcuttia inaequalis*)	FT, CE CNPS 1B	Vernal pools California's Central Valley. Requires deep pools with prolonged periods of inundation.	**Present.** There is one documented population occurring within the study area in a vernal pool on Kennedy Table (see Figure 6). (CDFG 2003).

TABLE 2. LIST OF SPECIAL STATUS PLANTS POTENTIALLY OCCURING WITHIN THE MILLERTON AREA WATERSHED COALITION STUDY AREA

PLANTS

Species Listed as Threatened or Endangered under the State and/or Federal Endangered Species Act (cont.)

Species	Status	Habitat	*Occurrence in the Study Area
Succulent Owl's Clover (*Castilleja campestris* ssp. *succulenta*)	FT, CE CNPS 1B	Vernal pools, valley foothills and grasslands. Moist places, often in acidic soils.	**Present.** Several documented populations occur in the study area. This species can be found in northern basalt vernal pools on Kennedy, Big and McKenzie Tables (Hartesveldt 2000 and CDFG 2003). This species also occurs in northern claypan vernal pools located on a large parcel just south of the community of Friant.
Tree Anemone (*Carpenteria californica*)	CT CNPS 1B	Occurs primarily in chaparral, but also in mixed hardwoods with shrub understory. Several occurrences in Fresno County E and SE of Auberry; one occurrence in Madera Co. south of North Fork.	**Present.** There is one documented population occurring within the northeast section of the study area, north of Squaw Leap. In addition there are several CNDDB documented populations occurring within 5 miles or less north and east of the study area.

Other special status plants listed by CNPS (cont).

Madera Linanthus (*Linanthus serulatus*)	CNPS 1B	Cismontane woodland, lower montane coniferous forests. Dry slopes, often on decomposed granite in woodland.	**Present.** There are two documented populations, with one population occurring on the north shore of Millerton Lake at Big Bend and the other on the east side of the South Bay of Millerton Lake. In addition, there is also one population at the San Joaquin Experimental Range. (see Figure 6) (CDFG 2003).
Spiny-sepaled Button Celery (*Eryngium spinosepalum*)	CNPS 1B	Vernal pools of Fresno and Tulare Counties.	**Possible.** There are no documented occurrences within study area. There is one population near Little Table Mountain and another documented population apprxoximately 3 miles north of of the intersection of Highway 145 and Highway 41 (see Figure 6) (CDFG 2003).
Flaming Trumpet (*Collomia rawsiana*)	CNPS 1B	Occurs on stabilized alluvium in riparian zones between 2500 and 6600 feet in Madera and Mariposa Counties.	**Unlikely.** There are no documented occurrences within study area This species has no CNDDB documented populations in Fresno County. Closest CNDDB documented population occurs 25 to 20 miles north of the study area, in Madera County near Whiskey Creek and Cascadel Point.
Orange Lupine (*Lupinus citrinus* var. *citrinus*)	CNPS 1B	Several populations are known from Madera and Fresno Counties in coarse granitic sands of decomposing outcrops.	**Possible.** There are no CNDDB documented occurrences within study area. However, there are several documented populations occurring within 5 miles or less east of the study area.

FE = Federally Endangered**; FT=**Federally Threatened**; CE=**California Endangered**; CT=**California Threatened**; CNPS 1B=** California Native Plant Society Listed as Rare, Threatened, or Endangered in California and Elsewhere**.**

5.1 SPECIAL STATUS PLANTS DISCUSSION

Bogg's Lake Hedge-Hyssop (*Gratiola heterosepala*) – Listed by state of California as Endangered in November 1978. This small, semi-aquatic, herbaceous annual belongs to the Snapdragon/Figwort (Scrophulariaceae) Family and blooms in April through August. This native California plant has been documented growing in the Northern Basalt Venal Pools located on Kennedy Table, McKenzie Table and Table Mountain. In addition it also occurs in saturated clay along lake margins, at an elevation range from 32 to 7,791 feet. It germinates and begins growth underwater, generally flowering while the base of the plant is still slightly submerged. The flowers are borne on slender, erect pedicels 0.39-.90 inches long, sepals 0.15-0.23 inches, corolla 0.23-0.31 inches, with lower lobes white and upper lobes yellow. Threats to existing populations include agriculture, development, grazing, trampling and vehicles (CNPS 2001).

Greene's tuctoria (*Tuctoria greenei*) – Listed by the state of California in September 1979 as California Rare and by the Federal Government as Endangered in March 1997. This plant belongs to the Grass (Poaceae) Family and is also known as Greene's Orcutt grass. Greene's tuctoria is an erect to low growing tufted annual, with several to many 2 to 6 inch purplish stems, which easily break apart at the nodes and end in spike-like inflorescences. Greene's tuctoria is found in small, shallow vernal pools or in sections of large vernal pools that dry out early in the year, at an elevation range from 98-3,510 feet and blooming between April through August. Greene's tuctoria occurs in Northern Basalt Flow, Northern Claypan and Northern Hardpan vernal pools, underlain by iron-slica cemented hardpan, tuffaceous alluvium or clay pan (Federal Register Volume 67, Number 185 Sept 2002, page 59905). According to the California Department of Fish and Game documented populations in Fresno and Madera County populations have been extirpated. Threats to existing populations include agriculture, urbanization and overgrazing (CNPS 2001).

Hairy Orcutt Grass (*Orcuttia pilosa*) – Listed by the state of California as Endangered in September 1979 and by the Federal Government as Endangered in March 1997. This plant belongs to the Grass (Poaceae) Family, growing in dense tufts, consisting of stems laying on the ground with the tip turned up or erect stems, that branch only from the lower nodes. The stems average 2 to 8 inches, ending in long, spike-like inflorescence and the entire plant has long soft straight hairs (pilose), giving the plant a grayish appearance. Hairy Orcutt Grass is found in vernal pools that hold water until May, June and July (Federal Register Volume 67, Number 185 Sept 2002, page 59905) at elevation range from 180 to 655 feet. Hairy Orcutt grass is found on both acidic and saline-alkaline soils, with vernal pools that have an iron-silica cemented hardpan or claypan (Federal Register Volume 67, Number 185 Sept 2002, page 59905),

blooming in May through September. There are no documented populations within the study area, but there are two documented populations along State Highway 145 approximately 4 to 6 miles east of Madera that were last observed in 1987, as well as another documented population just west of State Highway 41 and north 1.5 miles of Avenue 12 last observed in 1992. Threats to existing populations include agriculture, urbanization, overgrazing, non-native plants and trampling (CNPS 2001).

Hartweg's Golden Sunburst (*Pseudobahia bahiifolia*) – Listed by the state as Endangered in August 1981 and by the Federal Government as Endangered in February 1997. This annual herb belongs to the Asteraceae (Sunflower) Family. Hartweg's Golden Sunburst has stems that are 2 to 6 inches in length, covered with white wooly hairs and at the end of the one to few stems are bright yellow flowers, typical of a sunflower. This plant occurs in non-native grasslands that grow on Rocklin sandy loams, pumiceous variant in Fresno and Madera Counties and in grasslands growing on the Amador Soil Series in Stanislaus County (Stebbins 1991). Hartweg's Golden Sunburst blooms in March through April at an elevation range of 49 to 492 feet. The majority of CNDDB documented populations occur in the Friant area (Stebbins 1991 and CDFG 2003), with the largest known population in the state of California occurring just east of Madera County Road 206. Threats to existing populations include development, agriculture, overgrazing and trampling (CNPS 2001).

Mariposa Pussypaws (*Calyptridium pulchellum*) – Listed by the Federal Government as Threatened in September 1998. This annual herb belongs to the Portulacaceae (Purslane) Family. Mariposa pussypaws forms small compact rosettes, with smooth slender branches that are between 4 to 8 inches in length. At the end of each stem are loose clusters of rose-colored four-petaled flowers. The flowers bloom in April, through August at an elevation range of 1312-4002 feet on decomposed granitic sands in non-native grasslands and woodlands. CNDDB documented fewer than 10 populations occurring only in Fresno, Madera and Mariposa counties, with one documented population at Sugarloaf Hill in the Sierra National Forest, growing in chaparral, cismontane woodland and other habitats that have sandy or gravelly granitic soil. Threats to existing populations include development, grazing and vehicles (CNPS 2001).

San Joaquin Adobe Sunburst (*Pseudobahia peirsonii*) – Listed by the state of California as Endangered in January 1987 and by the Federal Government as Threatened in February 1997. This annual herb belongs to the Asteraceae (Sunflower) Family and is also known as Tulare pseudobahia. San Joaquin Adobe Sunburst has stems that are 4 to 18 inches in length that are covered with loosely white woolly hairs and at the end of the one to few stems are bright yellow flowers, typical of a sunflower. This plant occurs in non-native grasslands and non-native grasslands that intergrades into Blue Oak Woodland on

heavy clay soils, specifically clays in the Porterville, Centerville, Cibo and Mt. Olive soil series (Stebbins 1991). San Joaquin Adobe Sunburst blooms in March through April in non-native grasslands at elevation of 295-2624 feet. Documented populations occur only in Fresno, Kern, and Tulare counties, with the majority of the documented populations being very small. Two of the larger documented populations occur at State Highway 168 and Academy Avenue intersection and at Round Mountain. Threats to existing populations include agriculture, grazing, development, road construction and maintenance, and flood control activities (CNPS 2001).

San Joaquin Orcutt Grass (*Orcuttia inaequalis*) – Listed by the state of California as Endangered in September 1979 and by the Federal Goverment as Threatened in March 1997. This gray-green plant belongs to the Grass (Poaceae) Family, growing in tufts of several erect stems. The stems are 2 to 6 inches length, ending in a spike like inflorescences that bloom in April through September. The mature inflorescences aggregate into a dense, hat-shaped cluster (Federal Register Volume 62, Number 58, March 1997, page 14339). The foliage of this plant has long hairs on the stem and leaves, giving this plant a gray-green appearance. In addition to the long straight hairs this plant also produces an exudate and is capable of growing underwater for 3 months or more (Federal Register, Volume 67, Number 185 Sept 2002 page 59894). Documented populations have occurred in Northern Basalt Flow, Northern Claypan and Northern Hardpan vernal pools at elevation range between 30 to 755 meters (98 to 2,477 feet), with one population occurring on Kennedy Table. The vernal pools where San Joaquin Orcutt Grass populations have been identified occur on the Hideaway, Amador, Cometa, Corning, Greenfield, Los Robles, Madera, Peters, Raynor, Redding and San Joaquin soil series, as well as the Pollasky-Montpellier complex (Federal Register, Volume 67, Number 185 Sept 2002 page 59906). Documented populations occur in Fresno, Madera, Merced Stanislaus and Tulare counties, with the Stanislaus county population extirpated. Threats to existing populations include agriculture, development, overgrazing, channelization and non-native plants (CNPS 2001).

Succulent's Owl Clover (*Castilleja campestris* ssp. *succulenta*) – Listed by the state of California as Endangered in September 1979 and by the Federal Government as Threatened in March 1997. Succulent's Owl Clover belongs to the Snapdragon/Figwort (Scrophulariaceae) Family and is a hemiparsitic (obtains water and nutrients by forming root graphs with other host plants, but manufactures its own food through photosynthesis) annual herb. This plant has erect stems, 2 to 10 inches in length that may or may not be branched, ending in clustered bright yellow to white flowers, surrounded by bracts (leaf-life structures in the flowering structure) that bloom in April through May (Federal Register, Volume 67, Number 185 Sept 2002 page 59892). Documented populations occur in Northern Basalt Flow

Northern Claypan and Northern Hardpan vernal pools. The populations occurring in Northern Basalt Flow vernal pools are at Kennedy Table and McKenzie Table. Populations of this species occur in Northern Claypan vernal pools, on a large parcel just south of Friant. Succulent Owl's Clover occurs an at elevation range of 164 to 2,460 feet occurring on soils belonging to the Amador, Anderson, Corning, Fallbrook, Keyes, Pentz, Ramona, Redding, San Joaquin, Vista, and Yokohl soil series, as well as the Pollasky-Montpellier complex (Federal Register, Volume 67, Number 185 Sept 2002 page 59904). Documented populations occur in 6 California counties Threats to existing populations include urbanization, agriculture, flood control, grazing and trampling (CNPS 2001).

Tree Anemone (*Carpenteria californica*) – Listed by the state of California as Threatened in January 1990 and belongs to the Mock-Orange Family (Philadelphaceae). Tree Anemone is an erect evergreen shrub, growing to a height of 3 to 13 feet, and blooms in May through July at an elevation range from 1,115 to 4,691 feet. There are 10 documented populations occurring in Fresno and Madera Counties, with one documented population within the study area occurring just north of the San Joaquin River Gorge (formerly known as Squaw Leap) growing in chaparral and cismontane woodlands that have granitic soils. East of the study area and within a 5-mile radius there are an additional 6-documented populations, with one population on Black Mountain, one just south of Kerckhoff Lake, and another one south of Shaver Lake. Threats to documented populations include development, road construction, logging, vehicles and overgrazing. Special management is necessary since Tree Anemone reproduction is dependent on fire (CNPS 2001).

Madera Linanthus (*Linanthus serulatus*) – Listed by the California Native Plant Society as Rare, Threatened or Endangered in California and elsewhere. This annual herb belongs to the Phlox (Polemoniaceae) Family, blooming in April through May at an elevation range between 984 to 4,265 feet. Madera Linanthus has erect stems, 2 to 7 inches in length, with terminal (at the tip of the apex) sessile flowers (Hickman 1993). The flower petals (corolla) are a dark purple funnel-shaped tube, measuring 0.27 to 0.31 inches in length (Hickman 1993). Documented populations occur in Fresno, Kern, Madera, Mariposa, and Tulare Counties, growing in Cismontane Woodlands, and Lower Montane Coniferous Forests (CNPS 2001). Two populations are at Millerton Lake, which is within the study area and another population within a 5-mile radius of the study area is located at the San Joaquin Experimental Range.

Spiny Sepaled Button Celery (*Eryngium spinosepalum*) – This is a Federal Species of Concern and is listed by the California Native Plant Society as Rare, Threatened or Endangered in California and elsewhere, as well as a Federal Species of Concern. This perennial herb belongs to the Wild Carrot

(Apiaceae) Family, blooming April through May at an elevation range between 328 to 836 feet. This is a stout branching plant, with stems 12 to 30 inches in length, with ten or more flower clusters that are spherical or egg-shaped, approximately 0.3 to 0.8 inches in diameter. Spiny-sepaled button-celery grows in both northern hardpan and northern claypan vernal pools, as well as in roadside ditches, depressions and swales in non-native grassland and oak woodlands (http://sacramento.fws.gov/es/plant_spp_accts/spinysepal_buttoncelery.htm). CNDDB documented populations occur in Fresno, Madera, Stanislaus, Tulare and Tuolumne counties. No populations exist within the study area, but within a 5-mile radius there is a population near Little Table Mountain and another population approximately 3-miles north of the State Highway 145 and State Highway 41 intersection. Threats to documented populations include development, grazing and agriculture. This plant is difficult to identify because it intergrades with *Eryngium castrense* and possibly *E. vaseyi*.

Flaming Trumpet (*Collomia rawsiana*) – Listed by the California Native Plant Society as Rare, Threatened or Endangered in California and elsewhere. This perennial rhizomatous herb belongs to the Phlox (Polemoniaceae) Family, blooming in July through August, at an elevation range of 2,559 to 7,217-feet. Flaming Trumpet has erect stems, 3 to 23 inches in length, with terminal (at the tip of the apex) flowers. The flower petals (corolla) are a red orange, measuring 0.98 to 1.5 inches in length (Hickman 1993). No documented populations occur in Fresno County, only in Madera and Mariposa counties are there documented populations growing in lower montane coniferous forests, riparian scrub, meadows and seeps, generally preferring mesic sites. The closest documented population to study area is 20 to 25 air miles north near Whiskey Creek and Cascadel Point. Threats to documented populations include hydroelectric development, grazing and logging.

Orange Lupine (*Lupinus citrinus* var. *citrinus*) – Listed by the California Native Plant Society as Rare, Threatened or Endangered in California and elsewhere. This annual herb belongs to the Pea (Fabaceae) Family, blooming in April through July, at an elevation range of 1,246 to 5,577 feet. As the common name implies, the Orange Lupine flower has petals that are a gold-yellow color. CNDDB documented populations occur in Fresno and Madera counties in chaparral, cismontane woodland, and lower montane coniferous forest habitats, generally on granite outcrops. No documented populations occur withinthe study area, but there are several documented population within 5-miles or less, with one population less than 5-miles east of the State Highway 41 and Madera County Road 200 intersection discovered in 2000 (Hartesveldt 2000). Threats to documented populations include development, road widening, vehicles, grazing and logging (CNPS 2001).

Figure 7 Special Status Animals

5.2 SPECIAL STATUS ANIMAL SPECIES

TABLE 3. LIST OF SPECIAL STATUS WILDLIFE SPECIES POTENTIALLY OCCURING WITHIN THE MILLERTON AREA WATERSHED COALITION STUDY AREA

ANIMALS

Species Listed as Threatened or Endangered under the State and/or Federal Endangered Species Act

Species	Status	Habitat	*Occurrence in the Study Area
Conservancy Fairy Shrimp (*Branchinecta conservatio*)	FE	Found in vernal pools of California.	**Possible.** Although there are no documented populations within the region, suitable habitat is present in many unsurveyed pools within the study area.
Vernal Pool Fairy Shrimp (*Branchinecta lynchi*)	FT	Primarily found in vernal pools, may use other seasonal wetlands.	**Present.** This species has been documented in 29 vernal pools located at Kennedy Table. In addition this species likely occurs in many other vernal pools that have not been surveyed (see Figure 7) (CDFG 2003).
Vernal Pool Tadpole Shrimp (*Lepidurus packardi*)	FE	Found in vernal pools of California.	**Present.** This species has been documented in two vernal pools at Table Mountain and likely occurs in many other vernal pools that have not been surveyed (see Figure 7) (CDFG 2003).
Valley Elderberry Longhorn Beetle (*Desmocerus californicus dimorphus*)	FT	Lives in mature elderberry shrubs of California's Central Valley and Sierra Foothills.	**Present.** There is 1 documented population occurring just east of Table Mountain. In addition this species likely occurs in many other areas that have not been surveyed (see Figure 7) (CDFG 2003).
California Tiger Salamander (*Ambystoma californiense*)	FE, CSC	Found primarily in annual grasslands; requires vernal pools for breeding and rodent burrows for refuge.	**Present.** There are 7 documented occurrences within the study and a many within a 5-mile radius of the study area. The majority of these documented populations occur south of Millerton Road and east of the Friant-Kern Canal (see Figure 7) (CDFG 2003).
Peregrine Falcon (*Falco peregrinus*)	SE, FD	Breeds mostly in woodland, forest, and coastal habitats. Riparian areas and coastal inland wetlands are important habitats yearlong. Requires cliffs and ledges for cover.	**Likely.** No documented populations occur within the study area and within the 5-mile radius. Peregrine falcons are occasionally seen over the San Joaquin River east of Friant and would likely forage over the aquatic habitats of the study area as well. Suitable nesting habitat occurs in numerous tall trees near watercourses.
Swainson's Hawk (*Buteo swainsoni*)	CT	Uncommon resident and migrant in the Central Valley. Forages in grasslands and fields close to riparian areas	**Unlikely.** One documented population within the 5-mile radius of the study area near the intersection of State Highway 41 and Road 208 (see Figure 7) (CDFG 2003). Although the habitats of the study area appear to be suitable for the species. Swainson's hawks are rarely seen in the eastern portion of the San Joaquin Valley

TABLE 3. LIST OF SPECIAL STATUS WILDLIFE SPECIES POTENTIALLY OCCURING WITHIN THE MILLERTON AREA WATERSHED COALITION STUDY AREA

ANIMALS

Species Listed as Threatened or Endangered under the State and/or Federal Endangered Species Act

Species	Status	Habitat	*Occurrence in the Study Area
Bald Eagle (*Haliaetus lecocephalus*)	FT, FPD, CE	Requires large bodies of water, or free flowing rivers with abundant fish and adjacent snags or other suitable perches.	**Present.** This species is a regular winter resident along the shores of Millerton Lake and the upper reaches of the San Joaquin River.
Western Yellow-billed Cuckoo (*Coccyzus americanus occidentalis*)	CE	Resident of valley foothill and desert riparian habitats in scattered locations.	**Absent.** This species probably never occurred in high numbers and appears to have been extirpated from the region. The last reliable occurrence of the western yellow-billed cuckoo took place along Fancher Creek in 1907.
Fresno Kangaroo Rat (*Dipodomys nitratoides exilis*)	FE, CE	Resident of alkali scrub and herbaceous habitats with scattered shrubs in the southwestern San Joaquin Valley.	**Unlikely.** Suitable habitats are not present in the study area. 1992 was the last year this species was observed in its natural habitat and appears to have been extirpated.
San Joaquin kit fox (*Vulpes macrotus mutica*)	FE, CT	Preferred habitat is alkali shrub and open grassland habitats of the Central Valley. Has also been found in steep grasslands, almond orchards, culverts and riparian habitats.	**Unlikely.** Although suitable foraging and denning habitat for this species appears to be present, mainly in the grassland habitats of the study area, the species has never been verifiably sighted. There are several possible reasons for this lack of sightings, the most likely being that possibilities for migration from known kit fox areas to the study area are extremely limited owing to several obstructions including Millerton Reservoir and the City of Fresno.

State and Federal Species of Special concern

Western Spadefoot (*Scaphoipus hammondii*)	CSC	Primarily occurs in grasslands, but also occurs in valley and foothill hardwood woodlands. Requires vernal pools or other temporary wetlands for breeding.	**Present.** Tw0e documented populations in vernal pools located south of Friant (See Figure 7) (CDFG 2003).
Western Pond Turtle (*Clemmys marmorata*)	CSC	A thoroughly aquatic turtle of ponds, marshes, rivers, streams & irrigation ditches with aquatic vegetation. Uses upland habitats for egg laying.	**Present.** Five documented locations within the 5-mile radius of the study area.

TABLE 3. LIST OF SPECIAL STATUS WILDLIFE SPECIES POTENTIALLY OCCURING WITHIN THE MILLERTON AREA WATERSHED COALITION STUDY AREA

State and Federal Species of Special concern (cont.)

Species	Status	Habitat	*Occurrence in the Study Area
Foothill yellow-legged frog (*Rana boylei*)	CSC	Found in the foothills of the Sierra from sea level to 6,000 feet elevation. Requires permanent rocky streams for egg laying.	**Present.** One document population within the 5-mile radius of the study area, near Little Finegold Lake. In addition there are documented populations identified in reaches Watts Creek, Little Finegold Creek, and the South Fork of Willow Creek that are outside of the study area and the 5-mile radius.
Golden Eagle (*Aquila chrysaetos*)	CSC	Typically frequents rolling foothills, mountain areas, sage-juniper flats and desert.	**Present.** This species is often observed foraging over the grassland and oak woodland habitats of the study area. Documented populations of 3 nest sites on east facing cliffs overlooking Squaw Leap. A nest that was active in 2000 but now appears to be inactive was identified in a foothill pine tree by LOA biologists south of Table Mountain Casino and north of Auberry Road.
Prairie Falcon (*Falco mexicanus*)	CSC	Distributed from annual grasslands to alpine meadows; requires cliffs or rock outcroppings for nesting.	**Present.** This species has been observed foraging within the study area by LOA biologists on numerous occasions. Suitable nesting habitat is are cliffs associated with flat top mesas, similar to Kennedy Table, McKenzie Table and Table Mountain.
Merlin (*Falco columbarius*)	CSC	Nests in open woods or in wooded prairies. Forages in woods and grasslands,	**Present.** This species is occasionally observed within the study area by LOA biologists. Merlins observed in the study area are probably passing through on migration.
Cooper's Hawk (*Accipiter cooperi*)	CSC	Breeds in southern Sierra Nevada foothills in mixed deciduous riparian forests and conifers. Hunts for birds along habitat edges.	**Present.** This species is regularly observed in the study area and breeds in riparian habitats along the San Joaquin River.
Sharp Shinned Hawk *(Accipiter striatus*)	CSC	This species breeds at mid elevation woodland habitats, preferring riparian habitats. May no longer breed in the foothills of the Sierra Nevada (California Wildlife Volume II, 1990). May forage at lower elevations preferentially on north facing slopes.	**Present.** This species is commonly observed within the study area. However, this species breeds at higher elevations than those present.
Burrowing Owl (*Athene cunicularia*)	CSC	Found in open, dry grasslands, deserts and ruderal areas. Requires suitable burrows.	**Present.** Although this species is more commonly associated with grassland habitats of the valley floor, it has been observed in the grasslands of the study area by LOA biologists on several occasions.

TABLE 3. LIST OF SPECIAL STATUS WILDLIFE SPECIES POTENTIALLY OCCURING WITHIN THE MILLERTON AREA WATERSHED COALITION STUDY AREA

State and Federal Species of Special concern

Species	Status	Habitat	*Occurrence in the Study Area
Loggerhead Shrike (*Lanius ludovicianus*)	CSC	Forages in a variety of open habitats including grasslands. Nests in large trees near open spaces.	**Present.** This species is common in the study area and has been observed by LOA biologists on numerous occasions.
California Horned Lark (*Eremophila alpestris actia*)	CSC	Found in a variety of open habitats where trees and shrubs are absent; breeds in grasslands and fallow fields.	**Present.** This species is common in the grassland habitats of the study area.
Tri-colored Blackbird (*Agelaius tricolor*)	CSC	Occurs near fresh water with dense cattails, or thickets of willows or shrubs.	**Present.** Suitable nesting habitat is present in wetland areas with tall reeds or cattails. There are 12 documented populations in Fresno County and 1 documented population in Madera. The exact location of these populations is sensitive and therefore not available for public review. Suitable foraging habitat is present in the grassland habitats of the study area.
Black Swift (*Cypeseloides niger*)	CSC	Forages widely over many habitats, feeding exclusively on flying insects. Nests on steep, moist, rocky cliffs, usually behind waterfalls or above the ocean.	**Unlikely.** This migratory species nests on moist cliffs next to swift moving rapids and on the back side of waterfalls. None of these features are present within the study area. However, individuals may pass through during migration.
Mountain Plover (*Chadrius montanus*)	CSC, FPT,	Winter migrant, occurs in barren fields, often far from water during winter.	**Likely.** Grassland habitats of the study area likely provide foraging opportunities to wintering mountain plovers. This species breeds in the arctic.
Ringtail (*Basariscus astutus*)	CP	Inhabits brushy, rock slopes and riparian areas.	**Present.** This species is common in the riparian habitats of the San Joaquin River.
Pallid Bat (*Antrozous pallidus*)	CSC	Forages over grasslands and bluffs. Roosts in rock outcroppings.	**Possible.** This species may forage over the oaks woodland, riparian, and riverine habitats of the study area and find roosting opportunities in tree cavities.
Spotted Bat (*Euderma maculatum*)	CSC	One of North America's rarest mammals. Has been found in foothills and desert regions of CA. Feeds over water near ground. Apparently roosts in rock crevices. Cliffs are optimal roosting habitat.	**Possible.** This species may forage over mesic habitats of the study area and roost in rock crevices, particularly in cliff faces.
Little Brown Myotis *(Myotis lucifugus)*	CSC	Feeds low over watercourses. Uses separate day, night, hibernation, and nursery sites. May use very confined spaces including rock crevices for night roosts. More open crevices during day.	**Possible.** This species may roost in tree cavities, rock crevices, and down logs and forage over watercourses and along forest edges.

TABLE 3. LIST OF SPECIAL STATUS WILDLIFE SPECIES POTENTIALLY OCCURING WITHIN THE MILLERTON AREA WATERSHED COALITION STUDY AREA

State and Federal Species of Special concern

Species	Status	Habitat	*Occurrence in the Study Area
Yuma Myotis (*Myotis yumanensis*)	CSC	Forested and woodland habitats from sea level to 11,000 feet. Feeds over watercourses and roosts in buildings, mines, caves, or crevices.	**Possible.** Suitable foraging and breeding habitats are present throughout the study area.
Townsend's Western Big Eared Bat (*Plecotus townsendii townsendii*)	CSC	This species is found throughout California in all but subalpine and alpine habitats. Require caves, mines, or man-made structures for colonial roosts.	**Possible.** This species may forage over the oak woodland habitats and roost in large cavities in the basalt tables of the study area.

*Present: Species observed on the site at time of field surveys or during recent past.
Likely: Species not observed on the site, but it may reasonably be expected to occur there on a regular basis.
Possible: Species not observed on the site, but it could occur there from time to time.
Unlikely: Species not observed on the site, and would not be expected to occur there except, perhaps, as a transient
Absent: Species not observed on the site, and precluded from occurring there because habitat requirements not met.

STATUS CODES

FE Federally Endangered
FT Federally Threatened
FPE Federally Endangered (Proposed)
FC Federal Candidate
FSC Federal Species of Concern
FSS U.S. Forest Service Sensitive Species
FPT Federally Proposed Threatened

CE California Endangered
CT California Threatened
CR California Rare
CSC California Species of Special Concern
CNPS California Native Plant Society Listing
CP California Protected

Special Status Animal Species of the Study Area

As Table 3 illustrates, 31 special status animal species are either know to be present, or possibly occur within the study area. Due to the large size of the study area and a lack of comprehensive surveys for many of the regional special status animal species, this is most likely a conservative estimate. A discussion of the animal species that have received particular interest from the USFWS and CDFG are discussed below.

Vernal Pool Fairy Shrimp (*Branchinecta lynchi)*

The United States Fish and Wildlife Service (USFWS) listed this species as Federally Threatened in 1994 and in 2002 proposed 45,035 acres of critical habitat in Madera County and Fresno County (Federal Register Volume 67, Number 185 Sept 2002, page 59927) The majority of the proposed critical habitat includes an area in western Madera County between the Fresno River and San Joaquin River, as well as, the northern basalt vernal pools found on Kennedy Table and the surrounding area. In addition to these two areas, this proposed critical habitat also includes an area that is south of Millerton Lake and an area west of State Highway 41 along Little Dry Creek and Cottonwood Creek, both of which are within the study area. There are three CNDDB documented occurrences of this species occurring within the study area and seven documented occurrences within a 5-mile radius of the study area (Figure 7). There are undoubtedly many more vernal pools containing this species because only a fraction of the total vernal pools in the area have been surveyed.

The life cycle of this crustacean is uniquely adapted to the temporary ponds and springs that appear in seasonal ponds immediately after the prolific winter rains. Fairy shrimp embryos are protected throughout the dry, hot summer by a tough outer covering around each egg. But soon after being immersed in waters that are below 10^{o}C, the eggs hatch, releasing hundreds of little fairy shrimp who eat, grow, reproduce and lay eggs before their ephemeral pools disappear--often in as little as two weeks. Eggs are transported from pool to pool, or dry depression to dry depression, by 'hitching a ride' on wading animals. The fairy shrimp may also be dispersed by animals that ingest the eggs, since the tough egg-coats protect the embryos from being digested. Fairy shrimp swim on their backs, feeding on small particles of detritus, algal cells and bacteria by scraping vegetation or other surfaces with their legs, or filtering the surrounding waters. Many types of insects, amphibians, waterfowl and crustaceans prey on vernal pool fairy shrimp, making this species an extremely important link in the food web, particularly as a supply of energy for migratory birds. Vernal pool fairy shrimp are threatened by continued human efforts to drain and fill vernal pool watersheds for agriculture and development purposes. Stormwater

run-off containing pesticides, chemical residues and other contaminants are heavily impacting remaining shrimp populations as well (USFWS 1994).

Vernal Pool Tadpole Shrimp (*Lepiderus packardi*)

The vernal pool tadpole shrimp, listed by the USFWS in 1994 as Federally Endangered and in 2002 proposed 1,829 acres of critical habitat in Fresno County. The proposed critical habitat includes the northern basalt vernal pools found on Table Mountain and the surrounding area (Federal Register Volume 67, Number 185 Sept 2002, page 59937). There are two CNDDB documented occurrences within the study area (Figure 7). Like the vernal pool fairy shrimp, these two occurrences probably represent a fraction of the number of vernal pools that contain the species.

The vernal pool tadpole shrimp is a small crustacean in the Triopsidae Family. It has compound eyes, a large shield-like carapace (shell) that covers most of the body, and a pair of long cercopods (appendages) at the end of the last abdominal segment. Vernal pool tadpole shrimp adults reach a length of 2 inches in length. They have about 35 pairs of legs and two long cercopods. This species superficially resembles the ricefield tadpole shrimp (*Triops longicaudatus*).

Tadpole shrimp climb or scramble over objects, as well as plowing along or within bottom sediments. Their diet consists of organic debris and living organisms, such as fairy shrimp and other invertebrates. This animal inhabits vernal pools containing clear to highly turbid water.

The life history of the vernal pool tadpole shrimp is linked to the seasonal cycle of the vernal pool. After winter rainwater fills the pool, the population is reestablished from cysts that lie dormant in the dry pool sediments. Sexually mature adults have been observed in vernal pools three to four weeks after the pools had been filled. Some cysts hatch immediately and others remain dormant in the soil to hatch during later rainy seasons.

The ephemeral wetlands that support this network of populations are remnants of what was formerly a pristine vernal pool ecosystem, but which has been converted to mainly agricultural and urban uses. This highly disturbed remnant habitat is imperiled by a variety of human-caused activities, primarily urban development, water supply and flood control projects, and agriculture. Holland (1978) estimated that between 60 and 85 percent of the habitat that once supported vernal pools, had been destroyed by 1973. Since 1973, a substantial amount of remaining habitat has been converted for human uses. Rapid

urbanization of the Central Valley of California currently poses the most severe threat to the continued existence of the listed vernal pool crustaceans.

The habitat of the listed vernal pool crustaceans is highly fragmented. This fragmentation results in small isolated populations. Ecological theory predicts that such populations will be highly susceptible to extinction due to chance events, inbreeding depression, or additional environmental disturbance. Should extinction occur in a population that has been fragmented, the opportunities for recolonization are thought to be greatly reduced due to geographical isolation from other populations (USFWS 1994).

Western Spadefoot Toad (*Spea hammondii*)

The State of California in 1994 designated the western spadefoot toad as a species of special concern. Within the study area there are three CNDDB documented occurrences and within a 5-mile radius of the study there are eight CNDDB documented occurrences. Like the other species mentioned, the number of known spadefoot toad populations in the study area is probably much smaller than the actual number present, since many of the vernal pools in the area have never been surveyed for the species.

Western spadefoot toads are amphibians in the Family Pelobatidae. Spadefoot toads are distinguished from true toads (genus *Bufo*) by their cat-like eyes (due to vertically elliptical pupils), single black sharp-edged "spades" on their hind feet, teeth in their upper jaws and rather smooth skin. Adults range in length from 1.5 to 2.5 inches. They are dusky green or gray above. Often they have four irregular light-colored stripes on their back, with the central pair of stripes sometimes distinguished by a dark, hourglass-shaped area. Skin tubercles (small, rounded protuberances) are sometimes tipped with orange or are reddish in color, particularly among young individuals. The irises of western spadefoot toads' eyes are usually pale gold. Their abdomens are whitish without any markings.

Typical of toads, adult western spadefoot toads will forage on a variety of insects, worms, and other invertebrates, including grasshoppers, true bugs, moths, ground beetles, predaceous diving beetles, ladybird beetles, click beetles, flies, ants and earthworms. The call of western spadefoot toads is hoarse and snore-like, and lasts about one-half to one second.

Western spadefoot toads breed from January to May in temporary pools. Water temperatures in these pools must be between 48° F and 86° F. Breeding calls are audible at great distances, which serve to bring individuals together at suitable breeding sites. Females deposit their eggs in numerous small irregularly

cylindrical clusters of 10 to 42 eggs, and may lay more than 500 eggs in one season. Eggs are deposited on plant stems or pieces of detritus in temporary rain pools, or sometimes pools in ephemeral stream courses. Eggs hatch in 0.6-6 days depending on temperature. Larval development can be completed in 3 to 11 weeks. Larval development must be completed before pools dry. Age at sexual maturity is unknown, but considering the relatively long period of subterranean dormancy (8 to 9 months), individuals may require at least two years to mature.

The principal factors contributing to the decline of the western spadefoot toad are loss of habitat due to urban development and conversion of native habitats to agricultural lands, the introduction of non-native predators and stochastic events that particularly impact small, isolated populations.

Habitat loss and fragmentation results in populations that are small in size and increasingly isolated. This reduces movements by individuals and genetic exchange between populations. Small populations are more likely to go extinct due to catastrophic or stochastic events. Isolation reduces the potential for recolonization of areas where toads have disappeared.

The impact of road mortality is unknown. Roads can be a barrier to movements and effectively isolate populations. Contaminants from road materials, leaks and spills also could adversely impact toads by contaminating the water in wetlands.

Activities that produce low frequency noise and vibration in or near habitat for western spadefoot toads may be detrimental to the species. Spadefoot toads are extremely sensitive to such stimuli, which cause them to break dormancy and emerge from their burrows. This could result in mortality or reduced productivity.

Habitat protection is the primary strategy for conserving the western spadefoot toad. To complete its life cycle, the species needs appropriate aquatic habitats as well as adjacent upland habitats. The western spadefoot toad was designated a species of special concern by the State of California in 1994.

Valley Elderberry Longhorn Beetle (*Desmocerus californicus dimorphus*)

The valley elderberry longhorn beetle (VELB) was listed by the USFWS in 1980 as Federally Endangered. Within the study area there is one documented CNDDB occurrence and within a 5-mile radius of the study there is only one documented CNDDB occurrence (Figure 7). However, this number

most likely represents a fraction of the number of actual occurrences within the study area due to a lack of comprehensive surveys and the prevalence of its host plant, the blue elderberry.

Longhorn beetles (family Cerambidae) are characterized by somewhat elongate, cylindrical bodies with long antennae, often more than 2/3 of the body length. Valley elderberry longhorn beetles (*Desmocerus californicus dimorphus*) are stout-bodied. Males range in length from about 1/2 to nearly 1 inch (measured from the front of the head to the end of the abdomen) with antennae about as long as their bodies. Females are slightly more robust than males, measuring about 3/4 to 1 inch, with somewhat shorter antennae. Adult males have red-orange elytra (wing covers) with four elongate spots. The red-orange fades to yellow on some museum specimens. Adult females have dark colored elytra.

There are four stages in the animal's life: egg, larva, pupa and adult. The species is nearly always found on or close to its host plant, elderberry (*Sambucus* species). Females lay their eggs on the bark. Larvae hatch and burrow into the stems. The larval stage may last 2 years, after which the larvae enter the pupal stage and transform into adults. Adults are active from March to June, feeding and mating.

It appears that in order to serve as habitat, the shrubs must have stems that are 1.0 inch or greater in diameter at ground level. Use of the plants by the animal is rarely apparent. Frequently, the only exterior evidence of the shrub's use by the beetle is an exit hole created by the larva just before the pupal stage. Field work suggests that larval galleries can be found in elderberry stems with no evidence of exit holes. The larvae either succumb before constructing an exit hole or are not far enough along in the developmental process to construct an exit hole.

The beetle appears to be only locally common, i.e., found in population clusters that are not evenly distributed across the Central Valley and into the surrounding foothills. The VELB, though wide-ranging, is in long-term decline due to human activities that have resulted in widespread alteration and fragmentation of riparian habitats, and to a lesser extent, upland habitats, which support the beetle.

The primary threats to survival of the beetle include:

- ?? loss and alteration of habitat by agricultural conversion
- ?? inappropriate grazing
- ?? levee construction, stream and river channelization, removal of riparian vegetation and rip-rapping of shoreline
- ?? nonnative animals such as the Argentine ant, which may eat the early phases of the beetle
- ?? recreational, industrial and urban development.

Insecticide and herbicide use in agricultural areas and along road right-of-ways may be factors limiting the beetle's distribution. The age and quality of individual elderberry shrubs/trees and stands as a food plant for beetle may also be a factor in its limited distribution.

California Tiger Salamander (*Ambystoma californiense*)

This species, listed as a state species of special concern in the region of the study area has been documented as occurring in seven locations within the study area and 17 locations within a 5-mile radius of the study area (Figure 7). The California tiger salamander) is an amphibian in the Family Ambystomatidae. It is a large, stocky, terrestrial salamander with a broad, rounded snout. Adult males are about 8 inches long, females a little less than 7 inches.

Coloration consists of white or pale yellow spots or bars on a black background on the back and sides. The belly varies from almost uniform white or pale yellow to a variegated pattern of white or pale yellow and black. The salamander's small eyes protrude from their heads. They have black irises. Males can be distinguished from females, especially during the breeding season, by their swollen *cloacae*, a common chamber into which the intestinal, urinary, and reproductive canals discharge. They also have more developed tail fins and, as mentioned above, a larger overall size.

The species is restricted to grasslands and low (under 1500 foot) foothill regions where lowland aquatic sites are available for breeding. They prefer natural ephemeral pools or ponds that mimic them (stock ponds that are allowed to go dry).

Larvae require significantly more time to transform into juvenile adults than other amphibians such as the western spadefoot toad and Pacific tree frog (*Pseudacris regilla*). These requirements restrict California tiger salamanders to large vernal pools, vernal playas and large sag ponds. Compared to the western toad (*Bufo boreas)* or western spadefoot toad, California tiger salamanders are poor burrowers. They require refuges provided by ground squirrels and other burrowing mammals in which to enter a dormant state called aestivation during the dry months.

A typical salamander breeding population in a pond can drop to less than twenty breeding adults and/or recruiting juveniles in some years, making these local populations prone to extinction. California tiger salamanders therefore require large contiguous areas of vernal pools (vernal pool complexes or

comparable aquatic breeding habitat) containing multiple breeding ponds to ensure recolonization of individual ponds.

The primary cause of the decline of California tiger salamander populations is the loss and fragmentation of habitat from human activities and the encroachment of nonnative predators. Federal, State and local laws have not prevented past and ongoing losses of habitat. All of the estimated seven genetic populations of this species have been significantly reduced because of urban and agricultural development, land conversion, and other human-caused factors.

A strong negative association between bullfrogs and California tiger salamanders has been documented. Although bullfrogs are unable to establish permanent breeding populations in vernal pools, dispersing immature frogs from permanent water bodies within two miles take up residence and prey on adult or larval salamanders in these areas during the rainy season. Louisiana swamp crayfish, mosquito fish, green sunfish and other introduced fishes also prey on adult or larval salamanders.

A deformity-causing infection, possibly caused by a parasite in the presence of other factors, has affected pond-breeding amphibians at known California tiger salamander breeding sites. This same infection has become widespread among amphibian populations in Minnesota and poses the threat of becoming widespread here.

Reduction of ground squirrel populations to low levels through widespread rodent control programs may reduce availability of burrows and adversely affect the California tiger salamander. Poison typically used on ground squirrels is likely to have a disproportionately adverse effect on California tiger salamanders, which are smaller than the target species and have permeable skins. Use of pesticides, such as methoprene, in mosquito abatement may have an indirect adverse effect on the California tiger salamander by reducing the availability of prey.

Various nonnative subspecies of the tiger salamander within the (*Ambystoma tigrinum*) complex have been imported into California for use as fish bait. The introduced salamanders may out-compete the California tiger salamanders, or interbreed with them to create hybrids that may be less adapted to the California climate or are not reproductively viable past the first or second generations.

Automobiles and off-road vehicles kill a significant number of migrating California tiger salamanders, and contaminated runoff from roads, highways and agriculture may adversely affect them.

Golden Eagle (*Aquila chrysaetos*)

The California Department of Fish and Game listed the golden eagle as a California Species of Special Concern in 1982. There is only one CNDDB documented occurrence within the study area, however, golden eagles have been known to nest in several locations within the study area and are frequently observed foraging over the non-native grassland and woodland habitats. Golden eagles are 30 to 40 inches from the bill to the tip of the tail and have an 80 to 88-inch wingspan (National Geographic Society 1987). Adult eagles weigh approximately ten pounds, with females growing to slightly larger sizes than males (Sibley 2000). Juvenile eagles have a white tail with a broad, dark terminal band, uniform dark brown wing coverts, and usually white patches on the undersides (and sometimes above) on their wings at the base of their primaries (Peterson 1961, Sibley 2000). Second-year birds lose their white patches and gain a pale-colored bar along their shoulders (Sibley 2000). Adults are all dark in coloration, with sometimes a slight lightening at the base of the tail, and have buffy, feathered legs (Peterson 1961, Sibley 2000). Golden eagles have relatively small heads, long wings, and a golden nape that is shown in juvenile, second-year, and adult plumages (Sibley 2000).

The breeding season of golden eagles occurs from late January through August, with their peak occurring in March through July (Polite and Pratt 1990). The species builds new or maintain old nests on cliffs and in large trees (10-100 feet up) in open areas. Several alternative nests are often used within a territory. They build large platform nests of sticks, twigs, and greenery, often 3 meters (10 feet) across and 1 meter (3 feet) high (Polite and Pratt 1990). Golden eagles lay one to three eggs (usually two) in one single brood from early February to mid-May. The incubation period lasts approximately 43-45 days (Beebe 1974), and nestling period lasts usually 65-70 days (Polite and Pratt 1990). The female feeds the young with food brought by the male for about the first 30 days after hatching; thereafter the young are able to feed themselves and both parents bring the young food (Baicich and Harrison 1997). The smaller of the young usually dies before fledging (Baicich and Harrison 1997). Golden eagles may abandon their nests during the early stages of incubation if disturbed by humans (Thelander 1974).

Reproduction occurs from January through August with the peak occurring from March to July. The nest is large often 10 feet across and 3 feet high (Polite and Pratt 1990). Eggs are laid from February through May with a normal clutch size of two. Incubation is 43-45 days and young fledge from the nest in 65-70 days (Beebe 1974).

Golden eagles hunt by soaring 30-90 meters (98-297 feet) above the ground in search of prey, or making low, quartering flights, often 7-8 meters (23-26 feet) above the ground. They occasionally search from a perch and fly directly to prey (Carnie 1954). Golden eagles will also sometimes pirate food from other predators. They are commonly observed hunting in pairs (Polite and Pratt 1990). Golden eagles prey mostly on lagomorphs and rodents, but will also eat other mammals (including domestic calves and lambs), birds, reptiles, and some carrion (Polite and Pratt 1990). The diet of golden eagles is most varied during the non-breeding season (Polite and Pratt 1990).

Golden eagles are yearlong residents of California and are primarily active during the day (Polite and Pratt 1990).

Golden eagles have been observed using a variety of habitat types, including rolling foothills, mountain areas, sage-juniper flats, cliffs and rock outcrops, desert habitats, and wide arid plateaus deeply cut by streams and canyons (Polite and Pratt 1990). They prefer open terrain for hunting, such as grasslands, deserts, savannahs, and early successional stages of forest and shrub habitats (Polite and Pratt 1990). Golden eagles usually nest in rugged, open habitats with canyons and escarpments (Polite and Pratt 1990). Nests are typically on cliffs and rock outcroppings; however, eagles will also nest in large trees including oaks, sycamores, redwoods, pines, and eucalyptus (Polite and Pratt 1990). They will also nest on artificial structures such as transmission line towers.

Golden eagles require expansive home ranges. The home range of golden eagles within the study area is unknown; however, home range studies in southern California have been estimated as averaging 36 square miles (Dixon 1937), and 124 square kilometers (48 square miles) in northern California (Smith and Murphy 1973).

Habitat loss and alteration (including the reclamation of grasslands for agriculture), shooting, and human disturbance at nest sites are major threats to the species (Remsen 1978). Electrocution from small electrical distribution and transmission lines is also a significant problem for the golden eagle (Olendorff *et al*. 1981). Most collisions and electrocutions are of juveniles and of birds flying in windy or stormy weather. The high-voltage metal transmission lines are rarely a problem for golden eagles due to wide conductor spacing and the availability of several perch sites on a single tower (APLIC 1996).

The natural densities and reproductive rate of golden eagles is very low (Remsen 1978). The primary concerns for golden eagles within the study area should be to protect nest sites from disturbance, both

encroachment of urban development as well as limiting recreational access in the areas of nests, and maintaining adequate foraging habitat for nesting pairs.

Prairie Falcon (*Falco mexicanus*)

There is one documented CNDDB occurrence and the exact location of the nest is not available to public, but it is believed that the nest location is within the study area. This is due to in part that prairie falcons prefer to nest on cliffs associated with flat top mesas, similar to Kennedy Table, McKenzie Table and Table Mountain. This species has also been observed on numerous occasions by LOA biologists.

The Prairie Falcon is uniformly brown on the mantle or back and wings in both sexes. The malar stripe is present in this species, however unlike the Peregrine Falcon's it is much narrower and slants backwards. The breast is distinctly vertically streaked in both the adult and particularly the immature plumage. The head has a "blocky" or crew cut appearance with very large eyes. In the field the Prairie Falcon can be recognized by it's large and distinct falcon profile as well as generally drab coloration.

The Prairie Falcon is adapted to arid environments. In the study area it is commonly observed foraging over grasslands.

The Prairie Falcon is known to feed on a wide variety of prey, particularly on ground quarry, (a behavior quite unusual among falcons) such as ground squirrels, prairie dogs, lizards, and birds (particularly small ground dwelling species). Immature Prairie Falcons are known to feed upon large quantities of insects such as grasshoppers.

The Prairie Falcon nests almost exclusively on rock ledges on cliffs in river gorges and coulees, though this species occasionally nests in timbered mountains. Old stick nests of ravens or others raptors will occasionally be used. Prairie Falcons have a strong preference for sites that are in some way protected from the midday sun. Most cliff nesting sites are situated less than 15 meters from the cliff base, although cliff nests have been found as high as 300 meters or even higher.

Individuals have a tendency to return to their breeding territories in early January in the southern part of their range, but usually not until April in Canada. Individuals of either gender may arrive first, with vocal flight displays, (similar to those of the Peregrine Falcon) occurring for approximately two weeks before egg production begins.

Copulation is of frequent occurrence until egg production ceases. From the period of egg production until the young no longer require intensive brooding, the female does no hunting and is kept supplied with food entirely by the male. In this region, egg laying commences as early as mid March.

The average clutch size of this species is usually between 5 and 6 eggs, with an average measurement of 52.3 x 40.8 millimeters (Brown and Amadon). Incubation of the eggs lasts slightly more than 30 days and is shared by the male to a limited degree, such as when the female leaves the nest to feed. After hatching the young are brooded closely for about the first two weeks. The young fledge at approximately 40 days of age. Post fledging mortality is high, with 80 percent of a given years young failing to survive their first winter.

The Prairie Falcon was a bountied species during most of the 1920's and 1930's. Populations of Prairie falcons were decimated by shooting, pole trapping, and aerie destruction. Although its populations are at present stable, they are much reduced from historic levels.

The primary concerns for prairie falcons within the study area should be to protect nest sites from disturbance, both encroachment of urban development as well as limiting recreational access in the areas of nests, and maintaining adequate foraging habitat for nesting pairs.

Burrowing Owl (*Athene cunicularia*)

Although burrowing owls are more commonly associated with the grassland habitats of the valley floor than with grassland habitats of the foothill region, occasional sightings in the study area by LOA biologists indicate that they are present, although probably in low numbers. This species is listed by CDFG as a species of special concern.

Within the study area, burrowing owls have been observed in open terrain in non-native grasslands and in oak savannahs. Other suitable habitats include fallow fields, along irrigation dikes and levees, wherever burrows (generally dug by ground squirrels) are available away from intense human activity. They can occur adjacent to residential development, as evidenced by regular observations of these owls in sandy substrates.

Burrowing owls occupy burrows dug by others, primarily California ground squirrels. They show a high degree of site fidelity and if left undisturbed, they will use the same burrow year after year for nesting. A clutch of 7 to 9 eggs is laid between March and July. Both parents take part in incubation for about 28 days. The young emerge from the nest and spend daylight hours at the burrow entrance with one or both

adults. Their distress call is a low rattle, said to be a mimic of a rattlesnake. The burrows selected by these owls are typically abandoned rodent burrows, however, they also commonly use old pipes, culverts or other debris that simulates a hole in the ground.

Burrowing owls follow a crepuscular habit, being most active during the early morning and evening hours. Their diet is predominantly large insects and small rodents, but they will also take small birds, reptiles, amphibians, fish, scorpions, and other available prey. They are often observed perched on fence posts or utility wires. They typically live 8 years or more.

The most significant threat to the continued persistence of the burrowing owl is destruction of habitat. Their ground nesting habit also leaves them susceptible to predation by domestic cats and dogs. Individuals may be killed on roadways while foraging at night. In agricultural areas, levees and irrigation dikes where rodent burrows are present can provide a suitable nest site. In these areas, burrowing owls can be threatened by disturbance as a result of maintenance activities along dikes and levees and by poisoning from pesticide use or rodent poisoning campaigns. Burrowing owls can be inadvertently buried by construction activities. Off-road vehicle activity is a threat to the habitat of this species as their burrows can be crushed and their nest sites disturbed.

The open burrows on the ground occupied by burrowing owls make them particularly exposed and vulnerable to predation by domestic pets and to disturbance from human activities.

Protection of this species should necessarily include protection and maintenance of burrowing mammal populations and the preservation of grassland foraging habitats.

Special Status Bats

A number of bats including special status species possibly occur within the study area, five of which are California species of special concern (Table 3). The study area contains numerous features that are considered suitable for habitat for foraging and roosting (Sections 3.2 and 3.4). Watercourses throughout the study area and numerous habitat edges that support large abundances of flying insects are places where bats could be expected to forage. Tree cavities, exfoliating bark, rock outcrops, caves, tunnels, and the undersides of bridges are all places where bats could roost. Larger cavities may support maternal colonies. Western mastiff bats are known to roost in cavities in the basalt bluffs of Table Mountain (John Stebbins, pers. commun).

Maternal colonies are seasonal, usually becoming established in late April/May, when groups of pregnant females move in. They seek out warm sites, often is south or southwest facing sections of cliffs or other refugia, where they give birth to single young between June and mid-July. Twins are rare in bats and not all females breed every year. That is why it is important to avoid disturbance during the breeding season. The young are suckled and weaned at 6 weeks, after which time the females begin to disperse. The offspring leave later, but usually by the end of September they have all moved to their winter sites. Some species will overwinter in the study area from about October through January or February, but will leave during the breeding period. Bats dispersing from summer colonies will exhibit this behavior as well.

Roost requirements such as appropriate temperature, humidity, and a means of entry are critical for the well-being of bats and vary with species. This specificity in habitat selection may restrict the choices that bats have for roost site. Not surprisingly, bats typically show strong site fidelity to permanent roost sites including maternal roost sites (Kunz 1982). Because of this behavior, the preservation of maternal roost sites is highly important to the management of bat populations.

6.0 LAND USE

There are eight property owners within the study area represented in Table 4 and Figure 8. Ninety-seven percent of the study area is owned by three entities, representing private landowners, a non-profit local land trust, and federal and state governments. The majority of the private landowners use their property as rangeland for cattle. The non-profit organization manages their land to create wildlife habitat, promote traditional foothill land uses and preserve open space. The federal and state government areas manage their land holdings primarily for public recreational use activities.

TABLE 4. PROPERTY OWNERS WITHIN THE STUDY AREA

Property Owner	Approximate Acres	Approximate Square Miles	Percentage of the Study Area
Private	39,680	62	68%
BLM/BOR	5,885	9.20	10%
Sierra Foothill Conservancy	5,610	9	10%
California Parks and Recreation (includes Millerton Lake Reservoir)	5,150	8	9%
CDFG	983	1.5	2%
County/City/Regional Park	160	0.25	0.3%
Native American Tribe	151	0.24	0.3%
State of California	68	0.10	0.1
TOTAL	57,687	90	100%

Due to the fact that the majority of the study area is private land the main threat to habitat and natural resources is urban growth and development. The next threat to natural resources is the mismanagement of lands by overgrazing areas and the absence of wildfires.

6.1 URBAN GROWTH RECOMMENDATIONS

Urbanization, as well as agriculture, fire suppression, over-grazing, and invasion of non-native species are all impacting and reducing native plant and wildlife populations. The continued urbanization is a disturbance that creates favorable biotic conditions for non-native species. Currently, the Central Valley and non-native grasslands west of the study area are being invaded by non-native species. There is considerable debate as to whether the impact of non-native plant species generally decreases with an increase in elevation or whether the Central Valley and the surrounding non-native grasslands serve as a launching platform for non-native weedy plants, allowing them to ascend to higher elevations. This is a

Figure 8 Land Ownership Map

huge area of concern because the non-native weedy plants are not ecological equivalents of native foothill plant species and therefore displaces many native flora and fauna species, permanently changing the ecological function of habitats. An example emphasizing this point are the 85 terrestrial vertebrate species that require west-slope foothill blue oak woodland, chaparral or riparian habitats to sustain viable populations, with 14% considered at risk because of the continuing loss of habitat. If non-native weedy plants ascend to higher elevations, then there is the potential that the Sierra Nevada, which has about 50% of California's 7,000 vascular plants, could become permanently displaced (SNEP Summary 2000 page 5).

Two non-native invasive weeds, Scotch broom (*Cytisus scoparius*), and Spanish broom (*Spartium junceum*) are well established in reaches of the San Joaquin River between Kerckhoff Reservoir and Patterson Bend. This reach of the San Joaquin River is less than two miles north of the northern boundary of the study area. Biologists with the California Department of Food and Agriculture (CDFA) have identified both the Scotch broom and Spanish broom as a noxious weed. According to the CDFA a plant is designated a noxious weed if a plant is found to probably be "troublesome, aggressive, intrusive, detrimental, or destructive to agriculture, silviculture, or important native species, and difficult to control or eradicate". The California Exotic Pest Plant Council (CALEPPC) designates Scotch broom as a List A plant, which the CALEPPC defines as a widespread pest that is invasive in more than 3 Jepson regions, and is an aggressive invader that displaces natives and disrupts natural habitats. The CALEPPC designates Spanish broom as a List B plant, which the CALEPPC defines as a wild land pest plant of lesser invasiveness because this plant spreads less rapidly and causes a lesser degree of habitat disruption, but may be wide-spread or regional. According to the CALEPPC there are 15 plant species, 11 List A and 4 List B, non-native plants that are occurring in the Sierra Nevada Foothills, which are a potential serious threat to Californian native vegetation and habitats (Table 5). Other California Agencies and people may disagree with CALEPPC's designation of the plants listed in Table 5. Whether or not agencies or people agree with the CALEPPC's designation, Table 5 highlights the serious threat that exists to the Sierra Nevada Foothill habitat and the native flora. Therefore, programs and policies need to be established to monitor and control urban growth into the Sierra Nevada Foothill region, which will address the non-native exotic weed species issue and promote the preservation of native habitats, flora and fauna.

TABLE 5. EXOTIC PLANT SPECIES OCCURING IN THE SIERRA NEVADA FOOTHILL REGION			
Latin Name	**Common Name**	**CALEPPC List**	**Habitat**
Ailanthus altissima	Tree of heaven	A	Riparian, Grasslands and Oak Woodlands
Arundo donax	Giant reed	A	Riparian Areas
Carduus pycnocephalus	Italian thistle	B	Grasslands and Oak Woodlands
Centaure solstitialis	Yellow star thistle	A	Grasslands
Centaurea calcitrapa	purple starthistle	B	Grasslands
Cytisus scoparius	Scotch broom	A	Oak Woodlands and Grasslands
Egeria densa	Brazilian waterweed	A	Streams, ponds, lakes
Ficus carica	Edible fig	A	Riparian Woodlands
Foeniculum vulgare	Wild fennel	A	Grasslands
Phalaris aquatica	Harding grass	B	Riparian
Rubus discolor	Himalayan blackberry	A	Riparian and Oak Woodlands
Saponaria officinalis	Bouncing bet	A	Riparian Habitat
Schinus molle	Peruvian pepper tree	B	Riparian
Taeniatherum caput-medusae	Medusa head	A	Grasslands, particulary alkaline and poorly drained soils
Ulex europaeus	Gorse	A	Grasslands

Category A Plants:

Recommendations:

1. Develop a Watershed Level Noxious Weed Plan, identifying specific reaches of rivers, streams and creeks that are infested with exotic weed species that require eradication or some form of weed control.

2. Protect the location of special habitats (Figure 7) by creating a 100-foot buffer around these areas and prohibiting all development within the 100-foot buffer areas.

6.1 URBAN GROWTH AND WATER SUPPLY

During the ten-year period starting in 1990 and ending in 2000, the population of Fresno County increased 19.8%, while in Madera County during this same period the population increased 39.8% (Census 2000). In order for this population growth to continue, especially in the foothills a local water supply and infrastructure is required. The foothill region topography within the study area poses many challenges to developing an infrastructure that supports a large-scale water project, which could serve as a centralized source of water for the study area. For the most part the challenges presented by the topography are too difficult to overcome, detrimental to the environment, and generally are cost prohibitive. As a result a majority of individual residences and residential subdivisions that are developed in the study area will have to rely on groundwater from wells drilled into fractured rock sources, which are highly variable in terms of water quality, water quantity and depth of well. These variables result in an unreliable water source for large residential developments. The individual residences and residential subdivisions that are dependent on groundwater also use septic tank systems for waste disposal (Bulletin 160-98).

Recommendations:

1. Develop a local ordinance requiring all new houses built have water-saving appliances (i.e. low flush toilets, low flow showers etc).

2. Develop programs that encourage xeriscaping (landscaping with drought tolerant plants).

3. Develop standards for installing septic systems that will contain any septic system leak

6.2 GRAZING

The current non-native grassland (Section 3.3) in the foothills of the Sierra Nevada is the primary forage source for California's livestock industry (Publication 8018). Forage is the edible parts of plants that provide feed for grazing animals. The amount of an annual forage material that is present from one year to the next year is highly variable, influenced by precipitation, temperature, soil characteristics and the amount of dry plant material remaining on the ground from the previous year's growth (residual dry matter). These four factors largely control the forage productivity and the seasonal plant species composition. The amount of residual dry matter left at the end of the dry season is generally used to evaluate the effect of livestock grazing on the annual herbaceous plant material. Management of residual dry matter has a significant effect on subsequent year's herbaceous plant productivity and composition. The amount of residual matter per acre varies according to the species composition, topography, soil, and livestock use. Areas with heavy rainfall, erosive soils, or steep hills need more residual dry matter than do flat, stable soils in drier climates. The Cooperative Extension of the University of California, Division of Agricultural Sciences recommends the following guidelines and thresholds for areas in the Central Coast and Central Valley that receive between 10 to 40 inches of precipitation per year:

Lower or Flat Slopes. . . . . Approximately 400 pounds per acre
Average Gentle Slopes. . . . Approximately 600 pounds per acre
Upper of Steep Slopes. . . . Approximately 800 pounds per acre

Ranchers and range managers are encouraged to develop their own levels of residual dry matter per acre that are specific to site conditions (Guidelines for Residue Management and Annual Range). Residual dry matter creates microenvironments for early seedling growth, soil protection, adequate soil organic matter, and a source of low moisture for fall forage for livestock feed. A lower amount of residual dry matter in the fall created by heavy grazing encourages dominance of the following species: Silver European hairgrass (*Aira caryophyllea*), dove weed (*Eremocarpus setigerus*), quakinggrass (*Briza minor*), nitgrass (*Gastridium ventricosum*), broadleaf filaree (*Erodium botrys*), burclover *(Medicago polymorpha*), redstem filaree *(Erodium cicutarium*), and clovers *(Trifolium* spp.). A high amount of residue in fall, created by light to moderate grazing encourages dominance of the following species: slender wild oats (*Avena barbata*), soft chess brome, wild oats (*Avena fatua*), medusa-head (*Taeniatherum caput-medusae*) and brome (Publication 8018). Heavy grazing occurs when the ungrazed herbage is less than 2 inches in height, resulting in small objects and areas of bare soil being visible at 20 feet or more. The residual dry matter in heavily grazed areas is less than 400 pounds per acres. Light grazing occurs when the ungrazed

herbage is 3 inches or more in height, resulting in small objects being masked, no bare soil, and no to little patchy appearance. The residual dry matter is more than an average of 800 pounds per acre. Moderate grazing occurs when on average the ungrazed herbage is 2 inches in height, resulting in small objects not being visible at 20 feet or more and a little bare soil, with a patchy appearance. The residual dry matter ranges from 400 to 700 pounds (Leaflet 21327 Guidelines for Residue Management on Annual Range).

Livestock grazing has the potential to modify soil properties by compaction, which in turns degrades the soil structure, increases soil bulk density and increases soil erosion by reducing water infiltration rates. Studies in the foothill woodlands on grazing and soil compaction generally find that livestock grazing does compact the soil and the degree of soil compaction increases with grazing intensity (Roberson 1996). The grazing intensity and the resulting amount of the soil compaction was studied in 1999 by Camping, et. al who suggest that there is no detrimental effects to the long-term sustainability of the soil quality and nutrient status by low to moderate intensity grazing.

Grazing is a polarizing and complex issue. Grazing is also a complex process where timing, frequency, duration, season of use, and grazing intensity are all important. Developing a grazing management plan based on residual dry matter guidelines for a specific area requires one to have to ability to distinguish between the effects of grazing and environmental effects, especially in the study area where the non-native annual grassland is very sensitive to rainfall and daily temperatures. The grazing plan has to be flexible, adapting to different yearly forage biomass production, which varies greatly from year to year, and adjusting the number of cattle grazing accordingly so that there is enough residual dry matter to protect the soil and facilitate the growth of forage plant species.

Recommendations:

1. Develop a comprehensive adaptive management grazing plan that incorporates yearly vegetation studies that will assist with the cattle stocking rate from year to year.

2. Protect riparian areas by constructing exclosures that are designed to allow small mammals to cross the fence and prevents cattle from entering the riparian areas.

6.3 FIRE

The majority of the grasses that comprise the non-native grassland within the study area are known as cool-season grasses. Cool season grasses generally germinate with the onset of the late fall early winter rains, and grow, flower, and set seed from winter through spring. The majority of cool season grasses are dead plant material through the summer. One purpose to perform controlled burns within the non-native grassland habitat is to clear invading woody shrubs, reduce the amount of residual dry matter and promote the re-establishment of native perennial bunchgrasses and native vegetation. Re-establishing native perennial bunchgrasses is only possible if there are perennial bunchgrass populations already present and occurring within the study area. Controlled burns on non-native annual cool season grasses are performed either in the early spring when grasses are just starting to grow or in the fall to reduce the residual dry matter.

Due to the air quality, controlled burns are rigorously regulated, with more opportunities to burn occurring in the spring season than in the fall season. Controlled burns performed during the early spring, essentially kills the cool-season grasses and in theory allows the native perennial grasses and native forbs to grow and become established because there is no competition for plant resources by the cool season grasses. Controlled burns performed in the fall reduce the residual dry matter, which is important for germination and seedling establishment for cool season grasses. Controlled burns whether performed in the early spring or the fall, both reduce the amount of forage that will be available for grazing by cattle and therefore needs to be carefully planned and coordinated with any grazing management plans.

Controlled burns performed in non-native grassland habitat, which comprises the understory in blue oak woodland habitat, may have detrimental affects to blue oaks. Numerous studies show that fire is not favorable to blue oak regeneration, sets back the growth of small shrubby blue oaks, and does not result in stimulation of re-growth and regeneration. Fire has very little effect on the growth and re-establishment of the majority of non-native grasses, unless there is a high fuel load, which creates a very hot fire, possibly destroying a large portion of the seed banks in the soil.

Controlled burns performed in Interior Live Oak Woodlands/Forests are beneficial in reducing the fire load, opening up both the canopy and understory. After a fire Interior Live Oak resprouts from the root crown.

6.3.1 Fire Management

Sixty eight percent of the land within the study area is privately owned; the California Department of Forestry and Fire Protection (CDF) is responsible for fire suppression on these lands.

According to CDF division chief Roscoe Rowni of the Merced-Mariposa Ranger District, extensive burning was historically conducted by ranchers in the area. These burns were conducted in order to improve rangeland habitats by controlling noxious weeds and promoting grasses that are more palatable to livestock. Occasionally, these fires escaped and had to be brought under control by CDF. However, owing to the low density of residences in the area during this time period, the probability of an escaped controlled burn destroying a home or other property was quite low.

The increase of residences in rural areas resulting from the migration of the middle class to the suburbs following World War II increased the threat of homes being lost to wildfires. Complaints by the new rural residents about air quality resulting from these activities became an issue as well. This increase in the rural population resulted in CDF and the San Joaquin Air Pollution Control District regulating the days in which landowners could burn. Landowners are no longer permitted to burn during the summertime, when fire conditions are most severe. They also are no longer permitted to burn during days in which there is an inversion layer, which keeps the smoke from dissipating. The net effect has been a reduction of acreage that is burned each year. However, due to the increased recreational use of the area, the number of fire starts has seen an overall increase.

According to Keith Swope, a Fire Apparatus Engineer at the Ahwahnee CDF station, the most common cause of fire in the Millerton Area is now visitors to Millerton State Park Recreation Area disposing used charcoal briquettes by dumping them onto grass. The average size of these fires is approximately 50-60 acres and seldom results in permanent damage. Loss of homes in the area is rare owing to quick suppression of these fires, low housing density, and the fire safety awareness of local landowners. CDF conducts regular inspections of rural residences in the area for compliance with Public Resources Code 4291, which requires residences to maintain defensible space between their homes and flammable vegetation, as well as maintaining their roofs free of debris, and keeping spark arrestors on their chimneys and all internal combustion engines.

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