

APPENDIX A. WILDLIFE AND RARE PLANT MONITORING

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Introduction

This appendix summarizes wildlife and rare plant research and monitoring conducted at Site 300 and at the Livermore site during 2002. This includes monitoring programs that are required by existing permits; baseline surveys conducted to determine the distribution of special-status species on LLNL property; and additional monitoring programs designed to track the distribution and abundance of rare species.

Wildlife

Alameda Whipsnake

In 2002, LLNL began participation in a study, in cooperation with the U.S. Fish and Wildlife Service (USFWS) and four other agencies, to determine the effects of prescribed burns on federally-threatened Alameda whipsnakes (*Masticophis lateralis euryxanthus*). In April 2002, the USFWS issued a Biological Opinion for this study that outlined the general conditions for conducting prescribed burns and gathering information about potential impacts to Alameda whipsnakes. Through participation in this study, LLNL obtained USFWS approval to conduct controlled burns necessary for Site 300 operation in areas that support Alameda whipsnakes. A prescribed burn will be conducted at the burn site in the summer of 2003. Baseline studies were conducted in 2002 at Site 300 at a control site and a burn site that are both vegetated by coastal scrub and annual grasslands. Baseline

studies consisted of live trapping Alameda whipsnakes, recording the location of individuals, and marking the snakes for future identification. Eighteen Alameda whipsnakes were observed at the control and burn sites in 2002 (16 captures of 9 individuals in the burn site and 12 captures of 9 individuals in the control site; one snake moved between the burn and control plots). Long-term monitoring of the burn and control sites will be conducted for five years following the prescribed burn to determine if the burn has an effect on whipsnake distribution and abundance.

California Red-Legged Frog

Livermore site populations of the California red-legged frog (*Rana aurora draytonii*) were monitored in accordance with the 1997 and 1998 amended USFWS Biological Opinion for the Arroyo Las Positas Maintenance Project. A checkerboard pattern of Arroyo sections ranging in length from one-hundred feet to three-hundred feet were managed for excess in-stream vegetation, and 73 California red-legged frogs were temporarily moved from or relocated from project locations during the maintenance process.

California red-legged frog egg mass surveys were conducted in 2002 at the Livermore site. Egg masses were counted, and the location of each egg mass was recorded using global positioning system (GPS). Unlike the the adult frog life stage, which are highly secretive and cryptic, egg masses are rela-

tively conspicuous. This makes them a good indicator of productivity. The oviposition site (location and attachment point) was quantified to yield greater insight into micro-habitat characteristics that might be important to California red-legged frog breeding ecology in the Arroyo Las Positas. Although preliminary, survey results suggest that the Livermore site Arroyo Las Positas population is small but viable, even though the total number of California red-legged frog egg masses detected in the Arroyo Las Positas was down to 31 in 2002 from 37 in 2001. Because predation is high, the actual number of frogs produced per egg mass is unknown. Further annual surveys will help to evaluate the long-term viability of this population.

Nesting Raptors and Loggerhead Shrikes

The location of nesting raptors is monitored annually to ensure compliance with the federal Migratory Bird Treaty Act and for use in the preparation of the site-wide environmental impact statement (EIS) for continued operations at LLNL. At the Livermore site, one pair of white-tailed kites (*Elanus leucurus*), a California Fully Protected Species, successfully fledged three young, and a pair of red-shouldered hawks (*Buteo lineatus*) fledged two young.

The purpose of this study was to determine the composition, abundance, and distribution of nesting raptors and loggerhead shrikes at Site 300 (Bloom 2002). Surveys included nest searches of all potential nesting sites at Site 300 including power poles, cliffs, oaks, large junipers, and ground squirrel colonies. Nest searches were accomplished by walking to the potential nest sites or examining them with a spotting scope. These surveys were conducted in 2002 on April 18, 19, and 20 and July 29, 30, and 31.

Six species of nesting raptors including red-tailed hawk (*Buteo jamaicensis*), American kestrel (*Falco sparverius*), barn owl (*Tyto alba*), western screech owl (*Otus asio*), great horned owl (*Bubo virginianus*), and burrowing owl (*Athene cunicularia*) were observed during this survey. White-tailed kites (*Elanus leucurus*) and golden eagles (*Aquila chrysaetos*) have also been known to nest at Site 300 in the recent past (Woollett 2002). Although not found nesting, the regular presence of two turkey vultures at Site 300 during surveys suggests one pair may nest there. Active nests for red-tailed hawk (four nests), great horned owl (four nests), and burrowing owl (three nests) were found. One inactive barn owl nest was found on the outside of the ATA building. Numerous recently fledged American kestrels and one young western screech owl were also observed. Valley oaks (*Quercus lobata*) and conglomerate cliffs were the most frequently used nest structures. In addition, 18 pairs of loggerhead shrikes (*Lanius ludovicianus*) were found. Highlights of the survey included a small population of nesting burrowing owls and a relatively large population of both breeding and non-breeding loggerhead shrikes.

Tricolored Blackbirds

A nest searching technique was used to determine the distribution and productivity of the Elk Ravine tricolored blackbird (*Agelaius tricolor*) colony (van Hattem et al. 2002). The tricolored blackbird is a California and federal species of concern and is protected under the Migratory Bird Treaty Act. 835 nests were located and productivity was estimated for the colony at 2505 to 3340 fledglings (clutch size 3 to 4) or more conservatively estimated at 835 to 2505 fledglings (clutch size 1 to 3), representing the largest overall concentration of vertebrate special status species at Site 300. Information gathered from the tricolored blackbird colony will enhance planning and management of

Site 300 in addition to improving regional understanding of the distribution and abundance of this declining species.

Rare Plants

No rare plants are known to occur at the Livermore site despite previous survey efforts (Preston 1997, 2002a). Eight species of rare plants are known to occur at Site 300. A rare plant survey of Site 300 was conducted in 1997 and 2002 during which the locations of these eight species at Site 300 were mapped. This survey is described in the “Baseline Surveys” section of this appendix.

Restoration and/or monitoring activities were conducted for three of these species in 2002: the large-flowered fiddleneck (*Amsinckia grandiflora*), a federally endangered species; the big tarplant (*Blepharizonia plumosa*); and the diamond-petaled poppy (*Eschscholzia rhombipetala*). These three plants are all included in the California Native Plant Society’s (CNPS) List 1B (CNPS 2001). This list includes species that are rare or endangered in California and elsewhere. The results of this work are described in more detail in an annual progress report (Carlsen et al. 2003). The round-leaved filaree (*Erodium macrophyllum*) is a CNPS List 2 species (CNPS 2001). List 2 species are rare or endangered in California but more common elsewhere.

The gypsum-loving larkspur (*Delphinium gypsophilum* ssp. *gypsophilum*), California androsace (*Androsace elongata* ssp. *acuta*), stinkbells (*Fritillaria agrestis*), and hogwallow starfish (*Hespererax caulescens*) are all included on the CNPS List 4 (CNPS 2001), which includes plants of limited distribution.

Site 300 has had two of the three known natural populations of the large-flowered fiddleneck. LLNL has established an experimental population

within the *Amsinckia grandiflora* Reserve and is working with the USFWS and the U.S. Bureau of Reclamation on continued monitoring of native and experimental *Amsinckia* populations, and to further develop habitat restoration and maintenance techniques. An annual progress report is currently being prepared by LLNL and will be submitted to the USFWS and U.S. Bureau of Reclamation in 2003 (Carlsen et al. 2003).

The smaller of the two on-site native populations of fiddleneck appears to have been extirpated in 1997 when the bank containing the population washed away. Although no plants have been observed at this site since 1998, the other natural and experimental fiddleneck populations have suffered severe declines in recent years. The number of fiddleneck plants in the larger native population has been at historic lows for the past four years. The number of fiddleneck plants observed in 2002 in the original experimental population area (9 plants) is lower than that observed during the past three years (59 plants in 2001, 45 plants in 2000, 42 plants in 1999). The experimental population was expanded in 2000 to investigate more fully the use of fire as a management tool. A total of 57 *Amsinckia grandiflora* flowering plants were observed in this area in 2002; however, the vast majority of these plants were located in areas that were not burned in 2001. Therefore, to investigate the effects of seed burial on burn survival, seeds were planted in areas that were burned in 2002 as well as in areas that were not burned. Plant establishment in both areas will be monitored in 2003.

The low numbers of *Amsinckia grandiflora* plants observed over the past several years at Site 300 have also been observed in other existing natural and experimental populations of the fiddleneck throughout its existing range. Encroachment of bush lupine (*Lupinus albifrons*) has been observed both at the native population at Site 300 and at an

experimental population at Lougher Ridge in the Black Diamond Mines East Bay Regional Park. A significant level of spring and summer seed predation has been observed at the Site 300 experimental population, although its magnitude does not appear to correlate with plant establishment the following year. In order to enhance the experimental population at Site 300 and Lougher Ridge, LLNL began a rapid seedbank enhancement project in October 2003 with funding provided by the U.S. Bureau of Reclamation.

Monitoring of the big tarplant (*Blepharizonia plumosa*) and the diamond-petaled poppy (*Eschscholzia rhombipetala*) continued in 2002. The big tarplant remained widespread throughout Site 300. Populations were somewhat larger than those observed in 2001, particularly in areas that were burned in the past (and contained small big tarplant populations), but not burned in the spring of 2002. Detailed monitoring of populations located in areas undergoing controlled burning is being conducted to determine the impacts of fire on the population dynamics of this species. Data show the plants do not survive direct contact with the burn, but do benefit from reduced competition resulting from a burn. This suggests an intermittent burn frequency in some areas may further increase populations of this species. A second population of diamond-petaled poppy was identified during the special-status plant surveys (Preston 2002a). This population contained a total of 76 plants. A total of 285 diamond-petaled poppy plants were observed in the original site in 2002 (up from 189 in 2001 and similar to the 273 plants observed in 2000, but significantly higher than the 9 plants observed in 1999). The majority of these plants produced seed-bearing pods.

Invasive Species

Bullfrog (*Rana catesbeiana*) control continued in 2002 with the direct removal of both breeding adults and eggs from the Drainage Retention Basin (DRB) at the Livermore site. The control program appears to be stabilizing or reducing the overall numbers of bullfrogs after the original introduction and subsequent population explosion. California red-legged frog breeding in the DRB was documented for the first time after draining the basin to remove bullfrog larvae and catfish (both are non-native predators) in January 2001. No bullfrogs have been observed at Site 300 to date.

Baseline Surveys

Several baseline surveys were conducted in 2002 to determine the presence, abundance and distribution of plants, wildlife, and special habitats (i.e., wetlands) at Site 300 and at the Livermore site. These surveys were initiated to obtain baseline information for the preparation of the new site-wide EIS. Each survey described below was completed to facilitate accurate analyses of the impacts of continued operation of LLNL to environmentally sensitive resources, including wetlands and threatened and endangered species. In particular, the purpose of these surveys was to determine the presence or absence and distribution of environmentally sensitive resources.

The following surveys or inventories were completed in 2002: mesocarnivore surveys (Clark et al. 2002), a small mammal inventory (West 2002), bat surveys (Rainey 2003), an avian monitoring program (van Hattem 2003a), special status reptile surveys (Swaim 2002), amphibian surveys (van Hattem 2003b), valley elderberry longhorn beetle surveys (Arnold 2002), wet season branchiopod surveys (Weber 2002), a rare plant survey

and vegetation mapping (Preston 2002a), and wetland delineations and mapping (Preston 2002b).

Mesocarnivore Surveys

The purpose of this study was to determine the presence and distribution of mesocarnivores (medium-sized carnivores) at Site 300 (Clark et al. 2002). Three survey techniques were used: nocturnal spotlighting, infrared-triggered camera stations, and scat detection dogs. These surveys were conducted in September and October of 2002. Eight spotlighting sessions were conducted. Spotlighting consisted of two or more people scanning habitat adjacent to fire trails from a vehicle traveling approximately 10 to 15 mph with a spotlight. Spotlighting began at sunset and lasted for two to three hours. Camera stations equipped with motion detectors were set up at 30 different locations and left to operate for seven or more days at each site. In addition, a scat detection dog, trained in the identification of kit fox (*Vulpes macrotis*), red fox (*Vulpes vulpes*) and gray fox (*Urocyon cinereoargenteus*), was used to survey appropriate habitats across the site.

The three survey methods resulted in a total of 11 badger (*Taxidea taxus*) observations, two bobcat (*Lynx rufus*) observations, and 17 coyote (*Canis latrans*) observations. Additionally, there were 15 burrowing owl (*Athene cunicularia*) sightings during this study. (The burrowing owl is a California and federal species of concern known to occur at Site 300.) There were no observations of the endangered San Joaquin kit fox (*Vulpes macrotis mutica*) at Site 300 during the study, which validates earlier study results. Additional species observed in the study are included in [Table A-1](#).

Small Mammal Inventory

A small mammal inventory was conducted in 2002 to assess the diversity and habitat associations of small mammal species (including special-status species) in annual grassland, native grassland, oak savanna, riparian corridor, coastal scrub and seep/spring wetland habitats at Site 300 (West 2002). Two plots of 50 Sherman live traps were set in each of the six habitat types. Trapping was conducted for three consecutive days at each plot between May 14 and August 1, 2002. Traps were set within two hours of sunset and checked within three hours of sunrise. This represents 2689 trap-nights of effort. During this effort, 210 small mammals of ten species were captured. The largest numbers of individuals and species were captured in riparian (65 individuals and 7 species) and coastal scrub (63 individuals and 5 species) habitats. The lowest numbers of individuals were captured in oak savanna (5 individuals and 3 species) and native grasslands (4 individuals and 3 species). Three species were captured in seep/spring wetlands. All species captured are listed in [Table A-1](#).

Trapping in the native grassland habitat was conducted before and after a prescribed burn to help determine the effects of fires on the small mammal population. The number of individuals and species captured was low before and after the prescribed burn. Three species of small mammals were captured during three days of trapping conducted before the prescribed burn. During the three nights immediately following the prescribed burn, only four deer mice (*Peromyscus maniculatus*) were captured. During three nights of trapping conducted four weeks after the prescribed burn, four deer mice and one California vole (*Microtus californicus*) were captured. Although this data is not sufficient to allow statistical comparison of the pre- and post-burn species abundance

and diversity, immediate post-burn trapping indicated some animals survived and remained active in prescribed burn areas.

One of the species captured during this study is the dusky-footed woodrat (*Neotoma fuscipes*). There are 11 subspecies of the dusky-footed woodrat; one of these subspecies, the riparian woodrat (*Neotoma fuscipes riparia*), is a federal endangered species (USFWS 2000). The woodrats captured at Site 300 had characteristics that are intermediate of those of the riparian woodrat and more common subspecies. Because of this, a subspecies determination was not made for the Site 300 woodrats. Although the riparian woodrat's current known range is restricted to the vicinity of Caswell Memorial State Park in San Joaquin County, a historic record exists of the riparian woodrat from the Corral Hollow area (USFS 2000). The San Joaquin pocket mouse (*Perognathus inornatus*), a federal species of concern, was also observed at Site 300 during these surveys in annual grassland and oak savannah habitats.

Bat Surveys

Surveys for bats, including special status species, at Site 300 were conducted in spring and summer of 2002 (Rainey 2003). These surveys included mist netting, acoustic sampling, and roost surveys. At minimum, six bat species were observed during these surveys, including one California Special Concern species, the pallid bat (*Antrozous pallidus*). These species are shown in [Table A-1](#).

Avian Monitoring Program

An avian monitoring program was initiated at Site 300 in 2002 (van Hattem 2003a). This program included variable circular plot point counts and constant effort mist netting. Variable circular plot point count stations were systematically distributed through Site 300. Each point was

surveyed in the morning on calm dry days between sunrise and 0900 hours during March, April and May of 2002. Each site was surveyed once during this time period. Surveys included recording all bird species identified visually using binoculars or by their vocalization in 10 minutes. A constant effort mist netting station was also established in Elk Ravine and Gooseberry Canyon at Site 300. Birds were captured using ten standard passerine mist nets once every ten days throughout the breeding season (May 14 through August 2, 2002). Birds captured in the mist nets were identified to species, banded, aged, sexed, measured, and weighed before being released. Ninety species of birds were identified at Site 300 as a result of this effort. All of the species identified in these surveys are listed in [Table A-1](#).

Reptile Surveys

This effort consisted of determining the presence and distribution of four special-status reptiles: the Alameda whipsnake (*Masticophis lateralis euryxanthus*), the San Joaquin coachwhip (*Masticophis flagellum ruddockii*), the California legless lizard (*Anniella pulchra*), and the coast horned lizard (*Phrynosoma coronatum frontale*) at Site 300. This study included trapping and visual surveys conducted in two areas in the southwest quarter of Site 300 during the spring and fall of 2002 (Swaim 2002). Information about the presence and abundance of reptiles at Site 300, obtained during the Alameda whipsnake burn study, is also included in the report for this study. A total of 63 days of surveys were conducted between April 16 and July 1, 2002 and 30 days of fall surveys between August 14 and October 15, 2002. Study areas were chosen that were most likely to support the target species. Visual surveys consisted of walking fire trails in the study areas. Two types of traps were used: funnel traps and pit fall traps. Traps were placed at the ends of 50-foot drift fences that direct animals to the traps. When active, all traps were

monitored daily. All vertebrate animals captured were identified to species level with the exception of small mammals, which were identified to genus. All snakes were marked for future identification of recaptures.

During this study and the Alameda whipsnake burn study, Alameda whipsnakes (19 individuals), San Joaquin coachwhips (6 individuals) and California legless lizards (1 individual) were observed. Although coast horned lizards were not observed during these trapping and survey efforts, they have been observed by LLNL wildlife biologists at Site 300 during 2002 and in previous years at several locations. This is the first recorded observation of a silvery legless lizard, a species of special concern, at Site 300. All species identified during this survey are listed in [Table A-1](#).

Amphibian Surveys

An amphibian study was completed in 2002 to assess the distribution and abundance of special-status amphibians at Site 300 and at the Livermore site (van Hattem 2003b). This study included field surveys and an analysis of historic records. Sixty-five field surveys were completed in 2002 at the Livermore site and Site 300. Surveys consisted of systematically searching all available habitat within the littoral zone, open water and immediately adjacent terrestrial habitat on foot. A minimum of two daytime and two nighttime surveys were conducted at each site when conditions allowed. In most areas, surveys were not conducted after pools or wetlands had become dry.

At the Livermore site, California red-legged frogs (*Rana aurora draytonii*) were detected in Arroyo Las Positas, the Drainage Retention Basin, and in the West Perimeter Drainage Ditch. In addition, egg masses of California red-legged frogs were observed in Arroyo Las Positas. Although California tiger salamanders (*Ambystoma californi-*

ense) were not observed at the Livermore site, there has been observation of this species in close proximity to the site.

At Site 300, California red-legged frogs were observed in seven locations (Elk Ravine at B812, Elk Ravine at ATA, in the mine shaft in upper Draney Canyon, slide pond, lower juniper pond, upper juniper slide pond, and Ambrosino Pool). California tiger salamander eggs and larva were observed at Ambrosino Pool, pools in the fire trail just south of Ambrosino Pool, and Danger Pool.

Valley Elderberry Longhorn Beetle Surveys

Four specific habitat surveys for the presence of Valley Elderberry Longhorn Beetles (VELB) (*Desmocerus californicus dimorphus*) at Site 300 were conducted on April 8 and 22, and May 14 and 30, 2002 (Arnold 2002). Both adult and larval VELB primarily rely on elderberry plants (typically *Sambucus mexicana*) for their development and survival.

During each site visit, visual surveys were conducted of stands of elderberry shrubs at Site 300. These visual surveys consisted of searching foliage, flowers, and stems for VELB adults. In addition, stems were checked for emergence holes. The location of adults and emergence holes were recorded using a GPS. The locations of all known elderberry plants at Site 300 were also recorded using a GPS. A total of 338 elderberry plants were found in areas previously identified by LLNL wildlife biologists. 248 of these plants were located in six areas at Site 300, and 90 plants were identified in two areas in the adjacent California Department of Fish & Game (CDFG) reserve. These elderberry plants were found in a variety of habitats including intermittent drainage, seeps, riparian corridors, and in association with rock outcrops. Adult VELB and exit holes where

observed at two of the eight elderberry stands surveyed (at Site 300 in the canyon north of Linac Road that flows into Elk Ravine and at the CDFG reserve). Higher densities of elderberries growing in proximity of seasonal water characterize both of these locations.

The discovery of VELB at Site 300 is a range extension for this species. The closest previous observations of VELB are from the floor of the Central Valley.

Branchiopod Survey

A branchiopod survey was conducted in 2001/2002 to determine the distribution of federally listed branchiopods at Site 300 (Weber 2002). This survey was conducted according to the USFWS interim survey guidelines for listed vernal pool branchiopods (USFWS 1996). These guidelines require that the survey protocol be conducted during two consecutive wet seasons. (The second season of surveys was conducted in spring 2003.) Fairy shrimp, tadpole shrimp, and clam shrimp are the groups within the class Branchiopoda that contain species that are currently on the federal endangered species list.

At Site 300, potential habitat for these species exists in the two vernal pools located in the northwest corner of the site, nine relatively large pools in roadbeds, and three ephemeral pools in intermittent drainages. Surveys consisted of sampling these pools at the water surface, throughout the water column, along the pool margins and at the bottom using a fine-meshed aquarium net. Specimens were identified using a 10X hand lens. Surveys were begun on January 18 and continued approximately every two weeks after that date until April 26, 2002. Two branchiopod species that are not federal or California endangered species, California fairy shrimp (*Lindleriella occidentalis*), and California

clam shrimp (*Cyzicus californicus*) were found during the 2002 surveys. No listed branchiopods were observed at Site 300.

Rare Plant Survey/Vegetation Mapping

In 1997 and 2002, a rare plant survey of Site 300 was completed and the vegetation communities of Site 300 were mapped (Preston 2002a). A preliminary vegetation map was prepared using false color photographs taken on April 20, 1998. This map was corrected during field visits conducted in August 2001. Vegetation communities were classified using the list of California natural communities recognized by the Natural Diversity Database (California Natural Diversity Database 1999). Thirteen vegetation communities were identified at Site 300: coastal scrub, California sage scrub, poison oak scrub, native grassland, one sided bluegrass, annual grassland, cottonwood riparian/woodland, great valley willow scrub, Mexican elderberry, blue oak woodland, valley oak forest/woodland, juniper woodland/scrub, and juniper-oak cismontane woodland. Urban and disturbed areas were also mapped.

Before any field surveys for rare plants were conducted, existing information, including the California Natural Diversity Database and lists compiled in previous reports, relating to the occurrence of rare plants at Site 300 and surrounding areas was reviewed. Based on this review, a list of potential rare plants that may occur at Site 300 was prepared. This list includes species included in the Inventory of Rare and Endangered Plants of California (CNPS 2001).

Field surveys for rare plants were conducted between April 20 and May 12 and on September 23 in 1997 and between March 27 and April 3 in 2002. These surveys consisted of covering the entire site on foot while recording all plant species observed. The site was surveyed using

meandering transects that emphasized areas with the most likelihood to support rare plants. Thirty-five transects were sampled over approximately 223 person-hours. Eight rare plants species were observed at Site 300 during these surveys. The first recorded observations of diamond-petaled poppy (*Eschscholzia rhombipetala*), stinkbells (*Fritillaria agrestis*) and round-leaved filaree (*Erodium macrophyllum*) at Site 300 occurred during the 1997 and 2002 surveys. California androsace (*Androsace elongata* ssp. *acuta*) and hogwallow starfish (*Hesperervax caulescens*) were observed at Site 300 during the 1997 and 2002 surveys and during the 1986 rare plant surveys conducted by Biosystems (although these species were not recognized as rare until after 1986). Three additional rare plant species, large-flowered fiddleneck (*Amsinckia grandiflora*), big tarplant (*Blepharizonia plumosa*), and gypsum-loving larkspur (*Delphinium gypsophilum* ssp. *gypsophilum*), previously known to occur at Site 300 were also observed during the 1997 and 2002 surveys.

Wetland Delineation

During 2001 and 2002, a delineation of the wetlands of Site 300 was completed (Preston 2002b). The purpose of this study was to identify wetland areas at Site 300 including those that are federal jurisdictional wetlands subject to Section 404 of the Clean Water Act (ACOE 1987). Wetlands were identified based on the presence of

wetland vegetation. Wetland areas were first identified using false color aerial photographs. The locations of wetland sites were verified in the field and mapped using a GPS. A total of 8.6 acres of wetlands in 46 separate areas were identified during this study. Of these wetlands, 4.4 acres appear to be federal jurisdictional wetlands. The wetlands identified in this study were characterized as vernal pools, freshwater seeps, or seasonal ponds. Freshwater seeps were the most abundant type of wetland identified at Site 300. Thirty-seven areas were mapped as freshwater wetlands. These wetlands typically occur within intermittent drainages and were dominated by emergent perennial plants such as cattails (*Typha* spp.) and willows (*Salix* spp.). Three of the Site 300 wetlands were characterized as vernal pools. The Site 300 vernal pools are vegetated by wetland generalists that are restricted to saturated areas, but not restricted to vernal pools. Five seasonal ponds were observed during this study. Seasonal ponds have hydrology similar to vernal pools, but the vegetation around these ponds includes ruderal herbaceous species.

Table A-1. Site 300 Wildlife Species List. (This list includes species for which there are verified observations. It is not intended to be a complete list of Site 300 species)

Common Name	Scientific Name	Regulatory Status ^(a)	Source
Mammals			
Pallid bat	<i>Antrozous pallidus</i>	CASSC	Rainey 2003
Western red bat	<i>Lasiurus blossevillii</i>		Rainey 2003
Hoary bat	<i>Lasiurus cinereus</i>		Rainey 2003
California myotis	<i>Myotis californicus</i>		Rainey 2003
Western pipistrelle	<i>Pipistrellus hesperus</i>		Rainey 2003
Brazilian free-tailed bat	<i>Tadarida brasiliensis</i>		Rainey 2003
Desert cottontail	<i>Sylvilagus audubonii</i>		LLNL 2003 Clark et al. 2002
Black-tailed jackrabbit	<i>Lepus californicus</i>		LLNL 2003 Clark et al. 2002
Heermann's kangaroo rat	<i>Dipodomys heermanni</i>		LLNL 2003 West 2002
California pocket mouse	<i>Chaetodipus californicus</i>		LLNL 2003 West 2002
California ground squirrel	<i>Spermophilus beecheyi</i>		
San Joaquin pocket mouse	<i>Perognathus inornatus inornatus</i>	FSC	Clark et al. 2002
Botta's pocket gopher	<i>Thomomys bottae</i>		LLNL 2003 West 2002
California vole	<i>Microtus californicus</i>		LLNL 2003 West 2002
House mouse	<i>Mus musculus</i>		LLNL 2003 West 2002
Dusky-footed woodrat	<i>Neotoma fuscipes</i>		LLNL 2003 West 2002
Brush mouse	<i>Peromyscus boylii</i>		LLNL 2003 West 2002
Deer mouse	<i>Peromyscus maniculatus</i>		LLNL 2003 West 2002
Western harvest mouse	<i>Reithrodontomys megalotis</i>		LLNL 2003 West 2002
Coyote	<i>Canis latrans</i>		LLNL 2003 Clark et al. 2002
Raccoon	<i>Procyon lotor</i>		LLNL 2003 Orloff 1986
Long-tailed weasel	<i>Mustela frenata</i>		LLNL 2003 Orloff 1986
Striped skunk	<i>Mephitis mephitis</i>		LLNL 2003 Orloff 1986

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Common Name	Scientific Name	Regulatory Status ^(a)	Source
Western spotted skunk	<i>Spilogale gracilis</i>		LLNL 2003 Orloff 1986
American badger	<i>Taxidea taxus</i>		LLNL 2003 Clark et al. 2002
Bobcat	<i>Lynx rufus</i>		LLNL 2003 Clark et al. 2002
Mountain Lion	<i>Felis concolor</i>		LLNL 2003
Mule deer	<i>Odocoileus hemionus</i>		LLNL 2003 Clark et al. 2002
Wild pig	<i>Sus scrofa</i>		LLNL 2003 Clark et al. 2002
Herpetofauna			
California red-legged frog	<i>Rana aurora draytonii</i>	FT	LLNL 2003
Pacific tree frog	<i>Hyla regilla</i>		LLNL 2003
California tiger salamander	<i>Ambystoma californiense</i>	PT, CASSC	LLNL 2003
Western spadefoot toad	<i>Spea hammondi</i>	FSC, CASSC	LLNL 2003
Western toad	<i>Bufo boreas</i>		LLNL 2003
Alameda whipsnake	<i>Masticophis lateralis euryxanthus</i>	FT, ST	Swaim 2002
San Joaquin coachwhip	<i>Masticophis flagellum</i>	FSC, CASSC	LLNL 2003
Coast horned lizard	<i>Phrynosoma coronatum</i>	FSC, CASSC	LLNL 2003
California legless lizard	<i>Anniella pulchra</i>	FSC	Swaim 2002
Side-blotched lizard	<i>Uta stansburiana</i>		LLNL 2003 Swaim 2002
Western whiptail	<i>Cnemidophorus tigris</i>		LLNL 2003 Swaim 2002
Western fence lizard	<i>Sceloporus occidentalis</i>		LLNL 2003 Swaim 2002
Western skink	<i>Eumeces skiltonianus</i>		LLNL 2003 Swaim 2002
Gilbert skink	<i>Eumeces gilberti</i>		LLNL 2003 Swaim 2002
Southern alligator lizard	<i>Gerrhonotus multicarinatus</i>		LLNL 2003 Swaim 2002
Western yellow bellied racer	<i>Coluber constrictor</i>		LLNL 2003 Swaim 2002
Pacific gopher snake	<i>Pituophis melanoleucus</i>		LLNL 2003 Swaim 2002
Common kingsnake	<i>Lampropeltis getulus</i>		LLNL 2003 Swaim 2002

Table A-1. Site 300 Wildlife Species List. (This list includes species for which there are verified observations. It is not intended to be a complete list of Site 300 species) (continued)

Common Name	Scientific Name	Regulatory Status ^(a)	Source
Western rattlesnake	<i>Crotalus viridis</i>		LLNL 2003 Swaim 2002
Night snake	<i>Hypsiglena torquata</i>		LLNL 2003 Swaim 2002
Glossy Snake	<i>Arizona elegans</i>		LLNL 2003 Swaim 2002
Long-nosed snake	<i>Rhinocheilus lecontei</i>		LLNL 2003 Swaim 2002
California black-headed snake	<i>Tantilla planiceps</i>		Swaim 2002
Birds			
Cooper's hawk	<i>Accipiter cooperii</i>	CASSC, MBTA	LLNL 2003
Sharp-shinned hawk	<i>Accipiter striatus</i>	CASSC, MBTA	LLNL 2003
Golden eagle	<i>Aquila chrysaetos</i>	CASSC, MBTA	LLNL 2003
Red-tailed hawk	<i>Buteo jamaicensis</i>	MBTA	LLNL 2003
Rough-legged hawk	<i>Buteo lagopus</i>	MBTA	LLNL 2003
Red-shouldered hawk	<i>Buteo lineatus</i>	MBTA	LLNL 2003
Ferruginous hawk	<i>Buteo regalis</i>	FSC, CASSC, MBTA	LLNL 2003
Swainson's hawk	<i>Buteo swainsoni</i>	ST, MBTA	LLNL 2003
Northern harrier	<i>Circus cyaneus</i>	CASSC, MBTA	LLNL 2003
White-tailed kite	<i>Elanus leucurus</i>	CAFPS, MBTA	LLNL 2003
Osprey	<i>Pandion haliaetus</i>	CASSC, MBTA	LLNL 2003
Bushtit	<i>Psaltriparus minimus</i>	MBTA	LLNL 2003
Horned lark	<i>Eremophila alpestris</i>	CASSC, MBTA	LLNL 2003
Northern shoveler	<i>Anas clypeata</i>	MBTA	LLNL 2003
Cinnamon teal	<i>Anas cuamptera</i>	MBTA	LLNL 2003
Mallard	<i>Anas platyrhynchos</i>	MBTA	LLNL 2003
Bufflehead	<i>Bluecephala albeola</i>	MBTA	LLNL 2003
Common goldeneye	<i>Bucephala clangula</i>	MBTA	LLNL 2003
White-throated swift	<i>Aeronautes saxatalis</i>	MBTA	LLNL 2003
Great egret	<i>Ardea alba</i>	MBTA	LLNL 2003
Virginia rail	<i>Rallus limicola</i>	MBTA	DOE 1992
Cedar waxwing	<i>Bombycilla garrulus</i>	MBTA	LLNL 2003
Common poorwill	<i>Phalaenoptilus nuttallii</i>	MBTA	LLNL 2003
Blue-grosbeak	<i>Guiraca caerulea</i>	MBTA	LLNL 2003
Black-headed grosbeak	<i>Pheucticus melanocephalus</i>	MBTA	DOE 1992
Lazuli bunting	<i>Passerina amoena</i>	MBTA	LLNL 2003

Table A-1. Site 300 Wildlife Species List. (This list includes species for which there are verified observations. It is not intended to be a complete list of Site 300 species) (continued)

Common Name	Scientific Name	Regulatory Status ^(a)	Source
Turkey vulture	<i>Cathartes aura</i>	MBTA	LLNL 2003
Killdeer	<i>Charadrius vociferus</i>	MBTA	LLNL 2003
Rock dove	<i>Columba livia</i>		DOE 1992
Mourning dove	<i>Zenaida macroura</i>	MBTA	LLNL 2003
Western scrub jay	<i>Aphelocoma californica</i>	MBTA	LLNL 2003
American crow	<i>Corvus brachyrhynchos</i>	MBTA	LLNL 2003
Common raven	<i>Corvus corax</i>	MBTA	LLNL 2003
Greater roadrunner	<i>Geococcyx californianus</i>	MBTA	LLNL 2003
Bell's sage sparrow	<i>Amphispiza belli</i>	FSC, MBTA	LLNL 2003
Black-throated sparrow	<i>Amphispiza bilineata</i>	MBTA	LLNL 2003
Rufous crowned sparrow	<i>Aimophila ruficeps</i>	MBTA	LLNL 2003
Grasshopper sparrow	<i>Ammodramus savannarum</i>	FSC, MBTA	LLNL 2003
Lark sparrow	<i>Chondestes grammacus</i>	MBTA	LLNL 2003
California towhee	<i>Carpodacus mexicanus</i>	MBTA	LLNL 2003
Oregon junco	<i>Junco hyemalis</i>	MBTA	LLNL 2003
Lincoln's sparrow	<i>Melospiza lincolni</i>	MBTA	LLNL 2003
Song sparrow	<i>Melospiza melodia</i>	MBTA	LLNL 2003
Vesper sparrow	<i>Poocetes gramineus</i>	MBTA	DOE 1992
Fox sparrow	<i>Passerella iliaca</i>	MBTA	LLNL 2003
Savannah sparrow	<i>Passerculus sandwichensis</i>	MBTA	LLNL 2003
Golden-crowned sparrow	<i>Zonotrichia atricapilla</i>	MBTA	LLNL 2003
White-crowned sparrow	<i>Zonotrichia leucophrys</i>	MBTA	LLNL 2003
American kestrel	<i>Falco columbarius</i>	MBTA	LLNL 2003
Prairie falcon	<i>Falca mexicanus</i>	CASSC, MBTA	LLNL 2003
House finch	<i>Carpodacus mexicanus</i>	MBTA	LLNL 2003
Lesser goldfinch	<i>Carduelis psaltia</i>	MBTA	LLNL 2003
Cliff swallow	<i>Petrochelidon pyrrhonota</i>	MBTA	LLNL 2003
Northern rough winged swallow	<i>Stelgidopteryx serripennis</i>	MBTA	LLNL 2003
Tree swallow	<i>Tachycineta bicolor</i>	MBTA	LLNL 2003
Western wood-pewee	<i>Contopus sordidulus</i>	MBTA	DOE 1992
Red-winged blackbird	<i>Agelaius phoeniceus</i>	MBTA	LLNL 2003
Tricolored blackbird	<i>Agelaius tricolor</i>	FSC, CASSC, MBTA	LLNL 2003
Brewer's blackbird	<i>Euphagus cyanocephalus</i>	MBTA	LLNL 2003
Bullock's oriole	<i>Icterus bullockii</i>	MBTA	LLNL 2003
Brown-headed cowbird	<i>Molothrus ater</i>	MBTA	LLNL 2003

Table A-1. Site 300 Wildlife Species List. (This list includes species for which there are verified observations. It is not intended to be a complete list of Site 300 species) (continued)

Common Name	Scientific Name	Regulatory Status ^(a)	Source
Western meadowlark	<i>Sturnella magna</i>	MBTA	LLNL 2003
Loggerhead shrike	<i>Lanius ludovicianus</i>	FSC, CASSC, MBTA	LLNL 2003
Northern mockingbird	<i>Mimus polyglottos</i>	MBTA	LLNL 2003
California thrasher	<i>Toxostoma redivivum</i>	FSC, MBTA	LLNL 2003
California quail	<i>Callipepla californica</i>		LLNL 2003
Oak titmouse	<i>Baeolophus inornatus</i>	FSC, MBTA	LLNL 2003
Yellow-rumped warbler	<i>Dendroica coronata</i>	MBTA	LLNL 2003
Black-throated gray warbler	<i>Dendroica nigrescens</i>	MBTA	LLNL 2003
Yellow warbler	<i>Dendroica petechia</i>	CASSC, MBTA	LLNL 2003
Common yellowthroat	<i>Geothlypis trichas</i>	CASSC, MBTA	LLNL 2003
MacGillivray's warbler	<i>Oporornis tolmiei</i>	MBTA	LLNL 2003
Orange-crowned warbler	<i>Vermivora bachmanii</i>	MBTA	LLNL 2003
Wilson's warbler	<i>Wilsonia pusila</i>	MBTA	LLNL 2003
Double-crested cormorant	<i>Phalacrocorax auritus</i>	CASSC, MBTA	LLNL 2003
Wild turkey	<i>Meleagris gallopavo</i>		LLNL 2003
Northern flicker	<i>Colaptes auratus</i>	MBTA	LLNL 2003
Nuttall's woodpecker	<i>Picoides nuttallii</i>	FSC, MBTA	LLNL 2003
Acorn woodpecker	<i>Melanerpes formicivorus</i>	MBTA	DOE 1992
Pied-billed grebe	<i>Podilymbus podiceps</i>	MBTA	LLNL 2003
Phainopepla	<i>Phainopepla nitens</i>	MBTA	LLNL 2003
Ruby-crowned kinglet	<i>Regulus calendula</i>	MBTA	LLNL 2003
Common snipe	<i>Gallinago gallinago</i>	MBTA	LLNL 2003
Greater yellowlegs	<i>Tringa melanoleuca</i>	MBTA	LLNL 2003
Burrowing owl	<i>Athene cunicularia</i>	FSC, CASSC, MBTA	LLNL 2003
Short-eared owl	<i>Asio flammeus</i>	FSC, CASSC, MBTA	LLNL 2003
Great horned owl	<i>Bubo virginianus</i>	MBTA	LLNL 2003
Western screech owl	<i>Otus kennicottii</i>	MBTA	LLNL 2003
European starling	<i>Sturnus vulgaris</i>		LLNL 2003
Western tanager	<i>Piranga ludoviciana</i>	MBTA	LLNL 2003
Anna's hummingbird	<i>Calypte anna</i>	MBTA	LLNL 2003
Costa's hummingbird	<i>Calypte costae</i>	FSC, MBTA	LLNL 2003
Rufous hummingbird	<i>Selasphorus rufus</i>	FSC, MBTA	LLNL 2003
Allen's hummingbird	<i>Selasphorus sasin</i>	MBTA	DOE 1992
Rock wren	<i>Salpinctes obsoletus</i>	MBTA	LLNL 2003
Bewick's wren	<i>Thyothorus ludovicianus</i>	MBTA	LLNL 2003

Table A-1. Site 300 Wildlife Species List. (This list includes species for which there are verified observations. It is not intended to be a complete list of Site 300 species) (continued)

Common Name	Scientific Name	Regulatory Status ^(a)	Source
House wren	<i>Troglodytes aedon</i>	MBTA	LLNL 2003
Hermit thrush	<i>Catharus guttatus</i>	MBTA	LLNL 2003
Swainson's thrush	<i>Catharus ustulatus</i>	MBTA	LLNL 2003
Varied thrush	<i>Ixoreus naevius</i>	MBTA	LLNL 2003
Mountain bluebird	<i>Sialia currucoides</i>	MBTA	LLNL 2003
Western bluebird	<i>Sialia mexicana</i>	MBTA	LLNL 2003
American robin	<i>Turdus migratorius</i>	MBTA	LLNL 2003
Pacific-slope flycatcher	<i>Empidonax difficillis</i>	MBTA	LLNL 2003
Ash-throated flycatcher	<i>Myiarchus cinerascens</i>	MBTA	LLNL 2003
Western wood-pewee	<i>Contopus sordidulus</i>	MBTA	DOE 1992
Black phoebe	<i>Sayornis nigricans</i>	MBTA	LLNL 2003
Say's phoebe	<i>Sayornis saya</i>	MBTA	LLNL 2003
Western kingbird	<i>Tyrannus verticalis</i>	MBTA	LLNL 2003
Cassin's kingbird	<i>Tyrannus vociferans</i>	MBTA	LLNL 2003
Barn owl	<i>Tyto alba</i>	MBTA	LLNL 2003
Invertebrates			
Valley elderberry longhorn beetle	<i>Desmocerus californicus dimorphus</i>	FT	Arnold 2002
California fairy shrimp	<i>Linderiella occidentalis</i>	FSC	Weber 2002
California clam shrimp	<i>Cyzicus californicus</i>		Weber 2002

^a CAFPS = California Department of Fish and Game Fully Protected Species (CA Dept. of Fish and Game 2001)

CASSC = California Species of Special Concern (CA Dept. of Fish and Game 2001)

FE = Endangered under the Federal Endangered Species Act

FT = Threatened under the Federal Endangered Species Act

MBTA = Protected under the Federal Migratory Bird Treaty Act

PT = Proposed as threatened under the Federal Endangered Species Act

ST = Threatened under the State Endangered Species Act

FSC = Federal Species of Concern for Alameda and San Joaquin Counties. May be endangered or threatened. Not enough biological information has been gathered to support listing at this time (U.S. Fish and Wildlife Service 1-1-03-SP-0162)

