Attachment 3 – Species Accounts

SPECIES ACCOUNTS

San Joaquin Kit Fox (*Vulpes macrotis mutica*)

The San Joaquin kit fox is the smallest fox in North America, standing 9 to 12 inches at the shoulder (USFWS 2003a). An adult fox has a body length of approximately 20 inches and a tail length of approximately 12 inches, with relatively long legs and large ears and a slender build. The males weigh about 5 pounds, and females slightly less (4.6 pounds) (CDFG 2000). San Joaquin kit fox fur is tan during the summer and silver-gray in the winter. The tip of the tail is black (Brown et al. 1997).

Status

The San Joaquin kit fox was listed as endangered under the *Endangered Species Act* of 1967 and threatened in the State of California in 1971 (USFWS 2003a).

Threats

The most important threats to San Joaquin kit fox populations are habitat loss and fragmentation, reduction of prey populations through rodent control programs, and use of pesticides and rodenticides (USFWS 1998). Other carnivores may compete with and predate on San Joaquin kit fox, including native species such as the coyote (*Canis latrans)* and bobcat (*Felis rufus*) and nonnative species such as red fox *(Vulpes vulpes)* and domestic dogs (*Canis familiaris*) (USFWS 1998).

Range, Habitat, and Life History

Range: San Joaquin kit fox prior to 1930 ranged over most of the San Joaquin Valley from southern Kern County north to eastern Contra Costa County and eastern Stanislaus County (Grinnell et al. 1937, Brown et al. 1997, USFWS 1998). No recent extensive surveys have been conducted in the historical range. However, based on small-scale surveys and sightings, kit fox are thought to inhabit suitable habitat in the San Joaquin Valley and surrounding foothills and the Sierra Nevada and Tehachapi mountains. Kit fox have been found in Kern, Tulare, Kings, Fresno, Madera, San Benito, Merced, Stanislaus, San Joaquin, Alameda, and Contra Costa counties. They are also known from Monterey, San Benito, San Luis Obispo, Ventura, Santa

Barbara, San Luis Obispo, and possibly Santa Clara counties (USFWS 1998). Observations of San Joaquin kit fox in the 1980s and early 1990s are known from areas near Site 300, including the Carnegie New Town in northwestern San Joaquin county and Midway Substation on the San Joaquin and Alameda counties border, Bethany Reservoir, and Los Vaqueros Reservoir/Altamont Pass area (Orloff et al. 1986, Sproul and Flett 1993). Additionally, a kit fox has been observed at Brushy Peak north of the Livermore Site.

Habitat: San Joaquin kit foxes use grassland and scrubland, oak woodland, alkali sink scrubland, vernal pool, and alkali meadow communities. San Joaquin kit fox dig dens for temperature regulation, shelter, reproduction, and escape from predators (USFWS 1998). They may dig their own dens or modify dens constructed by other species such as ground squirrels, badgers, and coyotes (Morrell 1972, Berry et al. 1987). Loose-textured soils are preferred for den construction. San Joaquin kit fox may also use human-made structures such as culverts, pipelines, and banks in sumps or roadbeds (USFWS 1998). Home ranges vary from 1 square mile to approximately 12 square miles, depending on prey abundance (Morrell 1972, USFWS 1998).

Life History: San Joaquin kit fox are primarily nocturnal but can also be seen during the day on occasion, and are active throughout the year. Kit fox feed on small mammals, birds, insects, and vegetation. Common prey items include California ground squirrels, harvest and pocket mice, kangaroo rats, Jerusalem crickets, and black-tailed hares (Orloff et al. 1986, USFWS 1998). Kit foxes reach sexual maturity at one year of age, but may not breed their fist year of adulthood (Morrell 1972). Pairs usually remain together all year, although they may not occupy the same den (USFWS 1998). Female kit foxes begin preparing a natal pupping den in September and October. Mating occurs between December and March. Gestation takes between 48 to 52 days, and litters are usually born in February and March (Morrell 1972, USFWS 1998). Litters generally consist of two to six pups. Pups emerge aboveground at around one month of age, and disperse after 4 to 5 months, usually in August or September. Reproductive success depends on abundance of prey (USFWS 1998). Drought may lead to low reproductive success by reducing prey abundance. Kit foxes may live up to 10 years, but generally do not live that long in the wild, as adult mortality is high. Adult mortality may be as high as 50 percent, and juvenile

mortality may be around 70 percent (Berry et al. 1987). Predation by larger carnivores such as coyote may account for the majority of kit fox mortality (USFWS 1998).

Large-Flowered Fiddleneck (*Amsinckia grandiflora*)

Status

Large-flowered fiddleneck *(Amsinckia grandiflora)* was federally listed as endangered in 1985. On May 8, 1985, 160 acres of Site 300 surrounding the native large-flowered fiddleneck population in the Drop Tower Canyon, was designated critical habitat by the United States Fish and Wildlife Service (USFWS). In 1997, the USFWS published the final recovery plan for the species (USFWS 1997). On April 28, 2000, the Secretary of the United States Department of Energy established the *Amsinckia grandiflora* reserve on the 160 acres of critical habitat and signed a memorandum of agreement with the USFWS, describing technical services, management, and access to the reserve (USDOE 2000).

Range, Habitat, and Life History

Large-flowered fiddleneck (Gray) Kleeb. ex Greene (Boraginaceae), is a rare annual forb native to the California winter annual grasslands. Large-flowered fiddleneck has been recently known from only three natural populations containing individuals numbering from fewer than 30 to several thousand. All natural populations occur on steep, well-drained, north-facing slopes in the Altamont Hills of the Diablo range, about 19 miles southeast of San Francisco, California. The populations occur at low elevations, approximately 950 feet, and border on blue oak woodland and coastal sage scrub communities. Two of the natural populations occur on Site 300, a high-explosive testing facility operated by the University of California for the United States Department of Energy. The two natural populations at Site 300 are known as the Drop Tower population and the Draney Canyon population. Located in the north/southwest-trending Drop Tower Canyon, the Drop Tower population is the larger of the two populations at Site 300 and was the only known population of large-flowered fiddleneck up through 1987. In 1987, the Draney Canyon population was discovered in a north/southwest-trending canyon west of the Drop Tower Canyon. This population is now believed to have been eliminated. In 1993, a large large-flowered fiddleneck population, known as the Carnegie Canyon population, was discovered on private rangelands near the southeast border of Site 300.

Attempts at establishing two experimental populations have also occurred near Site 300. An ecological reserve, owned by the California Department of Fish and Game (CDFG), is located adjacent to the southeast border of Site 300. An attempt was made to establish an experimental population of large-flowered fiddleneck at this site (known in Pavlik 1994 as the Corral Hollow population), but no reproductive plants have been observed at this site in recent years, suggesting the establishment was not successful. A second experimental population was attempted at the Connolly Ranch, a privately owned ranch near the southwest border of Site 300. This attempt failed, paossibly as a result of extremely high rodent activity (Pavlik 1994).

Restoration efforts began in 1988 by researchers from Mills College. These efforts focused on determining the factors necessary for the successful establishment of additional populations of large-flowered fiddleneck (Pavlik 1988a, 1988b) and have resulted in the establishment of at least one apparently successful experimental population at Lougher Ridge in the Black Diamond Mines East Bay Regional Park (Pavlik 1994). Between 1993 and 1995, using funds obtained through a grant from LLNL's Laboratory Directed Research and Development Program, LLNL researchers teamed with researchers from Mills College to further investigate the causes of large-flowered fiddleneck rarity and to establish an additional population at Site 300. The experimental population was established near the Drop Tower native population on a north-facing slope on the eastern fork of the Drop Tower Canyon where it splits in two around the Drop Tower facility parking lot. This population is known as the Drop Tower experimental population.

Research on the Drop Tower experimental population, the Lougher Ridge experimental population, and data from management of the Drop Tower natural population indicated that competition from exotic annual grasses was contributing to the decline of *A. grandiflora.* In addition, long-term management proved necessary to reduce exotic annual grass cover and restore and maintain the native perennial bunch grass community to ensure the persistence of this species (Pavlik et al. 1993, Pavlik 1994, Carlsen et al. 2000). Long-term financial support is being provided through LLNL Site 300 management.

The goal of the ongoing management of the Site 300 large-flowered fiddleneck populations is to control the cover of exotic annual grasses while developing techniques to restore native perennial

grasslands (Carlsen et al. 2003). The use of controlled burning is being investigated as a tool for developing and maintaining perennial grasslands. Finally, the impact of seed predation is being investigated to determine its impact on the population dynamics of *A. grandiflora*.

The low numbers of large-flowered fiddleneck 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 the experimental population at Lougher Ridge. 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. 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 United States Bureau of Reclamation.

Valley Elderberry Longhorn Beetle (*Desmocerus californicus dimorphus*)

The valley elderberry longhorn beetle is a stout-bodied beetle with long antennae. Males range from 1/2 to 1 inch in length and have antennae as long as their bodies. Females are slightly larger, ranging from 3/4 to 1 inch, with shorter antennae. Adult males have red-orange wing covers with four elongated dark spots, while females have dark colored wing covers (USFWS 1999a).

Status

The valley elderberry longhorn beetle was listed in 1980 as threatened under the United States *Endangered Species Act* (USFWS 1999a).

Threats

The primary threats to valley elderberry longhorn beetles are habitat loss (destruction of riparian forests and associated elderberry trees), invasive insect species such as the Argentine ant, and insecticide and herbicide use. Activities that threaten individual beetles include dewatering or flooding, pesticide application, trimming of plants, and ant invasions (Huxel 2000, Collinge et al. 2001).

Range, Habitat, and Life History

Range: The valley elderberry longhorn beetle is found in the Central Valley of California from Shasta County in the north to Kern County in the south (Barr 1991) and east into the foothills of the Sierra Nevada (Arnold 2002). Adult valley longhorn elderberry beetles have been observed at Site 300 and at the neighboring CDFG site southeast of Site 300 (Arnold 2002).

Habitat: Valley elderberry longhorn beetles use riparian forests and adjacent upland habitats (USFWS 1999a). They are primarily associated with elderberry (*Sambucus* species) trees and shrubs (Arnold 2002, USFWS 1999b). The beetle requires elderberry shrubs with a basal diameter greater than 1 inch (Barr 1991).

Life History: In the spring (April/May), female valley elderberry longhorn beetles lay eggs in crevices in the bark of living elderberry plants. Eggs hatch in a few days and the larvae bore into the pith of the elderberry stem, trunk, or roots (Arnold 2002). The larvae feed on the pith until metamorphosis, which occurs one to two years after hatching (Arnold 2002). Prior to metamorphosis, the larvae chew an exit hole in the trunk of the elderberry, anywhere from ground level to 25 feet or more (Barr 1991). The exit holes are generally between 0.15 and 0.4 inches in diameter. Adults emerge when the host plant begins to flower (Barr 1991). Adult elderberry beetles appear to feed on elderberry flowers and foliage (Arnold 2002). Elderberry beetles are not strong fliers, tend not to leave their host plant, and do not seem to disperse between drainages (Collinge et al. 2001).

California Red-Legged Frog (*Rana aurora draytonii)*

The California red-legged frog is a large frog, reaching up to 5.5 inches from snout to vent in length, with a prominent dorsolateral fold. It is predominantly brown to reddish brown, with moderate-sized dark brown to black spots that sometimes have light centers (Jennings and Hayes 1994). It often has red to orange coloration to the belly and undersurfaces of the thighs, legs, and feet. However, distribution of the red coloration is highly variable. Some individuals have red pigment extending over all undersurfaces and upper surfaces of the body; other individuals lack

red pigment entirely or have it restricted to the feet (Jennings and Hayes 1994). There is a whitish stripe along the jaw (Stebbins 2003).

Status

The California red-legged frog was listed in 1996 as threatened under the *Endangered Species Act* (61 FR 25813). Critical habitat was designated for the California red-legged frog in March 2001, although most has been rescinded due to a recent court decision (USFWS 2002a).

Range, Habitat, and Life History

Range: The current range of the California red-legged frog includes Pacific slope drainages from Napa and Sonoma counties to Baja California. Isolated populations are also found in the Sierra Nevada foothills north of Sacramento (USFWS 2002b). Historically, the California red-legged frog was known from 46 counties but now has been eliminated from at 24 of these (61 FR 25813). The California red-legged frog is found at both Site 300 and at the Livermore Site (van Hattem 2003a).

Habitat: The California red-legged frog is found in a variety of aquatic, riparian, and upland habitats in areas below 4,900 feet. Aquatic systems used by California red-legged frogs include dune swales, ephemeral ponds, intermittent streams, seasonal wetlands, springs, seeps, permanent ponds, perennial creeks, man-made ponds, and virtually any aquatic system that is in close proximity to some permanent water source (USFWS 2001, 2002b). California red-legged frogs have been observed in streams up to 2 miles from breeding habitat and in riparian vegetation adjacent to streams (USFWS 2002b). In heavily grazed areas, adult California red-legged frogs often are observed hundreds of feet from breeding ponds, presumably foraging, seeking appropriate microhabitats or dispersing (van Hattem 2003). California red-legged frogs often use California ground squirrel burrows, deep desiccation cracks, or woody vegetation as thermal refuge during both dry and cold periods of the year. Breeding adults are frequently associated with relatively deep, greater than 2 feet, slow-moving water in areas of dense riparian vegetation, although breeding frogs are found in areas without dense emergent or riparian vegetation in water depths less than 2 feet (USFWS 2001, 2002b).

Life History: Adult California red-legged frogs have a variable diet including invertebrates, small mammals, and other amphibians (Arnold and Halliday 1986, Hayes and Tennant 1986). Larvae are thought to be algae eaters (Jennings and Hayes 1994). California red-legged frogs can complete their entire life cycle in one pond or use a mosaic of habitat types (USFWS 2001). The breeding period for California red-legged frogs is from late November to late April, although most frogs lay their eggs in March (Jennings and Hayes 1994, USFWS 2002b). Emergent vegetation, twigs, and roots are typically used for oviposition sites. Eggs develop into larvae in 20 to 22 days. Although over-wintering tadpoles have been observed in some areas, tadpoles typically develop into frogs in 11 to 20 weeks (USFWS 2002b). During periods of wet weather, California red-legged frogs can move over upland habitats to other aquatic habitats. During dry periods, California red-legged frogs can disperse from breeding habitat to forage or to seek summer habitat in response to declining water levels. A radio-tagged California red-legged frog in the Guadalupe Dunes of California was observed to move approximately 1.75 miles through upland and aquatic habitats over the course of a wet season (Rathbun and Schneider 2001). The California red-legged frog recovery plan (USFWS 2002b) describes unpublished research conducted in Santa Cruz County indicating that California red-legged frogs traveled distances of 0.25 to 2 miles without regard to topography, vegetation type, or riparian corridors.

Alameda Whipsnake (*Masticophis lateralis euryxanthus*)

The Alameda whipsnake is a slender, fast moving snake with a narrow neck and a relatively broad head with large eyes (Swaim 2002). Its dorsal side is sooty black, with yellow-orange dorso-lateral stripes. The anterior portion of the underside is orange to rufus (Stebbins 2003, Swaim 2002). Adult snakes reach up to 5 feet in long (Swaim 2002).

Status

The Alameda whipsnake was listed in 1997 as threatened under the *Endangered Species Act* and threatened in the State of California in 1971 (USFWS 2003c).

Threats

The main threats to the Alameda whipsnake are habitat alteration such as loss of chaparral and coastal sage scrub and fire suppression, which allows vegetation to overgrow its preferred open habitat. Habitat fragmentation has lead to isolation of populations (USFWS 2003c).

Range, Habitat, and Life History

Range: Alameda whipsnakes are found in the inner coast range in western and central Contra Costa and Alameda counties (USFWS 2003). The Alameda whipsnake is found at Site 300 (Swaim 2002).

Habitat: Alameda whipsnakes are found in chaparral, sage scrub, northern coyote brush scrub, and riparian scrub (Swaim 2002). They also use grasslands and oak woodlands adjacent to scrub habitats (Swaim 1994). Rocky outcrops appear to be important to the whipsnake as a source of cover and increased density of prey items such as lizards (Stebbins 1985, Swaim 1994).

Life History: Alameda whipsnakes are active during the day, during spring and summer. In the winter and early spring (November – March), they often remain in a hibernaculum (shelter), although they may be active for short periods of time (USFWS 2003). Mating occurs in late March through mid-June. Little is known about oviposition sites. Whipsnakes feed primarily on western fence lizards (*Sceloporus occidentalis*). They also feed on skinks, frogs, snakes, and birds (USFWS 2003c).

California Tiger Salamander *(Ambystoma californiense)*

The California tiger salamander is a large black salamander with large pale yellow to white spots, growing up to 5 inches from snout to vent (Stebbins 2003). Undersurfaces are highly variable, ranging from uniform white or pale yellow to variegated white or pale yellow and black (Jennings and Hayes 1994). California tiger salamander larvae are yellowish gray to olive above with dark mottling on the back and have large feathery gills (Stebbins 2003).

Status

The California tiger salamander is a state species of special concern and has been proposed for listing as threatened under the *Endangered Species Act* (USFWS 2003a). The Santa Barbara County population was listed as endangered in 2000, and the Sonoma County population was listed as endangered in 2003 (USFWS 2000, 2003b).

Threats

The most important threat to California tiger salamander populations is habitat loss and fragmentation, especially due to urban expansion and conversion of aquatic and upland habitat to agriculture (USFWS 2000). Additional significant population threats include predation by introduced species such as fish and bullfrogs (*Rana catesbeiana*) (Shaffer et al. 1993), vehicle-related mortality during breeding migrations (Gibbs 1998), and rodent control programs (Loredo et al. 1996).

Range, Habitat, and Life History

Range: The California tiger salamander is found in the Central Valley and adjacent foothills and coastal grasslands of California (Loredo and van Vuren 1996). The range of this California endemic extends from Sonoma County and the Colusa-Yolo County border in the north, south through the Central Valley and the Coast Range to Santa Barbara and Tulare counties (Shaffer et al. 1993, Jennings and Hayes 1994). Alameda and Contra Costa counties are among the remaining regions that support the greatest concentration of California tiger salamanders (Shaffer et al. 1993). California tiger salamanders are found at Site 300 (van Hattem 2003a).

Habitat: California tiger salamanders inhabit grasslands and open woodlands with available small mammal burrows and breeding sites (Jennings and Hayes 1994) in areas with a Mediterranean climate of cool wet winters and hot dry summers (Loredo and van Vuren 1996). California tiger salamanders require standing water for breeding (Petranka 1998).

Life History: California tiger salamanders breed in temporary rain pools and permanent waters of grasslands and open woodland of low hills and valleys (Stebbins 1985). Breeding sites can include both natural (vernal pools) and artificial (stock ponds) lentic environments. California tiger salamanders spend much of the year underground, in the burrows of ground squirrels

(*Spermophilus beecheyi*), pocket gophers (*Thomys bottae*), and badgers (*Taxidea taxus*). They usually emerge for only brief periods to breed (Stebbins 1985), typically after the first rains of the year in November or December (Jennings and Hayes 1994, Loredo and van Vuren 1996) and sometimes through April (Petranka 1998). The larval period lasts from 3 to 6 months (Petranka 1998) and, because of this, California tiger salamanders require breeding pools to remain hydrated for at least this length of time. Metamorphosis of salamander larvae begins in late spring or early summer and is followed by the dispersal of metamorphs from their natal ponds into terrestrial habitat (Holland et al. 1990, Loredo et al. 1996). Trenham (2001) recorded adult California tiger salamanders using burrows up to 814 feet from release points adjacent to breeding pools and juvenile salamanders have been reported to use burrows up to 0.75 mile from breeding sites (Jennings and Hayes 1994).

Swainson's Hawk (*Buteo swainsoni*)

The Swainson's hawk is a buteo of the plains, proportioned like a red-tailed hawk but with wings that are a slightly more pointed. When gliding, wings are held slightly above horizontal (Peterson 1990). Adult females weigh 28 to 34 ounces and males weigh 25 to 31 ounces (CDFG 2003d).

Status

The Swainson's hawk was listed as threatened in the State of California on April 17, 1983 (CDFG 2003d).

Threats

Threats to the Swainson's hawk include the destruction of California native grasslands as well as the loss of agricultural lands to various residential and commercial developments throughout California (CDFG 2003a, 2003d).

Range, Habitat, and Life History

Range: During the early 1900s, the Swainson's hawk nested in lowlands throughout most of California. By 1980, the population of this species had dwindled to approximately 110 pairs with

about two-thirds of the California population present in the southern Sacramento Valley and northern San Joaquin Valley (CDFG 2003e).

Habitat: The Swainson's hawk breeds in stands with few trees in juniper-sage flats, riparian areas, and in oak savannah in the Central Valley. The Swainson's hawk forages in grasslands suitable grain or alfalfa fields, or livestock pastures adjacent to breeding stands (CDFG 2003e).
Life History: The Swainson's hawk is diurnal. Common prey include mice, gophers, ground squirrels, rabbits, large arthropods, amphibians, reptiles, birds, and, rarely, fish. It soars at low and high levels in search of prey. It also may walk on the ground to catch invertebrates and other prey and catches insects and bats in flight. Breeding occurs from late March to late August, with peak activity in late May through July. The Swainson's hawk nests on a platform of sticks, bark, and fresh leaves in a tree, bush, or utility pole from 4 to 100 feet above ground. It nests in open riparian habitat, in scattered trees or small groves, in sparsely vegetated flatlands. Its clutch size is usually 2 or 3 eggs, which incubate in 25 to 28 days (CDFG 2003e).

Willow Flycatcher (*Empidonax traillii*)

The willow flycatcher is a member of several small (approximately 5.75 inches long), drab flycatchers in the Empidonax complex and share the characteristics of light eye-ring and two pale wing bars. During breeding, these birds are separated by voice, habitat, and manner of nesting. (Peterson 1990).

Status

The willow flycatcher was listed as endangered in the State of California on January 2, 1991 (CDFG 2003a).

Threats

Loss and degradation of riparian habitat is the principal reason for the decline of the willow flycatcher population and the decrease in geographic range of the species. Impacts of livestock grazing to both the habitat and nests of breeding birds have also been implicated in the decline of the species. Nest parasitism by brown-headed cowbirds has contributed to population reductions (CDFG 2003a).

Range, Habitat, and Life History

Range: The willow flycatcher was formerly a common summer resident throughout California. The species has now been eliminated as a breeding bird from most of its former range in California. Only small, scattered populations remain in isolated meadows of the Sierra Nevada and along the Kern, Santa Margarita, San Luis Rey, and Santa Ynez rivers in Southern California. The smallest of these populations consists of about five pairs and the largest about 50 pairs (CDFG 2003a).

Habitat: The willow flycatcher's breeding range in California formerly extended wherever extensive willow thickets occurred. Dense willow thickets are required for nesting and roosting. Low, exposed branches are used for singing posts and hunting perches. In the Sierra Nevada, the willow flycatcher is consistently absent from otherwise apparently suitable areas where the lower branches of willows have been browsed heavily by livestock (CDFG 2003a).

Life History: The willow flycatcher is diurnal in nature. It arrives from Central and South American wintering grounds in May and June and departs in August; transients are noted through mid-September (CDFG 2003f). Willow fly catcher nests are frequently parasitized by the brown-headed cowbird. Willow flycatchers are monogamous, with peak egg laying occurring in June. The incubation period is 12 to 13 days, with clutches averaging 3 or 4 eggs. The fledging age for this bird is 13 to 14 days (CDFG 2003f).

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