Galbreath Special Status Species Assessment – Mammals

Before I worked on this project, I had no idea how to apply GIS to basic ecological concepts. – Christoph Schopfer, Geography Major

Project Summary

A team of students and Center staff mapped potential habitat for 110 special status plants and animals on the Galbreath Wildlands Preserve. We identified special status species with potential to occur in the Galbreath Preserve using existing agency databases and publications. These included fungi, bryophytes, plants, invertebrates, amphibians, reptiles, birds and mammals. For each species, we collected biological information, undertook GIS-based habitat suitability analysis, and assessed the likelihood of occurrence within preserve boundaries. The project created professional experience for Biology and Geography undergraduates and graduate students who worked on an interdisciplinary team to develop assessment techniques and methods. See Methods (PDF) and Species List (PDF) for additional information.

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Funding: Robert and Sue Johnson Family

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Mammals

These results are part of a larger assessment of all special status species with potential to occur at the Galbreath Wildlands Preserve. Assessments were conducted as planning exercise and do not constitute evidence of occurrence.

Carnivora

Mustelidae

Martes pennanti (pacifica), Pacific Fisher: MAPE Text, MAPE Map

Taxidea taxus, American Badger: TATA Text, TATA Map

Chiroptera

Vespertilionidae

Antrozous pallidus, Pallid Bat: ANPA Text, ANPA Map

Corynorhinus townsendii, Townsend's Big-Eared Bat: COTO Text, COTO Map

Lasionycteris noctivagans, Silver-Haired Bat: LANO Text, LANO Map

Lasiurus blossevilli, Western Red Bat: LABL Text, LABL Map

Myotis evotis, Long-Eared Myotis: MYEV Text, MYEV Map

Myotis thysanodes, Fringed Myotis: MYTH Text, MYTH Map

Myotis yumanensis, Yuma Myotis: MYYU Text, MYYU Map

Rodentia

Muridae

Arborimus pomo, Sonoma Tree Vole: ARPO Text, ARPO Map

Status:

Federal: Candidate Threatened

State: Threatened

Other: None

Photo: Pacific Biodiversity Institute

Species Description:

The fisher is a member of the weasel family (Mustelidae). The fisher has a long slender body with short legs and a long, bushy tail; a triangular head with a sharp, pronounced muzzle; forward-facing eyes; and large, rounded ears (Powell and Zielinski 1994). Sexual dimorphism is pronounced, with males weighing between 3.5 and 5.5 kg and ranging in length from 90 to 120 cm, and females weighing between 2.0 and 2.5 kg and ranging from 75 to 95 cm long (Powell 1993). Fishers are mostly dark brown in color. Their face, neck, and shoulders are silver or light brown, contrasting with the guard hairs on the tail, legs, and rump, which are glossy black (Powell and Zielinski 1994). Their undersurface is uniformly brown, except for white or cream colored patches around the genitals and on the chest, which may be individually distinctive (Powell 1993). The fur ranges in length from 30 mm on the stomach and chest to 70 mm on the back (Powell 1993). (From Center for Biological Diversity 2008)

Recent genetic analyses found patterns of population subdivision similar to the earlier described subspecies (Drew et al. 2003). This observed variation was considered by Drew et al. to be insufficient to warrant recognition of subspecies, but sufficient to support recognition of distinct population segments. The West Coast population of the fisher was also recognized as a distinct population segment by USDI (1991, 2004). The present document recognizes the fisher in its West Coast range as a distinct population segment, hereafter denoted as the Pacific fisher, but refers to it as *Martes pennanti*. (From Center for Biological Diversity 2008)

Distribution:

In California, the fisher historically ranged throughout the Sierra Nevada from the Greenhorn Mountains in northern Kern County to the southern Cascades at Mount Shasta. From there, they ranged west into the North Coast Ranges and Klamath Mountains from Lake and Marin Counties north to the State line (Figure 1 and Grinnell et al. 1937). In the Sierra Nevada, the fisher occurs from roughly 600-2,600 m with occasional sightings up to 3,000 m (Grinnell et al. 1937, Zielinski et al. 1997a). In northern California, fishers are occasionally seen at sea level, but more commonly occur from 600-1,700 m (Grinnell et al. 1937, Zielinski et al. 1997a). The upper elevational limit of the fisher's range generally corresponds with those areas that receive significant winter snowfall, where it is believed fishers are not able to travel efficiently (Krohn et al. 1997).(From Center for Biological Diversity 2008)

The Pacific fisher in the United States is reduced to one small reintroduced population in southern Oregon near Crater Lake, and two small, isolated, native populations in California: one in northwestern California southwestern Oregon (in the North Coast Range and Klamath region) numbering at most 750 animals, and another in the southern Sierra Nevada numbering at most 360 individuals. (From Center for Biological Diversity 2008)

Life History & Threats:

Fishers are opportunistic, generalist predators with a diverse diet, including birds, porcupines (*Erethizon dorsatum*), snowshoe hares (*Lepus americana*), squirrels (*Sciurus* spp., *Tamiasciurus* spp., *Glaucomys* spp.), mice and voles (*Clethrionomys gapperi*, *Microtus* spp., *Peromyscus* spp.), shrews (*Blarina* spp., *Sorex* spp.), insects, carrion of deer (*Odocoileus* spp.) and moose (*Alces alces*), vegetation, and fruit (Powell 1993, Martin 1994, Powell and Zielinski 1994, Zielinski et al. 1999, Weir et al. 2005, Bowman et al. 2006). …reptiles were found to be an important prey item for fishers in Northern California (24.5 percent frequency of occurrence in scat; Golightly et al. 2006), particularly in the interior regions, but elsewhere in North America they constitute a very minor portion of the fisher's diet (<1 percent) (Zielinski et al. 1999). Also unique to the southern Sierra Nevada and northern California, fishers were found to potentially feed on hypogeous fungi (false truffles) (Grenfell and Fasenfest 1979, Zielinski et al. 1999). (From Center for Biological Diversity 2008)

Fishers have a low annual reproductive capacity. Females breed at the end of their first year, but because of delayed implantation do not produce a litter until their second year. One-year-old males are capable of breeding, but some have questioned whether they are effective breeders (see Powell 1993). Litter sizes generally range from one to four kits, but can be as high as five or six in rare cases (Powell 1993). Not all fishers produce young every year…In their study area on the North Coast, however, 73 percent of females gave birth to young in 1995, but only 14 percent (one of seven) did so in 1996, indicating fisher reproductive rates may fluctuate widely. (From Center for Biological Diversity 2008)

Historic trapping for the animal's valuable pelt, timber harvest, loss of an important prey item (porcupine), urban development, and other factors have severely reduced the fisher's range across the United States. … In the western United States, however, the genetically 'distinct population segment' (hereafter referred to as the "Pacific fisher") has not re-inhabited the majority of its former range, despite the cessation of legal trapping in the 1930s and 1940s. …both of California's fisher populations are threatened by continued logging, development, roads, and other anthropogenic factors, as well as low genetic diversity, population isolation, and demographic stochasticity.(From Center for Biological Diversity 2008)

During the 19th and early 20th centuries the fisher declined over most of its range because of excessive fur trapping and habitat destruction through logging. Aubry and Lewis (2003) state that over trapping appears to have been the primary initial cause of fisher population losses in southwestern Oregon. The high value of the skins, the ease of trapping fishers (Powell, 1993), year-round accessibility in the low to mid-elevation coniferous forests, and the lack of trapping regulations resulted in heavy trapping pressure on fishers in the late 1800s and early 1900s (Aubry and Lewis, 2003). Timber harvest can fragment fisher habitat, reduce it in size, or change the forest structure to be unsuitable for fishers. Habitat loss and fragmentation appear to be significant threats to the fisher. (From Reid and Helgen 2008)

Habitat & Habitat Associations:

General Habitat:

Pacific Fishers in the western United States are habitat specialists associated with forests exhibiting late-successional characteristics, such as an abundance of large trees, snags, and logs (>100 cm DBH), multiple canopy layers, high canopy closure, and few openings (Dark 1997, Freel 1991, Powell and Zielinski 1994, Seglund 1995, Truex et al. 1998, Carroll et al. 1999, Mazzoni 2002, Zielinski et al. 2004a). (From Center for Biological Diversity. 2008)

Throughout California, fishers occur in mixed conifer, Douglas-fir, and ponderosa pine forest types (Zielinski et al. 1997a, Zielinski et al. 2000). (Center for Biological Diversity 2008)

Several studies have shown that fishers are associated with riparian areas (Aubry and Houston 1992, Dark 1997, Seglund 1995, Zielinski 1999, Zielinski et al. 2004a). For example, Aubry and Houston (1992) noted that many of the past sightings of the fisher in Washington State were in riparian areas or wetlands. This is probably because riparian forests are in some cases protected from logging and are generally more productive, thus having the dense canopy closure, large trees, and general structural complexity associated with fisher habitat (Dark 1997). (Center for Biological Diversity 2008)

Federal Register April 8, 2004 (at p. 18774), cites literature making clear the relationship between fisher and closed canopy conditions: "The fisher's need for overhead cover is very well-documented. Many researchers report that fishers select stands with continuous canopy cover to provide security cover from predators... Fishers may use forest patches with large trees because the overstory closure increases snow interception... Forested areas with higher density overhead cover provide the fisher increased protection from predation and lower the energetic costs of traveling between foraging sites. Fishers probably avoid open areas because in winter open areas have deeper, less supportive snow which inhibits travel … and because they are more vulnerable to potential predators without forest cover... Furthermore, preferred prey species may be more abundant or vulnerable in areas with higher canopy closure..." (From Center for Biological Diversity. 2008)

Studies on the habitat use of fishers in the western United States demonstrate that the fisher is strongly associated with mature and late successional forests (Aubry and Houston 1992, Buck et al. 1994, Dark 1997, Jones and Garton 1994, Mazzoni 2002, Powell and Zielinski 1994, Seglund 1995, Truex et al. 1998, Carroll et al. 1999, Campbell 2004, Zielinski et al. 2004a, 2004b). In particular, fishers are generally found in stands with high canopy closure, large trees and snags, large woody debris, large hardwoods, and multiple canopy layers. (Center for Biological Diversity 2008)

Based on a review of eight studies of fisher home-range size, Freel (1991) determined that supporting a reproductive unit of fishers, including the home ranges of one male and two females, would require 2,428 ha (6,000 ac) in high capability habitat with 70-80 percent in mature, closed conifer forest; 3,966 ha (9,800 ac) in moderate capability habitat with 61-80 percent in mature, closed conifer forest; and 4,573 ha (11,300 ac) in low capability habitat with 50-60 percent in mature, closed conifer forest. Carroll et al. (1999) compared fisher locations with habitat variables at the scale of the stand, landscape, and region and found that habitat variables at landscape and regional scales predicted fisher distribution as well as a model incorporating fine-scale habitat attributes, potentially indicating that the fisher may be selecting habitat at the home-range scale or above. At the landscape scale, fisher distribution was strongly associated with landscapes with high levels of tree canopy cover (Carroll et al. 1999). (From Center for Biological Diversity. 2008)

Denning Habitat:

Denning and resting habitat is defined as the physical structures that are used by fishers for giving birth and raising kits (denning) and for resting between foraging bouts (resting), as well as the forest characteristics immediately surrounding these structures(From Center for Biological Diversity. 2008).

All dens were in cavities of very large live or dead conifer or hardwood trees, and all were standing except one white fir (*Abies concolor*) log (Table 2). (From Center for Biological Diversity. 2008).

Hardwood trees with dens appear to be smaller on average than conifer trees with dens. Truex et al. (1998) reported that of a total of 19 denning sites, eight were in live hardwood trees, six were in live conifer trees, four were in conifer snags, and one was in a conifer log. Overall the average diameter at breast height (DBH) was 114.8 cm for conifers and 62.5 cm for hardwoods. The minimum sized conifer den tree was an 82-cm live white fir, while minimum sized hardwoods were in 40-cm live black oak and live oak. Higley and Matthews (2006) reported the average DBH for birth and pre-weaning natal den trees was 59-113 cm for hardwoods and 102-137 cm for four conifer species, and Self and Callas (2006) reported the DBH of a Douglas-fir snag den site was 166.4 cm (no information was available on average DBH of hardwood tree den sites). Interestingly, Weir and Harestad (2003) found that the average DBH of black cottonwoods in British Columbia used as fisher maternal dens was 103.1 cm, which is larger than the hardwood tree den sites reported in California. (From Center for Biological Diversity. 2008).

Resting Habitat:

…. Resting structures protect fishers from inclement weather conditions and predators. Therefore “choosing a resting site may be among the most important choices made by fishers outside the breeding season,” (Zielinski et al. 2004a at p. 476)…. (From Center for Biological Diversity. 2008).

..fishers most frequently rested in live trees, followed in order of importance by snags, platforms, and logs. Rock piles, subnivean sites and holes in the ground were utilized less frequently. Douglas-fir was by far the most common species used for resting in both northern California sites, whereas oaks and true firs were most commonly used in the southern Sierra. (From Center for Biological Diversity. 2008).

The average DBH of trees and snags used by fishers for resting in numerous studies in California was 79.7 to 118.5 cm for conifers and 67.1 to 103.2 cm for hardwoods (Table 3). Approximately 80 percent of all logs used as rest sites by fishers were over 76 cm DBH. Other studies from the West Coast have found similar results (Table 3). Appropriate rest sites must be widely distributed throughout home ranges of fishers because they are typically used for only one rest or sleep (Powell and Zielinski 1994, Truex et al. 1998, Zielinski et al. 2004a)…. Resting sites are typically located within stands dominated by late-successional forest characteristics, such as large trees and snags, coarse woody-debris, high canopy closure, and multiple canopy layers (Truex et al. 1998, Zielinski et al. 2004a). Truex et al. (1998) documented high mean canopy closure and high mean DBH of the four largest trees in stands surrounding fisher rest sites on three study areas in California (Table 4). (From Center for Biological Diversity. 2008).

Zielinski et al. (2004a) concluded that canopy cover, DBH, and slope are the most significant variables explaining the differences between fisher resting and random sites. Resting sites had significantly larger maximum DBH, higher average canopy closure and

shrub canopy closure, more large snags, and steeper slopes than random sites. Conifers and hardwoods were smallest at random sites, larger in stands surrounding resting sites, and largest when used as resting structures (Zielinski et al. 2004a). Similarly, Mazzoni (2002) found that canopy cover, tree basal area, distance from water, and crown volume were the most significant indicators of fisher rest sites in the southern Sierra. In northern California, the presence of large conifer snags was also important, while in the southern Sierra, the presence of water and hardwoods was significant (Zielinski et al. 2004a). Similarly, Dark (1997) found that stands surrounding fisher rest sites have greater amounts of 50-75 percent canopy cover, fewer disjunct core areas, and more Douglas-fir than areas where fishers were not detected, and Seglund (1995) found that the fisher used rest sites with greater basal area per square meter, a higher percentage of dead and down woody debris, a greater average DBH of the four largest trees, and a greater number of vegetation layers (multiple canopy layers) on plots surrounding rest sites compared with sites where fishers were not detected. These characteristics are all typical of late-successional forests. (From Center for Biological Diversity. 2008)

Foraging Habitat:

Presumed foraging habitat, similar to resting and denning habitat, is often typified by characteristics associated with mature and late-successional forests (Dark 1997, Jones and Garton 1994, Zielinski 1999). Zielinski (1999) documented that fishers on the North Coast of California foraged in stands with greater basal area, a wider range of tree sizes (based on greater DBH standard deviation; this factor suggests presence of multiple canopy layers), and significantly higher canopy closure (average of 91.7 percent for sites with detections compared to 79.0 percent sites without detections) than stands where fishers were not found, Conversely, Klug (1997) found no difference in age between stands where fishers were detected at track plate stations and where fishers were not detected, and thus found no relationship between fishers and late-successional forests in his study on private timber lands in coastal northern California. However, Klug noted that there was very little old-growth in his study area (<2 percent) and that track plate surveys are unable to detect whether or not fishers are using the area incidentally or regularly. Powell and Zielinski(1994) concluded:

> "While some recent work in northern California indicates that fishers are detected in second-growth forests and in areas with sparse overhead canopy, it is not known whether these habitats are used transiently or are the basis of stable home ranges. It is unlikely that early and mid-successional forests, especially those that have resulted from timber harvest will provide the same prey resources, rest sites and den sites as more mature forests."

(From Center for Biological Diversity 2008)

Conceptual Basis for GIS Model Development: We mapped potential habitat for Fishers in the Study Area as:

- Coniferous and riparian woodlands and forests. An estimate of approximate maximum riparian vegetation extent was developed by creating a 130-meter buffer (the distance, as measured from aerial photos, incorporating the widest section of the creek, alluvial terraces, and streamside vegetation) around Rancheria Creek, the only watercourse on the Galbreath Preserve with significant riparian vegetation. Riparian vegetation within this zone is heterogeneous and disjunct.)

Best potential habitats (for denning, resting, and foraging) are indicated as coniferous woodlands and forests with:

- high canopy closure (≥ 40% canopy cover) and
- large trees (DBH ≥ 61 cm (24 in)), the largest DBH size category in the Study Area. (Note that Fishers generally occur in areas with trees > 100 cm, so the analysis overestimates the amount of potential habitat).

Potential Occurrence in the Galbreath Wildlands Preserve:

Habitat Quality: Habitat quality for Pacific Fisher is poor to moderate in the Galbreath Wildlands Preserve (Figure 100). Pacific Fishers require dense old-growth mixed-coniferous forest for almost every aspect of their life history. The majority of the Preserve is dominated by secondary growth forests with much of the canopy cover > 60%, but some areas include mature trees (DBH > 61 cm (24 in)).

Habitat Size: Densities in preferred habitat are about one Fisher per 2.6 to 7.5 km^2 (642 to 1853 ac)(Coulter, 1966; Kelly, 1977 as cited in Reid and Helgen 2008), and roughly 2,428 ha (6,000 ac) of high quality habitat (70-80% mature closed forest) is needed to support one male and two females (a reproductive unit). In "low capability habitat" (50-60% mature, closed conifer forest), 4,573 ha (11,300 ac) are needed. The Preserve contains 824 ha (2,037 ac) of montane coniferous forest; 125 ha (311 ac) is high quality habitat with trees ≥ 61 cm and a closed canopy. This amount of acreage could support a single Fisher. However the configuration is likely not appropriate (see "habitat configuration"). Total coniferous habitat in the Study Area (2,743 ha (6,777 ac)) is not sufficient to support a reproductive unit of Fishers.

Habitat Configuration: Pacific Fishers require contiguous coniferous forests and timber harvest can fragment fisher habitat, reduce it in size, or change the forest structure to be unsuitable for fishers (Reid and Helgen 2008). While total acreage in the Preserve may be enough to support a single Fisher, the habitat is not contiguous. The best habitat (coniferous forest with trees > 61 cm DBH and a closed canopy) occurs in 29 patches (total area =125 ha (311 ac) with an average patch size of 4.0 ha (10 ac) ranging is size from 0.04 to 314 ha (0.1 to 79 ac)). Habitat of poorer quality is more contiguous, occurring generally in two large polygons in the eastern and western portion of the Preserve. The largest of block of habitat is the low-quality coniferous forest on the western portion of the Preserve and contiguous coniferous forests immediately west of Preserve boundaries on Pardaloe Mountain.

Nearest Occurrence:

> Documented Occurrences in the Galbreath Wildlands Preserve: This species has not been documented on the Preserve. Baited camera trap surveys conducted by California Department of Fish and Game in the Preserve between Dec 2013 and Jan 2014 (two sites one mile apart in the Preserve) did not detect Pacific Fisher (data from this study are available from Preserve staff).
>
> Nearest Occurrence to the Galbreath Wildlands Preserve: As part of a regional survey for Pacific Fisher (2012-2014) California Fish and Wildlife did not find Pacific Fisher west of Hwy 101 between Hwy 128 and Hwy 20 (Laura McMahon,

California Department Fish and Wildlife, pers. comm.). Documented occurrences at Six Rivers and Shasta Trinity National Forest in Humboldt and Trinity Counties, California (Zielinski 2004) are over 200 miles from the Preserve.

Summary: We anticipate that the Pacific Fisher is “Unlikely to Occur” in the Preserve because habitat quality, quantity and configuration are poor, the distance to the nearest documented occurrence is over 200 miles north of the Preserve, and recent surveys did not detect Fishers in this region of the coast.

References

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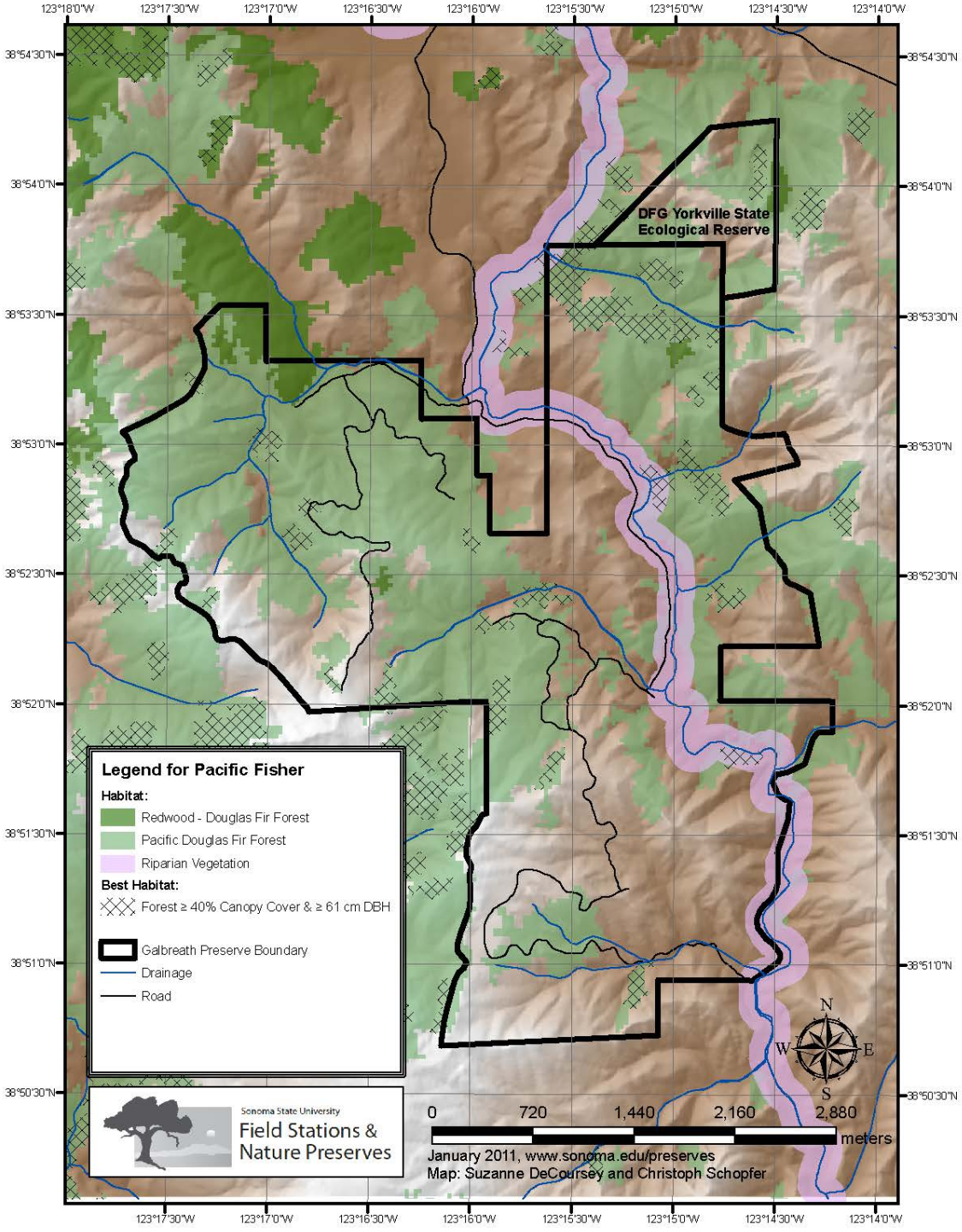
Species Account Description: Emily Harvey

Figure 100: Potential habitat for Pacific Fisher *(Martes pennanti)*



Mammalia (Mammals): Carnivora, Mustelidae
American Badger (Taxidea taxus)
Potential Occurrence: Likely to Occur

Status:

Federal: None

State: Species of Special Concern

Other: None


Photo: © Dr. Wayne Linch

Species Description:

American badgers are heavy bodied, short-legged, grayish mammals that have a white medial stripe from nose over the top of the head and down the back. Badgers have a black nose, white cheeks, and black spot in front of each ear. Their feet are black with extremely long front claws. The belly and the short tail are yellowish (Burt and Grossenheider 1980). (From Roll 2009)

Distribution:

American badger occurs as far north as Alberta, Canada, and as far south as central Mexico (Hall 1981). The taxon's distribution throughout the United States is expanding; it currently extends east from the Pacific coast to Texas, Oklahoma, Missouri, Illinois, Indiana, and Ohio (Long 1972, Williams 1986). In California, the American badger is an uncommon, permanent resident throughout most of the state, with the exception of the North Coast area (Grinnell *et al.* 1937). (From Roll 2009)

Life History & Threats:

American badgers are largely nocturnal but have been reported active during the day as well [18]. Mating occurs in late summer and early fall [18]. American badgers experience delayed implantation. Pregnancies are suspended until December or as late as February. Young are born from late March to early April [18]. Litters range from one to five young [16], averaging about three [19]. American badgers are born blind, furred, and helpless [18]. Eyes open at 4 to 6 weeks. The female feeds her young solid foods prior to complete weaning, and for a few weeks thereafter [19]. Young American badgers first emerge from the den on their own at 5 to 6 weeks [16,20]. Families usually break up and juveniles disperse from the end of June to August; Messick and Hornocker [20] reported that young American badgers left their mother as early as late May or June. Juvenile dispersal movements are erratic [16]. Most female American badgers become pregnant for the first time after thay are 1 year old. A minority of females 4 to 5 months old ovulate and a few become pregnant. Males usually do not breed until their second year [18]. (From Sullivan 1996)

The American badger is threatened by habitat conversion to urban and agricultural uses, farming operations, shooting and trapping, poisoning, and reduction of prey base as a result of rodent control activities (Williams 1986). Predator control with the usage of

> indiscriminate trapping and poisons have caused extensive loss (Ahlborn 2005). Vehicular accidents (road kill) are also a major cause of badger mortality (USFS 2008). (From Roll 2009)

> Major causes of adult American badger mortality include, in order, automobiles, farmers (by various methods), sport shooting, and fur trapping. Large predators occasionally kill American badgers [16]. Yearly mortality has been estimated at 35 percent for populations in equilibrium [14]. Lindzey [14] reported that average longevity was 9 to 10 years in the wild. The longevity record for wild American badgers is 14 years; a captive American badger lived at least 15 years 5 months [16]. (From Sullivan 2010)

Habitat & Habitat Associations:

American Badgers require a range of 25-100 acres of herbaceous, shrub or open habitat with friable soil to create burrows (Laudenslayer. 2007).

> Scrub, annual grasslands, woodlands (Laudenslayer 2007). American badgers are found in a variety of open, arid habitats, but are most commonly associated with grasslands, savannas, mountain meadows, and open areas of desert scrub (Stephenson and Calcarone 1999). They are usually absent from mature chaparral (Quinn 1990). Principle habitat requirements for the species include sufficient prey base, friable soils, and relatively open, uncultivated ground (Williams 1986). They are primarily found in areas of low to moderate slope (Stephenson and Calcarone 1999). The elevational range of the badger extends from below sea level to over 3,600 meters (12,000 ft) (Lindzey 1982). (From Roll 2009)

> American badgers occur primarily in grasslands, parklands, farms, and other treeless areas with friable soil and a supply of rodent prey [1,6]. They are also found in forest glades and meadows, marshes, brushy areas, hot deserts, and mountain meadows. (From Sullivan 1996)

Conceptual Basis for GIS Model Development: Potential habitat for American Badger was mapped in the Study Area as:

- grassland
- chaparral (i.e., mixed chaparral and scrub oak)

Possible best habitat was mapped as low to moderate slopes (< 17 degrees).

Potential Occurrence in the Galbreath Wildlands Preserve:

Habitat: American Badgers prefers open, arid grasslands and scrub. These habitats are small and patchily distributed in the Preserve (Figure 101). The map provides an overestimate of the amount of potential habitat for this species. American Badgers are absent from mature chaparral. Available GIS layers do not provide canopy cover estimates for chaparral and the distribution of open chaparral where this species occur could not be identified.

Habitat quality of the grassland areas for this species is good in that it occurs in areas with low to moderate slope preferred by Badgers. However, the abundance and distribution of the potential habitat suggests that Preserve lands may be inadequate to support many individuals. American Badgers require 25 to 100 acres of herbaceous, scrub or open

grassland to establish home ranges and grassland patch sizes appear to rarely meet these requirements,

Nearest Occurrence:

> Documented Occurrences in the Preserve: This species has not been documented in the Preserve. To our knowledge, no surveys have been conducted.
>
> Nearest Occurrence to Preserve: The American Badger has not been reported to occur in USGS quads adjacent to the Study Area, but is widespread throughout North America.

Summary: We anticipate that the American Badger is “Likely to Occur” in that individuals may use portions of the Preserve as part of their home ranges. Grasslands and open shrub land preferred by this species are not present on the Preserve in sufficient size or quantity to anticipate the establishment of home ranges.

References

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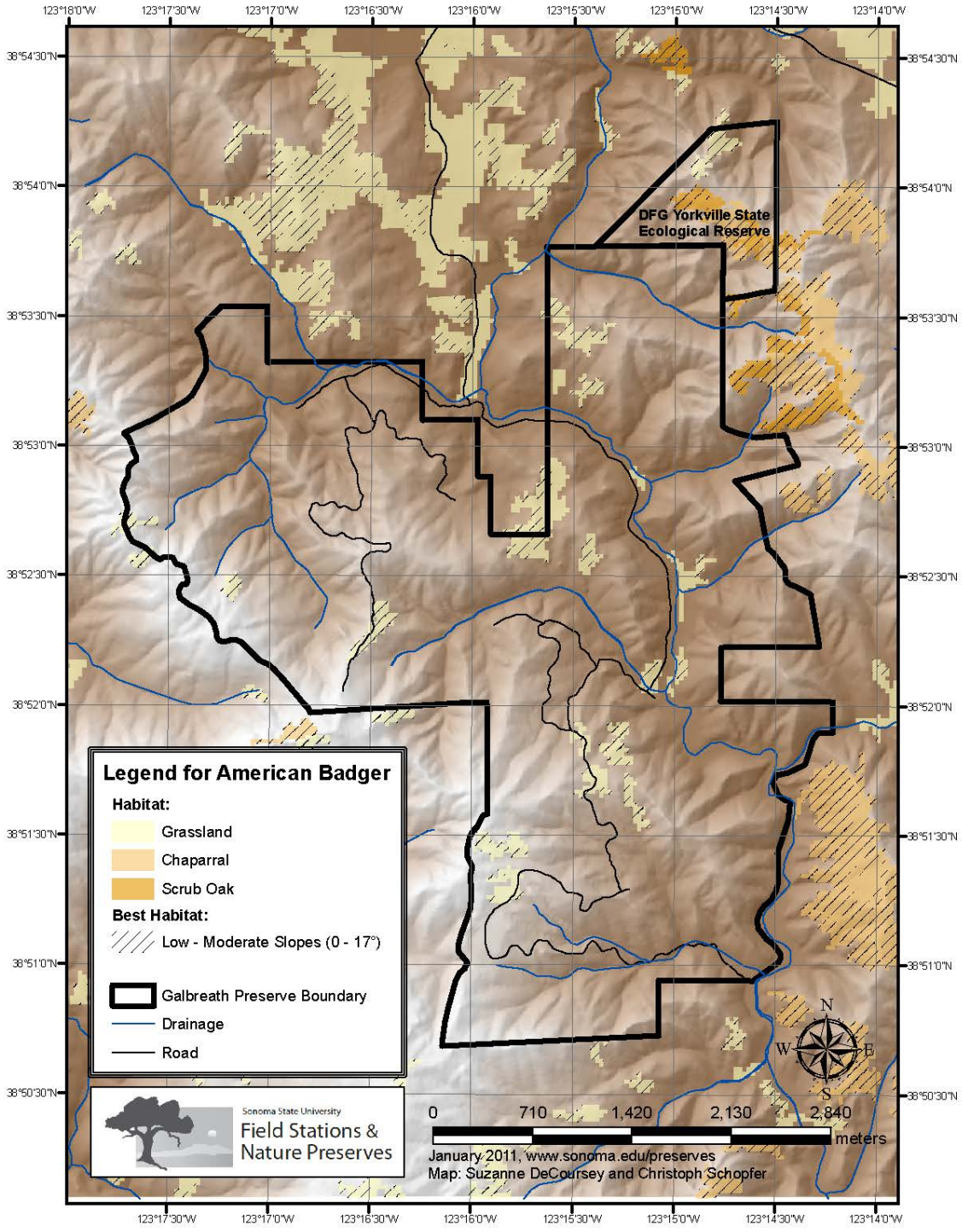
Species Account Description: Emily Harvey

Figure 101: Potential habitat for American Badger *(Taxidea taxus)*



Mammalia (Mammals): Chiroptera, Vespertillionidae
Pallid Bat (Antrozous pallidus)
Potential Occurrence: Likely to Occur

Status:

Federal: None

State: Species of Special Concern

Other: G5S3 BLM:S USFS:S


Photo: Tom Venzo 2008

Species Description:

The Pallid Bat (*Antrozous pallidus*) is a relatively large bat (102 to 135 mm body length) with long, prominent ears and large eyes. The dorsal fur is usually cream-coloured with light grey or light brown tips, ventral fur is ivory or white, and wing membranes are grey or pinkish brown. It has scroll-shaped nostrils and small glands on its muzzle that secrete a musky, skunk-like scent. (From The Pallid Bat Recovery Team 2008)

Distribution:

The pallid bat is a locally common species of low elevations in California. It occurs throughout California except for the high Sierra Nevada from Shasta to Kern cos., and the northwestern corner of the state from Del Norte and western Siskiyou cos. to northern Mendocino Co. (From Harris 1990)

Life History & Threats:

This slow-flying, maneuverable species is adapted to feed on large, hard-shelled prey on the ground or in foliage. It is known to roost with a number of other bats, principally Myotis spp. and *Tadarida brasiliensis*. Owls and snakes are known predators…. Social. Most pallid bats (95%) roost in groups of 20, or more, ranging to 162. Group size is important for metabolic economy and growth of young. Young animals occupy the center of clusters. Individuals out of clusters experience higher rates of weight loss (Trune and Slobodchikoff 1976,1978)…. Mates from late October-February. Fertilization is delayed, gestation is 53-71 days. Young are born from April-July, mostly from May-June. The average litter is 2, but females reproducing for the first time usually have 1 young. Litter size is 1-3. The altricial young are weaned in 7 wk, and are observed flying in July and August. Females nurse only their own young. Females and juveniles forage together after weaning. Females mate in first autumn, males in second. Maximum recorded longevity is 9 yr,1 mo (Cockrum 1973)….Nocturnal. Hibernates. Emerges late (30-60 min after sunset), with a major activity peak 90-190 min after sunset, and a second peak shortly before dawn. Briefer foraging periods occur in autumn, and activity is infrequent below 2°C (35°F). Undergoes shallow torpor daily. Hibernates in winter near the summer day roost (Hermanson and O'Shea 1983).(From Harris 1990)

The pallid bat roosts both during the day and at night, spending 60-80% of a 24-hour cycle in the roost environment (Vaughan and O'Shea 1976). (From Johnson 2009)

Very sensitive to disturbance of roosting sites. Such sites are essential for metabolic economy, juvenile growth and as night roosts to consume prey. (From Harris 1990)

Use of mines places this species in jeopardy with regards to mine closure projects. Additional threats include human vandalism within roost sites, roost site destruction, extermination in buildings and pesticide use. Loss of tree roosts could occur through commercial timber harvest (including selective hardwood removal), and loss of oaks to suburban expansion, and/or vineyard development. (From Texas Parks and Wildlife 2009)

Habitat & Habitat Associations:

General Habitat:

A wide variety of habitats is occupied, including grasslands, shrublands, woodlands, and forests from sea level up through mixed conifer forests. The species is most common in open, dry habitats with rocky areas for roosting. A yearlong resident in most of the range. (From Harris 1990)

Foraging Habitat:

Forages 0.5-2.5 km (1-3 mi) from day roost. Capable of homing from distances of a few miles, but not further. (From Harris 1990)

Pallid Bats feed on a variety of large arthropods (Hermanson and O'Shea 1983; Johnston and Fenton 2001), occasionally taking small vertebrates (O'Shea and Vaughan 1977; Bell 1982). They may glean, land on the ground, or aerially hawk prey (Grinnell 1918; Huey 1936; Bell 1982). As a result, they often forage in open areas (Bell 1982; Chapman et al. 1994; Ball 2002). Rambaldini (2006) found that over 60% of the volume of captured Pallid Bats' diet in British Columbia consisted of scarab beetles whereas Pallid Bats in Washington State had access to a more diverse, and larger bodied prey base. (From The Pallid Bat Recovery Team 2008)

Pallid Bats are opportunistic generalists, foraging over open or cluttered native habitat (i.e., grassland, shrub-steppe, and Ponderosa pine habitats); agricultural fields (e.g., ranch pastures, vineyards, and fruit orchards); talus slopes; and gravel roads generally less than 1km from roosts (Chapman et al. 1994; Sarell and Haney 2000; Rambaldini and Brigham 2004; Rambaldini 2006). (From The Pallid Bat Recovery Team 2008)

Rambaldini (2006) found that Pallid Bats foraged significantly more over native habitat in B.C. than vineyard habitat, and that prey availability is lower in vineyards. The native shrub-steppe habitats also contained more probable prey items than did adjacent vineyard habitats despite the proximity of vineyard habitat to native source habitats and the use of integrated pest management techniques. (From The Pallid Bat Recovery Team 2008)

Roosts, Hibernacula, and Nurseries: Rocky outcrops, cliffs, crevices, hollow trees and snags (Harris 1990).

During the day this species shelters inside crevices or cavities found in natural features such as trees, cliffs, caves and rocky outcrops, and in man-made features such as barns, bridges, mines and attics (Barbour and Davis 1969, Hermanson and O'Shea 1983, Pierson and Rainey 1998). Recent radio-tracking efforts in the west, including California, suggest that the pallid bat is far more dependent on tree roosts than was previously realized. This species has been located in tree cavities in oak, ponderosa pine, coast redwood, and giant

Sequoia (Rainey *et al*. 1992, Cross and Clayton 1995, Pierson and Heady 1996 in Pierson and Rainey 1998). On Santa Cruz Island, however, radio-tagged animals selected rock crevices and buildings, despite abundant oak woodland (Brown *et al.* 1984 in Pierson and Rainey 1998). Pallid bats are also one of the species most predictably associated with bridges. They roost in expansion joints by day, and are commonly found at night roosting in more open areas under the deck especially near abutments, particularly under concrete girder structures (Lewis 1994, Pierson *et al.* 1996 in Pierson and Rainey 1998, H. Johnson pers. obs.). (From Johnson 2009)

Night roosts are usually separate from day roosts and are often structurally more open but warmer than ambient temperatures and protected from wind. Night roosts are commonly located under bridges and overhanging porches, and inside barns. When the same roost is used both day and night, the pallid bat may hang in exposed places at night rather than retreating into crevices as it would during the day. It is important to note that night roosts often contain characteristic insect prey remains that are unique to this species. Sites where pallid bats have consumed large insects are characterized by discarded prey remains such as heads, legs, and wing covers scattered amongst the fairly distinctive guano. Pallid bat guano is similar in size, shape, and texture to that of the big brown bat (*Eptesicus fuscus*) but collections of discarded arthropod prey remains are unique. (From Johnson 2009)

Conceptual Basis for GIS Model Development:

Pallid bats occupy a wide variety of open habitats that have dynamic habitat features such as rocky outcrops, cliffs, crevices, hollow tree or snags for roosting sites (Harris 1990). We mapped potential habitat for this species as:

General Habitat: all habitats in the Study Area (i.e., grassland, shrubland, woodland, and forests)

Foraging Habitat: open dry habitats (i.e., all vegetation except riparian with < 40% canopy cover)

Roosts, Hibernacula, and Nurseries:

- cliffs
- abandoned buildings

Potential Occurrence in the Galbreath Wildlands Preserve:

- *Habitat:* Potential habitat for this generalist species occurs throughout the Preserve, and open dry habitats needed for foraging are common in the central portion of the Preserve (Figure 102). GIS data on roosting and hibernacula sites are not available.
- Habitat quality for this species is good. Initial field survey indicated that rocky outcrops (used for roosting) and snags (used for hibernacula) are common. We found abundant rocky outcrops in all habitats, some large enough to provide cracks and crevices used by this species. Buildings and caves used to hibernate are not as common, but snags may provide needed hibernacula for this species. Logging on the Galbreath Wildlands Preserve was discontinued in 2000 and large snags are common in the Preserve. Abundance and configuration of available foraging, roosting, and hibernacula suggests that Preserve lands may be adequate to support many individuals of this species.

Nearest Occurrence:

> Documented Occurrences in Preserve: This species has not been documented in the Preserve. To our knowledge, no surveys have been conducted.
>
> Nearest Occurrence to Preserve: Pallid Bat has not been reported to occur in USGS quads adjacent to the Preserve.

Summary: Although this species prefers a greater availability of hibernacula habitat, we anticipate that this widespread species is "Likely to Occur" in the Preserve due to the abundance of foraging and roosting habitat.

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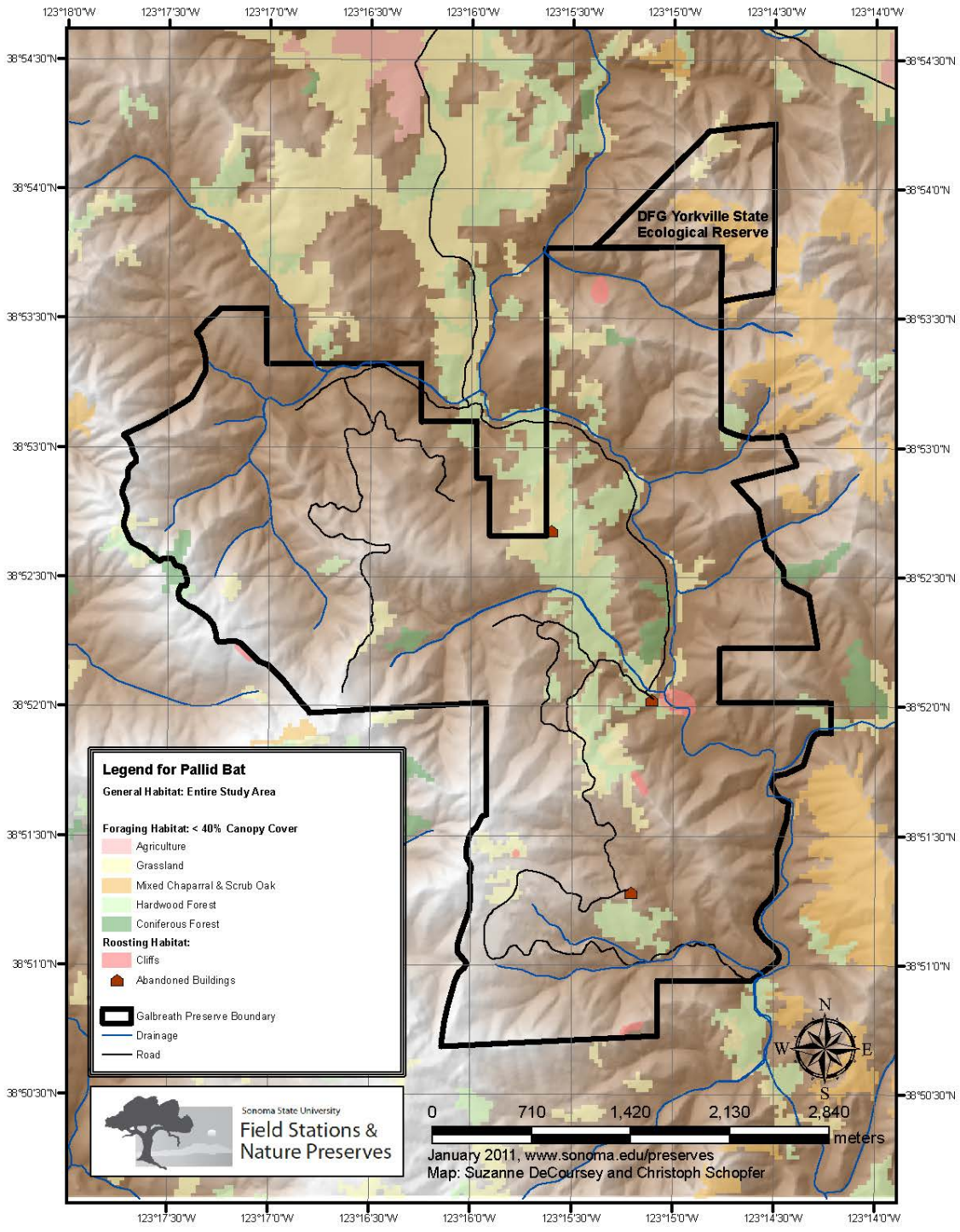
Species Account Description: Emily Harvey

Figure 102: Potential habitat for Pallid Bat *(Antrozous pallidus)*



Status:

Federal: None

State: Species of Special Concern

Other: None


Photo: New Mexico Energy 2008

Species Description:

The Townsend's big-eared bat (*Corynorhinus townsendii*) is a member of the taxonomic Order Chiroptera and Family Vespertilionidae. It is a medium-sized (8-14 g) bat with rabbit-like ears, a small indistinct face and overall brownish coloration. This species is related in appearance to only one other bat with very large ears, the pallid bat (*Antrozous pallidus*), which is larger overall, light-colored, with large eyes and a distinct muzzle. (From Fricke 2009)

Distribution:

Townsend's big-eared bat is found throughout California, but the details of its distribution are not well known. This species is found in all but subalpine and alpine habitats, and may be found at any season throughout its range. Once considered common, Townsend's big-eared bat now is considered uncommon in California. It is most abundant in mesic habitats. (From Harris 2000)

Life History & Threats:

The life history of the Townsend's big-eared bat centers on reproduction and meeting the energetic demands of a small insectivorous mammal. Its annual cycle includes an approximate 7 to 8 month period of peak activity in spring and summer when insects are most available and reproduction occurs. Pregnant females gather in maternity colonies which range in size from a few to several hundred individuals. Males usually roost elsewhere, singly or in small numbers. Maternity colonies form between March and June (based on local climatic factors), with a single pup born between May and July (Pearson *et al.* 1952). Maternity colonies cluster tightly together to share body heat and the appearance of the cluster is characteristic. Although roost site fidelity is variable in areas with many potential roost sites, it is quite high in California where roosting habitat is scarce (Sherwin *et al.* 2003). The Townsend's big-eared bat uses daily and seasonal periods of hibernation to conserve energy when it is inactive. In winter months when insect prey is less available this species extends hibernation over weeks or months and it may migrate locally to suitable hibernation sites. (From Fricke 2009)

Townsend's big-eared bats are highly sensitive to roost disturbance. Activities that can result in significant disturbance or loss of habitat include mine reclamation, renewed mining, water impoundments, recreational caving, loss of building roosts, and bridge replacement (Kunz and Martin 1982, Pierson et al. 1999). Pesticide contamination may

also threaten this species in agricultural areas (Geluso et al. 1976). (From Contra Costa County HCP/NCCP 2006)

Habitat & Habitat Associations:

General Habitat:

Generally, Townsend's big-eared bats are found in the dry uplands throughout the West, but they also occur in mesic coniferous and deciduous forest habitats along the Pacific coast (Kunz and Martin 1982). (From Gruver 2006)

Foraging Habitat:

Townsend's big-eared bat has been noted foraging in a wide variety of habitats (Pierson et al. 1999) throughout its western range, and this may reflect the need to roost where structures are available as opposed to within a particular vegetative zone. Given its wing morphology, which permits slow maneuverable flight and the ability to hover and glean insects from vegetation (Norberg and Rayner 1987), *Corynorhinus townsendii* is expected to forage primarily in and near vegetation, and to engage in little if any of the open-air hawking that is characteristic of swift-flying species such as hoary bats (*Lasiurus cinereus*). Thus, suitable foraging habitat for *C. townsendii* will likely be a heterogeneous mosaic of forested and edge habitats, including riparian zones, which are also used for commuting and drinking (e.g., Fellers and Pierson 2002). In California, both males and females foraged along the edges of riparian vegetation dominated by Douglas-fir, California bay, and willow species, but they also avoided open grasslands both when traveling and foraging (Fellers and Pierson 2002). (From Gruver 2006)

Areas with substantial beaver activity enhance the quality of foraging habitat by increasing ecosystem productivity (Naiman et al. 1986), providing gaps in the forest canopy, providing small, quiet ponds for drinking, and causing an increase in insect activity. (From Gruver 2006)

Roosts, Hibernacula, and Nurseries:

Townsend's big-eared bat is unequivocally associated with areas containing caves and cave-analogs for roosting habitat. Beyond the constraint for cavernous roosts, habitat associations become less well defined. Townsend's big-eared bat requires spacious cavern-like structures for roosting (Pierson et al. 1999) during all stages of its life cycle. Typically, they use caves and mines, but Corynorhinus townsendii have been noted roosting in large hollows of redwood trees (Fellers and Pierson 2002), in attics and abandoned buildings (Dalquest 1947, Fellers and Pierson 2002), in lava tubes (Handley 1959, Hinman and Snow 2004), and under bridges (Keeley 1998, Adam and Hayes 2000, Fellers and Pierson 2002). (From Gruver 2006)

Conceptual Basis for GIS Model Development:

Habitat for Townsend's Big-Eared Bat occurs throughout the Study Area. To more specifically define potential habitat use, we mapped:

Best Foraging Habitat:

- edges of woodland and forests (i.e., boundaries of cismontane, broadleaf upland, coniferous, and riparian woodland and forest)

- ponds and perennial or seasonal watercourses

Best Roosting, Hibernacula and Nursery Habitat:

- coniferous forest with ≥ 61 cm in DBH, the largest size class documented in the Study Area. Large, coniferous trees were mapped to indicate the most likely locations for large redwood trees which may contain the cavernous cavities used by this species.

- Unoccupied buildings

Data on caves locations are not available.

Potential Occurrence in the Galbreath Wildlands Preserve:

Habitat: Townsend's Big-Eared Bats are habitat generalists found in areas containing cavernous roost sites (caves, redwood cavities, and abandoned buildings). Without focused surveys to locate potential roosting habitat, habitat quality for this species is difficult to determine:

- Caves may occur on the preserve but are likely rare. Rocky outcrops and ridgelines do occur but are rarely large enough to accommodate the development of a substantial cavern.

- Redwood cavities may also occur but are likely limited. Logging in the Preserve was discontinued in 2000, but has a long history of timber harvest. Some old growth redwoods still occur in isolated locations.

- Abandoned buildings on the Preserve are limited to two sheep barns which are currently not known to support roosting bats.

We conclude that roosting habitat required by this species may be good quality if present, but is likely very limited in abundance (Figure 103).

Nearest Occurrence:

Documented Occurrences in the Preserve: This species has not been documented in the Preserve. To our knowledge, no surveys have been conducted.

Nearest Occurrence to Preserve: This species has not been reported to occur in USGS quads adjacent to the Preserve, but is widespread throughout California.

Summary: Townsend's Big-Eared Bats are "Unlikely to Occur" in the Study Area due to possible limitations on the availability of roosting habitat. Further surveys are needed to assess this species likelihood of occurrence.

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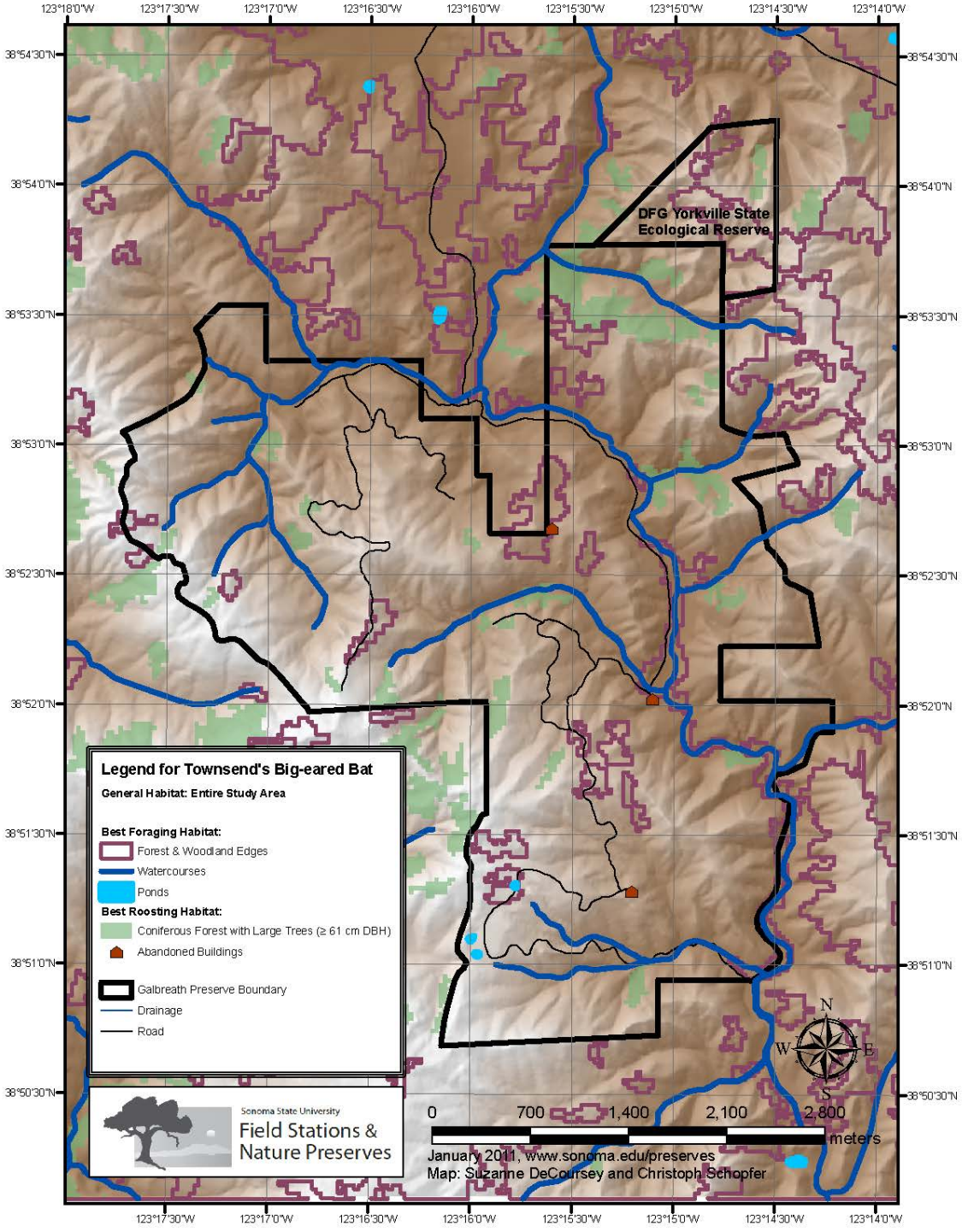
Species Account Description: Emily Harvey

Figure 103: Potential habitat for Townsend's Big-eared Bat *(Corynorhinus townsendii)*



Mammalia (Mammals): Chiroptera, Vespertillionidae
Silver-Haired Bat (Lasionycteris noctivagans)
Potential Occurrence: Likely to Occur

Status:

Federal: None

State: None

Other: G5 S3S4

Painting: Wendy

Species Description:

Medium-sized bat with forearm length of 37-44 mm (1.5-1.8 in) and wingspread of 277-310 mm (11-12 in). Total length is 92-107 mm (3.6-4.2 in). Upper parts are darkish-brown or black with silver tips, underparts slightly lighter, giving a salt and pepper appearance. The tail and wings are dark brown to black in color. Color distinguishes this bat from all others. Ears are short, rounded and naked with a short, blunt tragus. Skull is broad and flat with rostrum markedly broad with reference to braincase. (From AGFD 2004)

Distribution:

Lasionycteris noctivagans, a member of the Family Vespertilionidae, is found from southern Alaska, throughout southern Canada, and most of the United States into the San Carlos Mountains of northeastern Mexico. (From Perkins 2005)

The distribution of the silver-haired bat includes coastal and montane forests from the Oregon border south along the coast to San Francisco Bay, and along the Sierra Nevada and Great Basin region to Inyo Co. It also occurs in southern California from Ventura and San Bernardino Cos. south to Mexico and on some of the Channel Islands. This species also is recorded in Sacramento, Stanislaus, Monterey and Yolo Cos. During spring and fall migrations the silver-haired bat may be found anywhere in California. (From Harris 2005)

Life History & Threats:

Females form small nursery colonies of up to 70 individuals. Both males and females change roosts frequently, and use multiple roosts within a limited area throughout the summer, indicating that clusters of large trees are necessary. Some records exist for roosts in other structures. Based on recent radio telemetry, these appear to be largely anomalies. This species appears to have gestation of 50-60 days, and give birth to twins in mid to late June. The young require >36 days to become volant. Seasonal records suggest considerable north south migration, with animals moving to warmer, more southern climates in the winter. The few overwintering *L. noctivagans* that have been found in Oregon and Washington were juveniles from the previous summer. In some there appears to be summer segregation of the sexes (e.g., whereas both adult males and females are captured during the summer reproductive season in parts of northern California, males and females are geographically separated in most of Oregon). (From Perkins 2005)

The primary threat to *L. noctivagans* is likely to be loss of roosting habitat due to logging practices that fail to accommodate the roosting needs of this species (e.g., clusters of large snags). Loss of temporary roosts within migration corridors could also be important. Loss of foraging habitat in riparian areas, and reduction of prey base due to broadcast application of pesticides are other potential threats. (From Perkins 2005)

Habitat & Habitat Associations:

General Habitat:

L. noctivagans is primarily a forest bat, associated primarily with north temperate zone conifer and mixed conifer/hardwood forests. It has been found in winter and during seasonal migrations in low elevation, more xeric habitat (From Perkins 2005)

Summer habitats include coastal and montane coniferous forests, valley foothill woodlands, pinyon-juniper woodlands, and valley foothill and montane riparian habitats. (From Harris 2005)

Prefers forested (frequently coniferous) areas adjacent to lakes, ponds, and streams. During migration, sometimes occurs in xeric areas. (From InfoNatura 2007)

Summer range is generally below 2,750 m (9,000 ft) (Barbour and Davis 1969, Izor 1979, Kunz 1982). (From Harris 2005)

Foraging Habitat:

Needs drinking water. Poor urine-concentrating ability probably restricts this species to mesic habitats (Geluso 1978). Primarily a forest dweller, feeding over streams, ponds, and open brushy areas. (From Harris 2005)

L. noctivagans forages above the canopy, over open meadows, and in the riparian zone along water courses. Radiotracking has shown that it travels considerable distances from roost sites to foraging areas. Although the species is known to take a wide variety of insects, including chironomids, moths appear to be a major portion of dietary prey. (From Perkins 2005)

The largest species in our study, *L. noctivagans*, preferred clear-cuts and avoided intact patches. There were therefore differences in habitat selection by foraging bats among the species in our study area, and these were correlated with size and wing morphology. (From Patriquin and Barclay 2003)

Roosts, Nurseries & Hibernacula:

Lasionycteris noctivagans…which preferentially uses older forests in other parts of its range in the Pacific Northwest….All roosts were <3.5 km from the initial capture site and were in dead or dying trees with exfoliating bark, extensive vertical cracks, or cavities. Fourteen roosts were in trees with diameter at breast height >30 cm. Height of roost trees ranged from 6.9 to 61.5 m, and estimated height of roosts of bats ranged from 6.1 to 15.2 m. Roost trees were significantly taller than neighboring trees, which may facilitate the location of roosts by bats. Analysis of a 15-m radius plot around each roost tree revealed that roost sites had significantly less closure of overstory canopy, less understory, and shorter understory vegetation than comparable random plots. Reduced overstory canopy and understory vegetation provide a less-cluttered environment for flight of bats, which may be particularly important for newly volant young. (From Campbell et al. 1996)

Maternity roosts appear to be almost exclusively in trees -- inside natural hollows and bird excavated cavities or under loose bark of large diameter snags. Roosting sites are generally at least 15 m above the ground. (From Perkins 2005)

This species has been found hibernating in hollow trees, under sloughing bark, in rock crevices, and occasionally under wood piles, in leaf litter, under foundations, and in buildings, mines and caves. (From Perkins 2005)

Conceptual Basis for GIS Model Development: To identify potential habitat for Silver-Haired Bat in the Study Area, we mapped potential roosting and foraging habitat as:

Foraging Habitat:

- riparian vegetation (i.e., Fremont Cottonwood and estimated maximum riparian vegetation extent). An estimate of approximate maximum riparian vegetation extent was developed by creating a 130-meter buffer (the distance, as measured from aerial photos, incorporating the widest section of the creek, alluvial terraces, and streamside vegetation) around Rancheria Creek, the only watercourse on the Galbreath Preserve with significant riparian vegetation. Any riparian vegetation within this zone is heterogeneous and disjunct.

- permanent or intermittent watercourses, ponds

- grasslands.

Roosting Habitat:

- coniferous forests (i.e., Redwood-Douglas Fir mix or Pacific Douglas Fir),

- broadleaf upland or cismontane woodland (i.e., mixed, montane mixed, or single species dominant)

Best potential roosting habitat was indicated as areas in the above vegetation types with coniferous trees $\geq$ 28 cm DBH.

Hibernacula:

- abandoned buildings. Snags and caves are present on the Preserve but are not available in the GIS database.

Potential Occurrence in the Study Area:

Habitat:

Foraging Habitat: Grasslands and riparian areas are not common in the Study Area (Figure 104). Riparian habitat, in particular, likely provides suboptimal foraging for this species. Rancheria Creek, the primary open water course, has highly eroded stream banks an riparian vegetation is limited to narrow, small patches of riparian scrub or woodland. In addition, *L. noctivagans* prefers forested (frequently coniferous) areas adjacent to lakes, ponds, and streams, and requires drinking water year round. In the Study Area, perennial water is available only as a few small ponds or short sections of creeks in heavily wooded areas.

Roosting Habitat: Roosting habitat preferred by this species, coniferous trees > 30 cm DBH is abundant and widely distributed throughout the Study Area.

Hibernacula: Buildings and caves used by this species to hibernate are uncommon, but snags may provide needed microhabitat for this species. Logging on the Galbreath Wildlands Preserve was discontinued in 2000 and large snags are common in the Study Area.

Nearest Occurrence:

Documented Occurrences in Study Area: This species has not been documented in the Study Area. To our knowledge, no surveys have been conducted.

Nearest Occurrence to Study Area: *L. noctivagans* has not been reported to occur in USGS quads adjacent to the Study Area.

Summary: Although this species prefers areas with a greater availability of perennial water, we anticipate that this widespread species is "Likely to Occur" in the Study Area due to the occurrence of small perennial water sources and abundant roosting habitat.

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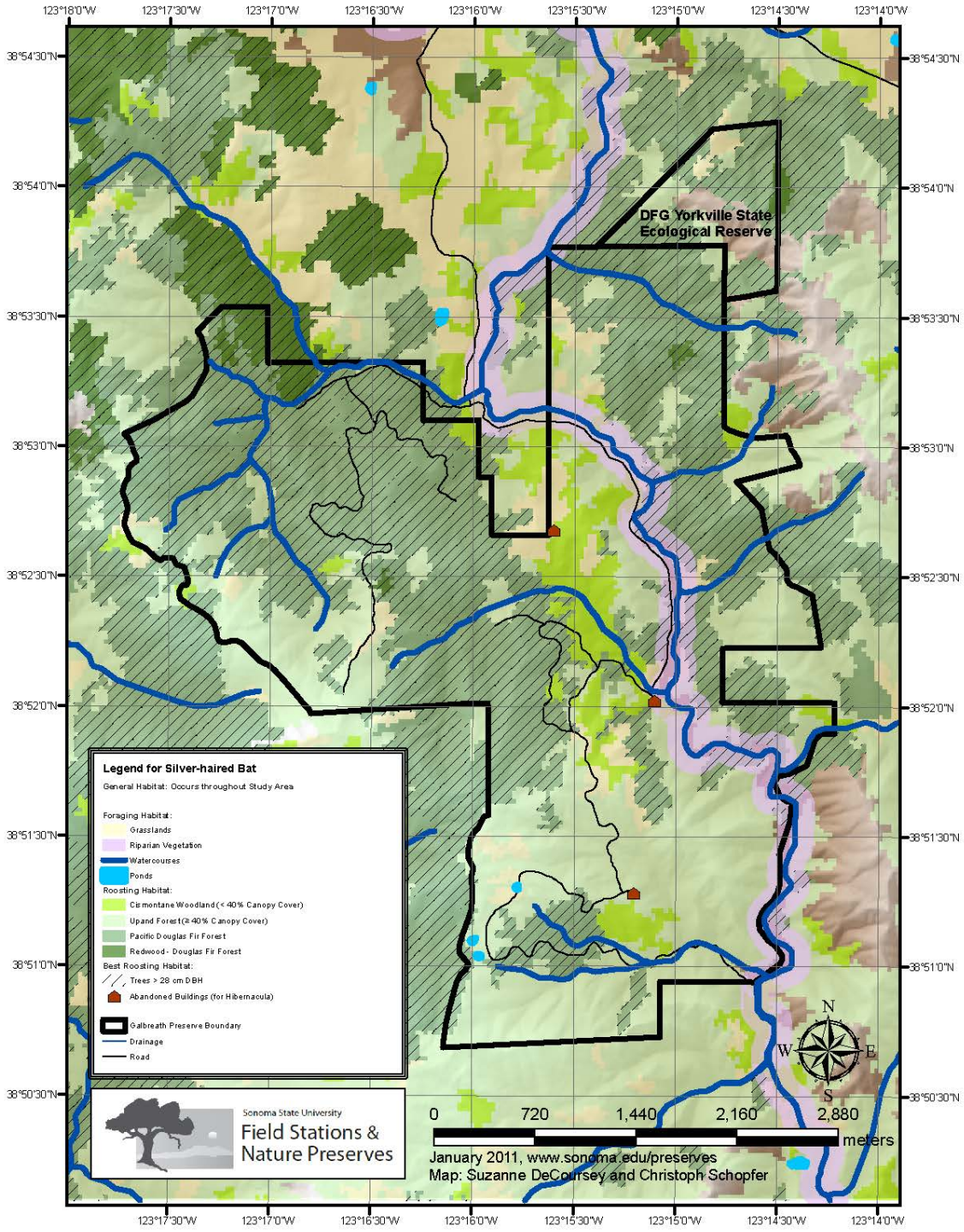
Species Account Description: Emily Harvey

Figure 104: Potential habitat for Silver-haired Bat *(Lasionycteris noctivagans)*



Status:

Federal: None

State: Species of Special Concern

Other: G5 S3 USFS:S


Photo: Gov't of Alberta

Species Description:

This species is a medium-sized bat (6-13 g) with short, broad, and rounded ears that do not extend much above the dorsal fur, and the nose is plain and short. The western red bat is not likely to be confused with other species due to its distinctive reddish coloration….Barbour and Davis (1969) state that the western red bats' tail is long and extends straight out behind in flight, which gives it a distinctive silhouette against the sky as compared to other species with shorter tails. (From Johnson et. al. 2009)

Taxonomy:

Until recently the western red bat was considered a subspecies of *L. borealis*, and was known as *L. b. teliotis*. Based on two recent phylogenetic studies (Baker et al., 1988; Morales and Bickham, 1995), however, this taxon is now recognized as a separate species, *L. blossevillii*, with a distribution that extends from southern British Columbia (Nagorsen and Brigham, 1993) through the western U.S., Mexico, Central America, and South America, although the work of Morales and Bickham (1995) suggests that the South American populations should be treated as a separate species. (From Pierson et. al. 2006)

Distribution:

The red bat is locally common in some areas of California, occurring from Shasta Co. to the Mexican border, west of the Sierra Nevada/Cascade crest and deserts. The winter range includes western lowlands and coastal regions south of San Francisco Bay. There is migration between summer and winter ranges, and migrants may be found outside the normal range. (From Harris 2000)

Life History & Threats:

Western red bats are usually solitary, except when adult females are with their young. Pups are born from late spring to early summer. Three pups are usual in a litter and there may be as many as five (Allen 1939). It is thought that red bats have more young than other bat species because their roosting habits in foliage expose them to greater predation. The literature contains numerous accounts of birds attacking red bats and their young (Allan 1947, Constantine 1959, Elwell 1962, Hoffmeister and Downes 1964). Multiple pups seem especially burdensome to females because grounded mothers have often been found unable to fly due to the weight of clinging pups (Allan 1947, M. Pearson pers. comm., Stains 1965). Western red bat pups are weaned between 6 to 8 weeks of age when they have grown to adult size and are thus able to fly. The only state with multiple breeding records

for the western red bat is California and the Central Valley is of primary importance to breeding populations (Pierson *et al.* 2004). (From Johnson et. al 2009)

No dietary information is available for western red bats in California however eastern red bats prey on moths, flies, beetles, and tiny wasps (WBWG 1998). This species may forage all night or often there is an initial foraging period after sunset and a minor secondary activity period before sunrise that corresponds to insect activity (WBWG 1998). (From Johnson et. al. 2009)

The primary threats to the western red bat are habitat loss and wind farm mortality. The Central Valley is this species' primary breeding region based on museum and capture records (Pierson *et al.* 2004); it is estimated that less than 6% of relatively intact old growth, riparian forest remains (Katibah, 1984). Roosting habitat in cottonwood and sycamore stands may be lost due to a lack of regeneration from hydrological alteration of watersheds. This species is especially susceptible to impacts from wind farms based on evidence from mortalities reported for eastern red bats (Johnson *et al.* 2003) and from a wind farm in Solano County (B. Hogan pers. comm.). (From Johnson et. al. 2009)

Habitat & Habitat Associations:

General:

L. blossevillii appears to be strongly associated with riparian habitats, particularly mature stands of cottonwood/sycamore. Although this has not been previously noted for this species in California, it has been observed in both Arizona (Hargrave, 1944; Hoffmeister, 1986) and New Mexico (Findley et al., 1975; Jones, 1961; Levy, 1958; Mumford et al., 1964). The eastern red bat, *Lasiurus borealis*, has also been found in association with willow, cottonwood and sycamore in Mexico (Bogan and Williams, 1970). Recent studies have documented the importance of riparian areas, particularly for foraging, for many bat species in both North America and Europe (Grindal et al., 1999; Racey, 1998). What distinguishes *L. blossevillii* from most other California taxa is its foliage roosting habits (shared in northern California only with *L. cinereus)*, and thus its apparent reliance on riparian forests for both roosting and foraging. (From Pierson et. al. 2006)

Water features are a vital habitat component because bats often drink immediately after emergence and water is an important source and concentration site for insects. Studies by Pierson *et al.* (1999) comparing mature riparian habitat extending >50 m back from the Sacramento River to areas with less extensive or degraded habitat suggest that this species prefers the mature, extensive riparian habitat. Mature orchards with dense canopies provide alternate roosting and possibly foraging habitat (Pierson *et al.* 2004). (From Johnson et.al. 2009)

Roosting habitat is found in woodland borders, rivers, agricultural areas, and urban areas with mature trees (Harvey *et al.* 1999). (From Johnson et al. 2009)

Roosting Sites:

This species roosts in the foliage of large shrubs and trees, usually sheltering on the underside of overhanging leaves. It often hangs from one foot on the leaf petiole but may occasionally hang from a twig or branch (Barbour and Davis 1969) and may resemble a fruit or dead leaf. Rarely, western red bats have been observed roosting in mines.,,Roost sites have been found in edge habitats adjacent to riparian habitat or open fields, and in orchards (WBWG 1998). Roost trees are typically large cottonwoods, sycamores, walnuts, and willows associated with riparian habitats (Adams 2003). Pierson *et al.* (2004) describe

roosting habitat as large diameter riparian cottonwoods and sycamores, and older orchard trees (particularly walnuts). (From Johnson et. al 2009)

Although tree species appeared to be chosen at random from among the available hardwood species (with no conifers being used), all bats roosted in the upper canopy, at an average height of 16.5 m above the ground in trees that averaged 18.5 m tall and 40.8 cm DBH. Similarly, Menzel et al. (1998), in a study in Georgia, found that red bats roosted at heights that were on average 15.3 m above the ground, preferentially selecting hardwood trees that were taller (24.85 vs. 16.96 m) and had a larger DBH (37.75 vs. 22.53 cm) than a random selection of over-story trees. Our data suggesting that levels of red bat activity were significantly higher in the more extensive (>50 m wide) riparian stands were strikingly consistent with the finding by Hutchinson and Lacki (2000) that eastern red bats selected roosts that were on average 277 m, and never less than 50 m, from the forest edge. (From Pierson et. al. 2006)

Foraging Sites:

Foraging occurs in and amongst vegetation and this species forages regularly over the same territory (Allen 1939). Foraging has been noted in habitats such as mature orchards, oak woodland, low elevation conifer forest, along riparian corridors, among non-native trees in urban and rural residential areas, and also near strong lights that attract flying insects. In addition, this species may forage in habitats and agricultural areas adjacent to streams and rivers that do not provide roosting habitat. (From Johnson et. al. 2009)

Conceptual Basis for GIS Model Development: To identify potential habitat for the Western Red Bat in the Study Area, we mapped:

- Roosting Habitat: Roosting habitat was mapped as riparian vegetation. Riparian vegetation along Rancheria Creek is not extensive enough to register in the Calveg layer (minimum mapping unit for Calveg is 2.5 acres). Because some species may be able to use and reproduce in riparian vegetation that occurs in small patches, we estimated a zone of patchy riparian woodland and scrub by placing a 130 meter buffer around the Rancheria Creek polyline feature in the Galbreath Preserve hydrology data layer. Buffer width was determined by identifying a section of Rancheria Creek with little cover and determining the width of Rancheria Creek—including stream, alluvial terraces, and riparian vegetation—at its widest point utilizing high-resolution aerial imagery. (Note: that although Western Red Bats can roost in orchards, there are no orchards in the Study Area).

- Foraging Habitat: riparian vegetation, cismontane woodland, broadleaf upland forest, and coniferous forests, permanent and intermittent watercourses, or ponds

Potential Occurrence in the Galbreath Wildlands Preserve:

Habitat: Western Red Bats prefer mature riparian vegetation for roosting or foraging, and can also be found foraging in woodlands and forests nearby. The quality and abundance of potential habitat for Western Red Bats in the Preserve is poor (Figure 105). Mature, extensive riparian corridors preferred by this species are lacking. Riparian vegetation on the Preserve is restricted to Rancheria Creek, patchy in distribution, and in many areas is limited to brushy willows and alder without the tall trees chosen by this species for roosting. Perennial open water required by this species after emergence is also limited occurring

only at a few ponds, and as sections of heavy shaded slow-moving streams that drain into the mainstem of Rancheria Creek.

Nearest Occurrence:

> Documented Occurrences in the Galbreath Wildlands Preserve: This species has not been observed on the Preserve. To our knowledge no surveys have been conducted.
>
> Nearest Occurrence to the Galbreath Wildlands Preserve: This species has not been reported to occur in USGS quads adjacent to the Preserve.

Summary: We anticipate that this species is “Unlikely to Occur” on the Preserve because of the lack of mature riparian vegetation and limited open perennial surface water.

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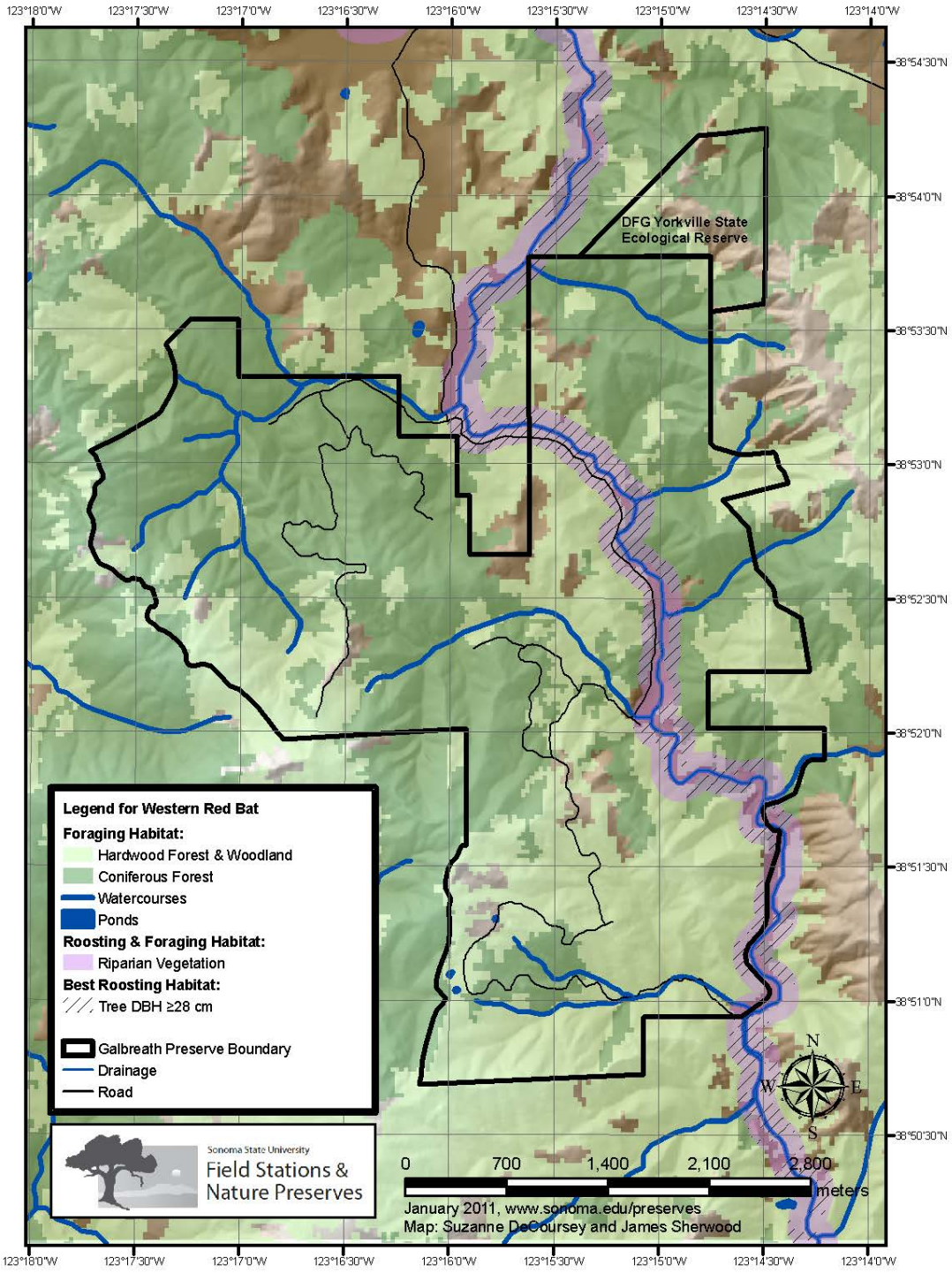
Species Account Description: Emily Harvey

Figure 105. Potential habitat for Western Red Bat, *Lasiurus blossevillii*



Mammalia (Mammals): Chiroptera, Vespertillionidae
Long-Eared Myotis (Myotis evotis)
Potential Occurrence: Likely to Occur

Status:

Federal: None

State: None

Other: BLM:S


Photo: J. Scott Altenbach

Species Description:

M. evotis has pale brownish to straw-colored pelage. It is distinguished from *M. auriculus* and *M. thysanodes* by having long (19 to 25 mm), glossy black ears and no distinct fringe of hairs along the edge of the uropatagium. *M. evotis* eats moths and small beetles, as well as flies, lacewings, wasps, and true bugs. In areas where *M. evotis* and *M. auriculus* are sympatric, *M. evotis* tends to eat more beetles. (From Bogan et. al. 2005)

Distribution:

Myotis evotis, a member of the Family Vespertilionidae, ranges across western North America from southwestern Canada (British Columbia, Alberta and Saskatchewan) to Baja California and eastward in the United States to the western Great Plains. (From Bogan et. al. 2005)

The long-eared myotis is widespread in California, but generally is believed to be uncommon in most of its range. It avoids the arid Central Valley and hot deserts, occurring along the entire coast and in the Sierra Nevada, Cascades, and Great Basin from the Oregon border south through the Tehachapi Mts. to the Coast Ranges. (From Harris 1990)

Life History & Threats:

This species is a slow flier and is often described as a hovering gleaner that feeds by eating prey off foliage, tree trunks, rocks, and from the ground. It generally leaves its roost for foraging after dark, but individuals have been caught as early as 0.5 h after sunset. *M. evotis* occurs in semiarid shrublands, sage, chaparral, and agricultural areas, but is usually associated with coniferous forests. Individuals roost under exfoliating tree bark, and in hollow trees, caves, mines, cliff crevices, sinkholes, and rocky outcrops on the ground. They also sometimes roost in buildings and under bridges. During the summer, females form small maternity colonies, whereas males and non-reproductive females roost alone or in small groups nearby. Females give birth to one young in late spring to early summer. Individuals have lived up to 22 years. Presumably, most individuals hibernate during the winter. (From Bogan et. al. 2005)

May be affected by closure of abandoned mines without surveys, recreational caving, some forest-management practices, and activities (such as highway construction, water impoundments, blasting of cliffs for avalanche control) that impact cliff faces or rock outcrops. (From Bogan et. al. 2005)

Habitat & Habitat Associations:

General Habitat:

This species has been found in nearly all brush, woodland, and forest habitats, from sea level to at least 2700 m (9000 ft), but coniferous woodlands and forests seem to be preferred. (From Harris 2000)

This species has a relatively poor urine concentrating ability, and probably requires water (Geluso 1978)…Feeds along habitat edges, in open habitats, and over water. (From Harris 2000)

Foraging Habitat:

Insects are caught in flight, gleaned from foliage, or occasionally taken from the ground. Foraging flight is slow and maneuverable. This species is capable of hovering…Usually less than 12 m (40 ft) above the ground….Feeds along habitat edges, in open habitats, and over water. (From Harris 2000)

Roosting, Hibernacula, and Nurseries:

The following roost sites used by *M. evotis* have been documented: loose bark in tall, open-canopied snags (Vonhof and Barclay 1996); pine stumps in south-facing clear-cuts with minimal vegetation overgrowth in younger forests, and conifer snags in older forests (Vonhof and Barclay 1997; Rabe et al. 1998); rock crevices (Chruszcz and Barclay 2002); caves (Barbour and Davis 1969); abandoned mines (Hendricks 1998; Altenbach et al. 2002; Hinman and Snow 2003; Ellison et al. 2004); and bridges (Keely 1998). (From Buseck and Keinath 2004)

Navo et al. (2002) reported swarming activity of *M. evotis* at a cave in Colorado (the first documentation of this behavior for this species), which suggested that they hibernated in that cave or one nearby. Another report found two *M. evotis* hibernating in a mine in Montana (Foresman 2001 in Schmidt 2003). Overall, little information is known about the winter activities or range of *M. evotis.* Hibernacula that have been documented for other bat species are usually in caves or mines (as is suspected with *M. evotis*) with temperatures that do not fluctuate or drop below 0°C, to prevent freezing (Tuttle and Taylor 1998). (From Buseck and Keinath 2004)

Selection of stumps and snags appeared to have the following characteristics: 1) moderate stages of decay, and therefore more potential for roost sites due to the sloughing of bark, 2) larger in diameter, providing thicker bark for more insulation (e.g., ponderosa pine), 3) taller than surrounding trees and/or vegetation (e.g., roost selection increased with the height of the stump), and 4) in open canopies providing easier access and more direct sunlight (Knight 1994; Vonhof and Barclay 1996, 1997; Rabe et al. 1998; Waldien et al. 2000). Suitable bridge roosts were characterized by a concrete bridge containing a 3/4 to 1-inch wide crevices at least 6 to 12-inches deep, located 10 feet or greater above the ground, sealed from rain water at the top, and receiving full sun for the majority of the day (Keely 1998). (From Buseck and Keinath 2004)

Conceptual Basis for GIS Model Development: We mapped potential habitat for this species as:

General Habitat:

- brush, woodland, and forest vegetation types (i.e., all types of chaparral, cismontane woodland, broadleaf upland forest, coniferous forest, riparian woodland, and riparian forest)

Possible best habitat was identified as coniferous forests with an open canopy (< 40% canopy cover)

Roosts & Hibernacula: within the brush, woodland and forest vegetation types, we identified roosting sites and hibernacula as large stumps and snags, rock crevices, concrete bridges, buildings, and caves

Foraging Habitat:

- perennial or seasonal watercourses, ponds

- habitat edges were identified as the edges of grasslands (all types), chaparral (all types), woodland/forests (all types), and riparian woodland/forests (all types).

Potential Occurrence in the Galbreath Wildlands Preserve:

Habitat: Long-Eared Myotis can occur in a wide variety of habitats but prefer open coniferous forests. They are dependent on nearby water for drinking, habitat edges for foraging, and a variety of features (rocky outcrops, cliffs, crevices, hollow trees, snags) for roosting. Habitat quality for this species is moderate. Surface water is available year round at ponds and tributaries to Rancheria Creek, and potential roosting habitats (rocky outcrops, cliffs, snags) were also observed to be abundant during field reconnaissance surveys. However, the preferred habitat – open coniferous forest - only occurs in small fragmented locations (Figure 106) and edge habitats used for foraging are not common within Preserve boundaries.

Nearest Occurrence:

Documented Occurrences in Preserve: This species has not been documented in the Preserve. To our knowledge, no surveys have been conducted.

Nearest Occurrence to Preserve: Long-Eared Myotis has not been reported to occur in USGS quads adjacent to the Preserve.

Summary: We anticipate that this widespread coastal species is “Likely to Occur” in the Preserve. Conifers are widespread, foraging habitat is common immediately outside of the Preserve boundaries, and roosting areas may be abundant.

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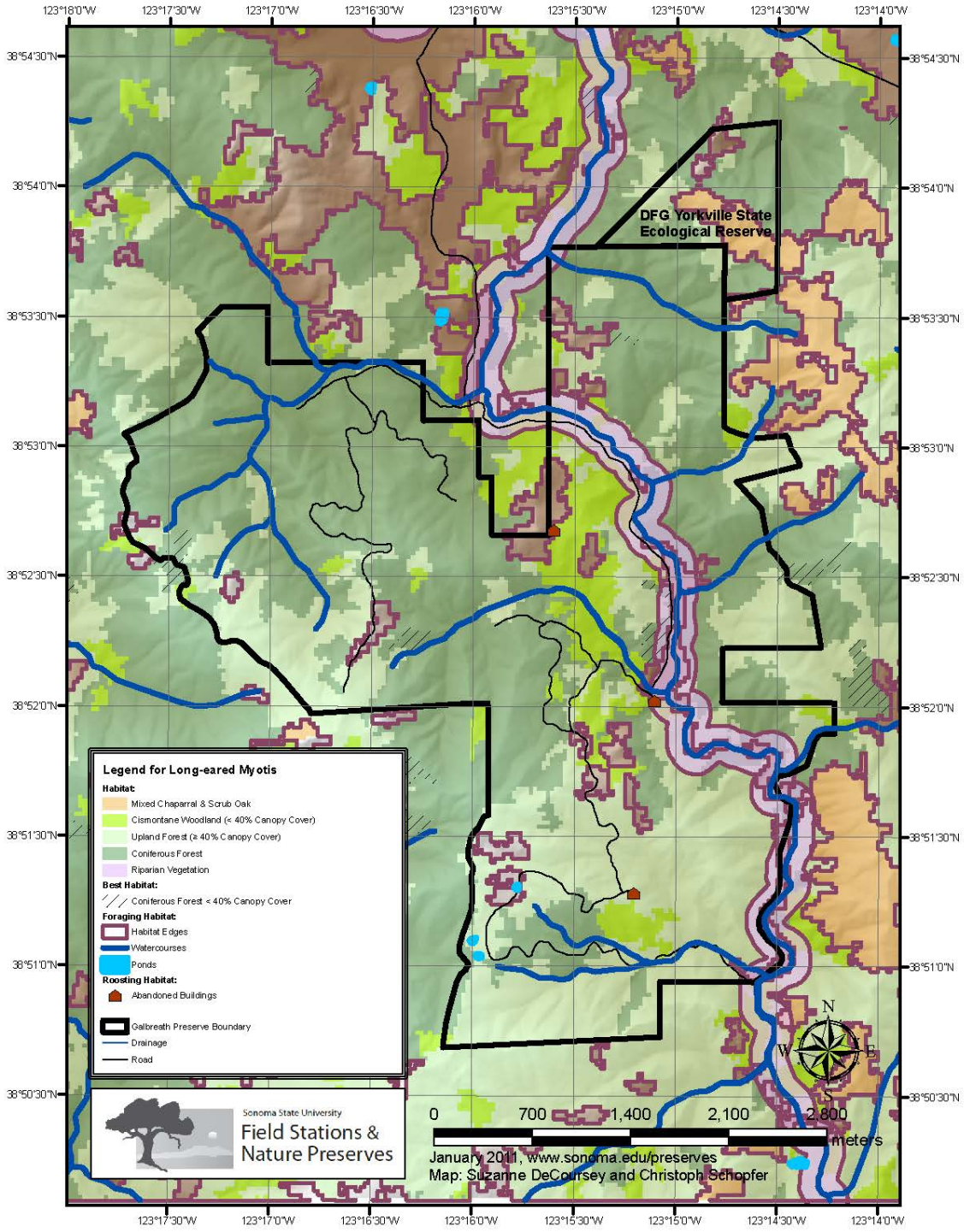
Species Account Description: Emily Harvey

Figure 106: Potential habitat for Long-eared Myotis *(Myotis evotis)*



Status:

Federal: None

State: None

Other: G4G5 S4 BLM:S


Photo: New Mexico Energy

Species Description:

Unlike all other *Myotis* species in North America, *M. thysanodes* has a conspicuous fringe of hair along the posterior border of the interfemoral membrane that extends 1.0 to 1.5 mm beyond the uropatagium (Jones and Genoways 1967)…There appears to be geographic variation in fur color, with darker animals occurring in the northern portions of the species' range (Miller and Allen 1928 in O'Farrell and Studier 1980). The dorsal fur varies in color from yellowish brown to dark brown with olive tones (O'Farrell and Studier 1980) or reddish tones (Barbour and Davis 1969). The ventral fur is usually somewhat paler and can be touched with ochre (Barbour and Davis 1969), but there may not be much color difference between the dorsal and ventral surfaces (O'Farrell and Studier 1980). (From Keinath 2004)

Distribution:

The fringed myotis is widespread in California, occurring in all but the Central Valley and Colorado and Mojave deserts. Its abundance appears to be irregular; it may be common locally. It occurs in a wide variety of habitats; records range in elevation from sea level to 2850 m (9350 ft in New Mexico) (Barbour and Davis 1969). Optimal habitats are pinyon-juniper, valley foothill hardwood and hardwood-conifer, generally at 1300-2200 m (4000-7000 ft). (From Harris 1990)

There are three recognized and one uncertain subspecies of *Myotis thysanodes*. *Myotis thysanodes thysanodes* occurs in the main part of the species' range, *M. t. aztecus* occurs in Oaxaca, Mexico (Wilson and Ruff 1999), and *M. t. pahasapensis* occurs only in the Black Hills of South Dakota, Wyoming, and Nebraska (Bole 1935, Jones and Genoways 1967, Barbour and Davis 1969). According to Jones and Genoways (1967), *M. t. pahasapensis* has slightly larger ears (average 18.7 mm versus 16.2 mm in *M. t. thysanodes*), a shorter forearm (41.1 mm versus 43.0 mm), a smaller skull (see measurements in Jones and Genoways 1967), and darker ears and membranes that contrast in color with the dorsal pelage. While not universally recognized as a valid subspecies, *M. t. vespertinus* has been suggested to occur west of the Cascade Mountains, along the Pacific coast, from southwestern Washington south through Oregon and into northwestern California as far south as Humboldt and Shasta counties (Manning and Jones 1988). (From Keinath 2004)

Life History & Threats:

The fringed myotis roosts in caves, mines, buildings, and crevices. Separate day and night roosts may be used. Adults and subadults generally form separate groups in the

roost. Maternity colonies of up to 200 individuals are located in caves, mines, buildings, or crevices. Adult males are absent from maternity colonies, which are occupied from late April through September. Maternity group members may remain together during hibernation. Nocturnal. Hibernates. This species is active from shortly after sunset to 4-5 hr after sunset. Most activity is from 1-2 hr after sunset. Wind and precipitation reduce activity. The period of hibernation lasts from October through March. Pregnant and lactating females may be heterothermic as an energy saving strategy (Studier et al. 1973). This species is migratory, making relatively short, local movements to suitable hibernacula. Probably not territorial. May be found singly or in colonies. Mating occurs in the fall, followed by delayed fertilization. Gestation lasts 50-60 days. The young are born from May through July, but most are born in late June. A single offspring is produced per yr. Lactating females are found in July and August. Young females are mature in their first yr, males are mature in their second yr. The maximum longevity recorded is 18.3 yr (Tuttle and Stevenson 1982). Sympatric with many other species. This species is a slow, maneuverable flier, and uses foliage gleaning. Possible predators include owls and snakes. (From Harris 2000)

Myotis thysanodes, like many bat species, is very sensitive to disturbance at or modification of roosts and the surrounding environment. The most important roosts are maternity colonies and hibernacula. Disturbance of roosts (i.e., caves, mines, cliffs, buildings, snags; see Roost section) can take the form of direct human contact or alteration of the roost environment. Roost destruction has been caused by anthropogenic activities including removal of large-diameter, cavity-forming trees suitable for roosting and modification of the forest structure around roost sites. Other important impacts include human activity in caves, closure of mines without consideration of bat access, and uninformed building and bridge modification. (From Keinath 2004)

Habitat & Habitat Associations:

General Habitat:

Myotis thysanodes appear to use a fairly broad range of habitats (Cryan 1997). The most common habitats in which this species has been found are oak, pinyon, and juniper woodlands or ponderosa pine forest at middle elevations (Davis 1966, Barbour and Davis 1969, O'Farrell and Studier 1980, Cockrum et al. 1996, Wilson and Ruff 1999, Ellison et al. 2004). They also appear to use deserts (Cockrum et al. 1996), grasslands, and other types of woodlands. When trying to generalize all published information, one observes that *M. thysanodes* is mostly found in dry habitats where open areas (e.g., grasslands and deserts) are interspersed with mature forests (usually ponderosa pine, pinyon-juniper, or oak), creating complex mosaics with ample edges and abundant snags. This can take a variety of forms in Region 2, where open areas are likely represented by short and mixed-grass prairie, sagebrush and other xeric shrublands and forests, including a variety of low and mid-elevation pine and mixed-conifer types, some not adequately studied in other areas (e.g., lodgepole pine and Douglas-fir in addition to ponderosa and pinyon-juniper). (From Keinath 2004)

The best habitat model for predicting bat presence in an area contained only these variables (the number of snags ≥ 30 cm DBH combined and percent canopy cover), where increasing numbers of snags and decreasing canopy cover increased the probability of bat occurrence (Weller 2000). Abundance of large snags and low canopy cover allows more thermal heating of roosts, easier flight access to roosts, and the ability to readily switch roosts in the event of roost collapse, for predator avoidance, or to find more suitable microclimates (Kunz 1982, Lewis 1995, Weller 2000). In such circumstances, *Myotis thysanodes* have been known to switch roosts several times a week (e.g., every 1.72 ± 0.23 days; Weller and Zabel 1999). (From Keinath 2004)

Although found in a variety of habitats, *Myotis thysanodes* appears to have a lower urine concentrating ability than most bats (Geluso 1980), suggesting a predisposition to more mesic environments or environments where persistent sources of drinking water are readily available. Dependence on nearby water sources is also supported by the fact that roost sites have been shown to be located closer to stream channels than expected by chance (Weller and Zabel 2001)… Smaller bats, such as *Myotis thysanodes*, can be seen at a wider variety of water bodies, because they need a minimal swoop zone and can maneuver through vegetative clutter. Such species can regularly use water sources as small as cattle stock tanks (Herder 1998) or persistent forest seeps. (From Keinath 2004)

Myotis thysanodes appear to range in elevation between roughly 1,200 and 2,100 m, and they can be found up to 2,850 m in spruce-fir forest in New Mexico (Barbour and Davis 1969, Arizona Game and Fish Department 1997). A similar elevation range of 1,340 to 1,890 m was reported for *M. t. thysanodes* in Arizona (Agyagos et al. 1994). They have occasionally been reported from elevations of less than 150 m in coastal areas of California (Orr 1956), including at sea level on San Clemente Island off the southern coast of California (Von Bloeker 1967, Brown 1980). (From Keinath 2004)

Foraging Habitat:

Many species of bats, including Myotis thysanodes, forage over bodies of water, as insect abundance (e.g., mosquitoes) is often much greater in these areas (Thomas and West 1991 as cited in Christy and West 1993, Grindal et al. 1999). Also, it has been shown that many bats preferentially forage along forest or field edges (Furlonger et al. 1987, Fenton 1990, Grindal 1995, Ellison et al. 2004). This makes ecological sense because forests and forest edges have been shown to support more insect biomass, abundance, and richness than adjacent open areas (Lewis 1970, Grindal 1995, Grindal and Brigham 1999), while edges have low spatial complexity relative to interior forest. (From Keinath 2004)

Roosts, Hibernacula, and Nurseries:

In northern California it appears that male and female *Myotis thysanodes* use tree snags exclusively for day roosts (Weller and Zabel 2001). In areas where tree roosting is the norm, vegetative structural complexity of habitat around roost sites is likely more important than plant species composition or general topographic features in determining local distribution. *Myotis thysanodes* in the Weller and Zabel study chose roost areas with a higher density of large snags (i.e., 8.3 ± 0.8 snags ≥ 30 cm diameter at breast height per 0.1 ha) than surrounding forest (2.9 ± 0.3 per 0.1 ha; $P = 0.002$) and lower canopy cover (78.5 ± 2.6 percent) than surrounding forest (89.2 ± 1.1 percent; $P = 0.004$), which are likely correlated variables. Thus, as in studies of other tree roosting bats, it appears that *M. thysanodes* roost trees are in open microsites in otherwise contiguous forests, not in the open (Vanhof 1995). (From Keinath 2004)

Roost snags also tended to be taller relative to the surrounding canopy than random snags, had a higher diameter at breast height than random snags, and were nearer to stream channels than randomly selected points. Since *M. thysanodes* tended to roost under loose bark, most roost snags were in decay classes 2 to 4 (Thomas et al. 1979). Roost snags were Douglas-fir, ponderosa pine, and sugar pine used in approximate proportion to their availability (the largest snags in the study area were predominantly Douglas-fir). (From Keinath 2004)

Few hibernacula have been well documented, but those that have are generally cool and usually in caves or mines with little temperature fluctuation throughout the winter, facilitating hibernation at a uniformly low metabolic rate… They have also been discovered

hibernating in buildings and mines along the coast range north of San Francisco Bay (Pierson 1998). (From Keinath 2004)

Conceptual Basis for GIS Model Development: We mapped potential habitat for this species as:

General Habitat: all habitats in the Study Area (i.e., grassland, shrubland, woodland, and forests)

Roosts & Hibernacula:

- cismontane, broadleaf upland, coniferous forests, or riparian woodland/forest with ≥ 30 cm DBH and contiguous canopy cover (≥ 40%).
- Abandoned buildings

Note that caves and snags have not been mapped on the Preserve.

Foraging Habitat:

- permanent or intermittent watercourses, ponds
- habitat edges: edges of grasslands (all types), chaparral (all types), woodland/forests (all types), and riparian woodland/forests (all types).

Potential Occurrence in the Galbreath Wildlands Preserve:

Habitat: Fringed Myotis occupy a wide variety of habitats, but mostly occur in areas that have complex mosaics of mature forest and open habitats. They are dependent on:

- nearby water for drinking,
- snags located in open microsites of dense mature forests for roosting (in northern California, they use snags exclusively for day roosts), and
- open water and habitat edges for foraging.

In areas where they occur, their presence can be best predicted by high snag abundance and low canopy cover.

Habitat quality in the Preserve is poor to moderate. Surface water is available year round at ponds and tributaries to Rancheria Creek, and snags are relatively abundant on the Preserve. (Logging was discontinued in 2000). However, edge habitats used for foraging are not common within Preserve boundaries (Figure 107). In addition, the Preserve lies at lower elevational range for this species. In Arizona and New Mexico, they are usually found between 1200 and 2100 m (3900 to 6900 ft), but in California, they have been occasionally reported in coastal areas at the elevation of the Preserve.

Nearest Occurrence:

Documented Occurrences in Preserve: This species has not been documented in the Preserve. To our knowledge, no surveys have been conducted.

Nearest Occurrence to Preserve: Fringed Myotis has not been reported to occur in USGS quads adjacent to the Preserve.

Summary: We anticipate that Fringed Myotis are “Unlikely to Occur” in the Preserve. Habitat quality is poor to moderate and this species is usually found at much higher elevations.

References

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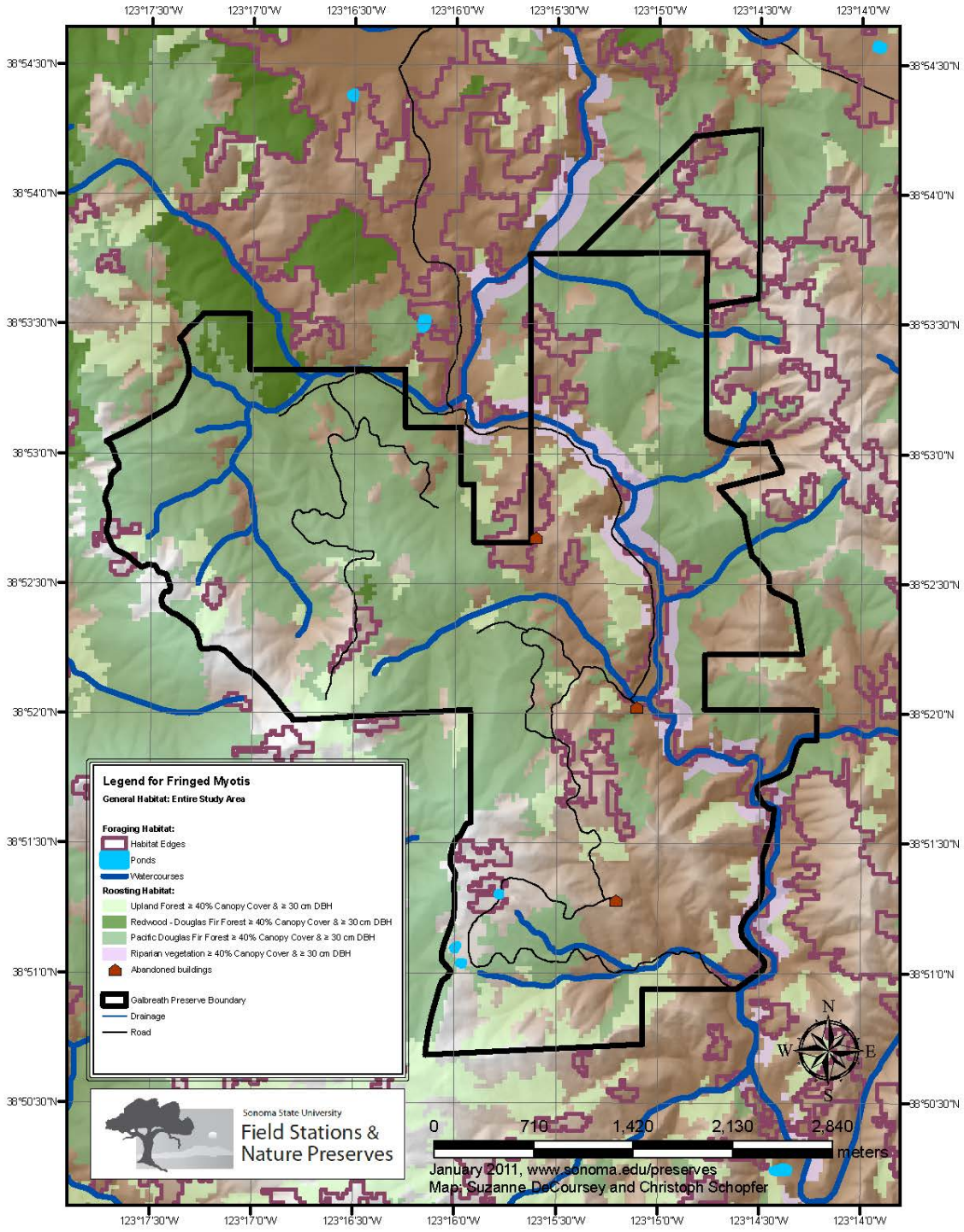
Species Account Description: Emily Harvey

Figure 107: Potential habitat for Fringed Myotis *(Myotis thysanodes)*



Status:

Federal: None

State: None

Other: G5 S4 BLM:S

Photo: J. Scott Altenbach

Species Description:

The Yuma myotis is described as having short rounded ears and a pointed tragus without a keeled calcar. The body is light buff to dark brown with lighter underparts. The fur is darker at the base and is dull looking. The braincase rises sharply from the rostrum giving it a steep sloped appearance. Body measurements are: total length, 73 to 91 mm; foot, 9 to 11 mm (Ingles 1965); forearm, 32 to 38 mm; ears length, 11 to 14.5 mm; greatest length of the skull, 13 to 14.2 mm. *Myotis yumanensis* can be very difficult to distinguish from the little brown myotis (*Myotis lucifigus*) which is not listed. The two species may hybridize and ranges overlap in the mid to north western, north eastern and eastern parts of California. M. lucifigus usually has shiny tipped fur compared to dull tipped fur of *M. yumanensis*. Size is generally larger in *M. lucifigus*, but overlap does occur in measurements and slope of forehead. Some subspecies of M.yumanensis may have shiny fur. (From CDFG 1995)

The Yuma myotis may be found feeding and roosting with other bat species, such as *Tadarida brasiliensis* and *Antrozous pallidus*. This species is difficult to distinguish from *M. lucifugus*, with which it may occasionally hybridize (Harris 1974, Parkinson 1979). (From Harris 1990)

Distribution:

Myotis yumanensis, a member of the Family Vespertilionidae, ranges across the western third of North America from British Columbia, Canada, to Baja California and southern Mexico. In the United States, it occurs in all the Pacific coastal states, as far east as western Montana in the north, and as far east as western Oklahoma in the south. (From Bogan et. al. 2005)

The Yuma myotis is common and widespread in California. It is uncommon in the Mojave and Colorado Desert regions, except for the mountain ranges bordering the Colorado River Valley. (From Harris 1990)

Life History & Threats:

Nocturnal. Hibernates. This species emerges soon after sunset in many areas (Barbour ansd Davis 1969), but Jones (1965) reported that peak activity was 1-2.5 hr after sunset. Warm temperatures are preferred, and activity may be extended on warm nights. Winter habits are poorly known, but this species apparently hibernates. Probably makes local or short migrations to suitable hibernacula. Individuals that spend the summer at high elevations probably move downslope. Territoriality has not been reported. Probably not territorial at feeding or roosting sites; roosts in large groups. The Yuma myotis, like other California bats, mates in the fall. Dalquest (1947) reported that the season of births lasted

from late May to mid-June with a peak in early June. It is likely that some young are born in July in some areas. A single litter of 1 young is produced yearly. The species may live up to 8.8 years (Cockrum 1973). (From Harris 2000)

Prey includes moths, midges, flies, termites, ants, homopterans, and caddisflies (Easterla and Whitaker 1972, Black 1974, Whitaker et al. 1977, 1981). (From Harris 2000)

May be affected by closure of abandoned mines without adequate surveys, some forest management practices, and disturbance of maternity roosts in caves and buildings. Since this species frequently occurs in anthropogenic structures, it is vulnerable to destructive pest control activities. Some riparian-management practices may be detrimental. (From Bogan et. al. 2005)

Habitat & Habitat Associations:

General:

Found in a wide variety of habitats ranging from sea level to 3300 m (11,000 ft), but it is uncommon to rare above 2560 m (8000 ft). (From Harris 2000)

Open forests and woodlands are optimal habitat. (From Harris 2000)

The Yuma Myotis has a relatively poor urine concentrating ability, and frequently is observed drinking. Distribution is closely tied to bodies of water, which it uses as foraging sites and sources of drinking water. (From Harris 2000)

Foraging:

This species usually feeds over water sources such as ponds, streams, and stock tanks. (From Harris 2000)

Roosts, Hibernacula, and Nurseries:

The Yuma Myotis roosts in buildings, mines, caves, or crevices. The species also has been seen roosting in abandoned swallow nests and under bridges. Separate, often more open, night roosts may be used. (From Harris 2000)

Maternity colonies of several thousand females and young may be found in buildings, caves, mines, and under bridges. Warm, dark sites are preferred. Individuals are clustered tightly in the warmest sites when temperatures are low. If temperatures exceed 40°C, bats seek cooler locations, and individuals roost farther apart. (From Harris 2000)

Conceptual Basis for GIS Model Development: Potential habitat for this species occurs throughout the Study Area. We mapped the following types of habitat:

Possible Best Potential Habitat: Open forest and woodlands (i.e., cismontane, broadleaf upland, coniferous, and riparian woodland and forest with canopy cover < 40%).

Roosts & Hibernacula:

- Abandoned buildings. Note that snags and caves have not been surveyed and are not included.

Foraging Habitat: perennial and seasonal watercourses and ponds

Potential Occurrence in the Galbreath Wildlands Preserve:

Habitat: Potential habitat for this generalist species occurs throughout the Preserve, and the open forest and woodland habitats preferred by Yuma Myotis are relatively abundant in the central area of the Preserve (Figure 108). The distribution of riparian foraging areas shown on the potential habitat map, however, is an overestimate of available habitat. Rancheria Creek, the primary open water course, has highly eroded stream banks and riparian vegetation is limited to narrow, patches of riparian scrub or woodland. Perennial water occurs as only a few small ponds or short sections of creeks that flow through heavily wooded areas.

Upland habitat quality for this species is good. Initial field surveys indicate that the open habitats preferred by this species contain snags, which could provide microhabitat needed for roosting and hibernating. Logging on the Galbreath Wildlands Preserve was discontinued in 2000 and large snags are common. Buildings and caves are uncommon on the Preserve.

Riparian habitat quality is moderate. This species appears to be highly dependent on surface water for drinking, and most of the surface water on the Preserve is present only seasonally. Notable exceptions are a few small ponds or short sections of creeks that flow through heavily wooded areas.

Nearest Occurrence:

> Documented Occurrences in Study Area: This species has not been documented in the Preserve. To our knowledge, no surveys have been conducted.
>
> Nearest Occurrence to Study Area if Not Documented in Study Area: Yuma Myotis has not been reported to occur in USGS quads adjacent to the Preserve.

Summary: Yuma Myotis has not been documented at Galbreath Wildlands Preserve, but is widespread in California. Although this species prefers a greater availability of perennial water, we anticipate that the Yuma Myotis is “Likely to Occur” in the Preserve due to the abundance of open forest and woodland habitats, snags, and access to some areas with perennial surface water.

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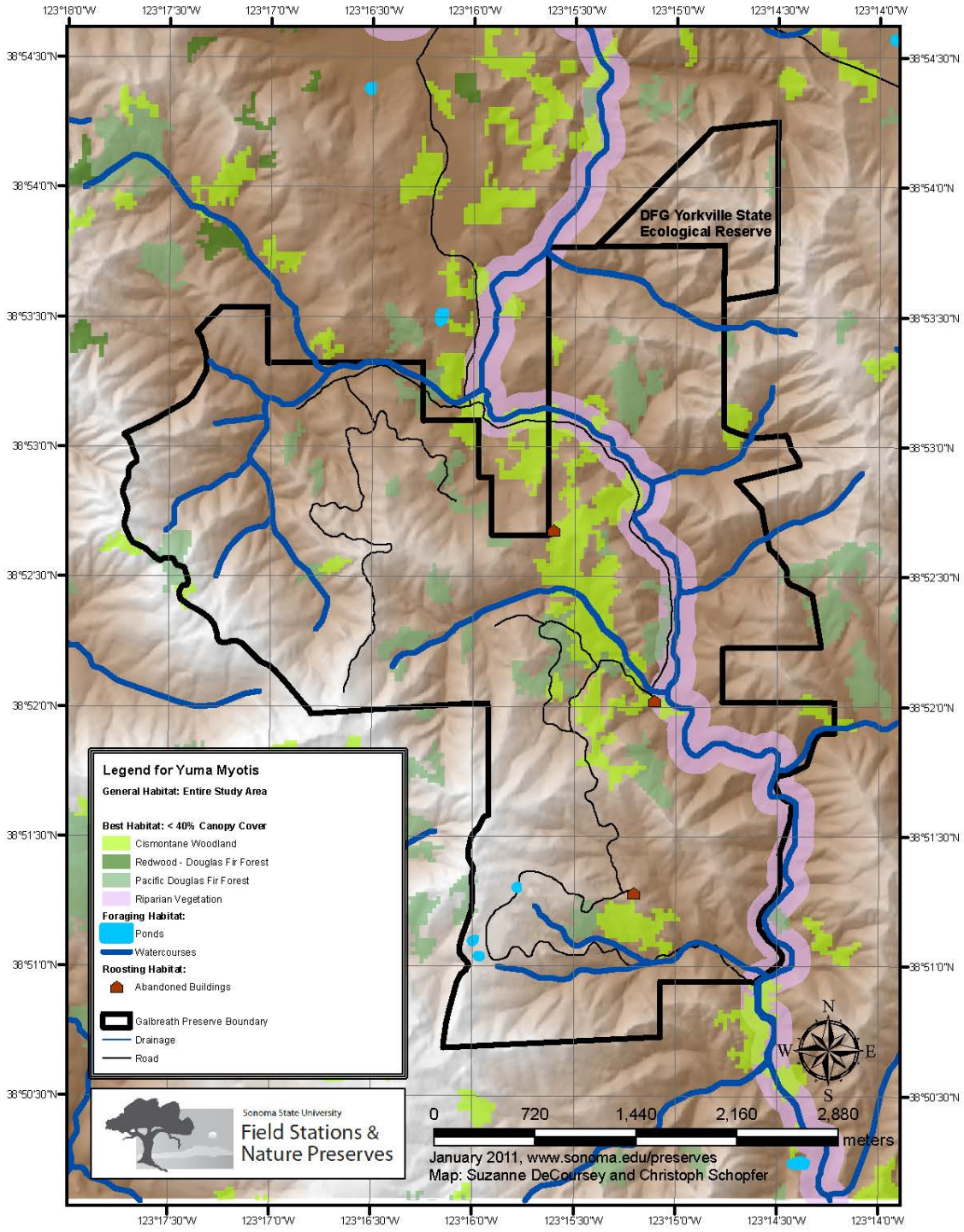
Species Account Description: Emily Harvey

Figure 108: Potential habitat for Yuma Myotis *(Myotis yumanensis)*



Status:

Federal: None

State: Species of Special Concern

Other: None

Art: Todd Zalewski 2002

Species Description:

Pelage of *A. pomo* is reddish brown on the dorsum and gray with rusty-brown tinged hairs on the venter. Tail is thick, well-haired, dusky-brown above, somewhat paler below (Johnson and George, 1991). Body mass is 20-45 g. Ears are small (10-12 mm) and almost hairless. Externally, *A. pomo* is almost identical to *A. longicaudus*, although *A. pomo* is slightly smaller in overall body size (Johnson and George, 1991). Females are usually larger than males. Four inguinal mammary glands are present (Howll, 1926; Johnson, 1973; Taylor, 1915). Six well-developed tubercles are on the hind feet and five are on the forefeet (Hooper and Hart, 1962; Taylor, 1915), and the claw on digit 1 on the front foot is modified to a nail (Kesner, 1986). (From Adam 1998)

Distribution:

Distributed along the North Coast from Sonoma Co. north to the Oregon border, being more or less restricted to the fog belt. Reported to be rare to uncommon throughout its range, but the difficulty of locating nests and capturing individuals makes abundance hard to assess. (From Brylski 1990)

There are two tree vole species, the Sonoma tree vole (*Arborimus pomo*) in California and the red-tree vole (*Arborimus longicaudus*) in Oregon and Northern California (Johnson and George, 1991; Bellinger et al., 2005). The boundary between the two species is approximately the Klamath River in northern California, but the exact boundary and taxonomic relationships between the two species are still not fully resolved (Johnson and George, 1991; Bellinger et al., 2005; Miller et al., 2006). Although morphological and genetic distinctions exist between these two species, no apparent ecological differences have been discovered (Johnson and George, 1991; Smith et al., 2003). (From Dunk 2009)

Life History & Threats:

This vole is primarily arboreal but exhibits some terrestrial activity. It nests in trees, 2-50 m above ground; it may use old nests of birds, squirrels, or woodrats. It breeds throughout the year. Ovulation is induced by copulation (Adam and Hayes 1998). Females may breed within 24 hours of giving birth. It sometimes exhibits delayed implantation. Gestation period is 27 to 48 days, with an average of 31 days (Hamilton 1962). Litter size usually is two, with a range of one to five (Adam and Hayes 1998). Newborns are altricial, weaned at 25 to 46 days (Hamilton 1962). (From Blois 2008)

This species is thought to have very limited dispersal capability (Thomas *et al.* 1993). Predators include Spotted Owls (*A. longicaudus* made up almost 50% of prey items of Spotted Owls in Oregon), and probably other owls, Raccoons, and Fishers (Adam and Hayes 1998). This vole feeds primarily on Douglas-fir needles. It also eats needles of Grand or Lowland White Fir,

Sitka Spruce, and Western Hemlock. It may eat inner bark of twigs as well (Benson and Borell 1931). Usually feeds inside or on top of its nest. (From Blois 2008)

Threats include forest fragmentation and habitat loss (Maser *et al.* 1981; Thomas *et al*. 1993; Gordon Gould pers. comm. 1998). Although the species is locally common in the foothills of mountains on the east edge of the coastal plain in Humboldt County, loss and fragmentation of habitat has been extensive everywhere within the range (Williams 1986). Timber harvest and clearing of trees for agriculture and home sites have significantly reduced available habitat and fragmented populations (Maser *et al*. 1981). Construction of roads and power lines has also contributed to the loss of habitat and fragmentation and isolation of populations. Furthermore, these trends are likely to continue at an accelerated pace in the future (Williams 1986). (From Blois 2008)

Habitat & Habitat Associations:

Occurs in old-growth and other forests, mainly Douglas-fir, redwood, and montane hardwood-conifer habitats. (From Brylski 1990)

The species' habitat consists of mixed evergreen forests; optimum habitat appears to be wet and mesic old-growth Douglas-fir forest, but this species also occurs in younger forests (e.g., Douglas-fir 47 years old). Nests usually are in Douglas-fir trees but sometimes may be in other conifer or in Pacific madrone (Meiselman and Doyle 1996, Vrieze 1980; all as cited in Adam and Hayes 1998). (From Blois 2008)

We found red tree vole nests strongly associated with old-growth/late seral forest conditions. Other researchers reported that the number of red tree vole nests per tree increased with tree dbh (Carey, 1991; Gillesberg and Carey, 1991) and that nest densities increased with dbh (Jones, 2003) and stand age (Biswell and Forsman, 1999; Thompson and Diller, 2002). (From Dunk 2009)

Meiselman and Doyle (1996) found tree vole nests only in Douglas-fir. We located nests in 8 tree species and on the ground, although 80% of the nests were in Douglas-fir trees. Tanoak was the next most frequently used tree for nest construction, which was presumable due to its common occurrence in many stands. (From Thompson and Diller 2002)

Conceptual Basis for GIS Model Development: To define potential habitat in the Study Area, we mapped:

- coniferous forest vegetation (i.e., Redwood-Douglas fir mix (*Sequoia sempervirens-Pseudotsuga menziesii)* and Pacific Douglas fir (*Pseudotsuga menziesii var.menziesii*) vegetation

- broadleaf upland forest (i.e., mixed hardwoods, montane mixed hardwoods, or single dominant hardwoods with canopy cover > 40%)

Possible best potential habitat was mapped as the above vegetation types with a DBH > 61 cm (the largest DBH size class in the Study Area).

Potential Occurrence in the Galbreath Wildlands Preserve:

Habitat: The habitat quality for this species is good in the Galbreath Wildlands Preserve. Sonoma Tree Voles prefer Douglas fir trees within old growth coniferous forests. The GIS map (Figure 109) illustrates the abundance of high quality habitat in the Preserve.

Nearest Occurrence:

> Documented Occurrences in the Galbreath Wildlands Preserve: This species has not been documented in the Preserve. To our knowledge, no surveys have been conducted.
>
> Nearest Occurrence to the Galbreath Wildlands Preserve: McGuire Ridge Quad (CNDDB 2010), immediately west of the Preserve's 4-quad area.

Summary: We anticipate that the Sonoma Tree Vole is "Likely to Occur" in the Preserve because of abundant suitable habitat.

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Species Account Description: Emily Harvey

Figure 109. Potential habitat for Sonoma Tree Vole, *Arborimus pomo*