National Park Service
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Yosemite National Park
Resources Management and Science

Wildlife Condition Assessment
for the
Merced River Corridor in Yosemite Valley

Yellow Warbler

Sierra Garter Snake

Pacific Chorus Frog

Spotted Bat

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PROJECT TITLE: Wildlife Conditions Assessment for the Merced River Corridor in Yosemite Valley, Yosemite National Park

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I. Introduction

The objectives of the wildlife assessment are to (1) model predicted occurrence of wildlife species in the riparian and meadow habitat adjacent to the Merced River in Yosemite Valley using California Wildlife Habitat Relationships (CWHR) models and validation tools; (2) survey for amphibians, reptiles, birds, and mammals to test the CWHR models; (3) characterize the wildlife communities using existing datasets and additional surveys; and (4) assess the health of the Yosemite Valley riparian and meadow habitats in relation to wildlife focal species. These steps are necessary in order to characterize the present ecosystem related to the Merced River and to assess habitat integrity.

Specific taxa have been targeted for inventory because they are particularly sensitive to ecosystem disturbance: herpetofauna (amphibian and reptile species) are sensitive to changes in river and riparian habitat (Dickerson 2001) and birds are sensitive to changes in riparian habitat (Marzluff and Sallabanks 1998). Most bat species forage either directly over water or within the adjacent riparian zone, where plant and insect productivity is higher than in seasonally dry upslope areas. The most important bat foraging habitat in Yosemite Valley is within the riparian zone of the Merced River (Pierson 1997).

Due to their life history, foraging behavior, and movements many amphibian and reptile species rely on riparian and/or wet meadow habitat (Dickerson 2001). For example, amphibians such as the western toad and Pacific chorus frog rely on water sources for reproduction (Lannoo 2005) and reptile species such as the Sierra garter snake are highly aquatic, foraging for prey in slow moving waters. As a result of their functional ties to river, riparian, and meadow habitats, herpetofauna are important indicators of both terrestrial and aquatic ecosystem health.

The sensitivity of bird populations to changes in the ecosystem also makes them an important indicator of overall habitat quality (Marzluff and Sallabanks 1998). Long-term monitoring of birds, particularly during the breeding season, can be used to effectively assess habitat health (Ralph et al. 1993). Bird population dynamics have been used as scientifically viable surrogates for evaluation of ecosystem condition because (1) birds are conspicuous, easily observable, and monitoring and analysis are cost effective; (2) as secondary consumers (i.e. insectivores), birds are sensitive indicators of environmental change; and (3) knowledge of the natural history of many bird species has a rich basis in literature.

Bats were the only mammal species surveyed in Yosemite Valley for this assessment. There are 17 bat species known to occur within Yosemite National Park (Pierson et al. 2001), five of which are special status species that have experienced state-wide declines. While population declines are based largely on issues that affect these species outside park boundaries, they serve to highlight the importance of park land as potential refugia, and signal a potentially heightened sensitivity of these species to management activities within the park.

In order to generate a vertebrate species list for Yosemite Valley, we used the CWHR. CWHR is a comprehensive information system on California's wildlife. The program contains life history, habitat relationships, and management information for 694 species of amphibians, reptiles, birds and mammals that are considered to be regularly occurring in California. Bioview was originally developed by the US Forest Service Pacific Southwest Research Station (PSW) as a stand-alone computer application utilizing the databases of CWHR to translate habitat suitability ratings for wildlife species into data that can be used in a Geographic Information System (GIS) for spatial and temporal analysis. The two applications have now been integrated (Eagleson et al. 2008).

II. Habitat Types

The following CWHR habitat types were used in this assessment (2008).

A. Montane riparian:

- **Structure**: Can be variable and structurally diverse but usually occurs as a fairly dense grove of deciduous trees up to 30 m tall with a sparse understory.
- **Composition**: Species characteristic to this type include black cottonwood (*Populus balsamifera trichocarpa*), alder (*Alnus spp.*), Pacific dogwood (*Cornus nuttallii*), wild azalea (*Rhododendron spp.*), and willow (*Salix spp.*)
- **Wildlife habitat**: Riparian habitats provide water, cover, migration corridors, nesting locations, and feeding opportunities. This diversity of opportunity gives riparian habitats exceptionally high value for many wildlife species.

B. Wet meadow:

- **Structure**: Usually has a simple structure consisting mainly of herbaceous plants. Shrubs and trees are usually absent or sparse.
- **Composition**: Has a wide variety of grass and grass-like species both native and nonnative. The most commonly occurring genera include Carex and Juncus. Willows (*Salix spp.*) are the most common shrub.
- **Wildlife habitat**: During spring and early summer, the meadows are generally too wet to provide habitat for small mammals. However, in late summer, these same species may use meadows that have dried. Mallards and other waterfowl use flowing streams in meadows and red-winged blackbirds occasionally nest in wet meadows with tall vegetation. Amphibians such as Pacific chorus frogs (*Pseudacris regilla*) and nonnative bullfrogs (*Lithobates catesbeianus*), and snakes such as the Sierra garter snake (*Thamnophis couchii couchii*) are common in wet meadows. The western mastiff bat (*Eumops perotis*) and the spotted bat (*Euderma maculatum*) forage primarily over meadows and riparian areas.

III. Methods

Amphibian, Reptile, and Invasive Aquatic Species Surveys

During the summer of 2010, we conducted two sets of Visual Encounter Surveys (VES) surveys for amphibian, reptile, and invasive aquatic species in Yosemite Valley using standardized protocols (Crump and Scott 1994). VES were conducted July 6-8 and September 14-16, 2010. During the surveys, two crew members carefully searched for amphibian, reptile, and invasive aquatic species as they walked upstream along 100m transects. Twenty-seven 100m transects were located within randomly established permanent visitor use monitoring plots (Fig. 3). The transects were located along the north side of the river and included 50m on either side of the center point of the monitoring plots. All center points were projected in GIS to facilitate site standardization among researchers. Two crew members surveyed each transect simultaneously. During the July surveys, one person walked in or on the edge of the river and one person walked approximately 1 m off the shoreline. The surveyor in the water would scan out 15-20 meters in front using binoculars to try to see animals before they were disturbed by the movement. No substrates or cover objects were moved. In order to improve detection rates, VES were expanded to include "wandering transects" during the September 14-16 surveys using the same 100 m transects in the 27 monitoring plots. During these surveys, one person walked in the water near the shore, usually up the knees but occasionally up to the hips while the other person walked along the shore surveying an approximately 10 meter swath along the shore targeting areas with specialized or limited habitat types within the survey reaches (e.g., large woody debris, rocky areas, small pools). For example, if the shore line was a large beach then the second surveyor walked upland to find higher quality habitat. All data, including date, time, transect, wind speed, air temperature, water temperature, cloud cover, species, and number of individuals per species were recorded on a standardized data sheets.

Bird Surveys

Utilizing the same established visitor use monitoring plots, we conducted three sets of bird surveys in Yosemite Valley during the 2010 breeding period (May 15 – July 31) using the standardized point count protocol for monitoring landbirds (Ralph et al. 1993, Nur et al. 1999). The point count protocol involves an observer standing in one spot and recording all birds seen or heard. At each point, the Variable Circular Plot (VCP) method delineates a 360° plot, with the observer at the center or 'point'. We used 5-minute point counts, and recorded each detection to the nearest 10 m (0 – 10 m, 10 – 20 m, 20 – 30 m, etc.) on a standardized data form. Incorporating distance sampling (Buckland et al. 2001) into point counts facilitates the estimation of detection probability--a parameter that may vary greatly by species, habitat, observer, or other factors. Surveys began fifteen minutes after local sunrise and were completed within four hours, no later than 10 AM. Each set of surveys were spaced at least 10-days apart and involved conducting a set of point count surveys at the center of pre-established vegetation plots. A total of 26 point count locations were surveyed. All data, including date, time, point count location, species, number of individuals per species, and distance from observer were recorded on a standardized data sheet. All points are projected in GIS for

facilitating site standardization among researchers. Between visits, we alternated transects and survey direction in order to reduce sample bias.

Bat Surveys

We conducted acoustic surveys to determine bat species presence/absence, composition, and activity at two locations within the Merced River Corridor in Yosemite Valley. At each site, we mounted a bat detector on a tree and secured it in a locked cash box (Fig. 1). The detectors were positioned to face forest openings to increase detection probability of foraging bats. The detectors recorded sound in the high frequency range continuously through the night between 8 p.m. and 5 a.m. Acoustic surveys at the Yosemite Creek site occurred June24 – 29, 2010 for a total of 5 nights. Acoustic surveys at the North Pines Campground site occurred June 29 –July 7, 2010 for a total of 8 nights.

A. Yosemite Creek Site B. North Pines Campground Site C. Bat detector close-up

Figure 1 Acoustic survey equipment used along the Merced River Corridor in Yosemite Valley, Yosemite National Park during summer 2010.

Dr. Joe Szewczak, creator of SonoBat™, provided specialized hands-on training the week of June 28, 2010 to instruct Yosemite Wildlife Biologists to (1) use bat detection and recording software and equipment and (2) analyze and interpret bat echolocation calls. We implemented these highly advanced techniques while performing bat surveys in Yosemite Valley.

We used Pettersson D500x ultrasound recording units coupled with SonoBat™ software for full-spectrum acoustic monitoring and bat echolocation call identification. The Pettersson D500x hardware is built specifically for long-term passive monitoring and can be deployed for up to two weeks per sampling occasion using AA batteries or for a longer period of time using an external power source. SonoBat™ software provides a comprehensive tool for analyzing and comparing high-resolution full-spectrum sonograms of bat echolocation calls. SonoBat™ uses a decision engine based on the quantitative analysis of approximately 10,000 species-known recordings from across North America. The software automatically recognizes and sorts calls, then processes the calls to extract six dozen parameters that describe the time-frequency and time-amplitude trends of a call. SonoBat's call trending algorithm can also recognize the end of

calls buried in echo and noise as well as establish trends through noise and from low power signals. SonoBat™ generates high resolution continuous trends of time-frequency and time-amplitude content that enable robust parameter extraction. Inclusion of amplitude parameters increases classification performance above that achieved by using time-frequency parameters alone.

Echolocation call data from each site was first analyzed using the batch process option in SonoBat™ and then reanalyzed using the manual option in SonoBat™ for species confirmation. Within SonoBat™, we manipulated screen-positioned cursors to quantify low/high frequency, bandwidth, duration, heel, slopes, characteristic frequency, and harmonics to differentiate bat echolocation calls for species determination. We also compared our bat calls to reference bat calls for species identification using SonoBat™.

Wildlife Habitat Relationships Modeling

We used a three-step process to generate the species lists for the Merced River Corridor within Yosemite Valley: (1) we determined habitat types using the park's Geographic Information System (GIS) vegetation map (Aerial Information Systems 1997) (Fig. 2); (2) we used the California Department of Fish and Game's California Wildlife Habitat Relationships (CWHR) System Software (2008) to run Wildlife Habitat Relationships models; and (3) we used professional judgment to edit the species lists, drawing on knowledge of the natural history of the species, the habitat, observations made as part of past and current NPS research, anecdotal observations from the Yosemite Wildlife Observation Database (2010), and previous park research.

This multi-step process for generating species lists by habitat type is a conservative approach for determining species presence. We performed two community-level matrix models associating wildlife species to a standardized habitat classification scheme. Using a "two-condition habitat value comparison," we selected the location as Yosemite Valley, indicated the relevant habitat types (montane riparian and wet meadow), selected the "arithmetic" average suitability level for all habitat groups and stage selections, included all available elements, and included all seasons. We generated a comprehensive list of all predicted species within Yosemite Valley. Each species was assigned suitability for each habitat type, status, and, if relevant, source. Suitability refers to "predicted density and frequency of occurrence," and is indicated as low, medium, or high suitability for the two habitat types included in this report. We then confirmed whether or not the species had ever been documented in the target area either through the 2010 survey efforts, or by other sources. We included the source of all species that have been observed and documented by a research study or anecdotal sighting in the river corridor (includes a ¼ mile buffer on either side of the river's edge) in Yosemite Valley between Happy Isle's Bridge and the Highway 120/Highway 140 junction (Fig. 2). The sources included the California Natural Diversity Database (2010) which is a database maintained by the State of California's Natural Heritage Program; the Museum of Vertebrate Zoology Collections Database which includes all specimens housed at the museum (2010); Wildlife Observation Database which includes all observations of wildlife in Yosemite National Park that are submitted by park staff, researchers, and members of the public (2010); National Park Service

surveys conducted in 2010 (NPS); Birds of Yosemite, Gaines 1992, an all-encompassing textbook of species accounts written by a California renown professional birder; Point Reyes Bird Observatory contracted surveys conducted to as part of the Merced River Alliance Project Biological Monitoring and Assessment Report (2010); and Pierson and Rainey, 1993-2001 bat surveys; Pierson and Rainey have conducted peer reviewed bat research throughout the Sierra Nevada for several decades, and have documented the 17 species of bats known to occur within the park. These data sources include observations through 2010 and may include observations dating back to the early 1900s. All observations were included regardless of the date of observation or a validation of the observation. We also identified if a particular species is a special status species including species that are federally or state listed as threatened, endangered, candidate, proposed, fully protected, or included on other special status species lists.

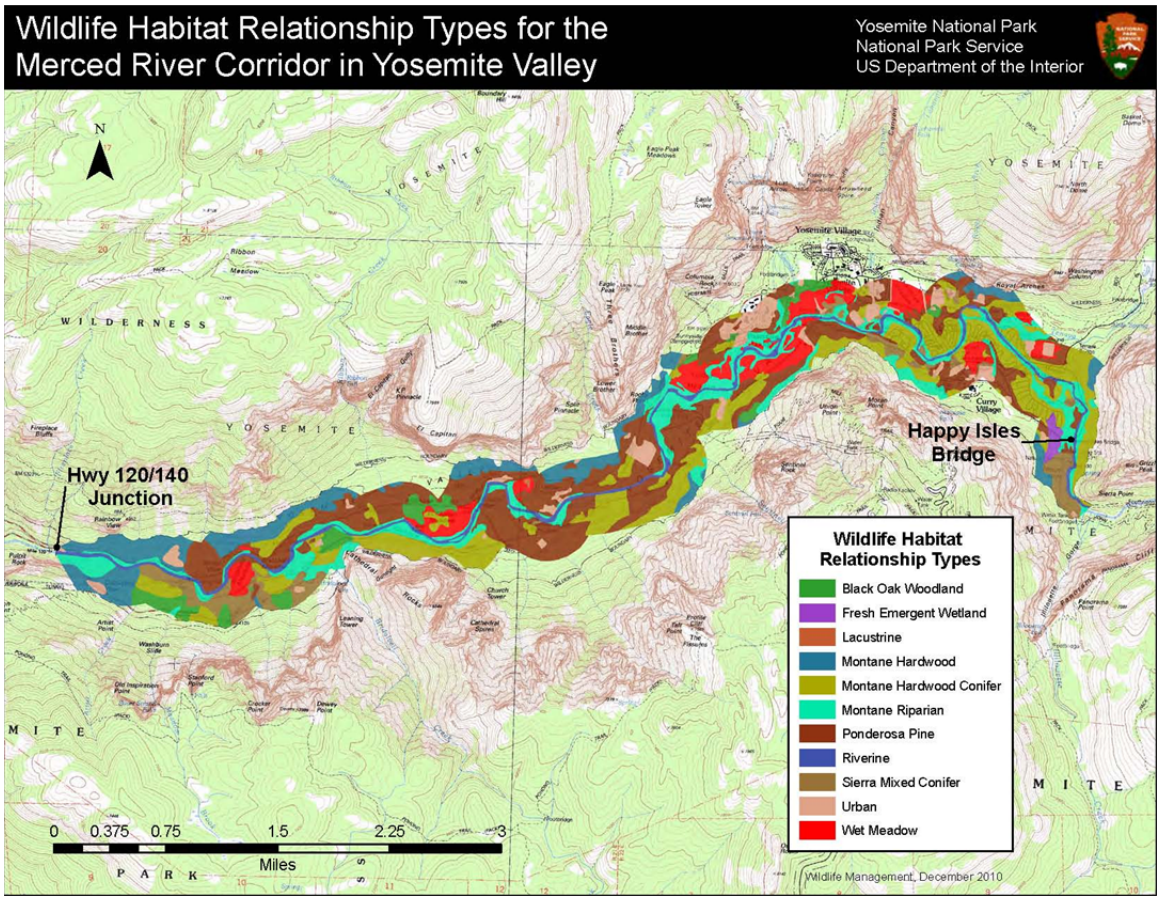

Figure 2 Wildlife Habitat Relationships modeling habitat types within the Merced River corridor in Yosemite Valley.

IV. Results

Amphibian, Reptile, and Invasive Aquatic Species Surveys

We detected a total of 44 individuals of two amphibian and at least four reptile species (including one unidentified lizard species) (APPENDIX 1). We detected five individuals (three species) during our July surveys and 39 individuals (4-5 species) during our September surveys. The species we detected included Pacific chorus frog (*Pseudacris regilla*), greater brown skink (*Eumeces gilberti gilberti*), western fence lizard (*Sceloporus occidentalis*), Sierra garter snake (*Thamnophis couchii*), and unidentified Sceloporus species (*Sceloporus spp*). No special status species were observed. Nonnative invasive species included bullfrogs (*Lithobates catesbeiana*)) and five signal crayfish (*Pacifastacus leniusculus*), an invasive invertebrate species.

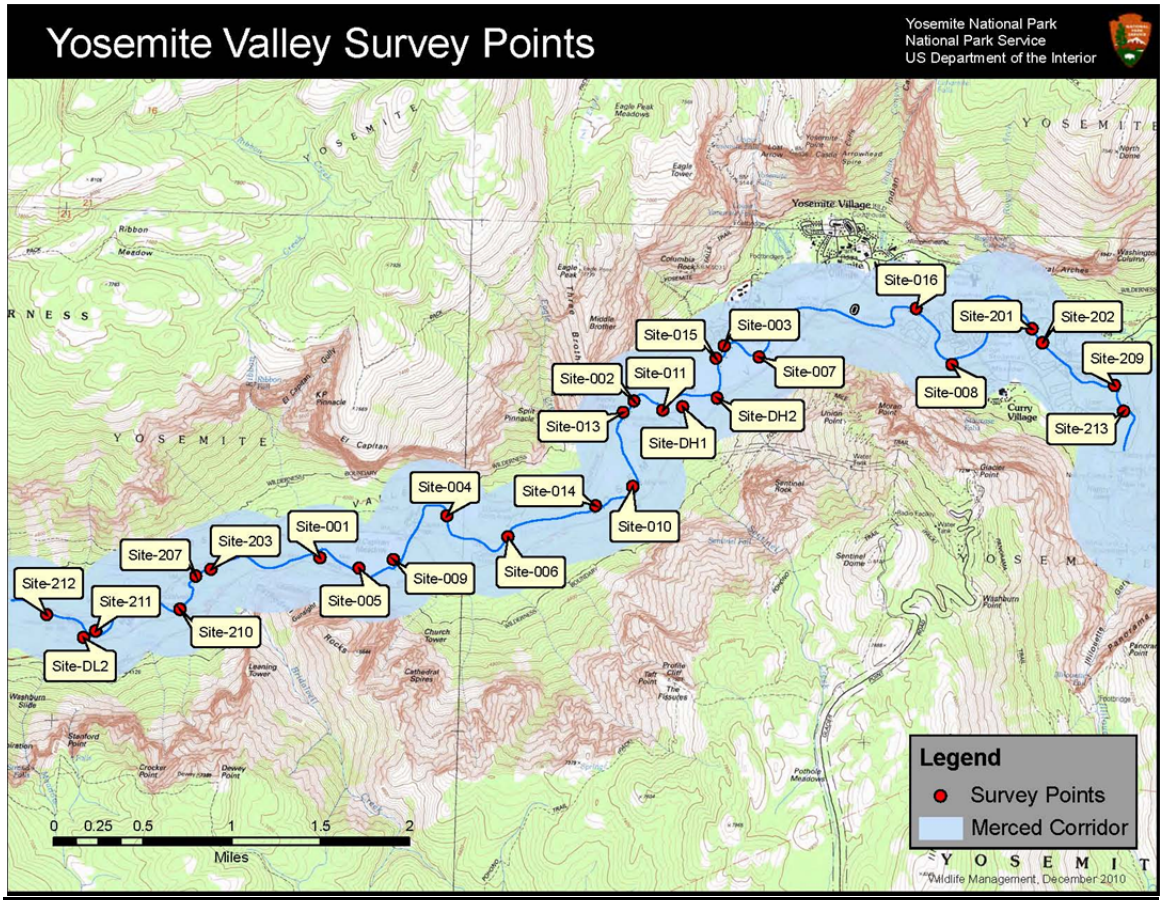

Figure 3 Survey point locations sampled within the Merced River corridor in Yosemite Valley during summer 2010.

Bird Surveys

We conducted bird surveys using the point count survey protocol at 26 of the same visitor use monitoring plots in Yosemite Valley (Fig. 3), during summer 2010. To account for variation in detection probabilities, we visited each point three times during one of two days. The first visit was on June 18 and 22, the second visit was on July 2-6 and the third visit was July 12 and 16, 2010.

We detected a total of 41 species of 953 individual birds (APPENDIX 2). To account for possible duplicate observations among visits, we estimated relative abundance for each species to be the average number of individuals observed across all 26 points; thus the relative abundance was estimated at 317.67 individuals (total number of individual detections divided by 3 visits). The most frequently encountered species were song sparrow (*Melospiza melodia*) (117 individuals), Brewer's blackbird (*Euphagus cyanocephalus*) (83 individuals), and western wood-pewee (*Contopus sordidulus*) (74 individuals).

The 41 species detected comprised 28 probable and 17 confirmed locally breeding species, five riparian focal species (RFS) (black-headed grosbeak (*Pheucticus melanocephalus*), song sparrow, spotted sandpiper (*Actitis macularia*), warbling vireo (*Vireo gilvus)*, and yellow warbler (*Dendroica petechia*) (RHJV 2004), one California species of special concern (yellow warbler), two nest predators (Steller's jay (*Cyanocitta stelleri*) and common raven (*Corvus corax*), and one nest brood parasite species, brown-headed cowbird (*Molothrus ater)* (APPENDIX 3).

To make the bird survey data as relevant as possible to general condition of the river corridor, we examined detections of RFS, the nest brood parasite, and the two species of nest predators in relation to the eight geomorphic reaches in Yosemite Valley identified in the report "Merced River and Riparian Vegetation Assessment" (Cardno ENTRIX 2011). From the upstream end to the downstream end these eight reaches are referred to as: Happy Isles, Above Tenaya, Below Tenaya, Upper Meadows, Inter-Meadows, Lower Meadows, Above Pohono Bridge, and Below Pohono Bridge (Figure 4). A complete summary of each of these reaches may be found in the Final Report by Cardno ENTRIX (2011).

For the purposes of comparing bird use and habitat availability in each of the geomorphic reaches, Table 1 breaks down detections in each geomorphic reach by the number of RFS (species richness), relative abundance of RFS, brown-headed cowbirds, Steller's jays, and common ravens. Rather than reporting the number of individual detections for each reach, we report relative abundance, which is the number of individuals averaged across point count stations, since there were a disproportionate number of point count stations in each reach.

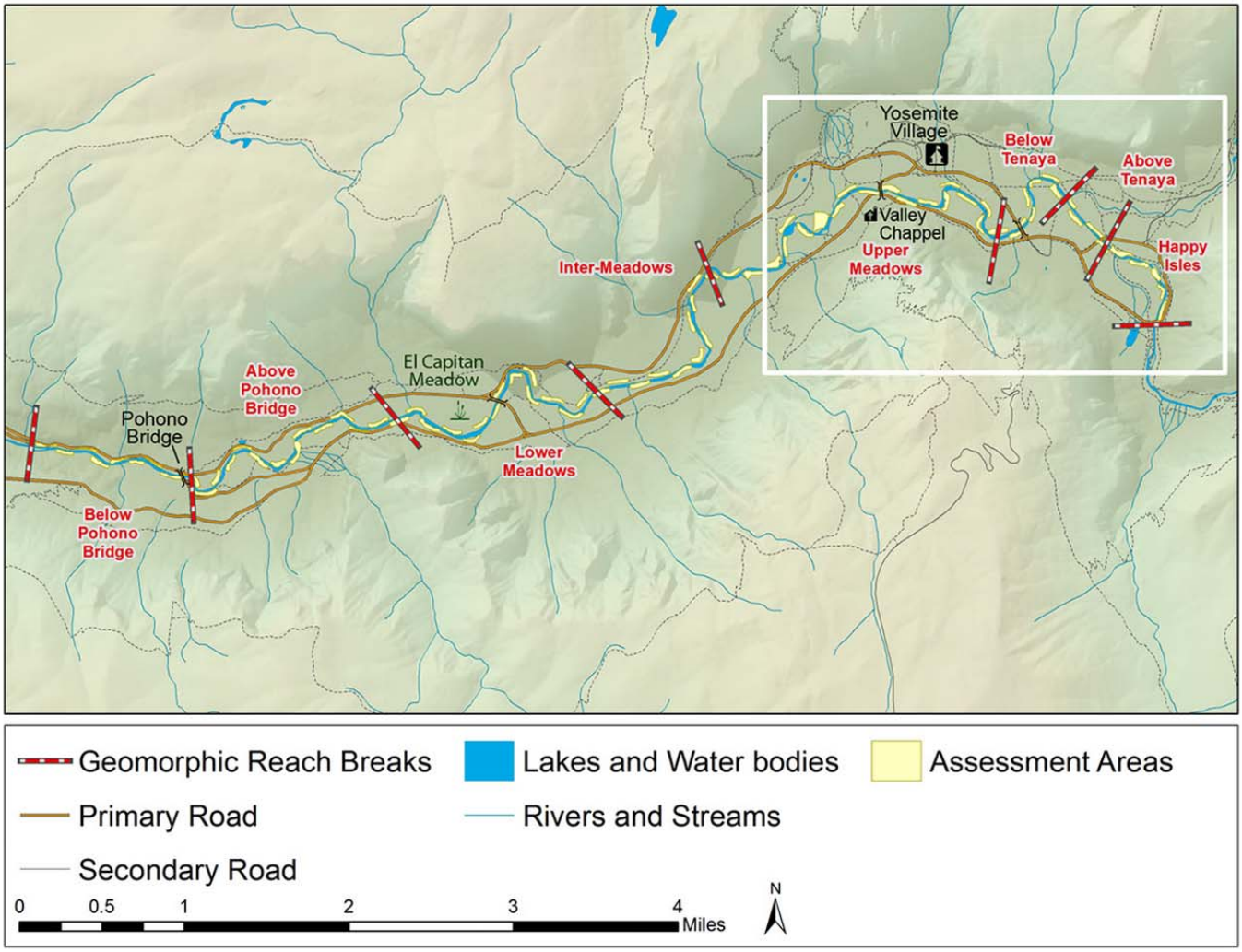

Figure 4 Geomorphic reaches based upon channel gradient channel planform (sinuosity), entrenchment, bankfull width, and valley width. Geomorphic reach breaks occurred at significant changes in the above parameters and were named using local landmarks (Cardno ENTRIX 2011.

Table 2 Relative abundance of Riparian Focal Species (RFS), brown-headed cowbird, Steller's jay, and common raven from point count surveys conducted in June-July 2010. Relative abundance is the number of individuals averaged across point count stations within each geomorphic reach in the Merced River Corridor in Yosemite Valley.

Geomorphic reach	No. Point Count Stations	RFS_1 Species richness	Relative abundance of RFS_1	Relative abundance of Brown-headed Cowbird	Relative abundance of Steller's Jay	Relative abundance of Common Raven
Below Pohono	1	3	5.00	0	**5.00**	0
Above Pohono	5	4	3.00	0	2.00	0.40
Lower Meadows	4	5	**20.75**	**3.75**	0.75	0.50
Inter-Meadows	4	5	**12.00**	**1.00**	1.75	0
Upper Meadows	7	5	**14.14**	**1.86**	**2.86**	**0.86**
Below Tenaya	1	3	7.00	0	2.00	**1.00**
Above Tenaya	2	3	4.00	0	**3.50**	**6.50**
Happy Isles	2	1	1.00	0	1.50	0

RFS_1 – Riparian Focal Species (5) include black-headed grosbeak, song sparrow, spotted sandpiper, warbling vireo, and yellow warbler
BOLD TEXT – denotes highest relative abundance of RFS, brown-headed cowbird, Steller's jay, and common raven by geomorphic reach

The highest relative abundance of RFS was observed in the "Lower", "Inter-", and "Upper" meadow reaches. These were the only geomorphic reaches where all five RFS were present. However, these were also the only geomorphic reaches where brown-headed cowbirds were present. The relative abundance and species richness of RFS in these three reaches suggest that there is greater availability of riparian habitat in these reaches compared to the other five reaches.

The two subsidized nest/brood predators, Steller's jay and common raven, were present in all reaches, but appeared to be concentrated in the "Above Tenaya" reach, which is where two campgrounds are located (North Pines and Lower Pines Campgrounds). Steller's jay and common raven were also concentrated in the "Upper Meadows" reach, where Swinging Bridge picnic area and Housekeeping Camp are located. Steller's jay had particularly high abundance in the "Below Pohono" reach, an area where the riparian corridor was on average in poorer condition compared to the other geomorphic reaches (Cardno ENTRIX 2011).

Bat Surveys

We documented a high diversity of bats in Yosemite Valley. Of the 17 bat species known to occur in Yosemite National Park (Pierson et al. 2001), we detected 11 species (APPENDIX 4). Surveys were conducted at two sites, Yosemite Creek and North Pines Campground, sampled between June 24 – 29 and June 29 – July 7, 2010, respectively. The North Pines Campground site had an overall higher number of detections (1496) than the Yosemite Creek site (89) (APPENDIX 4). Two special status species (spotted bat and western mastiff bat) were detected at both sites while spotted bat had the second highest number of detections overall. The hoary

bat was detected in very high frequency at the North Pines Campground site, followed by spotted bat, Mexican free-tailed bat, and western pipistrelle (APPENDIX 4). Six other species known to occur in Yosemite National Park but were not detected at the two sites sampled in Yosemite Valley are long-legged myotis, long-eared myotis, fringed myotis, pallid bat, western red bat, and Townsend's big-eared bat, the latter three being species of special concern.

Wildlife Habitat Relationships Modeling

The first unedited species list generated from the CWHR model that included both montane riparian and wet meadow habitat types in the river corridor in Yosemite Valley predicted 343 vertebrate species. Using professional judgment, we edited the list to include a total of 317 species (10 amphibians, 21 reptiles, 218 birds, and 68 mammals) (APPENDIX 5). From the species lists, there were 27 special status species and six non-native species, all of which are predicted to occur in Yosemite Valley.

When the results of our herpetofauna surveys are combined with previous detections, a total of eight of the 10 predicted amphibian species have been recorded within Merced River Corridor in Yosemite Valley; arboreal salamander (*Aneides lugubris*) and hell hollow slender salamander (*Batrachoseps diabolicus*) have not been documented. Eighteen of the predicted 21 species of reptiles were found in the Merced River Corridor in Yosemite Valley; the western whiptail (*Cnemidophorus tigris*), striped racer (*Masticophus lateralis*), and night snake (*Hypsiglena torquata*) have not been documented. Two reptile species that were not predicted to occur (sagebrush lizard (*Sceloporus graciosus*) and western skink (*Eumeces skiltonianus*)) have been detected within the target area. The model predicted a total of 218 bird species expected to occur within the Merced River Corridor in Yosemite Valley, 14 of which are special status species. Of these 14 special status bird species, only one, yellow warbler, was observed during summer 2010 bird surveys. The model predicted a total of 68 mammal species expected to occur within the Merced River Corridor in Yosemite Valley, 9 of which are special status species. Five of these 9 special status mammal species are bats. In addition, CWHR modeling predicted that all 17 bat species are expected to occur within the Merced River Corridor in Yosemite Valley, in agreement with Pierson et al.'s (2001) study.

V. Discussion

Results from the CWHR model predict that the Merced River Corridor within Yosemite Valley may support a high diversity and density of animals. However, the model only considered general habitat types and physiographic location, specific habitat attributes characterizing the montane riparian and wet meadows habitats in Merced River corridor in Yosemite Valley were not integrated into the model. The model presents a list of species against which future field surveys may be compared, but a definitive list of species must be supplemented by continued floral and faunal surveys and local expertise.

Few amphibians were detected during the 2010 surveys. The lack of amphibian species detected during the 2010 surveys may be due in part to the surveys being conducted during the dry season. Amphibians are more active, and consequently more detectable, when conditions are wet, especially during the breeding season. Invasive signal crayfish were detected in the Inter-Meadows, Lower Meadows, and Above Pohono Bridge Geomorphic Reaches. American bullfrogs were only detected in the Lower Meadows Geomorphic reach (Cardno ENTRIX 2011). The presence of nonnative bullfrogs and signal crayfish is also impacting habitat quality and population abundance of native amphibians and possibly reptiles. Both nonnative species have been implicated in the decline of native amphibians and reptiles (Gamradt and Kats 1996, Lannoo 2005) through predation and competition. Adult bullfrogs are voracious predators that will readily eat anything smaller than themselves (Bury and Whelan 1984). Signal crayfish are generalist omnivores and avid predators on benthic macroinvertebrates and the eggs and larvae of amphibians. Eradication efforts, which began in 2005, have substantially reduced the population of bullfrogs in Yosemite Valley. However, their continued presence in natural and manmade water bodies continues to have a negative impact on native wildlife. Two amphibian species (arboreal salamander and hell hollow slender salamander) and three reptile species (western whiptail, striped racer, and night snake) were predicted to occur, but were not documented in the Merced River corridor in Yosemite Valley. Yosemite Valley is at the upper end of their elevation range, therefore, the habitat for these species is considered to have low suitability (Behler and King 2002, Lannoo 2005) and they may not be present due to natural distribution constraints.

Results from 2010 bird surveys indicate that the Merced River provides important breeding habitat for a diverse group of birds representing a variety of breeding niches of different heights in the vertical strata, including understory, mid-story, and canopy and differing seasonal strategies (e.g., resident species, short-distance, and long-distance migrants). Analyzing the bird data specifically for RFS, whose requirements define different spatial attributes, habitat characteristics, and management regimes, is useful because we can assume that a landscape managed to meet the focal species' needs encompass the requirements of other species (Lambeck 1997, RHJV 2004). Bird surveys in 2010 detected five RFS identified in the California Riparian Bird Conservation Plan (RHVJ 2004): black-headed grosbeak, song sparrow, spotted sandpiper, warbling vireo, and yellow warbler.

By geomorphic reach (Cardno ENTRIX 2011), the greater relative abundance and species richness of RFS in the Lower, Inter-, and Upper Meadow reaches suggested that the structural integrity of the riparian habitat may be higher in those reaches compared to the other five reaches. This interpretation is consistent with findings from the Cardno ENTRIX (2011) report that found large proportions of the Black Cottonwood Temporarily Flooded Forest Alliance in the Upper and Lower Meadows geomorphic reaches and a fairly common distribution of Shining Willow Riparian Scrub in the Inter-Meadow geomorphic reach. They also reported presence of the Meadow and herbaceous community types in the three Upper, Inter-, and Lower Meadow geomorphic reaches.

In addition to harboring the highest diversity of RFS, these three geomorphic reaches were the only reaches where brown-headed cowbirds were detected. The brown-headed cowbird is a brood parasite that lays its eggs in the nests of many different species. Cowbird expansion into Yosemite in the last century (first recorded in Yosemite Valley in 1934 (Gaines 1992)) has exposed naive populations and new species to brood parasitism, and the pressure on such host populations can be substantial (Lowther 1993). Cowbird parasitism contributes to lowered productivity in host species through direct destruction of host eggs; through competition between cowbird and host chicks, resulting in increased mortality; and through nest abandonment in some species, thus lowering overall fecundity within a season (RHJV 2004). Brown-headed cowbirds take advantage of concentrated food sources at stables, campgrounds, and picnic areas in Yosemite Valley; every horse corral and stable supports a summer flock, as do most campgrounds and bird feeders (Gaines 1992). They forage in meadows and other open habitats but rarely more than five miles from a stable or other principal feeding center (Gaines 1992). Over 220 host species have been reported as being parasitized by cowbirds (Lowther 1993), including extremely high parasitism rates in RFS: warbling vireo, song sparrow, and yellow warbler. Thus, the presence of brown-headed cowbirds in the Lower, Inter-, and Upper Meadow reaches is probably a result of the relatively higher abundance of RFS and increased opportunities for brood parasitism of these RFS species. Further, these brown-headed cowbirds are being subsidized by the nearby DNC stables, campgrounds, and picnic areas.

Whereas the two nest predators, common raven and steller's jay, were present in all eight geomorphic reaches, they were most abundant in the "Above Tenaya" and the "Upper Meadows" reaches. These nest predators were probably taking advantage of food and garbage associated with North Pines and Lower Pines Campgrounds in the Above Tenaya" reach and the Swinging Bridge picnic area and Housekeeping Camp in the "Upper Meadows" reach. Steller's jay had particularly high abundance in the "Below Pohono" reach, an area where human–related impacts, such as trash and other refuse, were observed (Cardno ENTRIX 2011).

Although riparian habitats are disproportionately important to wildlife, riparian habitat has declined by 90% in historic times, resulting in great conservation and management concern (Hatten et al. 2010). The area encompassed by the Merced River Corridor may provide suitable habitat for California state endangered willow flycatcher (*Empidonax traillii*), however, none were observed during 2010 surveys. Willow flycatcher numbers have declined in recent decades due to cowbird parasitism and habitat destruction, while populations overall appear to be on a downward trend (Zeiner 1988). Willow flycatchers require dense willow thickets for nesting and roosting, attributes found in montane riparian habitat (Zeiner 1988). In the Sierra Nevada, willow flycatcher have been consistently absent from otherwise suitable areas where the lower branches of willows have been browsed (Zeiner 1988).

Introduced species also undoubtedly affect local population levels. In a harlequin duck study by LeBourdias et al. (2009), low productivity and recruitment were linked to introduction of fish into historically fishless waters, resulting in reduced quality of harlequin breeding habitat. In California, both breeding and wintering populations of harlequin ducks, a California

Species of Special Concern, have declined, most likely due to human disturbance of breeding streams and damming of rivers (Zeiner 1988).

Out of the 17 species of bats that are known to occur in Yosemite National Park, 11 species were documented during the summer of 2010 within the Merced River Corridor in Yosemite Valley. Two of the 11 bat species are special status species while one of these, the spotted bat, had the second highest number of detections overall. Results of this research were similar to a Yosemite Valley bat study by Pierson and Rainey (1993) in which 11 species were detected using a variety of survey techniques. Between these two studies, 15 of the 17 bat species expected to occur in Yosemite were documented. However, neither this study nor the 1993 study detected the long-legged myotis and the western red bat, a California Species of Special Concern. Both of these species were later documented in Yosemite in Pierson et al.'s (2001) study, and are expected to occur in Yosemite Valley. The Western red bat is a tree-dwelling species, primarily associated with lower elevation deciduous or mixed conifer forest while the long-legged myotis is a crevice-dwelling species, roosting in rock crevices, under bark, in snags, mines, and caves (Pierson and Rainey 1993).

Yosemite Valley supports the largest known populations of the western mastiff bat and spotted bat in California (Pierson and Rainey 1996). Although these two species can be readily detected in the Valley during warmer months (with the western mastiff bat being locally more numerous), both species are considered rare (western mastiff bat), or extremely rare (spotted bat) throughout their known range (Pierson and Rainey 1996). In Yosemite Valley, these two species roost exclusively in cliff faces, and forage primarily over meadows and riparian areas. Through their radio-tracking study, Pierson and Rainey (1996) discovered that the western mastiff bat makes nightly and seasonal movements up and down the Merced Canyon, suggesting that the habitat corridor is important to this species year-round. Pierson (1997) also found a significant population of the pallid bat in the Valley, which roosts in buildings, rock crevices and bole cavities, and lightning scars of oaks and ponderosa pine.

The lower number of detections at the Yosemite Creek site during 2010 surveys most likely reflects less ideal detector placement and a shorter monitoring period rather than lower bat activity at this site. The echolocation call files obtained from this site were of lower quality than those call files obtained from the North Pines Campground site, indicating that signal bounce off of nearby vegetation may have influenced overall call quality. However, species assemblages were similar between the two sites.

CWHR modeling predicted the presence of 68 different mammal species in montane riparian or wet meadow habitat encompassing the Merced River Corridor in Yosemite Valley. Of these 68 mammal species, 13 species have yet to be detected in Yosemite Valley even though habitat suitability ratings for some of these species in either habitat are considered high, including the northern pocket gopher and California vole. Other species, such as the mountain cottontail, are included the CWHR model because suitable habitat in Yosemite Valley is on the periphery of their historical range. Although the dusky-footed woodrat was not predicted to occur in Yosemite Valley, its presence has been documented by the Museum of Vertebrate

Zoology. The large-eared woodrat, formerly a subspecies of the dusky-footed woodrat, is predicted to occur in the Valley. The large-eared woodrat was elevated to species status after discovery of morphological and genetic differences indicating genetic isolation between the two groups (Matocq 2002).

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APPENDIX 1. **Amphibian and Reptile Survey Results**

Amphibian and reptile detections in July and September 2010 at 27 survey transects along the Merced River, Yosemite Valley, Yosemite National Park.

Species	Common Name	6-8 July 2010 No. of detections	14-16 Sept. 2010 No. of detections
Pseudacris regilla	Pacific chorus frog	2	0
Lithobates catesbeianus	American bullfrog	1	4
Sceloporus occidentalis	Western fence lizard	2	0
Sceloporus spp.	Sceloporus lizard species	0	30
N/A	Unknown lizard species	0	1
Eumeces gilberti gilberti	Greater brown skink	0	1
Thamnophis couchii	Sierra garter snake	0	3
	5-7 Species	**5 Detections**	**39 Detections**

APPENDIX 2. Bird survey results

Average bird species relative abundance and species richness, total number of individuals, and species relative abundance by point using 2010 point count data collected in Yosemite Valley, Yosemite National Park. Data include all detections, excluding flyovers.

Point	**1**	**2**	**3**	**4**	**5**	**7**	**8**	**9**	**10**	**11**	**13**	**14**	**15**	**16**	**201**	**202**	**203**	**207**	**209**	**210**	**211**	**212**	**213**	**DH1**	**DH2**	**DL2**	**Average**
Visits	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	
Total individuals	**62**	**50**	**54**	**61**	**64**	**44**	**30**	**46**	**28**	**55**	**46**	**34**	**50**	**40**	**17**	**50**	**19**	**10**	**5**	**16**	**23**	**20**	**4**	**46**	**65**	**14**	**36.65**
Species richness	**19**	**20**	**21**	**18**	**15**	**18**	**14**	**17**	**12**	**22**	**22**	**13**	**18**	**12**	**8**	**13**	**7**	**3**	**4**	**9**	**12**	**9**	**3**	**19**	**24**	**9**	**13.88**
Acorn Woodpecker				2	2	2					1		1												1		3.00
American Dipper								1									2			2							1.67
American Robin	3	4	4	3	3		6	1	1	1	2	1	4	3		1	1		2	1	1	4	1		3	1	17.00
Anna's Hummingbird										1	1																0.67
Band-tailed Pigeon		1				1																					0.67
Black-headed Grosbeak	1	2	2		3	1	3	1		1				3		4			1	1	1	1	1	2	1	2	10.33
Black-throated Gray Warbler							1			1																	0.67
Brewer's Blackbird			3	8		3	5	2	8	1	1		7	9	2	21	2			1				4	6		27.67
Brown Creeper	1		2	3		1		1	1		2	7	2		1	1	3	2		4	5			2	2		13.33
Brown-headed Cowbird	3		3	2	8	2		2			3	1	2	1										3	2		10.67
Bullock's Oriole		1	1	1							1			2											1		2.33
Cassin's Vireo		2			2	2	1	2	1	1	2	2	1	1						2	1	3		2			8.33
Chipping Sparrow		1																							1		0.67
Common Merganser				10		1									1										1		4.33
Common Raven	1		2				1	1		1			1		8	5				1	1			1	1		8.00
Downy Woodpecker		1				1	1						3														2.00
Hairy Woodpecker	1			1						1																	1.00
House Wren		3									1																1.33
Lesser Goldfinch	3									1																	1.33
Lincoln's Sparrow				1																							0.33
MacGillivray's Warbler	6	3	1							2	1							4							1		6.00
Mallard				2				1			1													1			1.67
Mountain Chickadee	1	1	1					2			1		1			1								5	5		6.00
Northern Flicker	1		1	1	1					1		2					2			2	1	1				1	4.67
Oregon Junco		1	3							1	1	5									1	1					4.33
Pacific Wren																										1	0.33

APPENDIX 2 cont.

Point	1	2	3	4	5	7	8	9	10	11	13	14	15	16	201	202	203	207	209	210	211	212	213	DH2	DH2	DL2	Average
Pacific-slope Flycatcher		2			1						3										1						2.33
Pileated Woodpecker			2						1							1									1		2.00
Purple Finch												1															0.33
Red-breasted Nuthatch	2					2			1	1	1					1								1	1		3.33
Red-winged Blackbird	4	1	2	7	8	7	1	2	4	8	1	2	2			6								5	8		22.67
Song Sparrow	15	8	6	3	8	6	3	7	5	6	7	5	7	4	1	1		4			4	3		6	7	1	39.00
Spotted Sandpiper		1	4	1	6	2		3	1	6			3	1							2			3	5		12.67
Steller's Jay	1	1	1	2			2			1	5	1	2	13	1	6	3		1	2	4	5	2	1	2	1	19.00
Warbling Vireo	6	5	4	5	5	1	1	6		3	3	1	2	1							1	1		1	4	5	18.33
Western Tanager	3	2	1		1		1	4	2	3	4	2	1			1			1			1		1	2	1	10.33
Western Wood-Pewee	6	4	5	8	8	6	3	6	2	5	1	4	5	1										4	6		24.67
White-headed Woodpecker	1														1										1		1.00
White-throated Swift						1	1										6										2.67
Yellow Warbler	3	6	4		6	4		4	1	8	3		4	1	2									2	1		16.33
Yellow-rumped Warbler			2	1	2	1				1			2			1								1	2	1	4.67

APPENDIX 3. BREEDING STATUS OF BIRDS DETECTED

List of 41 bird species detected and their breeding status from point count surveys in Yosemite Valley, Yosemite National Park, in May – August, 2010.

Species	Probable	Confirmed	Status[1]
Acorn Woodpecker			
American Dipper		CF, F	
American Robin	P, S	CN, F	
Anna's Hummingbird			
Band-tailed Pigeon	S		
Black-headed Grosbeak	P, S	CF, F	RFS
Black-throated Gray Warbler	S	CF, F	
Brewer's Blackbird	P, T	CF, F	
Brown Creeper	S		
Brown-headed Cowbird	S	F	
Bullock's Oriole	S		
Cassin's Vireo	S		
Chipping Sparrow	S		
Common Merganser		F	
Common Raven			
Downy Woodpecker		CF, F	
Hairy Woodpecker			
House Wren	S		
Lesser Goldfinch	S		
Lincoln's Sparrow	S		
MacGillivray's Warbler	S	CF	
Mallard			
Mountain Chickadee	S		
Northern Flicker			
Oregon Junco	S	P	
Pacific-slope Flycatcher	S		
Pileated Woodpecker	D		
Purple Finch	S		
Red-breasted Nuthatch			
Red-winged Blackbird	S	CF, F	
Song Sparrow	S	CF, F	RFS
Spotted Sandpiper	P, S		RFS
Steller's Jay		CF, F	
Warbling Vireo	S	CF	RFS
Western Tanager	S		
Western Wood-Pewee	T	CF, ON	
White-headed Woodpecker			SS
White-throated Swift			
Pacific Wren	S		
Yellow Warbler	P, S	CF, F	RFS, SS, CSC
Yellow-rumped Warbler	P, S	CM	

Breeding status for each species detected in Yosemite Valley study area during the breeding season is reported as possible, probable, and confirmed breeders. Codes indicating breeding status are: P = pair observed during the breeding season; S = more than one singing male in study area or male bird singing during at least 3 visits; D = drumming woodpecker heard; T = Territorial behavior; CN = bird observed carrying nest material or nest building; CF = bird observed carrying food for young; F = recently fledged or downy young observed; ON = occupied nest observed.

[1]CSC = California species of special concern; SS = CDFG Bird Species of Special Concern; RFS = California Partners in Flight Riparian Focal Species

APPENDIX 4. BAT SURVEY RESULTS

Bat detections in June-July, 2010 at two survey sites along the Merced River, Yosemite Valley, Yosemite National Park.

		24 - 29 June 2010 (5 nights)	29 June - 7 July 2010 (8 nights)
Species	**Common Name**	**Yosemite Creek No. of detections**	**North Pines Camp No. of detections**
Eptesicus fuscus	Big brown bat	1	9
Euderma maculatum*	**Spotted bat**	1	351
Eumops perotis*	**Western mastiff bat**	24	35
Lasiurus cinereus	Hoary bat	59	638
Lasionycteris noctivagans	Silver-haired bat	0	30
Myotis californicus	California myotis	0	1
Myotis ciliolabrum	Small-footed myotis	0	1
Myotis lucifugus	Little brown bat	0	2
Myotis yumanensis	Yuma myotis	0	3
Parastrellus hesperus	Western pipistrelle	2	92
Tadarida brasiliensis	Mexican free-tailed bat	2	334
	11 Species	**89 Detections**	**1496 Detections**

*California Species of Special Concern

APPENDIX 5. SPECIES LIST FROM CWHR MODELS

California Wildlife Habitat Relationship (CWHR) habitat types: *Wet Meadow & Montane Riparian*

KEY

Suitability: MR = montane riparian; WM = wet meadow; H = species expected to occur in relatively high pop densities at high frequencies; M = species expected to occur in relatively medium population densities at medium frequencies; L = species expected to occur in relatively low population densities at low frequencies; NP = species not predicted to occur

Confirmed: Y = species has been documented in Yosemite Valley; N = species has not been documented in Yosemite Valley

Source: CNDDB = California Natural Diversity Database (2010); MVZ = Museum of Vertebrate Zoology Collections Database (2010); WOD = Observations documented in the Yosemite Wildlife Observation Database (2010); NPS = National Park Service surveys conducted in 2010; BOY = Birds of Yosemite (Gaines, 1992); PRBO = Point Reyes Bird Observatory/Stillwater surveys (2010); PR = Pierson and Rainey, 1993-2001

Status: 1=Federal Endangered; 2=Federal Threatened; 3=CA Endangered; 4=CA Threatened; 5=CA Fully Protected; 6=CA Protected; 7=CA Species of Special Concern; 8=Federally-Proposed Endangered; 9=Federally-Proposed Threatened; 10=Federal Candidate; 11=BLM Sensitive; 12=USFS Sensitive; 13=CDF Sensitive; 14=CA Candidate; 15= California Bird Species of Special Concern

Notes: (I) = invasive; (NP) = not predicted in CWHR models; (V) = vagrant; (T) = transient

BOLD SPECIES indicates special status species. For the purposes of this report, "special status species" are defined as those that are: listed by the USFWS as endangered, threatened, proposed, or candidate; by the State of California as endangered, threatened, candidate, species of special concern, or fully protected, or California Bird Species of Special Concern.

AMPHIBIANS

	Suitability					
Common Name	**MR**	**WM**	**Confirmed**	**Source**	**Status**	**Notes**
CALIFORNIA NEWT	M	H	Y	WOD		
COMMON ENSATINA	M	L	Y	MVZ, WOD		
ARBOREAL SALAMANDER	L	L	N			
HELL HOLLOW SLENDER SALAMANDER	L	NP	N			
MOUNT LYELL SALAMANDER	**NP**	**L**	**Y**	**CNDDB, MVZ, WOD**	**7**	
WESTERN TOAD	M	M	Y	MVZ, WOD		
PACIFIC CHORUS FROG	H	H	Y	MVZ, WOD, NPS		
SIERRA NEVADA YELLOW-LEGGED FROG	**L**	**L**	**Y**	**CNDDB, WOD**	**10,12,14**	
FOOTHILL YELLOW-LEGGED FROG	**L**	**L**	**Y**	**WOD**	**7,11,12**	
BULLFROG	M	M	Y	MVZ, WOD, NPS		(I)

REPTILES

	Suitability					
Common Name	**MR**	**WM**	**Confirmed**	**Source**	**Status**	**Notes**
WESTERN POND TURTLE	**M**	**M**	**Y**	**CNDDB, WOD**	**7,11,12**	
SAGEBRUSH LIZARD	NP	NP	Y	MVZ		(NP)
WESTERN FENCE LIZARD	M	L	Y	MVZ, WOD, NPS		
GILBERT'S SKINK	M	L	Y	MVZ, WOD, NPS		
WESTERN SKINK	NP	NP	Y	WOD		(NP)
WESTERN WHIPTAIL	L	NP	N			
SOUTHERN ALLIGATOR LIZARD	H	L	Y	MVZ, WOD		
NORTHERN ALLIGATOR LIZARD	M	L	Y	MVZ, WOD		
RUBBER BOA	H	L	Y	MVZ, WOD		
RACER	M	M	Y	MVZ, WOD		
STRIPED RACER	L	L	N			
COMMON KINGSNAKE	L	M	Y	WOD		
CALIFORNIA MOUNTAIN KINGSNAKE	H	H	Y	MVZ, WOD		
GOPHER SNAKE	L	M	Y	WOD		
NIGHT SNAKE	L	NP	N			
RINGNECK SNAKE	M	NP	Y	MVZ, WOD		
SHARPTAIL SNAKE	H	H	Y	WOD		
COMMON GARTER SNAKE	M	H	Y	MVZ, WOD		
WESTERN TERRESTRIAL GARTER SNAKE	H	H	Y	WOD		
WESTERN AQUATIC GARTER SNAKE	H	H	Y	MVZ, WOD, NPS		
WESTERN RATTLESNAKE	M	L	Y	MVZ, WOD		

BIRDS

Common Name	Suitability MR	WM	Confirmed	Source	Status	Notes
PACIFIC LOON	L	NP	Y	BOY		(V)
PIED-BILLED GREBE	L	NP	Y	WOD		(T)
EARED GREBE	L	NP	Y	WOD		(T)
AMERICAN WHITE PELICAN	NP	L	Y	WOD		**(T)**
DOUBLE-CRESTED CORMORANT	L	NP	Y	WOD		(T)
AMERICAN BITTERN	L	NP	Y	WOD		(T)
GREAT BLUE HERON	M	M	Y	WOD		
GREAT EGRET	L	L	Y	WOD		
SNOWY EGRET	NP	L	Y	WOD		(T)
GREEN HERON	L	NP	Y	WOD		(T)
BLACK-CROWNED NIGHT-HERON	L	NP	N			(T)
CANADA GOOSE	L	L	Y	WOD		(T)
WOOD DUCK	L	NP	Y	WOD		
GREEN-WINGED TEAL	L	NP	Y	WOD		(T)
MALLARD	M	H	Y	WOD, MVZ, NPS, PRBO		
NORTHERN PINTAIL	L	L	Y	WOD		(T)
BLUE-WINGED TEAL	L	NP	Y	WOD		(T)
CINNAMON TEAL	L	NP	Y	WOD		(T)
NORTHERN SHOVELER	L	NP	Y	WOD		(T)
GADWALL	L	NP	N			(T)
AMERICAN WIGEON	L	NP	Y	WOD		(T)
CANVASBACK	L	NP	Y	BOY		(T)
RING-NECKED DUCK	L	NP	Y	WOD		
LESSER SCAUP	L	NP	Y	WOD		(T)
HARLEQUIN DUCK	**L**	**NP**	**Y**	**WOD**	**7,15**	
COMMON GOLDENEYE	L	NP	Y	WOD		(T)
BUFFLEHEAD	L	NP	Y	WOD		(T)
HOODED MERGANSER	L	NP	Y	WOD		
COMMON MERGANSER	H	M	Y	WOD, NPS, PRBO		
RED-BREASTED MERGANSER	L	NP	Y	WOD		(T)
RUDDY DUCK	L	NP	Y	WOD		(T)
TURKEY VULTURE	L	L	Y	WOD		
OSPREY	L	L	Y	WOD	13	
WHITE-TAILED KITE	NP	L	Y	BOY		(T)
BALD EAGLE	**L**	**L**	**Y**	**WOD**	**3,5,13**	
NORTHERN HARRIER	**L**	**M**	**Y**	**WOD**	**7,15**	
SHARP-SHINNED HAWK	M	NP	Y	WOD, MVZ		
COOPER'S HAWK	M	NP	Y	WOD, MVZ		
NORTHERN GOSHAWK	**L**	**NP**	**Y**	**WOD, MVZ, CNDDB**	**7,11,12,13,15**	
RED-SHOULDERED HAWK	M	L	Y	WOD		
RED-TAILED HAWK	M	M	Y	WOD		
GOLDEN EAGLE	**M**	**L**	**Y**	**WOD**	**5,11,13**	
AMERICAN KESTREL	M	L	Y	WOD, MVZ		
MERLIN	L	L	Y	WOD		
PEREGRINE FALCON	**L**	**L**	**Y**	**WOD**	**5,12,13**	
PRAIRIE FALCON	L	L	Y	WOD		
SOOTY GROUSE	L	NP	Y	WOD		
CALIFORNIA QUAIL	L	L	Y	WOD		
MOUNTAIN QUAIL	M	L	Y	WOD		
VIRGINIA RAIL	L	M	Y	WOD		
SORA	NP	L	Y	WOD		

BIRDS Continued

Common Name	Suitability MR	WM	Confirmed	Source	Status	Notes
AMERICAN COOT	NP	L	Y	WOD		(T)
KILLDEER	NP	L	Y	WOD		
BLACK-NECKED STILT	NP	L	Y	BOY		(T)
WILLET	NP	L	Y	BOY		(T)
SPOTTED SANDPIPER	NP	M	Y	WOD, NPS, PRBO		
WILSON'S SNIPE	NP	L	Y	WOD		
WILSON'S PHALAROPE	NP	L	Y	BOY		(T)
RED-NECKED PHALAROPE	NP	L	Y	BOY		(T)
RED PHALAROPE	NP	L	Y	BOY		(V)
RING-BILLED GULL	NP	L	Y	BOY		(T)
CALIFORNIA GULL	NP	L	Y	WOD		
BLACK TERN	NP	L	Y	WOD		(T)
BAND-TAILED PIGEON	H	NP	Y	WOD, MVZ, NPS, PRBO		
MOURNING DOVE	L	NP	Y	WOD		
GREATER ROADRUNNER	L	NP	Y	BOY		(T)
BARN OWL	L	NP	Y	WOD		(T)
FLAMMULATED OWL	L	NP	N			
WESTERN SCREECH OWL	L	L	Y	WOD		
GREAT HORNED OWL	M	L	Y	WOD		
NORTHERN PYGMY OWL	M	L	Y	WOD, MVZ		
SPOTTED OWL	**L**	**NP**	**Y**	**WOD, MVZ**	**7,11,12,15**	
GREAT GRAY OWL	**NP**	**L**	**Y**	**WOD**	**3,12,13**	
LONG-EARED OWL	**L**	**L**	**Y**	**WOD, MVZ**	**7,15**	
NORTHERN SAW-WHET OWL	M	L	Y	WOD		
COMMON NIGHTHAWK	NP	L	Y	BOY		
COMMON POORWILL	NP	L	Y	WOD		
BLACK SWIFT	**L**	**NP**	**Y**	**WOD**	**7,15**	
VAUX'S SWIFT	**L**	**L**	**Y**	**WOD**	**7,15**	
WHITE-THROATED SWIFT	M	L	Y	WOD, NPS		
BLACK-CHINNED HUMMINGBIRD	L	NP	Y	BOY		
ANNA'S HUMMINGBIRD	M	NP	Y	WOD, NPS, PRBO		
CALLIOPE HUMMINGBIRD	L	L	Y	WOD, MVZ		
RUFOUS HUMMINGBIRD	L	L	Y	WOD		
BELTED KINGFISHER	M	NP	Y	WOD		
LEWIS' S WOODPECKER	L	NP	Y	BOY		
ACORN WOODPECKER	M	NP	Y	WOD, MVZ, NPS, PRBO		
RED-NAPED SAPSUCKER	L	NP	Y	BOY		
RED-BREASTED SAPSUCKER	M	NP	Y	WOD		
WILLIAMSON'S SAPSUCKER	L	NP	Y	WOD, MVZ		
NUTTALL'S WOODPECKER	L	NP	Y	WOD		
DOWNY WOODPECKER	M	NP	Y	WOD, MVZ, NPS, PRBO		
HAIRY WOODPECKER	M	NP	Y	WOD, MVZ, NPS, PRBO		
WHITE-HEADED WOODPECKER	M	NP	Y	WOD, NPS		
BLACK-BACKED WOODPECKER	L	NP	Y	WOD		
NORTHERN FLICKER	H	L	Y	WOD, MVZ, NPS, PRBO		
PILEATED WOODPECKER	L	NP	Y	WOD, NPS, PRBO		
OLIVE-SIDED FLYCATCHER	**L**	**NP**	**Y**	**WOD, PRBO**	**7,15**	
WESTERN WOOD-PEWEE	M	NP	Y	WOD, NPS, PRBO		
WILLOW FLYCATCHER	**L**	**L**	**Y**	**WOD**	**3,12**	*
HAMMOND'S FLYCATCHER	L	NP	Y	WOD		
DUSKY FLYCATCHER	M	NP	Y	WOD		

BIRDS Continued

Common Name	Suitability MR	WM	Confirmed	Source	Status	Notes
GRAY FLYCATCHER	L	NP	Y	WOD		(T)
PACIFIC-SLOPE FLYCATCHER	M	NP	Y	WOD, MVZNPS		
BLACK PHOEBE	H	M	Y	WOD		
SAY'S PHOEBE	L	NP	Y	WOD		(T)
ASH-THROATED FLYCATCHER	L	NP	Y	WOD		
WESTERN KINGBIRD	NP	L	Y	WOD		(T)
HORNED LARK	NP	L	Y	WOD		
TREE SWALLOW	L	L	Y	BOY		
VIOLET-GREEN SWALLOW	M	L	Y	WOD, PRBO		
NORTHERN ROUGH-WINGED SWALLOW	H	L	Y	WOD, PRBO		
BANK SWALLOW	L	L	Y	BOY		(T)
CLIFF SWALLOW	L	L	Y	BOY		
BARN SWALLOW	L	M	Y	WOD		
STELLER'S JAY	H	NP	Y	WOD, MVZ, NPS, PRBO		
WESTERN SCRUB-JAY	L	NP	Y	WOD, BOY		
PINYON JAY	L	NP	Y	WOD		(T)
CLARK'S NUTCRACKER	L	NP	Y	WOD		
BLACK-BILLED MAGPIE	L	NP	Y	WOD		(V)
YELLOW-BILLED MAGPIE	NP	L	Y	BOY		
AMERICAN CROW	L	NP	Y	WOD		(T)
COMMON RAVEN	H	L	Y	WOD, NPS, PRBO		
MOUNTAIN CHICKADEE	L	NP	Y	WOD, MVZ, NPS, PRBO		
CHESTNUT-BACKED CHICKADEE	L	NP	Y	WOD		
OAK TITMOUSE	L	NP	Y	BOY		
BUSHTIT	L	NP	Y	WOD		
RED-BREASTED NUTHATCH	M	NP	Y	WOD, NPS, PRBO		
WHITE-BREASTED NUTHATCH	L	NP	Y	WOD		
PYGMY NUTHATCH	L	NP	Y	BOY		
BROWN CREEPER	L	NP	Y	WOD, MVZ, NPS, PRBO		
CANYON WREN	L	NP	Y	WOD, MVZ		
BEWICK'S WREN	L	NP	Y	WOD		
HOUSE WREN	M	L	Y	WOD, NPS		
WINTER WREN	L	NP	Y	WOD, MVZ, NPS		
MARSH WREN	L	L	Y	MVZ		
AMERICAN DIPPER	H	NP	Y	WOD, MVZ, NPS, PRBO		
GOLDEN-CROWNED KINGLET	M	NP	Y	WOD, MVZ, PRBO		
RUBY-CROWNED KINGLET	M	NP	Y	WOD, MVZ		
BLUE-GRAY GNATCATCHER	L	NP	Y	WOD		
WESTERN BLUEBIRD	M	L	Y	WOD, MVZ		
MOUNTAIN BLUEBIRD	H	L	Y	WOD		
TOWNSEND'S SOLITAIRE	L	NP	Y	WOD, MVZ		
SWAINSON'S THRUSH	L	NP	Y	BOY		
HERMIT THRUSH	M	NP	Y	WOD, MVZ		
AMERICAN ROBIN	M	L	Y	WOD, NPS, PRBO		
VARIED THRUSH	M	L	Y	WOD, MVZ		
NORTHERN MOCKINGBIRD	L	NP	Y	WOD		(T)
SAGE THRASHER	L	NP	Y	WOD		(T)
AMERICAN PIPIT	NP	L	Y	BOY		
BOHEMIAN WAXWING	L	NP	Y	WOD		(T)
CEDAR WAXWING	L	NP	Y	WOD		
PHAINOPEPLA	L	NP	Y	BOY		

BIRDS Continued

	Suitability					
Common Name	**MR**	**WM**	**Confirmed**	**Source**	**Status**	**Notes**
LOGGERHEAD SHRIKE	L	L	Y	WOD		**(T)**
EUROPEAN STARLING	L	L	Y	WOD		(I)
CASSIN'S VIREO	M	NP	Y	WOD, NPS, PRBO		
HUTTON'S VIREO	L	NP	Y	WOD, MVZ, PRBO		
WARBLING VIREO	M	NP	Y	WOD, NPS, PRBO		
NORTHERN PARULA	L	NP	Y	WOD		(V)
ORANGE-CROWNED WARBLER	L	NP	Y	WOD		
NASHVILLE WARBLER	M	NP	Y	WOD, MVZ		
YELLOW WARBLER	**M**	**L**	**Y**	**WOD, NPS, PRBO**	**7,15**	
MAGNOLIA WARBLER	L	NP	Y	BOY, PRBO		(V)
YELLOW-RUMPED WARBLER	M	L	Y	WOD, NPS, PRBO		
BLACK-THROATED GRAY WARBLER	L	NP	Y	WOD, MVZ, NPS		
TOWNSEND'S WARBLER	L	NP	Y	WOD, PRBO		
HERMIT WARBLER	L	NP	Y	WOD, PRBO		
CERULEAN WARBLER	L	NP	Y	BOY		(V)
BLACKPOLL WARBLER	L	NP	Y	BOY		(V)
BLACK-AND-WHITE WARBLER	L	NP	Y	BOY		(V)
OVENBIRD	L	L	Y	BOY		(V)
MACGILLIVRAY'S WARBLER	M	NP	Y	WOD, NPS		
COMMON YELLOWTHROAT	M	M	Y	BOY		
WILSON'S WARBLER	M	NP	Y	WOD		
PAINTED REDSTART	L	NP	Y	BOY		
YELLOW-BREASTED CHAT	L	NP	Y	WOD		
SUMMER TANAGER	L	NP	Y	WOD		**(V)**
WESTERN TANAGER	M	NP	Y	WOD, NPS, PRBO		
BLUE GROSBEAK	L	NP	Y	BOY		
BLACK-HEADED GROSBEAK	M	NP	Y	WOD, MVZ, NPS, PRBO		
ROSE-BREASTED GROSBEAK	L	NP	Y	BOY		(V)
LAZULI BUNTING	L	L	Y	WOD		
GREEN-TAILED TOWHEE	L	NP	Y	WOD		
SPOTTED TOWHEE	L	NP	Y	WOD, PRBO		
RUFOUS-CROWNED SPARROW	L	NP	Y	BOY		
CHIPPING SPARROW	M	L	Y	WOD, MVZ, NPS, PRBO		
BREWER'S SPARROW	NP	L	Y	WOD		
VESPER SPARROW	L	L	Y	BOY		**(T)**
LARK SPARROW	NP	L	Y	BOY		(T)
SAGE SPARROW	L	L	Y	WOD		(T)
SAVANNAH SPARROW	NP	L	Y	WOD		
FOX SPARROW	M	NP	Y	WOD, MVZ		
SONG SPARROW	M	H	Y	WOD, MVZ, NPS, PRBO		
LINCOLN'S SPARROW	M	M	Y	MVZ, NPS		
HARRIS'S SPARROW	L	NP	Y	BOY		(T)
GOLDEN-CROWNED SPARROW	L	L	Y	WOD		
WHITE-CROWNED SPARROW	M	M	Y	WOD		
WHITE-THROATED SPARROW	L	L	Y	BOY		(T)
DARK-EYED JUNCO	M	L	Y	WOD, MVZ, NPS, PRBO		
BULLOCK'S ORIOLE	M	NP	Y	WOD, NPS, PRBO		
WESTERN MEADOWLARK	NP	L	Y	WOD		
RED-WINGED BLACKBIRD	L	H	Y	WOD, MVZ, NPS, PRBO		
YELLOW-HEADED BLACKBIRD	NP	L	Y	WOD		**(T)**
BREWER'S BLACKBIRD	L	M	Y	WOD, NPS, PRBO		

BIRDS Continued

Common Name	Suitability MR	WM	Confirmed	Source	Status	Notes
GREAT-TAILED GRACKLE	NP	L	Y	WOD		
BROWN-HEADED COWBIRD	H	M	Y	WOD, NPS, PRBO		(I)
GRAY-CROWNED ROSY-FINCH	NP	L	Y	WOD		(T)
RED CROSSBILL	L	NP	Y	WOD		
EVENING GROSBEAK	L	NP	Y	WOD		
HOUSE FINCH	L	L	Y	WOD		
PURPLE FINCH	L	L	Y	WOD, NPS		
CASSIN'S FINCH	L	L	Y	WOD		
LESSER GOLDFINCH	L	L	Y	WOD, NPS, PRBO		
LAWRENCE'S GOLDFINCH	L	L	Y	BOY		
AMERICAN GOLDFINCH	L	NP	Y	WOD		
PINE SISKIN	L	L	Y	WOD		
PINE GROSBEAK	L	L	Y	WOD		
HOUSE SPARROW	NP	L	Y	BOY		(I)

MAMMALS

Common Name	Suitability MR	WM	Confirmed	Source	Status	Notes
VIRGINIA OPOSSUM	M	M	Y	WOD		
DUSKY SHREW	H	M	Y	MVZ		
WATER SHREW	H	M	N			
TROWBRIDGE'S SHREW	M	NP	Y	MVZ		
BROAD-FOOTED MOLE	H	H	Y	WOD, MVZ		
LITTLE BROWN BAT	H	M	Y	PR,NPS		
YUMA MYOTIS	H	H	Y	WOD, MVZ, CNDDB,PR,NPS	11	
LONG-EARED MYOTIS	M	L	Y	MVZ, CNDDB,PR	11	
FRINGED MYOTIS	H	H	Y	WOD, CNDDB,PR	11	
LONG-LEGGED MYOTIS	H	H	Y	CNDDB,PR		
CALIFORNIA MYOTIS	H	M	Y	WOD, MVZ,PR,NPS		
WESTERN SMALL-FOOTED MYOTIS	H	L	Y	MVZ, CNDDB,PR,NPS	11	
SILVER-HAIRED BAT	M	L	Y	WOD, CNDDB,PR,NPS		
WESTERN PIPISTRELLE	H	M	Y	WOD, MVZ,PR,NPS		
BIG BROWN BAT	H	H	Y	WOD, MVZ,PR,NPS		
WESTERN RED BAT	**L**	**L**	**Y**	**WOD**	**7,12**	
HOARY BAT	H	M	Y	CNDDB,PR,NPS		
SPOTTED BAT	**H**	**H**	**Y**	**WOD, MVZ, CNDDB,PR,NPS**	**7,11**	
TOWNSEND'S BIG-EARED BAT	**L**	**L**	**Y**	**WOD, CNDDB**	**7,11,12**	
PALLID BAT	**M**	**M**	**Y**	**WOD, MVZ, CNDDB,PR**	**7,11,12**	
BRAZILIAN FREE-TAILED BAT	M	H	Y	WOD,PR,NPS		
WESTERN MASTIFF BAT	**H**	**H**	**Y**	**WOD, CNDDB,PR,NPS**	**7,11**	
BRUSH RABBIT	L	NP	N			
MOUNTAIN COTTONTAIL	M	NP	N			
SNOWSHOE HARE	**M**	**L**	**N**		**7**	
BLACK-TAILED JACKRABBIT	L	L	Y	WOD		
SIERRA NEVADA MOUNTAIN BEAVER	**H**	**M**	**Y**	**WOD**	**7**	
ALLEN'S CHIPMUNK	L	NP	Y	MVZ		
MERRIAM'S CHIPMUNK	L	NP	Y	WOD, MVZ		
CALIFORNIA GROUND SQUIRREL	M	M	Y	WOD, MVZ		
GOLDEN-MANTLED GROUND SQUIRREL	M	NP	Y	WOD		
WESTERN GRAY SQUIRREL	M	NP	Y	WOD, MVZ		
DOUGLAS' SQUIRREL	M	NP	Y	WOD, MVZ		

MAMMALS Continued

Common Name	Suitability MR	WM	Confirmed	Source	Status	Notes
NORTHERN FLYING SQUIRREL	M	NP	Y	WOD, MVZ		
BOTTA'S POCKET GOPHER	M	H	Y	MVZ		
NORTHERN POCKET GOPHER	H	H	N			
AMERICAN BEAVER	M	L	N			(I)
WESTERN HARVEST MOUSE	M	M	Y	MVZ		
CALIFORNIA MOUSE	L	NP	N			
DEER MOUSE	H	H	Y	WOD, MVZ		
BRUSH MOUSE	M	NP	Y	MVZ		
PINYON MOUSE	M	L	N			
DUSKY -FOOTED WOODRAT	L	NP	Y	MVZ		**NP**
LARGE-EARED WOODRAT	M	NP	N			
BUSHY-TAILED WOODRAT	M	L	Y	WOD		
MONTANE VOLE	L	H	Y	MVZ		
CALIFORNIA VOLE	H	H	N			
LONG-TAILED VOLE	H	H	Y	MVZ		
HOUSE MOUSE	M	M	Y	MVZ		
WESTERN JUMPING MOUSE	H	H	Y	MVZ		
COMMON PORCUPINE	M	L	Y	WOD		
COYOTE	M	M	Y	WOD, MVZ		
GRAY FOX	H	H	Y	WOD, MVZ		
BLACK BEAR	H	H	Y	WOD, MVZ		
RINGTAIL	H	L	Y	WOD, MVZ		
RACCOON	H	H	Y	WOD		
PACIFIC FISHER	**L**	**NP**	**Y**	**MVZ**	**7,10,11,12**	
ERMINE	M	M	Y	WOD		
LONG-TAILED WEASEL	M	M	Y	WOD		
AMERICAN MINK	H	NP	N			
AMERICAN BADGER	**L**	**L**	**Y**	**WOD**	**7**	
WESTERN SPOTTED SKUNK	M	L	Y	WOD, MVZ		
STRIPED SKUNK	H	M	Y	WOD, MVZ		
NORTHERN RIVER OTTER	M	NP	N			
MOUNTAIN LION	H	L	Y	WOD		
BOBCAT	H	L	Y	WOD, MVZ		
WILD PIG	L	L	N			(I)
MULE DEER	H	H	Y	WOD, MVZ		