

## **Final Report – Inventory and Monitoring Program, National Park Service**

### **The Grinnell Re-survey Project, Yosemite National Park**

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#### **Abstract:**

From 2003 through 2005 we conducted a resurvey of the terrestrial vertebrate fauna (mammals, birds, reptiles, and amphibians) at 21 sites within Yosemite National Park (YNP) that were originally studied between 1911-1920 by Joseph Grinnell and other staff of the Museum of Vertebrate Zoology, University of California at Berkeley. The early survey provides the vast majority of available knowledge of the vertebrate fauna of the Park, yet that information is now nearly a century out of date. Our resurveys provide updated information on habitat and community changes at each site over the past century while documenting the presence as well as ranges (geographic and habitat) of species of special concern to the Park and to both the lay and scientific community. Substantial changes in the presence and elevational distribution of species have been noted.

#### **Introduction:**

Between 1911 and 1920, Joseph Grinnell and his students (primarily Tracey Storer, Joseph Dixon, Walter Taylor, and Charles Camp) from the University of California at Berkeley's Museum of Vertebrate Zoology (MVZ) surveyed the terrestrial vertebrates at 41 general sites along a transect that stretched from the western foothills of the Sierra Nevada, through Yosemite National Park (YNP), to the area around Mono Lake (Fig. 1). These surveys were part of a larger study of the fauna of California that Grinnell and his colleagues conducted for much of the first half of the twentieth century. The main emphasis of these studies was to characterize the fauna of California, as it existed at that time. But Grinnell also had the foresight to realize that these studies could serve as important baselines against which future studies could be compared in order to measure faunal change over time, and he encouraged future scientists to make these comparisons. To that end, he and his colleagues quantified their observations, and left a record that is rare or absent among the works of their contemporaries. Their compiled observations of the Yosemite area were published in 1924 as *Animal Life In The Yosemite* (University of California Press, authored by Grinnell and Storer; now available on-line through the NPS website, [http://www.cr.nps.gov/history/online\\_books/grinnell/](http://www.cr.nps.gov/history/online_books/grinnell/)). The original records of their observations are in the form of preserved specimens, volumes of field notes, and photographic images archived in the MVZ.

Grinnell and his colleagues transected the central Sierra Nevada, surveying along a "...narrow rectangular area, 89 1/4 miles in length by 17 1/3 miles in width..." (Grinnell and Storer 1924:1), a band that began on the eastern edge of the San Joaquin Valley at 250 feet elevation and proceeded across the high Sierra to the Great Basin near Mono

Lake (Fig. 1). The survey area encompassed some 1547 square miles and involved 957 person-days of fieldwork. Within Yosemite National Park, the transect included the entire Yosemite Valley and most of the area along Tioga Road to Tioga Pass, with high elevation sites both north and south of the road. They established base camps in Yosemite Valley, Porcupine Flat, and Tuolumne Meadows within the Park, from which trips of 1-2 weeks to adjacent areas and habitats were made. Data archived by the MVZ and pertaining to these surveys within the Park include some 2000 pages of field notes, 817 photographs, and 2795 specimens. Collections within the Park were most extensive for mammals ( $N = 1572$ ), followed by birds (722) and herpetofauna (501). Allowing for the extensive additional information captured in field notes, the original data are quite comprehensive for small mammals, birds, and frogs, but less so for less obvious reptiles (e.g., snakes) and non-aquatic amphibians (especially salamanders). General areas surveyed by the Grinnell team that are represented by the largest collections and highest known diversities of taxa are listed in Table 1.

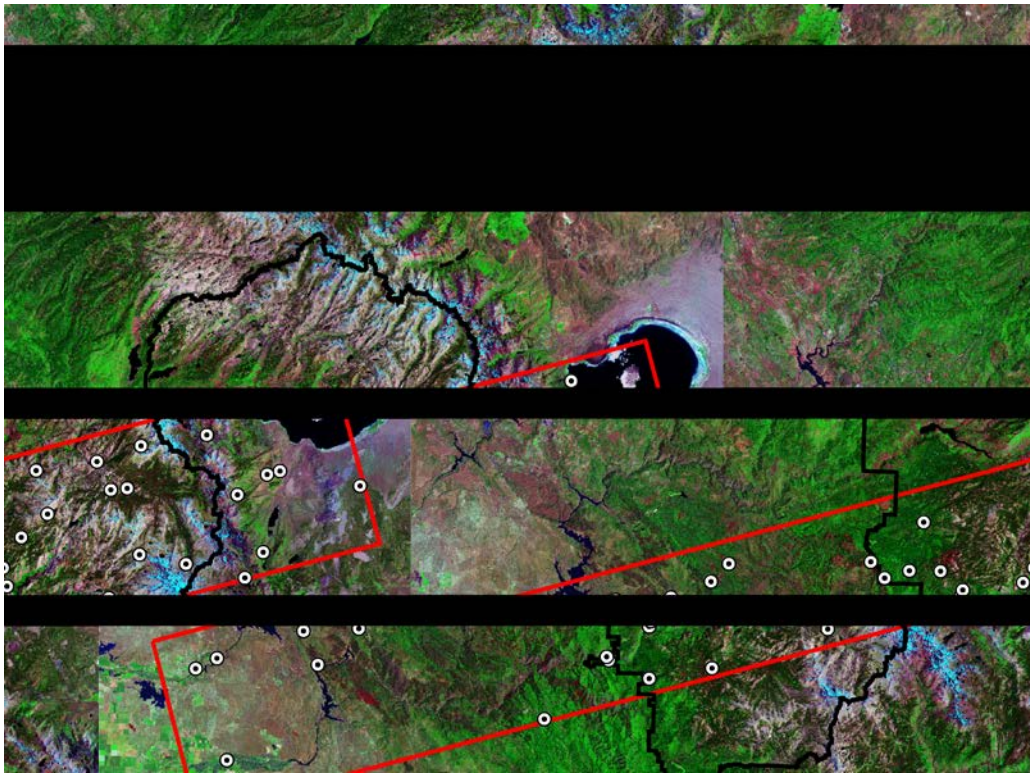


Figure 1. The Grinnell Yosemite Transect (red rectangle) across the central Sierra Nevada; white circles with black centers indicate each of the 41 original sites surveyed. 21 of these sites are within the boundary of Yosemite National Park.

Table 1. General localities sampled by teams from the Museum of Vertebrate Zoology headed by Joseph Grinnell and Tracy Storer, 1911-1920. The number of non-volant, small mammal (insectivores, rodents, and lagomorphs) species recorded at each locality is provided as an index of the overall species richness across these sites. NPS Priority Species, as well as those of interest to staff of the MVZ, known from each general locality are listed (for mammals, the number of preserved specimens in the MVZ collections is indicated). Habitats are from Grinnell and Storer (1924: 26-35).

| General locality               | Elevation (range) | Habitat                                                                            | Number of known non-volant mammal species | NPS Priority Species                                                                                                                                                                                                                                                                                                                                                                             |
|--------------------------------|-------------------|------------------------------------------------------------------------------------|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Yosemite Valley                | 4000 ft           | Transition Zone: chaparral, meadow, oak woodland, conifer forest, riparian         | 13                                        | <i>Hydromantes platycephalus</i><br><i>Ensatina eschscholtzii</i><br><br><i>Carina bottae</i><br><i>Thamnophis couchii</i><br><i>Thamnophis sirtalis</i><br><i>Eumeces gilberti</i><br><br><i>Sorex trowbridgii</i><br><i>Tamias merriami</i><br><i>Peromyscus boylii</i><br><i>Microtus longicaudus</i> )<br><i>Microtus montanus</i><br><i>Zapus princeps</i><br><i>Ensatina eschscholtzii</i> |
| Merced Big Trees to Crane Flat | 5400-6300 ft      | Transition to Canadian Zone: oak woodland, conifer forest, meadow, riparian, talus | 11                                        | <i>Sceloporus graciosus</i><br><br><i>Sorex trowbridgii</i> )<br><i>Sorex vagrans</i> )<br><i>Tamias quadrimaculatus</i><br><i>Tamias senex</i> )<br><i>Tamias speciosus</i><br><i>Zapus princeps</i> )                                                                                                                                                                                          |
| Big Oak Flat/Gentry's          | 5800-6300 ft      | Transition Zone: chaparral, yellow-pine, oak, talus                                | 8                                         | <i>Sorex trowbridgii</i><br><i>Tamias quadrimaculatus</i><br><i>Tamias speciosus</i> )                                                                                                                                                                                                                                                                                                           |
| Chinquapin                     | 6200-6300 ft      | Canadian Zone: chaparral, conifer forest, riparian                                 | 13                                        | <i>Sorex trowbridgii</i><br><i>Tamias quadrimaculatus</i><br><i>Tamias senex</i><br><i>Tamias speciosus</i><br><i>Zapus princeps</i> (12)                                                                                                                                                                                                                                                        |
| Aspen Valley                   | 6400 ft           |                                                                                    | 11                                        | <i>Tamias quadrimaculatus</i><br><i>Tamias speciosus</i>                                                                                                                                                                                                                                                                                                                                         |
| E Fork Indian Canyon           | 7200-7300 ft      |                                                                                    | 13                                        | <i>Sorex monticolus</i><br><i>Sorex trowbridgii</i><br><i>Tamias quadrimaculatus</i><br><i>Tamias senex</i><br><i>Tamias speciosus</i><br><i>Peromyscus boylii</i><br><i>Zapus princeps</i>                                                                                                                                                                                                      |

|                               |                  |                                                                       |    |                                                                                                                                                                                                                                   |
|-------------------------------|------------------|-----------------------------------------------------------------------|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Mono Meadow                   | 7300-7400 ft     |                                                                       | 13 | <i>Sceloporus graciosus</i><br><br><i>Sorex monticolus</i><br><i>Tamias senex</i><br><i>Tamias speciosus</i><br><i>Zapus princeps</i>                                                                                             |
| Merced Lake                   | 7500 ft          | Canadian Zone:<br>conifer forest,<br>meadow                           | 13 | <i>Charina bottae</i><br><i>Sceloporus graciosus</i><br><i>Sceloporus occidentalis</i><br><br><i>Sorex monticolus</i><br><i>Sorex trowbridgii</i><br><i>Tamias senex</i><br><i>Tamias speciosus</i><br><i>Zapus princeps</i>      |
| Glen Aulin,<br>Tuolumne River | 7700 ft          |                                                                       | 12 | <i>Sceloporus occidentalis</i><br><br><i>Sorex monticolus</i><br><i>Tamias alpinus</i><br><i>Tamias senex</i><br><i>Tamias speciosus</i><br><i>Peromyscus boylii</i><br><i>Phenacomys intermedius</i><br><i>Ochotona princeps</i> |
| Porcupine Flat                | 8100 ft          | Canadian-<br>Hudsonian Zone<br>boundary:<br>conifer forest,<br>meadow | 22 | <i>Thamnophis elegans</i><br><i>Sceloporus graciosus</i><br><br><i>Sorex monticolus</i><br><i>Tamias senex</i><br><i>Tamias speciosus</i><br><i>Peromyscus boylii</i><br><i>Zapus princeps</i>                                    |
| Tuolumne<br>Meadows           | 8600-9500 ft     | Canadian Zone:<br>conifer forest,<br>meadow, riparian                 | 16 | <i>Thamnophis elegans</i><br><br><i>Sorex monticolus</i><br><i>Tamias alpinus</i><br><i>Tamias speciosus</i><br><i>Zapus princeps</i>                                                                                             |
| Ten Lakes                     | 9500 ft          |                                                                       | 10 | <i>Tamias alpinus</i><br><i>Tamias speciosus</i><br><i>Phenacomys intermedius</i>                                                                                                                                                 |
| head Lyell<br>Canyon          | 9700-11000<br>ft | Hudsonian-Arctic<br>Alpine Zone:                                      | 16 | <i>Hydromantes platycephalus</i><br><br><i>Sorex lyelli</i><br><i>Sorex monticolus</i><br><i>Tamias alpinus</i><br><i>Tamias speciosus</i><br><i>Phenacomys intermedius</i><br><i>Zapus princeps</i>                              |
| Vogelsang Lake                | 10350 ft         | Hudsonian-Arctic<br>Alpine Zone                                       | 15 | <i>Sorex lyelli</i><br><i>Sorex monticolus</i><br><i>Tamias alpinus</i><br><i>Tamias speciosus</i><br><i>Phenacomys intermedius</i>                                                                                               |

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With initial funding from the Inventory and Monitoring Program of the National Park Service and Museum of Vertebrate Zoology, supplemented in subsequent years by funding from the Yosemite Fund, field biologists of the Museum completed resurveys of the terrestrial vertebrate fauna at most of the original “Grinnell sites” in the Park in 2003 through 2005. This report represents a synopsis of the findings of these resurveys.

## **Methods:**

Field teams spent a minimum of 10 days at each site, and samples each of the major habitats within a radius of approximately 1 kilometer (chaparral, woodland, forest, meadow, riparian, talus, etc.). Most sites were surveyed one time during the 3-year period, but several were revisited two or more times. Each mammal live trap and pitfall trap line at each site was “run” for a minimum of 4 consecutive days/nights. Timed early morning observations of bird diversity were conducted using a point-count method rather than the line transect method of Grinnell and Storer (1924). We followed the avian survey protocol established by the Grinnell team as closely as possible, including place, date, and time, to provide comparable data. Descriptions of habitats were made consistent with the level of detail in the field notes from the original surveys, supplemented by photographs taken at the same locations and under the same light conditions as previously. A standard vegetation profile form was used to characterize habitat surrounding many specific trap-lines, with digital photos taken in each cardinal direction from the GPS point along that line (Fig. 2). All fieldnotes, photographs, datasheets, and maps are archived in the Museum of Vertebrate Zoology.

Given the diversity of habitats at each site, the differences in major habitats across the elevational transect, and the range in food habits of focal taxa, it is not feasible to establish a standardized trapping design for small mammals (e.g., grid or parallel lines of traps set at uniform distance intervals with a common bait). Any such spatially explicit effort will fail to encompass all habitats with respect to the numbers of traps per habitat. Rather, we standardized our program not by a spatial trap design but by using a standard trap effort (number of traps) for each habitat. For small mammals, we used primarily Sherman live traps, supplemented with Tomahawk live traps, with a minimum of 50 traps per habitat per night for the four consecutive nights. Traps were placed in “likely” spots within each habitat (i.e., grass tunnels of *Microtus*). Trap “lines” were moved to different microsites within each dominant habitat during the total sampling period of a given site, depending upon success rate, to maximize assessment of species diversity. Pocket gophers were trapped using commercial Macabee™ gopher traps.

NATIONAL PARK VEGETATION MAPPING PROGRAM: ACCURACY ASSESSMENT POINT FORM

**IDENTIFIERS/LOCATORS**

Field Point Code TR Site ① / Tomahawk ① Database Point Code \_\_\_\_\_

State CA Park Name Yosemite Park Site Name Mono Meadow trail head

Quad Name (7.5') \_\_\_\_\_ Quad Code \_\_\_\_\_

Primary Veg Assoc Name \_\_\_\_\_

Secondary Veg Assoc Name \_\_\_\_\_

Other Veg Assoc within 50 m \_\_\_\_\_

Classification Comments: \_\_\_\_\_

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GPS file name \_\_\_\_\_ Field UTM X \_\_\_\_\_ m E Field UTM Y \_\_\_\_\_ m N

37.67122 / -119.58593 trap 3 GPS Error 9 m

please do not complete the following information when in the field

Corrected UTM X \_\_\_\_\_ m E Corrected UTM Y \_\_\_\_\_ m N UTM Zone \_\_\_\_\_

Survey Date 7/13/03 Surveyors JP Patton + CP Patton

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**ENVIRONMENTAL DESCRIPTION**

Elevation 7298 (ft) Slope 2.5° Aspect 47° (south facing)

Topographic Position \_\_\_\_\_

Landform \_\_\_\_\_

|                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                              |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Environmental Comments (including hydrology, fire history):<br><u>open mixed conifer forest - gentle rising slope to NW. Distinct shrub understory, gopher workings on exposed ground, fire scars on live trees and burned trunks; some large trees cut</u> | Unvegetated Surface: (please use the cover scale below)<br><u>2</u> Bedrock class <u>6</u><br><u>45</u> Litter, duff<br><u>20</u> Wood (> 1 cm)<br><u>1</u> Large rocks (cobbles, boulders > 10 cm)<br><u>1</u> Small rocks (gravel, 0.2-10 cm)<br><u>30</u> Sand (0.1-2 mm)<br><u>30</u> Bare soil<br><u>1</u> Other: _____ |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

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**VEGETATION DESCRIPTION**

|       |       |   |   |
|-------|-------|---|---|
| snags | class | 5 | 2 |
|       |       | 4 | 3 |
|       |       | 3 | - |
|       |       | 2 | - |
|       |       | 1 | - |

photos # 3303 - 3306



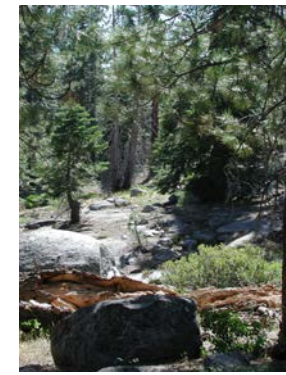
north



east



south



west

Figure 2. Left: generalized vegetation survey form (front page only), adopted from the NPS vegetation-mapping program, used to characterize vegetation at mammal trap lines. Right: digital images of habitat taken in each cardinal direction from GPS center of mammal trap line at Mono Meadow trailhead.

We employed pitfall traps for non-aquatic amphibians, reptiles, and small mammals such as shrews. Two meandering lines, each comprising 25 32 oz. plastic cups were placed in the ground at approximately 10 m intervals using a 4" soil auger. These were run during the same interval as trapping, and retrieved as the survey at a given locality terminated with the hole refilled with dirt.

The diversity of traps and methods employed ensured that the full range of target taxa was sampled. These systematic methods were supplemented with targeted searches of microhabitat suitable for priority reptiles and amphibians. Animals caught were identified, sexed, and weighed, with reproductive data (e.g., for mammals, testis condition for males, vaginal, pelvic, and nipple condition for females) noted for all individuals released. All trap lines or stations were georeferenced by hand-held GPS units, using the WGS-84 datum; those data are archived in fieldnotes for all individuals encountered, including those released as well as preserved.

Methodological caveats: Survey methodologies, especially for both birds and mammals, differed substantially between the two survey periods. For example, the Grinnell-era team used shotguns and snap-traps for all mammal surveys while the 2003-2005 survey team used live traps. Since these two sets of methods may result in biases in trapability, we used statistical methods to assess the comparability of survey success for each species across the two time periods. Detectability probabilities were similar for key species of small mammals, suggesting that the data obtained on species presence at any given site are comparable between the two survey periods (Table 2).

Table 2. Detectability estimates, based on different survey methods, for selected small mammal species for the Grinnell-era and 2003-2005 survey data. P\* (the probability of detection) is given for both time periods and at a scale of individual traplines (across multiple trap "nights") and for sites (multiple traplines in a general area).

| Habitat          | Indicator species                | Grinnell<br>p* trap | Present<br>p* trap | Grinnell<br>p* site | Present<br>p* site |
|------------------|----------------------------------|---------------------|--------------------|---------------------|--------------------|
| boreal-Hudsonian | <i>Spermophilus beldingi</i>     | 0.72                | 0.93               | 1.00                | 1.00               |
|                  | <i>Tamias alpinus</i>            | 0.71                | 0.84               | 1.00                | 1.00               |
|                  | <i>Ochotona princeps</i>         | 0.71                | 0.78               | 1.00                | 1.00               |
| boreal-Canadian  | <i>Tamias senex</i>              | 0.82                | ---**              | 1.00                | 1.00               |
|                  | <i>Tamias speciosus</i>          | 0.78                | 0.95               | 1.00                | 1.00               |
|                  | <i>Thomomys monticola</i>        | 0.80                | 0.90               | 1.00                | 0.95               |
|                  | <i>Zapus princeps</i>            | 0.93                | 0.59               | 1.00                | 0.97               |
|                  | <i>Microtus montanus</i>         | 0.84                | 0.94               | 1.00                | 1.00               |
| Transition       | <i>Sorex trowbridgii</i>         | 0.62                | 0.63               | 1.00                | 0.98               |
|                  | <i>Tamias quadrimaculatus</i>    | 0.26                | 0.91               | 0.96                | 1.00               |
|                  | <i>Peromyscus boylii</i>         | 0.88                | 0.99               | 1.00                | 1.00               |
| Upper Sonoran    | <i>Chaetodipus californicus</i>  | 0.03*               | 0.63               | 0.26                | 0.98               |
|                  | <i>Peromyscus truei</i>          | 0.96*               | 0.91               | 1.00                | 1.00               |
|                  | <i>Reithrodontomys megalotis</i> | 0.98*               | 0.91               | 1.00                | 1.00               |

\* Grinnell-era data based on sites to the west and east of the Park boundary.

\*\* not encountered at any Grinnell-era site during present surveys (see Results, below).

Grinnell-era avian surveys were quantified line-transect surveys (i.e., numbers of each bird species encountered [observed or identified by song] per unit of time while walking a particular trail). Data for all species were compiled on printed census sheets inserted into fieldnotes (see, for example, Fig. 3 in Grinnell and Storer, 1924, pg. 23), which provided the date, investigator, nature of route (habitat and trail), length of the transect, time duration, and weather. These surveys were not, however, standardized by distance traveled or by equivalent temporal effort along the entire route taken. The 2003-2004 avian surveys were conducted generally along the same trail routes used by Grinnell-era field workers, but used a variable distance point-count methodology. All sampling began within one hour of sunrise and concluded by 11:00 AM. Transects consisted of points from 200 to 300 meters apart, each marked with GPS coordinates. The number of points varied but averaged 15 points per transect. Each point was taken as the center of a circle with a radius of 100 m, and using a range finder we determined increments of 0-10, 10-20, 20-30, 30-40, 40-50, 50-75, 75-100, and >100 meters from the center. Each point count lasted 7 minutes, within which we recorded every bird we saw or heard, and assigned it a distance increment. We spent 1 minute at the point before we began counting in order to allow birds to acclimate to our presence.

Because the methods employed at the two time-intervals are different, we determined the equivalence in the data obtained by conducting both line transects and point-counts along the same transect on alternate days. The correlation coefficient of this comparison thus provides a measure of the equivalence in the original data despite different methodologies employed. Fig. 3 illustrates the scatterplot of our counts of bird species diversity for both methods as applied to separate transects. As is evident, the regression relationship is strong, with a high and significant correlation coefficient. This gives us confidence that the estimates of bird species presence, and diversity, across the two time periods are comparable despite the differences in survey methodology.

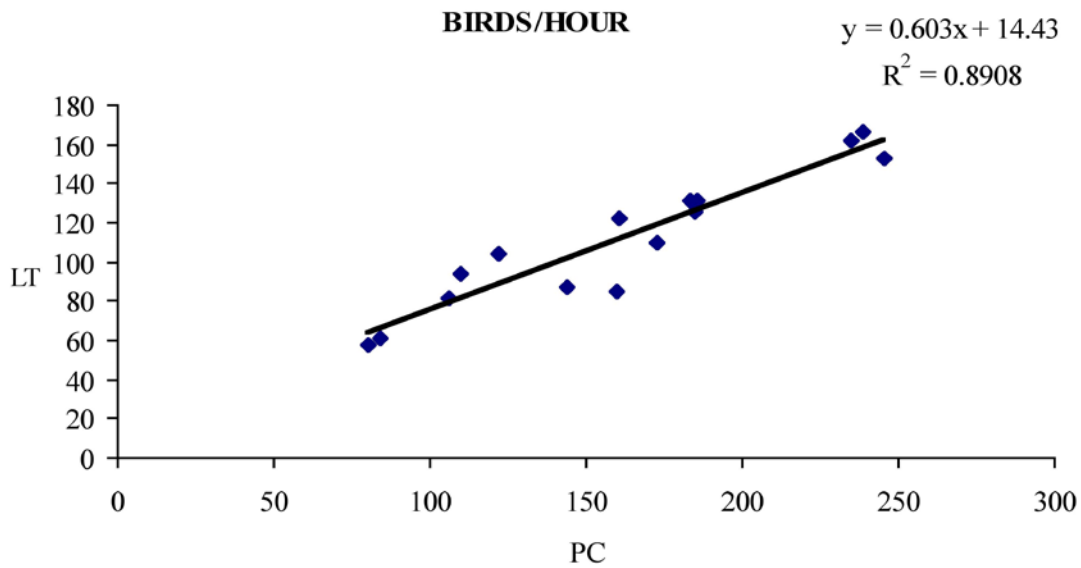


Figure 3. Regression of the number of birds encountered per hour along the same transect, as assessed by point-counts (PC, employed by the 2003-2005 survey team) and line transect (LT; employed by the Grinnell-era team) methodologies.

A final caveat involves our ability to relocate as specifically as possible the actual sites, transects, and trap lines surveyed by the Grinnell-era investigators. Fortunately, the detailed maps and fieldnotes of those individuals, archived in the MVZ, have made this task relatively simple in most cases. The position of all generalized sites, based on documentation of the actual campsite, has been reasonably well established, and even individual trap lines are often clearly demarcated on hand-drawn maps, but based on USGS topographic quadrats of that era, can be located with precision. As an example, Fig. 4 provides a hand-drawn map from the fieldnotes of Charles Camp that marks the placement of his traplines in upper Lyell Basin. The combination of this map with his written descriptions of trap sites has allowed us to survey the exact same talus slopes, stream edges, and so forth.

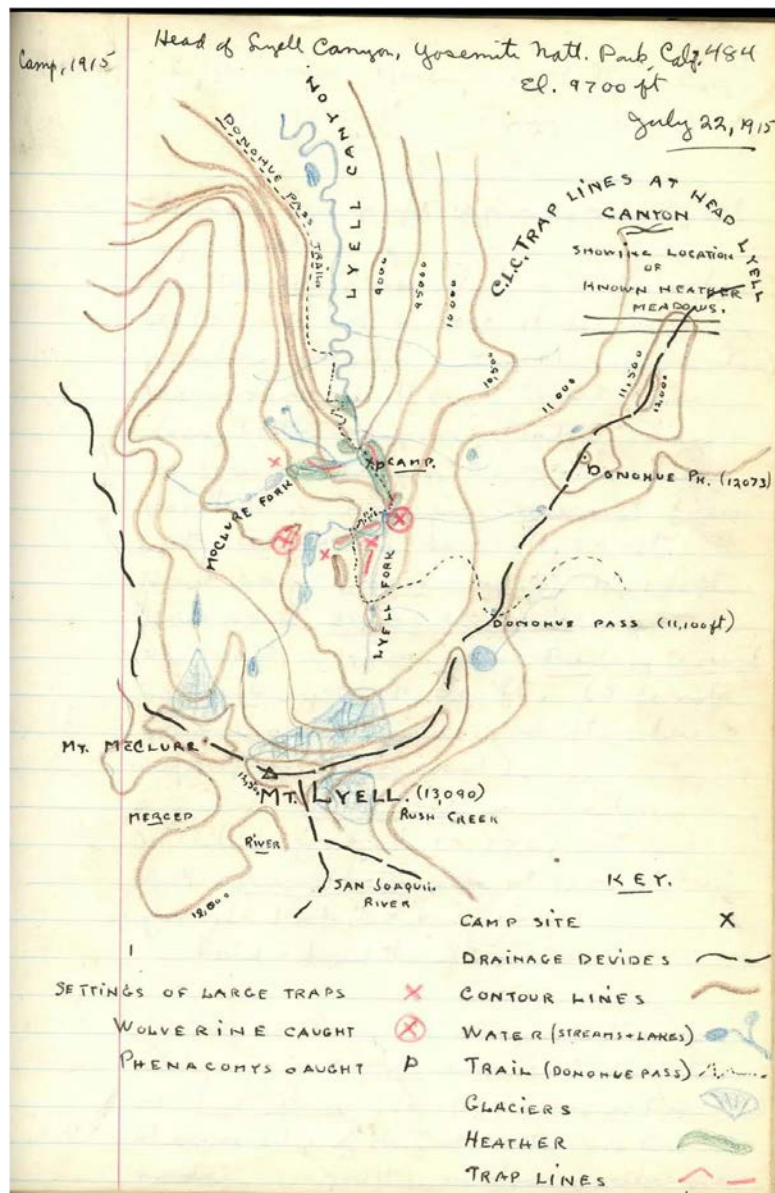


Figure 4. Map of individual trap sites in upper Lyell Canyon from the fieldnotes of Charles Camp, July 1915. Map is drawn from the USGS topographic quadrat in the field.

## Results:

With minor exceptions, we report below data only from those original Grinnell-sites, and their resurvey equivalents, found in YNP, and exclude data from sites either to the west or east of the Park boundary. Complete presentations of all data along the entire transect can be found in the cumulative annual reports of our research endeavors to the National Park Service. Complete data for all specimens that were collected and preserved can be accessed from the MVZ collection database at <http://bscit.berkeley.edu/mvz/>; query for the inclusive years 2003 to 2005 and for the locality “Yosemite”. All records and data can be downloaded as a tab-delimited file. Fieldnotes from the original Grinnell survey team members are also available on-line at the same website address.

We provide a summary of findings for each taxonomic group separately below.

### 1. Reptiles and amphibians

The Grinnell-era survey of frog, salamander, lizard, and snake species was haphazard at best, as species presence was recorded only when observed and no systematic survey methods were employed. As a consequence, there is little basis for comparing species lists for the Park, or for any site within the park, across the two temporal sampling efforts. Lists of all sites within the Park that were surveyed for amphibians and reptiles, including species present and estimates of relative abundance are provided in Appendix 2. Figure 5 maps localities surveyed.

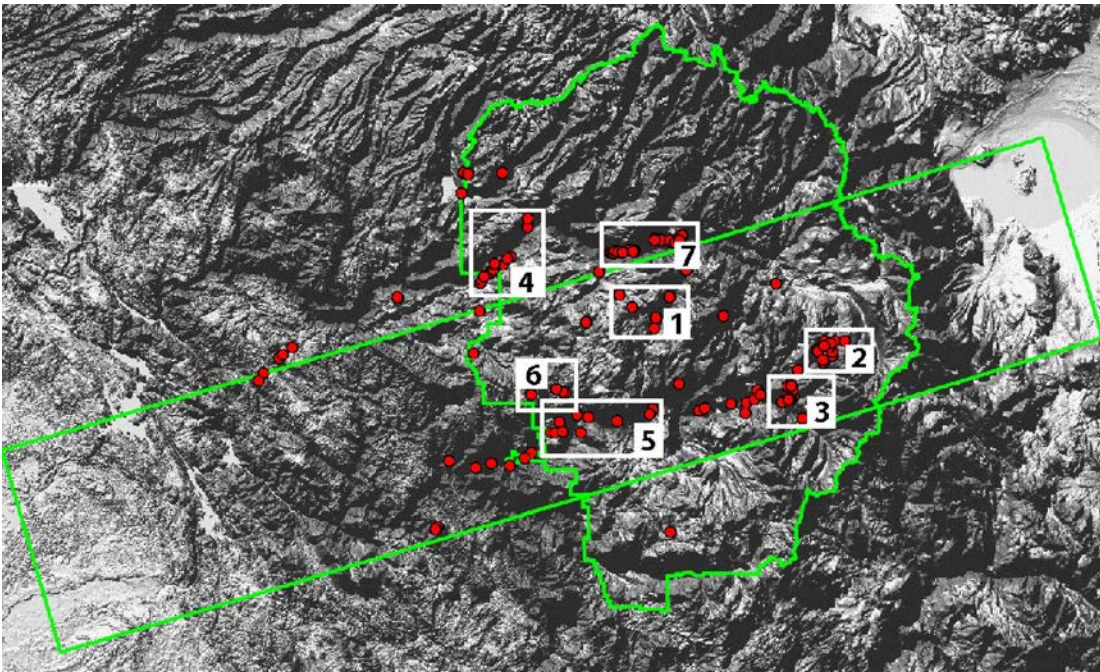


Figure 5. Map of survey localities for amphibians and reptiles. Numbers correspond to sites listed in Appendix 2.

Notable results from the 2003-2005 herpetological surveys include:

1. Two snake species thought to be absent from the park, the Sharp-Tailed Snake (*Contia tenuis*) and Ringneck Snake (*Diadophis punctatus*) were discovered at Hetch Hetchy.
2. One rare snake species, the Night Snake (*Hypsiglena torquata*), was found in high abundance at Hetch Hetchy.
3. The Mount Lyell Salamander (*Hydromantes platycephalus*) was rediscovered at the type locality at Mount Lyell (~3,200 meters).
4. The scientific literature suggests that the high-elevation subspecies of the Western Fence Lizard, *Sceloporus occidentalis taylori*, may warrant species status due to its unique morphological features (e.g., extensive blue ventral pigmentation, dark dorsal pigmentation, and large size). Our preliminary mtDNA sequence data reject this hypothesis. Multiple high elevation populations of this putative species do not form a monophyletic group. This result implies multiple, independent origins of the unique high-elevation phenotype exhibited by *S. o. "taylori"*.
5. Discovery of a new population of *Hydromantes platycephalus* from Vogelsang Lake (two localities).
6. Breeding populations of *Rana muscosa* and *Bufo canorus* at unnamed lake 0.5 km east of Evelyn Lake
7. Healthy populations of *Rana muscosa* at Dorothy Lake.

## 2. Birds

We performed variable distance point counts along transects representative of routes used by Grinnell et al. in their original censuses, and in most cases our transects overlapped exactly with the original routes. In 2003 we established 14 transects consisting of a total of 212 points (Fig. 6, top). We sampled each transect two to three times over 36 sampling days, detecting a total of 8547 individual birds. In 2004, we revisited 7 of the 2003 transects (111 total points), and set up 13 new transects (made up of 200 points) within YNP and at Grinnell sites in the foothills to the west of YNP, for a total of 47 sampling days (33 days within YNP) (Fig. 6, bottom). We detected 15879 total birds (8691 from point counts, 7188 from line transect counts) in 2004. In the combined 2003/2004 counts, we logged 146 total species. We tallied 135 species from the census data of Grinnell and his colleagues. There were 112 species in common to both surveys.

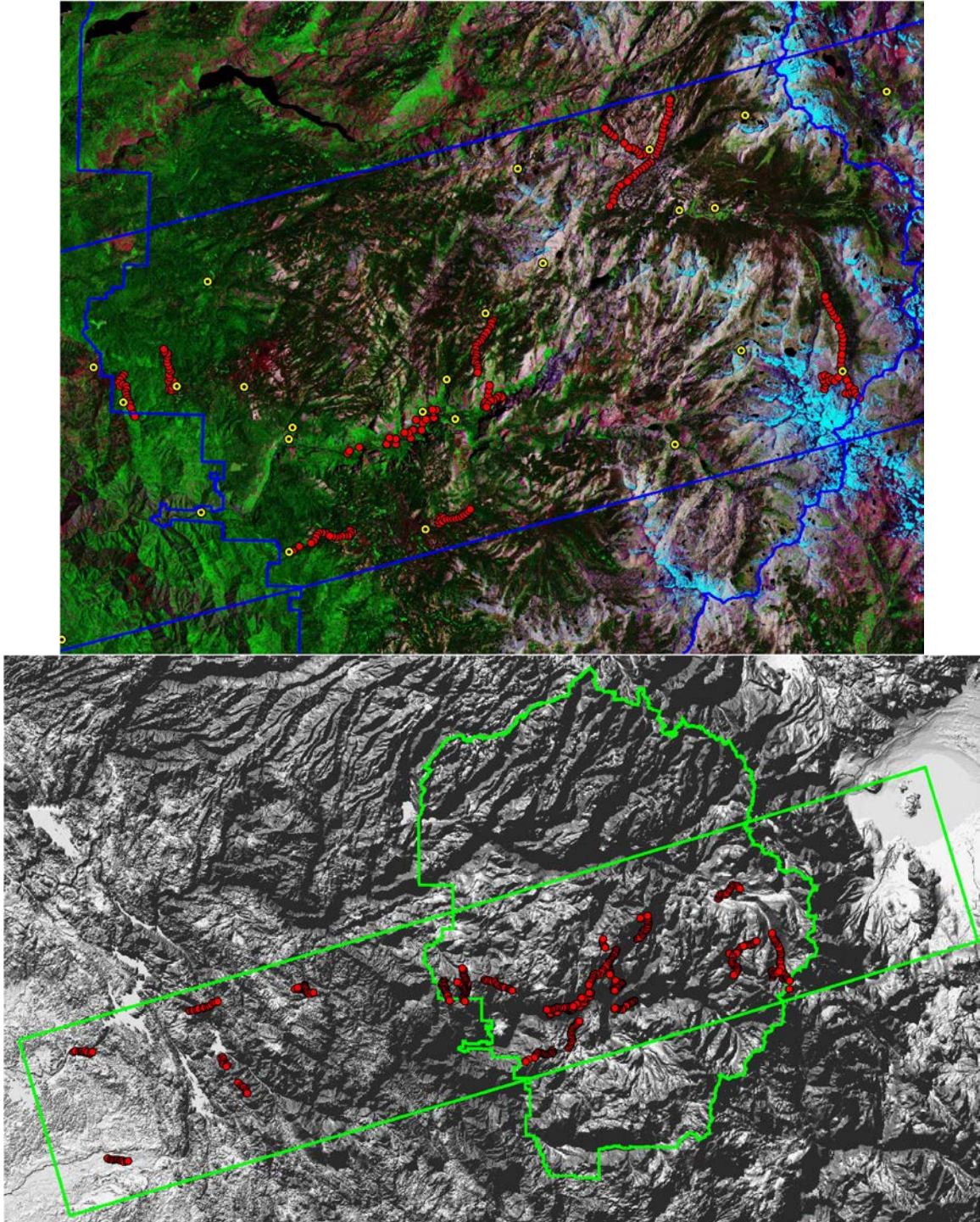


Figure 6. Local survey transects for avian species point-counts in 2003 (upper) and 2004 (lower). The general location of each original “Grinnell sites” are indicated in the upper map by the yellow dots with black centers. Only transects in Yosemite NP were done in 2003; western foothill localities outside of the Park were also surveyed in 2004. The boundary of YNP is indicated on each map.

Significant changes in the abundance and distribution of certain bird species have apparently occurred since Grinnell's time. The relative abundances of certain species have changed at all individual sites and some species had shown an upward range expansion in elevation. Other species had apparently colonized YNP since Grinnell's time. The two survey periods have similar J-shaped plots of the species abundance, with the bulk of the individuals observed being comprised of relatively few abundant species (Fig. 7). The 2003/2005 distribution, however, shows greater numbers of individuals for the most common species. This could indicate that these common species have become more common during the intervening years, or it could be an indication of a difference in sampling effort. Both surveys detected similar numbers of species overall, and the long tail of the distribution made up of rare or hard to detect species converges in the plot of each survey period. It is possible, however, that the modern methodology used in 2003/2004 is more thorough than the original surveys in the sense that more time is spent counting along a similar route. This could result in a similar number of total species being found due to similarity in the total length of a given route, but the time spent intensively counting individuals in the 2003/2004 surveys could result in greater numbers of the more common species being counted.

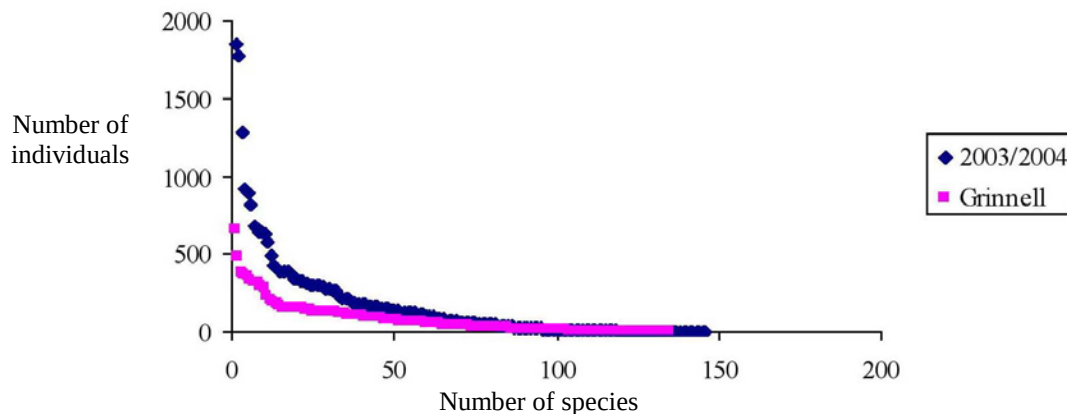


Figure 7. Plots of avian species abundance pooled across all sites for the Grinnell-era (pink squares) and 2003/2004 survey (blue diamonds) periods.

Avian species richness also showed a predictable decline with elevation for both the Grinnell survey data and for the 2003/2004 resurveys (Fig. 8), although plots of species richness by elevation for both surveys show parallel decreasing trends over sites. Nevertheless, substantial species turnover is apparent at each site. Figure 9 illustrates the proportion of species detected at sites during each survey period. Species exclusive to the 2003/2004 surveys make up a greater proportion of the overall species detected at the higher elevation sites. It is also worth noting that with regard to sites surveyed in both 2003 and 2004, the number of Grinnell exclusives has decreased in most cases and the number of 2003/2004 exclusives has grown, while the number of species common to both studies has remained relatively stable. This could indicate changes in community structure at sites, with new species moving into sites where they were previously absent

or rare. By extension, it could also indicate that the species exclusive to the Grinnell studies not found in either 2003 or 2004 may perhaps have become extremely rare or extirpated at these sites.

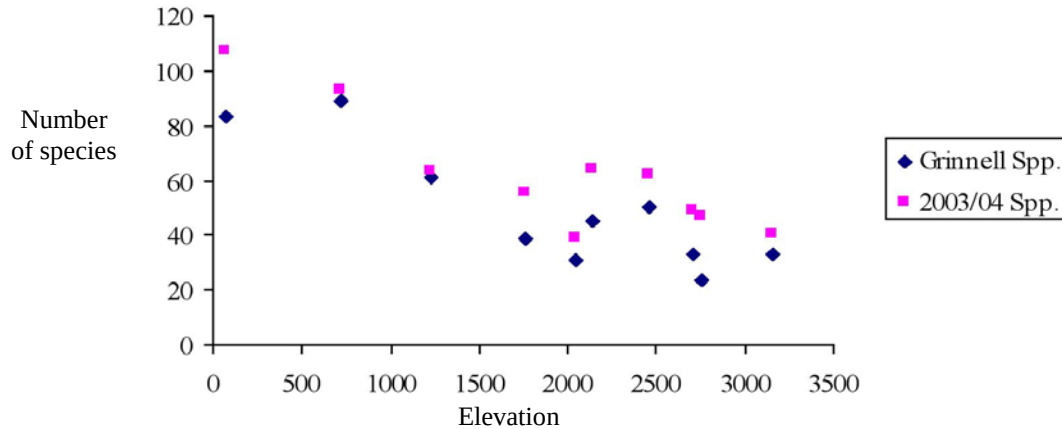


Figure 8. Species richness plotted by elevation for the original Grinnell surveys and for the 2003/2004 surveys. Trend lines are similar for both survey periods.

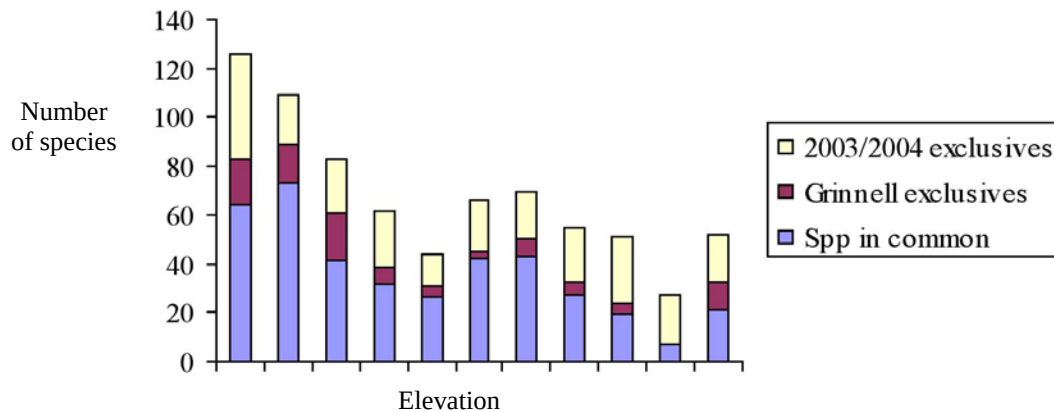


Figure 9: Comparison of numbers of species (vertical axis) during Grinnell-era and the 2003-2005 surveys for each of 11 pooled, nearby sites along the Yosemite Transect. Sites are numbered as follows, from left to right from the west slope to the crest of the Sierras: La Grange and Snelling; Pleasant Valley and Coulterville; Yosemite Valley; Merced Grove-Crane Flat; Tamarack Flat; Chinquapin-Mono Meadow; Indian Canyon – Porcupine Flat; Glen Aulin; Tuolumne Meadows; Lyell Canyon; Vogelsang. Note that there has been apparent turnover in species presence at each area long the transect (yellow bars are number of exclusive species to the 2003/2004 surveys; red bars are the number of exclusive species to the Grinnell-era surveys; and purple bars are the number of species in common across the two survey periods).

Species accumulation curves were plotted for three sites. These, as well as Chao-1 estimates of species richness at each sites predict a greater number of species per site from the 2003/2004 surveys than during the Grinnell-era in every case.

Yosemite Valley was surveyed more times and over a longer period by Grinnell (1911-1919) than any other site in the study. It has also undergone the most dramatic habitat modifications since Grinnell's time, with ever increasing numbers of visitors and increased forestation. Fifty-nine species were detected during the 2003/2004 surveys, while Grinnell found 48 in his censuses. Both the Chao-1 estimate and the species accumulation curve predict a higher number of species for the Valley from the 2003/2004 counts (Fig. 10). The Chao-1 estimate for the species richness at the site based on the 2003/2004 surveys is 83, while the estimate from Grinnell's surveys is 48. These estimates seem to indicate that Grinnell's surveys were thorough in terms of detecting species in the Valley at the time, but that the more recent surveys have found only about 70% of the species at the site. This represents a large increase in species richness for the site as well as substantial species turnover. Twelve species found in the original surveys were not refound in 2003/2004, while 18 new species were found. Several species such as Cooper's and Sharp-shinned Hawks, Willow Flycatcher, and Swainson's Thrush are known to be absent or nearly so as breeders in Yosemite Valley. New species found in the 2003/2004 surveys, unknown in Yosemite Valley in Grinnell's time include Common Raven, Chestnut-backed Chickadee, Song Sparrow, Brown-headed Cowbird, and Bullock's Oriole. Some of the shifts in species presence in Yosemite Valley are undoubtedly due to substantial habitat changes that have taken place in the past century (see, for example, the comparison photographs of the east end of Stoneman Meadow, Appendix 1).

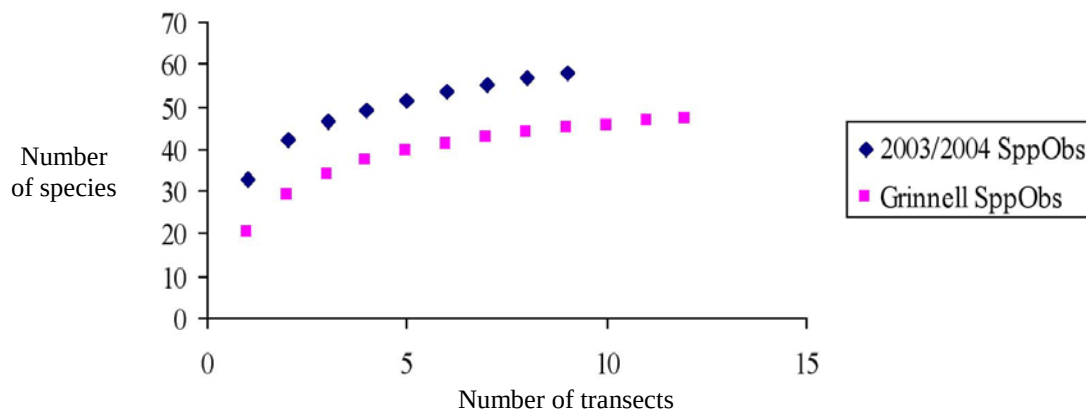


Figure 10. Cumulative number of avian species for successive transects in Yosemite Valley (1232 m) during the Grinnell-era (pink squares) and 2003/2004 surveys (blue diamonds). Note that species diversity is higher in the 2003-2004 surveys for each cumulative sample. The Grinnell-era observed a maximum of 47 species, the 2003-2004 survey a maximum of 59. Estimates of the total pool of species, obtained by the Chao-1 estimate from the species-accumulation curves, is 48 for the Grinnell-era and 83 for the 2003-2004 survey period.

Indian Canyon/Porcupine Flat is a site stretching from Yosemite Point to Porcupine Flat and May Lake. In order to cover the original routes in this area surveyed by Grinnell et al., we set up three transects in 2003/2004. These sites are lumped in this analysis because the original data overlaps, and it is impossible to differentiate between the individual transects from the Grinnell-era. Habitat at this site seems to have remained relatively stable, having avoided some of the dramatic modifications and development at some of the more visited sites. Fifty-eight species were detected in the 2003/2004 surveys, while Grinnell et al. detected 43. Once again, both the species accumulation curve and the Chao-1 estimate a greater number of species for the site from the 2003/2004 data (Fig. 11). The Chao-1 estimator of species richness based on the 2003/2004 counts is 63 species, while that based on the Grinnell et al. counts is 45. These estimates are close to the actual number of species detected by each survey respectively, indicating thorough coverage in each case. This may indicate that the increase in the number of the species detected in the more recent surveys represents a real increase in species at the site rather than a result of greater sampling effort in the more recent surveys. It is hard to draw conclusions by examining the 7 species exclusive to the Grinnell et al. surveys or the 25 species exclusive to the 2003/2004 surveys. Ruby-crowned Kinglets, more common at several sites in Grinnell's time, were absent in 2003/2004. Common Ravens and Brewer's Blackbirds, found in 2003/2004, are new to the park or have shown dramatic increases respectively.

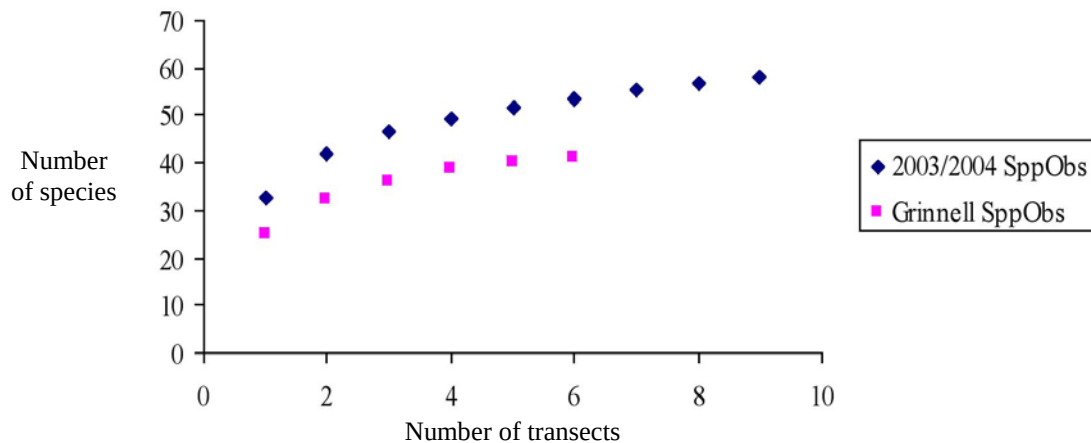


Figure 11. Species accumulation curve for the Grinnell censuses and for the 2003/2004 censuses for Indian Canyon/Porcupine Flat (2454 m).

Lyell Fork Meadows, the large meadow system along the Lyell Fork of the Tuolumne River in Lyell Canyon, showed interesting changes in the 2003 surveys, with a number of species apparently colonizing the area as breeders. We revisited this site to see if we would find further evidence of movement of species into this area. Indeed, we continued to find species not documented in the original surveys, and these species seem to be similar to species exclusive to the 2003 counts in that they are riparian or wetland

associated species. For example, in 2003/2004, Blue-winged and Green-winged Teal were found in a wide marshy area of the Lyell Fork, both with fledglings. In addition, we found Warbling Vireos, Red-winged Blackbirds, and Song Sparrows—all related to some degree to wetland or riparian habitats. None of these species was found in the original surveys. All of these species, with the exception of the teal, were encountered again in 2004. In the 2005 surveys, we added American Coots with offspring, Black Phoebe and Belted Kingfishers, all riparian/wetland birds new to the site. The species accumulation curve and the Chao-1 estimators comparing both surveys shows a much larger number of species predicted to occupy the site based on the 2003/2004 surveys (Fig. 12). Forty-two species were found in the 2003/2004 surveys while 23 were found in the original surveys. The Chao-1 estimate of species richness based on the 2003/2004 surveys is 48, while that based on the Grinnell et al. surveys is 29.

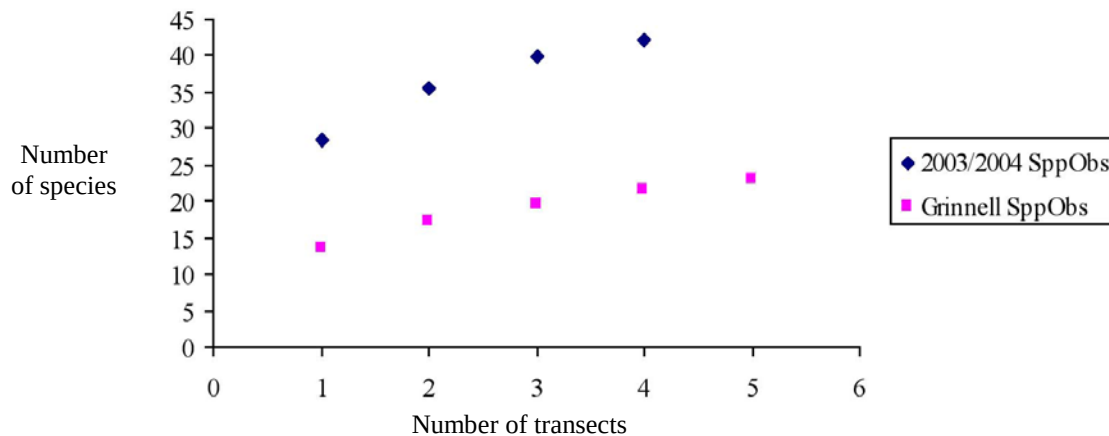


Figure 12. Species accumulation curve for the Grinnell censuses and for the 2003/2004 censuses for Lyell Fork Meadows, Lyell Canyon (2750 m).

Surveys were conducted in 2004 in Tuolumne Meadows produced a similar pattern of species turnover and species presence as observed in Lyell Fork Meadows (Fig. 11). Since both meadow systems are, in actuality, extensions of each other, one would expect to find similar changes at both sites. In fact, many of the same riparian/wetland-associated species unknown at the site in Grinnell's time but observed along Lyell Fork were also found along the Tuolumne River in Tuolumne Meadows, including Green-winged Teal, Mallards, Red-winged Blackbirds, and Song Sparrows, as well as several territorial Warbling Vireos and Yellow Warblers which remained throughout the survey period. None of these species was known from Grinnell's time.

Despite significant turnover at each site across the transect, many avian species have remained high in ranked abundance across the sample periods and at each site where they have been encountered. For example, the American Robin, Dark-eyed Junco, Mountain Chickadee, and Western Tanager have each remained very common and widespread (Fig. 13).

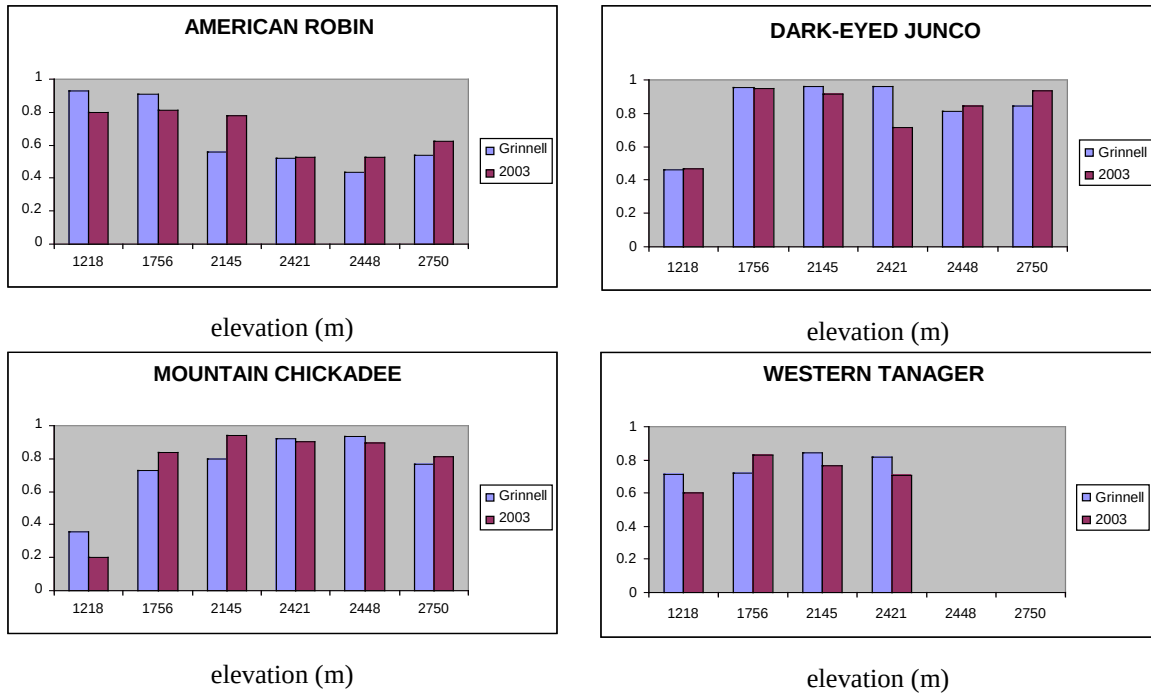
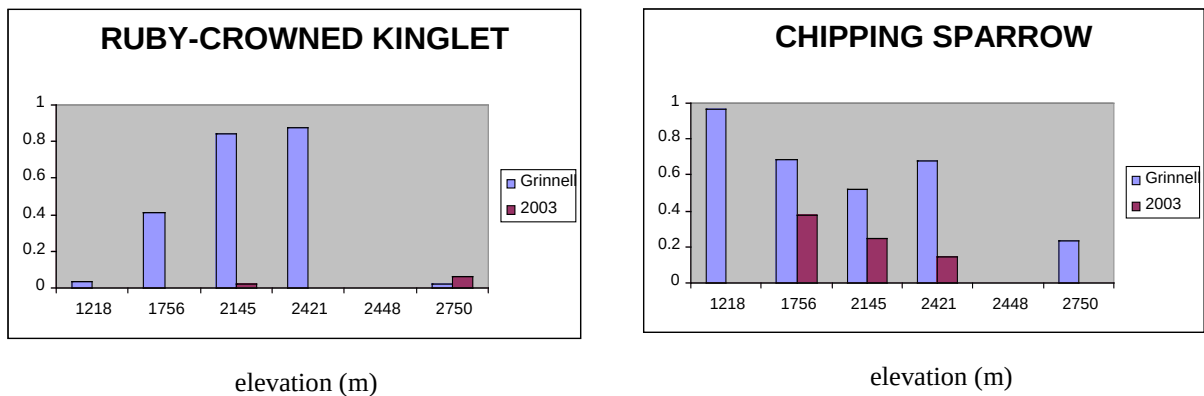


Figure 13. Comparative ranked abundance of four species of birds at six sites along the Yosemite Transect from the Grinnell-era (purple bars) to the 2003-2004 survey (red bars).

Other bird species, however, have apparently declined substantially in abundance, either at single localities or across their entire range at the time of the original survey in the early 1900s, while others have increased in abundance. For example, both Chipping Sparrows and Ruby-crowned Kinglets have nearly disappeared (Fig. 14) while the Yellow-rumped Warbler, Red-breasted Nuthatch, Red-winged Blackbird, and Common Raven are now some of the most common birds in the Park.



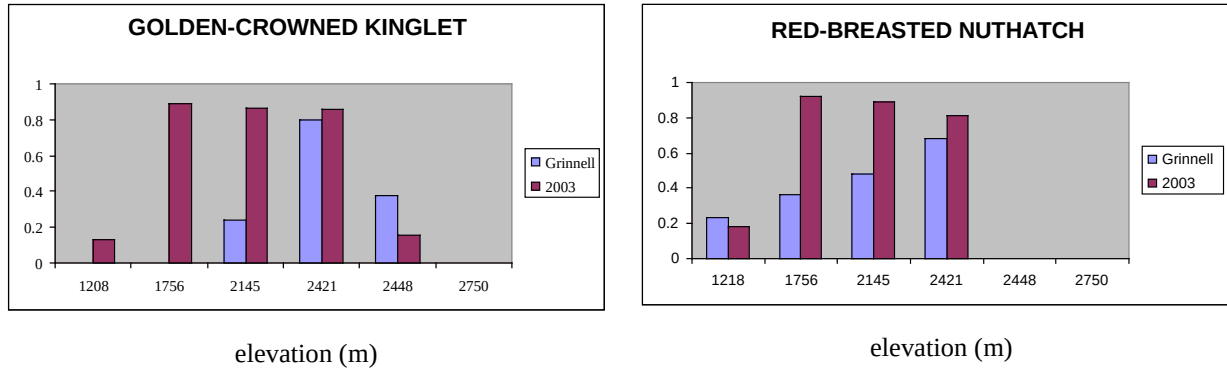


Figure 14. Comparative ranked abundance of four species of birds at five sites along the Yosemite Transect from the Grinnell-era (purple bars) to the 2003/2004 surveys (red bars). Upper panels delineate species that have declined significantly at all sites where once present; lower panels illustrate two species that have increased in abundance, particularly in the mid-elevations.

### 3. Mammals

We present the resurvey results for mammals in five different sections. The first of these identifies those mammalian species that have been added to the faunal list of Yosemite National Park; the second focuses on the current status and range of species specifically identified by Park personnel as of concern because of apparent rarity; the third identifies expanded distributions of some species because of our recent survey efforts in parts of the Park not previously visited by mammalian biologists; the fourth describes a few species that have apparently become increasingly rare in the Park and for which more expanded surveys, now or in the near future, would be useful; and the final section documents those species that have experienced substantial range shifts, particularly in their elevational boundaries. Lists of all localities sampled with species caught (or observed) and estimates of relative abundance are given in Appendix 3

- Additions to the mammalian fauna of Yosemite National Park: Four species have been added to the Park's mammalian fauna as a result of the 2003-2006 survey efforts:
  - a. Western harvest mouse (*Reithrodontomys megalotis*). Previously known from west of the Park in the Sweetwater Mountains and El Portal area along the Merced River, this species was collected both in the Happy Isles fen and at Mirror Lake in the eastern part of Yosemite Valley.
  - b. Piñon mouse (*Peromyscus truei*). This species is common throughout central and southern California in chaparral and oak woodland west of the Sierras and in the piñon-juniper belt on the eastern slope and desert mountain ranges. In 2003 we recorded this species in the upper Lyell Basin at elevations as high as 10,240 ft (3100 m) in lodgepole and white-bark pine communities) and at Glen Aulin at 7900 ft (2390 m) along the Sierran crest; in 2005 we trapped the species in white-thorn

ceonothus near Hazel Green and above Merced Grove at the western margins of the Park at 5900 ft elevation (1788 m); see Fig. 15.

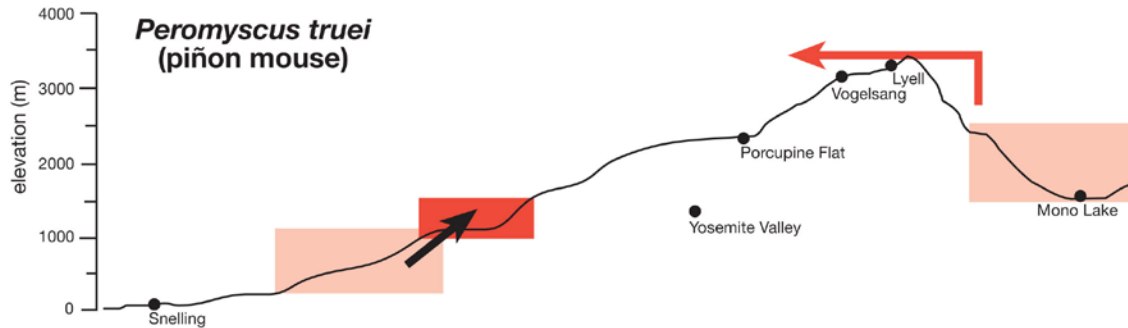


Figure 15. Range (elevation) expansion of the Piñon mouse, *Peromyscus truei*, on both the western and eastern slopes of the Sierra Nevada into Yosemite National Park. The expansion on the west is limited to a few hundred feet within the same habitat zone (chaparral); that on the east is more extensive in elevation (about 2500 ft [760 m]) and horizontally (from Lee Vining on the west shore of Mono Lake to Glen Aulin in the middle Tuolumne River), and encompasses a significant expansion in habitat from piñon-juniper to lodgepole and white-bark pine.

- c. California pocket mouse (*Chaetodipus californicus*). This species also occurs in chaparral and oak woodland west of the Sierra Nevada in central and southern California. It was trapped along with the piñon mouse in white-thorn ceonothus near Hazel Green in 2005.
  - d. Inyo shrew (*Sorex tenellus*). This rare shrew is known from only a few localities east and north of the Sierra Nevada (e.g., Lassen-Volcanic National Park, Sweetwater Mts., and White Mts.). In 2005, specimens of this species were collected in upper Lyell Basin (a “Grinnell site” at 10,240 ft) and in upper Virginia Canyon along Return Creek (at 9900 ft). The addition of this species brings to 4 the number of sympatric shrews at both localities, providing each with the richest shrew species assemblage in the Sierra Nevada (other co-occurring species include the Montane shrew, *Sorex monticolus*, Lyell shrew, *Sorex lyelli*, and Water shrew, *Sorex palustris*).
- b. Priority species: The Park expressed strong interest in a few species that, based on the few prior records, were either considered rare or of unknown status. Species of special interest, in particular, were the Lyell shrew (*Sorex lyelli*), which was previously known from only 5 specimens from two localities within the Park and only a total of 9 specimens from areas to the east of the Park, and the Heather vole (*Phenacomys intermedius*), which was known only from three localities and four specimens from the Park (and, indeed, the entire central Sierra Nevada).

- a. *Sorex lyelli* – our recent surveys for this species have found it at the two original localities where it was recorded in the Grinnell-era (upper Lyell Basin and Vogelsang Lake) and has expanded its range to the north, and to lower elevations, at Glen Aulin (7900 ft) and upper Return Creek in Virginia Canyon (9900 ft). While this species was uncommon at each locality, especially with respect to *Sorex monticolus*, detectability (the probability of detection given survey method and effort) is high at each site where the species has been encountered.
  - b. *Phenacomys intermedius* – Known historically from four localities in the Park, we have now expanded the range of this species westward to Snow Flat (below May Lake) and northward to upper Return Creek and Kerrick Meadow. Again, while not common locally, the species was trapped at nearly all localities surveyed above 8000 feet in elevation.
- Expanded ranges: In addition to those species listed immediately above, we have recorded Alpine chipmunks at both upper Return Creek, Virginia Canyon, and in upper Kerrick Meadow, both localities in the northern part of the Park and north of the previously known distributional limits of this high-elevation, and Sierra Nevadan endemic species.
  - Recently rare species: The resurvey efforts had only very limited success in finding either the Shadow chipmunk (*Tamias senex*) or Bushy-tailed woodrat (*Neotoma cinerea*). Both species were widespread and abundant at nearly all localities encountered during the Grinnell-era survey. However, we recorded the Shadow chipmunk only at one locality and the Bushy-tailed woodrat at three. Site surveys for both species (visual observations of the diurnal Shadow chipmunk and nest or marking sign of the nocturnal woodrat) failed to find much evidence of either across their prior known range in the Park. It is not at all clear if the failure to detect either results from some long-term decline or only annual changes in density. Other species that might also have declined are porcupines and both Snowshoe hares and White-tailed jackrabbits, although the latter two are notorious for long-term population cycles and our survey efforts possibly coincided with a “low” in those cycles.
  - Range shifts: The elevational, and thus habitat, limits of most species of small mammals have remained rather constant over the past near-century (13 of 25 species). However, an upward retraction of four boreal species is apparent following the recent re-surveys (Belding ground squirrels, Golden-mantled ground squirrels, Alpine chipmunks, and pikas; Figs. 16 and 17). The Alpine chipmunk, recorded during the Grinnell-era as low as 7800 feet (2360 m) at Glen Aulin and common then in the open lodgepole pine-granite slab area near Soda Spring and on Fairview Dome in Tuolumne Meadows at about 8600 ft (2600 m), has not been found recently below 9700 ft (2940 m), and is apparently abundant now only at elevations at treeline and above.

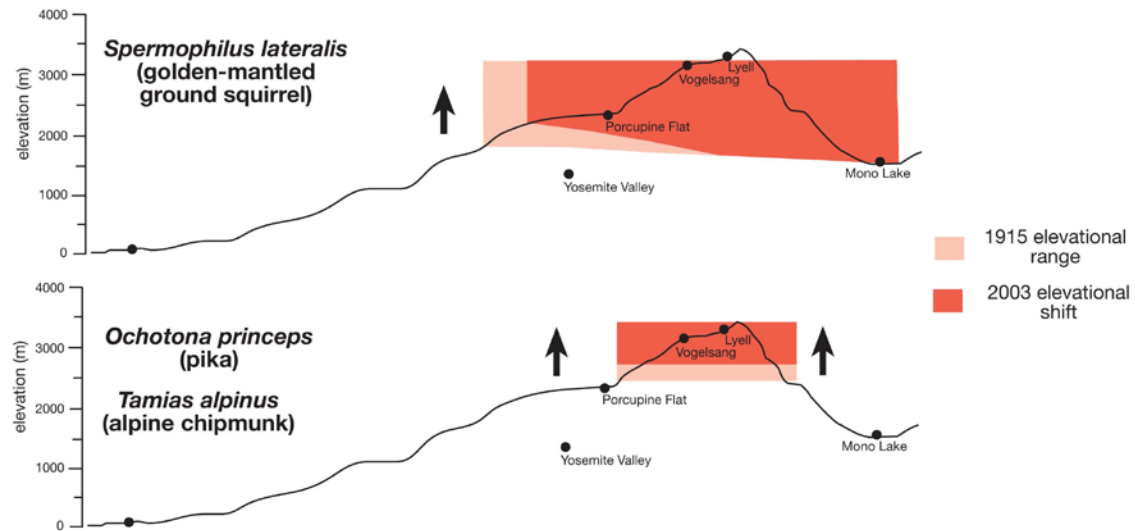


Figure 16. Distributional shifts in three species of small mammals along the Yosemite Transect from the Grinnell-era to the present: upper – the Golden-mantled ground squirrel (*Spermophilus lateralis*) has apparently retracted a few hundred feet on its western margins but not on the eastern Sierran slopes; lower – both the pika (*Ochotona princeps*) and Alpine chipmunk (*Tamias alpinus*) have retracted upwards by 500 to nearly 1000 meters.

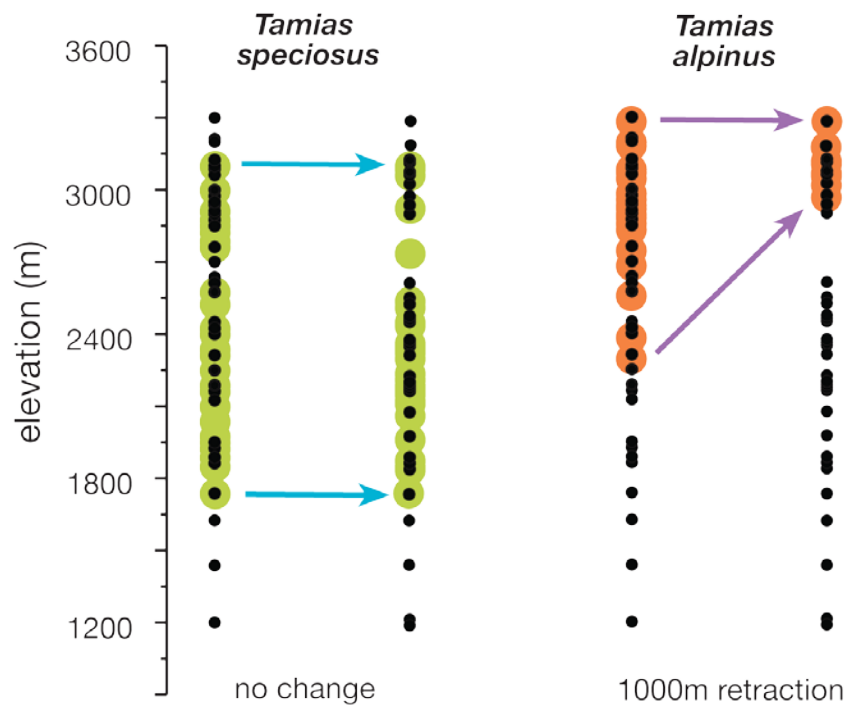


Figure 17. Comparative historic (left column in each diagram) and modern (right column) elevational ranges of two species of Sierran chipmunks, the Lodgepole pine chipmunk (*Tamias speciosus*), which has not shifted in distribution, and the Alpine chipmunk (*Tamias alpinus*), which has retracted upwards substantially. Black dots in each column represent the elevations samples during each survey period; colored circles represent localities at which each species was recorded during the Grinnell-era and in our 2003-2006 surveys.

Several low elevation species have also expanded their ranges upward, some of these minimally and other substantially. In addition to the Inyo Shrew, Piñon mouse, Western harvest mouse, and California pocket mouse mentioned above), for example, the Beechey ground squirrel (*Spermophilus beecheyi*) is now present at Warren Fork to the east of Tioga Pass at about 9300 ft; it was unknown from the entire Mono Basin in the Grinnell-era. We obtained the California vole (*Microtus californicus*) at Merced Grove, about xx feet higher than Cascade Creek where it was obtained in the Park by the Grinnell team.

Not all species have shifted upwards, however, as the Montane shrew, *Sorex monticolus*, recorded in the Grinnell-era only at elevations higher than 7000 feet to above timberline in the moist meadows and stream-edges now is the dominant shrew in all meadows and stream edges at Crane Flat and as far down in elevation as throughout Yosemite Valley (at about 4000 ft); see Fig. 18. This species has apparently replaced the Trowbridge shrew, *Sorex trowbridgii*, in the meadow systems of the Valley floor, as this latter species, common throughout the Valley during the Grinnell-era, was found by us only in a stretch of dry meadow on the edge of Rocky Point.

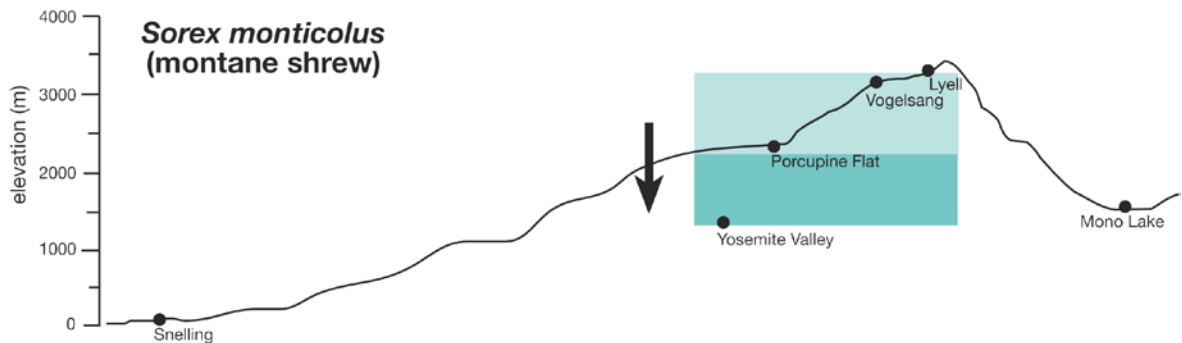


Figure 18. Stylistic downward range expansion of the Montane shrew, *Sorex monticolus*, from its historic distribution at elevations above 7000 ft (2100 m) to its current distribution, which includes the meadow systems at Crane Flat and throughout Yosemite Valley.

## APPENDIX 1

“Before” and “After” photographs of four selected Grinnell-era sites in Yosemite National Park illustrating gross, qualitative vegetation changes from the early 1900s to the present. Photographs are in the archives of the Museum of Vertebrate Zoology.

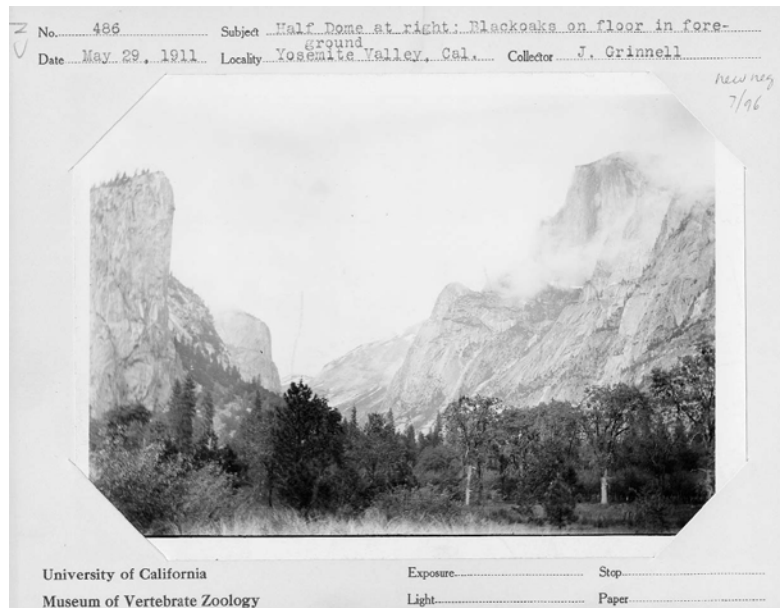


Figure 1. Photograph comparisons of the east end of Stoneman Meadow, Yosemite Valley, looking towards Half Dome. Left: photo taken by Joseph Grinnell in May 1911; Right: photo taken by Robert Hijmans in May 2003. Note almost complete shift in tree dominance from black oak to conifer (primarily Yellow pine) and encroachment of pine saplings onto meadow floor over the past 98 years.



Figure 2. Photograph comparisons of upper Lyell Fork meadow and Kuna Crest. Left: photo taken by Walter Taylor in July 1915; Right: photo taken by Robert Hijmans in August 2003. Note increased density of lodgepole pine on slopes and slight encroachment of same into Lyell Fork meadow.



Figure 3. Photograph comparisons of the north end of Vogelsang Lake. Left: photo taken by Walter Taylor in July 1915; Right: photo taken by Chris Conroy in July 2004. Note expansion and increased growth of white-bark pine, both around original campsite (tent visible on right of 1915 photo) and on granite slabs on far end of lake.



Figure 4. Photograph comparisons of Mt. Gibbs and Mt. Dana, from “Farrington’s Ranch, south of Williams Butte, on the east side of the Sierra Nevada. Left: photo taken by Walter Taylor in June 1916; Right: photo taken by Robert Hijmans in August 2003. Note expansion and increased density of Jeffrey pine (lower slopes) and lodgepole pine (upper slopes).

## APPENDIX 2

Herpetological surveys, by year and site:

### 2003

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1. Hetch Hetchy Area, between Ranger Station and O'Shaughnessy Dam along Hetch Hetchy Road, 1175 – 1704 meters (32 georeferenced localities).

Hetch Hetchy contained the greatest amount of snake diversity of all sampled sites. Driving on roads at night proved to be the most productive method for finding both common and rare species. Three snake species believed to be scarce or even absent from the park were found driving the roads at night. These snakes include *Diadophis punctatus*, *Contia tenuis*, and *Hypsiglena torquata*. Of these three rare snakes species, *H. torquata* was surprisingly abundant in the Hetch Hetchy area.

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2. Foresta Area, between Hodgson Meadows Campground and Foresta Road along Big Oak Flat Road, 1350 – 1850 meters (16 georeferenced localities).

Two genetic lineages of *Sceloporus occidentalis* are in secondary contact in the Foresta area. It is unclear if these lineages are exchanging genes. Additional sampling throughout the area is needed to refine the species limits of this complex.

One pitfall array was installed at Foresta and monitored for five days. The pitfall array trapped six individual lizards (*S. occidentalis* N=5, *Aspidocelis tigris* N=1). These lizards were found in high abundance and were easily collected by noose. Thus, the pitfall array did not result in the discovery of any unsampled reptile or amphibian species at the Foresta site within the timeframe of our survey.

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3. Yosemite Valley, between Arch Rock entrance station and Happy Isles Nature Center, 1292 – 2277 meters (13 georeferenced localities).

Yosemite Valley contained the highest lizard diversity of all the sampled sites. An array of pitfall traps (16 1 gallon paint cans) was installed at Sentinel Beach and monitored for five days. The only species trapped was *Sceloporus graciosus*. This species was abundant in the area and easily captured by noose. The amphibian and snake diversity in Yosemite Valley is also high based on Museum records, although this diversity is not reflected in our 2003 sampling.

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4. Lyell Canyon, between Tuolumne Meadows and Mount Lyell, 2600 – 3200 meters (11 georeferenced localities).

*Hydromantes platycephalus* were found at their type locality visited by Grinnell and colleagues at the base of Mount Lyell as originally described by Camp in 1916. This nocturnal salamander was only found after dusk following a day of continuous rain. The

reptile and amphibian diversity at Lyell Canyon is low due to the high elevation. The only reptile species found was *Thamnophis elegans*. *Hyla regilla* and *Bufo canorus* tadpoles were found in several small ponds at high elevation, but were absent anywhere trout were present. *Hyla regilla* tadpoles and metamorphs were common in meadows along Lyell Canyon and were usually accompanied by *Thamnophis elegans*.

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5. Glen Aulin, between McGee Lake and California Falls (including Tenaya Lake, Olmsted Point, and Siesta Lake) 2100 – 5600 meters (25 georeferenced localities).

The high elevation subspecies of the Western Fence Lizard, *Sceloporus occidentalis taylori*, is common in Glen Aulin. The scientific literature suggests that this subspecies may warrant species status due to its unique morphological features (e.g., extensive blue ventral pigmentation, dark dorsal pigmentation, and large size). Our preliminary mtDNA sequence data reject this hypothesis. Multiple high elevation populations of this putative species do not form a monophyletic group. This result is intriguing because it implies multiple, independent origins of the unique high-elevation phenotype exhibited by *S. o. taylori*. Populations of *S. occidentalis* at lower elevation have light dorsal coloration, less ventral pigmentation, and are smaller in size. Specimens of *Sceloporus occidentalis* collected along an elevational transect following the Grand Canyon of the Tuolumne from Glen Aulin to Return Creek graded in morphology from the high-elevation “*taylori*” phenotype to the low-elevation phenotype. Additional sampling is required to extend this transect from Return Creek to Hetch Hetchy. A potential genetic contact zone exists along this portion of the Grand Canyon of the Tuolumne transect.

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6. Bridalveil Creek, between Glacier Point and Chinquapin, 1800 – 2300 meters (15 georeferenced localities).

Two pitfall arrays were installed at Bridalveil Creek and monitored for five days. The pitfall traps captured one *Sceloporus graciosus* and a gopher (*Thomomys monticola*). These lizards were scarce in the heavily forested area where the pitfall array was installed. Mountain Yellow-legged frogs (*Rana muscosa*) were found at Summit and Monroe Meadow. Both adult frogs and tadpoles were found. *Sceloporus graciosus* and *S. occidentalis* were common at Glacier Point. All meadows visited contained *Hyla regilla* tadpoles and *Thamnophis elegans*. These species were common in all wet meadows throughout the Park.

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7. Wawona Area, between Mariposa Grove and Rail Creek along Wawona Road, 1200 – 2000 meters (16 georeferenced localities).

After warm winter rains in December, Sierra Nevada salamanders (*Ensatina eschscholtzii platensis*) were common on the forest floor under pine logs in the Wawona area. Slender salamanders (*Batrachoseps gregarius*) were difficult to find and appear to be scarce in

the Park. Higher species diversity is expected at Wawona, however our sampling did not begin until late summer when reptiles and amphibians are less abundant.

Table 1. Reptile and amphibian species collected in Yosemite National Park. General collecting localities and numbers of individuals taken are shown. Shaded boxes indicate species considered to be common in Yosemite. Shaded species names indicate common California species

|                                  | Hetch<br>Hetchy | Foresta | Yosemite<br>Valley | Lyell<br>Canyon | Glen<br>Aulin | Bridalveil<br>Creek | Wawona |
|----------------------------------|-----------------|---------|--------------------|-----------------|---------------|---------------------|--------|
| <b>Frogs (3 species)</b>         |                 |         |                    |                 |               |                     |        |
| <i>Bufo canorus</i>              |                 |         |                    | 13              |               |                     |        |
| <i>Hyla regilla</i>              | 6               | 1       |                    | 14              | 29            | 26                  |        |
| <i>Rana muscosa</i>              |                 |         |                    |                 |               | 8                   |        |
| <b>Salamanders (3 species)</b>   |                 |         |                    |                 |               |                     |        |
| <i>Batrachoseps gregarius</i>    |                 |         |                    |                 |               |                     | 4      |
| <i>Ensatina eschscholtzii</i>    |                 |         |                    |                 |               | 2                   | 20     |
| <i>Hydromantes platycephalus</i> |                 |         |                    | 5               |               |                     |        |
| <b>Lizards (6 species)</b>       |                 |         |                    |                 |               |                     |        |
| <i>Aspidoscelis tigris</i>       |                 | 5       |                    |                 |               |                     |        |
| <i>Elgaria coerulea</i>          |                 | 2       | 3                  |                 | 4             | 1                   | 1      |
| <i>Elgaria multicarinata</i>     | 1               |         | 1                  |                 |               |                     |        |
| <i>Eumeces gilberti</i>          |                 |         | 3                  |                 |               |                     |        |
| <i>Sceloporus graciosus</i>      |                 | 1       | 15                 |                 | 21            | 14                  |        |
| <i>Sceloporus occidentalis</i>   | 12              | 24      | 15                 |                 | 99*           | 11                  | 11     |
| <b>Snakes (13 species)</b>       |                 |         |                    |                 |               |                     |        |
| <i>Charina bottae</i>            | 1               |         |                    |                 | 3             |                     |        |
| <i>Coluber constrictor</i>       |                 |         | 1                  |                 |               |                     |        |
| <i>Contia tenuis</i>             | 1               |         |                    |                 |               |                     |        |
| <i>Crotalus viridis</i>          | 1               |         |                    |                 | 1             |                     |        |
| <i>Diadophis punctatus</i>       | 1               |         |                    |                 |               |                     |        |
| <i>Hypsiglena torquata</i>       | 13              |         |                    |                 |               |                     |        |
| <i>Lampropeltis zonata</i>       | 2               |         |                    |                 |               |                     |        |
| <i>Masticophis lateralis</i>     | 1               | 2       |                    |                 |               |                     |        |
| <i>Pituophis catenifer</i>       | 5               | 1       |                    |                 |               |                     |        |
| <i>Thamnophis couchii</i>        | 2               |         | 1                  |                 |               |                     | 1      |
| <i>Thamnophis elegans</i>        |                 |         |                    | 10              | 29            | 21                  |        |
| <b>Total</b>                     | 46              | 36      | 39                 | 42              | 186           | 83                  | 37     |

\* Combined total of 14 populations including Glen Aulin, Tenaya Lake, Olmsted Point, McGee Lake, and Return Creek. Mean number of specimens collected per population = 7.1.

## 2004

Amphibian and reptile species recorded during the 2004 field season.

| Common Name            | Scientific Name                  |
|------------------------|----------------------------------|
| mount lyell salamander | <i>Hydromantes platycephalus</i> |
| yosemite toad          | <i>Bufo canorus</i>              |
| pacific treefrog       | <i>Hyla regilla</i>              |

|                                  |                                |
|----------------------------------|--------------------------------|
| Bullfrog*                        | <i>Rana catesbiana</i>         |
| mountain yellow-legged frog      | <i>Rana muscosa</i>            |
| western whiptail lizard          | <i>Aspidoscelis tigris</i>     |
| gilbert skink                    | <i>Eumeces gilberti</i>        |
| northern alligator lizard        | <i>Elgaria coerulea</i>        |
| southern alligator lizard        | <i>Elgaria multicarinata</i>   |
| sagebrush lizard                 | <i>Sceloporus graciosus</i>    |
| western fence lizard             | <i>Sceloporus occidentalis</i> |
| rubber boa                       | <i>Charina bottae</i>          |
| gopher snake                     | <i>Pituophis catenifer</i>     |
| night snake                      | <i>Hypsiglena torquata</i>     |
| california whipsnake             | <i>Masticophis lateralis</i>   |
| western aquatic garter snake     | <i>Thamnophis couchii</i>      |
| western terrestrial garter snake | <i>Thamnophis elegans</i>      |
| western rattlesnake              | <i>Crotalus viridis</i>        |

## 1. vicinity of Porcupine Flat

| Locality                                                  | Latitude | Longitude  | Species                                              |
|-----------------------------------------------------------|----------|------------|------------------------------------------------------|
| 10 Lakes trail near Colby Mt                              | 37.89616 | -119.54510 | <i>Elgaria coerulea</i> , <i>Thamnophis elegans</i>  |
|                                                           | 37.83400 | -119.69728 |                                                      |
| 3.5 mi on Hwy 120 SW of entrance to White Wolf Campground |          |            | <i>Sceloporus graciosus</i>                          |
| From May Lake Trailhead to May Lake                       | 37.84105 | -119.49166 | <i>Sceloporus occidentalis</i>                       |
| Harden Lake                                               | 37.89416 | -119.67750 | <i>Hyla regilla</i> , <i>Thamnophis elegans</i>      |
| Mammal site at turnout ~3.5 mi E White Wolf junction      | 37.83890 | -119.59295 | <i>Sceloporus graciosus</i>                          |
| McSwain Meadow trap line                                  | 37.85193 | -119.62811 | <i>Hyla regilla</i> , <i>Bufo canorus</i>            |
|                                                           |          |            | <i>Sceloporus graciosus</i> ,                        |
| North Dome                                                | 37.76022 | -119.55880 | <i>S. occidentalis</i>                               |
| Porcupine Flat, N of road in creek                        | 37.81188 | -119.56390 | <i>Hyla regilla</i>                                  |
| Porcupine Flat                                            | 37.80701 | -119.56500 | <i>Elgaria coerulea</i>                              |
| Pothole Dome                                              | 37.87863 | -119.41233 | <i>Sceloporus occidentalis</i>                       |
| Return trail from North Dome                              | 37.76936 | -119.55708 | <i>Sceloporus graciosus</i>                          |
| Upper White Wolf camp                                     | 37.86644 | -119.64773 | <i>Hyla regilla</i>                                  |
| Yosemite Creek Campground                                 | 37.82693 | -119.59547 | <i>Sceloporus graciosus</i> , <i>S. occidentalis</i> |
| Yosemite Creek on 10 Leuker Trail                         | 37.58540 | -119.57218 | <i>Sceloporus graciosus</i>                          |
| Yosemite Creek trail to 10 Lakes                          | 37.86342 | -119.57195 | <i>Sceloporus graciosus</i>                          |

| Family          | Species                        | Commonness | # Localities |
|-----------------|--------------------------------|------------|--------------|
| Hylidae         | <i>Pseudacris regilla</i>      | common     | 4            |
| Bufonidea       | <i>Bufo canorus</i>            | uncommon   | 1            |
| Phrynosomatidae | <i>Sceloporus graciosus</i>    | common     | 7            |
| Phrynosomatidae | <i>Sceloporus occidentalis</i> | common     | 4            |
| Anguidae        | <i>Elgaria coerulea</i>        | uncommon   | 2            |
| Colubridae      | <i>Thamnophis elegans</i>      | common     | 1            |

## 2. Vogelsang Lake

| Locality                                     | Latitude | Longitude  | Species                                                         |
|----------------------------------------------|----------|------------|-----------------------------------------------------------------|
| 0.5 km N Tuolumne Pass                       | 37.81046 | -119.33971 | <i>Bufo canorus</i>                                             |
| E end of Townsley Lake                       | 37.79273 | -119.32830 | <i>Bufo canorus</i>                                             |
| E side of Vogelsang Lake                     | 37.78827 | -119.34250 | <i>Hydromantes platycephalus</i>                                |
| Fletcher Creek, SE of Emeric Lake            | 37.77634 | -119.38064 | <i>Bufo canorus</i> , <i>Hyla regilla</i>                       |
| Pond ~0.25 km W of Boothe Lake               | 37.79993 | -119.35178 | <i>Hyla regilla</i>                                             |
| Pond ~0.5 km NE of Evelyn Lake               | 37.80342 | -119.33291 | <i>Bufo canorus</i> , <i>Hyla regilla</i>                       |
| Pond ~0.5 km NE of Townsley Lake             | 37.79744 | -119.32874 | <i>Hyla regilla</i>                                             |
| Pond at S end of Vogelsang Lake              | 37.78476 | -119.34244 | <i>Hyla regilla</i>                                             |
| Pond NE of Evelyn Lake                       | 37.81044 | -119.32504 | <i>Hyla regilla</i>                                             |
| Pond NW of Evelyn Lake                       | 37.80799 | -119.33141 | <i>Hyla regilla</i>                                             |
| Pond on E side of trail, Tuolumne Pass       | 37.80494 | -119.34035 | <i>Hyla regilla</i> , <i>Thamnophis elegans</i>                 |
| SW end of Boothe Lake                        | 37.79834 | -119.34946 | <i>Hyla regilla</i>                                             |
| SW end of Townsley Lake                      | 37.79275 | -119.32952 | <i>Bufo canorus</i>                                             |
| unnamed lake, ~1 km E (by trail) Evelyn Lake | 37.81059 | -119.30991 | <i>Bufo canorus</i> , <i>Hyla regilla</i> , <i>Rana muscosa</i> |

| Family         | Species                          | Commonness                 | # Localities |
|----------------|----------------------------------|----------------------------|--------------|
| Bufonidae      | <i>Bufo canorus</i>              | uncommon                   | 6            |
| Hylidae        | <i>Hyla regilla</i>              | common                     | 10           |
| Ranidae        | <i>Rana muscosa</i>              | rare                       | 1            |
| Plethodontidae | <i>Hydromantes platycephalus</i> | rare                       | 2            |
| Colubridae     | <i>Thamnophis elegans</i>        | uncommon at high elevation | 1            |

Notable observations:

1. Discovery of a new population of *Hydromantes platycephalus* from Vogelsang Lake (two localities).
2. Breeding populations of *Rana muscosa* and *Bufo canorus* at unnamed lake 0.5 km east of Evelyn Lake

## 3. Merced Lake

| Locality                                                            | Latitude | Longitude  | Species                                                |
|---------------------------------------------------------------------|----------|------------|--------------------------------------------------------|
| ~0.2 mi S jct Vogelsang Pass and Merced Lake, ~1.6 mi E Merced Lake | 37.74199 | -119.39129 | <i>Hyla regilla</i> , <i>Sceloporus occidentalis</i>   |
| ~1 mi NE Merced Lake                                                | 37.7412  | -119.39444 | <i>Sceloporus graciosus</i>                            |
| ~1.2 mi NE of Merced Lake                                           | 37.74214 | -119.39345 | <i>Sceloporus graciosus</i>                            |
| ~100 m E Merced Lake High Sierra Camp                               | 37.73821 | -119.40529 | <i>Charina bottae</i><br><i>Sceloporus graciosus</i> , |
| ~300 m W Little Yosemite Valley Campground                          | 37.72992 | -119.52447 | <i>S. occidentalis</i>                                 |
| 0.7 mi N Echo Valley junction, Echo Valley                          | 37.75249 | -119.44099 | <i>Elgaria coerulea</i>                                |
| 1 km E Merced Lake                                                  | 37.73946 | -119.40217 | <i>Thamnophis elegans</i>                              |
| 100 m E Merced High Sierra Camp                                     | 37.73811 | -119.40462 | <i>Sceloporus graciosus</i> , <i>S. occidentalis</i>   |
| Babcock Lake                                                        | 37.7569  | -119.39650 | <i>Hyla regilla</i> , <i>Thamnophis elegans</i>        |
| base of Moraine Dome along trail                                    | 37.73639 | -119.48036 | <i>Hyla regilla</i> , <i>Sceloporus graciosus</i>      |
| Merced River, 0.6 mi W Echo Valley                                  | 37.7413  | -119.44614 | <i>Hyla regilla</i>                                    |
| E side of Bunnell Point along trail                                 | 37.73778 | -119.45824 | <i>Hyla regilla</i>                                    |

|                                                            |                     |                                                                                        |
|------------------------------------------------------------|---------------------|----------------------------------------------------------------------------------------|
| Echo Valley                                                | 37.74715 -119.43634 | <i>Sceloporus graciosus</i> ,<br><i>S. occidentalis</i>                                |
| Jct John Muir and Mist trails                              | 37.7252 -119.45930  | <i>Sceloporus graciosus</i>                                                            |
| Jct Vogelsang Pass and Merced Lake trails                  | 37.74397 -119.38708 | <i>Sceloporus graciosus</i><br><i>Sceloporus graciosus</i> ,<br><i>S. occidentalis</i> |
| Near Little Yosemite Valley Campground                     | 37.73116 -119.52009 | <i>S. occidentalis</i>                                                                 |
| NW end Washburn Lake                                       | 37.71835 -119.37406 | <i>Sceloporus occidentalis</i>                                                         |
| trail between Babcock Lake trail and Merced Ranger Station | 37.74231 -119.39352 | <i>Elgaria coerulea</i> , <i>Sceloporus occi</i>                                       |
| W side Fletcher Creek, SE Babcock Lake                     | 37.75745 -119.39050 | <i>Hyla regilla</i> , <i>Thamnophis elegans</i>                                        |

| Family          | Species                        | Commonness | # Localities |
|-----------------|--------------------------------|------------|--------------|
| Hylidae         | <i>Hyla regilla</i>            | common     | 6            |
| Anguidae        | <i>Elgaria coerulea</i>        | uncommon   | 2            |
| Phrynosomatidae | <i>Sceloporus graciosus</i>    | common     | 9            |
| Phrynosomatidae | <i>Sceloporus occidentalis</i> | common     | 8            |
| Colubridae      | <i>Thamnophis elegans</i>      | common     | 3            |
| Boidae          | <i>Charina bottae</i>          | rare       | 1            |

#### 4. Hetch Hetchy

| Locality                                                     | Latitude Longitude  | Species                                                             |
|--------------------------------------------------------------|---------------------|---------------------------------------------------------------------|
| ~0.5 mi S Ranger Station, Hetch Hetchy                       | 37.88845 -119.85043 | <i>Sceloporus occidentalis</i>                                      |
| 1.5 mi N of entrance station on E side of road, Hetch Hetchy | 37.90305 -119.83464 | <i>Sceloporus occidentalis</i> , <i>Aspidoscelis tigris</i>         |
| Between Kibbie Ridge and Kibbie Creek, vicinity Lake Eleanor | 38.00946 -119.87469 | <i>Sceloporus occidentalis</i> , <i>Crotalus viridis</i>            |
| Cherry Lake Rd (17), ~5 mi N (by road) Hwy. 120              | 37.86377 -119.98044 | <i>Pituophis catenifer</i>                                          |
| First entrance gate, Hetch Hetchy                            | 37.88374 -119.85378 | <i>Thamnophis elegans</i>                                           |
| Hetch Hetchy Road (between Ranger Station and Dam)           | 37.91219 -119.80981 | <i>Hyla regilla</i> , <i>Hypsiglena torquata</i> , <i>Pituophis</i> |
| Hetch Hetchy Reservoir Dam                                   | 37.94723 -119.78532 | <i>Masticophis lateralis</i>                                        |
| N side Hetch Hetchy Reservoir                                | 37.95725 -119.78432 | <i>Sceloporus occidentalis</i> , <i>Aspidoscelis tigris</i>         |
| shower at Ranger Camp, Hetch Hetchy                          | 37.89314 -119.84165 | <i>Hyla regilla</i>                                                 |
| trail to Lake Eleanor Camp                                   | 37.98698 -119.88412 | <i>Sceloporus graciosus</i>                                         |

| Family          | Species                        | Commonness | # Localities |
|-----------------|--------------------------------|------------|--------------|
| Hylidae         | <i>Hyla regilla</i>            | common     | 2            |
| Teiidae         | <i>Aspidoscelis tigris</i>     | common     | 2            |
| Phrynosomatidae | <i>Sceloporus graciosus</i>    | uncommon   | 1            |
| Phrynosomatidae | <i>Sceloporus occidentalis</i> | common     | 4            |
| Colubridae      | <i>Thamnophis elegans</i>      | uncommon   | 1            |
| Colubridae      | <i>Hypsiglena torquata</i>     | uncommon   | 1            |
| Colubridae      | <i>Pituophis catenifer</i>     | uncommon   | 2            |
| Colubridae      | <i>Masticophis lateralis</i>   | uncommon   | 1            |
| Viperidae       | <i>Crotalus viridis</i>        | uncommon   | 2            |

## 5. Yosemite Valley (8-11 August)

| Locality                                      | Latitude | Longitude  | Species                                                                           |
|-----------------------------------------------|----------|------------|-----------------------------------------------------------------------------------|
| ~0.5 - 1.5 mi from trailhead of 4-mile trail  | 37.72983 | -119.59753 | <i>Sceloporus occidentalis</i><br><i>Sceloporus graciosus</i> ,                   |
| ~50 m up Glacier Point Trail, Yellowpine Camp | 37.72437 | -119.60287 | <i>S. occidentalis</i>                                                            |
| 4-mile trail trailhead                        | 37.73151 | -119.59934 | <i>Sceloporus graciosus</i>                                                       |
| Base of Bridalveil Falls in spray zone W pool | 37.71617 | -119.65128 | <i>Hydromantes platycephalus</i>                                                  |
| Cascade Creek                                 | 37.72374 | -119.71124 | <i>Elgaria multicarinata</i> , <i>Sceloporus occidentalis</i> , <i>Thamnophis</i> |

| Family          | Species                          | Commonness | # Localities |
|-----------------|----------------------------------|------------|--------------|
| Plethodontidae  | <i>Hydromantes platycephalus</i> | rare       | 1            |
| Anguidae        | <i>Elgaria multicarinata</i>     | uncommon   | 1            |
| Phrynosomatidae | <i>Sceloporus graciosus</i>      | common     | 2            |
| Phrynosomatidae | <i>Sceloporus occidentalis</i>   | common     | 3            |
| Colubridae      | <i>Thamnophis couchii</i>        | common     | 1            |

## 6. Foresta Road

| Locality                                              | Latitude | Longitude  | Species                                                                    |
|-------------------------------------------------------|----------|------------|----------------------------------------------------------------------------|
| ~1.5 mi by road off Big Oak Flat Road on Foresta Road | 37.70284 | -119.74478 | <i>Sceloporus occidentalis</i>                                             |
| ~2.0 mi by road off Big Oak Flat Rd. on Foresta Rd.   | 37.70265 | -119.70567 | <i>Sceloporus occidentalis</i>                                             |
| ~2.0 mi by road off Big Oak Flat Rd. on Foresta Rd.   | 37.70265 | -119.70567 | <i>Elgaria multicarinata</i> , <i>Sceloporus occidentalis</i>              |
| 1 mi E of Crane Flat, Big Oak Flat Rd.                | 37.74808 | -119.78035 | <i>Masticophis lateralis</i>                                               |
| Big Oak Flat Road, 0.4 mi W of Foresta Rd.            | 37.71557 | -119.73821 | <i>Masticophis lateralis</i>                                               |
| Foresta Rd.                                           | 37.70403 | -119.73315 | <i>Aspidoscelis tigris</i> , <i>Eumeces gilberti</i> , <i>Sceloporus o</i> |
| Hodgdon Meadows Campground                            | 37.7976  | -119.86618 | <i>Sceloporus graciosus</i>                                                |
| Tamarack Creek                                        | 37.7505  | -119.72898 | <i>Sceloporus graciosus</i>                                                |
| Tamarack Flat                                         | 37.7512  | -119.73296 | <i>Sceloporus graciosus</i>                                                |

| Family          | Species                        | Commonness | # Localities |
|-----------------|--------------------------------|------------|--------------|
| Teiidae         | <i>Aspidoscelis tigris</i>     | uncommon   | 1            |
| Anguidae        | <i>Elgaria multicarinata</i>   | uncommon   | 1            |
| Phrynosomatidae | <i>Sceloporus graciosus</i>    | common     | 3            |
| Phrynosomatidae | <i>Sceloporus occidentalis</i> | common     | 4            |
| Scincidae       | <i>Eumeces gilberti</i>        | uncommon   | 1            |
| Colubridae      | <i>Masticophis lateralis</i>   | uncommon   | 2            |

## 7. Pate Valley

| Locality | Latitude | Longitude | Species |
|----------|----------|-----------|---------|
|----------|----------|-----------|---------|

Tuolumne River, between Hetch Hetchy Reservoir and Pate Valley\* 37.91699 to 37.91838 -119.66160 to -119.62648 *Hyla regilla*,  
Pate Valley\*\*

37.93151 to 37.93106 -119.59417 to -119.55691 *Hyla regilla*

\* represents 21 separate GPS localities

\*\* represents 12 separate GPS localities

| Family          | Species                        | Commonness | # Localities |
|-----------------|--------------------------------|------------|--------------|
| Hylidae         | <i>Hyla regilla</i>            | Common     | 6            |
| Phrynosomatidae | <i>Sceloporus occidentalis</i> | Common     | 18           |
| Colubridae      | <i>Thamnophis couchii</i>      | Common     | 3            |
| Viperidae       | <i>Crotalus viridis</i>        | Common     | 8            |

## 2005

### Dorothy Lake Area

| Locality                                                               | Latitude | Longitude | Species                                                  |
|------------------------------------------------------------------------|----------|-----------|----------------------------------------------------------|
| On trail south of Leavitt Meadows, N Roosevelt Lake                    | 38.29783 | 119.54221 | <i>Thamnophis elegans</i>                                |
| On trail south of Leavitt Meadows, S Lane Lake ~100m S of Dorothy Lake | 38.28542 | 119.53897 | <i>Elgaria coerulea</i>                                  |
|                                                                        | 38.17303 | 119.59591 | <i>Thamnophis elegans</i> ,<br><i>Pseudacris regilla</i> |
| On east side of ridge ~750m S Bond Pass                                | 38.16594 | 119.61033 | <i>Pseudacris regilla</i>                                |
| On top of ridge, about 0.5km S Bond Pass                               | 38.16776 | 119.61063 | <i>Pseudacris regilla</i><br><i>Pseudacris regilla</i> , |
| Grizzly Meadow, about 0.5km SW Emigrant Pass                           | 38.19185 | 119.62918 | <i>Bufo canorus</i> ,<br><i>Thamnophis elegans</i>       |
| About 500m NW of Middle Emigrant Lake                                  | 38.19456 | 119.65882 | <i>Hydromantes platycephalus</i>                         |
| On ridge above Grace Meadow                                            | 38.14054 | 119.61824 | <i>Thamnophis elegans</i>                                |
| Grace Meadow, SE Bigelow Peak                                          | 38.14326 | 119.61478 | <i>Pseudacris regilla</i>                                |
| 0.5km NW Dorothy Lake Pass                                             | 38.18458 | 119.58434 | <i>Pseudacris regilla</i>                                |
| Pond at NW end of Grace Meadow                                         | 38.1416  | 119.61604 | <i>Pseudacris regilla</i>                                |
| About 0.5km S Emigrant Pass                                            | 38.19545 | 119.63547 | <i>Bufo canorus</i>                                      |
| About 100m E Emigrant Meadow Lake on trail from Grizzly Meadow         | 38.20243 | 119.64116 | <i>Bufo canorus</i>                                      |
| Outflow dam on west side of Emigrant Meadow Lake                       | 38.20068 | 119.65139 | <i>Bufo canorus</i>                                      |
| About 0.75km NW of outflow dam on west side of Emigrant Meadow Lake    | 38.20648 | 119.6553  | <i>Bufo canorus</i>                                      |
| About 0.75km SW of Emigrant Pass                                       | 38.19543 | 119.63842 | <i>Bufo canorus</i>                                      |
| S end of Grace Meadow                                                  | 38.13468 | 119.61919 | <i>Thamnophis elegans</i>                                |
| about 400m N Grace Meadow along PCT                                    | 38.14632 | 119.61263 | <i>Elgaria coerulea</i>                                  |

SE side of Dorothy Lake

38.17303

119.59293

*Rana muscosa*

| Family         | Species                                    | Commonness | # Localities |
|----------------|--------------------------------------------|------------|--------------|
| Bufonidae      | <i>Bufo canorus</i>                        | uncommon   | 6            |
| Hylidae        | <i>Pseudacris regilla</i>                  | common     | 7            |
| Ranidae        | <i>Rana muscosa</i>                        | rare       | 1            |
| Plethodontidae | <i>Hydromantes</i><br><i>platycephalus</i> | rare       | 1            |
| Colubridae     | <i>Thamnophis elegans</i>                  | common     | 4            |
| Anguidae       | <i>Elgaria coerulea</i>                    | uncommon   | 2            |

Notable observations:

- Discovery of a new population of *Hydromantes platycephalus* from Middle Emigrant Lake
- Healthy adult *Rana muscosa* found at Dorothy Lake

### APPENDIX 3:

Record of mammal species trapped or seen at each of the re-survey general sites, as well as additional localities, within Yosemite National Park, by date and general locality. Specific localities for each general size are individual traplines, with coordinates taken by GPS at the approximate mid-point of the line.

#### 2003

##### 1. Yosemite Valley:

| Specific locality                      | Latitude | Longitude  | Habitat             |
|----------------------------------------|----------|------------|---------------------|
| Leidig Meadow                          | 37.73797 | 119.60513  | meadow              |
| Eagle Creek, base of Rocky Point       | 37.72982 | 119.61532  | conifer-oak         |
| meadow across from Rocky Point         | 37.73000 | 119.61082  | meadow              |
| El Capitan Meadow                      | 37.72193 | 119.63632  | meadow              |
| Fern Spring                            | 37.71515 | 119.66500  | conifer-oak         |
| Chapel Meadow                          | 37.74133 | 119.59365  | meadow              |
| meadow south of Chapel                 | 37.74048 | 119.59162  | meadow              |
| Yellow Pine Campground, Sentinel Beach | 37.73230 | 119.60800  | meadow, conifer-oak |
| forest slope south of Sentinel Beach   | 37.73055 | 119.60405  | conifer-oak         |
| above Mirror Lake                      | 37.75495 | 119.54604  | conifer-oak         |
| Stoneman Meadow                        | 37.74053 | 119.57217  | meadow              |
| Ahwahnee Meadow                        | 37.74618 | 119.57859  | meadow              |
| forest south of Chapel                 | 37.47078 | 119.59071  | conifer-oak         |
| Happy Isles                            | 37.73267 | -119.55807 | fen meadow          |
| Tenaya Creek                           | 37.75286 | -119.54425 | riparian            |
| lower Indian Creek Canyon              | 37.75236 | -119.58723 | conifer-oak         |

##### Mammal species present, by habitat:

| Family     | Species                          | Habitat                              | Commonness  | # Localities |
|------------|----------------------------------|--------------------------------------|-------------|--------------|
| Talpidae   | <i>Scapanus latimanus</i>        | meadow                               | common      | 7*           |
| Soricidae  | <i>Sorex monticolus</i>          | meadow                               | very common | 6            |
|            | <i>Sorex trowbridgii</i>         | meadow-forest                        | rare        | 1            |
| Sciuridae  | <i>Glaucomys sabrinus</i>        | conifer forest                       | uncommon    | 1            |
|            | <i>Sciurus griseus</i>           | oak-conifer forest                   | common      | 2**          |
|            | <i>Spermophilus beecheyi</i>     | conifer forest                       | common      | 3***         |
| Geomyidae  | <i>Thomomys bottae</i>           | meadow                               | common      | 3            |
| Cricetidae | <i>Peromyscus boylii</i>         | oak-conifer forest                   | very common | 9            |
|            | <i>Peromyscus maniculatus</i>    | oak-conifer forest,<br>fen, riparian | common      | 8            |
|            | <i>Reithrodontomys megalotis</i> | fen, riparian                        | rare        | 2            |
|            | <i>Neotoma macrotis</i>          | oak-conifer forest                   | rare        | 2            |
|            | <i>Microtus longicaudus</i>      | fen, riparian                        | uncommon    | 2            |
|            | <i>Microtus montanus</i>         | meadow                               | very common | 7            |
|            | <i>Spilogale putorius</i>        | oak-conifer forest                   | common      | 2            |

|         |                      |                |        |      |
|---------|----------------------|----------------|--------|------|
| Canidae | <i>Canis latrans</i> | meadow, forest | common | **** |
|---------|----------------------|----------------|--------|------|

\*mounds or surface tunnels observed in 6 meadows in addition to salvaged specimen found.  
observed almost daily along both Southside and Northside drives.  
\*\*commonly observed throughout the Valley floor; two road-kill salvaged specimens preserved.  
\*\*\*commonly observed throughout the valley floor, in campgrounds, dwellings, rock outcrops, and forest-meadow edge.  
\*\*\*\*vocalizing groups were commonly heard at night and very early morning; individuals were seen at multiple sites in the Valley floor.

## 2. Hodgdon Meadow to Crane Flat

| Specific locality                         | Latitude | Longitude | Habitat               |
|-------------------------------------------|----------|-----------|-----------------------|
| Hodgdon Meadow                            | 37.79395 | 119.86431 | meadow                |
| Hodgdon Meadow                            | 37.79611 | 119.86781 | meadow                |
| Crane Flat                                | 37.75425 | 119.80368 | meadow                |
| Crane Flat                                | 37.75515 | 119.80015 | mixed conifer         |
| Crane Flat                                | 37.75813 | 119.80161 | meadow                |
| Crane Flat                                | 37.75937 | 119.80127 | meadow                |
| Crane Flat                                | 37.75731 | 119.80131 | meadow                |
| Crane Flat                                | 37.75139 | 119.79149 | mixed conifer         |
| Crane Flat Campground                     | 37.74597 | 119.79930 | mixed conifer, meadow |
| 3 mi (by rd) E Crane Flat                 | 37.75775 | 119.76990 | mixed conifer         |
| Merced Grove                              | 37.74826 | 119.83747 | conifer, riparian     |
| Big Meadow                                | 37.70283 | 119.74784 | meadow                |
| 0.9 mi E (by rd) Foresta                  | 37.70455 | 119.73331 | chaparral             |
| Tuolumne Creek at Tioga Pass Road         | 37.61096 | 119.71286 | riparian              |
| North Crane Creek at Old Tioga Pass Road  | 37.78981 | 119.83766 | riparian              |
| Yosemite Creek at Tioga Pass Road         | 37.85175 | 119.57310 | riparian              |
| Siesta Lake, 13.4 mi E on Tioga Pass Road | 37.85053 | 119.65900 | meadow                |

### Mammal species present, by habitat:

| Family     | Species                             | Habitat                              | Commonness  | # Localities |
|------------|-------------------------------------|--------------------------------------|-------------|--------------|
| Talpidae   | <i>Scapanus latimanus</i>           | meadow                               | common      | 4*           |
| Soricidae  | <i>Sorex monticolus</i>             | meadow                               | very common | 4            |
|            | <i>Sorex trowbridgii</i>            | meadow-forest                        | rare        | 3            |
| Sciuridae  | <i>Glaucomys sabrinus</i>           | conifer forest                       | uncommon    | 1            |
|            | <b><i>Tamiasciurus douglasi</i></b> | conifer forest,                      | common      | 4            |
|            | <b><i>Spermophilus beecheyi</i></b> | conifer forest                       | common      | 3**          |
|            | <i>Spermophilus lateralis</i>       | conifer forest                       | common      | 1            |
|            | <i>Tamias quadrimaculatus</i>       | conifer forest                       | common      | 3            |
|            | <i>Tamias speciosus</i>             | conifer forest                       | common      | 7            |
| Geomyidae  | <i>Thomomys monticola</i>           | meadow                               | common      | 3            |
| Cricetidae | <i>Peromyscus boylii</i>            | chaparral                            | rare        | 1***         |
|            | <i>Peromyscus maniculatus</i>       | oak-conifer forest,<br>fen, riparian | very common | 15           |

|            |                              |                  |                |   |
|------------|------------------------------|------------------|----------------|---|
|            | <i>Microtus californicus</i> | riparian         | rare           | 1 |
|            | <i>Microtus longicaudus</i>  | fen, riparian    | uncommon       | 6 |
|            | <i>Microtus montanus</i>     | meadow           | rare           | 2 |
| Dipodidae  | <i>Zapus princeps</i>        | meadow, riparian | locally common | 4 |
| Mustelidae | <i>Mustela erminea</i>       | Meadow           | rare           | 1 |

\*fresh mounds and surface runways observed only.

\*\*individual were commonly observed around the campgrounds at both Hodgdon Meadow and Crane Flat.

\*\*\* Brush mice (*Peromyscus boylii*) were encountered only in the burned hillsides above Foresta.

### 3. Chinquapin to Mono Meadow

| Specific locality               | Latitude | Longitude  | Habitat               |
|---------------------------------|----------|------------|-----------------------|
| Mono Meadow trail head          | 37.67037 | 119.58527  | mixed conifer         |
| 0.7 mi W Mono Meadow trail head | 37.66792 | 119.59743  | mixed conifer, meadow |
| south end Pothole Meadows       | 37.69924 | 119.58647  | mixed conifer         |
| Peregoy Meadow                  | 37.66819 | 119.62267  | meadow                |
| Monroe Meadows                  | 37.66191 | 119.66409  | meadow                |
| Monroe Meadows                  | 37.66285 | 119.66467  | riparian, stream side |
| 0.2 mi W Summit Meadow          | 37.67152 | 119.65707  | mixed conifer         |
| 0.2 mi S Chinquapin             | 37.64750 | 119.70387  | mixed conifer         |
| Chinquapin                      | 37.25671 | 119.69941  | mixed conifer         |
| Indian Creek, Chinquapin        | 37.65168 | 119.70079  | riparian              |
| meadow, 600 m NW Monroe Meadows | 37.66596 | -119.66798 | meadow                |

#### Mammal species present, by habitat:

| Family       | Species                       | Habitat                  | Commonness     | # Localities |
|--------------|-------------------------------|--------------------------|----------------|--------------|
| Talpidae     | <i>Scapanus latimanus</i>     | meadow                   | uncommon       | 1*           |
| Soricidae    | <i>Sorex monticolus</i>       | meadow                   | common         | 6            |
|              | <i>Sorex trowbridgii</i>      | conifer forest           | rare           | 1**          |
|              | <i>Sorex palustris</i>        | streamside               | rare           | 1            |
| Aplodontidae | <b><i>Aplodontia rufa</i></b> | riparian, streamside     | locally common | 2            |
| Sciuridae    | <i>Spermophilus beecheyi</i>  | conifer forest           | common         | 2***         |
|              | <i>Spermophilus lateralis</i> | conifer forest           | common         |              |
|              | <i>Tamiasciurus douglasi</i>  | conifer forest           | uncommon       | 1****        |
|              | <i>Tamias quadrimaculatus</i> | conifer forest           | rare           | 1            |
|              | <i>Tamias speciosus</i>       | conifer forest           | common         | 5            |
| Geomyidae    | <i>Thomomys monticola</i>     | meadow                   | common         | 4*****       |
| Cricetidae   | <i>Peromyscus boylii</i>      | conifer forest           | rare           | 1            |
|              | <i>Peromyscus maniculatus</i> | conifer forest, riparian | common         | 6            |
|              | <i>Microtus longicaudus</i>   | meadow, riparian         | common         | 8            |
|              | <i>Microtus montanus</i>      | meadow                   | common         | 4            |
| Dipodidae    | <i>Zapus princeps</i>         | meadow, riparian         | locally common | 4            |
| Mustelidae   | <b><i>Mustela erminea</i></b> | conifer forest           | rare           | 1            |

- \* sign observed only at Chinquapin.  
 \*\* recorded only at Chinquapin.  
 \*\*\* individuals seen at Chinquapin and Bridalveil campground; none captured.  
 \*\*\*\* individuals seen at several places along Glacier Point Road; one road kill specimen was salvaged.  
 \*\*\*\*\* sign of pocket gophers was seen in virtually all meadows we visited; we could find no sign of pocket gophers at Chinquapin, where the species had been previously recorded.

#### 4. upper Lyell Canyon (9800-10,500 ft)

| Specific locality             | Latitude | Longitude | Habitat             |
|-------------------------------|----------|-----------|---------------------|
| upper Lyell Canyon, 9788 ft   | 37.77801 | 119.26115 | mixed conifer       |
| upper Lyell Canyon, 9788 ft   | 37.77719 | 119.26395 | mixed conifer       |
| upper Lyell Canyon, 9788 ft   | 37.77998 | 119.26089 | mixed conifer       |
| upper Lyell Canyon, 10,010 ft | 37.77211 | 119.25828 | talus               |
| upper Lyell Canyon, 10,240 ft | 37.76807 | 119.25506 | meadow, forest edge |
| upper Lyell Canyon, 10,240 ft | 37.76220 | 119.25723 | meadow, riparian    |
| upper Lyell Canyon, 10,565 ft | 37.76358 | 119.25996 | meadow              |

Mammal species present, by habitat:

| Family       | Species                       | Habitat                | Commonness     | # Localities   |
|--------------|-------------------------------|------------------------|----------------|----------------|
| Talpidae     | <i>Scapanus latimanus</i>     | meadow                 | uncommon       | 1*             |
| Soricidae    | <i>Sorex monticolus</i>       | meadow                 | very common    | 6              |
| Ochotonidae  | <i>Ochotona princeps</i>      | talus                  | locally common | 3              |
| Aplodontidae | <i>Aplodontia rufa</i>        | stream side            | locally common | 1*             |
| Sciuridae    | <i>Tamiasciurus douglasi</i>  | conifer forest         | common         | 1*             |
|              | <i>Marmota flaviventris</i>   | talus                  | Common         | 4*             |
|              | <i>Spermophilus beldingi</i>  | meadow                 | common         | 2              |
|              | <i>Spermophilus lateralis</i> | conifer forest, talus  | common         | 4              |
|              | <i>Tamias alpinus</i>         | talus, meadow edge     | rare           | 2*****         |
|              | <i>Tamias speciosus</i>       | conifer forest, meadow | very common    | 5              |
| Geomyidae    | <i>Thomomys monticola</i>     | meadow                 | common         | 1*****         |
| Cricetidae   | <i>Peromyscus maniculatus</i> | conifer forest, meadow | very common    | 7              |
|              | <i>Peromyscus truei</i>       | conifer forest, talus  | uncommon       | 3              |
|              | <i>Microtus longicaudus</i>   | meadow, riparian       | common         | 7              |
|              | <i>Microtus montanus</i>      | meadow                 | rare           | 1              |
|              | <i>Phenacomys intermedius</i> | heather, talus         | rare           | 2              |
| Dipodidae    | <i>Zapus princeps</i>         | riparian, meadow       | uncommon       | 5              |
| Mustelidae   | <i>Martes americana</i>       | conifer forest         |                | 1 <sup>=</sup> |
| Procyonidae  | <i>Procyon lotor</i>          | trail                  |                | 1 <sup>=</sup> |
| Cervidae     | <i>Odocoileus hemionus</i>    | meadow                 |                | 1              |

\* mole sign was observed along the John Muir Trail above the footbridge, at approximately 9850 feet elevation.

\*\* mountain beaver sign was observed along both Lyell Fork and Maclure Creek.

\*\*\* chickarees were commonly seen among the lodgepole pine from camp to 10,000 feet elevation.  
 \*\*\*\* yellow-bellied marmots were seen commonly in all rock outcrops and talus slopes from camp at 9788 feet to the highest trapline at 10,565 feet.  
 \*\*\*\*\* alpine chipmunks were encountered only at the highest elevations sampled (10,240 and 10,565 ft); only two individuals were observed and one was trapped.  
 \*\*\*\*\* pocket gopher sign was seen only in the small meadows near camp at 9788 ft elevation; no sign was seen in the larger meadows above 10,000 feet.  
 = two pine martens were seen in the immediate vicinity of camp.  
 = foot prints of a raccoon were seen on the trail between the two meadows at 10,240 and 10,565 feet elevation.

## 5. Glen Aulin – McGee Lake

| Specific locality   | Latitude | Longitude | Habitat                               |
|---------------------|----------|-----------|---------------------------------------|
| Glen Aulin, 7914 ft | 37.91355 | 119.42225 | mixed conifer, shrub, granite slab    |
| Glen Aulin, 8175 ft | 37.91586 | 119.41835 | mixed conifer, shrub, granite slab    |
| Glen Aulin, 7880 ft | 37.91360 | 119.42421 | mixed conifer, shrub, granite slab    |
| Glen Aulin, 2389 m  | 37.91170 | 119.42495 | meadow, burn                          |
| Glen Aulin, 2389 m  | 37.91245 | 119.42653 | meadow, burn                          |
| Glen Aulin, 2400 m  | 37.91311 | 119.42397 | meadow, burn                          |
| Glen Aulin, 7850 ft | 37.91042 | 119.41607 | meadow, burn                          |
| Glen Aulin          | 37.91343 | 119.42860 | meadow, burn                          |
| Glen Aulin          | 37.91543 | 119.43118 | meadow, burn                          |
| McGee Lake, 8190 ft | 37.90070 | 119.43209 | mixed conifer                         |
| McGee Lake, 8171 ft | 37.90236 | 119.42969 | riparian (lake edge)                  |
| McGee Lake, 2510 m  | 37.90344 | 119.43121 | open conifer forest, granite outcrops |

Mammal species present, by habitat:

| Family     | Species                       | Habitat              | Commonness  | # Localities |
|------------|-------------------------------|----------------------|-------------|--------------|
| Talpidae   | <i>Scapanus latimanus</i>     | meadow               | common      | 1*           |
| Soricidae  | <i>Sorex monticolus</i>       | meadow               | common      | 4            |
|            | <i>Sorex lyelli</i>           | meadow-forest        | uncommon    | 2            |
| Sciuridae  | <i>Spermophilus lateralis</i> | forest, slab         | common      | 7            |
|            | <i>Tamias speciosus</i>       | forest, slab         | very common | 5            |
|            | <i>Tamiasciurus douglasi</i>  | open forest          | common      | **           |
| Geomyidae  | <i>Thomomys monticola</i>     | meadow               | rare        | 1            |
| Cricetidae | <i>Peromyscus maniculatus</i> | forest, meadow, slab | very common | 8            |
|            | <i>Peromyscus truei</i>       | forest, scrub, slab  | common      | 4            |
|            | <i>Neotoma cinerea</i>        | oak-conifer forest   | uncommon    | 3            |
|            | <i>Microtus longicaudus</i>   | meadow, riparian     | common      | 5            |
|            | <i>Microtus montanus</i>      | meadow, riparian     | rare        | 2            |
|            | <i>Phenacomys intermedius</i> | slab edge            | rare        | 1            |
| Dipodidae  | <i>Zapus princeps</i>         | meadow, riparian     | uncommon    | 2            |
| Mustelidae | <i>Mustela erminea</i>        | conifer, scrub       | rare        | 1            |

\* mole sign was seen at only one spot in Glen Aulin.

\*\* chickarees were commonly seen on the floor of Glen Aulin around our camp.

## 2004

### **1. White Wolf, Porcupine Flat, Yosemite Creek, Lehamite Creek, Mt. Hoffmann**

| Specific Locality                        | Latitude | Longitude | Habitat                        |
|------------------------------------------|----------|-----------|--------------------------------|
| 0.9 mi W Porcupine Flat on Hwy 120       | 37.81435 | 119.57728 | mixed conifer                  |
| 3.8 mi E. White Wolf entrance on Hwy 120 | 37.83979 | 119.59254 | Jeffrey pine, chaparral        |
| Lehamite Creek                           | 37.77441 | 119.56924 | mixed conifer                  |
| Lehamite Creek                           | 37.77991 | 119.56425 | mixed conifer                  |
| McSwain Meadow                           | 37.85193 | 119.62811 | meadow                         |
| Old Tioga Mine Rd.                       | 37.84309 | 119.62314 | meadow                         |
| Old Tioga Mine Rd.                       | 37.84469 | 119.61269 | chaparral, mixed conifer       |
| Old Tioga Mine Rd.                       | 37.84631 | 119.63327 | mixed conifer                  |
| Porcupine Flat                           | 37.80489 | 119.56405 | mixed conifer                  |
| Porcupine Flat                           | 37.80759 | 119.56455 | mixed conifer                  |
| SE slope Mt. Hoffmann                    | 37.84097 | 119.49964 | mixed conifer, meadow          |
| Snow Creek at Hwy. 120                   | 37.81763 | 119.51022 | riparian meadow, mixed conifer |
| Snow Flat                                | 37.82637 | 119.49919 | meadow                         |
| White Wolf Campground                    | 37.86644 | 119.64773 | mixed conifer, riparian        |
| White Wolf Campground                    | 37.86806 | 119.64837 | mixed conifer, riparian        |
| White Wolf entrance on Hwy 120           | 37.85723 | 119.64744 | mixed conifer                  |
| Yosemite Creek tributary                 | 37.8497  | 119.57801 | mixed conifer, oak, chaparral  |

Mammal species present, by habitat:

| Family     | Species                       | Habitat                     | Commonness  | # Localities |
|------------|-------------------------------|-----------------------------|-------------|--------------|
| Soricidae  | <i>Sorex monticolus</i>       | forest, meadow              | common      | 6            |
|            | <i>Sorex palustris</i>        | riparian                    | rare        | 1*           |
|            | <i>Sorex trowbridgii</i>      | riparian                    | uncommon    | 1            |
| Sciuridae  | <i>Spermophilus beecheyi</i>  | roadsides, granite outcrops | uncommon    | 1            |
|            | <i>Spermophilus beldingi</i>  | dry meadows                 | uncommon    | 1            |
|            | <i>Spermophilus lateralis</i> | conifer forest              | common      | 4            |
|            | <i>Tamiasciurus douglasii</i> | conifer forest              | common      | 5****        |
|            | <i>Marmota flaviventris</i>   | conifer forest, meadow      | common      | 1*****       |
|            | <i>Glaucomys sabrinus</i>     | conifer forest              | uncommon    | 1***         |
|            | <i>Tamias senex</i>           | conifer forest              | uncommon    | 2**          |
|            | <i>Tamias speciosus</i>       | conifer forest              | common      | 9            |
| Geomyidae  | <i>Thomomys monticola</i>     | meadows                     | common      | 3            |
| Cricetidae | <i>Peromyscus boylii</i>      | forest, riparian            | uncommon    | 2=           |
|            | <i>Peromyscus maniculatus</i> | grassland, forest, riparian | very common | 10           |
|            | <i>Neotoma cinerea</i>        | riparian, forest            | uncommon    | 1=           |
|            | <i>Microtus longicaudus</i>   | riparian, meadow            | common      | 10           |
|            | <i>Microtus montanus</i>      | wet meadows                 | common      | 5=           |
|            | <i>Phenacomys intermedius</i> | meadow- conifer interface   | rare        | 1=           |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                       |          |        |   |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|----------|--------|---|
| Dipodidae                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <i>Zapus princeps</i> | riparian | common | 2 |
| <p>* Grinnell and colleagues regularly trapped water shrews at most localities, but we found them less common. This may be largely due to our use of live traps, rather than strategically placed snap traps along creeks.</p> <p>** <i>T. senex</i> was an abundant species in 1915, but we found them to be rare, perhaps replaced by <i>T. speciosus</i> either actively or passively. Since 1915, the MVZ has acquired only two other specimens of <i>T. senex</i> (1966).</p> <p>*** We caught one specimen on forest floor among Jeffrey Pines. We did not actively trap for this nocturnal species, so it may be quite abundant if searched for specifically.</p> <p>**** While highly abundant, most of our specimens of <i>T. douglasii</i> were obtained as roadkill. They are difficult to live trap in tomahawk traps, but on this trip two were caught in tomahawks and one caught in a Sherman live trap.</p> <p>***** Two juveniles were taken at the base of rocky outcrops along a creek that ran through forest.</p> <p>= This species is commonly associated with oak woodlands and these captures probably represent the edge of its distribution in this part of the park.</p> <p>= This species was much more common in the past.</p> <p>= Where highly common, we took ear clips of live animals and released them otherwise unharmed.</p> <p>= This species was collected at Snow Flat, a new locality for the species in the park.</p> |                       |          |        |   |

## 2. Boothe Lake, Fletcher Lake, Townsley Lake, Vogelsang Lake, Merced Lake, Washburn Lake

| Specific Locality                          | Latitude | Longitude | Habitat                      |
|--------------------------------------------|----------|-----------|------------------------------|
| 0.7 mi NW Washburn Lake                    | 37.72604 | 119.39541 | riparian, mixed conifer      |
| 1 km E Merced Lake                         | 37.73946 | 119.40217 | mixed conifer, aspen, meadow |
| 1 km E of Merced Lake on Lewis Creek       | 37.73775 | 119.39605 | mixed conifer, riparian      |
| 1 mi E Merced Lake                         | 37.74036 | 119.39641 | mixed conifer, chaparral     |
| 1.5 mi SE Merced Lake                      | 37.73393 | 119.39339 | mixed conifer, meadow        |
| 2 mi SE Merced Lake                        | 37.73031 | 119.39230 | granite slab                 |
| Merced Lake                                | 37.74051 | 119.41345 | chaparral                    |
| Merced Lake                                | 37.74069 | 119.41023 | mixed conifer, aspen, meadow |
| Merced Lake                                | 37.74090 | 119.40804 | mixed conifer, aspen, meadow |
| Ranger Station, east end Merced Lake basin | 37.73314 | 119.39529 | mixed conifer                |
| Evelyn Lake                                | 37.80485 | 119.32759 | mixed conifer, meadow        |
| east end Townsley lake                     | 37.79125 | 119.32805 | talus, meadow                |
| west end Townsley Lake                     | 37.7965  | 119.33623 | meadow, shrub edge           |
| camp, east end Fletcher Lake               | 37.79826 | 119.33917 | mixed conifer                |
| east end Fletcher Lake                     | 37.79778 | 119.33617 | willow, meadow               |
| Fletcher Creek                             | 37.78997 | 119.35275 | mixed conifer, meadow        |
| Fletcher Creek                             | 37.79036 | 119.35120 | mixed conifer, meadow        |
| Fletcher Lake                              | 37.79652 | 119.33929 | mixed conifer, meadow        |
| Fletcher Lake                              | 37.79982 | 119.34177 | mixed conifer, meadow        |
| Boothe Lake                                | 37.79834 | 119.34946 | mixed conifer                |
| Outlet Creek, Vogelsang Lake               | 37.78949 | 119.34650 | riparian, rocky              |
| Vogelsang Lake                             | 37.78769 | 119.34690 | lakeshore, talus             |
| Vogelsang Lake                             | 37.78820 | 119.34220 | lakeshore, talus             |

### Mammal species present, by habitat:

| Family    | Species                 | Habitat        | Commonness | # Localities |
|-----------|-------------------------|----------------|------------|--------------|
| Soricidae | <i>Sorex monticolus</i> | forest, meadow | uncommon   | 11           |

|            |                               |                             |             |       |
|------------|-------------------------------|-----------------------------|-------------|-------|
|            | <i>Sorex lyelli</i>           | meadow, stream edge         | uncommon    | 2     |
|            | <i>Sorex palustris</i>        | riparian                    | rare        | 1     |
|            | <i>Sorex trowbridgii</i>      | riparian                    | uncommon    | 1     |
| Talpidae   | <i>Scapanus latimanus</i>     | conifer forest              | common      | 1**** |
| Sciuridae  | <i>Spermophilus beecheyi</i>  | aspen/conifer forest        | common      | 2*    |
|            | <i>Spermophilus beldingi</i>  | dry meadows, lake shores    | common      | 4     |
|            | <i>Spermophilus lateralis</i> | conifer forest              | common      | 6     |
|            | <i>Tamiasciurus douglasii</i> | conifer forest              | common      | 1**   |
|            | <i>Marmota flaviventris</i>   | conifer forest, meadow      | common      | 1***  |
|            | <i>Tamias alpinus</i>         | talus, meadow edge          | common      | 6     |
|            | <i>Tamias quadrimaculatus</i> | conifer forest              | rare        | 1     |
|            | <i>Tamias speciosus</i>       | conifer forest              | common      | 5     |
| Geomyidae  | <i>Thomomys monticola</i>     | meadows                     | common      | 3     |
| Cricetidae | <i>Peromyscus boylii</i>      | forest, riparian            | uncommon    | 3     |
|            | <i>Peromyscus maniculatus</i> | grassland, forest, riparian | very common | 15    |
|            | <i>Microtus longicaudus</i>   | riparian, meadow            | common      | 10    |
|            | <i>Microtus montanus</i>      | wet meadows                 | common      | 7     |
| Dipodidae  | <i>Zapus princeps</i>         | riparian                    | common      | 7     |
| Mustelidae | <i>Mustela erminea</i>        | meadow                      | uncommon    | 1     |

\* *S. beecheyi* was collected at Merced Lake in the past and this represents the upper limit for this species on the Merced drainage.

\*\* *T. douglassi* was only caught in one place, near camp at Merced Lake, but was highly abundant in the forest on the east side of the lake. We also observed this species among lodgepole pine at and around Fletcher Lake where the forest is sparse.

\*\*\* Marmots were quite common in the open grassy areas around lakes, but only one was secured; found dead on a trail, possibly dropped by a predator.

\*\*\*\* One mole was caught by hand in our camp at Merced Lake. Marmots were seen; sign of coyotes were seen.

### 3. Tamarack Flat, Aspen Valley, Cascades

| Specific Locality             | Latitude | Longitude | Habitat               |
|-------------------------------|----------|-----------|-----------------------|
| Aspen Valley                  | 37.82534 | 119.77221 | mixed conifer, meadow |
| Aspen Valley                  | 37.82085 | 119.77466 | mixed conifer, meadow |
| Cascades                      | 37.724   | 119.71115 | mixed oak/conifer     |
| Merced River at Wildcat Creek | 37.7206  | 119.71456 | willows, streambank   |
| Tamarack Flat                 | 37.75456 | 119.74298 | chaparral             |

#### Mammal species present, by habitat:

| Family     | Species                       | Habitat                  | Commonness  | # Localities   |
|------------|-------------------------------|--------------------------|-------------|----------------|
| Soricidae  | <i>Sorex monticolus</i>       | forest, meadow           | common      | 1              |
| Sciuridae  | <i>Spermophilus beecheyi</i>  | aspen/conifer forest     | common      | 2*             |
|            | <i>Spermophilus lateralis</i> | conifer forest           | common      | 6              |
|            | <i>Sciurus griseus</i>        | conifer forest           | common      | 1              |
|            | <i>Tamiasciurus douglasii</i> | conifer forest           | common      | 3**            |
|            | <i>Tamias quadrimaculatus</i> | conifer forest           | uncommon    | 3***           |
|            | <i>Tamias speciosus</i>       | conifer forest           | common      | 1****          |
| Geomyidae  | <i>Thomomys monticola</i>     | meadows                  | common      | 1 <sup>=</sup> |
| Cricetidae | <i>Peromyscus boylii</i>      | forest, riparian         | common      | 2 <sup>=</sup> |
|            | <i>Peromyscus maniculatus</i> | meadow, forest, riparian | very common | 4              |

|            |                             |                  |          |                   |
|------------|-----------------------------|------------------|----------|-------------------|
|            | <i>Microtus longicaudus</i> | riparian, meadow | common   | 1                 |
|            | <i>Microtus montanus</i>    | wet meadows      | rare     | 1 <sup>==</sup>   |
| Mustelidae | <i>Mustela erminea</i>      | meadow           | uncommon | 1                 |
|            | <i>Spilogale putorius</i>   | forest           | common   | 1 <sup>====</sup> |

\* Ground squirrels were observed in a variety of habitats.

\*\* *T. douglasii* were observed in all forested habitats, but only trapped at Tamarack Flat. Other specimens were recovered as roadkill.

\*\*\* Two specimens were taken at Aspen Valley and two were taken as roadkill near Crane Flat.

\*\*\*\* Only *T. speciosus* was taken at Tamarack Flat in both Sherman and Tomahawk traps.

= *T. monticola* was abundant along the edges of Aspen Valley.

= *P. boylii* was the most common species captured near Cascades on Hwy. 140 in oak/conifer forest.

= This is apparently the first record of *M. montanus* at Aspen Valley.

= One specimen was obtained as a roadkill.

## 2005

### 1. Crane Flat, Merced Grove, Hazel Green – western margins of Yosemite National Park

| Specific Locality              | Latitude | Longitude  | Habitat                                      |
|--------------------------------|----------|------------|----------------------------------------------|
| Crane Flat                     | 37.75139 | -119.79149 | mixed conifer (same site as trapped in 2003) |
| Crane Flat Ranger Station road | 37.75331 | -119.80890 | manzanita scrub, mixed conifer               |
| Crane Flat                     | 37.75817 | -119.80033 | mixed conifer, oak                           |
| Crane Flat                     | 37.75470 | -119.80420 | mixed conifer, oak                           |
| Crane Flat                     | 37.75629 | -119.80145 | mixed conifer, oak                           |
| Crane Flat, along Crane Creek  | 37.74865 | -119.79209 | mixed conifer, riparian                      |
| 0.5 mi SE Hazel Greenft        | 37.76312 | -119.85983 | <i>Ceanothus</i> chaparral, old burn         |
| Merced Grove Trailhead         | 37.76208 | -119.84264 | mixed forest, <i>Ceanothus</i> chaparral     |
| Merced Grove                   | 37.74782 | -119.84052 | mixed forest                                 |
| Merced Grove                   | 37.74899 | -119.83862 | mixed forest, riparian                       |

#### Mammal species present, by habitat:

| Family       | Species                         | Habitat                                   | Commonness  | # Localities |
|--------------|---------------------------------|-------------------------------------------|-------------|--------------|
| Soricidae    | <i>Sorex trowbridgii</i>        | wet meadow,<br><i>Ceanothus</i> chaparral | common      | 5            |
| Sciuridae    | <i>Tamias quadrimaculatus</i>   | mixed conifer                             | common      | 6            |
|              | <i>Tamias speciosus</i>         | mixed conifer                             | very common | 5            |
|              | <i>Spermophilus beecheyi</i>    | mixed conifer                             | common      | 4            |
| Heteromyidae | <i>Chaetodipus californicus</i> | <i>Ceanothus</i> chaparral                | uncommon    | 1*           |
| Cricetidae   | <i>Neotoma macrotis</i>         | <i>Ceanothus</i> chaparral                | uncommon    | 1**          |
|              | <i>Peromyscus boylii</i>        | oak, mixed conifer,<br>chaparral          | very common | 2            |
|              | <i>Peromyscus truei</i>         | <i>Ceanothus</i> chaparral                | very common | 2***         |
|              | <i>Peromyscus maniculatus</i>   | oak, mixed conifer,<br>chaparral          | abundant    | 7            |

\* First record for California pocket mouse from the Park, on YNP edge east of Hazen Green; elevational range increase of about 3000 ft

\*\* Elevational range increase of 1500 ft

\*\*\* First record for piñon mouse on west side of Park, on YNP edge east of Hazen Green; elevational range increase of about 3000 ft

## 2. Upper Return Creek, Virginia Canyon

| Specific Locality                            | Latitude | Longitude  | Habitat                                           |
|----------------------------------------------|----------|------------|---------------------------------------------------|
| Upper Return Creek, Virginia Canyon, 9900 ft | 38.06129 | -119.33899 | lodgepole and whitebark pine, willows along creek |

### Mammal species present, by habitat

| Family      | Species                       | Habitat               | Commonness | # Localities |
|-------------|-------------------------------|-----------------------|------------|--------------|
| Soricidae   | <i>Sorex lyelli</i>           | stream edge           | rare       | 1            |
|             | <i>Sorex monticolus</i>       | stream edge           | common     | 1            |
|             | <i>Sorex palustris</i>        | stream edge           | rare       | 1            |
|             | <i>Sorex tenellus</i>         | stream edge           | rare       | 1*           |
| Sciuridae   | <i>Spermophilus beldingi</i>  | open meadows          | abundant   | 1            |
|             | <i>Spermophilus lateralis</i> | open conifer forest   | uncommon   | 1            |
|             | <i>Tamias alpinus</i>         | open conifer forest   | uncommon   | 1            |
|             | <i>Tamias speciosus</i>       | open conifer forest   | uncommon   | 1            |
| Geomyidae   | <i>Thomomys monticola</i>     | open meadow           | common     | 1            |
| Cricetidae  | <i>Peromyscus maniculatus</i> | open conifer forest   | uncommon   | 1            |
|             | <i>Microtus longicaudus</i>   | open forest, riparian | uncommon   | 1            |
|             | <i>Phenacomys intermedius</i> | open conifer forest   | uncommon   | 1            |
| Dipodidae   | <i>Zapus princeps</i>         | riparian              | common     | 1            |
| Mustelidae  | <i>Mustela frenata</i>        | gopher burrow         | uncommon   | 1            |
| Talpidae    | <i>Scapanus latimanus</i>     |                       |            | 1**          |
| Ochotonidae | <i>Ochotona princeps</i>      |                       |            | 1***         |

\* first record for Inyo shrew from Yosemite National Park

\*\* sight record of fresh mole runway systems

\*\*\* sight records of animals, fecal piles, hay piles, and vocalizations on two talus slopes, one adjacent to Virginia Pass and the second at the eastern base of Virginia Peak, both in the upper part of the Return Creek basin

## 3. Vicinity of Tuolumne Meadows

| Specific Locality                           | Latitude | Longitude  | Habitat                                                                     |
|---------------------------------------------|----------|------------|-----------------------------------------------------------------------------|
| Juniper Ridge, Tuolumne Meadows 8665 feet   | 37.88358 | -119.36340 | lodgepole pine forest; open granite, talus                                  |
| west base Fairview Dome, Yosemite 8385 feet | 37.87649 | -119.41609 | lodgepole pine, western white pine, red fir, mountain hemlock; open granite |

### Mammal species present, by habitat:

| Family    | Species                 | Habitat           | Commonness | # Localities |
|-----------|-------------------------|-------------------|------------|--------------|
| Soricidae | <i>Sorex monticolus</i> | forest-talus edge | uncommon   | 1            |

|            |                               |                     |             |   |
|------------|-------------------------------|---------------------|-------------|---|
| Sciuridae  | <i>Spermophilus beldingi</i>  | open meadows        | common      | 1 |
|            | <i>Spermophilus lateralis</i> | open conifer forest | common      | 2 |
|            | <i>Tamias speciosus</i>       | open conifer forest | very common | 2 |
| Cricetidae | <i>Peromyscus maniculatus</i> | open conifer forest | uncommon    | 1 |

note: sign (active burrows) of both moles (*Scapanus latimanus*) and pocket gophers (*Thomomys monticola*) were observed at both the Juniper Ridge and Fairview Dome trap sites.

#### 4. Upper Lyell Canyon (10,240 – 10,600 ft)

| Specific Locality             | Latitude | Longitude  | Habitat                                         |
|-------------------------------|----------|------------|-------------------------------------------------|
| upper Lyell Canyon, 10,240 ft | 37.76807 | -119.25506 | whitebark pine, open meadow, talus, stream edge |
| upper Lyell Canyon, 10,565 ft | 37.76358 | -119.25996 | whitebark pine, open meadow, talus, stream edge |

Mammal species present, by habitat:

| Family      | Species                       | Habitat                         | Commonness  | # Localities |
|-------------|-------------------------------|---------------------------------|-------------|--------------|
| Soricidae   | <i>Sorex monticolus</i>       | open meadow, talus, stream edge | very common | 1            |
|             | <i>Sorex palustris</i>        | stream edge                     | uncommon    | 1            |
|             | <i>Sorex tenellus</i>         | stream edge                     | uncommon    | 1            |
| Sciuridae   | <i>Spermophilus beldingi</i>  | open meadow                     | common      | 2            |
|             | <i>Spermophilus lateralis</i> | open conifer forest             | common      | 1            |
|             | <i>Tamias alpinus</i>         | open conifer forest             | uncommon    | 1            |
|             | <i>Tamias speciosus</i>       | open conifer forest             | uncommon    | 2            |
|             | <i>Peromyscus maniculatus</i> | open conifer forest             | uncommon    | 1            |
| Cricetidae  | <i>Microtus longicaudus</i>   | open conifer forest             | common      | 2            |
|             | <i>Microtus montanus</i>      | stream edge                     | uncommon    | 1            |
|             | <i>Phenacomys intermedius</i> | open conifer forest             | uncommon    | 1            |
| Ochotonidae | <i>Ochotona princeps</i>      | talus                           | uncommon    | 1            |
| Mustelidae  | <i>Mustela erminea</i>        | talus edge                      | uncommon    | 1            |

note: marmots were common; the specimen of the Inyo shrew, *Sorex tenellus*, is the second record of this rare shrew for Yosemite National Park.

#### 5. Dorothy Lake, northeast end Grace Meadows

| Specific Locality                  | Latitude  | Longitude  | Habitat                            |
|------------------------------------|-----------|------------|------------------------------------|
| Dorothy Lake, 9444 ft              | 38.176090 | -119.59468 | willow, lodgepole pine forest      |
| Dorothy Lake, 9395 ft              | 38.170610 | -119.59460 | stream edge, lodgepole pine forest |
| Dorothy Lake, 9430 ft              | 38.169080 | -119.59505 | talus, willows                     |
| northeastern Grace Meadow, 9060 ft | 38.162540 | -119.60461 | riparian                           |

Mammal species present, by habitat:

| Family    | Species                 | Habitat                         | Commonness | # Localities |
|-----------|-------------------------|---------------------------------|------------|--------------|
| Soricidae | <i>Sorex monticolus</i> | open meadow, talus, stream edge | common     | 2            |

|             |                              |                     |          |   |
|-------------|------------------------------|---------------------|----------|---|
|             | <i>Sorex palustris</i>       | stream edge         | common   | 2 |
| Sciuridae   | <i>Spermophilus beldingi</i> | open meadow         | common   | 2 |
|             | <i>Tamias speciosus</i>      | open conifer forest | uncommon | 2 |
| Cricetidae  | <i>Microtus longicaudus</i>  | open conifer forest | common   | 3 |
| Dipodidae   | <i>Zapus princeps</i>        | Riparian            | common   | 2 |
| Ochotonidae | <i>Ochotona princeps</i>     | talus               | common   | 1 |

note: *Peromyscus maniculatus*, a typically highly abundant species was absent from this locality and was rare in other high elevation sites this year. Sign of pocket gophers, *Thomomys monticola*, was abundant. We also observed pine marten, marmots, black bear, and deer. Chickaree were observed in camp and elsewhere, but were not common.

## 6. Kerrick Meadow

| Specific Locality       | Latitude | Longitude  | Habitat               |
|-------------------------|----------|------------|-----------------------|
| Kerrick Meadow, 9476 ft | 38.11129 | -119.48180 | lodgepole pine forest |
| Kerrick Meadow, 9368 ft | 38.11107 | -119.48164 | lodgepole pine forest |
| Kerrick Meadow, 9509 ft | 38.11332 | -119.48162 | lodgepole pine forest |

Mammal species present, by habitat:

| Family    | Species                       | Habitat               | Commonness | # Localities |
|-----------|-------------------------------|-----------------------|------------|--------------|
| Sciuridae | <i>Spermophilus lateralis</i> | lodgepole pine forest | common     | 2            |
|           | <i>Tamias alpinus</i>         | lodgepole pine forest | uncommon   | 1*           |

\* northern-most record of the Alpine chipmunk from the Sierra Nevada.