3.2 - Wildlife

3.21) Wildlife Monitoring - Science and Natural Resources Management, SEKI

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EXECUTIVE SUMMARY

Wildlife fire effects monitoring was initiated in the East Fork Kaweah River drainage as part of the Mineral King Risk Reduction Project. The monitoring focused on rodents because of the large number of species present, their specificity to habitat structure and composition, and their importance to the ecosystem. In 1998, the monitoring concentrated on two components: 1) permanent monitoring plots to document long-term changes in rodent populations at a few of the most widespread or important habitats, and 2) serendipity surveys to determine the species and relative abundance of rodents in a majority of the drainage's major habitats for drainage-wide evaluation of fire effects (**Fig. 3.21-1**).

In the East Fork one-hectare long-term monitoring plots were monitored in mature sequoia forest at Atwell Grove and in westside ponderosa pine forest. The 1,020 trapnights at the Atwell Plot produced 645 rodent captures. The postburn population estimate of 70 rodents/ha in 1998 was twice as high as the 1996 and 1997 postburn population estimates and over four times as many rodents in the preburn population. With ninety-four percent of the captures, the deer mouse (*Peromyscus maniculatus*) was the most abundant postburn rodent at the Atwell Plot. Other rodents included a few captures of the lodgepole chipmunk (*Tamias speciosus*), northern flying squirrel (*Glaucomys sabrinus*), long-tailed vole (*Microtus longicaudus*), and brush mouse *(Peromyscus boylii*). The 1,138 trapnights at the Ponderosa Plot produced 178 rodent captures with a population estimate of 20 rodents. This was similar to the preburn estimates. The species composition changed from a nearly equal balance between deer mice (*Peromyscus maniculatus*) and brush mice (*Peromyscus boylii*) to a population that is predominantly deer mice.

Serendipity sampling in the East Fork was done in aspen/sagebrush, aspen wetland, boulder field, black oak, canyon live oak, conifer/lake edge, foothill annual grassland, wet meadow, and wet meadow/palustrine environments. Deer mice (*Peromyscus maniculatus*) dominated all but the oak sites which contained primarily brush mice (*Peromyscus boylii*). Areas favored by deer mice were characterized as high-elevation dry, grassy, and mid-elevation moist sites. In the perimeter of the 1996 Kaweah Fire, deer mice, California pocket mice (*Chaetodipus californicus*), and western harvest mice (*Reithrodontomys megalotus*) increased in areas of chamise. This was an expected response to the increase in herbaceous vegetation and loss of shrub cover following the fire. Of the larger animals, both ringtail (*Bassariscus astutus*) and fisher (*Martes pennanti*) were found in mixed conifer forest, and pine martin (*Martes americana*) and chickaree (*Tamiasciurus douglasi*)

Additionally, in the Middle Fork watershed, two two-tenths hectare long-term plots were sampled in chamise chaparral with a total of 1,680 trapnights and 326 captures. The plots were burned November 10, 1980. One plot (Plot 1CHF) was burned by a headfire, and the other (Plot 2CHF) straddled the burn perimeter. Seventeen and a half years after the burn, the population estimate of 26 rodents at Plot 1CHF was forty-three percent less than the preburn population and about sixty-seven percent less than the first early-summer postburn population. Species composition varied between the preburn condition, the first two years after the burn, and the summer of 1998. Originally the site was dominated by pinion mice (*Peromyscus truei*) and dusky-footed woodrats (*Neotoma fuscipes*). In 1998, it was primarily California mice (*Peromyscus californicus*) and brush mice (*Peromyscus boylii*). Plot 2CHF had an estimate of 44 rodents, predominantly brush mice and California mice. The rodent fauna was similar on both sides of the 1980 burn perimeter even though the structure of the vegetation was very different with the burned side having less height and greater stem density. were caught in sequoia grove. Ringtail were also captured in riparian forest.

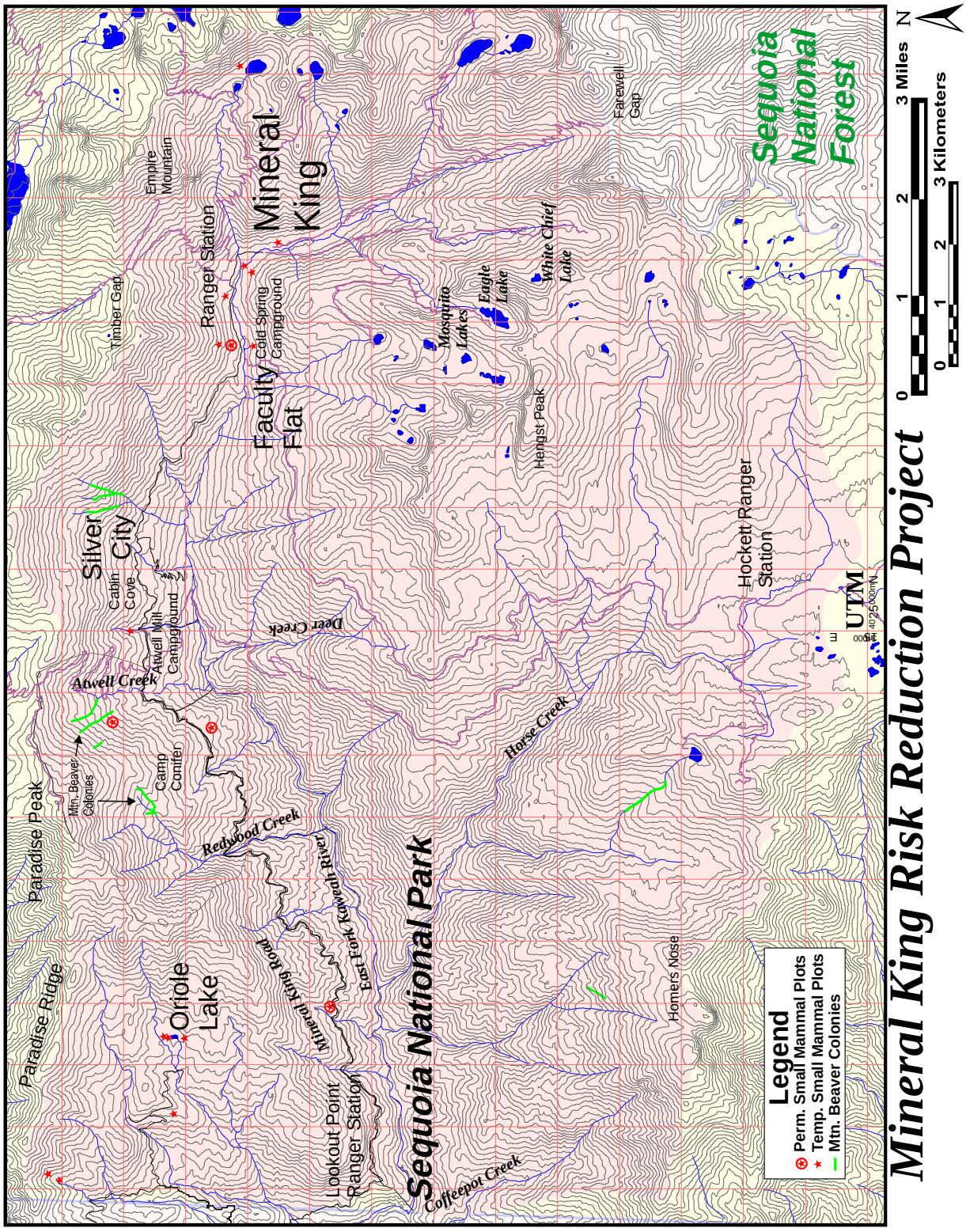

Figure 3.21-1. Location of small mammal live trapping sites and location of mountain beaver colonies.

Four more colonies of mountain beaver (*Aplodontia rufa*) were located in the East Fork Kaweah. All were in combustible vegetation types. One site burned in 1995.

INTRODUCTION

This work was initiated to evaluate the effects of the Mineral King Risk Reduction Project (MKRRP) on selected fauna. There is considerable existing literature on fire effects on wildlife, and it demonstrates a broad range of responses from favorable to unfavorable for individual species. It is very likely that fire will cause changes in the small mammal community. To understand local responses, it is prudent to have local data under conditions typical of local burns. This report summarizes the fourth year of field surveys. Two other additional sites were also monitored. These include plots with the 1996 Kaweah Burn and several plots established following a 1980 prescribed burn in the Middle Fork of the Kaweah River.

This work concentrated on small mammals for several reasons. a) First, the Mineral King area contains a relatively large number of sympatric native rodents. There are at least eleven species of rats and mice present. They range from generalists like *Peromyscus maniculatus* which occurs in a wide range of habitats and elevations to other species like *Chaetodipus californicus* which has much more specificity in its habitat requirements. b) Most rodents consume significant quantities of vegetation, and some are arboreal or otherwise dependent on plants for cover. This links them to floral composition and structure, two things that are normally affected by fire. c) Rodents do not have large home ranges. The species of rats and mice present in the East Fork Kaweah drainage typically have home ranges that are under 0.6 ha (Zeiner *et al.* 1990). Because the individuals do not roam far, rodent populations can be correlated to more discrete features of their environments than animals occupying larger areas. d) Rodents have short life histories with rapid development and maturation. Some of the species present in the MKRRP have been reported to be reproductive in about 50 days after birth, and most small mammals survive little more than a year in the wild (Orr 1976), some even less. Young disperse after being weaned. This all contributes to high potential for measurable adjustments to the rodent population structure as the habitat changes. e) Rodents are a major source of food for predatory birds, mammals, and reptiles. Rodent success or failure has a major influence on the success or failure of many larger animals. f) Finally, rodents are easy to trap, handle, and mark. It takes little time to become familiar with the local species, and there is an abundant literature providing methodologies. Until the recent discovery of hantavirus, their handling seemed to present little risk to the investigators.

Because fire can have significant effects to both the structure and vegetative composition of the habitat and because rodents present a diverse array of easy to handle respondents to habitat changes, they make good cost-effective, ecologically-significant animals for monitoring fire effects. Other major groups for which we would like to have local data, but which was not collected on this study for lack of resources include birds and insects. Both of the these groups are represented by large numbers of species, but their documentation requires more observer skill and larger plots for birds.

There are a number of smaller groups for which we have special interest. These include mountain beaver, forest carnivores (e.g. martin, fisher, ringtail, etc.), mule deer, bats, and brown-headed cowbirds. These represent a range of public and agency interests.

METHODS

Rodent populations were investigated from two perspectives: 1) long-term monitoring of select areas, and 2) serendipity surveys of the most common and unique habitats. The long-term monitoring is intended to document long-term changes in rodent populations and their habitat following fire under known conditions. Serendipity surveys inventory rodent species and their relative abundance within both common and unique environments to facilitate large-scale assessment of potential fire effects.

Two one-hectare permanent long-term monitoring plots were surveyed. The Atwell Plot was located in a mature sequoia forest in Atwell Grove with plot center at UTM coordinates 4037.147 northing and 349.506 easting. The Ponderosa Plot was located in westside ponderosa pine forest with plot center at UTM coordinates 4035.466 northing and 349.415 easting. Plot locations and elevations were determined with a Rockwell AN/PSN-11 PLGR geographic positioning system (GPS) on averaging mode. The plots are 75 m by 135 m (flat distance) with 6 mm diameter steel stakes marking the trapping grid at 15 m intervals. Each plot contains 60 trap stations with one Sherman live trap (Model LFATDG, 7.6 x 8.9 x 22.9 cm) normally within one meter of each station stake. The traps were normally run four nights per week. The Atwell Plot was run for a total of 17 nights from August 24, 1998 through September 26, 1998 (1,020 trapnights). The Ponderosa Plot was run for a total of 19 nights from July 14, 1998 through August 15, 1998 (1,138 trapnights). The traps were baited with a dry mixture of rolled oats and peanut butter. A high-low thermometer was located in each plot at a shady location about 1.5 m above the ground, and a rain gage was located nearby.

In addition. Two 0.2 ha permanent long-term monitoring plots established in 1980 in the Middle Fork were surveyed in chamise chaparral. The one plot (1CHF) was established with plot center at UTM coordinates 4043.572 northing and 339.005 easting in July 1980 and burned November 10, 1980. A second plot (2CHF) was established with plot center at UTM coordinates 4043.676 northing and 338.944 easting in February 1981 on the burn perimeter, leaving half of the plot burned and half unburned. The plots are 40 m by 60 m (surface distance) with rebar stakes marking the trapping grid at 10 m intervals. Each plot consists of 35 trap stations with one Sherman trap at each station in Plot 1CHF (except in 1980 when there were three traps per station) and two traps at each station in Plot 2CHF. Preburn data was collected on the first plot (1CHF) during July through August 1980. he plots were monitored for two years following the burn. The second plot (2CHF) allows comparison of rodents inhabiting the burned and unburned sides of the plot over the same time interval. It consisted of fifteen stations on either side of the 1980-burn perimeter and five stations on the perimeter. The resurveys done June 2-July 3, 1998, describe the rodent population eighteen and a half years after it was burned.

Captured rodents were marked with numbered self-piercing 1 monel ear tags (Style # 1005-1 from National Band and Tag Company). Captured rodents were ear tagged, and recorded information included tag number, species, sex, age (adult, subadult), weight, hind foot length, ear notch length, tail length, and general comments. The handlers wore respirators, rubber gloves, and eye protection for hantavirus protection (Mills *et al.* 1995). Plot populations were estimated using a modified Jolly-Seber Method (Buckland 1980). Data was stored in dBase III^{+} files.

Serendipity trapping for rodents was done at nine sites in the Mineral King drainage: annual grassland (70 trapnights; UTM coordinates 4036.005 northing, 341.986 easting), aspen/sagebrush (51 trapnights; UTM coordinates 4035.012 northing, 356.828 easting), aspen wetland (23 trapnights; UTM coordinates 4035.016 northing, 356.736 easting), black oak forest (60 trapnights; UTM coordinates 4037.527 northing, 341.869 easting), boulder field (80 trapnights; UTM coordinates 4034.937 northing, 355.697 easting), canyon live oak forest (10 trapnights; UTM coordinates 4037.125 northing, 341.856 easting), conifer/lake edge (105 trapnights; UTM coordinates 4036.169 northing, 344.456 easting), and wet meadows at Oriole Lake (35 trapnights; UTM coordinates 4036.230 northing, 344.413 easting) and north of Oriole Lake (57 trapnights; UTM coordinates 4036.490 northing, 344.537 easting). In addition, serendipity trapping was done at five sites within the 1996 Kaweah Fire, located within the Kaweah River's main-stem drainage. These habitats included chamise burned by a high intensity headfire and little rock (UTM coordinates 4040.6 northing, 333.2 easting; 96 trapnights), chamise burned by high-intensity headfire and much rock (UTM coordinates 4040.7 northing, 333.5 easting; 80 trapnights), chamise burned by medium-intensity fire (UTM coordinates 4040.6 northing, 333.4 easting; 40 trapnights), a riparian area in which all leaves and twigs were consumed by fire (UTM coordinates 4040.6 northing, 333.2 easting; 40 trapnights), and burned blue oak wood-land (UTM coordinates 4040.2 northing, 334.2 easting; 64 trapnights). Sherman live traps were scattered loosely through these sites at approximately 15 m intervals (not measured). Serendipity sites were surveyed from

July 28, 1998 through October 31, 1998 for a total of 491 trapnights in Mineral King drainage and 320 trapnights on the Kaweah Fire. Catch per unit effort (captures/ trapnight) was used as a measure of relative abundance among sites. An ink spot on the fur was used to recognize recaptures.

Serendipity surveys also included some trapping for medium-sized mammals (e.g. forest carnivores) using mid-sized Tomahawk traps baited with meat and covered with burlap bags. This sampling was done from June 29, 1998 through October 31, 1998. It amounted to 81 trapnights. This trapping included blue oak woodland (8 trapnights), chamise chaparral (8 trapnights), mixed chaparral (4 trapnights), mixed conifer forest (10 trapnights), riparian forest (17 trapnights), sequoia grove (29 trapnights), and westside ponderosa pine forest (5 trapnights).

Vegetation density was determined using T-square procedures as described in Krebs (1989). The station stakes were used for random points making the procedure systematic. The same plots surveyed for density were used to characterize the species composition and size. Shrubs were measured at ground level. Only living stems >1 cm diameter at point measured were surveyed.

RESULTS AND DISCUSSION

Permanent Plots*:*

Atwell Plot: The Atwell Plot is located in a mature giant sequoia forest. The plot was burned on or about November 20, 1995. The plot's location, topography, preburn vegetation (trees only), preburn rodent population, and duff/litter consumption is described in Werner (1996). The postburn condition is described in Werner (1997). In 1997 and 1998, the herbaceous vegetation looked similar to the preburn condition, and litter was beginning to provide some soil cover.

Seventeen nights of trapping (1,020 trapnights) produced 645 rodent captures (131 different individuals). The mean population estimate during the survey period was 70 individuals (95% CI = 66-74 individuals). This was over four times as high as the preburn population estimate and twice as high as the population estimates during the first two postburn summers (Werner 1996, 1997, 1998). Because the Atwell Plot was sampled later in the summer than normal, it is possible that some of the differences are due to time of year effects. All surveys from early summer show gradual population increases during the survey period, and surveys during the late summer show a declining population during the survey period (**Fig. 3.21-2**). Ninety-four percent of the individuals (91.6% of the captures) were *Peromyscus maniculatus* (mean plot population = 64 individuals, 95% CI = 60-67 individuals). *Peromyscus maniculatus* was far more common than all other species combined: *Tamias speciosus* (3.8% of the individuals, 2.2% of the captures), *Glaucomys sabrinus* (2.3% of individuals, 1.6% of the captures), *Microtus longicaudus* (1.5% of the individuals, 0.9% of the captures), and *Peromyscus boylii* (0.8% of the individuals, 1.6% of the captures). Captures of non-rodents included two *Sorex trowbridgii* (Trowbridge shrew). There were several changes in species captured between the preburn sampling in 1995 and the two years of postburn sampling in 1996 and 1997. *Peromyscus boylii* was only captured in the postburn sampling, and *Microtus longicaudus* was only captured in the preburn sampling and after two

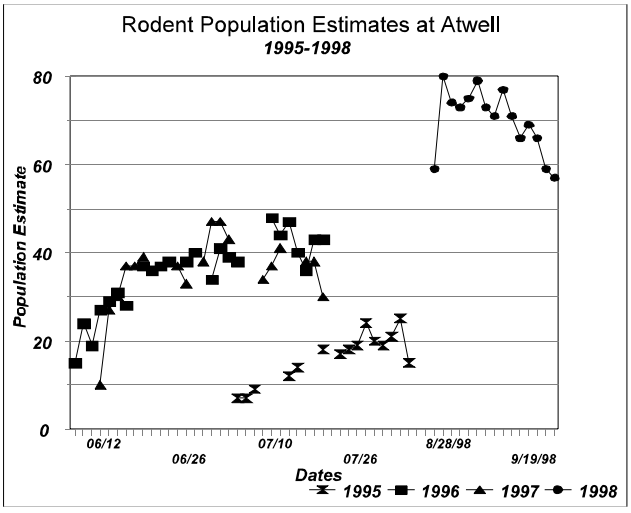

Figure 3.21-2. Comparison of population estimates at the Atwell Plot. The 1995 estimates were preburn sampling. Estimates for 1996 through 1998 are postburn.

and a half years of postburn floral recovery. *Microtus longicaudus* was usually associated with wetland vegetation, which was limited to a small perennial seep near the center of the plot. After the burn, wetland vegetation seemed smaller and more isolated.

Catch rates for the five rodent species were 0.593, 0.014, 0.010, 0.010 and 0.006 captures/trapnight for *P. maniculatus*, *T. speciosus*, *G. sabrinus*, *P. boylii*, and *M. longicaudus*, respectively. Like the mean population size, the catch rate for *P. maniculatus* increased from 0.133 captures/trapnight preburn to 0.593 captures/trapnight during the third year postburn.

The sex ratio for *P. maniculatus* sampled was about equal for the individuals sampled (♀ = 47%, ♂ = 53%, n=609). Sex ratios for other species included: *T. speciosus* (♀ = 7%, ♂ = 93%, n=14), *G. sabrinus* (♀ = 100%, n=10), *P. boylii* (♀ = 100%, n=10), and *M. longicaudus* (♀ = 100%, n=6).

Eighty-six percent of the *P. maniculatus* captured were adults. For the other species, the percent that were adult were: *T. speciosus* (100%), *G. sabrinus* (90%), *P. boylii* (100%), and *M. longicaudus* (100%).

Ponderosa Plot: The Ponderosa Plot was located in westside ponderosa forest. The plot was burned during the week of November 2, 1997. The plot's location, topography, preburn vegetation (trees and shrubs only), and the preburn rodent population are described in Werner (1997). In 1998, the vegetation was very different from the preburn condition. In 1998, the crew counted 24 live trees (Live is defined here as having green leaves in the preburn canopy.) in this plot which we estimated to have 1,456 trees and shrubs in 1996 (preburn; Werner 1997). Those live trees included 24 *Calocedrus decurrens*, 17 *Pinus ponderosa*, and eight *Quercus kelloggii*. Many of the oaks appeared to be regrowing from stump sprouts. The immediate postburn condition of the plot is described in Werner (1998). During the 1998 sampling period, the forest looked largely denuded. Trees remained as black sticks, and much of the soil was exposed. There was some herbaceous cover and much of the non-conifer woody vegetation was beginning to sprout at ground level.

Nineteen nights of trapping (1,138 trapnights) produced 178 rodent captures (45 different individuals). The mean population estimate during the survey period was 20 individuals (95% CI = 18-22 individuals). This was 29% less than the preburn population estimate in 1996 (Werner 1997). However, where postburn survey dates overlapped the preburn survey, postburn population estimates were higher (**Fig. 3.21-3**). There were several changes in species captured between the preburn sampling in 1996 and the postburn sampling in 1998. Eighty percent of the individuals (82.0% of the captures) were *Peromyscus maniculatus* (mean plot population = 15 individuals, 95% CI = 14-17 individuals). In the preburn surveys, *P. maniculatus* was slightly less than half of the population. *Peromyscus boylii* went from being slightly dominant in the preburn sampling to being only seventeen percent of the individuals (15.7% of the captures) in the postburn sampling. The remaining two *Peromyscus* individuals (three captures) were too young to identify to species. There were no captures of non-rodents.

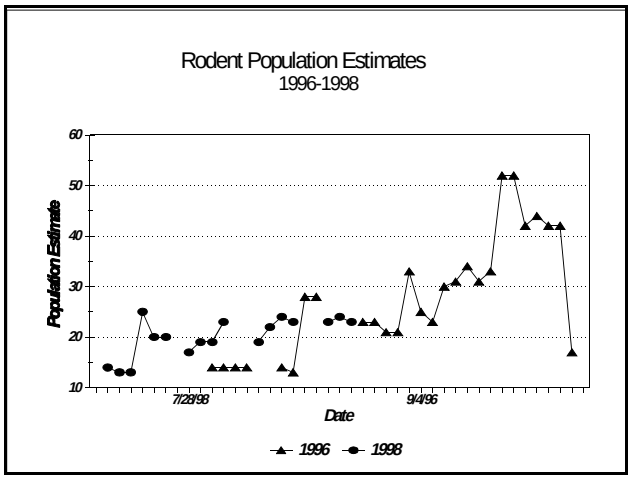

Figure 3.21-3. Comparison of preburn (1996) population estimates with first-year postburn (1998) estimates.

The change in relative abundance between *P. maniculatus* and *P. boylii* might be explained by their preburn distribution. In the preburn surveys, *P. maniculatus* was general found in the dryer areas, and *P. boylii* was more prevalent in the more moist areas of the plot (Werner 1967). Following the burn, the plot has become more xeric, favoring *P. maniculatus*.

Catch rates for the two rodent species were 0.128 captures/trapnight for *P. maniculatus* and 0.025 captures/trapnight for *P. boylii*.

The sex ratio for the sampled population of *P. maniculatus* was about equal for the individuals sampled (♀ = 49%, ♂ = 51%, n=146). The sex ratio for *P. boylii* was more skewed, but the sample was smaller (♀ = 57%, ♂ = 43%, n=28).

Ninety-eight percent of the *P. maniculatus* captured were adults. For *P. boylii*, only seventy-five percent were adults, suggesting that they were experiencing a different population dynamic than *P. maniculatus*.

Chamise Plots: The vegetation at both chamise plots (**Fig. 3.21-4**), 1CHF and 2CHF, continued to be dominated by *Adenostoma faciculatum.* Visually the plots resembled the tall, dense, preburn condition. Plot 1CHF, the original 1980 plot burned by a headfire in November, had 48,762 stems/ha (95% CI = 30,647-119,256 stems/ha) and 11,420 shrubs/ha (95% CI = 10,793-12,124 shrubs/ha). The vegetation height was 2.2 m (95% CI = 1.9-2.4 m). The sampled stems (n=70) consisted of *Adenostoma faciculatum* (95.7%), *Ceanothus cuneatus* (2.9%), and *Eriodictyon crassifolium* (1.4%). Large patches of grass, believed to be primarily *Achnatherum lemmonii*, were present. Plot 2CHF, the 1981 plot established on the perimeter of the burn, had 26,746 stems/ha (95% CI = 16,796-66,024 stems/ha) and 5,057 shrubs/ha (95% CI = 4,779-5,368 stems/ha). This plot showed dramatic differences between its burned and unburned sides. While there was not a large difference in the number of shrubs (5,293 shrubs/ha [95% CI = 4,631-6,176 shrubs/ha] in the burned area versus 4,384 shrubs/ha [95% CI = 3,836-5,116 shrubs/ha] in the unburned area), the burned side contained over twice as many estimated stems (17,058 stems/ha [95% CI = 8,877-21,743 stems/ha] in the unburned area versus 40,192 stems/ha [95% CI = 21,553-297,240 stems/ha] in the burned area). Mean vegetation height on the unburned side (2.6 m [95% CI = 2.3-2.9 m]; n=15) was taller (P = 0.014) than on the burned side (1.9 m [95% CI = 1.4-2.4 m]; n=15). Visually the two areas appeared as different as the numbers suggest. Vegetation on the burned side appeared shorter, denser, and thinner than the unburned side. The burned side had large stems growing from larger basal trunks. Dead wood was more plentiful on the unburned side. The unburned side is believed to be at least fifty years since it was last burned, and it might be much older. There is no park record of it ever burning. From a distance, both sides appear indistinguishable. The vegetative composition of Plot 2CHF was similar to the other plot. Most of the stems (94.3%; n=70) were *Adenostoma faciculatum*. Other species sampled included *Toxicodendron diversilobum* (2.9%), *Arctostaphylos viscida* (1.4%), and *Lonicera interrupta* (1.4%). The *T. diversilobum* and *A.*

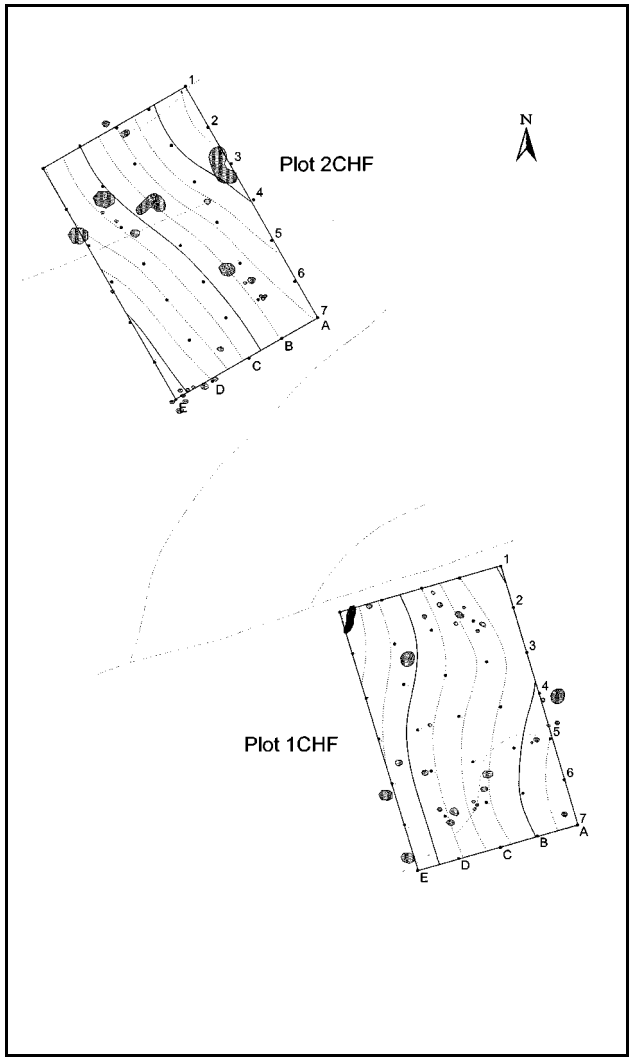

Figure 3.21-4. Map of the chamise plots showing trap stations, general surface contours (within plots), large boulders, and dry stream beds. distance between stations is 10 m.

viscida were in unburned areas. *Lotus scoparius* was conspicuous on both plots.

At Plot 1CHF, fourteen nights of trapping (490 trapnights) produced 83 rodent captures (38 different individuals). The mean population estimate during the survey period was 26 individuals (95% CI = 21-31 individuals). This was 43% less than the 1980 preburn population and about 67% less than the first June postburn population estimate (Werner 1981). Sixty-three percent of the individuals (73.5% of the captures) were *Peromyscus californicus* (mean plot population = 16 individuals, 95% CI = 14-18 individuals). Other species in descending order of abundance include *Peromyscus boylii* (21.0% of individuals; 14.5% of captures), and *Peromyscus truei* and *Neotoma fuscipes* were tied for least abundant (7.9% of individuals; 6.0% of captures). This is a significant change from the 1980 preburn population which was primarily *Peromyscus truei* (50.7% of captures) and *Neotoma fuscipes* (20.8% of captures; Werner 1981). A year later (postburn), the rodent fauna was primarily *P. boylii* and smaller numbers of *P. truei* (Werner 1981). During the second postburn summer, trap success declined; and *Chaetodipus californicus* was the predominate rodent captured. Fall, winter, and spring during the first two postburn years, saw other species appearing and sometimes dominating the rodent fauna (Werner 1982). these include *Peromyscus maniculatus, Microtus californicus*, and *Reithrodontomys megalotus*. Overall, this plot has seen a lot of change in faunal composition since 1980. Populations have gone up and down. The current rodent community is different and less populous than the preburn or immediate postburn community.

Catch rates for the rodents were 0.124 captures/trapnight for *P. californicus*, 0.024 captures/trapnight for *P. boylii*, 0.010 captures/trapnight for both *P. truei* and *N. fuscipes*.

The sex ratio for the sampled population of *P. californicus* was somewhat equal for the individuals sampled (♀ = 56%, ♂ = 44%, n=61). The sex ratios for *P. boylii, P. truei,* and *N. fuscipes* were less balanced (♀ = 17%, ♂ = 83%, n=12;♀ = 60%, ♂ = 40%, n=5;♀ = 100%, ♂ = 0%, n=5, respectively).

Seventy-seven percent of the *P. californicus* captured were adults. Observed adulthood for other species included: *P. boylii* (75%), *P. truei* (100%) and *N. fuscipes* (100%).

At Plot 2CHF, seventeen nights of trapping (1,190 trapnights) produced 243 rodent captures (84 different individuals). The mean population estimate during the survey period was 44 individuals (95% CI = 38-50 individuals). Forty-six percent of the individuals (34.5% of the captures) were *Peromyscus boylii* (mean plot population = 18 individuals, 95% CI = 14-21 individuals). *Peromyscus californicus* were captured more frequently (50.6% of captures), but involved less individuals (39.3% of individuals). Other species in descending order of abundance included *P. truei* (8.3% of individuals; 9.0% of captures), *Chaetodipus californicus* (3.6% of individuals; 4.9% of captures), and *Peromyscus. maniculatus* (2.4% of individuals; 0.8% of captures). I was surprised by the complete absence of *Neotoma fuscipes* in the plot. However, it was not common during the sampling in the early 1980s (Werner 1982). Non-rodent (and non-mammal) captures included one *Crotalis viridis*.

Catch rates for the rodent species were 0.103 captures/trapnight for *P. californicus*, 0.070 captures/trapnight for *P. boylii*, 0.018 captures/trapnight for *P. truei*, 0.010 for *C. californicus*, and 0.002 captures/trapnight for *P. maniculatus*.

The sex ratio for most species sampled were very unbalanced: *P. boylii* (♀ = 63%, ♂ = 37%, n=122), *P. californicus* (♀ = 63%, ♂ = 37%, n=82), *P. truei* (♀ = 41%, ♂ = 59%, n=22), *C. californicus* (♀ = 83%, ♂ = 17%, n=12), and *P. maniculatus* (♀ = 0%, ♂ = 100%, n=2).

Ninety-one percent of the *P. boylii* and eighty-four percent of the *P. californicus* captured were adults. Other species (*P. truei, C. californicus,* and *P. maniculatus)* were all adults. There was little difference in the rodent population abundance or species composition on the two sides of Plot 2CHF (**Table 3.21-1**). An

Table 3.21-1. Comparison of rodent captures from the fifteen trapping stations on either side of the 1980 burn perimeter. These results are from 510 trapnights per side.

Species	Percent of Captures		Percent of Individuals	
	Unburned	Burned 1980	Unburned	Burned 1980
Peromyscus californicus	54.9	47.4	46.5	38.5
Peromyscus boylii	32.8	34.7	44.2	46.2
Peromyscus truei	11.5	5.3	7.0	7.7
Chaetodipus californicus	0	11.6	0	7.7
Peromyscus maniculatus	0.8	0	2.3	0

exception, *Chaetodipus californicus* was only captured on the side burned in 1998. Population densities were almost identical on both sides of the plot. Population estimates varied from twenty-two rodents on the unburned side to twenty-four on the burned side.

In 1981 and 1982, there were conspicuous differences in the rodent captures on the burned and unburned sides of the plot. The rodent community on the unburned side of the plot was predominately *Peromyscus californicus* and *Peromyscus boylii*. *Neotoma fuscipes* was present, but they were captured much less frequently than *P. californicus* and *P. boylii*. The rodent fauna on the burned side of the plot resembled Plot 1CHF though there were some differences like *Chaetodipus californicus* being more common at Plot 2CHF (Werner 1982).

Serendipity Surveys*:*

Rodents: The results of serendipity surveys for rodents in the East Fork Kaweah drainage are summarized in **Table 3.21-2.** *Peromyscus maniculatus* was the most frequently captured rodent at all of the sites except

Table 3.21-2. Serendipity trapping results in the East Fork Kaweah River drainage.

Site Description	Species Capture Rate (captures/trapnight)					
	PEMA	PEBO	MILO	NEFU	TASP	ALL
aspen/sagebrush (51 TN)	0.588		.078			0.667
aspen wetland (23 TN)	0.609		.261			0.870
boulder field, Mineral King (80 TN)	0.400	0.088			0.050	0.525
black oak woodland (60 TN)	0.017	0.400				0.417
canyon live oak forest (10 TN)		0.100				0.100
conifer/lake edge, Oriole Lake (105 TN)	0.590	0.086	0.010			0.695
foothill annual grassland (70 TN)	0.514	0.029		0.014		0.557
wet meadow, Oriole Lake (35 TN)	0.714	0.029				0.771
wet meadow/palustrine forest (57 TN)	0.579	0.035				0.667

PEMA = *Peromyscus maniculatus*, PEBO = *Peromyscus boylii*, MILO = *Microtus longicaudus*, NEFU = *Neotoma fuscipes*, TASP = *Tamias speciosus*, TN = trapnight

Table 3.21-3. Summary of serendipity trapping results for mid-sized mammals.

Site Description	Species Captures/Trapnight			
	BAAS	MAAM	MAPE	TADO
blue oak woodland (8 TN)				
chamise chaparral (8 TN)				
mixed chaparral (4 TN)				
mixed conifer forest (4 TN)	0.100		0.200	
riparian forest (17 TN)	0.059			
sequoia grove (29 TN)		0.034		0.034
westside ponderosa pine forest (5 TN)				

BAAS = *Bassariscus astutus*, MAAM = *Martes americana*, MAPE = *Martes pennanti*, TADO = *Tamiasciurus douglasii*, TN = trapnight

for the black oak woodland. *P. maniculatus* tends to be the high-elevation generalist that seems to dominate all but wet sites at high elevations. At lower elevations, the species seems to be most abundant in areas that are grassy or moist. *Peromyscus boylii* dominated the oak stands. This is consistent with observations elsewhere. I was surprised by the lack of *Microtus longicaudus* captures in the wet areas.

Mid-sized Mammals: Few larger mammals were captured (**Table 3.21-3**). The site in mixed conifer forest that produced two species was located by a stream in the Oriole Lake vicinity. The *Martes pennanti* were believed to be the same specimen captured twice.

Kaweah Fire: Postburn data on the Kaweah Fire is summarized in **Table 3.21-4.** The table provides for a comparison with all trap results following the fire.

The increase in *P. maniculatus*, *C. californicus*, and *Reithrodontomys megalotus* is consistent with other postburn observations in chamise chaparral (Werner 1982). *P. truei* appears to be common only in very rocky areas. All of these species should decrease in abundance as the chamise returns to its preburn structure, especially after the grasses and forbs begin to disappear.

Mountain Beaver: Four more colonies of *Aplodontia rufa* were located during 1998 (**Fig. 3.2-1**). All were in combustible habitats, though two of the sites had not yet burned. Two of the unburned sites were located on the south aspect of the East Fork below the road on Deadwood Creek and north of Silver City along the creek that flows through the developed area. The third unburned colony was located in Eden Grove where the abandoned Eden Grove Trail crosses a small unnamed tributary to the east branch of Eden Creek (Anthony Caprio, personal observation). The other site was along Atwell Creek where it is crossed by the Paradise Ridge Trail. This last site burned in 1995.

PLANS FOR 1999

1. Conduct post-burn survey of the Atwell Plot and Ponderosa Plots.
2. Conduct serendipity surveys in the Hockett area.
3. Visit burned *Aplodontia rufa* colonies and record observations that may be fire related.
4. Continue development of guide to wildlife fire environments.
5. Continue postburn sampling of the Kaweah Fire if time permits.

Table 3.21-4. Summary of rodent capture success following the Kaweah Fire. Within each box, the first number describes results from trapping in 1996, immediately postburn. The second value is capture data for 1997, and the third number is 1998.

Site Description	Species Capture Rate (captures/trapnight)							
	CHCA	MILO	NEFU	PEBO	PECA	PEMA	PETR	REME
chamise, complete consumption, few rocks (1996 TN* = 94; 1997 TN = 84; 1998 TN = 96)	0.021 0.036 0.260					0 0.036 0.500		0 0 0.104
chamise, complete consumption, very rocky (1996 TN = 63; 1997 TN = 70; 1998 TN = 80)	0.175 0.271 0.550		0 0 0.012	0.032 0.114 0	0.079 0 0	0 0 0.075	0 0.014 0.150	0 0 0.012
chamise, poor consumption of stems (1996 TN = 38; 1997 TN = 35; 1998 TN = 40)	0.132 0.200 0.550				0.026 0 0	0.053 0.057 0.225	0.026 0 0	
foothill riparian, high consumption (1996 TN* = 38; 1997 TN = 35; 1998 TN = 40)	0.026 0.314 0.125	0 0 0.025			0.026 0 0	0 0 0.350		0 0.057 0.125
blue oak woodland, consumption good (1996 TN* = 36; 1997 TN = 56; 1998 TN = 64)	0.083 0.196 0.109		0.028 0 0	0.194 0.036 0.031	0.111 0.018 0	0.056 0.036 0.075		

CHCA = *Chaetodipus californicus*, MILO = *Microtus longicaudus*, NEFU = *Neotoma fuscipes*, PEBO = *Peromyscus boylii*, PECA = *Peromyscus californicus*, PEMA = *Peromyscus maniculatus*, PETR = *Peromyscus truei*, REME = *Reithrodontomys megalotus*, TN = trapnight

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