4.2 - Wildlife

4.21) Wildlife Monitoring - Science and Natural Resource 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 1999, 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.

One-hectare plots were monitored in mature sequoia forest at Atwell Grove, in westside ponderosa pine forest, and in mixed chaparral. The 1,362 trapnights at the Atwell Plot produced 381 rodent captures. The postburn population estimate of 23 rodents in the late spring/early summer sampling and 37 rodents in the fall survey. The population estimate for both survey periods combined was fifty-nine percent less than the previous year, but it was ninety-three percent higher than the preburn population. The 1996-1998 postburn increase in rodents began to decline in 1999. Rodent diversity increased. Since monitoring began in 1995, the deer mouse (*Peromyscus maniculatus*) dominated the rodent population. In the fall of 1999, twenty-six percent of the individuals captured were lodgepole chipmunk (*Tamias speciosus*), a species that was not present during the preburn sampling. The arrival and success of lodgepole chipmunks (*T. speciosus*) is believed to be linked to the decrease in tree density from an estimated 362 trees/ha preburn to an estimated 158 trees/ha in 1999. Other rodents included a few captures of northern flying squirrels (*Glaucomys sabrinus*), long-tailed voles (*Microtus longicaudus*), and brush mice *(Peromyscus boylii*).

The 1,427 trapnights at the Ponderosa Plot produced 424 rodent captures with a average population estimate of 41 rodents for the survey period. This was forty-six percent higher than the preburn population estimate. After the plot burned in 1997, the species composition changed from a nearly equal balance between deer mice (*P. maniculatus*) and brush mice (*P. boylii*) to a population that is predominantly deer mice (*P. maniculatus*). Domination by deer mice (*P. maniculatus*) continued in 1999, and lodgepole chipmunks (*T. speciosus*) immigrated to the plot and comprised eighteen percent of the individuals monitored. As at the Atwell Plot, the arrival of lodgepole chipmunks (*T. speciosus*) is believed due to the reduction in tree density. There were two captures of Botta's pocket gopher (*Thomomys bottae*).

The Traugers plot in mixed chaparral was a preburn resample to evaluate changes since the last survey in 1995. The 713 trapnights, produced 245 rodent captures. The estimated population of 52 rodents was about twice as high as the previous survey, but the estimated rodent biomass, 2,633 gm, was nearly the same as the 1995 value (2,680 gm). The species present were nearly identical, but the relative abundance changed. A large portion of the large dusky-footed woodrats (*Neotoma fuscipes*) that dominated the plot in 1995 were replaced with mice that formerly were less abundant. These included brush mice (*P. boylii*), California mice (*P. californicus*), and pinyon mice (*P. truei*). The California pocket mouse (*Chaetodipus californicus*) was scarce in both 1995 and 1999. The California vole (*Microtus californicus*), which was rare in 1995, was not captured in 1999.

Serendipity sampling was done in the following environments: live oak near Redwood Creek, sagebrush, montane chaparral, subalpine prairie (formerly montane chaparral and sagebrush before it burned in 1994), red fir forest, subalpine meadow, lodgeple pine forest, and lodgepole pine forest that burned in 1994. Brush mice (*P. boylii*) dominated the live oak forest, and deer mice (*P. maniculatus*) dominated the remaining sites except for the subalpine meadow and the unburned lodgepole pine which was dominated by long-tailed voles (*M. longicaudus*). The burned lodgepole pine was codominated by deer mice (*P. maniculatus*) and long-tailed voles (*M. longicaudus*), and lodgepole chipmunks (*T. speciosus*) were present. A single specimen of montane vole (*Microtus montanus*) was captured in both the unburned lodgepole pine and in the subalpine meadow. A few brush mice (*P. boylii*) were found in the montane chaparral, but it was dominated by deer mice (*P. maniculatus*).

Serendipity trapping for medium-sized mammals occurred in a variety of vegetation types as an collateral activity to the rodent trapping. Ringtail (*Bassariscus astutus*) were captured in the hardwood-conifer forest (0.333 captures/trapnight) and live oak forest (0.250 captures/trapnight). Martin (*Martes americana*) were captured in sequoia forest (0.238 captures/trapnight), mixed conifer forest (0.182 captures/trapnight), and westside ponderosa pine forest (0.143 captures/trapnight). A black bear cub (*Ursus americanus*) was also captured in one of the traps in the sequoia forest. Two yellow-bellied marmots (*Marmota flaventris*) were captured in two nights of trapping in Jeffrey pine forest.

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 fifth year of field surveys.

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 on them. 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 terrestrial amphibians, birds, and insects. Two of the these groups are represented by large numbers of species. Their documentation requires more observer skill, and larger plots are needed to monitor 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.

Three one-hectare permanent long-term monitoring plots were surveyed. The Atwell Plot was

located in mature sequoia forest in Atwell Grove with plot center at UTM coordinates 4037147 northing and 349506 easting. The Ponderosa Plot was located in westside ponderosa pine forest with plot center at UTM coordinates 4035466 northing and 349415 easting. The Traugers Plot was located in mixed chaparral with plot center at UTM coordinates 4033776 northing and 344925 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, except at the Traugers Plot where the crew used Model XLK, 7.6 x 9.5 x 30.5 cm) normally within one meter of each station stake. The traps were normally run four nights per week. The Atwell Plot was run 23 nights. This was directed into two trapping periods: thirteen nights in spring/summer (May 31, 1999 through June 29, 1999; 769 trapnights) and ten nights in the fall (September 20, 1999 through October 6, 1999; 593 trapnights). The Ponderosa Plot was run for a total of 24 nights from July 6, 1999 through August 19, 1999 (1,427 trapnights). The Traugers Plot was run for a total of 12 nights from October 12, 1999 through October 29, 1999 (713 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.

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 in three areas in the Mineral King drainage: Near Redwood Creek, a live oak (*Quercus chrysolepis*) forest was surveyed for eight days (120 trapnights; UTM coordinates 4035400 northing, 347400 easting). Near the Monarch Lake/Sawtooth trailhead, the crew surveyed sagebrush for seven days (85 trapnights; UTM coordinates 4035300 northing, 356800 easting); for seven days, a subalpine prairie that was montane chaparral (*Arctostaphalus patula*) and sagebrush (*Artemisia* sp.) before it burned in 1994 (90 trapnights; UTM coordinates 4035400 northing, 357100 easting); and for seven days, montane chaparral dominated by *Arctostaphalus patula* (79 trapnights; UTM coordinates 4035700 northing, 357000 easting). On the Hockett Plateau, the crew surveyed lodgepole pine for five days (100 trapnights; UTM coordinates 4025800 northing, 351400 easting); for five days, lodgepole pine burned in 1994 (100 trapnights; UTM coordinates 4026600 northing, 351000 easting); for five days, red fir forest (66 trapnights; UTM coordinates 4026100 northing, 351200 easting); and for six days, a subalpine meadow (85 trapnights; UTM coordinates 4026600 northing, 351800 easting).

Sherman live traps were scattered loosely through these sites at approximately 15 m intervals (not measured). Serendipity surveys were conducted between July 21, 1999 and September 15, 1999 for a total of 725 trapnights in the Mineral King drainage. 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 2, 1999 through November 17, 1999. It amounted to 108 trapnights. This trapping included blue oak woodland (8 trapnights), chamise chaparral (4 trapnights), Jeffrey pine forest (2 trapnights), live oak forest (4 trapnights), lodgepole pine forest (7 trapnights), mixed chaparral (6 trapnights), mixed conifer forest (11 trapnights), mixed hardwood/conifer forest (9 trapnights), palustrine wetland forest (8 trapnights), red fir forest (3 trapnights), sequoia grove (21 trapnights; an additional 9 trapnights baited with fruit and lupine in an attempt to capture *Aplodontia rufa*), westside ponderosa pine forest (14 trapnights), and white fir forest (2 trapnights). Vegetation density was determined at the Atwell Plot 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. Trees were measured at chest level. Only living stems >1 cm diameter at point measured were surveyed.

RESULTS AND DISCUSSION

Permanent Plots:

Atwell Plot: The Atwell Plot was 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). Since 1997, the herbaceous vegetation empiracally resembles the preburn condition.

Trees on the plot were estimated at 158 trees/ha (95% CI = 130 - 202). This is fifty-six percent less than the preburn density (Werner 1996). The mean basal area of trees surveyed increased fifty-three percent from 0.52 m^2 in 1995 to 0.80 m^2 in 1999. This is the type of change that would be anticipated since most of the observed postburn mortality was among the youngest trees. As a consequence of the burn, *Abies concolor* decreased numerically from eighty-three percent of the sample in 1995 to seventy-nine percent in 1966. *Sequoiadendron giganteum* increased from five to eight percent. *Pinus lambertina* remained at twelve percent, and *Calocedrus decurrens* was a new addition to the sample at slightly less than one percent. Though *S. gigantuem* was only eight percent of the individuals in the sample, their basal area accounted for fifty-five percent of the total. *Abies concolor* was very close in mass with forty-three percent of the basal area. *Pinus lambertina* only accounted for two percent of the basal area, and *C.*

decurrens was negligible at one-hundredth of a percent.

Twenty-three nights of trapping (1,362 trapnights) produced 381 rodent captures (100 different individuals) and eleven captures of non-rodents (*Sorex trowbridgii*). The mean population estimate for the Atwell Plot during the survey period was 23 individuals (95% CI = 20-25 individuals) during the late spring/early summer sampling. The mean population estimate during the fall sampling increased to 37 individuals (95% CI = 29-45 individuals).

Not only did the plot population increase significantly (P = 0.008) from late spring/early summer to fall , but domination of the rodent community became more diverse. In 1999, *P. maniculatus* comprised eighty-three percent of the individuals (94% of the captures) marked in the spring/summer, but only sixty-one percent of the individuals (65% of the captures) marked in the fall. This was not due to a decline in the *P. maniculatus* population, but due to an big increase in the population of *Tamias speciosus* from ten percent of the individuals (2% of the captures) in the spring/summer to twenty-six percent (23% of the captures) in the fall. Between the late spring/summer sampling and fall sampling, population estimates increased for both species. While *T. speciosus* more than doubled from only a few individuals (≤4 individuals) to an average of nine individuals, the mean population estimate for *P. maniculatus* only increased twenty-nine percent from 21 to 27 individuals. While the two species probably compete for some of the same food resources, their periods of activity are separated by *P. maniculatus* being nocturnal and *T. speciosus* being diurnal. In twenty years of experience at Sequoia and Kings Canyon National Parks, I tend to associate my observations of *T. speciosus* with the less-dense portions of forests. The increase in *T. speciosus* may be attributable to the postburn loss of tree density from 362 trees/ha when the plot was burned to 158 trees/ha in 1999.

Table 4.21-1. Species composition of rodents captured at the Atwell Plot during 1999.

Species	Percent of Individuals	Percent of Captures
Late Spring/Early Summer Sampling		
Peromyscus maniculatus	83	94
Tamias speciosus	10	2
Glaucomys sabrinus	2	3
Microtus longicaudus	0	0
Peromyscus boylii		1
Fall Sampling		
Peromyscus maniculatus	61	65
Tamias speciosus	26	23
Glaucomys sabrinus	6	4
Microtus longicaudus	7	8
Peromyscus boylii	0	0

The other species sampled are summarized in **Table 4.21-1**. The most important information about the other species sampled is that *Microtus longicaudus* comprised seven percent of the individuals in the fall sampling. These were the most observations of this species since the plot was burned. This is similar to its abundance in the preburn sampling in 1995.

Rodent populations at the Atwell Plot were

much lower than in 1998. While sampling in 1999 was done at a slightly different time of year, population estimates were much lower where survey dates overlapped (**Fig. 4.21-1**). Combining both 1999 sampling periods, the estimated rodent population at the Atwell Plot was fifty-nine percent less than in 1998. For the dominant species, *P. maniculatus*, the decrease was sixty-six percent. In spite of this decrease over last year, the rodent population estimate is still ninety-three percent higher than the preburn (1995) condition. The *P. maniculatus* population estimate in 1999 was forty-seven percent higher than the preburn condition.

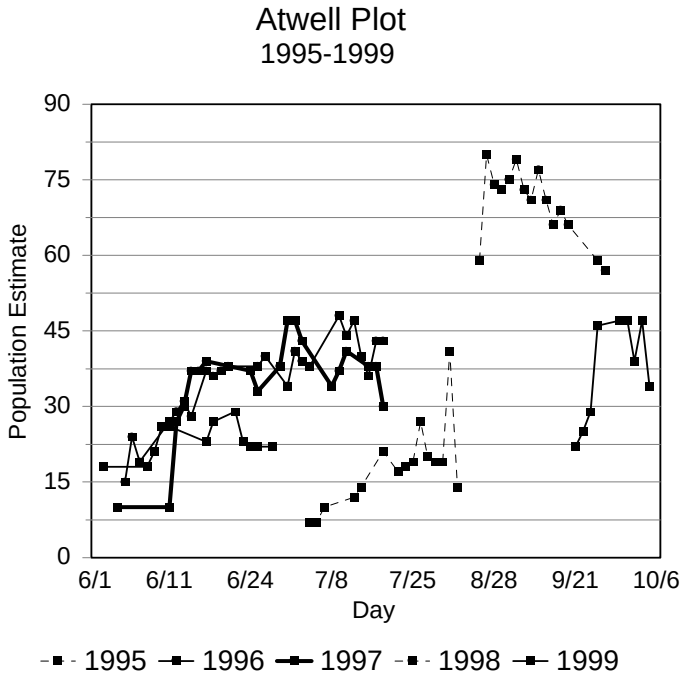

Figure 4.21-1. Population estimates at the Atwell Plot, 1995 (preburn) through 1999.

Catch rates for the five rodent species were 0.226, 0.041, 0.012, 0.009, and 0.001 captures/trapnight for *P. maniculatus, T. speciosus, M. longicaudus, G. sabrinus*, and *P. boylii*, respectively. The catch rate for *P. maniculatus* decreased from 0.593 captures/ trapnight in 1998 to 0.226 captures/ trapnight in 1999.

The sex ratio for *P. maniculatus* sampled was nearly equal for the individuals sampled (♀ = 58%, ♂ = 42%, n = 304). Sex ratios for other species included: *T. speciosus* (♀ = 51%, ♂ = 49%, n = 47), *M. longicaudus* (♀ = 19%, ♂ = 81%, n = 16), *G. sabrinus* (♀ = 75%, ♂ = 25%, n = 12), and *P. boylii* (♂ = 100%, n = 2).

Eighty-nine percent of the *P. maniculatus* captured were adults (n = 307). For the other species, the percent that were adult were: *T. speciosus* (100%, n = 54), *G. sabrinus* (100%, n = 12), *P. boylii* (50%, n = 2), and *M. longicaudus* (100%, n = 16).

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 1999 sampling period, the forest continued to look denuded except for the sprouts around the base of oaks and the twenty-four trees that retained green canopies. Much of the soil was covered by herbaceous vegetation and shrubs.

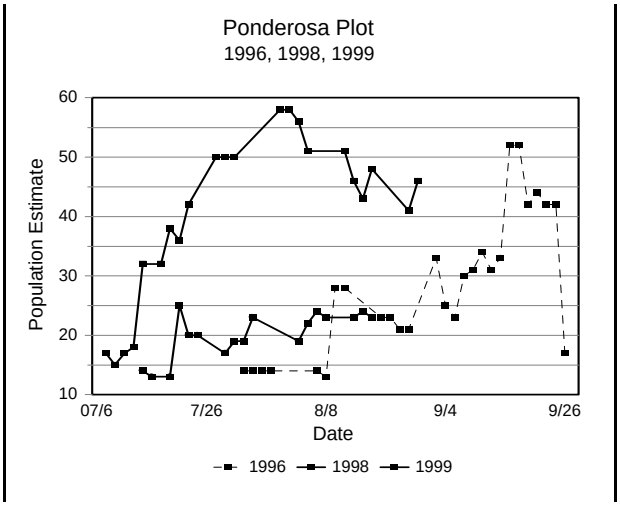

Figure 4.21-2. Population estimates at Ponderosa Plot, 1996 (preburn), 1998, and 1999.

Twenty-four nights of trapping (1,427 trapnights) produced 424 rodent captures (88 different individuals). The mean population estimate during the survey period was 41 individuals (95% CI = 35 - 47 individuals). This is over twice as high as the mean first-summer-postburn population estimate for 1997, and forty-six percent higher than the mean preburn population estimate in 1996. The slight difference in the preburn and initial postburn sampling may be a time-of-year effect (**Fig. 4.21-2**), but the rodent population clearly increased during the second summer after the burn (**Fig. 4.21-2**). This contrasts with the Atwell Plot which showed a similar increase during the first summer after it burned.

The immediate response observed at the Ponderosa Plot was the change in species composition. Prior to the burn, both *Peromyscus boylii* and *P. maniculatus* were codominant species. Since the burn, *P. maniculatus* has dominated the rodent community (80 % of the individuals in 1998 and 68 % in 1999). *Tamias speciosus* first appeared in 1999 and was a significant portion of the population representing eighteen percent of the individuals surveyed. This was also the first time that *Microtus longicaudus* was seen at the Ponderosa Plot. Only two specimens were captured (3 % of the individuals). Pocket gophers (*Thomomys* sp.) were captured in 1996, and two *Thomomys bottae* (3 % of the sample individuals) were captured in 1999.

Catch rates for the four rodent species were 0.797 captures/trapnight for *P. maniculatus*, 0.123 captures/trapnight for *T. speciosus*, 0.068 captures/trapnight for *P. boylii*, and 0.005 captures/trapnight for both *M. longicaudus* and *T. bottae*. There was one capture of a juvenile *Peromyscus* that was too young for identification to species.

The sex ratio for the sampled population of *P. maniculatus* was skewed strongly toward females (♀ = 67 %, ♂ = 33 %, n = 336). The sex ratio for the other species include: *P. boylii* (♀ = 63 %, ♂ = 37 %, n = 27), T. speciosus (♀ = 44 %, ♂ = 56 %, n = 34), and *M. longicaudus* (♀ = 100 %,

n = 1).

Eighty-seven percent of the *P. maniculatus* captured were adults, nine percent were subadults, and four percent were juvenile (n = 333). For the other species surveyed, *P. boylii* was ninty-three percent adult (n = 28), and *T. speciosus* was fifty-nine percent adult (n = 27) with the balance for both species being subadults. Both *M. longicaudus* were adults.

Traugers Plot: The Traugers Plot was located in mixed chaparral. A description of the vegetation and topgraphy can be found in Werner (1996). This plot has not been burned since it was established in 1995. This sampling was done to update the preburn data and to assess comparability to the previous sampling. These data provide an indication of preburn variability. Empirically, the plot looked the same as in 1995.

Twelve nights of trapping (713 trapnights) produced 245 rodent captures (83 individuals). The mean population estimate for the Traugers Plot during the survey period was 52 individuals (95 % CI = 39 - 65 individuals). This was about twice as many individuals as when the plot was surveyed in 1995 (26 individuals; 95 % CI = 23 - 28 individuals). This difference was significant both when comparing each entire survey (P = 0.005) or only comparable dates (P = 0.012) for both years. Even though the rodent population doubled, the rodent biomass remained nearly identical (**Table 4.21-2**). This is because the large *Neotoma fuscipes* were replaced by more numerous but smaller rodents. Either this is coincidence, or it suggests that the most abundant rodents are competing for and limited by the same resources (especially food, though not necessarily the same foods). It also assumes that the sum of those resources and predation are relatively constant.

Table 4.21-2. Comparison of individual population estimates and rodent biomass at the Traugers Plot for surveys in 1995 and 1999.

Species	1995 Surveys			1999 Surveys		
	$\bar{\times}$ Pop. Estimate	$\bar{\times}$ Wt. (gm)	Biomass (gm)	$\bar{\times}$ Pop. Estimate	$\bar{\times}$ Wt. (gm)	Biomass (gm)
Neotoma fuscipes	16	154	2,464	9	158	1,422
Peromyscus boylii	1	25	25	23	24	552
Peromyscus californicus	3	41	123	14	36	504
Peromyscus truei	3	22	66	6	25	150
Microtus californicus	0.02	35	1	0	0	0
Chaetodipus californicus	0.05	21	1	0.2	24	5
Total			2,680			2,633

Capture success was much higher in 1999 than 1995 (**Table 4.21-3**). Two things are believed to have contributed to this. First, populations were twice as dense. With more individuals, one would expect more captures per trapnight. Second, the traps were more efficient for two reasons: 1) because the frequency of bears and other predators springing the traps was less in 1999 (4 % disturbed) compared to 1995 (6 % disturbed) and 2) because the longer traps used in 1999 seemed to largely prevent rats from stealing cotton or bait without getting caught. Trap disturbance and bait/cotton thievery were both big problems in 1995 and not in 1999. Though the species ratios have changed, the basic species composition has remained the same. The only species that did not appear in 1999 was *Microtus californicus*, and it was rare on the plot in 1995.

Table 4.21-3. Comparison of capture success at the Traugers Plot between 1995 and 1999.

Species	1995 Survey	1999 Survey
	Captures/ trapnight	Captures/ trapnight
Neotoma fuscipes	0.067	0.073
Peromyscus boylii	0.004	0.157
Peromyscus californicus	0.012	0.067
Peromyscus truei	0.009	0.042
Microtus californicus	0.002	0
Chaetodipus californicus	0.002	0.004

The sex ratio for the most abundant rodent sampled, *P. boylii*, was sym-metrical (♀ = 50 %, ♂ = 50%, n=110). Sex ratios for other species included: *N. fuscipes* (♀ = 54%, ♂ = 46%, n = 52), *P. californicus* (♀ = 73%, ♂ = 27%, n = 48), *P. truei* (♀ = 27%, ♂ = 73%, n = 30), and *C. californicus* (♀ = 33%, ♂ = 67%, n = 3).

Ninety-five percent of the *P. boylii* captured were adults and five percent were subadults (n = 111). For the other species surveyed, *P. californicus* was eighty-eight percent adult (n = 48), *P. truei* was completely adult (n = 30), *N. fuscipes* was ninety-six percent adult (n = 52), and *C. californicus* was entirely adult (n = 3). The balance of these last four species were subadults.

Serendipity Surveys:

Rodents: The results of serendipity surveys for rodents in the East Fork Kaweah drainage are summarized in **Table 4.21-4**. In addition, several non-rodents were captured. These included: two *Sorex trowbridgii* in Hockett Meadow and one in the lodgepole pine forest at Hockett; one *Pipilo chlorurus* in sagebrush at Mineral King, and one *Elgaria coerulea* in the subalpine prairie that was montane chaparral and sagebrush before it burned in 1994.

There were few surprises in the serendipity surveys. *Peromyscus boylii* was abundant in the dense stand of live oak (*Quercus chrysolepis*). This was expected since *P. boylii* is the most

common mouse in another foothill forest type, black oak, that occurs at a similar elevation. Finding *P. boylii* in montane chaparral was a little surprising because of the elevation. However, in a previous year, a specimen was captured at a much higher elevation in a foxtail pine forest. In all of the high elevation sites, *Peromyscus maniculatus* was the dominant rodent except in lodgepole pine and subalpine meadow, where *Microtus longicaudus* dominated the rodent population. This is logical because lodgepole pine forest and the

Table 4.21-4. Serendipity trapping results in the East Fork Kaweah River drainage.

Site Description	Species Capture Rate (captures/trapnight)					
	PEMA	PEBO	MILO	MIMO	TASP	ALL
Redwood Creek, Live Oak (120 TN)		0.633				0.633
Mineral King, Sagebrush (85 TN)	0.318		0.012			0.329
Mineral King, Subalpine Grassy Prairie (90 TN)	0.344					0.344
Mineral King, Montane Chaparral (79 TN)	0.405	0.051				0.456
Hockett, Lodgepole Pine (100 TN)	0.050		0.290	0.010		0.350
Hockett, Lodgepole Pine burned 1994 (100 TN)	0.170		0.190		0.040	0.400
Hockett, Red Fir Forest (66 TN)	0.545		0.030			0.576
Hockett, Subalpine Meadow (85 TN)	0.012		0.035	0.012		0.059

PEMA = *Peromyscus maniculatus*, PEBO = *Peromyscus boylii*, MILO = *Microtus longicaudus*, MIMO = *Microtus montanus*, TASP = *Tamias speciosus*, TN = trapnight

meadow site are more mesic than the other high elevation sites sampled, and *M. longicaudus* is a species that shows a preference for moist areas. The capture data does indicate that recent fires may enable *P. maniculatus* to attain significant populations in some *M. longicaudus* habitat. Where the lodgepole pine forest was burned in 1994, *M. longicaudus* shared its domination with *Peromyscus maniculatus*. *Tamias speciosus* was also only captured in the lodgepole pine forest burned in 1994. This too is likely to be a fire effect since the same species now inhabits both the Atwell and Ponderosa Plots, and they were not observed in either plot prior to burning. The driest sites where *M. longicaudus* was observed were the sagebrush and the red fir forest. They were relatively rare at both sites and could have drifted in from nearby moist areas. The crew captured two specimens of *Microtus montanus* in the Hockett area. One was in the meadow, and the other was in a grassy area in the lodgepole pine forest. This was the first time that this species was encountered in any habitat sampled since this project began in 1995.

Mid-sized Mammals: The results of trapping mid-sized animals is summarized in **Table 4.21-5.** Sometimes traps catch animals that they were never intended to catch. The small Tomahawk traps that we use to catch medium-sized mammals were never intended to capture large carnivores like *Ursus americanus*, but one was in the trap on June 24, 1999. It was a cub, and it

was released unharmed. As is typical, the *Bassariscus astutus* were found in the upper foothill environments and the *Martes americanus* were in the lower-elevation conifer habi-tats.

Table 4.21-5. Summary of serendipity trapping results for mid-sized mammals.

Site Description	Species Captures/Trapnight			
	BAAS	MAAM	MAFL	URAM
Hardwood-conifer Forest (9 TN)	0.333			
Jeffrey Pine Forest (2 TN)			1.000	
Live Oak Forest (4 TN)	0.250			
Mixed Conifer Forest (11 TN)		0.182		
Sequoia Forest (21 TN)		0.238		0.048
Westside Ponderosa Pine Forest (14 TN)		0.143		

BAAS = *Bassariscus astutus*, MAAM = *Martes americana*, MAFL = *Marmota*

The table only shows data for vegetation types in which trapping was successful. There was an additional nine trapnights in sequoia forest with the traps baited with lupine and fruit in an attempt to capture *Aplodontia rufa.* The effort was unsuccessful. Other unsuccessful trapping effort included: white fir forest (2 trapnights), lodgepole pine forest (7 trapnights), palustrine wetland forest (8 trapnights), red fir forest (3 trapnights), chamise chaparral (4 trapnights), mixed chaparral (6 trapnights), and blue oak woodland (8 trapnights).

Additionally, a new colonies of *Aplodontia rufa* were located in the upper portion of Squirrel Creek (Caprio personal communication) expanding the range of this species into the Oriole Lake drainage and in a tributary of Deer Creek near Tar Gap (just above the Tar Gap Trail) (Manley personal communication) (**Fig. 4.21-3**)

PLANS FOR 2000

1. Conduct postburn survey of the Atwell and Ponderosa Plots.
2. Depending on when the Traugers Plot is likely to burn, conduct preburn and immediate postburn sampling.
3. Conduct serendipity surveys in Sierra juniper and other high-elevation sites.
4. Continue development of guide to wildlife fire environments.
5. Continue postburn sampling of the Kaweah Fire if time permits.

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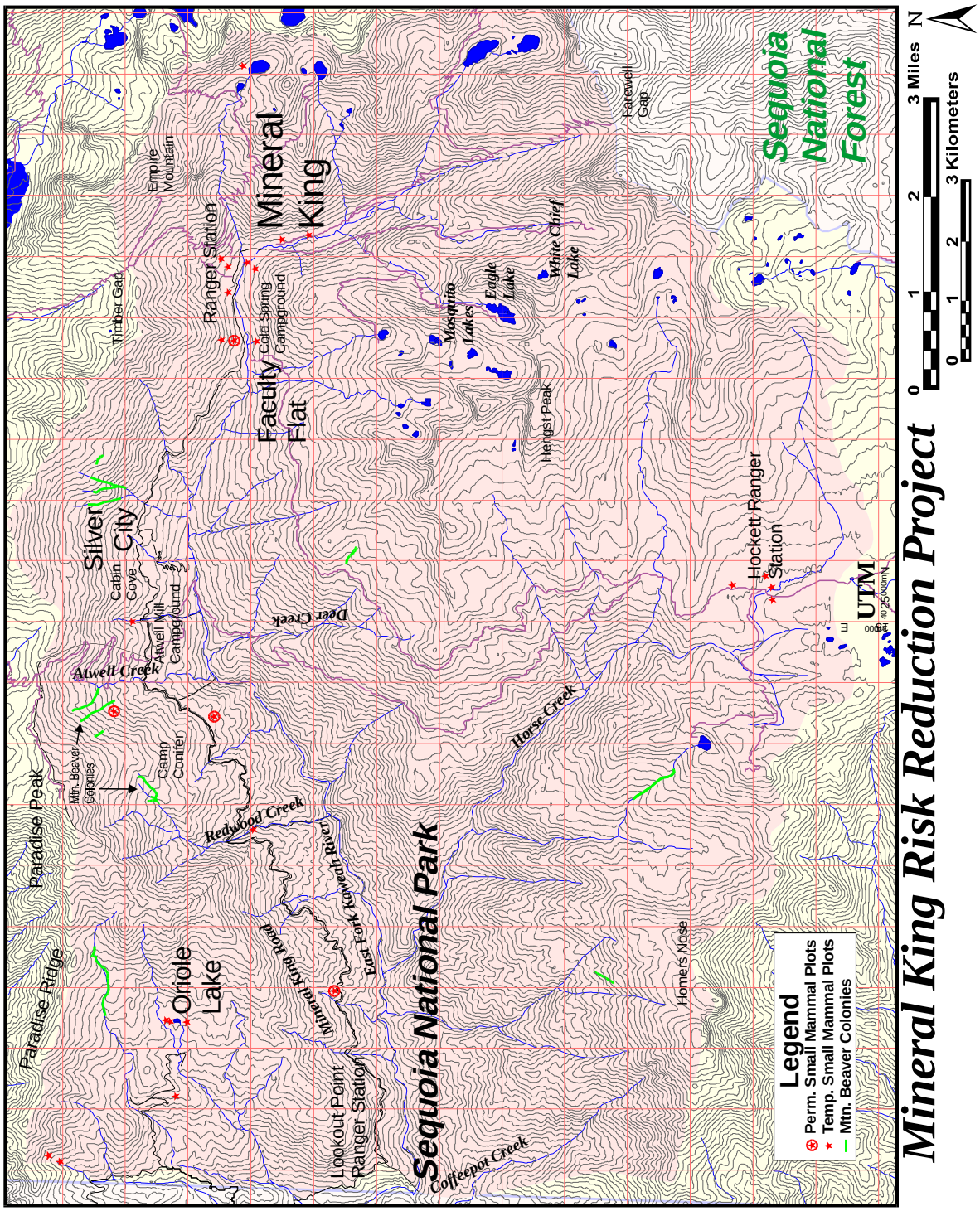

Figure 4.21-3. Locations where wildlife was sampled and riparian areas where mountain beaver have been found.

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