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 and their specificity to habitat structure and composition. In 1997, 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 long-term monitoring plots were monitored in mature sequoia forest at Atwell Grove and in Jeffrey pine forest. The 1,260 trapnights at the Atwell Plot produced 319 rodent captures. The deer mouse (***Peromyscus maniculatus***) was the most abundant postburn rodent at the Atwell Plot with an average population estimate of 33 individuals, similar to the first postburn year (36 individuals in 1996) and over twice as high as the preburn population (15 individuals in 1995). Other rodents included a few captures of the brush mouse ***(Peromyscus boylii***) and northern flying squirrel (***Glaucomys sabrinus***). The brush mouse was only seen in the postburn sampling and the long-tailed vole (***Microtus longicaudus***) that was present in preburn sampling had disappeared. At the Jeffrey Plot, 1,500 trapnights produced 101 rodent captures with an average population of 19 individuals during the trapping period. Predominate preburn rodents were the deer mouse (***P. maniculatus***; 58% of individuals), brush mouse (***P. boylii***, 20% of individuals), and lodgepole chipmunk (***Tamias speciosus***, 13% of individuals). Other species present included the western flying squirrel **(*G. sabrinus***, 7% of individuals), and bushy-tailed woodrat (***Neotoma cinerea***, 2% of individuals).

The Jeffrey Plot habitat was described. The tree density was estimated at 324 trees/ha with Jeffrey pine (***Pinus jeffreyi***) dominating frequency (59%) and basal area (80%). There was a significant presence of white fir (***Abies concolor***), black oak (***Quercus kelloggii***), and western juniper (***Juniperous occidentalis***). The shrub density was estimated at 922 stems/ha with green-leaf manzanita (***Arctostaphylos patula***) dominating the frequency (58%) and basal area (72%). The remainder of the diverse shrub understory was shared among nine species. Shrubs had a clumped distribution. The plot faced southwest at 2,340-2,380 m elevation. Side slopes varied from 21 to 35 degrees. Boulders and litter were common. Down logs were not common, and no surface water was present.

The Ponderosa Plot was photographed and mapped after being burned during the week of November 2, 1997.

Serendipity surveys were conducted at four areas in the East Fork Kaweah River (**Fig. 3.2-1**). In the unburned sequoia forest near Deadwood Creek, the captured species in descending order of capture abundance were the deer mouse (***Peromyscus maniculatus***) and long-tailed vole (***M. longicaudus***). Captures here helped substantiate that rodent population changes at the Atwell Plot were in fact caused by fire. In descending order of capture abundance, the rocky Jeffrey pine forest was inhabited by the deer mouse (***P. maniculatus***), brush mouse (***P. boylii***), and lodgepole chipmunk (***T. speciosus***). This site's fauna resembled the adjacent Jeffrey Plot even though the habitat was structurally different. The red fir forest was inhabited by the deer mouse **(*P. maniculatus***), long-tailed vole (***M. longicaudus***) and lodgepole chipmunk (***T. speciosus***). Serendipity trapping in the Monarch area was done in an alpine/subalpine site containing eleven different habitats. The six species of rodents (deer mouse, ***P. maniculatus***; brush mouse, ***P. boylii***; long-tailed vole, ***M. longicaudus***; golden-mantled ground squirrel, ***Spermophilus lateralis***; alpine chipmunk, ***Tamias alpinus***; and bushy-tailed woodrat, ***N. cinerea***)

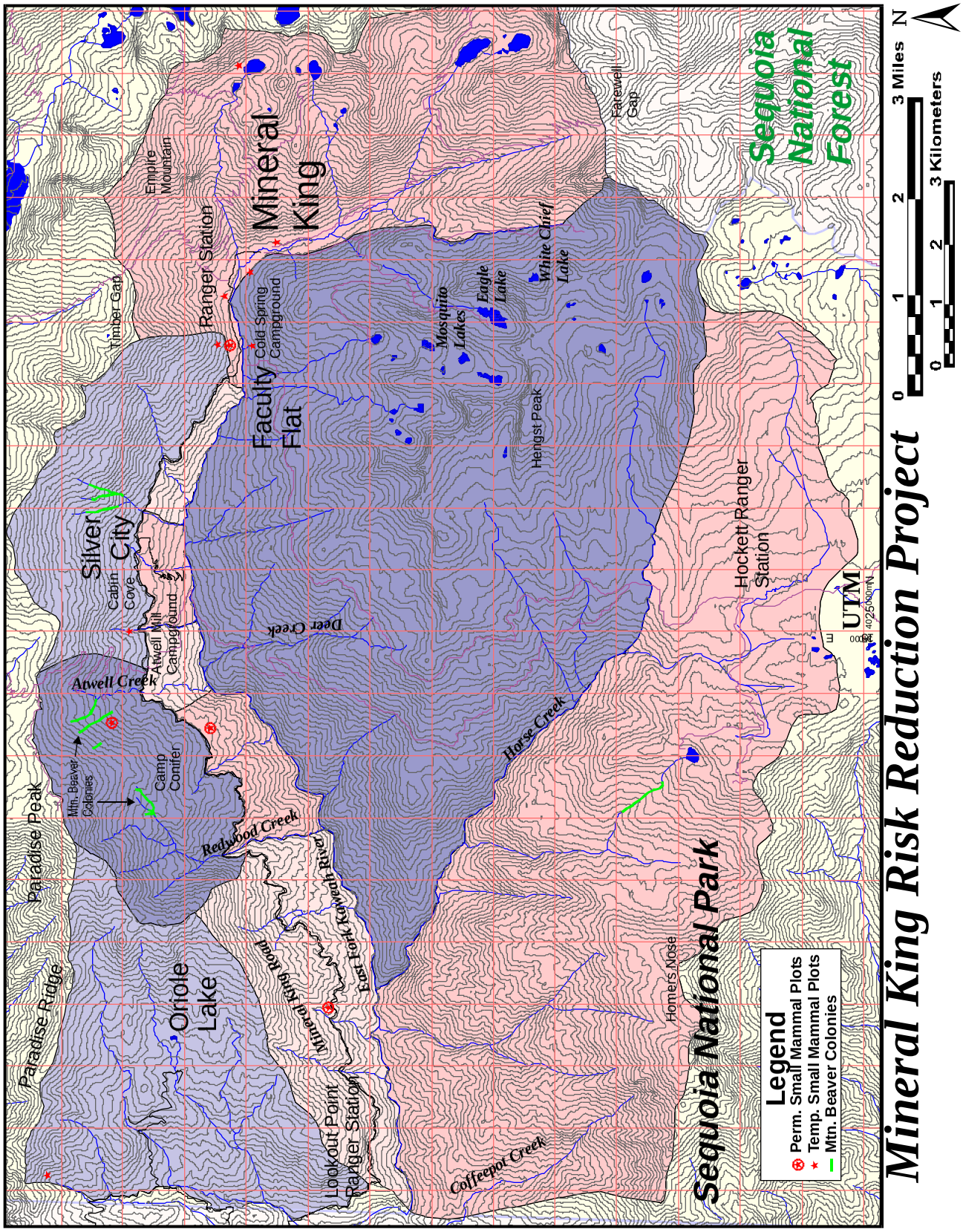

Figure 3.2-1. Location of small mammal live trapping sites and location of mountain beaver colonies.

showed considerable habitat specificity, except for the deer mouse which is a generalist. Two non-rodents captured included pica, ***Ochotona princeps***, and an unidentified shrew, ***Sorex*** sp.

Serendipity trapping of mid-sized mammals found ringtail (***Bassariscus astutus***) and pine martin (***Martes americanus***) in sequoia forest. A yellow-bellied marmot (***Marmota flaviventris***) was captured in red fir forest.

There was one-year-postburn serendipity trapping within the perimeter of the 1996 Kaweah Wildfire. The predominant species in the burned chamise chaparral was the western pocket mouse **(*Chaetodipus californicus*)**. Other species included deer mouse (***P. maniculatus*)**, brush mouse (***P. boylii***), and pinion mouse (***P. truei***). The California mouse (***P. californicus***) did not appear in the one-year postburn collection even though it was one of the frequent immediate-postburn captures. Likewise, it was not collected in the riparian site and dropped in capture frequency in the blue oak woodland. Chamise areas with the least cover remained the most depauperate. The burned riparian habitat increased in capture activity compared to last year. It was predominately western pocket mouse (***C. californicus***), but also acquired a new postburn species, the western harvest mouse (***Reithrodontomys megalotus***). The burned blue oak woodland had less capture activity than last year, and the dusky-footed woodrat (***Neotoma fuscipes***) was not found in 1997. The western pocket mouse (***C. californicus*)** dominated the sampling. Other species included the brush mouse (***P. boylii***), deer mouse ***(P. maniculatus***), and California mouse (***P. californicus***).

Mountain beaver (***Aplodontia rufa***) continue to occupy the east fork of Redwood Creek following the burn in 1995. Mountain beaver were also found near the Atwell Plot and along streams in the Evelyn Lake area.

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 second 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 ***P. 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) 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 tools 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 Gr ove with plot center at UTM coordinates 4037.147 northing and 349.506 easting. The Jeffrey Plot was located in Jeffrey pine forest with plot center at UTM coordinates 4035.456 northing and 355.264 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 21 nights from June 3 through July 19, 1997 (1,260 trapnights). The Jeffrey Plot was run for a total of 25 nights from August 27 through October 17, 1997 (1,500 trapnights). The traps were baited with a dry mixture of rolled oats and peanut butter. A high-low thermometer was located in the Atwell 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 at four sites in the Mineral King drainage: unburned sequoia forest near Deadwood Creek at UTM coordinates 4036.9 northing, 350.9 easting (180 trapnights), a rocky area in a Jeffrey pine forest at UTM coordinates 4035.5 northing, 355.3 easting (150 trapnights), red fir forest (40 trapnights), and at eleven vegetation types within the Monarch Lake area (Table 3.21-1). In addition, serendipity trapping was done at five sites in the Kaweah Fire in the drainage of the main stem of the Kaweah River. These habitats

Table 3.2-1. Location of trapping efforts by habitat in the Monarch area.

Vegetation Type	Approximate Centroid for Trapping		Trap-nights
	UTMN	UTME	
alpine prairie, dry graminoid (HAG)	4035.8	359.5	30
alpine prairie, heather (SAH)	4035.6	359.9	54
alpine prairie, mixed prairie (HMA)	4035.8	359.5	69
alpine prairie, dwarf shrub (SAD)	4035.8	359.1	33
alpine wet meadow, graminoid (HAW)	4035.4	359.6	66
alpine wet meadow, willow (SWS)	4035.4	359.6	27
sparse alpine, fell field (HAF)	4035.4	359.8	70
sparse alpine, rock outcrop (BRS)	4035.6	359.9	53
sparse alpine, scree (BTB)	4035.9	359.3	54
subalpine forest, foxtail, grassy (FFG)	4035.2	359.2	80
subalpine forest, foxtail, sparse (FFB)	4036.0	359.2	88

included chamise burned by a high intensity headfire and little rock (UTM coordinates 4040.6 northing, 333.2 easting; 84 trapnights), chamise burned by high-intensity headfire and much rock (UTM coordinates 4040.7 northing, 333.5 easting; 70 trapnights), chamise burned by medium-intensity fire (UTM coordinates 4040.6 northing, 333.4 easting; 35 trapnights), a riparian area in which all leaves and twigs were consumed by fire (UTM coordinates 4040.6 northing, 333.2 easting; 35 trap-nights), and burned blue oak wood-land (UTM coordinates 4040.2 northing, 334.2 easting; 56 trap-nights). Sherman live traps were scattered loosely through these sites at approximately 15 m intervals (not measured). Serendipity sites were surveyed from July 7 through November 4, 1997 for a total of 994 trapnights in Mineral King drainage and 280 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. All serendi-pity site coordinates need to be verified with a GPS.

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 through October, 1997. It amounted to 49 trapnights. This trapping included sequoia grove (28 trapnights), mixed conifer forest (3 trapnights), Jeffrey pine (14 trapnights), and red fir forest (4 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. Trees were measured at breast height and shrubs at ground 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). In 1997, the herbaceous vegetation looked similar to the preburn condition, and litter was beginning to provide some soil cover.

Twenty-one nights of trapping (1,260 trap nights) produced 319 rodent captures (81 different individuals). The mean population estimate during the survey period was 34 individuals (95% CI = 30-39 individuals). This was twice as high as the preburn sampling and is similar to 1996 postburn population estimates (Werner 1996, 1997). The population estimates for 1997 are almost identical to the previous year (**Fig. 3.2-2**). Ninety-six percent of the individuals (98% of the captures) were ***Peromyscus maniculatus*** (mean plot population = 33 individuals, 95% CI = 28-37 individuals). Two percent of the individuals (2% of the captures) were ***Glaucomys sabrinus***. One ***P. boylii*** was captured (1% of the individuals, 0.3% of the captures). Captures of non-rodents included two ***Sorex trowbridgii***. There were several changes in species captured between the preburn sampling in 1995 and the two years of postburn sampling in 1996 and 1997. ***P. boylii*** was only captured in the postburn sampling, and ***Microtus longicaudus*** was only captured in the preburn sampling.

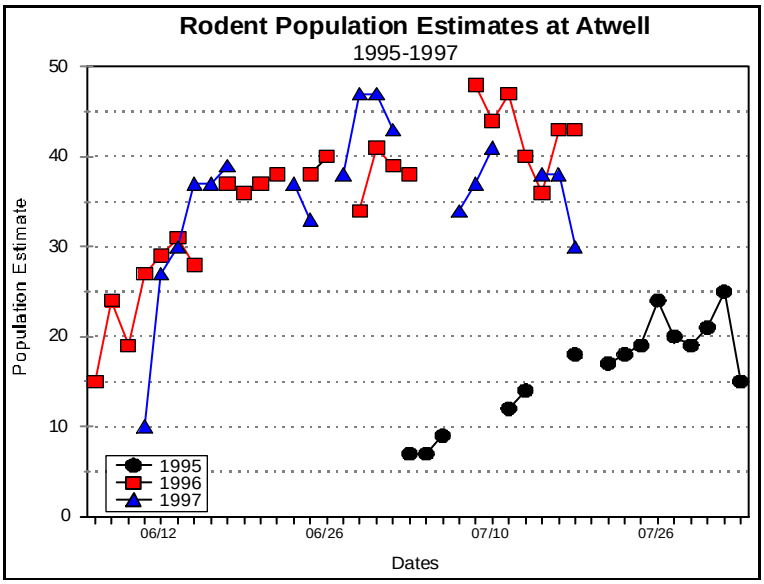

Figure 3.2-2. Comparison of population estimates at the Atwell Plot before the burn and during two postburn years.

Both of these species were relatively scarce. ***M. 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 three rodent species were 0.248, 0.005, and 0.0007 cap-tures/ trapnight for ***P. maniculatus***, ***G. sabrinus***, and ***P. boylii***, respectively. Like the mean population size, the catch rate for ***P. maniculatus*** doubled during the postburn sampling from 0.133 captures/trapnight preburn to 0.248 captures/trapnight postburn.

The sex ratios for the sampled population of ***P. maniculatus*** were about equal for the individuals sampled (♀ = 53%, ♂ = 47%, n=78) and for total captures (♀ = 51%, ♂ = 49%, n=312). The ***P. boylii*** captured was male, and the two ***G. sabrinus*** were both female.

Eighty-two percent of the ***P. maniculatus*** captured were adults (88% in 1996). Only adults were captured for the other species. Overall, the estimated population, catch rates, sex ratios, and age are very similar to the first postburn year.

Jeffrey Plot: The Jeffrey Plot was located in a Jeffrey pine forest classified as xeric conifer forest on vegetation maps used in the Mineral King Risk Reduction Project. The density of trees was estimated at 324 trees/ha (95% CI = 270-408 trees/ha). While ***Pinus jeffreyi*** dominated the site both numerically and in basal area, ***Abies concolor***, ***Quercus kelloggii***, and ***Juniperus occidentalis*** were common. By descending order of dominance,

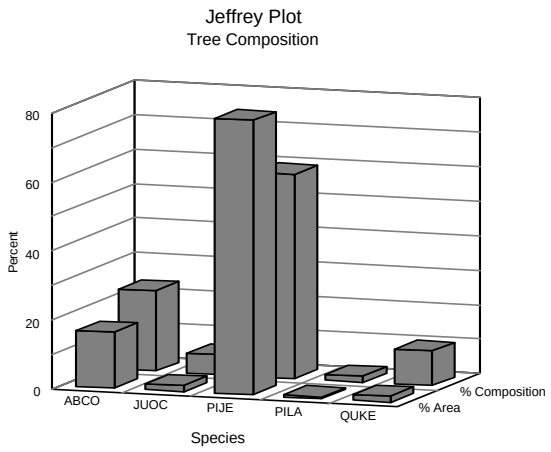

Figure 3.2-3. Tree composition at the Jeffrey Plot in 1997.

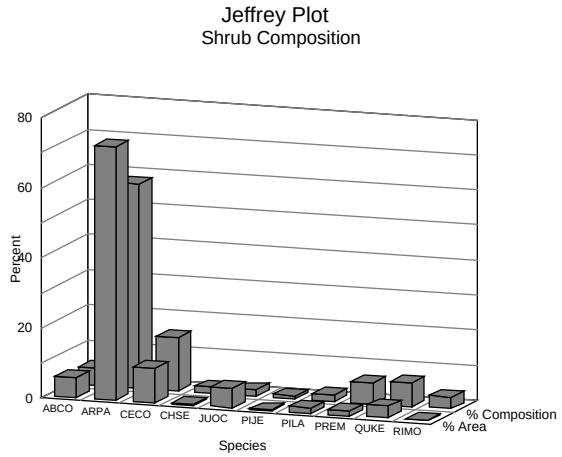

Figure 3.2-4. Shrub composition at the Jeffrey Plot during 1997.

the trees were predominately ***P. jeffreyi*** (59.2% composition, 79.7% area), ***A. concolor*** (23.3% composition, 16.2% area), ***Q. kelloggii*** (10.0% composition, 1.8% area), ***J. occidentalis*** (5.8% composition, 1.8% area), and ***P. lambertiana*** (1.7% composition, 0.5% area; **Fig. 3.2-3**). The density of shrubs in the understory was estimated at 922 stems/ha (95% CI = 522-3,912 stems/ha). Over half of the shrub understory was ***Arctostaphylos patula*** (58.3% composition, 72.3% basal area). In descending order of frequency, other species included ***Ceanothus cordulatus*** (15.0% composition, 9.8% basal area), ***Q. kelloggii*** (6.7% composition, 3.4% basal area), ***Prunus emarginata*** (5.8% composition, 1.2% basal area), *Abies concolor* (5.0% composition., 5.6% basal area), ***Ribes montigenum*** (3.3% composition., 0.3% basal area), ***J. occidentalis*** (1.7% composition, 5.6% basal area), ***P. lambertiana*** (1.7% composition, 1.5% area), ***Chrysolepis sempervirens*** (1.7% composition., 0.4% basal area), and ***P. jeffreyi*** (0.8% composition, 0.1% basal area; **Fig. 3.2-4**). The distribution of understory shrubs was aggregated (Hines' Test: $H(T) = 7.881$, $P<0.001$).

The plot faced southwest at 2,340-2,380 m elevation. Side slopes varied from 21 to 35 degrees (mean = 27°). The plot was dissected by several gullies that might occasionally serve as ephemeral drainages under unusually wet conditions (**Fig. 3.2-5**). While large boulders are scattered throughout the plot, there are only a few major rock outcrops. Fine fuels form a thick mat over the soil in most areas, but large logs are sparse compared to other plots in this study. Grasses and other herbaceous vegetation were largely inconspicuous. There was no evidence of recent fire though there was ample fuel. The

presence of junipers, a fire-intolerant species, suggests that it has not burned for a while. Empirically, the site appears to be a homogeneous stand of ***P. jeffreyi*** being invaded by ***J. occidentalis*** and ***A. concolor***.

Twenty-five nights of trapping (1,500 trapnights) produced 101 rodent captures (45 individuals). The mean population estimate during the survey period was 19 individuals (95% CI = 17-22 individuals; **Fig. 3.2-6**). ***Peromyscus maniculatus*** dominated the sampled rodent population with 58 percent of the individuals (67% of the captures). Of intermediate capture abundance were ***P. boylii*** (20% of individuals, 15% of captures) and ***Tamias speciosus*** (13% of individuals, 12% of captures). The least frequently encountered were ***G. sabrinus*** (7% of the individuals, 5% of the captures) and ***Neotoma cinerea*** (2% of the individuals, 1% of the captures). Captures of non-rodents included three *Sorex* sp.

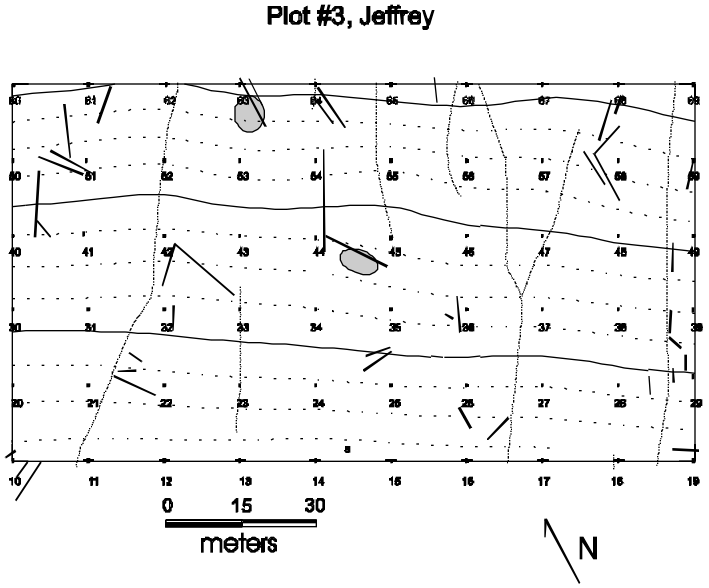

Figure 3.2-5. Jeffrey Plot. Horizontal lines represent contour intervals. The circular areas are major rock outcrops. Vertical lines are drainages or gullies.

Catch rates for the five species of rodents were 0.045 captures/trapnight for ***P. maniculatus***, 0.010 captures/trapnight for ***P. boylii***, 0.008 captures/trapnight for ***T. speciosus***, and 0.003 captures/trapnight for ***G. sabrinus***, and 0.0007 captures/trapnight for ***N. cinerea***. Catch rates were considerably less than reported the previous year (Werner 1997) doing serendipity trapping in the same forest type. This site differed from the 1996 site in having a denser and more homogeneous canopy, and there was a conspicuous lack of grasses and other herbaceous vegetation that could provide seeds or other food. Few cones were observed either in the trees or on the ground. Trap disturbance by ***Ursus americanus*** (and possibly other animals) also hindered trapping efficacy.

The sex ratios for the sampled population were predominately male. Seventy-three percent (n=24) of the ***P. maniculatus*** were male (71% of captures, n=66), and all of the *T. speciosus* were male (6 individuals, 10 captures). Two of the three ***G. sabrinus*** were male, and the single capture of a *N. cinerea* was male. Only ***P. boylii*** showed any balance with 56% of the individuals (n=9) being female (64% of captures, n=14).

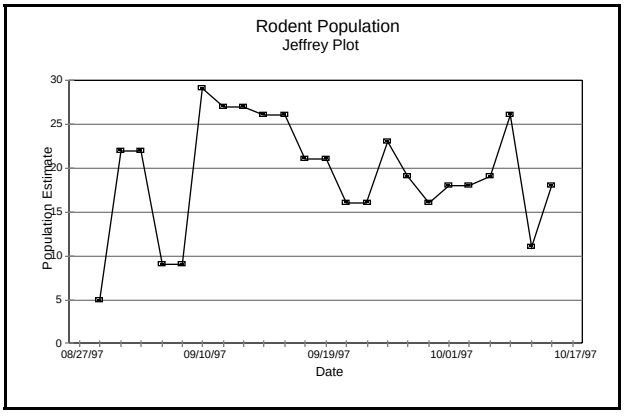

Figure 3.2-6. Population estimates for all rodent species at the Jeffrey Plot during surveys, August 27 through October 17, 1997.

Most of the rodents captured were adults. This includes 94% of the *P. maniculatus* and all of the ***T. speciosus, G. sabrinus***, and ***N. cinerea***. Only ***P. boylii***, the species with a balanced sex ratio, had a large percentage of subadults, 29% (n = 14).

Ponderosa Plot: The Ponderosa plot burned during the week of November 2, 1997. It was too late in the year for postburn trapping due to cold, moist conditions; but downed logs were mapped and postburn photographs were taken. In general, the plot burned very hot. Most trees were either leafless or scorched to the top. The understory had become very open. The ridge in the center of the plot was one of the few areas

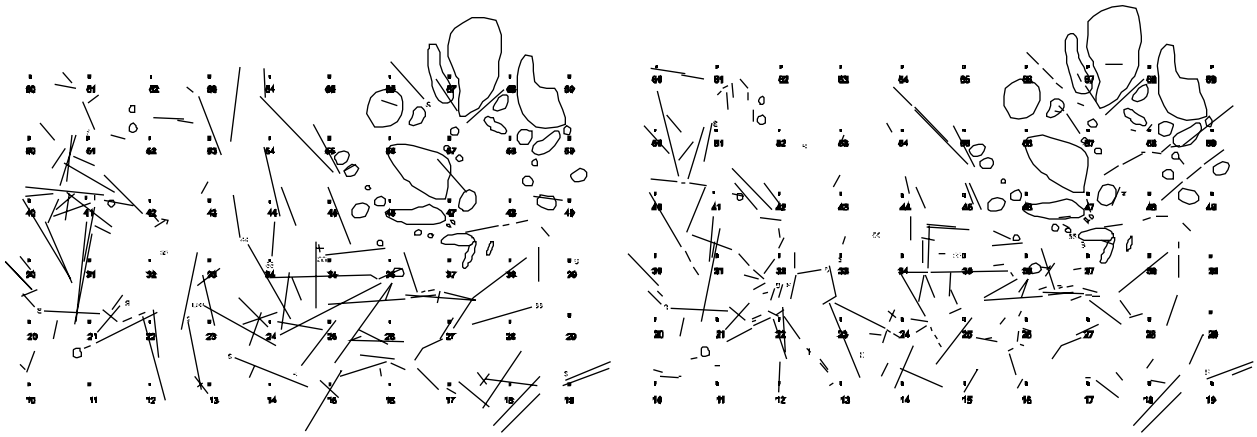

Figure 3.2-7. Down logs in the Ponderosa Plot prior to burning (left side; 1996) and postburn (right side; 1997). Circular images are large rocks.

where green tree tops were visible. It was the only place where any of the surface fuels remained unburned. The unburned fuels were estimated at about a square dekameter of ***Chamaebatia foliolosa*** that was not consumed because of an anthropogenic firebreak caused by an old abandoned trail that crossed the north side of the plot. Of the 60 trap stations within the plot, 56 (93%) were completely consumed, 3 (5%) were partially consumed due to sparse fuel, and one (2%) was in the unburned area described above. Unlike other combustible components of the landscape, heavy logs showed little loss, and they seemed to be almost as abundant after the burn as during the preburn trapping (**Fig. 3.2-7**). Most stumps seemed to burn well with consumption extending underground along the large roots.

Serendipity Surveys:

Deadwood Creek: This site was in unburned sequoia forest. The site was selected to compare trap success in an unburned sequoia forest with the existing burned sequoia forest at the Atwell Plot. The site was at about 2,000 m elevation and west of Deadwood Creek. In descending order of capture abundance, the site produced *P. maniculatus* (0.061captures/trapnight), ***Microtus longicaudus*** (0.051 captures/trapnight), and one non-rodent, ***Sorex*** sp. These results resembled the preburn condition in the Atwell plot in that ***M. longicaudus*** was present and trap success was low compared to the postburn Atwell trap success (0.248 captures/trapnight for ***P. maniculatus***). The catch rate for ***P. maniculatus*** at Deadwood Creek was less than half the preburn catch rate for ***P. maniculatus*** (0.133 captures/trapnight) at the Atwell Plot. ***M. longicaudus*** had a higher catch rate at Deadwood Creek than in the preburn condition at the Atwell plot (0.010 captures/trapnight). This was probably due to the Deadwood site being near more riparian habitat than in the Atwell area. While the sites were not completely comparable, the captures at Deadwood Creek support the proposition that the population increase at the Atwell plot was a consequence of the last burn there.

The cause of the increased postburn catch rates at Atwell remains a mystery, but I propose several theories for further exploration: 1) Increased productivity from enhanced food supply, either more of it or better quality; 2) Decreased predation, either less predators present or less efficient predation; 3) Physiological reproductive response triggered by fire; 4) Increased immigration to trap bait in plot due to lack of food outside plot; or 5) Coincidental event caused by influences unrelated to fire. This serendipity site provides some evidence by which to dismiss the last theory. The second seems unlikely since fire tends to reduce availability of cover for prey. However this can work both ways since fire also reduces ambush cover for some predators. Some combination of the remaining three (theories 1, 3, and 4) seems most likely.

Monarch: The Monarch trapping was done in a diverse area in which eleven vegetation types were sampled. Elevations ranged from about 3,100 to 3,200 m, and side slopes were generally steep (estimated 20°-30°). The drainage faced west.

Table 3.2-2. Summary of rodents captured in the Monarch serendipity trapping area in 1997.

Vegetation Type	Species Captures/Trapnight						
	MILO*	NECI*	PEBO*	PEMA*	SPLA*	TAAL*	ALL
alpine prairie, dry graminoid	0.067			0.267			0.333
alpine prairie, heather				0.074		0.056	0.130
alpine prairie, mixed prairie	0.087	0.029		0.087	0.087		0.290
alpine prairie, dwarf shrub				0.303		0.061	0.364
alpine wet meadow, graminoid	0.242						0.242
alpine wet meadow, willow	0.222						0.222
sparse alpine, fell field				0.186			0.186
sparse alpine, rock outcrop				0.226		0.019	0.245
sparse alpine, scree				0.111			0.111
subalpine forest, foxtail, grassy			0.013	0.063	0.013	0.200	0.288
subalpine forest, foxtail, sparse				0.011		0.011	0.023

* MILO = ***Microtus longicaudus***, NECI = ***Neotoma cinerea***, PEBO = ***Peromyscus boylii***, PEMA = ***Peromyscus maniculatus***, SOLA = ***Spermophilus lateralis***, TAAL = ***Tamias alpinus***

The rodents in the Monarch (**Table 3.2-2**) area showed considerable vegetation type specificity, with the exception *P. maniculatus*, a generalist, which was found in all vegetation types except for the wet meadows. Capture rates were relatively high compared to other trapping done in this drainage. Biodiversity was also good. Three of the habitats had four species of small rodents. One of the most interesting sites was foxtail pine. Without grass in the understory, foxtail pine was depauperate and had the lowest catch rate in the Monarch area. With grass, foxtail was one of the most diverse sites in the Monarch area with over twelve times the catch rate of sites without grass. Only the grassy site had sufficient fuel to carry a fire. Fifty-five percent of the captures in the Monarch area were recaptures. Non-rodent captures included four ***Ochotona princeps*** (0.074 captures/trapnight) and two unidentified (to date) ***Sorex*** spp. (0.037 captures/trapnight).

Jeffrey Rock: This site was established to compare the rodent species of a very open, rocky area to the rodent fauna of the Jeffrey Plot. The site was mostly exposed and fissured granite with little vegetation and steep side slopes (estimated about 30°) facing southwest. The elevation was about 2,400 m. The predominate species captured were ***P. maniculatus*** (0.073 captures/trapnight), ***P. boylii*** (0.033 captures/trapnight), and ***T. speciosus*** (0.020 captures/trapnight). These capture rates were significantly higher (P=0.047) than for the same species in the Jeffrey Plot. Forty-two percent of the individuals (n=12) and 53% of the captures (n=19) were rodents from the adjacent Jeffrey Plot. The ***Peromyscus*** found at both places only occurred on the northern (adjacent) edge of the Jeffrey Plot suggesting home ranges that spanned both areas. Two of the three ***Tamias*** found in the Jeffrey Rock Site were captured in the southern part of the Jeffrey Plot. Thirty-seven percent of the captures at the Jeffrey Rock Site (n=19) were recaptures (Note: First captures of marked Jeffrey Plot rodents at the Jeffrey Rock Site were not counted as recaptures at the Jeffrey Rock Site.). The incombustible rocky areas appear to support fauna "similar to" (in species composition - not necessarily similar numerically) and partially "shared with" the combustible portions of the Jeffrey pine forest.

Red Fir: The site was on a heavily forested north aspect estimated at about 2,300 m elevation and about 20° slope. The vegetation was predominately ***Abies grandiflora*** and appeared homogeneous. A small stream was present. Nineteen captures representing four species of small rodents were found at

the Red Fir Site from only 40 trapnights. The captures were predominately ***P. maniculatus*** (0.250 captures/trapnight), but also included ***M. longicaudus*** (0.075 captures/trapnight), ***G. sabrinus*** (0.075 captures/trapnight), and ***T. speciosus*** (0.075 captures/trapnight). As part of a separate trapping effort using larger traps, one ***Marmota flaviventris*** (0.250 captures/trapnight, n=4) was captured. Only four (21%) of the captures were recaptures. The preliminary data suggested that the site was rich numerically and in biodiversity.

Mid-sized Mammals: Twenty-eight trapnights produced five ***Bassariscus astutus*** (0.179 captures/ trapnight) and one ***Martes americana*** (0.036 captures/trapnight) in sequoia forest. Three trapnights in mixed conifer forest and fourteen trapnights in Jeffrey pine forest produced no captures. Four trapnights in red fir forest produced one ***M. flaviventris*** discussed above.

Table 3.2-3. Summary of rodent capture success following the Kaweah Fire. Within each box, the first number describes results form trapping in 1996, immediately postburn. The second value is capture data for 1997.

Site Description	Species Capture Rate (captures/trapnight)						
	CHCA	**NEFU**	**PEBO**	**PECA**	**PEMA**	**PETR**	**REME**
chamise, complete consumption, few rocks (1996 TN* = 94; 1997 TN = 84)	0.021 0.036				0 0.036		
chamise, complete consumption, very rocky (1996 TN = 63; 1997 TN = 70)	0.175 0.271		0.032 0.114	0.079 0		0 0.014	
chamise, poor consumption of stems (1996 TN = 38; 1997 TN = 35)	0.132 0.200			0.026 0	0.053 0.057	0.026 0	
foothill riparian, high consumption (1996 TN* = 38; 1997 TN = 35)	0.026 0.314			0.026 0			0 0.057
blue oak woodland, consumption good (1996 TN* = 36; 1997 TN = 56)	0.083 0.196	0.028 0	0.194 0.036	0.111 0.018	0.056 0.036		

* TN = trap nights

Kaweah Fire: One-year-postburn data on the Kaweah Fire is summarized in **Table 3.2-3.** The table provides for a comparison with trap results immediately following the fire. The most conspicuous change was the increase in ***Chaetodipus californicus*** at all sites, and the addition of ***Reithrodontomys megalotus*** in the burned riparian area. ***Neotoma fuscipes*** was captured in blue oak woodland immediately after the fire but not captured anywhere in 1997. After a year, ***Peromyscus californicus*** were captured at fewer locations and at lower capture rates than immediately after the burn. During the year, ***P. boylii*** captures decreased dramatically in the blue oak woodland, but increased greatly in the rocky area of chamise burned by high intensity fire.

Mountain Beaver:

The mountain beaver (***Aplodontia rufa)*** colony on the east fork of Redwood Creek continued to show evidence of an active population. Additional activity was observed near the Atwell Plot along the creek that is east of the plot (Ray and Keesey, pers. comm.) ***Aplodontia rufa*** evidence was seen along a creek that drains Evelyn Lake (Caprio and Ray, pers. comm.). This is the most southern known population in the Park.

PLANS FOR 1998

1. Conduct post-burn survey of the Atwell Plot and Ponderosa Plots.
2. Conduct serendipity surveys in Oriole Lake and/or Hockett areas.
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.
6. Examine literature regarding fire and predation.

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