# III) Project Year 1995

The MKRRP was initialized during March 1995 with field work and limited burning scheduled to begin during 1995. Of significant consequence was that the project began following a winter/spring (1994/95) of much greater than average snow accumulation in the Sierra Nevada. This resulted in the most delayed snow melt in many years (many upper elevation areas were not snow free and accessible until late July or early August). This was followed by the driest fall in 48 years of record, with significant winter rains only beginning on December 12. These weather conditions resulted in delays in initiating some field components of the research and monitoring but allowed field work to continue to a much later date in the autumn than is normally the case.

Field work during 1995 concentrated on the south facing slope of the East Fork watershed (**Fig. 4**) since this was the area designated as the primary burn segments for burn operations during 1995 and 1996 by the Fire Management Office. This area, which includes the Oriole Lake drainage, was divided into eight segments based on topographic and anthropogenic features (**Fig. 1**). Segment #3 was selected to be the primary burn unit since it could be used to create an anchor point to tie additional burns units into. Eventually, a burn buffer between the lower East Fork drainage and the Silver City/Mineral King developed areas would be created. While specific plans varied during the summer, by early fall the plan was to burn this segment during 1996, with most line preparation completed during 1995. However, beginning on October 12 with blacklining ignitions during preparation of the upper perimeter, the burn unexpectedly backed downhill into the segment interior (**Fig. 5**). This was due to extremely dry conditions and the development of a strong nightly mid-elevation temperature inversion. At this time a decision was made to allow the segment to continue to burn since it remained in prescription and the probability of a season ending precipitation event was high. A small number of additional interior ignitions were made on October 29 on the ridge to the west of Camp Conifer (southeast flank of the January 1994 burn). The segment continued to burn, with perimeter line-holding, until December 12-13 when 5.6 cm (2.18 in) of rain fell. The total acreage treated within segment #3 boundaries was about 850 ha (2,100 acres) with the actual acreage physically burned within the unit slightly less due to unburned patches.

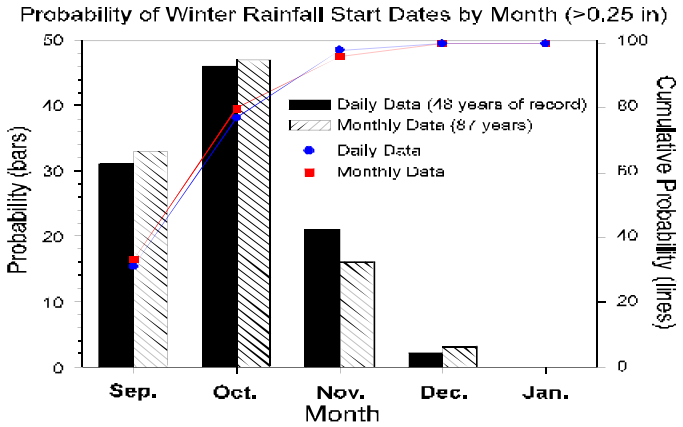


**Figure 3.** Probability of winter season rainfall starting each year by month. Data based on Ash Mountain MET station (missing values estimated from surrounding stations).

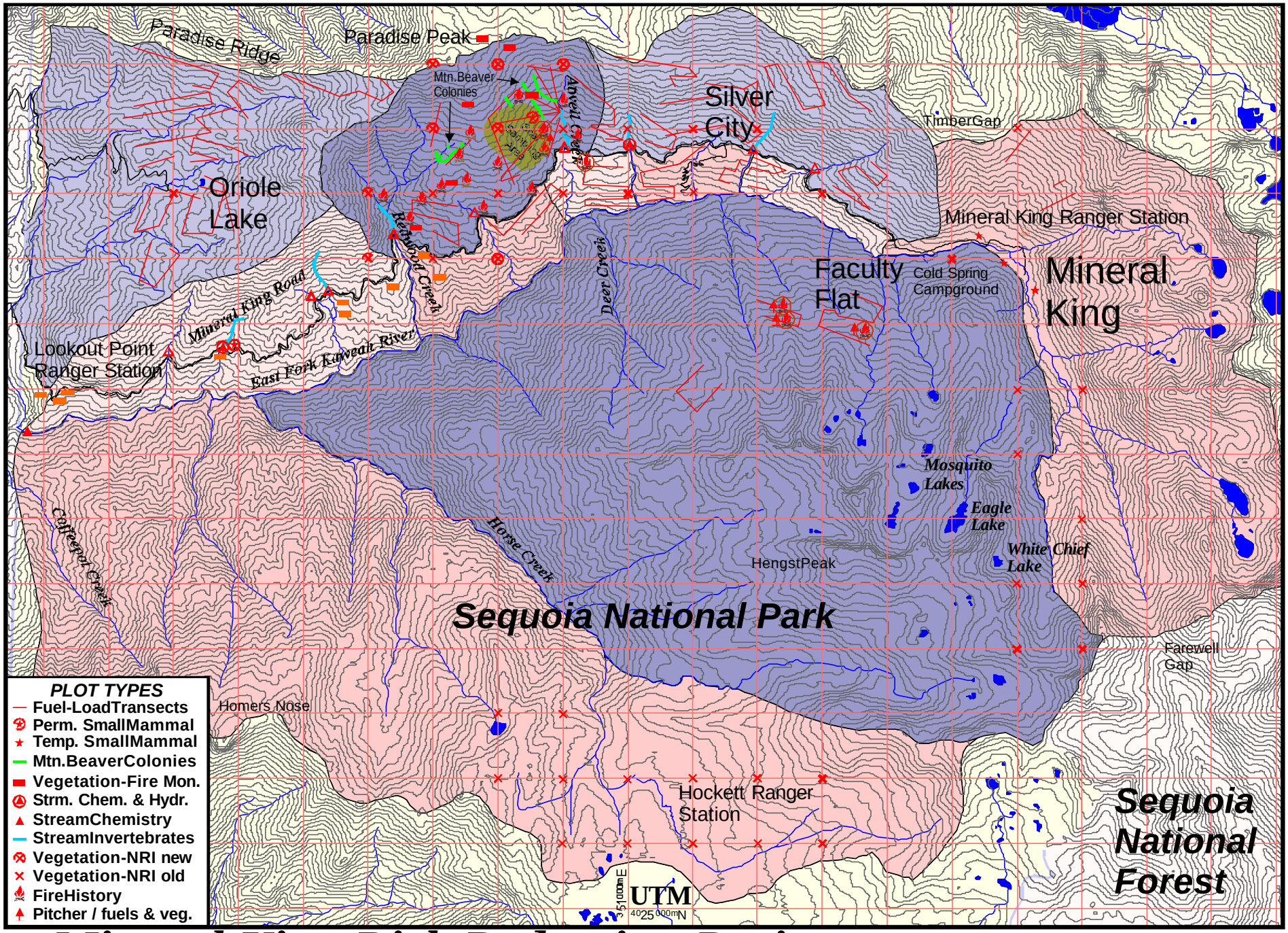


Figure 4.

# Mineral King Risk Reduction Project

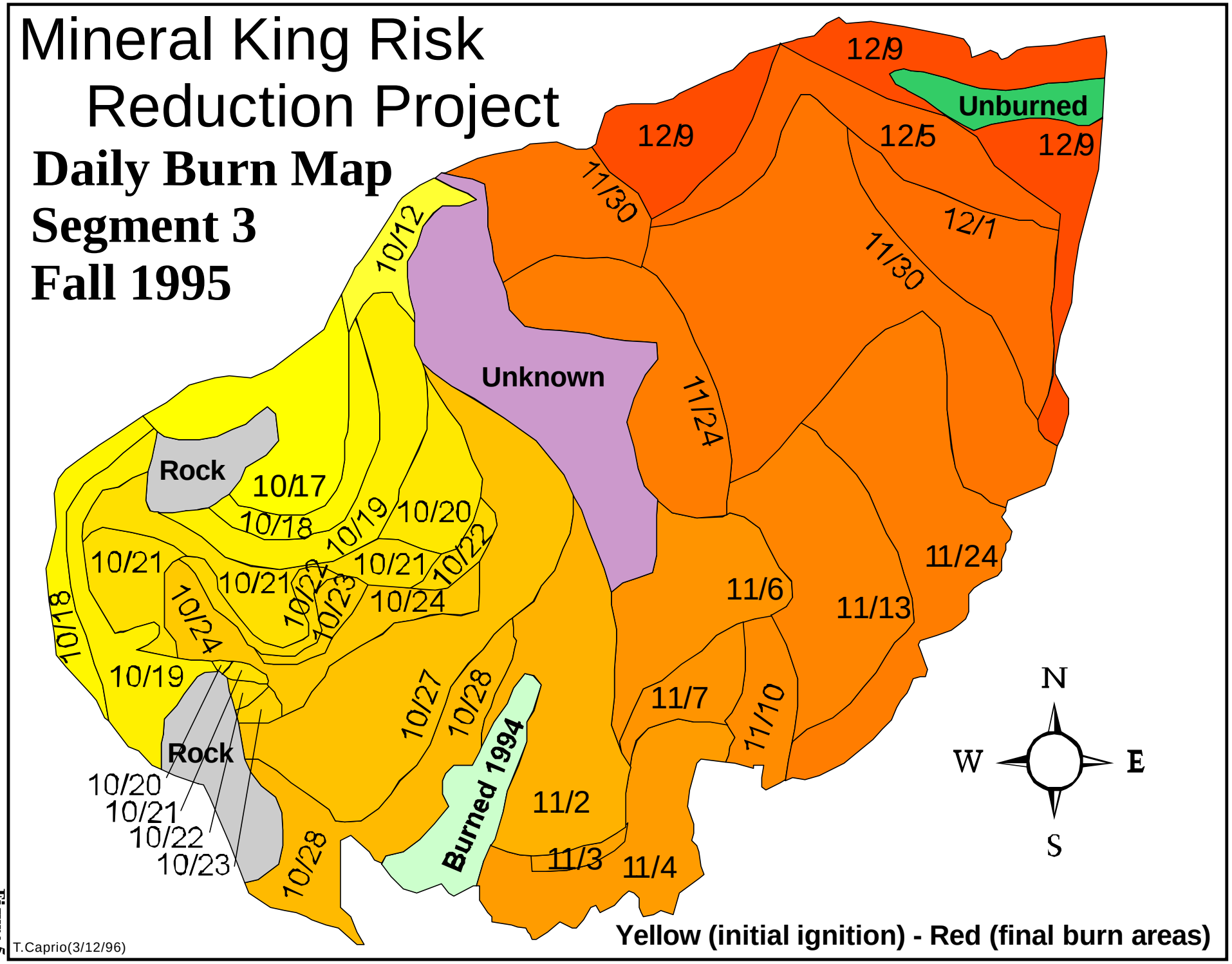
Mineral King Risk Reduction Project
Daily Burn Map
Segment 3
Fall 1995
12/9
Unburned
12/9
12/5
12/9
11/30
12/1
11/30
10/12
Unknown
11/24
Rock
10/17
10/18
10/19
10/20
10/21
10/21
10/22
10/21
10/24
10/23
10/24
10/24
10/18
10/19
11/24
11/6
11/13
10/27
10/28
11/7
11/10
Rock
10/20
10/21
10/22
10/23
10/28
Burned 1994
11/2
11/3
11/4
N
W
E
S
Yellow (initial ignition) - Red (final burn areas)
T.Caprio(3/12/96)

Figure 5.

# Vegetation Sampling

## 1) Fire Effects Plots - Science and Natural Resources Management, SEKI

Lead: M. Keifer; field-crew supervisor: G. Dempsey; field-crew members: B. Everett, G. Indindolia, A. Rusk, and P. Whitmarsh

***Objectives***: The fire effects plots are part of an ongoing monitoring process to assess burn objectives and achievements and to evaluate management objectives. Vegetation monitoring in the Mineral King burn is critical to (1) examine changes in vegetation structure and composition; (2) detect any unexpected or undesirable changes in vegetation that may be a result of the project; and (3) provide the above information to fire managers, other park staff, and the public. The primary monitoring variable is total fuel load since fuel reduction is currently the primary SEKI burn objective. A secondary monitoring variable has been chosen as overstory tree density although this is not a stated SEKI burn objective.


**Figure 6.** Sampling densely vegetated chaparral shrub plot below the Atwell Grove.

**Field Work**: Two seasonal positions were funded to handle fire effects monitoring and increased workload associated with the MKRRP during 1995. Field crews set up a total of 15 plots within the MKRRP; six forest plots and nine brush plots. Five of the fire effects plots were located in the forested portion of segment #3 (**Fig. 7**). These included two in giant sequoia/mixed-conifer forest, two in red fir forest, and one in pine/white fir mixed conifer forest. A red fir control plot was also set up on the immediate north side of Paradise Ridge, adjacent to segment #3. In addition to the forest plots, three plots were established during the fall of 1995 in chemise chaparral and six plots in mixed chaparral, all in segments #2 and #4 (**Fig. 7**).

**Data Collection**: With some modifications, these plots followed standardized methods used for monitoring fire effects on vegetation as outlined in the NPS Western Region Fire Monitoring Handbook (1992). Data collected on the plots emphasize forest structure, trees, and shrubs. The three red fir plots represent a new vegetation type for SEKI' s fire effects monitoring program.

The burning of segment #3 during the fall of 1995 burned at least three of the fire effects plots within the unit and probably all five (to be verified after snow melt). Three of the plots have been visited postburn and two of these have had postburn rechecks completed. Neither time nor personnel allowed the remaining three plots to be sampled prior to the onset of winter snows.

**Plans for 1996 Field Season**: Postburn rechecks of plots burned during 1995 will be completed once winter snows have melted and field crews are available. New plots will be installed in areas of the MKRRP where specific vegetation types have previously been unsampled or have been under represented in past sampling. Any brush plots burned during the winter of 1996 will be rechecked.

## 2) Giant Sequoia Fire Scars and Fuel Loading

- Science and Natural Resources Management, SEKI

Lead: M. Keifer; field-crew supervisor: G. Dempsey; field-crew members: B. Everett, G. Indindolia, A. Rusk, and P. Whitmarsh

***Objectives***: This study was planned to assess the relationship between the amount of fuel accumulation surrounding giant sequoias prior to burning and the resulting fire effects (Keifer 1995, see Appendix 1). The specific objectives of the study are to: (1) determine the amount of heavy fuels surrounding giant sequoia trees prior to and following prescribed burning, and measure the specific fire effects characteristics; (2) from these measurements, determine the relationship between the amount of large fuel and duff surrounding giant sequoia trees and resulting changes in fire effects characteristics (bark char, crown scorch, fire scars, and mortality); (3) provide SEKI' s Fire Management staff with the study results to assist in making decisions regarding heavy fuel clearance in giant sequoia groves.

As a result of public concern about the visual effects of fire, giant sequoia trees located in restoration burn units are subject to prefire fuel removal as required by Appendix H of the SEKI Fire Management Plan (FMP). The appendix states that unnaturally high fuel levels around sequoia trees must be removed prior burning to limit bark char and crown scorch in trees greater than four feet in diameter. This study will provide information to managers about the actual impacts of burning these unnatural fuels are on sequoias. A waiver of Appendix H requirements was obtained for this research project.

**Figure 8.** Sampling a giant sequoia for the fire scar study.

**Field Work and Data Collection**: The study is being conducted in the central portion of Atwell Grove (**Fig. 7**) where 60 giant sequoia trees have been selected for sampling within segment #3. These trees include 30 previously scarred individuals and 30 unscarred trees, all greater-than four feet in diameter. Trees were sampled during the late summer and fall of 1995. Data collected at each tree included: within a 7.6 m (25 ft) radius, map and tally of 1000-hr fuels, litter and duff depths; depth and width of all fire scars, using permanently marked points; bark char characteristics; crown scorch height; and crown scorch percent (a detailed study description is given in **Appendix 1**).

During late November the portion of Atwell Grove containing the sampled trees was burned by the prescribed management fire ignited on October 12. Field crews were on hand during the burning of some areas where selected trees were sampled and able to make fire behavior observations. Burning conditions they observed appeared to be of the expected intensity and within the planned burn prescription..

**Problems & Solutions**: Sampling of the trees in this study were originally scheduled to be completed early in the summer of 1996, prior to the planned burning of the segment #3 during that year.

However, the unexpected burning of the segment during the fall of 1995 required that an exceptional effort be made to complete the sampling prior to the study area burning. Field crews worked long hours and received additional help from staff of Resource Management and the National Biological Service.

There was concern that burning of the study trees late in the year, during a period when precipitation is likely, could produce non-uniform burning conditions and fuel consumption over the study area and result in poor data. However, the period when the study area burned was dry and fuel consumption appeared to have been relatively uniform.

**Plans for 1996 Field Season**: All trees will be resampled at the earliest date possible following the melting of winter snows in the Atwell Grove area.

## 3) Natural Resource Inventory Plots (NRI) - National Biological Service, SEKI Field Station

D. M. Graber (P.I.), S. A. Haultain, and E. Sanderson

***Objectives***: The NRI plots were established in order to document the preburn floristic, composition and forest structure of the Atwell Grove segment (Haultain 1996). An effort was made to include points falling within the little known, dense chaparral adjoining the Atwell unit scheduled for subsequent (late fall 1995, spring 1996) ignition. Surveys for sensitive vascular plant species suspected to occur in the area (***Ribes tularensis***, ***Angelica callil***) were also conducted during the course of accessing the plots.

The general purpose of the NRI plots is to provide a systematic, plot-based inventory for detecting and describing the distribution of vascular plants, vertebrate animals, and soils throughout the Parks (Graber et al. 1993). The inventory was initiated in 1985 with over 600 plots sampled by 1995. The sampling scheme is designed to be compatible with the Parks' geographic information system (GIS), and to assist in the field validation of remote sensing. All new NRI plots within the MKRRP were permanently marked. Data recorded include cover for all plant species present in a plot, tree DBH, vegetation type, fuels, soils, litter/duff depth, rock type, and evidence of fire or other disturbance.

**Fieldwork**: Fieldwork during 1995 was conducted during a 2½ week period in July in order to capture herbaceous species during the peak flowering period. The field crew consisted of the NRI plant ecologist (Sylvia Haultain) and one biological technician (Eric Sanderson). Due to the remoteness of many of the plots, the steepness of the drainage, and the dense forest/chaparral cover they were able to only establish one plot per field day. Sampling within stands of ***Arctostaphylos mewukka*** south and west of the Atwell Grove, was exceptionally slow and tortuous.

**Data Collected/preliminary Results**: The eight plots surveyed during 1995 were established according to the standard NRI protocol (Graber et al.1993), using the 1 km Universal Transverse Mercator grid intersections as plot locations (**Fig. 7**). This allowed inclusion of 32 NRI plots previously established within the proposed burn area as part of the preburn sample, resulting in a total of nine NRI plots within segment #3, and 41 plots within the East Fork watershed as a whole. 1995 marked the first year that plots were located using a PLGR global positioning device, increasing the likelihood of relocation for post-burn measurements.

Between-plot surveys resulted in the discovery of one previously unrecorded population of

***Angelica callii***, south of the Mineral King roadbed. The plants are scattered along a creek margin beneath the mixed conifer overstory in otherwise unremarkable habitat. Previous surveys located this species along similar creeks in the drainage and it is likely that additional populations will be found further up the canyon, along the streams between the roadbed and the East Fork of the Kaweah. No occurrences of ***Ribes tularensis*** were noted.

Of natural history interest was the occurrence of a single individual of ***Eburophyton austinae***, an achlorophyllous orchid, in extremely thick litter on plot 601. Although this species holds no special status, it is rarely encountered in Sequoia and Kings Canyon National Parks and marked the first observation of the taxa for the field crew.

Plot data and voucher specimens were curated by the NRI staff at Ash Mountain, under the supervision of the Research Biologist/Station Director.

**Future Plans for NRI Involvement: 1996 Field Season**: We anticipate having a field crew of two biological technicians available to re- read the plots burned during fall of 1995, and to establish additional plots in segments #4 and #5 according to NRI protocol. Fieldwork in the East Fork drainage will be conducted in addition to continuing surveys throughout the Parks, with perhaps four weeks of fieldwork dedicated to the MKRRP. Sampling will likely begin in May when phenology is at peak for the chaparral plots; and continue intermittently during July and August according to phenology in the mixed conifer and upper montane forests scheduled for ignition in 1996-97.

# Wildlife Monitoring - Science and Natural Resources Management, SEKI

Lead: H. Werner; field-crew members: P. Hart and C. Ray

***Objectives***: Wildlife monitoring efforts were initiated to evaluate fire effects from the MKRRP on selected mammal fauna. Primary effort was placed on small mammals because rodent populations respond readily to changes in vegetation structure and composition due to fire, they are easy to handle, and are a cost-effective tool for monitoring fire effects (Werner 1996, see **Appendix 2**). Small mammal populations were sampled using two methods; 1) long-term monitoring of permanently marked areas, and 2) serendipity surveys of interesting and unique habitats. Long-term monitoring was designed to document changes in small mammal populations following fire under known specific conditions. Serendipity trapping was conducted to inventory species and their relative abundances as a means to make a large-scale assessment of fire effects.

**Long-Term Plots**: During the summer and fall of 1995 two permanent long-term monitoring plots

were established in the Mineral King drainage (**Fig. 9**), one in sequoia mixed-conifer forest (Atwell, 2,130 to 2,177 m elevation) and the second in mixed chaparral/oak (Traugers, 1,428 to 1,493 m elevation). Plots were 75 x 135 m (corrected for slope) with a 15 m trapping grid for 60 total stations per plot. Sherman live traps were located within two meters of each station. Traps were baited with a mixture of rolled oats and peanut butter. A high/low thermometer was located at each plot. Trap lines were normally run for four nights per week. The total number of trap nights at the two plots totaled 3,276 (one trap for one night). The Atwell plot was run from July 3 through August 4, 1995 for a total of 17 nights. The Traugers plot was trapped from September 13 through December 1, 1995 for a total of 38 nights (a detailed study description is given in Appendix 2).

**Figure 10.** Weighing a captured rodent in one of the small mammal trapping plots. Protective gear (mask and gloves) was worn by the field crew to reduce exposure to hantavirus (photo by Harold Werner).

Captured individuals were tagged and measured for a number of standard parameters (species, sex, age, weight, hind-foot length, ear-notch length, tail length, and general comments). During handling personnel wore respirators, rubber gloves and eye protection as preventative measures against hantavirus. Based on capture/recapture data population size, density, and home ranges were estimated.

Vegetation density, composition, and basal area of living trees and shrubs was measured at each plot. At Atwell tree density was dominated by ***Abies concolor*** (white fir - 83% of the sampled individuals) while ***Sequoiadendron giganteum*** (giant sequoia) dominated basal area (62%).

Three mammal species were captured at the Atwell plot; ***Peromyscus maniculatus*** (deer mouse - 91% of captures, 0.133 captures/trapnight), ***Microtus longicaudis*** (longtailed vole - 7%, 0.010 captures/trapnight), and ***Glaucomys sabrinus*** (flying squirrel - 3%, 0.004 captures/trapnight). This plot burned on about November 20, 1995. Duff was completely consumed over about 63% of the plot, partially consumed over 23%, and unburned over 13%. At the Traugers plot six mammal species were captured; ***Neotoma fuscipes*** (dusky-footed woodrat - 69%), ***Peromyscus californicus*** (California mouse - 12%), ***Peromyscus truei*** (piñon mouse - 10%), ***Peromyscus boylii*** (brush mouse - 4%), ***Microtus californicus*** (California vole - 3%), and ***Chaetodipus californicus*** (California pocket mouse - 2%).

**Serendipity Trapping**: Serendipity trapping was carried out at three sites in the Mineral King Valley (**Fig. 9**); 1) a subalpine ***Ribes-Artemisia*** scrub site at 2424 m elevation, 2) a subalpine ***Salix*** shrub site at 2303 m elevation, and 3) in a subalpine wet meadow at 2350 m elevation. Sherman live traps were placed loosely at these sites at approximately 15 m intervals. Areas were surveyed from July 31 through August 25, 1995 for a total of 360 trap nights. Catch per unit effort (captures/trapnight) was used as a measure of relative abundance.

The highest trap success at the three serendipity sites was in the ***Ribes-Artemisia*** scrub where only ***P. maniculatus*** were captured (0.28 captures/trapnight). The two wetland sites produced quite different

results. The ***Salix*** shrub site had low capture success with 0.04 captures/trapnight for ***P. maniculatus*** and 0.01 captures/trapnight for ***M. longicaudus***. The wet meadow produced more species and higher overall capture success with ***Zapus princeps*** (western jumping mouse) dominating (0.08 captures/trapnight). Other species captured at this site include: ***P. maniculatus*** (0.04 capture/trapnight), and ***M. longicaudus*** (0.007 captures/trapnight).

Limited serendipity trapping was also carried out for medium-sized mammals (e.g. forest carnivores). This sampling was done from September 29 to December 1, 1995 and amounted to 120 trap nights. Trapping was conducted in white fir forest, mixed-conifer/hardwood forest, lower montane hardwood forest (72 trap nights in all three vegetation types), and mixed chaparral (48 trap nights). This effort resulted in two captures of ***Martes americana*** (pine marten - 0.09 captures/trapnight) in fir forest and two ***Bassariscus astutus*** (ringtail cat - 0.12 captures/trapnight in riparian mixed hardwood/conifer site at Redwood Creek and 0.02 captures/trapnight in lower montane hardwood forest).

**Other Mammal Species of Special Interest**

***Aplodontia*** **(mountain beaver)**: Mountain beaver in the southern Sierra Nevada appear to be a relict distribution. The last survey in the 1960s (Wright 1969) found few active colonies and they were distantly spaced (the colonies in the Atwell Grove were not located during this survey). Much of this was likely caused by natural fragmentation of their riparian habitat.

The colony reported by Wright (1969) on the east fork of Redwoood Creek (at the old Oriole Lake Trail crossing) was relocated **(Fig. 9)**. Inspection of the colony in 1995 showed it to be active and of considerable size, extending for several hundred meters above the trial crossing. Two additional branches of the east fork of Redwood Creek were also found to have active mountain beaver burrows. Additional, previously unreported and active ***Aplodontia*** colonies were also found in three locations in the Atwell Creek drainage (**Fig. 9**). These colonies also extended for several hundred meters along the creeks along which they were found. Colony elevations ranged Between About 210-2500 m, along waterways that appeared to be permanent and contained substantial soil development on gentle to moderately steep slopes. All colonies were located in giant sequoia groves. While apparent populations and number of colonies in the Mineral King area was found to be greater than originally expected, neither the short-term nor long-term effects of burning on the species is known. Fire-history samples have been obtained from the two colony areas to provide data of past fire occurrence at these sites.

Both areas in which colonies were found burned during the burning of segment #3 during the fall of 1995. In early January, 1996, the Atwell area was revisited and postburn activity around and in some of the ***Aplodontia*** burrows was noted. Both sites will be revisited during 1996 to make general observations that might indicate fire related impacts.

***Martes pennanti*** **(American fisher)**: Original plans for 1995 called for limited monitoring of ***Martes pennanti*** using track plates. This was not done because the new protocol being developed by the Forest Service for trapping this species was not yet available (using this protocol is important to maintain data compatibility among nearby agencies) and a large supply of track boxes was not available.

**Problems & Solutions**:

1) Some traps were destroyed by black bears (***Ursus americanus***). To alleviate this problem trapping periods need to be kept as short as possible and areas with extensive use by black bears need to be avoided.

2) Hantavirus protection needs to be considered early when making plans for any small mammal handling project because handling procedures add significantly to the time and cost of running monitoring

operations. However, the procedures are essential because the virus is life-threatening. These procedures increase the amount of field equipment that must be carried, decreases handler comfort, impedes handling, generates waste that requires sanitation, and adds directly to the cost of labor and supplies. Hantavirus supplies need to be stock-piled to be sure of ready access because commercial and government sources are not always available. New designs and techniques for handling mammals are being explored.

3) Dealing with late snow storms, bear problems, and lack of a real kitchen may have added some form of charm to the field crews job, but also added to the difficulty. While the crew did not complain about conditions and were always cheery, better housing facilities would have been useful. It would also have been useful if they had local access to electricity and a computer for data entry.

**Plans for 1996 Field Season:**

1) Conduct postburn survey of the Atwell plot.
2) Establish two more long-term small mammal monitoring plots. If suitable sites can be found, one will be located in the hardwood-conifer ecotone (***Pinus ponderosa*, *Caloedrus decurrens*, *Quercus kellogii***). The other will probably be placed in a lower subalpine environment (red fir, Jefferey pine forest, green-leaf manzanita chaparral, or sagebrush scrub). The second site may be postponed if the mixed chaparral plot established in 1995 is burned during 1996 at a date that would permit an immediate postburn survey.
3) Continue serendipity surveys in habitats not surveyed with long-term plots.
4) Visit ***Aplodontia*** colonies and make fire related observations.
5) Continue the development of a guide to wildlife fire environments.

# Watershed Sampling

## 1) Watershed: Stream Chemistry and Stream Hydrology

- National Biological Service, SEKI Field Station

PI: D. M. Graber, field-crew supervisor: L. H. Hammett, field-crew B. Johnson

***Objectives***: Assess the effects of watershed scale prescribed fire on stream chemistry and hydrodynamics in the Mineral King watershed. Data will be compared to the "reference" unburned Log watershed in Giant Forest, sampled as part of another long-term watershed study. This will permit some determination of how widely fire effects studies may be extrapolated to characterize fire-related stream responses in the Sierra Nevada (Graber and Hammett 1996). The study was designed with consultation with John Melack, Jim Sickman, and Michael Williams of the University of Santa Barbara (UCSB). Sediment transport was also identified as a priority study component but was not pursued due to limited expertise and resources.

**Field Work and Data Collection**: Three sites, two streams and the East Fork of the Kaweah, were chosen for long-term monitoring (**Fig. 11**).

**Trauger' s Creek**- Selected as a lower elevation site (1400 m) and located in mixed chaparral/oak-woodland, in a transition zone between mixed-conifer forest and chamise chaparral. Precipitation

for the site is measured at Lookout Point (2 miles west) with a Belfort Recording Rain Gauge operated by Sequoia National Park.

**Deadwood Creek** - Selected as an mid-to-upper elevation site (2000 m) and located in sequoia/mixed-conifer forest. Precipitation measurements for the site are recorded at the Atwell Mill stables by a remote rain/snow gauge operated by the U.S. Army Corps of Engineers.

**East Fork of the Kaweah River** - The Park outflow point on the East Fork, below Lookout Point, was chosen for obtaining grab samples. This site is the lowest point in the watershed within the Park and was selected to measure cumulative downstream effects at the main Mineral King watershed outflow point.

The stream sites were selected away from segment #3 to permit at least one year of preburn baseline data to be collected. Both streams are perennial and partially spring fed. Streams from two elevations were chosen to span an elevational gradient representing riparian areas in mixed-conifer forest and oak-woodland/chaparral vegetation. Stilling wells, constructed of 10 in diameter PVC pipe, enclosing two pressure transducers (flow) and a thermistor (temperature), were set up on each stream (**Fig. 12**). Measurements were recorded every five minutes and downloaded onto Omnidata portable data loggers. This equipment is on loan from USCB. Permanent stream gauges were also installed.

Beginning in May 1995, grab samples form the two stream sites and the east fork were collected at regular intervals for chemical analysis. This analysis includes acid neutralizing capacity (ANC) (**Fig. 13**), pH, and conductivity at the National Biological Service' s Sequoia and Kings Canyon Field Station Water Lab, while major ion analysis was performed by the Melack lab (UCSB) for sulfate, nitrate, potasium, phosphate, clorine, sodium, magnesium, ammonium.

**Problems and Solutions** - Roadwork disturbed some equipment installed in inconspicuous locations (to keep equipment from being tampered) at creek crossing.

**Plans for 1996 Field Season:** Sampling of the burned and unburned streams will continue at regular intervals.

**Figure 12.** Installing stilling well to house a pressure transducer and thermistors to collect stream height and temperature data at the road culvert over Trauger' s Creek.

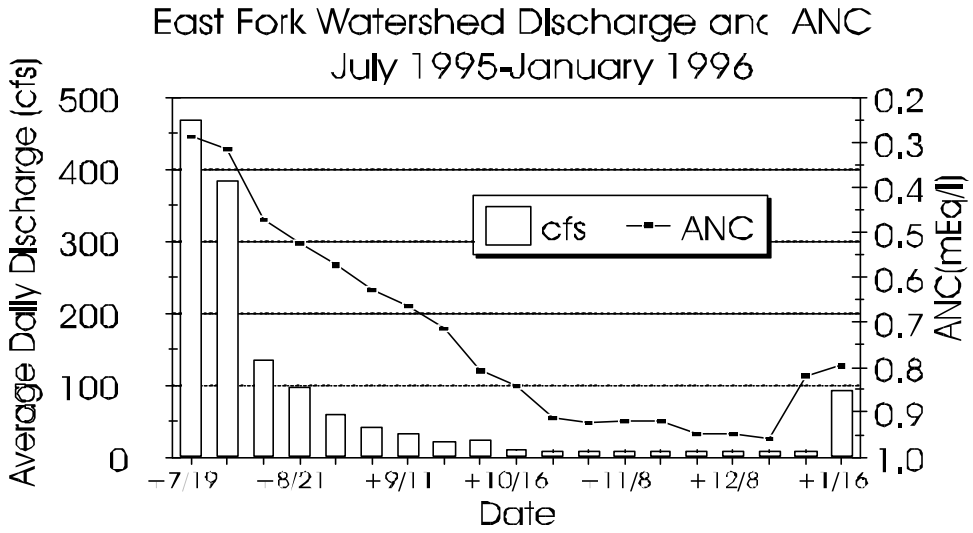


**Figure 13.** ANC values their relationship to average daily discharge of the East Fork of the Kaweah River.

## 2) Watershed: Aquatic Biota Survey - University of California, Davis

I. Chan, D. Erman, and N. Erman

***Objectives***: Assess the effects of prescribed fire on the structure of aquatic macro invertebrate communities and provide baseline inventory of composition, abundance, and diversity (Graber and Hammett 1996).

**Field Work and Data Collection**: Treatment (burn) and non-treatment reference streams were located in September 1995. In the Mineral King watershed six treatment streams were selected for sampling; Trauger' s Creek, East Fork Slapjack, Redwood Creek, Atwell Creek, Deadwood Creek, and an unnamed creek above Silver City ( **Fig. 11**). They range in elevation from 1400 m to 2134 m and are located in three different burn segments (#2, #3, and #7). The streams were sampled for descriptive chemistry data to help characterize them. Four reference streams are located in the Middle Fork watershed; Big Fern Creek, Log Creek, and Panther Tributaries III and IV.

Preburn invertebrate sampling was carried out on all streams in September 1995. Benthic macro-invertebrates were collected through a combination of quantitative sampling and qualitative description in three habitat types: riffles, pools, and slickrock glides. In addition, several artificial substrates (unglazed clay tiles) were placed in slickrock area to help quantify colonization rates.

**Plans for 1996 Field Season:** Prior to next spring 1996, emergence traps will be installed to collect emerging adult species. Samples are preserved and will be identified to the lowest practical taxonomic level (usually genus). Postburn surveys will track biotic impacts and response.