4.5 - Other

- **Effects of Prescribed Burning on Forest Floor Fuels and at the Bases of Giant Sequoia Trees** - This has been a long-term research project by Steve Sackett and Sally Haase of the USDA Forest Service, Riverside Fire Lab. Current objective of this study are to *(1)* determine soil temperatures at different depths below the soil/duff interface during normal prescribed fires, *(2)* determine cambium temperatures in sequoia and sugar pine trees during prescribed fires, *(3)* determine pre- and postburn concentrations of the available forms of nitrogen (ammonium and nitrate) in the upper soil stratum and to trace them over time, *(4)* determine prediction equations for forest floor fuel loading through depth measurements, and *(5)* to determine in situ root live-to-dead ratios for roots up to 3.8 cm in diameter prior to and after prescribed burns in a giant sequoia/mixed conifer ecosystem.

Results to date indicate that concentrations of nitrogen changed around the giant sequoia as follows: for the 0-5cm depth, before burn= 4.58, after burn=67.71 and spring after burn=41.70. For 5-15 cm depth, before burn=1.79, after burn=18.63, and spring after burn=14.06. Soil and cambium temperatures during the SEKI-VII fire have been translated and are similar to previous burns. Spring samples of inorganic soil nitrogen showed abnormal changes taking place in both the levels of nitrate- and ammonium-nitrogen. Ten years of record now exist for inorganic soil nitrogen after burning. Ammonium-nitrogen around the giant sequoia on each study site, had increased from the previous year with the exception of SEKI-VI at 0-5 cm in which they had decreased. Nitrate-nitrogen had also increased from the previous year on all giant sequoia sites for both sampling depths except for SEKI-VI. Results varied for the sugar pine ammonium- and nitrate-nitrogen for the two depths. Ammonium decreased for all sites except SEKI-II and IV at 0-5cm depth and increased for all sites except SEKI-I for the 5-15cm depth.

See also: Haase, S.M. and S.S. Sackett. 1998. Effects of Prescribed Fire in Giant Sequoia-Mixed Conifer Stands in Sequoia and Kings Canyon National Parks. In: Leonard A. Brennan, and Teresa L. Pruden (eds.). Fire in ecosystem management: shifting the paradigm from suppression to prescription. Proceedings of the Tall Timbers Fire Ecology Conference, No. 20. Tall Timbers Research Station, Tallahassee, FL. pp 236-243.

- **Bark-Foraging Bird Species** - Todd Dennis (graduate student University of Virginia) conducted research that focused on understanding possible mechanisms that may limit bird species distributions (his emphasis is on the bark-foraging guild - some 14 species of woodpeckers, nuthatches, etc. inhabit the west slope of the Sierra Nevada). Over 600 foraging behavior plots were sampled along with some 450 descriptive vegetation plots during 1996 and 1997. Much of his field sampling was undertaken within the East Fork watershed and has included the examination of species within a number of recent burns in the drainage. He found a number of bark-foraging species to prefer these recent burned areas: northern flicker (*Colaptes auratus*), white-headed woodpecker *(Picoides albolarvatus),* hairy woodpecker (P. villosus), Williamson's sapsucker, and black-backed woodpecker (*P. arcticus*). The latter species was only observed in recent burns which appear to be critical habitat for its presence. Other species on which field observations were made include Nuttall's woodpecker (*P. nuttallii)* and Downy woodpecker *(P. pubescens).* The reference and abstract for the dissertation are given below.

  Foraging behavior of Sympatric *Picoides* Woodpeckers of the Sierra Nevada: The Relative Importance of Competition and Habitat Structure. Todd Dennis 1999. PhD Dissertation,

University of Virginia. - Although there has been substantial interest in how interspecific competition and habitat structure individually affect the foraging behavior of birds, no one to date has explicitly considered which of these two factors is a more important influence for coexisting, ecologically similar species. In order to address this issue, I characterized the foraging- behavior and habitat structure/floristic composition of the five species of *Picoides* woodpeckers inhabiting the Pacific slope of the Sierra Nevada mountains (*P. pubescens, P. nuttallii, P. albolarvatus, P. villosus,* and *P. arcticus).* With these data, I answered four questions: (1) Which of these species are sympatric? (2) How do sympatric species differ in foraging behavior and habitat characteristics? (3) For the two species with adequate sample sizes *(P. albolarvatus* and *P. villosus),* how is foraging behavior related to the structure of the foraging substrate? and (4) Are sympatric species more or less similar than what one would expect by chance? Comparison of elevation and habitat data showed that there were three strongly sympatric species-pairs: (1) *pubescens/nuttallii;* (2) *albolarvatus/villosus:* and (3) *villosus/arcticus.* Multiple response permutation procedures (MRPP – a type of randomization analysis) indicated that the members of two of these pairs were significantly different in foraging heights but a null-model analysis showed that these differences were no greater than what one would expect by chance. MRPP and X^2 tests demonstrated that the foraging heights and locations of *P. albolarvatus and P. villosus* were associated with foliage characteristics of the foraging substrate. Lastly, a null-model analysis showed that the foraging behavior of sympatric species was more similar than what would be expected by chance. thereby supporting the habitat structure hypothesis. Other evidence suggestive of a lack of strong exploitative and contest competition was also presented. The results of this study provide a demonstration of convergent foraging behavior and show that for these *Picoides* species habitat structure is a more important influence of foraging behavior than is interspecific competition.

- **Fire and Fire Surrogates Project, JFSP** - Preliminary planning by the USGS Southern Sierra Research Station within the Parks for the Fire and Fire Surrogates Project was begun in 1999. This project will examine effects of burning in lower mixed-conifer forest during differing seasons and will be one subsite in a national network of sites being funded as part of the Joint Fire Sciences Program to investigate the consequences of fire and fire surrogate treatments. The study will use a subset thee standard experimental design and protocol developed for the national study. These methods will allow evaluation of fuel treatments so that results are comparable across agencies, fuel types, and geographic areas. (Jon Keeley and Nate Stephenson - USGS)

- **Resampling Redwood Mountain Kilgore Plots** - Kathleen Williams (UC Humboldt) has resampled plots established by Bruce Kilgore at Redwood Mountain in the 1970s to look at fire effects. She is comparing differences between burned and unburned plots since the time of the burns.