National Park Service
Fire Ecology Annual Report Calendar Year 2010
Sequoia & Kings Canyon National Parks
and Devils Postpile National Monument

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2010 Program Overview

Major activities for the Fire Ecology Program in SEKI involved fire effects plot sampling, data analysis, postfire landscape assessment sampling, completion of field sampling for the lodgepole pine fire regimes study, and operational support for prescribed fires. Substantial time was also spent on resource advisor (READ) activities because of an active wildfire season. Sizable burns in 2010 included the *Viewpoint, Bobcat,* and *Sillman Prescribed (Rx) Burns* (73, 97 and 98 ac) and the large 9,120 ac *Sheep Wildfire* (origin and 3,125 ac in the park). Staff collaborated on several manuscripts, with some utilizing long-term fire ecology data sets. A SEKI "Fire Ecology Review" was organized and held in the park in February. Additionally, during the year significant time was invested by the fire ecologist on SEKI's Division of Resources Management and Science (DRMS) Natural Resources Condition Assessment (NRCA) as a focal resource lead, as a member of the SEKI *Fire Management Committee*, and on input into park compliance. Time was also committed as the federal representative for a Joint Fire Science (JFS) project and to providing inputs or feedback to the SIEN *Inventory and Monitoring Program*. Our PSTF GS-7 lead fire effects position remained unfilled as per the direction of PWR fire management office in expectation of budget reductions for fire programs in FY11.

2010 Sheep Wildland Fire. Postfire effects observed in open pine forest in upper Sheep Creek along the park and forest service boundary northeast of Lookout Peak and the Don Cecil Trail.

Workload and Staffing

With reduced staffing fire effects had a busy season just to meet minimal objectives. However, 32 FMH plot visits were still made within seven monitoring types (***Table 1***), which included two new plot installations and eight postburn reads. Additional planned reads were missed because access to the areas where plots were located was not approved by law enforcement due to potential marijuana growing activities (primarily brush plots) and because of crew staffing reductions (five YR02 reads). Additionally, postburn black oak mortality/survival was sampled within two 2009 prescribed burns in Cedar Grove (several hundred trees) because of concerns about the effects of fire on larger sized individuals of this species that are an important component of lower elevation ponderosa pine/black oak forest.

For the National Landscape Assessment Project (burn severity mapping) 82 composite burn index (CBI) plots were sampled within major vegetation types on five 2009 burns; Falls, Hart, Azalea, and Swale Rx burns, and the Horse Wildfire on Hockett Plateau. A slightly modified CBI protocol was used that added an estimate of pre and postfire cover by tree species. This additional detail allowed the CBI data, along with FMH plot data, to be used in an analysis of fuel flammability (see Schwilk and Caprio in press *Journal of Ecology*).

Field work for the southern Sierra lodgepole pine fire regime study was completed in 2010. Seven addition plots were sampled (five on Chagoopa Plateau and two on Hockett Plateau, the latter collected in conjunction with CBI sampling) with additional fire history samples also collected in the two areas. Field data (fuels and forest structure data) have been input into a custom FFI database and crossdating of age structure cores (~2,500 cores) and fire history samples (partial tree bole sections with fire scars) is being completed by the research cooperator (Peter Brown, Rocky Mountain Tree-Ring Research) and SEKI fire ecologist. A presentation on preliminary results was given at the *2010 Yosemite Fire Science Symposium* in April.

Without a fire effects lead position during 2010 the assistant lead, as well as all crew members, had to assume added responsibility for meeting summer goals. This also meant more planning and greater day-to-day interaction and direction of the crew by the fire ecologist. The reduced staffing (about a 30% reduction in overall crew time) meant fieldwork priorities for FMH plot sampling had to be implemented during 2010. For instance, YR02 reads were given a lower priority than other reads. Additionally, further sampling on several special projects designed to provide supplemental information to the fire management program was put on hold. This included an expanded data set evaluating fire and its effects on giant sequoia mortality and regeneration (seedlings through monarchs) and additional evaluation of named giant sequoia trees to the Named Tree Inventory database that is used for fire planning. There was also considerable added workload for the ecologist, particular personnel management, hiring, and summer preplanning, which reduced time available for data analysis or addressing other management needs.

Field sampling for Sierra Nevada lodgepole pine fire regime study in Yosemite N.P.

Table 1. Fire ecology plot workload in 2010 and total plots installed (red numbers highlight updated values for 2011).

Park	Type of Plot (FMH, photo point, other)	Monitoring Unit	Installs/Pre-Burn Reads	Immed. Postburn	Postburn (1-40 yrs)	Not Treated^	Total Plots#
SEKI	FMH forest	Giant sequoia-mixed conifer		2	6		**50 / 9**
		White fir-mixed conifer	1	2	3		**18 / 2**
		Low elevation-mixed conifer			1	1	**6 / 1**
		Red fir forest					**7 / 4**
		Ponderosa forest		2	7	2	**22 / 6**
		Xeric Jeffrey pine	1		2		**6 / 0**
		Buckeye Wildfire					**3 / 0**
		Blue oak woodland					**2 / 0**
	FMH brush	Chamise chaparral					**3 / 0**
		Montane chaparral/sagebrush			2		**7 / 5**
		Mixed chaparral					**9 / 0**
	FMH Mechanical	Thinning+pile burning+Rx burn		2	1		**10 / 0**
	CBI*†	Five 2009 burns		82			**868**
	Cheatgrass Monitoring*†	Horse Trail/Roads End R_x					**377 / 56**
	Forest Structure*	S. Sierra PICO fire regimes	7				**91**
	Kilgore Plots (pre-FMH)	1968 Rattlesnake R_x					**14 / 3**
		1969 Redwood Mtn. R_x					**18 / 3**
	Legacy Plots	1970 Cedar R_x					**2 / 0**
		1978 Mineral King Red Fir					**3 / 1**
	Black Oak Fire Effects*†	Cedar R_x burns	2				**4 / 0**
	Sequoia Seedlings	10 R_x burns					**21 / 0**
	Expanded Sequoia Mort.	7 R_x burns					**7 / 3**
	Tree Regeneration*†	Redwood Mtn. PILA regen.	10			10	**10 / 10**
DEPO	FMH Forest	Rainbow Wildfire (postfire)					**9 / 3**
	FMH Mechanical	Thinning + pile burning					**1 / 0**
	Tree Regeneration†	Rainbow Fire tree regen.					**42 / 9**
Total FMH or pre-FMH			**5**	**11**	**39**	**11**	**175 / 36**
Total Other (permanent and non-permanent)			**19**	**82**		**10**	**1435**

*Not permanent plots; †Sampled using specific rapid assessment protocols; ^Not treated = unburned "controls", #Total plots/number unburned,

Figure 3. Kilgore plots established in 1969 in sequoia-mixed conifer forest and resampled in 2009. Views of an unburned plot on left (average total fuels = 89.9 kg·m^2, N=2) and burned plots on right (burned in 1977, average total fuels = 15.5 kg·m^2, N=2). Tree density was about twice as great in unburned relative to burned plots. Right panel shows the many sugar pine saplings in the area burned in 1977, which is scheduled for a second entry burn in 2011.

Staffing details 2010 - Staffing consisted of PFT GS-11 fire ecologist, a seasonal assistant lead GS-6, and three GS-5 seasonal biological technicians. Our PSTF GS-7 lead fire effects position remained unfilled as per the direction of PWR fire management office in expectation of budget reductions for fire programs in FY11. Two additional temporary positions were also filled for about 4 payperiods each to assist in field work during the summer; a GS-3 student hire and a GS-5 emergency hire.

Ecologist and Monitors	Starting Date	Ending Date	# of Pay Periods	READ Qualified (Yes or No)	Training and Development
Tony Caprio	1/1/10	12/31/10	26	Yes	Supervisors (40 hr)
Christy Frenzen	5/10/10	11/6/10	13	Trainee	B3
Monica Delmartini	5/10/10	11/6/10	13	Yes	S-290
Roxanne Kessler	5/17/10	10/29/10	12.5	Trainee	S-130/S-190, B3
Tim McClung	7/6/10	11/6/10	9	Trainee	B3
Daniel Knapp	6/24/10	8/11/10	4	No	student hire (GS-3)
Becky Lindstrom	7/27/10	9/24/10	(60 days)	No	emergency hire

Management Objectives and Monitoring Results

Table 3. Summary of management objectives and monitoring results. Fuel reduction objectives/results are mean percent reduction from preburn to immediate postburn. Stand density objectives/results are for live stand density five years postburn with 10 year results also provided if available. Stand composition at five years post-burn is also given for giant sequoia-mixed conifer. Results from "initial" and "second" entry restoration burns in giant sequoia-mixed conifer are shown. When the "n" value for number of plots is underlined the minimum sample size has been attained for that variable.

Monitoring Unit	Management Objective (Restoration)	Monitoring Results	N	Objective Achieved?	Anal. Yr
Giant sequoia-mixed conifer forest	**Initial Entry Restoration Burn**				
	60-95% total fuel reduction:	Total fuel reduction = 72.4%	*31*	**YES**	2008
	5-yr postburn stand density: 50-250 trees/ha <80 cm DBH 10-75 trees/ha ≥ 80 cm DBH	5-yr stand density = 575 trees/ha <80 cm DBH 46 trees/ha ≥ 80 cm DBH	*29*	**NO** (<80 cm) **YES** (>80 cm)	2008
	10-yr postburn stand density:	10-yr stand density = 324 trees/ha <80 cm DBH 42 trees/ha ≥ 80 cm DBH	*28*	**N/A**	2008
	5-yr postburn stand composition: 40-80% fir, 10-40% sequoia, 5-20% pine	Fir = 73.5% Sequoia = 8.4% Pine = 12.0% Other = 6.2%	*31*	**YES** (except sequoia low)	2008
	Second Entry Restoration Burn				
	Total fuel reduction:	Total fuel reduction = 38.5% Change from 1st to 2nd Prefire = -17.3 %	*21*	**N/A**	2008
	5-yr postburn stand density:	5-yr stand density = 166 trees/ha <80 cm DBH 39 trees/ha ≥ 80 cm DBH	*14*	**YES**	2008
	10-yr postburn stand density:	10-yr stand density = 97 trees/ha <80 cm DBH 43 trees/ha ≥ 80 cm DBH	*6*	**N/A**	2008
	5-yr postburn stand composition:	Fir = 70.3% Sequoia = 17.4% Pine = 12.3% Other = 0%	*14*	**YES**	2008

Ponderosa pine-mixed conifer forest	**Initial Entry Restoration Burn**				
	60-95% total fuel reduction:	Total fuel reduction = 90.5%	*8*	**YES**	2010
	5-yr postburn stand density: 50-250 trees/ha <80 cm 10-75 trees/ha >80 cm	5-yr stand density = 284 trees/ha <80 cm DBH 20 trees/ha ≥ 80 cm DBH	*7*	**NO** (<80cm) **YES** (>80 cm)	2010
	10-yr postburn stand density:	10-yr stand density = 421 trees/ha <80 cm DBH 20 trees/ha ≥ 80 cm DBH	*12*	**N/A**	2010
	5-yr postburn stand composition: (50-80% pine, 5-20% fir, 10-20% cedar, 1-10% oak)	Fir = 11.5% Cedar = 16.9% Pine = 43.4% Black Oak = 7.9% Live Oak = 20.4%	*8*	**Partially**	2010
	Second Entry Restoration Burn				
	Total fuel reduction:	Total fuel reduction = 65.4% Change from 1st to 2nd Prefire = -30.1%	*5*	**N/A**	2010
	Third Entry Burn				
	Total fuel reduction:	Total fuel reduction = 47.4%	*6*	**N/A**	2010
White fir-mixed conifer forest	**Initial Entry Restoration Burn**				
	60-95% total fuel reduction	total fuel reduction = 77.6%	*13*	**YES**** but minimum sample size too small	2009
	5-yr postburn stand density: 50-250 trees/ha <80 cm 10-75 trees/ha ≥ 80 cm	5 yr stand density = 652 trees/ha <80 cm DBH 37 trees/ha ≥ 80 cm DBH	*10*	**NO** (<80 cm) **YES** (>80 cm)	**?**
	10-yr postburn stand density:	10 yr stand density = 401 trees/ha <80 cm DBH 33 trees/ha ≥ 80 cm DBH	*10*	**N/A**	**?**
	Second Entry Restoration Burn				
	Total fuel reduction:	Total fuel reduction = 42.5%	*4*	**N/A**	2009
Low elevation-mixed conifer forest	60-95% total fuel reduction	total fuel reduction = 75-93%	*5*	**YES*** but sample size too small	**?**
	5-yr postburn stand density: 50-250 trees/ha <80 cm DBH 10-75 trees/ha ≥ 80 cm DBH	5 yr stand density = 542 trees/ha <80 cm DBH 22 trees/ha ≥ 80 cm DBH	*5*	**NO** (<80 cm) **YES** (>80 cm)* but sample size too small	**?**
	10-yr postburn stand density:	10 yr stand density = 316 trees/ha <80 cm DBH 17 trees/ha ≥ 80 cm DBH	*5*	**N/A**	**?**
Mechanical Thinning + Pile Burning	Reduce fuels to < 12 tons/acre immediate post treatment*	Fuel load = 52 tons/acre post (total fuel reduction 22%)	*9*	**NO*** but sample size too small	2008
	Immediate post treatment stand structure: maximum of 25 tree/acre <22.9 cm DBH*	Stand density = 17 trees/acres <20 cm DBH (range 8-61)	*9*	**YES*** but sample size too small	2008

* Excluding DEPO plot.

B. Fire ecologist accomplishments and areas of focus

Table 4. Fire Ecologist Accomplishments/Focus Areas

Category	Percent Time	Accomplishments and/or areas of activities
Planning	25	• Assisted in the development and review of the five-year burn plan for SEKI • FFMP annual update • Assisted in review of the annual burn plan for SEKI • Burn plan scoping and data needs (some on site visits were required to address or remedy issues), • Developed rehab plan for Sheep Wildfire • MR/MT for wilderness fire history sampling in PICO study • Developed summer's overview of seasonal crew activities • Support for SEKI's Division of Resources Management and Science: 1) Natural Resource Condition Assessment (park lead on the following focal resource workgroups with each requiring a knowledge review/summary condition statement): - Altered Fire Regimes - Giant Sequoias - Five-Needle Pines - Old Forests - some input into Foothills workgroup 2) Division restructuring 3) Division workplans, accomplishment reports • Provided input on DEPO's Natural Resource Condition Assessment (data and fire regime information)
Presentations	5	• SEKI Fire Ecology Review, Presentations by the fire ecologist included: ▪ *Overview of current program* (projects and who's using the data?) ▪ *40 years of fire: Kilgore plot data* ▪ *Repeat fires and giant sequoias* ▪ *Rainbow Fire DEPO: Effects 10 yrs postfire* ▪ *High elevation fire regimes: Lodgepole pine* ▪ *Fire and piñon pine: Integrating science into burn implementation* ▪ *Fire severity mapping and CBI* (Caprio/Folger) ▪ *Fire and understory species* (Caprio/Webster) • A presentation by fire ecologist was made at the *2010Fire Science Symposium* in YOSE on preliminary analysis of data from the southern Sierra Nevada lodgepole pine fire regime study. • Fire ecologist presented a lecture on fire management, ecology, and field sampling methods to a forest ecology class from Fresno State Univ., Dr. Ruth Kern. • Responded to media and other individual inquiries on fire were made via consultation with the parks' fire and public information officers. • A presentation/issues overview was given to SEKI Leadership Team. • Wrote article on foxtail pine for Nutcracker Notes
NPS Meetings/ task groups	10	• Planned and executed SEKI Fire Ecology Review (review #6) • Pacific West Regional Fire Ecology Meeting • National NPS Fire and Aviation Meeting in San Antonio • YOSE Fire Science Symposium • Member of SEKI Fire Management Committee • SEKI Spring and Fall Ops Meetings • SIEN I&M Three Year Review

		• SEKI Nat. Res. Cond. Assessment Workshops (2) • Southern Sierra Region Resource Management Climate Change Response Strategies A Workshop to Explore Collaborative Opportunities • SEKI/USGS Invasive Plant Prioritization Workshop • Primary liaison between FMO and natural resources division • Wilderness Operations Annual Review
Interagency work	<5	• Attended two JFS funded workshops at the Learning Center in Tucson addressing fire, fire history, and climate change: **1)** ***Fire History and Climate Change*** **(FHCC)** **2)** ***Fire and Climate Synthesis*** **(FACS).** • Hosted Dr. Joe Fontaine and Dr. Neal Enright, Murdoch University, Perth, Australia with field trip and discussions on Sierran and SW Australia fire ecology.
Wildfire assignments	5	• Lead resource advisor on Sheep Wildfire • Responded to FOIA request related to smoke and Sheep Fire
Prescribed fire projects	5	• Prefire input and postfire AAR reviews of all prescribed burns. • READ/ecological effects observer on one burn in a sensitive area
Non-fire fuels projects		
Research	15	• NPS Reserve Funded Studies 1) PICO fire regimes (RMTRR, SEKI, YOSE) 2) Wildfire vs Prescribed Fire (USGS, SEKI) – manuscript prep. • Federal cooperator on JFSP study:***"Reconstructing natural fire events, their strength and causes: A Case Study in Oriole Lake".*** • Study Carbon Sequestration and Fire (USGS, YOSE and SEKI) 1) Above ground carbon and fire (funded) ***"Impacts of Fire Management on Carbon Stocks in Yosemite and Sequoia & Kings Canyon National Parks".*** 2) Below ground carbon and fire (proposal) • Forest pest damage and fire to inform fire management (YOSE and SEKI) (proposal) • Black oaks and fire (USGS proposal) • Collaborated with Dylan Schwilk (Texas Tech) on flammability research using FMH and CBI data from SEKI – manuscript prep. • Provided peer review for journal manuscript (*Landscape Ecology*)
Data collection	5	Time spent in the field collecting data was primarily related to crew training or development of sampling protocols. The exception being the collection of specialized age structure and fire history data for the PICO fire regime study with the crew since they didn't have the needed experience for this sampling.
Data entry	<5	Primarily related to crew training or making corrections to FFI database
Data analysis	5	• Minimal because of administrative workload without a fire effects lead. • Oversaw calculation of updated fuel constant values by smoke tech (Ari Sarzoti) for all fuels data in FFI that will be used to provide more realistic fuel load values for burns to improve both projected and actual smoke production values.
Supervision/Admin	20	• Hiring, supervision, evaluations, crew training, payroll, budget, travel authorization/vouchers, purchasing, etc. • Put together agreement between NPS, CESU and URI for Oriole L. JFSP funded study
Training	5	• Firefighter refresher • PT

		• Supervisor training (40 hr) • Required hiring training • Attended mandatory park trainings (defensive driver, hazmat etc) • Mandatory AFS-3
Miscellaneous	10	• Assisted and reviewed success stories for FIO • Parkwide compliance (subject matter expert on fire and giant sequoias) • Provide reviews of research permit applications in areas of expertise; fire ecology, forest ecology, and dendrochronology • Fire Ecology section in 2009 **SEKI Superintendants Annual Report**

The SEKI fire ecologist collaborated on a number of fire projects underway in the parks by SEKI staff, USGS staff, and university researchers. Over the past year a number of these projects were or are in the final stages of completion with manuscripts prepared by the PIs.

- Work continued of the study investigating fire regimes and fire related forest dynamics in southern Sierra Nevada lodgepole pine (*Pinus contorta*), a joint project between SEKI, YOSE and research cooperator, Dr. Peter Brown at Rocky Mountain Tree-Ring Research, which is funded by NPS reserve funds. To date about three-quarters of the samples have been crossdated and all field data has been entered into a custom FFI database. *See additional detail on the study below in Section D.*

- The fire ecologist is the federal cooperator on a JFS project by University of Rhode Island researcher Dr. Rainer Lohmann to reconstruct a record of past fires and their magnitude by detecting the occurrence of pyrogenic black carbon (BC) and other molecular compounds as fingerprints of past fires in lake sediments and soils. The relevance of the historical record this study may provide is highlighted by recent research indicating black carbon is an important climate forcing agent, estimated to be second only to CO_2 as an anthropogenic contributor to global change. Preliminary results from the study were submitted for review to **Geochimica and Cosmochmicia Acta**. ***Black Carbon and Sorption of PAHs in Natural Fire-Impacted Sediments from Oriole Lake (CA)*** – J. Sullivan, P. Appleby, K. Bollinger, M. Cantwell, A. Caprio, J. King, B. Ligouis, and R. Lohmann. *See additional detail below in Section D.*

Burnout operations protecting a 25 year old unburned plot in PIPO/manzanita shrubs in Cedar Grove.

- SEKI Fire Ecology Program Review (Feb. 24-25)– Objectives were to review program history and objectives, provide updates on recent monitoring and research results, and provide a forum for discussing issues related to fire ecology in the parks. It was attended by fire, resource, research, interpretation, I&M and other staff. Presentations and discussions were given by fire management, interpretation, resource, and USGS staff. Topics included smoke, fire treatment priority analysis and progress in meeting goals, invasive plants, retardant and caves, fire effects monitoring results, lodgepole fire regimes, fire effects on piñon pines and oaks, GIS fuel succession modeling, the READ program, fire and giant sequoias, and effects of repeat fires.

- Fire ecologist worked with SEKI prescribed fire specialist (Ben Jacobs) and smoke tech (Ari Sarzoti) in developing, calculating, and inputting custom fuel constant values to SEKI fuels data in FFI. Additionally assistance was given to the fire monitoring crew in developing a RAP (short-term rapid assessment plots for pre and post-fire fuels and severity assessments). This information will improve our fuel load estimates for proscribed burns and will be used for reporting both projected and actual smoke production values from the burns.

- Fire ecologist also wrote a short general article, "***Foxtail Pine in the Range of Light***" for "**Nutcracker Notes**" (Issue 18), published by the Whitebark Pine Ecosystem Foundation. The article described characteristics, biology, and importance of foxtail pine (***Pinus balfouriana***), a high elevation five-needle pine found near tree-line in the southern Sierra Nevada. The foundation is dedicated to sustaining whitebark pine and other related five-needle pines.

- The fire ecologist was a co-author on, ***Multi-Millennial Fire History of the Giant Forest, Sequoia National Park, California, USA***, T.W. Swetnam, C.H. Baisan, A.C. Caprio, P.M. Brown, R. Touchan, R.S. Anderson, and D.J. Hallett. 2009. **Fire Ecology** 5:120-150. The paper generated considerable media attention and was highlighted on the NPS's homepage in April.

- The fire ecologist also collaborated on manuscript preparation with Dr. Dylan Schwilk, Texas Tech University, looking at changes in flammability of park plant communities, which utilized data from FMH and CBI plots (slightly modified data collection) sampled in SEKI: ***Scaling from Leaf Traits to Fire Behaviour: Community Composition Predicts Fire Severity in a Temperate Forest.*** The manuscript has been accepted for publication in **Journal of Ecology**. The results suggest that the restoration of fire can result in changes to the flammability of the resulting vegetation, which has implications for fire and natural resource managers and in understanding pre-Euroamerican settlement fire regimes.

- Contributions by the fire ecologist were made to the USGS/NPS study looking at effects of wildland fire versus prescribed fire, funded by NPS reserve funds. A manuscript, ***A Comparison of Effects from Prescribed Fires and Wildfires Managed for Resource Objectives in Sequoia and Kings Canyon National Parks***, describing findings has been submitted for review to **Forest Ecology and Management** (provisionally accepted as of Jan. 2011). The results indicate differences between wildfire and prescribed fires were generally not detectable and both fire types resulted in highly variable effects.

- Additionally, the former SEKI fire effects lead, Karen Webster, completed her graduate studies (M.S.) and thesis at the University of Washington which focused on the analysis of fire effects on understory plant species using data collected in SEKI FMH fire effects plots by fire ecology staff over the last 25 years, "***Effects of Prescribed Fire on Understory Vegetation in Mixed-Conifer Forests of the Southern Sierra Nevada, California***.

C. Fire effects crew accomplishments and areas of focus

Table 5. Fire Effects Crew Accomplishments/Focus Areas.

Category	Percent Time	Notes
FMH plots	45	Completed 32 reads. Installed two plots (One PIJE & one ABCO)
WUI plots	5	Three mechanically thinned plots (one read after broadcast burn of plot)
CBI plots	5	82 CBI plots were sampled in five burns
Other plot work	<5	• PILA tree regeneration and fire (20 rapid assessment regen plots) • PICO fire regime field sampling (7 plots + fire history sampling) • Fire effects on black oaks (two burns)
Wildfire assignments	5	Four crew members had one to two assignments as either READ (one person) or READ trainee (three crew members) on Sheep Wildfire
Prescribed fire projects	<5	Crew assisted with one prescribed burn project FFT2 or assisted FIO (time for project support was limited due to reduced staffing).
Non-fire fuels projects		
Data entry	20	Completed data entry of all FMH and CBI plot data collected from Oct. 2009 through September 2010 with crew level QC
Data analysis		
Supervision/Admin	5	Assistant lead monitor oversaw five staff; misc travel vouchers, time paperwork (Quicktime), and evaluations.
Training	10	• Refresher training if previously redcarded. • One new crew member completed S130/S190 • One crew member completed S290. • All regular crew members were B3 certified. • Three of the crew worked as READ "trainees" on the Sheep Wildfire.
Miscellaneous	<5	Assisted fire monitors in testing and sampling RAP plots for fuel and smoke monitoring

2010 Sheep Wildfire showing paired pre and postfire images at two FMH plots within the burn. Preburn image (left) was taken in 2008 (plots established in 2006) and postfire image (right) was taken in October 2010 during postfire reads of the two plots. Plots were located in relatively open PIPO with a predominantly mountain misery understory. The last fire in the area was 1908.

D. Additional Information

Table 6. Data Entry and Projects Monitored in 2010. Values include both first and second entry projects (2009 burns sampled in 2010 using CBI plots are not included but would be four additional Rx burns and one wildfire).

Park	% 2010 Data Entered	% 2010 Data Quality Checked	# Prescribed Fires Monitored*	# Non-fire Fuels Treatments Monitored*	# Wildfires Monitored*	# BAER Treatments Monitored*
Sequoia and Kings Canyon	100%	100%	2†	0	1	0
Devils Postpile**	NA	NA	0	0	0	0

***** Number of treatment units with treatment effects monitoring conducted. Include pre-burn and post-burn monitoring but not burn-day monitoring.

** No treatments in Devils Postpile in 2010.

† One of prescribed burns was a broadcast burn in an area originally monitored for a non-fire fuels treatment (mechanically thinned).

Details SEKI/DEPO Fire Research Projects and Collaboration

1) *Fire and Lodgepole Pine in Southern Sierra Parks*.
Anthony Caprio (SEKI), Peter Brown (RMTRR), Gus Smith (YOSE) – Funded by NPS Reserve Funds

Lodgepole pine (*Pinus contorta*) is a widely distributed species occurring throughout much of western North America across a diverse set of habitats. It is also one of the most widespread forest types in the Sierra Nevada and is particularly important at higher elevations. Fire has generally been described as having a minor role in Sierran lodgepole (var. *murrayana*) in contrast to Rocky Mountain lodgepole (var. *latifolia*) (Keeley 1981; Parker 1986, 1988). Persistence of Sierran lodgepole has been mainly attributed to gap phase dynamics characterized by continuous or intermittent regeneration with fires depicted as being small and infrequent. In contrast, several recent studies in Sequoia and Kings Canyon N.P. (SEKI) suggest fire may play a more active role in community dynamics (Keifer 1991; Caprio 2006). This work indicates that at least some fires can be of large size and of mixed severity that result in forests with age structure patterns having both discretely aged and mixed age patches. However, fire regimes have not been well studied in Sierran lodgepole and fire's role prior to Euroamerican settlement is poorly understood (Skinner and Chang 1996).

Figure 7. Fire scarred lodgepole pine on Chagoopa Plateau in SEKI with five fires recorded in the catface. This is an unusual tree, most scarred trees have only one or two scars.

We have initiated a more thorough look at fire's role in lodgepole pine communities in the southern Sierra by sampling fire history to examine fire frequency and stand structure patterns to examine past fire regime type. We have completed field sampling at four areas; two areas in YOSE (Upper Tuolumne/Dana Meadows [23 subplots] and Bridalveil Creek [22 subplots]) and in SEKI (Chagoopa [25 subplots in 2008/2010] and Hockett Plateaus [25 subplots 2009/2010]). Fire ecology crews from the two parks worked together to facilitate collection of several thousand tree-ring samples for determining tree age structure and fire history.

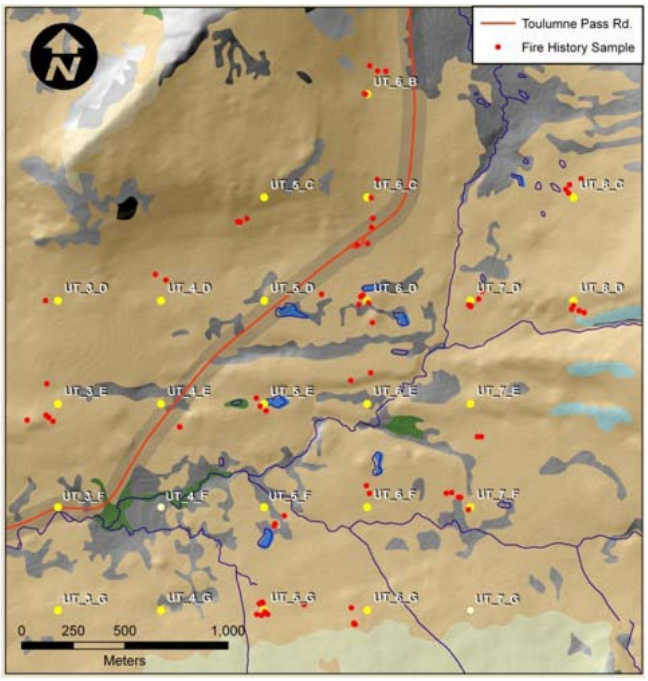

Figure 8. Locations of subplots in Dana/Tuolumne area of Yosemite (yellow dots) and fire history samples (red dots).

***Reconstructing natural fire events, their strength and causes: A Case Study in Oriole Lake*.** Rainer Lohmann (URI) and Anthony Caprio (SEKI) – Funded by JFS Program.

The study is comparing data from sediment cores collected in 2007 at the lowest elevation lake in SEKI to the historic fire regime. The fire regime data is based on both contemporary fire records of mapped fire within the East Fork Drainage of the Kaweah River and reconstructed fire history from fire scarred trees collected from the surrounding landscape. It will reconstruct a record of past fires and their magnitude by detecting the occurrence of pyrogenic black carbon (BC) and other molecular compounds as fingerprints of past fires in lake sediments and soils. The study has the potential to reconstruct fire occurrence many hundreds to thousands of years into the past. These data will be compared to local and regional climate data. The relevance of the record this study provides is highlighted by recent research indicating black carbon is an important climate forcing agent, estimated to be second only to CO_2 as an anthropogenic contributor to global change.

Peter Brown, research cooperator from RMTRR, instructs fire ecology crews from both YOSE and SEKI on using an increment borer for extracting cores for determining forest age structure in the lodgepole fire regime study area.