National Park Service
CENTRAL AND SOUTHERN CALIFORNIA
Fire Ecology Annual Report
Calendar Year 2006

Channel Islands National Park
Golden Gate National Recreation Area
Joshua Tree National Park
Pinnacles National Monument
Point Reyes National Seashore
Santa Monica Mountains National Recreation Area

Summary

Calendar year 2006 was a productive year for the Southern and Central California Fire Ecology and Fire Effects Program. Most of the plot and ecology work was concentrated at Santa Monica Mountains NRA (SAMO) and Point Reyes National Seashore (PORE). The Fire Effects Crew read 118 plots, including 103 fire effects and 15 mechanical fuels treatment plots. In addition, the crew completed several fire assignments and did a tour at Lassen Volcanic National Park (LAVO) assisting the Klamath-Cascades Fire Effects Crew with plot installation in several vegetation types.

The Southern California Fire Ecologist spent most of the year working on the Topanga Fire BAER project and supervising a separate fire effects crew which studied the ecological effects of the Topanga Fire. The Bay Area Network Fire Ecologist organized the first annual Fire Effects Forum, worked with the National Fire Ecology Program on the FEAT GIS Module, and worked with all of the network parks on planning for future prescribed fire projects.

Fire Effects

The Fire Effects Crew started the season with two trips to SAMO, to re-read 38 plots that burned in the Topanga fire, 16 plots that were prescribe burned, and 10 plots that were mowed. The crew also collected biomass samples from 24 annual grass plots. Assistance provided by SAMO staff on several days was greatly appreciated. At PORE, there were 29 plots to read that had burned last year (including controls), and 15 that were up for their 5-year read. We also read five plots that are being used to monitor the park's eucalyptus thinning operation. At Golden Gate National Recreation Area, the crew read five redwood forest plots in Muir Woods that burned in 1996. Data entry was completed not only for 2006, but also for 2005 plots that were not entered last year.

The Central and Southern California Fire Effects Crew was also able to assist the Klamath-Cascades Fire Effects Crew this season. We joined them at LAVO for one pay period where we installed modified forest plots in the Stonehenge burn unit near Manzanita Lake. We enjoyed working with another crew and seeing a new park.

The Fire Effects crew also participated in activities other than routine FEM plot work. The crew inventoried and mapped Scotch broom at PORE, providing critical information for developing control strategies. The Lead Monitor and one seasonal completed a 14-day fire assignment to monitor wildfire use fires in Yosemite National Park. All three crew members monitored a prescribed burn at Lava Beds National Monument, traveling with other PORE fire staff. We worked with the PORE Hazard Fuels Crew on several occasions, assisting in the preparation of the Limantour burn unit. The Lead Fire Effects Monitor participated in the Limantour prescribed fire, doing monitoring and ignition.

Now that the new Fire Management building at Point Reyes is completed, the Lead Monitor excitedly abandoned our spacious but remote office for the winter, to be more centrally located at Headquarters. The new office has proved to be a pleasant and spacious working environment.

Bay Area Network Fire Ecology

The year 2006 was a productive one for the Bay Area Network Fire Ecology program. Highlights of FY06 include hosting the first annual Fire Effects Forum, assisting the national Fire Ecology program with testing and training for the FEAT GIS Module, and completing the PORE hazard and risk assessment. In addition to these and other accomplishments, the Bay Area Network continues to improve communication and collaboration across park units. One emphasis of the program has been and will continue to be working to implement the recommendations provided in the Program Review. Finally, the Bay Area Network Fire Ecologist was able to participate in several trainings and fire assignments during FY06, and completed her GISS task book.

National/Regional Accomplishments: The Bay Area Network Fire Ecologist had the opportunity to participate in a number of national- and regional-level projects during FY06. These included working with the National Fire Ecology Program office to test and teach a training for the FEAT GIS Module. She also had the opportunity to serve as a Joint Fire Science Program proposal reviewer. Additionally, the ecologist participated in the National Fire Ecology Monitoring Plans working group and presented Bay Area Network data at the fall 2005 FMO conference. Finally, she successfully completed the Presidential Management Fellowship program.

Network Accomplishments: Probably the most important network event of FY06 was the first annual Bay Area Fire Effects Forum, which was held in January of 2006 at Point Reyes. This forum was an opportunity to present fire effects monitoring results to park staff and fire managers and also to bring fire-related staff from across the network together. The forum led to a fruitful discussion of potential future directions for the Bay Area Fire Effects Monitoring program. And perhaps most significantly, this event got the ball rolling for a formal annual meeting where fire effects monitoring data are presented to fire management and other staff across the network.

Local Unit Accomplishments: There were several important accomplishments at the local units within the Bay Area Network during 2006. At PORE, a fire hazard and risk analysis was completed using FLAMMAP along with ignition and census data to assist in prioritizing different areas for treatment. Additionally, a contract was completed to survey a rare, fire-dependent chaparral species, *Arctostaphylos virgata*, at PORE and in the North District of GOGA. At PINN, planning is underway for a proposed prescribed burn in yellow star thistle in the newly acquired lands.

Mediterranean Coast Network Fire Ecology

The Fire Ecologist administered $778,096 to implement emergency stabilization projects during 2006. Projects included public information and public safety, increased law enforcement patrol, installation of new gates, cultural resources survey, infrastructure repair and cleanup, non-native invasive species control and native plantings. A BAR plan was funded for an additional $295,248 to continue monitoring, weed eradication and native plantings in 2007 and 2008. Two biotechnicians were hired with lapse salary to study fire effects in coastal sage scrub and *Nassella* grasslands, to field-validate burn severity maps, and to examine the efficacy and ecological impacts of the 1999 Shepherd's Flat prescribed burn in the Topanga Fire. We presented some of this work at the Fire Congress in November.

The Fire Ecologist and Fire GIS specialist continued to work with the Fire Management staff to develop this year's fuel modification projects and to plan future fuels projects in FY2008 and beyond. We are continuing to examine locations for strategic fuel modification such as the Cheeseboro bottleneck which was burned in 2005 and to identify park interface properties that may require additional treatment.

Fire Effects Plot Workload 2006

Channel Islands National Park
No fire effects work was done at Channel Islands in 2006. The forty plots on Santa Rosa Island (in coastal sage scrub and coastal grassland) are due for their ten-year re-read next year in '07. Below is a table of the plots installed to date in the different monitoring types.

Park: Channel Islands

Monitoring Type Name	Number of Plots Read in 2006			Total # of Plots, by Monitoring Type	
	Pre-burn	Immediate Post	Postburn, (1-20 yrs)	Burn	Control
Coastal Sage Scrub				7	14
Coastal Grassland				9	10
Fennel				5	0
Mixed Fennel				7	0
Mixed Coastal Sage Scrub				6	0
Island Manzanita				5	0
Island Scrub Oak				6	0
Total Plots for 2006	**0**	**0**	**0**		
Total Number of Plots Installed to Date				**45**	**24**

Golden Gate National Recreation Area
Ten-year re-reads were done for five redwood plots at Golden Gate. No other plots were installed or due to be read.

Park: Golden Gate

Monitoring Type Name	Number of Plots Read in 2006			Total # of Plots, by Monitoring Type	
	Pre-burn	Immediate Post	Postburn, (1-20 yrs)	Burn	Control
Northern Coastal Scrub (ARCA)				1	0
Northern Coastal Scrub (BAPI)				11	7

Manzanita Chaparral				4	0
Annual Non-native Grassland (BRDI)				25	3
Annual Non-native Grassland (BRDI2)				5	3
Italian Thistle				5	0
Eucalyptus Forest				1	0
Mustard				1	0
Northern Coastal Prairie				16	9
Perennial Non-native Grassland (PHAQ)				6	2
Perennial Non-native Grassland (FEAR)				4	0
Redwood Forest			5	9	0
Bay Woodland				4	0
Total Plots for 2006	**0**	**0**	**5**		
Total Number of Plots Installed to Date				**92**	**24**

Joshua Tree National Park

No trips were made to Joshua Tree this year. The park has 12 plots in one monitoring type, and the ten-year read was done in 2003. No new burns or plot work are planned.

Park: Joshua Tree

Monitoring Type Name	**Number of Plots Read in 2006**			**Total # of Plots, by Monitoring Type**	
	Pre-burn	**Immediate Post**	**Postburn, (1-20 yrs)**	**Burn**	**Control**
Black Brush Scrub				10	2
Total Plots for 2006	**0**	**0**	**0**		
Total Number of Plots Installed to Date				**12**	

Pinnacles National Monument

No fire effects plots were read in Pinnacles this year, though there are seven more 10-year reads coming up in '07 and '08. This park has not had any plans for more burns or plot work for several years, but management of the recently acquired lands may involve the application of fire, and thus fire effects plots. Below is a table showing the plots that have been installed to date, in the three different monitoring types.

Park: Pinnacles

Monitoring Type Name	Number of Plots Read in 2006			Total # of Plots, by Monitoring Type
	Pre-burn	Immediate Post	Postburn, (1-20 yrs)	
Chamise Chaparral				26
Mixed Chaparral				28
Blue Oak Woodland				16
Total Plots for 2006	**0**	**0**	**0**	
Total Number of Plots Installed to Date				**70**

Point Reyes National Seashore

Several plots were burned or cut last year, and 15 others were up for their 5-year re-read. No new plots were installed.

Park: Point Reyes

Monitoring Type Name	Number of Plots Read in 2006			Total # of Plots, by Monitoring Type	
	Pre-burn	Immediate Post	Postburn, (1-20 yrs)	Burn	Control
Non-native Annual Grassland			9	22	14
Non-native Perennial Grassland			7	4	3
Non-native Grassland with Scotch Broom			15	18	0
Non-native Grassland with French Broom			13	13	0

Northern Coastal Scrub				6	4
Bishop Pine				3	0
Douglas Fir				1	0
Eucalyptus*			5	5	0
Total Plots for 2006			**49**		
Total Number of Plots Installed to Date				**72**	**21**

* These eucalyptus plots were modified FMH plots for assessing stand density before a cutting operation. On each plot we measured tree diameters, measured one Brown's transect, and counted shrubs.

Santa Monica Mountains National Recreation Area

At SAMO, the emphasis was on last fall's Topanga wildfire; two-thirds of the plots read burned in this wildfire (12 of the plots were read by SAMO staff). Ten of the 11 oak woodland FMH plots also burned in the fire and we did the POST, but did not read them this year. The other 25 plots we read were either prescribe-burned or mowed and sprayed with herbicide last year. We also collected 48 1-m square grass biomass samples from the burn unit, to be compared with our pre-burn samples. And we re-sampled a species of concern to the park, *Ericameria palmeri pachylepis*, in the prescribed burn.

Park: Santa Monica Mountains

Monitoring Type Name	Number of Plots Read in 2006			Total # of Plots, by Monitoring Type	
	Pre-burn	Immediate Post	Postburn, (1-20 yrs)	Burn	Control
Avena fatua Non-native Annual Grassland			12	10	1
Bromus diandrus Non-native Annual Grassland			10	10	0
Non-native Annual Grassland (ANGR)			12	16	8
Non-native Perennial Grassland			10	10	0
Distichlis spicata Native Perennial Grassland			1	1	0

Nassella pulchra Native Perennial Grassland			8	8	0
Mustard			1	0	1
Forb (non-native annuals and herbaceous perennials)			12*	12	0
Sagebrush Coastal Sage Scrub			2	16	0
Laurel Sumac Coastal Sage Scrub				1	0
Chamise Chaparral			5	17	0
Big-pod Ceanothus Chaparral				11	0
Greenstem Ceanothus Chaparral				5	0
Hoary-Leaf Ceanothus			1	1	0
Eastwood Manzanita Chaparral				1	0
Black Sage Chaparral			1	2	0
Oak Woodland				11	1
Total Plots for 2006	**0**	**0**	**75***		
Total Number of Plots Installed to Date				132	11

* The 12 Forb plots were read by local park staff.

Management Objectives and Monitoring Results 2006

Park: Point Reyes NS

Monitoring Unit	Management Objective	Monitoring Results (90% CI)	Objective Achieved?
Scotch Broom	Scotch broom reduction (1º)/native plant enhancement(2º)	1º: 1-20% Increase in Scotch broom 2º: 3-13% Reduction in native species# (n=14)	1º: No 2º: No
French Broom	French broom reduction(1º)/native plant enhancement(2º)	1º: 6-14% Reduction in French broom 2º: 3-16% Reduction in native species (n=11)	1º: Yes 2º: No
Non-native Annual Grassland: D Ranch	Increase cover of Bromus carinatus (1º)/Increase cover of native species (2º)	1º: No significant difference between seeded and unseeded plots in % cover BRCA 2º: No significant change in % native cover (n=9)	1º: No 2º: No
Non-native Perennial Grassland	Decrease cover of BAPI(1º)/Maintain or decrease cover of PHAQ(2º)/Maintain or Increase cover of native spp. (3º)	1º: 1-9% reduction in % cover BAPI 2º: 20-40% decrease in % cover of PHAQ 3º: No significant change in % native cover (n=7)	1º: Yes 2º: Yes 3º: Yes
Eucalyptus	To decrease the standing BA of eucalyptus(1º)/To decrease dead and downed fuel loading at the site(2º)/To minimize eucalyptus resprouting(3º)/To maintain GEMO2 density at or below pre-treatment levels(4º)	1º: 811-4315 cm^2 reduction in basal area of eucalyptus 2º: Fuel constants not available for EUGL 3º: 0-22% rate of resprouting 4º: -.2 - 22 stems/m^2 reduction in GEMO2 density# (n=4)	1º: Yes 2º: Unknown 3º: Yes 4º: Unknown: sample size is too small.

# Indicates that results are not statistically significant at α= 0.1

Park: Golden Gate NRA

Monitoring Unit	Management Objective	Monitoring Results (90% CI)	Objective Achieved?
Redwood Forest	Decrease fuel loading	Fuel loading changes between a 16% decrease and a 42% increase. (n=5)	Unknown: sample size is too small.

Park: Pinnacles NM

Monitoring Unit	Management Objective	Monitoring Results (90% CI)	Objective Achieved?
Chamise Chaparral	Enhance native plants*	8-35% Decrease in native species (n=7)	No
California Mixed Chaparral	Enhance native plants, specifically *ceanothus**	2º: -44 to +97 Change in native species[#] (n=2)	Unknown
Blue Oak Woodland	Enhance native plants**	Unknown	Unknown

[#] Indicates that results are not statistically significant at α= 0.1
* This was not the original burn objective. The original goal was to create a discontinuity in the fuels along the boundary without type converting the area to grass. This objective is no longer considered valid.
** This was not the original burn objective. The original goal was to prevent encroachment by shrubby species and remove low limbs in the boundary buffer area. This objective is no longer considered valid.

Park: Channel Islands NP

Monitoring Unit	Management Objective	Monitoring Results (95% CI)	Objective Achieved?
Coastal Sage Scrub (Santa Rosa Island)	Increase native shrub cover/decrease exotic species cover	Control plots 5 year ARCA cover average increase =12.9%, ST DEV=16.4, n=14 Burn plots 5 year ARCA cover average decrease = 23.3%, ST DEV= 21.2, n=7 Control vs. burn are significantly different, P = 0.003	No Need 10 year analysis (2007)
Nassella pulchra grassland (Santa Rosa Island)	Increase native grass cover/decrease exotic species cover	Burn plots 5 year NAPU cover average increase = 17.5%, ST DEV = 9.05, n=10 Control plots 5 year NAPU cover average increase=11.7%, ST DEV = 12.1, n=9 Control vs. burn are not significantly different, P = 0.257	No clear benefit Need 10 year analysis (2007) Need multivariate analysis

Park: Santa Monica Mountains NRA

Monitoring objectives need to be redefined for older FMH plots and the plot data mined for relevant applications to current park fire management issues.

Monitoring Unit	Management Objective	Monitoring Results (95% CI)	Objective Achieved?
ANGR	Provide fuel breaks at a strategic control points in the Simi Hills fire corridor and the Potrero fire corridor	YR 0 Burn 100% decrease in biomass Biomass change: YR 1 Burn -204 g/m2 +/- 176 YR 1 Control -84 g/m2 +/- 234 P=0.416 YR 1 Mow 24 g/m2 +/- 154 YR 1 Control 68 g/m2 +/- 125 P=0.612	YES YR 0 NO YR 1 Must re-treat annually Substitute mowing for burning for sustainability

Fire Ecology Staffing 2006

Monitor	Starting Date	Ending Date	# of Pay Periods	Training and Development
Alison Forrestel	n/a	n/a	26	FPA-PM, S390, Measuring and Monitoring Plant Populations, UC Berkeley Fire Ecology seminar
Marti Witter	n/a	n/a	26	
Wende Rehlaender	1-15-06 3-26-06	2-25-06 12-30-06	23	One-day communications seminar
Beth Eisenberg	4-9-06	10-14-06	13.5	Grass class, S-290, First Aid/CPR
Elizabeth Urbanski	5-7-05	10-28-06	12.5	Grass class, S-290, First Aid/CPR

Accomplishments and Focus Areas for Fire Ecologists and Fire Effects Monitors

Bay Area Fire Ecologist

Category	% Time	Accomplishments/Focus Area
General Planning	15%	• Assisted with planning and project review for PORE fuels projects • Assisted with PORE/GOGA operational FMP's • Worked with PINN on planning for proposed new lands burn
Monitoring Plans	0%	Scheduled for 2007
Presentations	10%	• Presented Bay Area Network fire effects data to fall FMO meeting • Presented Bay Area Network fire effects data at Fire Effects Forum • Presented FEAT GIS module training to National Fire Ecology & Fire Effects group • Presented GPS training to PORE fuels crew
NPS Meetings / Task Groups	15%	• Organized first annual Fire Effects Forum • Facilitated monthly meetings/fieldtrips for PORE fire & resource management staff • Participated in Monitoring Plans working group • Assisted National Fire Ecology Program with FEAT GIS Module testing
Interagency Work	5%	• Served as peer reviewer for Joint Fire Science proposals
Fire Assignments and Fuels Projects	10%	• Participated in 1 PORE prescribed fire as FEMO • GISS/GISS-T on Warm Fire, San Rafael Complex, and Uncles Fire. Completed GISS task book.
Research	10%	• Expanded CESU project with Max Moritz at UC Berkeley to examine SOD and fire at PORE to include more extensive field work and spatial analysis. • Assisted with development and submission of proposals to study SOD resistance and to use prophylactic treatment on high value trees. Currently being considered for funding.
Monitoring Field Work	5%	Assisted with field work at PORE and GOGA.
Data Entry	0%	Monitors completed data entry.
Data Management and Conversion	0%	FEAT conversion was completed in FY05.

Data Analysis	10%	• Completed data analysis for planning, presentations, and annual report. • Completed fire hazard and risk assessment fore PORE.
Supervision/Admin	10%	• Supervised lead monitor • Ranked seasonal applications • Travel & time paperwork • Administered contract w/ Phytosphere research (rare plant monitoring)
Training & Professional Development	10%	• S390 • Measuring and Monitoring Plant Populations • Fire refresher • FPA-PM • Participated in UC Berkeley Fire Ecology Seminar • Completed Presidential Management Fellowship

Mediterranean Coast Fire Ecologist

Category	Accomplishments/Focus Area
General Planning	• Assisted with development and review of SAMO fuels projects
Monitoring Plans	• Ongoing
Presentations	• Witter, M.S., R. S. Taylor, S. Davis. 2006. Fire History and Vegetation Response to Wildfire in the Santa Monica Mountains. Proceedings of the Southern California Botanists Annual Meeting, Fullerton, CA. *Oral presentation*. • Witter, M.S. and K. Sikes. 2006. Impact of fire on a native California buchgrass, *Nassella pulchra.* Third International Fire Conference, San Diego, CA. *Poster* • Kendra Sikes, Marti Witter, Robert S Taylor, Julie Christian, and Jon Keeley. 2006. Field Validation of NPS-USGS Burn Severity Mapping Techniques in Chaparral and Coastal Sage Scrub. Third International Fire Conference, San Diego, CA. *Poster.* • Orrock, J., M.S.Witter, O. Reichman. 2006. Grassland invasion and apparent competition. Ecological Society of America Annual Meeting, Memphis, TN. *Oral presentation.* • Witter, M., J. Orrock, and O. J. Reichman. 2006. Grassland restoration impacted by apparent competition. California Native Grass Association Annual Meeting. Chico, CA. *Oral Presentation*

	• Marti Witter, John Orrock and O. J. Reichman. 2006. Grassland restoration impacted by herbivore-mediated apparent competition with *Brassica nigra*. Society for Ecological Restoration, California Chapter (SERCAL), Santa Barbara, CA. *Poster*
NPS Meetings / Task Groups	• SAMO fire management meetings for fuels project planning • Weekly BAER progress meetings
Fire Assignments and Fuels Projects	• Topanga Fire BAER projects
Research/ Co-operative Projects/Park Projects	• Continue collaboration with John Orrock, National Center for Ecological Synthesis and Analysis (NCEAS), Santa Barbara on herbivore impacts on post fire rehabilitation plantings • Implement BAR Plan with the Mountains Restorations Trust, a park co-operator • Collaborated with Jon Keeley, USGS, regarding burn severity assessment in shrubland community types. • Collaborated with Carl Bell, UC Co-operative Extension to evaluate herbicide use in *Nassella* post fire rehabilitation • Participated in USGS Hazards Initiative scoping meetings (Lucy Jones, Caltech)
Monitoring Field Work	• BAER/BAR plots • Topanga Fire Effects CBI, *Nassella* and CSS plots
Data Management and Conversion	• Data analysis of FMH plots remains to be done in 2007
Data Analysis	• Data analysis for projects, publications, presentations, and annual report.
Supervision/Admin	• Supervised five BAER biotechnicians and two Fire Effects biotechnicians • Supervised as an NPS intern Julie Clark DeBlasio a UCLA MS student in her graduate project re: regulatory issues regarding fuel modification
Publications	• Witter, M.S. and R. S. Taylor. 2006. Fire in Southern California Shrublands - Proceed with Caution. Rx Effects, Volume 1 Issue 6, Spring 2006. Newsletter of the National Park Service Fire Ecology Program. • Witter, M.S., R. S. Taylor, S. Davis. 2006. Fire History and Vegetation Response to Wildfire in the Santa Monica Mountains. Proceedings of the Southern California Botanists Annual Meeting, Fullerton, CA. Special Publication, The Santa Monica Mountains, *In Press* • Orrock, J., M.S.Witter, O. Reichman. 2006 Biological invasion via apparent competition. *Submitted* Ecology.

Fire Effects Crew

Category	Percent Time		Accomplishments/Focus Area
	Crew	Lead	
FMH Plots	32%	19%	Includes 10 people-days of driving time to away parks.
Mechanical Treatment Plots	4%	2%	Eucalyptus plots at PORE, Harding grass plots at SAMO
Other Projects	1% 1.5% 1.5% 5%	1% 1% 2% 5%	• Scotch broom mapping • European dune grass pilot data collection and burn • Assisted Fuels Crew • Miscellaneous
Fire Assignments	9%	10%	• All three monitored and mopped up a prescribed burn at LABE (3 shifts) • Lead and one crew member completed fire use assignment, 28 shifts total for two people • Lead participated in one more prescribed burn (one shift), and one shift of pile burning
Data Entry, Slide & Photo Labeling, Keying Vouchers, and Miscellaneous Office Work	25%	3%	
Data Management and Summaries	0%	3%	
Supervision and Administration	1%	37%	Hiring, planning, timesheets and other paperwork, evaluations, ordering supplies, annual report, and various other administrative tasks
Meetings	<1%	4%	
Training and Development	13%	8%	Fire refresher, training and development as noted in previous table, regular PT
Orientation and Informal Training	5%	5%	Learning and teaching
Assisting Other Divisions	2%	<1%	• Wetlands field work • Drove Res. Mgt. vehicle to GSA