



**National Park Service
Fire Ecology Annual Report
Southern Utah Group Fire Effects Monitoring Program
Calendar Year 2006**

Summary

Its graduation time here in the Southern Utah Group Fire Effects Monitoring Program. Lead Monitor Claire Crow is in the process of graduating from the University of Arizona with a Masters in Wildlife Management and Conservation and will be returning to Zion National Park as the Wildlife Biologist. Assistant Lead Alina Cansler graduated to Lead Fire Effects Monitor for North Cascades National Park near the end of the season. And finally, Katie Johnson stepped up from crewmember to Zion Fire Effects Lead.

Minus the change in staffing, this year's field season was uneventful. Three parks remain in the Southern Utah Group program and provided for a sufficient workload. With the East Mesa unit in Zion National Park being the only prescribed fire of the season, the majority of the reads were Post-Burns and Re-Pre's. More than half the field time was spent at Bryce Canyon National Park, mainly due to dodging lightning strikes and downpours. In between trips to Bryce, a brief trip to Golden Spike National Historic Site was made for three FMH brush plots.

This year's field data was entered in it's entirety into FMH, even though all previous data had been converted into FEAT. Li Brannfors from Grand Canyon National Park detailed in and assisted with the final conversion from FMH to FEAT 2.4. FEAT will be in working order and ready for analysis and data entry in the spring.

The Kolob fire in June/July, which burned over 10,000 acres of climax pinyon/juniper community in Zion National Park, kept Kelly, the Fire Ecologist, busy as the Resource Advisor for the fire. The 10 day ordeal involved briefing the Incident Command Team and field crews, coordinating with other ZNP field resource advisors, consulting on suppression actions, and post fire rehab planning. A NPS Intermountain Region BAER team was called in on July 16th to assess the natural and cultural resource damage and make recommendations to the park for rehab actions. As soon as the BAER team departed, the task of implementing recommendations and coordinating contracts began. When selected rehab actions were completed in November, 3.7 miles of fence were replaced, 493 acres were aerially seeded and herbicide was aerially applied to over 8000 acres of the park. This application of herbicide is the largest in NPS history and was accomplished to prevent the conversion of the juniper/pinyon community to an annual exotic grass (*Bromus tectorum*). This treatment will be followed up with 3 years of monitoring to determine its effectiveness. The Fire Ecologist also served as the Acting Chief of Resources beginning in November.

Table 1. Fire Effects Plot Workload 2006

Park	Monitoring Type	Type of Plot (FMH, photo point, other)	Installs	Pre- and Re Pre-burn	Immed. Post	Postburn (1, 2, 5, 10, 20 yrs)	Total Plots
Zion	Great Basin Sage Brush	FMH Brush plot	0	0	0	1	1
	Pinyon / Juniper	FMH Forest plot	0	0	2	3	5
	Ponderosa Pine	FMH Forest plot	0	0	4	5	9
	Ponderosa Pine	Photo Point	3	0	3	0	6
	Gambel Oak	FMH Forest plot	0	0	0	2	2
	Rare plants	Modified FMH Brush plot	0	0	0	3	3
	Column SubTotals		3	0	9	14	26
Bryce Canyon	Black Sagebrush	FMH Brush plot	0	0	0	2	2
	Ponderosa Pine	FMH Forest plot	0	4	0	13	17
	Mixed Conifer	FMH Forest plot	0	2	0	1 (control)	3
	Column SubTotals		0	6	0	16	22
Golden Spike	Sage Brush	FMH Brush plot	1	0	0	2	3
Total			4	6	9	32	51

Staffing

Zion Fire Effects had a good deal of experience behind them this summer. Claire Crow, Lead Monitor but considered herself a detailer, had 7 years at Zion. Alina Cansler, Acting Lead, was in her fourth season in Zion. Katie Johnson, new to Zion Fire Effects, had three seasons as Fire Effects prior to her stint at Zion. Shannon Eberhard, previously on a Zion engine, had detailed with Fire Effects in the past. Thus the crew was very proficient in the field as well as in the office.

Table 2. Fire Ecology Staffing 2006

Monitor	Starting Date	Ending Date	# of Pay Periods	Training and Development
Kelly Fuhrmann	1/01/06	12/31/06	26	•
Katie Johnson -crewmember -Lead Monitor	4/30/06 9/03/06	9/02/06 12/16/06	9 7.5	• S-234 • Completed FFT1 taskbook • FEAT/Stats training • GIS training
Claire Crow	6/25/06	8/19/06	4	• Worked toward graduate degree
Alina Cansler	4/03/06	9/08/06	11.5	• S-234 • S-131- FFT1 taskbook initiated • S-212 • S-133 • Completed FEMO taskbook
Shannon Eberhard -intermittent	5/08/06 9/20/06	9/19/06 11/03/06	7 5.5	• S-215 • FEMO taskbook initiated

Table 3. Fire Ecologist Accomplishments/Focus Areas

Category	Percent Time	Accomplishments/Focus Areas
Planning	5%	- Completed climate history data set for Zion National Park - Initial FY07 Zion Fire Management Program planning - Reviewed 8 ZION NEPA compliance documents - Progressed with Three Finger Mesa compliance planning - Established GOSP research project with USGS and Utah State Univ. - Established reliable botanical support from Southern Utah University
Presentations	5%	- Planning sessions for Kolob BAER project - Washington County water board meeting (Kolob treatment) - Arthur Carhart Institute wilderness training session (Kolob treatment)
NPS Meetings/ task groups	40%	- Zion staff meetings - BRCA fuels treatment workshop - Kolob BAR agency and university (NAU) planning sessions - Kolob BAR implementation leader
Interagency work	5%	- AZ BLM/UT BLM,USFS fire ecology monitoring program coordination - Color Country fuels group meetings (3)
Fire Assignments	5%	- Zion NP wildland fire logistics – Duty Officer (12 shifts) - ZION NP East Mesa FEMO (4 shifts) - Mesa wildfire (BLM) (1 shift) - Kolob wildfire Resource Advisor (14 shifts)
Research	2%	Revise FMH4 Description Sheets for ZION
Data entry	0	Completed by Lead and Assistant Lead
Data Conversion	0	Completed by Fire Effects staff
Data analysis	1%	2006 analysis for annual report
Supervision/Admin	20%	- Hired and supervised Zion Fire Effects staff (4) - Managed Fire Effects budget - Equipment inventory purchase/replacement - Completed mid and end of season performance reviews - Program/office/data organization and logistics - Annual report preparation - Fire operations support
Training	5%	- CBI training at GRCA - S215 - RX510 - Plot work with Fire Effects crew - Travel
Miscellaneous	12%	Acting Chief of Resources Management – Zion NP (November – December 2006)

Table 4. Fire Effect Crew Accomplishments

Category	Percent Time	Notes
FMH plots	38%	ZION, BRCA, GOSP
Rare Plant plots	1%	ZION rare Erigeron plots
Fire Assignments and Fuels Projects	10%	- One crewmember served as FEMO for 4 shifts on East Mesa RX - Three crewmembers assisted the Zion engine crew on severity detail for 12 shifts and served as FFT2, FFT1, and FEMO on area fires - One crewmember served 4 shifts as HECM trainee with Zion Helitack - One 12 day detail on Color Country Interagency Hand Crew
Data entry	8%	Two crewmembers spent 1 month entering data into FMH for the final

Category	Percent Time	Notes
		time!
Data conversion & management	2%	- Final data conversion from FMH to FEAT 2.4 - Li Brannfors detailed for one week to facilitate conversion
Data Analysis	1%	Little analysis due to 2nd and 3rd entry post burn reads
Supervision/Admin	5%	- Lead and Acting Lead spent time trying to answer plot history and protocol questions - Field scheduling and prep, travel, purchasing
Training	25%	Included 4 NWCG courses, FEAT/Stats, CBI at Grand Canyon, Trimble GPS, GIS/GPS for fire management
Miscellaneous	10%	- Data archival project - Writing up projects for following year, working on annual reports - Working and Digital Herbarium clean-up, plant identification - Plot location/Burn Unit map creation in GIS

Continuing Projects for 2006

- GIS projects including updating plot location and fire history coverages
- Continue with FEAT data organization and learn methods for FEAT data analysis
- Contribute Digital Herbarium to PLANTS National Database
- Answer plot history questions

2006 and extended project and program development summary

6-12 months

- ✓ Pursue funding through Joint Fire Science Program. (Time: FY 07)

The focus of this effort is to develop project proposals and secure funding for projects related to:

- Researching and compiling historical photo documentation for determining fire history in Zion and Bryce National Parks
- Research social aspects of the Kolob fire BAER herbicide spraying
- Apply for additional funding to complete follow-up monitoring and additional of the Kolob fire herbicide application of vegetation community response

- ✓ Continue to organize and develop ZION Fire Effects program (Time: Ongoing)

The focus of this effort is multi-fold:

- Complete FMH plot folder, historical burn plan organization and plot photo archiving project initiated in 2005.
- Address equipment needs for Fire Effects program.
- Improve Fire Effects program organization, crew training levels, etc.
- Improve quality and scope of data collection standards.
- Improve deficiencies such as botanical and statistical support.
- Develop and incorporate FEAT standards and protocols into program.
- Develop familiarity with FEAT data entry and analysis and FireMon software conversion.

- Promote ecologically-based fire management planning process
- Complete GIS based fire and plot history coverages and metadata project

12-36 months

- ✓ Develop and implement GIS/GPS technology for Fire Effects program (Time: FY07)

The focus of this effort is to develop the GIS/GPS element of the Fire Effects program

- Establish a self sufficient GIS/GPS program
 - Continue to develop fire and plot history coverages
- ✓ Investigate incorporating wildlife monitoring techniques into FMH protocols
 - ✓ Develop manuscript for journal publication

Management Objectives and Monitoring Results 2006

Table 5. Zion National Park Management Objectives and Monitoring Results 2006

<u>Monitoring Unit</u>	<i>Management Objectives</i>	<u>Monitoring Results</u> (n = # of plots)	Management Objectives Achieved?
Ponderosa Pine FPIPO1T09	Reduce needle and duff layer by 40-60% (immediate post burn)	45% decrease in litter and duff total (n=17)	YES - 67% litter & 40% duff reduction
	Reduce 1,000 hour fuels by 40-80% (immediate post burn)	12% reduction (n=17)	NO - Further research and analysis is needed in relation to this objective
	Lower brush cover height by 40% (1 year post burn)	12% decrease in live brush height 41% decrease in live brush density (n=17)	NO* - Minor decrease in height, but more significant decrease when viewed in terms of density
	Attain 30-60% mortality of live ponderosa pine 4-12" DBH (5 years post burn)	17% decrease in 6-12" size class (n=14)	NO* - More intensity likely needed to achieve objective (only 6-12" DBH trees analyzed)
	Limit mortality of ponderosa pine greater than 24" DBH to 20% (5 years post burn)	100% increase (n=14)	YES - Increases likely occurred from growth in smaller DBH size classes
Quaking Aspen FPOTR1T02	Reduce fuel load 40-70% immediate post burn	1.7% increase (n=7)	NO - Treated during wet conditions, snow on north aspects and in some of the plots
	Reduce overstory tree (POTR) density 20-50% within 5 years post burn	35% decrease in POTR (n=10)	YES – Acceptable decrease in aspen overstory
	Increase seedling and pole density/regeneration 15-40% within 5 years post burn	96% increase seedlings 30% decrease poles (n=10)	NO – Over-achieved in seedlings and decreased poles for all species lumped together (also, wet conditions and area has browsing by deer and elk)

<u>Monitoring Unit</u>	<i>Management Objectives</i>	<u>Monitoring Results</u> (n = # of plots)	Management Objectives Achieved?
White Fir FABCO1T10	Reduce fuel load 50-80% immediate post burn	54% decrease (n=4)	YES
	Limit the reduction/mortality of overstory trees (ABCO) to 30-50% within 5 years post burn	76% decrease in ABCO at YR02 (n=3)	NO* - Overachieved reduction objectives in white fir (no year 5 data yet—analysis run with year 2 data)
Gambel Oak FQUGA1T06	Reduce fuel load 30-80% immediate post burn	35% decrease (n=11)	YES
	Reduce oak (QUGA) density of all size classes by 25-80% in 1 year	79% increase seedlings in QUGA 44% decrease poles in QUGA 31% decrease overstory in QUGA (n=11)	YES and NO - Increase in seedlings likely due to fire re-sprouting response
	Limit Ponderosa overstory mortality to <50% within 2 years	10% increase (n=11)	YES - Increases likely occurred from growth in smaller DBH size classes
Juniper and Pinyon FJUOS1T06	Reduce overstory tree density by 20-40% within 1 year post burn	6% decrease in pinyon & juniper species (n=4)	NO
	Reduce brush density by 5-25% within 1 year post burn	3% increase (n=4)	NO
	Reduce seedling and pole sized trees by 5-20% within 1 year post burn	19% decrease seedlings 0% change poles (n=4)	YES and NO – Fires likely haven’t burned hot enough to achieve desired pole mortality

<u>Monitoring Unit</u>	<i>Management Objectives</i>	<u>Monitoring Results</u> (n = # of plots)	Management Objectives Achieved?
Sage Brush BARTR1T06	Reduce brush density by 40-80% within 2 years post burn**	68% decrease (n=10)	YES
	Increase native grasses and forbs in 5-10 years by >10% cover	28% increase (n=9)	YES
Ripgut Brome GBRDI1T02	Reduce Ripgut Brome (BRDI) and Cheatgrass (BRTE) density 100%	81% decrease in BRDI at YR02 1232% increase in BRTE at YR02 (n=4)	NO – Partial decrease in ripgut brome offset by dramatic increases in cheatgrass and Russian thistle (overall non-native density decreased by 29%)
	Increase relative cover of native vegetation 30-40% within 5-10 years post treatment	51% increase at YR02 (n=4)	YES* – Over-achieved by increasing relative cover more than expected (no year 5 data yet—analysis run with year 2 data)

All results shown are 80% confidence intervals of the mean. * Not all plots have been treated with fire for some of these variables and all of them have not been evaluated for minimum sample size for plots related to these variables. **Analysis from 2006 data.

Table 6. Bryce Canyon National Park Management Objectives and Monitoring Results 2006

<u>Monitoring Unit and Code</u>	<i>Management Objectives</i>	<u>Monitoring Results</u> (n = # of plots)	Management Objectives Achieved?
Mixed Conifer FABCO1G08	Reduce total fuel load by 20-50% immediate post burn	68% decrease (n=12)	YES – Over-achieved, but is within an acceptable range
	Reduce White Fir (<i>Abies concolor</i>) pole density by 10-20% within 2 years post burn	52% decrease (n=12)	NO - Significantly over-achieved, however objective is probably too low - decrease may be acceptable with even more mortality needed
	Reduce White Fir seedling density by 20-40% within 1 year post burn	79% decrease (n=12)	NO - Significantly over-achieved, however objective may be too low - decrease may be acceptable with even more mortality needed
	Increase Quaking Aspen (<i>Populus tremuloides</i>) seedling density by 30-70% within 2 years post burn	Increase from 0 to 266.7 trees/hectare occurred (n=12)	YES* - A substantial increase occurred, but can not analyze % change due to no POTR seedlings present pre burn
Ponderosa Pine FPIPO1T02	Reduce total fuel load by 30-60% within immediate post burn readings	39% decrease (n=7)	YES
	Decrease brush density by 40-60% within 1 year	66% increase (n=7)	No – Large increases in <i>Mahonia repens</i> and <i>Arctostaphylos patula</i> drove results
	Increase native grasses and forbs by 5-20% within 5 years**	712% increase at YR05 in % cover (n=7)	YES - Significantly over-achieved when measured in relation to percent cover

<u>Monitoring Unit and Code</u>	<i>Management Objectives</i>	<u>Monitoring Results</u> (n = # of plots)	Management Objectives Achieved?
	Limit mortality (density) to <20% of ponderosa pine greater than 24" DBH over a 5 year period	33% decrease (n=19)	NO* - Decrease was from only 0.6 trees/acre pre burn to 0.4 trees/acre post burn. Density increases from 8.1 to 8.5 trees/acre with all trees 16"+ DBH
	Limit scorch height to <30'(Post Burn)	7.8' mean scorch height (n=15)	YES
Black Sagebrush BARNO1T05	Reduce brush density by 40-70% within 2 years post burn	79% increase (n=3)	NO – only decreases for <i>Artemisia</i> species and <i>Chrysothamnus depressus</i> , but overall 79% increase with all species combined
	Increase native grasses and forbs in 5-10 years by >10% cover	19% increase at YR05 (n=2)	YES

Table 7. Golden Spike National Historic Site Management Objectives and Monitoring Results 2006

<u>Monitoring Unit and Code</u>	<i>Management Objectives</i>	<u>Monitoring Results</u> (n = # of plots)	Management Objectives Achieved?
Sage Brush BARTR1T06	Reduce brush density by 40-80% within 2 years post burn.	99.7% decrease at YR02 (n=3 plots, 2 fires)	YES – Over-achieved, but results are within an acceptable range and sample size is small

All results shown are 80% confidence intervals of the mean. * Not all plots have been treated with fire for some of these variables and all of them have not been evaluated for minimum sample size for plots related to these variables. **[Analysis from 2006 data.](#)