



A. Summary

The 2010 field season was productive and enjoyable for the Southern Utah Group Fire Effects Crew. Throughout the season, the crew continued to collect fire related data from Zion National Park, Bryce Canyon National Park and Golden Spike National Historic Site. The crew read a total of 41 FMH plots during the season. 18 FMH plots were located on the east and west plateau areas in Zion NP. The crew traveled to Bryce Canyon a total of 4 times during the summer. While at Bryce Canyon the crew read 20 FMH plots, 15 tree density plots, 10 photo points and assisted with the Dave's Hollow RX. The crew also traveled to Golden Spike in Northern Utah in order to read 3 FMH brush plots. The crew continued to collect data from the 140 cheat grass research plots located within the Kolob Wildfire (2006).

The season was one of transition and flexibility for the Zion Fire Effects crew. The lead monitor, Joel Silverman, accepted another position and left the crew by July 1st. Katie Walsh, the assistant lead at the time, accepted the lead position in July. The fire ecologist, Katie Johnson, spent a majority of the year working on her master's degree at Northern Arizona University but was able

to assist the crew with FMH monitoring during the busy three months of summer. The other crew members, Isadora Albert and Laura Young, contributed to a safe and productive field season with accomplishments in both field data collection and data entry. The Fire Effects crew was assisted by several other crews and individuals throughout the season. Grand Canyon Fire Effects crew graciously detailed two employees to Zion for two weeks in the early summer. Their hard work helped us complete the Kolob Fire research plots. Zion Fire Effects also received assistance from the Zion Vegetation crew, the Zion Engine crews, the Bryce Canyon Engine crew and the Bryce Canyon Vegetation crews. All the extra assistance was greatly appreciated and it allowed us to meet our project goals.

Despite our work load and small crew size, all members of the crew were able to go on details and assist with prescribed and wild fires. Laura Young detailed with the Zion Helitack crew for two weeks and had the opportunity to work on her Helicopter Crewmember task book. Isadora Albert detailed with the Zion Canyon Engines for two weeks and participated in several wildfires within Zion National Park. Katie Walsh detailed to the Grand Canyon Helicopter Training Academy for two weeks and was able to complete her helicopter crewmember task book. The fire effects crew also filled the role as fire monitors for two prescribed burns at Zion and one prescribed burn at Bryce Canyon. The Fire Effects crew was able to assist Zion fire managers with the monitoring of the Subway Fire, a fire for resource benefit within the designated wilderness of Zion National Park. Katie Walsh and Isadora Albert filled the role of both FEMO and READ during eight days of operations.



Isadora Albert and Donna Pippen identifying plants within the Pocket Mesa prescribed burn unit.

The Zion Fire Effects crew continued to support the development of a working herbarium that will be shared by park resources including the vegetation crews. The crew assisted with plant collection, specimen mounting and database editing. A seasonal vegetation employee hired

through the Chicago Botanical Gardens spent the majority of the summer collecting plant specimens, educating park employees on proper collection procedures, organizing the database, and organizing the collection specimens.



The Zion Fire Effects crew and Zion Engine crews monitoring the Kolob Fire research plots.

In October, the Northern Arizona University graduate students presented their findings from research plots installed within the Kolob Fire (2006) and The Dakota Hills Fire (2007). The studies looked at the effectiveness of broadcast herbicide spraying and native seed dispersal in order to reduce *Bromus* species invasion. The research plots were handed over to the Zion managers in 2009, who in collaboration with USGS continue to monitor and study with assistance by the Fire Effects crew and the park Vegetation crew.



Zion Fire Effects Crew- Katie Walsh, Laura Young, Isadora Albert and Katie Johnson (Fire Ecologist), Joel Silverman-not pictured.

Table 1. Fire Effects Plot Workload (2010) and Total Plots Installed

Park	Monitoring Unit	Type of Plot (FMH, Photo pt, other)	Pre burn	Immed. post burn read	Post burn 1-20 years	Total 2010 samples	Total Plots (installed to date)
Zion	Ponderosa Pine	FMH Forest Plot	0	0	4	4	19
Zion	Sagebrush	FMH Brush Plot	0	8	0	8	20
Zion	Gambel Oak	FMH Forest Plot	0	0	4	4	11
Zion	Juniper Woodland	FMH Forest Plot	0	0	2	2	8
Zion	Aspen	FMH Forest Plot	0	0	0	0	10
Zion	White Fir	FMH Forest Plot	0	0	0	0	9
Zion	Kolob Fire	Cheat grass treatment plots	0	0	140	140	140
Zion	East Entrance	Photo Point	0	0	5	5	5
Zion	Pocket Mesa	Fuel Transects	9	0	0	9	9
Zion	Rare Erigeron	Other	0	0	3	3	3
Zion	Zion Grass RX	Photo Point	3	3	0	3	3
Bryce	White Fir	FMH Forest Plot	0	0	14	14	14
Bryce	Ponderosa Pine	FMH Forest Plot	0	0	6	6	23
Bryce	Black Sage	FMH Brush Plot	0	0	0	0	7
Bryce	Dave's Hollow	Tree Density Ponderosa Pine	0	15	0	15	15
Bryce	Dave's Hollow	Photo Points	0	3	0	3	3
Bryce	Puma RX	Photo Points	0	0	7	7	7
Golden Spike	Sagebrush	FMH Brush Plot	0	0	3	3	10
Total FMH	---	FMH Plots	0	8	33	41	131
Plot Total	---	All Plot Types	12	29	188	226	316

Table 2. Fire Ecology Staffing 2010

Ecologists and Monitors	Start Date	End Date	# Pay Periods	READ qualified (yes or no)	Training and Development
Katie Johnson Fire Ecologist	01/01/2010	12/31/2010	26	Yes	Full time graduate student at NAU
Katie Walsh Assistant Lead Monitor	04/8/2010	08/01/2010	6	Yes	Wilderness First Responder, S-211, Grand Canyon Helicopter Training Academy
Lead Monitor	08/01/2010	11/20/2010	8		
Joel Silverman Lead Monitor	01/01/2010	07/01/2010	14	Yes	Wilderness First Responder, NPS Fundamentals
Isadora Albert Monitor Crew	04/12/2010	10/14/2010	14	No	S130, S190, L180, I100, S212, S-211 Wilderness First Responder
Laura Young Monitor Crew	05/24/2010	8/12/2010	6	No	S271

Table 3. Management Objectives and Monitoring Results**Table 3a** Zion National Park Management Objectives and Monitoring Results 2010

Monitoring Unit	Management Objective (Restoration)	Monitoring Results (20% confidence interval)	Objective Achieved?	Year of Analysis
Ponderosa Pine FPIPO1T09	Reduce needle and duff layer by 40-60% (immediate post burn)	1 st burn, reduction: 43 to 67% (<i>n</i> =19 plots) 2 nd burn, reduction: 38 to 69% (<i>n</i> =13 plots)	Yes; perhaps slightly over-achieved Yes; perhaps slightly over-achieved	2009

Monitoring Unit	Management Objective (Restoration)	Monitoring Results (20% confidence interval)	Objective Achieved?	Year of Analysis
	Attain 30-60% mortality of live ponderosa pine 4-12" DBH (5 years post burn)	1 st burn, mortality: 20 to 41% (<i>n=17 plots</i>)	Yes, perhaps slightly low	2009
	Reduce 1,000 hour fuels by 40-80% (immediate post burn)	1 st burn, reduction: 3% INCREASE to 31% DECREASE (<i>n=19 plots</i>) 2 nd burn reduction: 11 to 91% (<i>n=13 plots</i>)	No Uncertain; minimum sample not achieved	2009
	Lower brush cover height by 40% (1 year post-fire)	1 st burn, reduction: 15 to 40% (<i>n=18 plots</i>) 2 nd burn, reduction: 6 to 45% (<i>n=12 plots</i>)	No No	2009
	Limit mortality of ponderosa pine greater than 24" DBH to 20% (5 years post burn)	1 st burn mortality: INCREASE by 97% to a DECREASE of 30% (<i>n=18 plots</i>)	Yes, but only 16 trees of this size! Minimum sample not achieved. Need to adjust objective to include more mid-size trees	2009
Quaking Aspen FPOTR1T02	Reduce fuel load 40-70% immediate post burn	1 st burn total fuel reduction: 4 INCREASE to 4% DECREASE (<i>n=7 plots</i>)	No; aspen groves barely burned	2009
	Reduce live overstory tree (POTR) density 20-50% within 5 years post burn	1 st burn, reduction: 26 to 46% (<i>n=9 plots</i>)	Yes, BUT NOT DUE TO FIRE; Rx burn was too damp to ignite the aspen groves.	2009

Monitoring Unit	Management Objective (Restoration)	Monitoring Results (20% confidence interval)	Objective Achieved?	Year of Analysis
	Increase seedling and pole density/regeneration 15-40% within 5 years post burn	Pole density: 7% INCREASE to 66% DECREASE (<i>n=9 plots</i>) Seedlings density: 46 to 192% increase (<i>n=9 plots</i>)	No; minimum sample not achieved; no fire in groves. Yes, BUT NOT DUE TO FIRE; no fire in groves; also, minimum sample not achieved.	2009

White Fir FABCO1T10	Reduce fuel load 50-80% immediate post burn	Total fuel reduction = 28 to 70% (<i>n=4 plots</i>)	Borderline; 49% mean fuel reduction	2009
	Limit the reduction/mortality of overstory trees (ABCO) to 30-50% within 5 years post burn	Overstory reduction = 14 to 118% (<i>n=3 plots</i>)	Uncertain; minimum sample not achieved	2009
Gambel Oak FQUGA1T06	Reduce total fuel load 30-80% immediate post burn	Fuel Reduction: 29 to 54% (<i>n=11 plots</i>)	Yes	2009
	Reduce oak (QUGA) density of all size classes by 25-80% in 1 year	Seedling increase: 45 to 154% (<i>n=11 plots</i>) Pole size reduction: 22 to 65% (<i>n=11 plots</i>) Overstory reduction: 3 to 59% (<i>n=11 plots</i>)	No, <i>increased</i> seedlings; re-sprouts and seedlings are both included in this count; also, minimum sample not achieved Yes, but minimum sample is borderline. No, but minimum sample not achieved	2009
	Limit Ponderosa overstory mortality to <50% within 2 years	Reduced by 5 to 28% (<i>n=18 plots</i>)	Yes	2009

Juniper and Pinyon FJUOS1T06	Reduce overstory tree density by 20-40% within 1 year post burn	Reduced by 4 to 33% (<i>n=8 plots</i>)	No	2009
	Reduce brush density by 5-25% within 1 year post burn	Brush reduction: 6 to 76% (<i>n=8 plots</i>)	Probably, but minimum sample not achieved	2009
	Reduce seedling and pole sized trees by 5-20% within 1 year post burn	Seedling reduction: 16 to 44% (<i>n=8 plots</i>) Pole reduction: 10 to 62% (<i>n=8 plots</i>)	Probably, but minimum sample not achieved Uncertain; minimum sample not achieved	2009
Sagebrush BARTR1T06	Reduce brush density by 40-80% within 2 years post burn	Brush density reduction: 49 to 80% (<i>n=10 plots</i>)	Yes	2009
	Increase native grasses and forbs in 5-10 years by >10% cover	Increase in cover 10 yrs post fire: 27 to 112% (<i>n=6 plots</i>)	Yes, but minimum sample not achieved; need to review how well pre-fire grass ID was conducted too.	2009
Brome GBRDI1T02	Reduce Ripgut Brome (BRDI) and Cheatgrass (BRTE) density 100%	81% decrease in BRDI at YR02 1232% increase in BRTE at YR02 (<i>n=4 plots</i>)	NO – Partial decrease in ripgut brome offset by dramatic increases in cheatgrass and Russian thistle (overall non-native density decreased by 29%)	2009
	Increase relative cover of native vegetation 30-40% within 5-10 years post treatment	51% increase at YR02 (<i>n=4 plots</i>)	YES – Over-achieved by increasing relative cover more than expected (no year 5 data yet—analysis run with year 2 data)	2009

Table 3b Bryce Canyon National Park Management Objectives and Monitoring Results 2010

Monitoring Unit	Management Objective (Restoration)	Monitoring Results (20% confidence interval)	Objective Achieved?	Year of Analysis
Ponderosa Pine FPIPO1T09	Reduce total fuel load by 30-60% within immediate post burn	2 nd entry burn: 14 to 88% decrease <i>(n=10 plots)</i> 3 rd entry burn: 7% INCREASE to 44% DECREASE <i>(n=5 plots)</i>	Uncertain; minimum sample not achieved No; mean was 18%	2009
	Increase native grasses and forbs by 5-20% within 5 years	2 nd entry burn: 7% DECREASE to 15% INCREASE <i>(n=10 plots)</i>	Uncertain; minimum sample not achieved	2009
Mixed Conifer FABCO1G08	Reduce total fuel load by 20-50% immediate post burn	2 nd entry burn: 22% decrease <i>(n=12 plots)</i>	Yes	2010
	Reduce White Fir (<i>Abies concolor</i>) pole density by 10-20% within 2 years post burn	2 nd entry burn: 31% reduction <i>(n=12 plots)</i>	Yes	2010
	Reduce White Fir seedling density by 20-40% within 1 year post burn	2 nd entry burn: 6 to 42% decrease <i>(n=12 plots)</i>	Yes	2010
	Increase Quaking Aspen (<i>Populus tremuloides</i>) seedling density by 30-70% within 2 years post burn	Only 1 POTR seedling found in 1 plot (<i>n=12</i>)	No	2010

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	1%	Kolob re-treatment assessment planning.
Presentations	2%	Resource management, internal park fire ecology talks
NPS Meetings/ task groups	5%	Squad, Wilderness Committee, Resource Management meetings, attended Society of American Foresters conference in Albuquerque, NM, Wild and Scenic River workshop
Interagency work	2%	LANDFIRE inputs, WFDSS
Fire Assignments	0%	
Research	5%	NAU graduate research project – counted as training; Worked with Mark Miller and Cheryl Decker on Kolob retreatment monitoring and assessment
Data Collection	5%	Assisted crew with data collection
Data entry	0%	Fire Effects Monitoring crew completed data entry.
Data analysis	5%	Data analysis for RX burn plans
Supervision/Admin	%	Supervision, travel, Quicktime certifier, purchasing, credit card, hired permanent Lead Fire Effects Monitor
Training	60%	Full Time graduate student at Northern Arizona University in Spring and Fall 2010
Miscellaneous	15%	Zion and Bryce Canyon RAWS maintenance

Table 5. Fire Effects Crew Accomplishments/Focus Areas

Category	Percent Time	Notes
FMH plots	20%	A total of 41 FMH plots were read this year. 20 at Bryce Canyon, 3 at Golden Spike and 18 at Zion
WUI plots	0%	None completed
CBI plots	0%	None completed
Other Plot Work	20%	Includes • Kolob Fire <i>Bromus</i> plots (140) • Photo points (10) • Rare <i>Erigeron</i> plots (3) • Dave's Hollow Tree Density plots (15)
Fire Assignments	20%	Includes • Lead two week detail at Grand Canyon Helicopter Training Academy • Crew member two week detail with Zion engine crews • Crew member two week detail with Zion Helitack crew • Assisted with 3 prescribed fires as FEMO/FFT2 • Lead and crew member assisted with Subway fire at Zion National Park as READ and FEMO
Fuels Work	<5%	Assisted with preparation of Zion Grass Burn and Lava Point fuel reduction.
Data Entry	15%	Completed and error checked all data collected in the 2010 field season. Kolob fire plot data was sent off for Mark Miller's office to enter.
Data Analysis	0%	
Supervision/Admin	8%	Lead monitor hired two crewmembers and rehired assistant lead. Lead monitor took another job, assistant was hired as lead.
Training	14%	• Wildland Firefighter Refresher • One crewmember completed fire school • S-212, S-211, S-271 • Wilderness First Responder • See previous table
Miscellaneous	<5%	Assisted Zion vegetation with organization of a working herbarium.

D. Additional Information

Table 6. Data Entry and Projects Monitored

Park	% 2010 Data Entered	% 2010 Data Quality Checked	# Prescribed Fires Monitored*	# Non-fire Fuels Treatments Monitored*	# Wildfires Monitored*	# BAER Treatments Monitored*
Zion National Park	100%	100%	6	0	0	1
Bryce Canyon National Park	100%	100%	3	0	0	0
Golden Spike National Historic Site	100%	100%	1	0	0	0

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



Joel Silverman enjoying the wildflowers near the Kolob Fire research plots.