National Park Service
Yellowstone National Park
Fire Ecology Annual Report
Calendar Year 2012

A. Summary

'Gone in a flash' sums up 2012 for the Yellowstone fire ecology program; it seems as if just yesterday everyone was scrambling to make final preparations before the seasonal employees and new fuels specialist arrived. The 2012 field season was once again a productive year for the program. Fun was had by all, several training assignments were available, all priority plots were finished, multiple weather stations were cobbled back together (bears like to use them as jungle gyms), and everyone was able to see at least a little fire behavior within the park. The program consisted of Becky Smith (fire ecologist), newcomer Bill Mayer (fuels specialist), Jess Page (lead fire effects), Tim Pankey (fire effects crewmember) who returned for a third season, and newcomer Kendra Graff (fire effects crewmember). As usual, job duties encompassed several aspects of fire ecology and management; the following is an overview of the program's 2012 endeavors in more detail.

Figure 1: Kendra, Jess and Tim in the Deep Creek area of the park.

Weather Network and NFDRS

This year Yellowstone's final low data rate remote automated weather station (RAWS) was converted to a high data rate transmission capable datalogger. The conversion will allow the station's weather data to continue to transmit through the GOES satellite after May 31, 2013, when low data rate transmission will no longer be supported. Additionally, the regional RAWS coordinator was able to secure funds to purchase the last remaining RAWS needed to ensure the park's stations are supported by the RAWS depot after 2017. After the new station is swapped out next summer, the park will be nearly five years ahead of the curve! Currently, Yellowstone's

Figure 2: Jess and helitack assistant foreman Doug Kraus fixing a bear jungle gym (i.e. RAWS).

weather network consists of six RAWS and four manual weather stations. Most of the manual stations operate from June through mid October, depending on weather conditions and the number of volunteers available. The fire effects crew is responsible for conducting annual maintenance on the RAWS, setting up and taking down the manual stations every year, and training the volunteers on how to accurately record weather observations and call them in to the fire dispatch center to be entered into the WIMS database.

The crew is also responsible for gathering weather reports, lightning maps, fire weather indices, fuel moisture data, safety information and seasonal predictions for daily fire cache meetings, fire briefings and general park staff briefings. In order to be successful at this, everyone within the fire ecology program, particularly the fire effects crew, must be proficient with the WIMS, WFMI, and Fire Family Plus programs.

Yellowstone uses the ERC from the Quadrant weather station as a fire prediction indicator. 2012 in Yellowstone saw record breaking ERC numbers, both in early August and mid to late September.

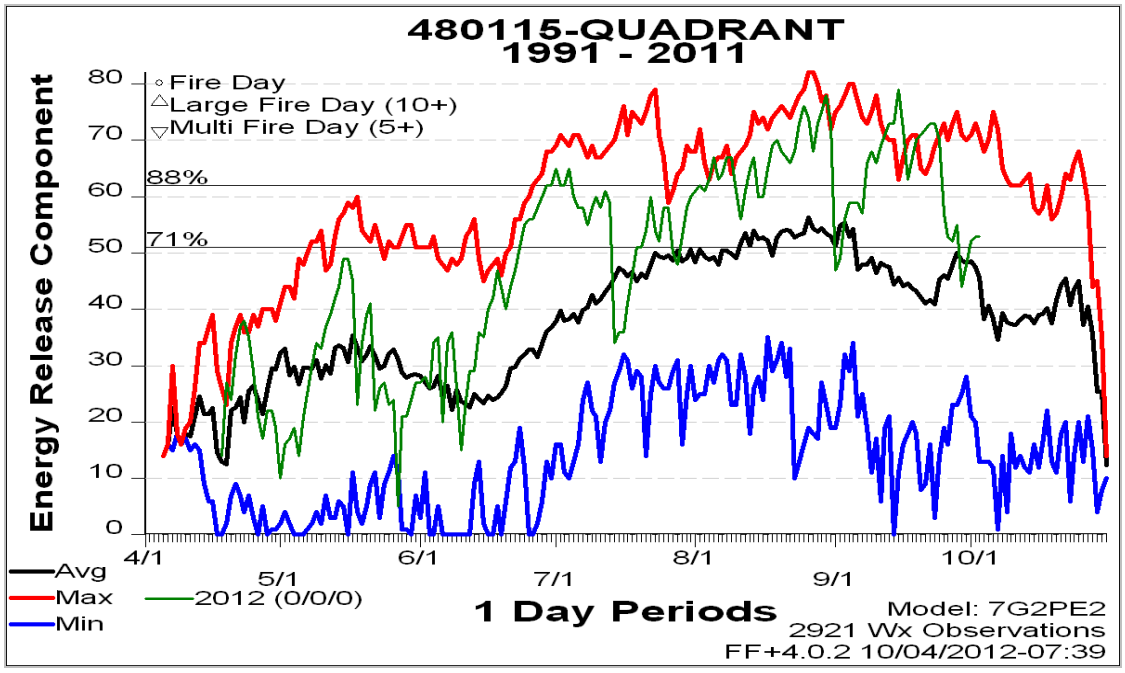


Figure 3: 2012 ERC chart produced by the fire ecology program.

Fuel Sampling

During the 2012 field season the fire effects crew, along with assistance from engine and helitack personnel, made 42 total visits for fuel moisture data collection to four long term sites representing the major vegetation types of the park. These major vegetation types include: mature lodgepole forest, regeneration lodgepole forest (i.e. 1988 burned area), Douglas-fir forest, and high elevation mixed conifer forest. Each manual weather station throughout the park also has a 1000 hour log station; there are currently nine long-term 1000 hour moisture

monitoring sites in use. Log data at the manual weather station sites are collected once a week by the weather volunteers in the park and called into dispatch along with the weather, thereby helping the park's fire ecology program greatly. The fire ecology's fuel moisture program becomes indispensible during the fire season by serving to inform park managers during their decision on which management action to take on a new fire start. The year's data showed the 1000 hour log moisture dropping sharply at the beginning of July, which was an entire month earlier than the 2011 season. During the 2012 field season the fire effects crew and other fire cache personnel were also once again able to replace 23 temperature sensors for Zack Holden at the Missoula Fire Science Lab. Data from the sensors are being used to model fine scale air temperatures in variable terrain.

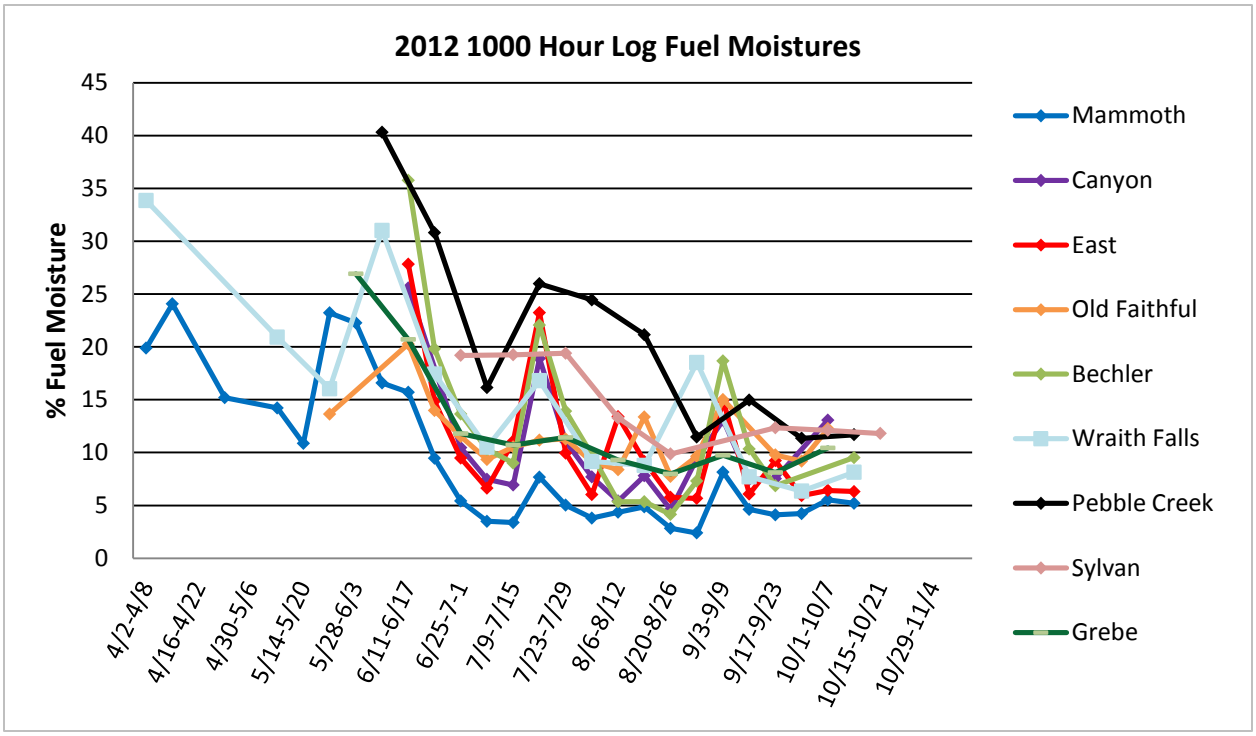


Figure 4: 2012 parkwide 1000 hour log moistures.

Fire Operations and Fire Monitoring

Members of the fire ecology program were able to complete training assignments as ICT5(t), FEMO(t), FFT1(t), HMGB(t), ENGB(t), FIRB(t), HECM(t), and ICT3(t); in WY, MT, NE, SD, and CA during 2012. Fire effects crewmember Kendra, was able to pursue her passion by detailing with a BAER team and was also able to keep current on her redcard qualifications by working on six different fires as a READ, FEMO, FFT1, and FALB. Fire effects crewmember Tim, was able to train as a FFT1 on a 20 person handcrew which traveled to several different fires around WY early in the fire season, maintain his HECM knowledge on the Reading fire in Lassen NP, and continue to gain FEMO skills on several fires in the park. He was also able to help with the Hurricane Sandy recovery effort which extended his season into late November. Fire effects lead Jess completed a two week out of park assignment as an ENGB(t), multiple assignments within the park as a FEMO, and a FIRB(t) assignment on the Stephens Creek burn; she was also able to complete her HMGB taskbook this year. Fuels specialist Bill, was able to complete assignments as TFLD and ENGB, along with an ICT3(t) assignment on the park's Cygnet complex. Fire ecologist Becky assisted within the park as HECM, ICT5, FEMO, RXB2, and PSC3 during the season. All members of the program also, at some point, joined the Saguaro fire module as FEMOs to collect weather, fire behavior and smoke data for the Cygnet complex.

Figure 5: Kendra happily on site as a READ for the Yellowstone Blacktail fire.

Figure 6: Tim smiling in New York during a hurricane Sandy assignment.

Plot Work

The fire effects crew visited five Fire Monitoring Handbook (FMH) plots and 27 rapid assessment hazard fuel plots during the 2012 field season. The crew spent a total of three weeks at Grant, visiting 24 hazard fuel plots (HZF monitoring type) which were installed in 2009 to monitor a thinning project. The plots had not been revisited post-thin yet as not all of the piles were burned throughout the area. Three hazard fuel plots (FMECH1T99 monitoring type) were revisited at Canyon to monitor the effects of a 2004 thinning project, and eventually a 2012 thinning project which had not yet started. Four FMH plots within the Norris prescribed burn (FLP01T08 monitoring type) were visited to complete five year post reads, and one FMH plot (FWFRB1T99 monitoring type) located in the remote park area of Deep Creek was visited for a 10 year read. The Deep Creek plot was originally installed to monitor the effects of the 2002 Broad Fire, but never burned, so is therefore treated as a control plot.

Fuels Reduction

The fuels specialist hit the ground running at the end of May, and throughout the summer he spent many hours at Grant and Canyon. With the help of various fire management staff

working 170 hours, a total of 92 piles over 48 acres were restacked, cleaned up, and burned at Grant to improve the existing piles left over from 2009, and to insure successful biomass consumption. Time at Canyon was spent planning and implementing a second entry hazard fuel treatment (manual thinning) into the same two units, totaling 24.1 acres, which were cut in 2004. The Saguaro fire module assisted at Canyon by flagging the units and helping the fire ecologist read three plots. Removal of trees at Canyon began in October, utilizing fire cache personnel. The effort produced firewood, posts, poles, rails, and woodchips for multiple park divisions before weather ended the season. The Canyon project will continue into the 2013 field season. In addition to running between the Grant and Canyon developed areas, several fire cache personnel assisted the fuels program by burning four large slash/debris piles located at gravel pits throughout the park. The fire ecologist and fuels specialist also spent many hours during the summer supporting and helping the Saguaro Fire Module complete 662, out of 1945 total, structure assessments throughout the park.

Table 1. Fire Effects Plot Workload (2012) and Total Plots Installed

Park	Monitoring Unit	Plot Type	Pre-burn /Precut 2012	Control (unburned /uncut) 2012	Imm. Post 2012	Postburn/ Postcut (1-20 yrs) 2012	Annual Total 2012	Total Plots
Yellowstone National Park	FLP01T08 (Lodgepole regeneration)	FMH forest	-	1	-	3	**4**	**4**
	FWFRB1T99 (Wildland Fire for Resource Benefits)	FMH forest	-	1	-	-	**1**	**19**
	FMICO1T10 (Mixed Conifer)	FMH forest	-	-	-	-	**-**	**6**
	Hazard Fuel Treatments	Photo point	-	-	-	-	**-**	**74**
	HZF (Grant fuel treatment and all future treatments)	Rapid assessment radial WUI	-	8*	-	16*	**24***	**24***
	FMECH1T99 (Hazard Fuel Treatments 2002-2005)	Rapid assessment radial WUI	-	-	-	3	**3**	**69**
	Despain	Pre-FMH natural fire veg. and fuel	-	-	-	-	-	**16**
Little Bighorn Battlefield NM	No fire effects monitoring plots are currently installed at LIBI; a Fire Management Plan and Monitoring Plan need to be completed first.			-	-	-	-	**0**
Total				**10**		**22**	**32**	**212**

* Pilot sampling plots

Table 2. Fire Ecology Staffing 2012

Ecologist, Fuels Specialist and Monitors	Starting Date	Ending Date	# of Pay Periods	READ Qualified (Yes or No)	Training and Development
Becky Smith	1/1/12	12/31/12	26	No	S-215, Type 3 Plans Section Chief Class (FEMA L-962 NIMS ICS All Hazards Planning Section Chief), M-410, NSC Defensive Driving II, HAZWOPER, Bloodborne Pathogens, 11th Biennial Scientific Conference on the GYE
Bill Mayer	EOD 5/20/2012	12/31/12	16	No	ONE DOI supervisory training, 2012 FISSA+, NSC Defensive Driving II, Radio training, Supervisory Ethics, HAZWOPER, Bloodborne Pathogens, Pay & Leave for Supervisors, Merit System Principle, Managing Employee Performance, Leveraging Diversity, Conduct & Performance-based Actions, No FEAR Act, Bison Connect, ICT3(T) assignment, Snowmobile Training, 11th Biennial Scientific Conference on the GYE
Jess Page	3/26/2012	12/01/12	19	No	RX-410, S-215, CPR, WFR recertification, S-490 coach, ENGB(t) assignment, FIRB(t) assignment, ONE DOI supervisory training, HMGB taskbook completed, NSC Defensive Driving II, HAZWOPER, Bloodborne Pathogens, 11th Biennial Scientific Conference on the GYE
Kendra Graff	5/7/2012	10/25/2012	12.5	Yes	S-270/271, CPR, READ assignment, BAER team assignment, ICT5(t) assignment, NSC Defensive Driving II, HAZWOPER, Bloodborne Pathogens
Tim Pankey	5/7/2012	11/26/2012	15.5	No	CPR, FFT1(t) assignments, FEMO(t) assignment, ICT5(t) assignment NSC Defensive Driving II, HAZWOPER, Bloodborne Pathogens

B. 2012 Management Objectives and Monitoring Results

Grant Hazard Fuel Project (HZF Monitoring Type)

The Grant hazard fuel project is a 48 acre wildland urban interface project; mechanical and manual thinning started in 2009, and pile burning was completed in 2012. The treatment consisted of four zones: Zone 1 (0-30' from structure), Zone 2 (31-120' from structure), Zone 3 (121-300' from structure), and Zone 4 (>300 from structure). All woody vegetation was removed from Zone 1, Zone 2 and 3 were thinned, and Zone 4 represented an area where the canopy was feathered for aesthetic and purposes. Twenty four plots were installed in the treatment area, with eight plots each in Zones 2, 3 and 4. All Grant plots are pilot sampling plots, with point intercept and daubenmire vegetation transects completed at each plot to compare protocols.

The original treatment plan called for an initial mechanical and manual treatment, followed by a prescribed burn treatment. The prescribed burn has been removed from the plan, but follow up mechanical/manual treatments will be conducted in this area. Previous experiences of Yellowstone's fire managers have shown lodgepole pine forests need to be thinned slowly to prevent blowdown due to the tree's shallow root systems, therefore it is anticipated thinning will take place periodically at Grant over the next ten years before the project is complete.

Tree density and fuel reduction results are mean percent reduction from pre-treatment to three years post-treatment. Non-native vegetation results are mean percent reduction from pre-treatment to three years post-treatment using Daubenmire transect data; a more in depth analysis of the Daubenmire versus point intercept vegetation transect data will follow at a later date. In 2009, objectives for the HZF monitoring type were written to include a minimum average crown spacing of 20 feet, which is difficult to monitor efficiently and accurately. Because of this, monitoring focused on tree densities and canopy bulk density measurements rather than actual crown spacing. Currently, the Yellowstone fire ecology program is using 40 g/m^3 (0.0025 lb/ft^3) as a critical canopy bulk density per the FMECH1T99 FMH-4, but more research using Yellowstone's extensive weather and fuel moisture data is warranted to determine if this number is realistic and useful within the park. Scott (2003) suggests 100 g/m^3 (0.0062 lb/ft^3) as a critical canopy bulk density for horizontal propagation of crown fire; this number is also included on the graphs to depict the goal of slowly thinning lodgepole forests. Canopy bulk density results are also mean percent reduction from pre-treatment to three years post-treatment. An underlined number of plots indicate the minimum sample size has been attained for the objective.

Table 3. Grant HZF Tree Density Monitoring Results

Monitoring Unit	Management Objective (Hazard Fuel Reduction)	Monitoring Results (80% confidence interval)	Objective Achieved?	Year Analysis Completed
Grant Fuel Treatment (HZF)	Establish live canopy spacing within 300' (Zone 2 and Zone 3) of structures to an average of 20' spacing between crowns; using tree density as a measure.	Zone 2 PRE: 2112 (± 362) trees/acre Zone 2 01YR03: 1432 (±511) trees/acre **Reduction of 32.2%** *(n=8 plots, 1 treatment)*	Not yet, but difficult to measure	2012 (2009-2012)
		Zone 3 PRE: 2305 (± 722) trees/acre Zone 3 01YR03: 2246 (±1071) trees/acre **Reduction of 2.5%** *(n=8 plots, 1 treatment)*	Not yet, but difficult to measure	
		Zone 4 PRE: 2324 (± 654) trees/acre Zone 4 01YR03: 2241 (±512) trees/acre **Reduction of 3.6%** *(n=8 plots, 1 treatment)*	Not included in objective	

Table 4. Grant HZF Canopy Bulk Density Monitoring Results

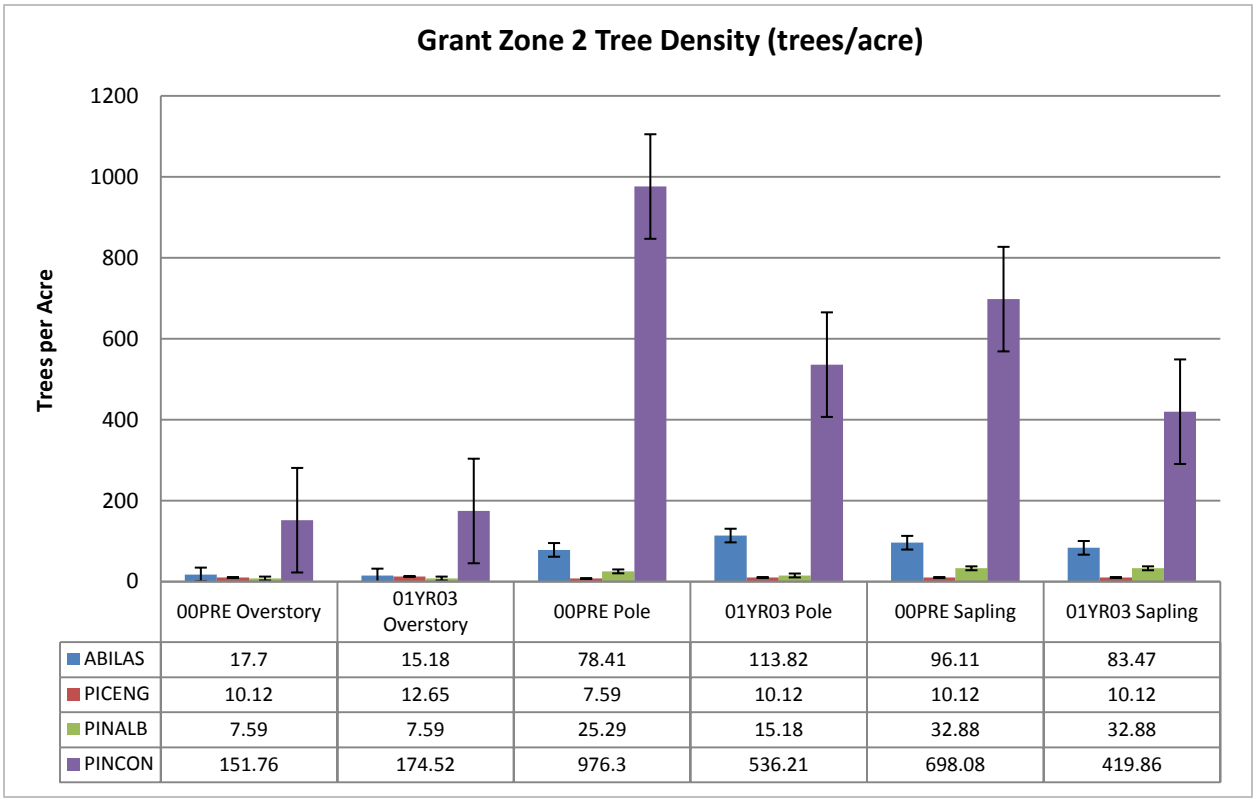
Monitoring Unit	Management Objective (Hazard Fuel Reduction)	Monitoring Results (80% confidence interval)	Objective Achieved?	Year Analysis Completed
Grant Fuel Treatment (HZF)	Establish live canopy spacing within 300' (Zone 2 and Zone 3) of structures to an average of 20' spacing between crowns; using segmental canopy bulk density as a measure.	Zone 2 PRE: 0.0076 (±0.0011) lb/ft^3 Zone 2 01YR03: 0.0065 (±0.0010) lb/ft^3 **Reduction of 14.6%** Critical canopy bulk density: 0.0025 lb/ft^3 *(n=8 plots, 1 treatment)*	No	2012 (2009-2012)
		Zone 3 PRE: 0.0067 (±0.0013)lb/ft^3 Zone 3 01YR03: 0.0082 (±0.0023) lb/ft^3 **Increase of 22.9%** Critical canopy bulk density: 0.0025 lb/ft^3 *(n=8 plots, 1 treatment)*	No	
		Zone 4 PRE: 0.0075 (±0.0017) lb/ft^3 Zone 4 01YR03: 0.0073 (±0.0017) lb/ft^3 **Decrease of 2.7%** Critical canopy bulk density: 0.0025 *(n=8 plots, 1 treatment)*	Not included in objective	

Table 5. Grant HZF Surface Fuel Monitoring Results

Monitoring Unit	Management Objective (Hazard Fuel Reduction)	Monitoring Results (80% confidence interval)	Objective Achieved?	Year Analysis Completed
Grant Fuel Treatment (HZF)	Remove dead and down woody material within 120' (Zone 2) of structures.	Zone 2 PRE: 73.4 (±20.5) tons/acre Zone 2 01YR03: 63.6 (±21.8) tons/acre **Reduction of 13.4%** *(n=8 plots, 1 treatment)*	Yes, but objective not specific	2012 (2009-2012)
		Zone 3 PRE: 77.1 (±13.2) tons/acre Zone 3 01YR03: 78.7 (±14.7) tons/acre **Increase of 2.1%** *(n=8 plots, 1 treatment)*	Not included in objective	
		Zone 4 PRE: 67.0 (±20.0) tons/acre Zone 4 Post: 59.4 (±13.0) tons/acre **Reduction of 11.3%** *(n=8 plots, 1 treatment)*	Not included in objective	

Table 6. Grant HZF Non-Native Species Monitoring Results

Monitoring Unit	Management Objective (Hazard Fuel Reduction)	Monitoring Results (80% confidence interval)	Objective Achieved?	Year Analysis Completed
Grant Fuel Treatment (HZF)	Monitor non-native species, using relative percent cover.	Zone 2 PRE: 0% (±0%) non-native Zone 2 01YR03: 0% (±0%) non-native **Reduction of 0%** *(n=8 plots, 1 treatment)*	Yes, but objective not specific	2012 (2009-2012)
		Zone 3 PRE: 0.2% (±0.35%) non-native Zone 3 01YR03: 0% (±0%) non-native **Reduction of 0%** *(n=8 plots, 1 treatment)*	Yes, but objective not specific and minimum sample size not achieved	
		Zone 4 PRE: 0% (±0%) non-native Zone 4 01YR03: 0% (±0%) non-native **Reduction of 0%** *(n=8 plots, 1 treatment)*	Yes, but objective not specific	



	00PRE Overstory	01YR03 Overstory	00PRE Pole	01YR03 Pole	00PRE Sapling	01YR03 Sapling
ABILAS	17.7	15.18	78.41	113.82	96.11	83.47
PICENG	10.12	12.65	7.59	10.12	10.12	10.12
PINALB	7.59	7.59	25.29	15.18	32.88	32.88
PINCON	151.76	174.52	976.3	536.21	698.08	419.86

Figure 7: Grant Zone 2 tree densities by species, size class and read.

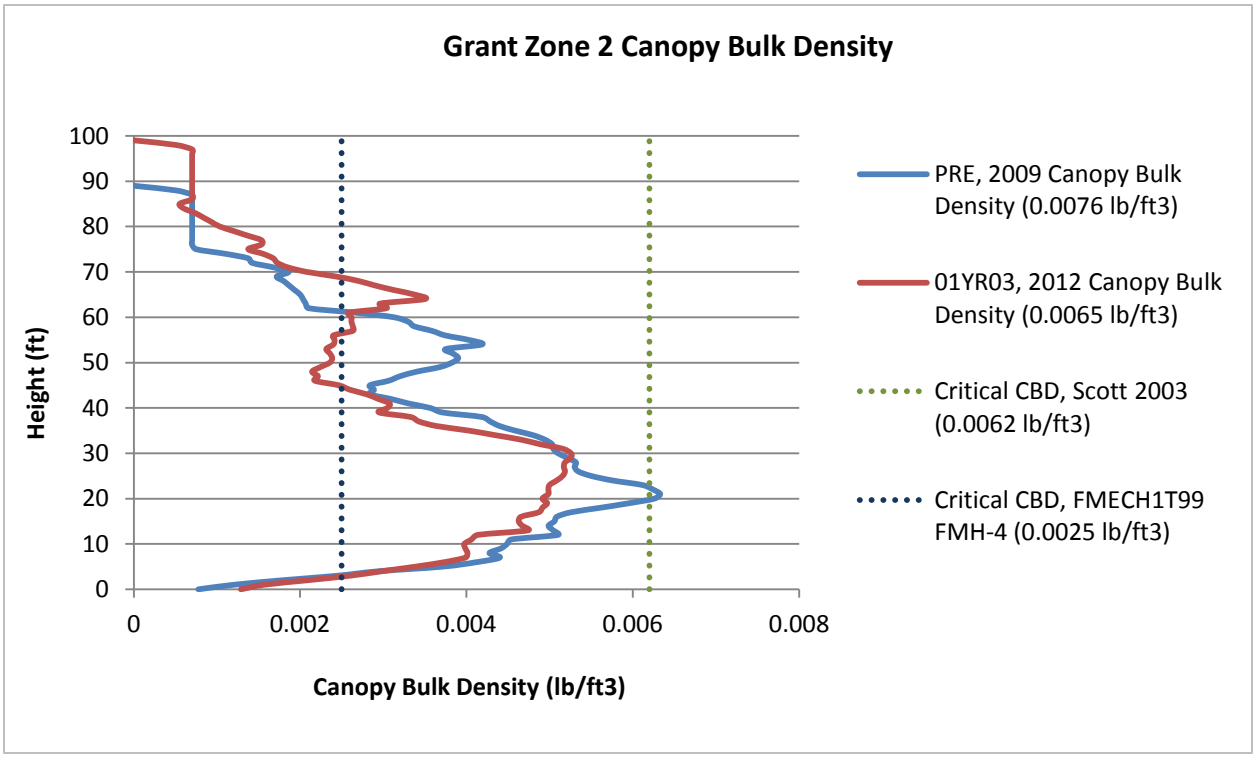
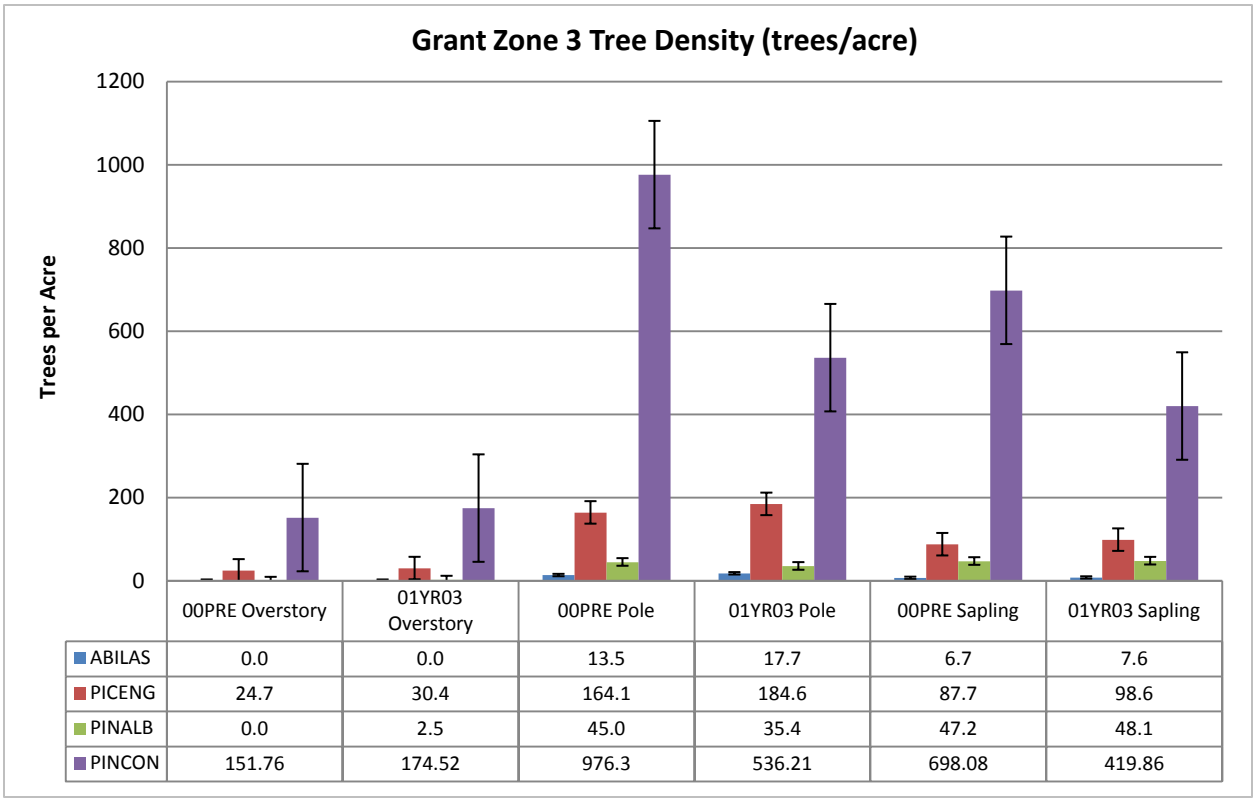


Figure 8: Grant Zone 2 canopy bulk density.



	00PRE Overstory	01YR03 Overstory	00PRE Pole	01YR03 Pole	00PRE Sapling	01YR03 Sapling
ABILAS	0.0	0.0	13.5	17.7	6.7	7.6
PICENG	24.7	30.4	164.1	184.6	87.7	98.6
PINALB	0.0	2.5	45.0	35.4	47.2	48.1
PINCON	151.76	174.52	976.3	536.21	698.08	419.86

Figure 9: Grant Zone 3 tree densities by species, size class and read.

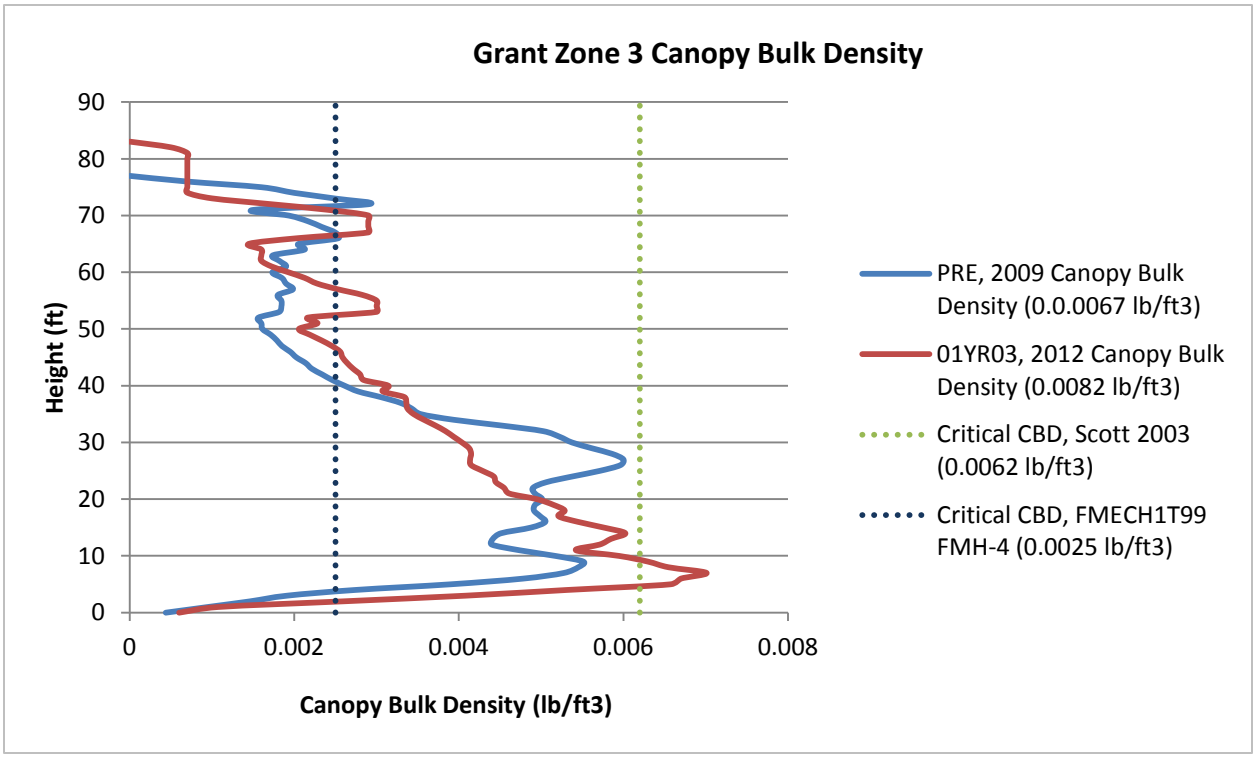
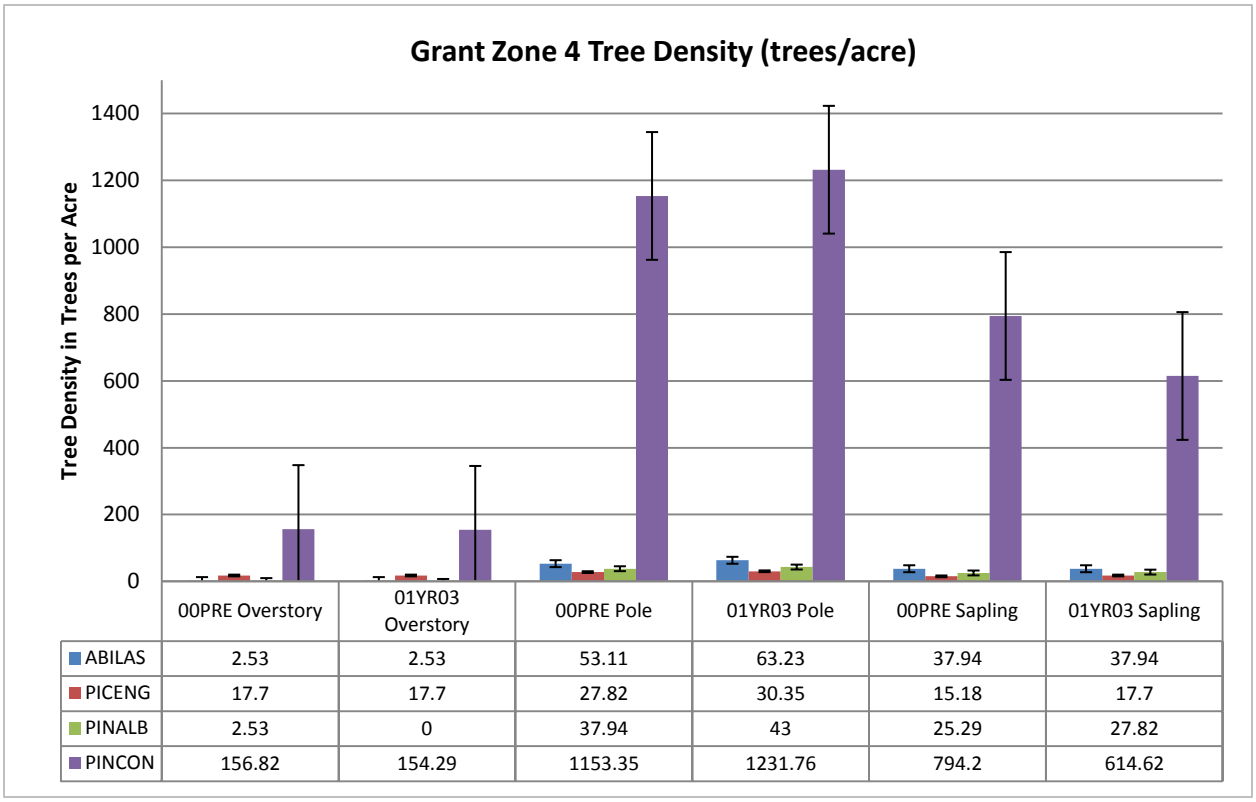


Figure 10: Grant Zone 3 canopy bulk density.



	00PRE Overstory	01YR03 Overstory	00PRE Pole	01YR03 Pole	00PRE Sapling	01YR03 Sapling
ABILAS	2.53	2.53	53.11	63.23	37.94	37.94
PICENG	17.7	17.7	27.82	30.35	15.18	17.7
PINALB	2.53	0	37.94	43	25.29	27.82
PINCON	156.82	154.29	1153.35	1231.76	794.2	614.62

Figure 11: Grant Zone 4 tree densities by species, size class and read.

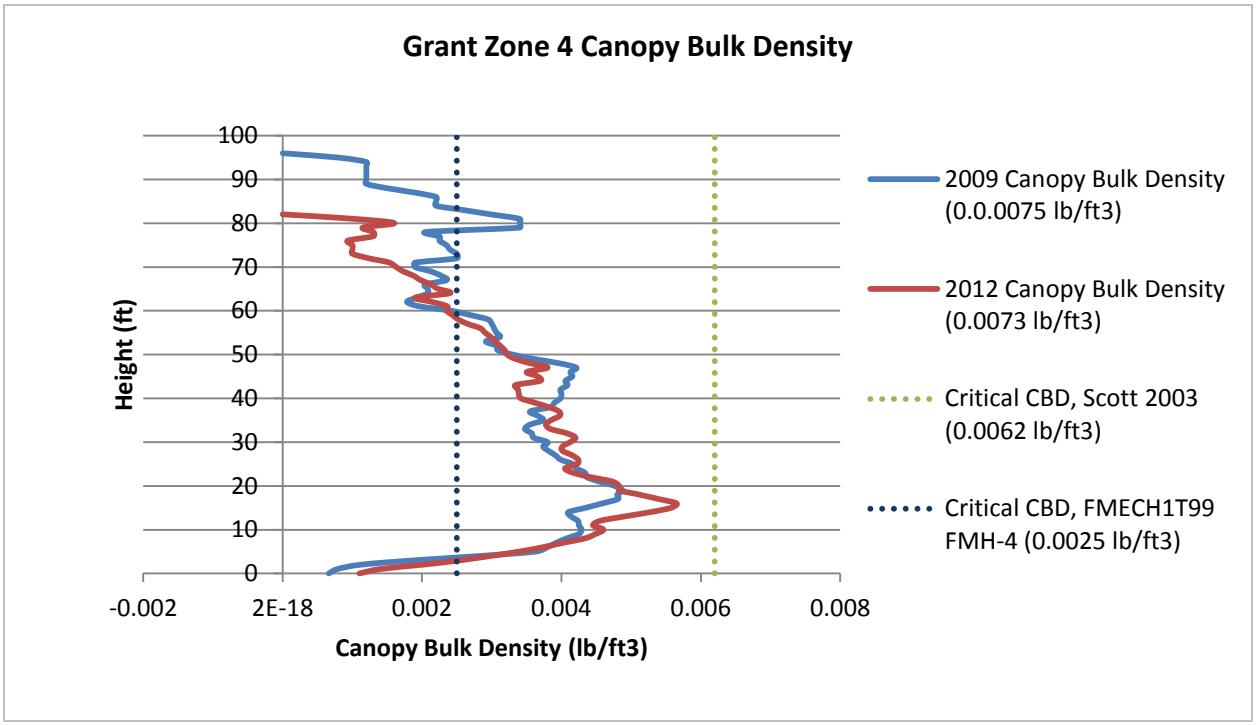


Figure 12: Grant Zone 4 canopy bulk density.

Canyon Hazard Fuel Project (FMECH1T99 Monitoring Type)

The 2004 Canyon hazard fuel project consists of two treatment units, located in the Canyon government housing area, totaling 24.1 acres. The first fuel reduction treatment was conducted in 2004; the second treatment was initiated in the fall of 2012 and will be complete in the fall of 2013. Three plots were installed in 2004 prior to the first entry. The plots are currently in the FMECH1T99 monitoring type, but will be converted to the HZF monitoring type when the next read occurs.

Canopy bulk density, tree density and surface fuel results are mean percent change from pre-treatment through eight years post-treatment. Results do not include the effects of the second entry treatment in 2012. In 2004, objectives for the FMECH1T99 monitoring type were written to include a minimum crown spacing of greater than 20 feet, which is difficult to monitor efficiently and accurately. Because of this, monitoring focused on canopy bulk density rather than actual crown spacing. Currently, the Yellowstone Fire Ecology program is using 40 g/m^3 (0.0025 lb/ft^3) as a critical canopy bulk density based on the FMH-4 written for this monitoring type, but more research is warranted. Scott (2003) suggests 100 g/m^3 (0.0062 lb/ft^3) as a critical canopy bulk density for horizontal propagation of crown fire; this number is also included on the graphs to depict the goal of slowly thinning lodgepole forests. An underlined number of plots indicate the minimum sample size has been attained for the objective.

Table 7. Canyon FMECH1T99 Monitoring Results

Monitoring Unit	Management Objective (Hazard Fuel Reduction)	Monitoring Results (80% confidence interval)	Objective Achieved?	Year Analysis Completed
Canyon Hazard Fuel (FMECH1T99)	Create >20' crown spacing, out to 400' from each structure; using segmental canopy bulk density as a measure.	PRE: 0.0132 (±0.0015) lb/ft^3 01YR08: 0.0111 (±0.0017) lb/ft^3 **Reduction of 15.7%** Critical canopy bulk density: 0.0025 lb/ft^3 *(n=3 plots, 1 treatment)*	No	2012 (2004-2012)
	Reduce ladder fuels (trees <2.5" dbh), out to 400' from each structure.	PRE: 12,561 (±23,098) trees/acre 01YR08: 25,226 (±34,380) trees/acre **Increase of 100.8 %** *(n=3 plots, 1 treatment)*	No	2012 (2004-2012)
	Reduce 1000 hour fuels immediately post-thin* to <10 tons/acre. *The immediate post-thin read was missed; data collected in YR08 were used for this analysis to identify fuel loading within the unit.	PRE: 3.9 (±3.7) tons/acre 01YR08: 9.7 (±2.1) tons/acre **Increase of 146.5%** *(n=3 plots, 1 treatment)*	Unknown due to a missed immediate post-thin read in 2005, but 1000 hr. fuels are currently below objective	2012 (2004-2012)

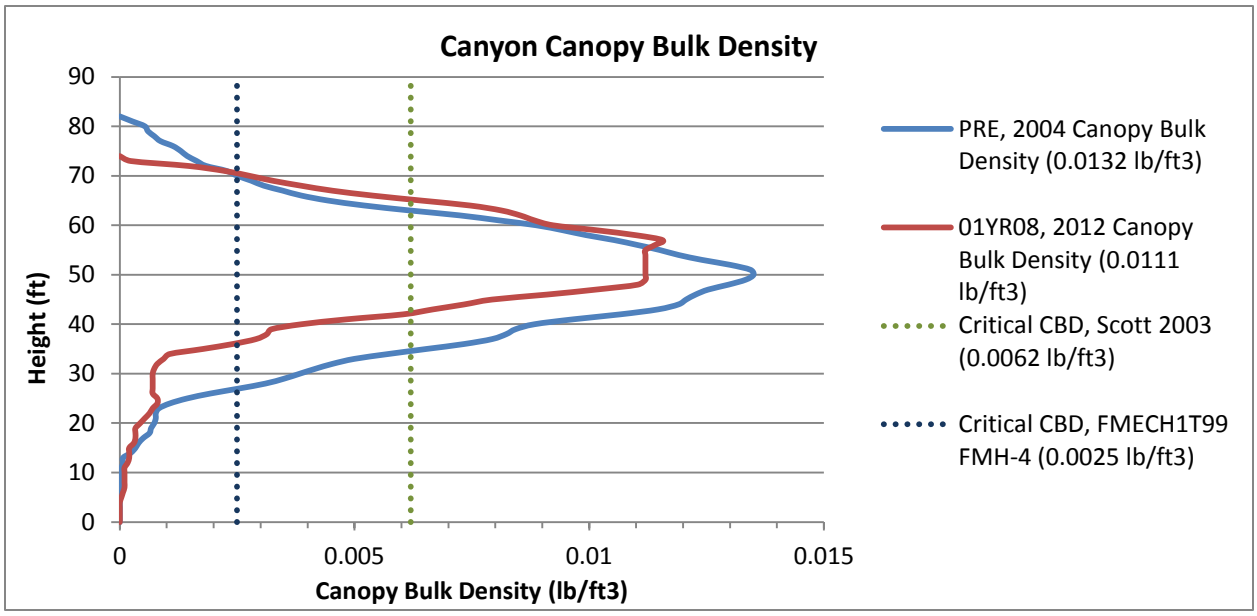


Figure 13: Canyon canopy bulk density before and after first thin treatment.

Norris Prescribed Burn (FLP01T08 Monitoring Type)

The Norris prescribed fire project initiated in 2006 as a 62 acre hazard fuel reduction. Three burn plots, and one control plot, were installed in 2006. The unit consisted of mature and 1988 regeneration lodgepole pine vegetation, and was burned in the fall of 2007.

Non-native species, tree density and surface fuel results are mean percent change from pre-treatment through five years post-treatment. An underlined number of plots indicate the minimum sample size has been attained for the objective.

Table 8. Norris FLP01T08 Non-native Species Monitoring Results

Monitoring Unit	Management Objective (Hazard Fuel Reduction)	Monitoring Results (80% confidence interval)	Objective Achieved?	Year Analysis Completed
Norris Prescribed Burn (FLP01T08)	Monitor non-native vegetation one, two, three*, five and 10 years post-burn; using relative percent cover. *The YR03 read was missed; therefore data collected in YR04 were used for this analysis.	PRE: 2.5% (±4.5%) non-native 01YR01: 4.8% (±5.6%) non-native **Difference from PRE to 01YR01: +94%** *(n=3 plots, 1 treatment)*	Yes, but objective not specific and minimum sample size not achieved	2012 (2006-2012)
		01YR02: 0.8% (±0.9%) non-native **Difference from PRE to 01YR02: -69.4%** *(n=3 plots, 1 treatment)*		
		01YR04: 9.1% (±9.0%) non-native **Difference from PRE to 01YR04: +268%** *(n=3 plots, 1 treatment)*		
		01YR05: 7.8% (±11.7%) non-native **Difference from PRE to 01YR05: +218%** *(n=3 plots, 1 treatment)*		

Table 9. Norris FLP01T08 Tree Density Monitoring Results

Monitoring Unit	Management Objective (Hazard Fuel Reduction)	Monitoring Results (80% confidence interval)	Objective Achieved?	Year Analysis Completed
Norris Prescribed Burn (FLP01T08)	Monitor tree density (live trees ≥1" dbh, in trees/acre) one, two, three*, five and 10 years post-burn. *The YR03 read was missed; therefore data collected in YR04 were used for this analysis.	PRE pole density: 383 (±236.7) trees/acre PRE overstory density: 43 (±76.6) trees/acre PRE total density: 426 trees/acre 01YR01 pole density: 275 (±519) trees/acre 01YR01 overstory density: 0 trees/acre 01YR01 total density: 275 trees/acre **Difference from PRE to 01YR01: -35%** *(n=3 plots, 1 treatment)* 01YR02 pole density: 297 (±559.7) trees/acre 01YR02 overstory density: 0 trees/acre 01YR02 total density: 297 trees/acre **Difference from PRE to 01YR02: -30%** *(n=3 plots, 1 treatment)* 01YR04 pole density: 302 (±569.9) trees/acre 01YR04 overstory density: 0 trees/acre 01YR04 total density: 302 trees/acre **Difference from PRE to 01YR04: -29%** *(n=3 plots, 1 treatment)* 01YR05 pole density: 302 (±569.9) trees/acre 01YR05 overstory density: 0 trees/acre 01YR05 total density: 302 trees/acre **Difference from PRE to 01YR05: -29%** *(n=3 plots, 1 treatment)*	Yes, but objective not specific and minimum sample size not achieved	2012 (2006-2012)

Table 10. Norris FLP01T08 Surface Fuel Monitoring Results

Monitoring Unit	Management Objective (Hazard Fuel Reduction)	Monitoring Results (80% confidence interval)	Objective Achieved?	Year Analysis Completed
Norris Prescribed Burn (FLP01T08)	Monitor surface fuel loading (1-1000 hours, litter, duff) one, two, three*, five and 10 years post-burn. *The YR03 read was missed; therefore data collected in YR04 were used for this analysis.	PRE: 63.9 (±24.3) tons/acre 01YR01: 25.4 (±6.2) tons/acre **Difference from PRE to 01YR01 = -60%** *(n=3 plots, 1 treatment)*	Yes, but objective not specific and minimum sample size not achieved	2012 (2006-2012)
		01YR02: 32.1 (±12.1) tons/acre **Difference from PRE to 01YR02 = -49%** *(n=3 plots, 1 treatment)*		
		01YR04: 29.8 (±14.5) tons/acre **Difference from PRE to 01YR04: -53%** *(n=3 plots, 1 treatment)*		
		01YR05: 30.0 (±16.6) tons/acre **Difference from PRE to 01YR05: -53%** *(n=3 plots, 1 treatment)*		

C. Fire ecologist and Fuels specialist accomplishments and areas of focus

Table 11. Fire Ecologist 2012 Accomplishments/Focus Areas

Category	Percent Time	Accomplishments and/or areas of activities
Planning	41%	• Lead on FMP EA • Assisted with Section 7 and 106 consultation (for FMP EA and 2 hazard fuel projects) • Lead of Fire and Fuels Interdisciplinary Team (IDT) • Stephen's Creek burn plan development • Developed maps and spreadsheets of 1500 structures (almost 80% of the park) for structure assessments
Presentations	1%	• Attended the 11th Biennial Scientific Conference on the Greater Yellowstone Area • Presented limited data to Fire and Fuels IDT
NPS Meetings/ task groups	4%	• Fire and Fuels IDT meetings to plan hazard fuel treatments and development of the FMP EA • Morning staff meetings during fire season
Interagency work	0%	
Wildfire assignments	16%	• T3 Planning Section Chief for the Yellowstone Cygnet Complex • HECM on Blacktail fire • ICT5 on Beaver fire • Made all fire maps or helped coordinate making of fire maps on all park fires • FEMO on Cygnet fire
Rx fire projects	<1%	• Burn boss of Stephen's Creek prescribed burn
Non-fire fuels projects	4%	• Burn pile clean up at Grant • Burning piles at Grant • Flagging Canyon boundaries • Supervised cutting of fencing materials for Ranger Division
Research	<1%	• Assisted with temp sensor deployment for Fire Science Lab • Assisted researchers creating climate change fire model for park through information sharing
Data collection	2%	• Assisted Saguaro module with three rapid assessment radial plot reads at Canyon • Assisted with seven rapid assessment radial plot reads at Grant
Data entry	3%	• Dealt with canopy bulk density numbers in FMA+ • Created plant vouchers for field based identification assistance
Data analysis	10%	• Data analysis for hazard fuel projects and annual regional report
Supervision/Admin	12%	• Hiring PFT fuels specialist • Supervision of fuels specialist and lead fire effects monitor • Payroll, travel authorization/vouchers, purchasing, budget, etc.
Training	5%	• S-215 • Type 3 Plans Section Chief Class (FEMA L-962 NIMS ICS All Hazards Planning Section Chief) • M-410 • NEPA and NHPA/Section 106 • NSC Defensive Driving II, HAZWOPER, Bloodborne Pathogens, FISSA • Helped teach L-280 • Taught two fireline refresher classes • Participation in Blackwater staff ride
Out of park travel	0%	
Miscellaneous	2%	• Personal PT • Coordinator of park physical fitness challenge

Table 12. Fuels Specialist 2012 Accomplishments/Focus Areas

Category	Percent Time	Accomplishments and/or areas of activities
Planning	1%	• Stephens Creek Burn Plan review
Presentations	2%	• 11th Biennial Scientific Conference on the Greater Yellowstone Area
Wildfire assignments	37%	• ICT3(t) • ENGB • TFLD • DIVS(t)
Prescribed fire projects	<1%	• Stephens Creek RX Preparation
Non-fire fuels projects	17%	• Grant fuels repile and burn • Canyon preparation and cutting/chipping • Roadside clearing
Data collection	<1%	• Fuel Moisture sample collection
Supervision/Admin	7%	• Supervision/Duty Officer, payroll, travel authorization/vouchers
Training	10%	• 2011 Discrimination & Whistle-blowing in the Workplace, FISSA+, Google Email & Calendar Essentials, Managing Shared Calendars in Google Apps, Credit Card • Supervisory Skills Workshop, Conduct and Performance Based Actions, Leveraging Diversity, Managing Employee Performance, Merit System Principals, Pay & Leave for Supervisors, Supervisory Ethics • NSC Defensive Driving II, Safety: Bloodborne Pathogens, Safety: First Responder Awareness Level, Radio Training, B3 Aviation Training • Instructed S-212 • Participation in Blackwater staff ride
Miscellaneous	20%	• Temperature sensor placement • Gathering info for morning meetings • Search and rescue • Conference attendance • Leave taken, misc. office work, PT time, and janitorial duties

D. Fire effects crew accomplishments and areas of focus

Table 13. Fire Effects Crew 2012 Accomplishments/Focus Areas

Category	Percent Time	Notes
FMH plots	6%	• 5 FMH forest plot reads
WUI plots	7%	• 24 plots in Grant fuels treatment area, 3 plots in Canyon treatment area
CBI plots	0%	
Other plot work	0%	
Wildfire assignments	17%	• Lead spent 2 weeks as ENGB(t) in SD and NE • One crewmember spent a total of 4 weeks on 2 assignments as: FFT2, FFT1(t), HECM, FEMO(t), ICT5(t) • One crewmember spent 5.5 weeks on 3 assignments as: ICT5(t), READ, FFT1, FFT2 • The whole crew assisted with six fires in park as: FEMO, FFT2, FFT1, FALA, FALB, HMGB(t), ICT5, and READ
Prescribed fire projects	1%	• Lead and one crewmember helped prep and burn a vegetation management research plot (Stephens Creek)
Non-fire fuels projects	12%	• Fuel sampling • Canyon fuels project • Grant fuels project • Cutting trees at Grebe pit to produce fencing material for Ranger Division
Travel out-of-park for plot work	0%	• No out of park travel for plot work
Data entry	7%	• 100% of 2012 data entered and checked as well as finishing any 2011 data checking needs
Data analysis	<2%	• Lead analyzed some of Grant data and created graphs for final report
Supervision/Admin	5%	• Evaluations, payroll, travel authorization/voucher, etc.
Training	8%	• Wildland fire refresher, CPR, Wilderness First Responder recertification • Coach for S-490 • S-215, S-271, S-270, RX-410 • On-line credit card class, FISSA, USERRA, whistleblower in the workplace, blood borne pathogens, Hazwopper, NSC Defensive Driving II class, radio training, B3 aviation training • One DOI supervisory training, supervisory skills workshop, EEO • Participation in Blackwater staff ride
Miscellaneous	35%	• Weather station set up and rehab • NFDRS updates and WIMS configuration • ERC charts • Temperature sensor placement • Gathering info for morning meetings • Search and rescue • Lead attended 11th Biennial Scientific Conference on the Greater Yellowstone Area • Leave taken, misc. office work, PT time, and janitorial duties

E. Additional Program Information

Table 14. Planning - 2012

Park	Does Park have written DFCs? (yes or no)	Date Park-level Monitoring Plan completed (or revised)	Total # of Project- or Community-level Monitoring Plans (not just 2012)	Assisted with how many BAER plans in 2012?
Yellowstone National Park	no	Hopefully after Fire Mgmt. Plan is completed	2	0
Little Bighorn Battlefield National Monument	no	Hopefully after Fire Mgmt. Plan is completed	-	0

Table 15. Monitoring - 2012

Park	% 2012 Data Entered	% 2012 Data Quality Checked	# Prescribed Fires Monitored*	# Non-fire Fuels Treatments Monitored*	# Wildfires Monitored*	# BAER Treatments Monitored*
Yellowstone National Park	100%	100%	1	2	2	0
Little Bighorn Battlefield National Monument	100%	100%	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.

Table 16. Communicating Results - 2012

Park	# of Project Monitoring Reports completed in 2012	# of annual meeting(s) with Park staff	# of formal presentations of results	Do you use Minitab?*
Yellowstone National Park	0	5-8	0	Yes
Little Bighorn Battlefield National Monument	0	1	0	

***** This information will help to assess Minitab multi-user license needs.

Table 17. Research - 2012

Park	Are research needs identified in FMP or Monitoring Plan? (yes or no)	# of Proposals Submitted in 2012	# of Proposals Funded in 2012	# of Research Projects Supported in 2012*	Additional Comments
Yellowstone National Park	No	0	0	2	
Little Bighorn Battlefield National Monument	No	0	0	0	

*****Number of funded research projects, new or ongoing, supported by the fire ecology program including logistical info or support, staffing, etc.

F. 2013 Direction

The Yellowstone Fire Ecology program has come a long way during the last year, but is still working out kinks that sometimes come with staff transitions. The fire ecology program added a fuels specialist in 2012; many hours were spent getting Bill familiar with not only Yellowstone, but the Park Service in general. With his position being vacant for the last three years, many more hours were spent cleaning up previous WUI projects, planning future projects, taking time to form relationships with various other divisions throughout the park, and learning the many other duties of his job (e.g. NFPORS and cache manager to name a few). With almost a year under his belt it is anticipated the fuel program will become more efficient and accomplishments will continue to increase into the future.

The Fire Management Plan Environmental Assessment should be complete by March of 2013, which will pave the way for a new Fire Management Plan to be completed before the 2013 field season. Once these documents are finished the fire ecologist will have more time to complete a Fire Monitoring Plan and to clean up the various fire effects data collected over the past 25 years.

Throughout all of the previous years' transitions, the lead fire effects, Jess Page, has been the steady member of the fire ecology program. Jess has now been in the position for five years, and her institutional knowledge is invaluable. She juggles the fire weather station network, NFDRS data, fuel moisture monitoring program, and the fire effects monitoring program gracefully and with minimal help. It is hopeful the fire ecologist and fuels specialist will soon be up to speed and able to assist her with some of these duties.

During the upcoming year it is anticipated the fire effects crew will focus on WUI project monitoring. Clear and measurable objectives will be defined in each WUI project's plan, which will direct monitoring activities. Multiple 10 year reads will be completed on WUI plots installed in previous treatments to help determine how long a treatment may be effective, and when a second or third entry is needed. FMH plots will be visited only opportunistically during 2013, as most are located deep within the backcountry and have no measurable objectives. 2013 will also bring a major push to clean up the program's FFI database. A huge thanks to MaryBeth Keifer and John Caratti who have organized and implemented the task of converting and adding Yellowstone's many outdated access databases/excel spreadsheets into FFI. It is anticipated by the end of 2013 all data will be in FFI, and the goal is to have all of it quality checked and cleaned by the end of the year. Once all data are clean, the process can begin of analyzing it to determine what data are usable and useful to the program.

In the face of shrinking budgets, and less positions and money to complete everything from daily job tasks to training, fire ecology staff will continue to try to be useful to the Yellowstone fire program by being 'multiuse tools'. This means not only collecting fire effects data, but running chainsaws for WUI projects, responding to fires within the park, and augmenting the engine or helitack crew for out of park assignments.

G. Optional Information

Time lapse plot photos to show effects of manual and prescribed burn WUI projects.

Figure 14: Grant Zone 2, plot 5, pre-cut photo.

Figure 15: Grant Zone 2, plot 5, three years post-cut photo.

Figure 16: Canyon plot 7, pre-cut photo.

Figure 17: Canyon plot 7, eight years post-cut photo.

H. Literature Cited

Scott, Joe H. 2003. Canopy Fuel Treatment Standards for the Wildland-Urban Interface. In: Omi, Philip N.; Joyce, Linda A., ed.; Fire, fuel treatments, and ecological restoration: Conference proceedings; 2002 April 16-18; Fort Collins, CO. RMRS-P-29: 29-37.