

**Teton Interagency Fire
Fire Ecology Annual Report
Calendar Year 2007**



Summary

The 2007 field season proved the busiest yet for the Teton Interagency Fire Effects Crew. A total of 29 projects were monitored by the crew throughout western Wyoming; in Grand Teton NP, Bridger-Teton NF, Bighorn Canyon NRA, and Fossil Butte NM. Diane Abendroth led this busy 9th season of the interagency fire ecology program as the Lead Fire Effects Monitor (GS-8), assisted by Kate Cueno, seasonal Crew Lead (GS-6). The crew was comprised of returnee, Cynthia Malleck and new members River-Joy Osborn, Katie Brandt, and Sam Coffin (all GS-5). The third crew member position was shared by Cynthia, who had a short season, and Sam, who spent 4+ pay periods as the research assistant for Joel Silverman's NASA-funded project on using dNBR burn severity maps to predict invasive species in the park. The fire effects crew benefited greatly from monitoring assistance from a variety of colleagues from Wyoming Game & Fish, the Teton Interagency Fuels Crew, Teton Interagency Engine 3, Grand Teton's Youth Conservation Program, various Grand Teton and Bridger-Teton fire personnel, and one Australian volunteer. Specifically, the crew owes thanks to: Jill Miller, Jared Rogerson, Eric Maichek, and Steve Kilpatrick (WYG&F); Deb Flowers and the Fuels Crew; Wayne Petch, Anthony Rojo, Jon White, and the Engine 3 crew; Dwayne Gibbons and the Engine 331 crew; Colin Maxwell, Ed Hencelt, and Joe Leech (Aussie volunteer). The fire effects crew could not have completed the monitoring workload of 2007 without all of the valuable assistance!

The project-level monitoring approach used for Teton Interagency Fire means a complicated schedule, and constant coordination with the many individuals who are involved. The projects have varied objectives and vegetation types, so the timing of rereads is different, and must be tracked over the years. Some objectives call for rereads as many as 20 years into the future. Every project has a monitoring plan that outlines how

each objective will be measured, and an instruction sheet that gives detailed protocols, datasheets, GPS locations, and a reread schedule.

The Teton Interagency Fuels and Fire Effects Monitoring Plan is out for review in draft form. This document describes the project level approach, the variety of protocols used, and how the program is organized. It will become an appendix to the Fire Management Plan.

Summary reports are completed for each project where data is collected in a given year. These reports go into the files, and are attached in the appendix. After five years post treatment, a comprehensive report is provided. In 2007, fire effects meetings were held with each zone of the BTNF, GTNP, and BICA to go over the results from the previous year's monitoring and discuss upcoming projects. A diverse group of fire and resource managers as well as agency leaders participated. These provided a great opportunity to share ideas and plan for field activities.



2007 was also a busy fire year with several large fires on the BTNF, and in the Great Basin Region. The crew juggled fire assignments along with plot work and traveled fire ready at all times. Gear management became difficult for a total of six individuals with field gear, fire gear, red bags, tools, camping equipment, food, and water.

Fortunately, the crew vehicle spawned a roof pod, which successfully contained red bags and firefighting tools, making travel much safer and more manageable.

Table 1. Projects currently being tracked by the Interagency Fire Effects Crew

Unit	Total Projects Being Monitored Over Time	Projects with Post Burn Monitoring in 2007	Project with New Pre-Treatment Implementation 2007
Grand Teton NP	19	8	2
BTNF North Zone	7	1	4
BTNF East Zone	15	5	4
BTNF West Zone	9	1	1
Fossil Butte NM	1	1	0
Bighorn Canyon NRA	4	1	1
Total	55	14	15

Table 2. Fire Effects Plot Workload 2007

Unit	Project & veg type	Types of Plots	Pre- burn	Immed. Post	Postburn (1-20 yrs)	Total Plots
Grand Teton NP	Wolff Ridge Aspen Sagebrush	Aspen density circles & browse FMH brush plots			X X	1 6
Grand Teton NP	Kelly Sagebrush	FMH brush plots			X	4
Grand Teton NP	Elbo East & West Smooth brome	FMH brush plots			X	12
Grand Teton NP	Lost Creek Sagebrush	FMH brush plots photopoints			X X	6 7
Grand Teton NP	Eynon Ridge Douglas Fir	Stand exams & sightability board Browns transects Photopoints			X X X	2 2 11
Grand Teton NP	Bar-BC Sagebrush	Photopoints		X		3
Grand Teton NP	Death Canyon Phase II Mechanical thin	Stand exams & sightability board Browns transects Photopoints	X X X			1 1 1
Grand Teton NP	Ditch Creek Mechanical thin	Stand exams & sightability board Browns transects Photopoints	X X X			1 1 1
Grand Teton NP	Jenny Lake Mechanical thin	Stand exams & sightability board Browns transects Photopoints			X X X	1 1 2
Grand Teton NP	Lizard Creek Mechanical thin	Stand exams & sightability board Browns transects Photopoints			X X X	1 1 1
Fossil Butte NM	Rock Creek Sagebrush Mtn Shrub	FMH brush plots, modified Photopoints			X X	6 9
Bighorn Canyon NRA	East Trail Creek Juniper	FMH brush plots, modified Photopoints			X X	4 4
Bighorn Canyon NRA	Barry's Island – Chain Canyon	FMH brush plots, modified Photopoints	X X			5 5
Bridger-Teton NF North Zone	Lower Gros Ventre, units J & K Limber pine Mixed conifer various	Photopoints (all other pre data collected 2006)	X			3
Bridger-Teton NF North Zone	South Burro Hill Sagebrush	Sage density circles Cover & Composition plots Photopoints	X X X	X		1 2 3
Bridger-Teton NF North Zone	NE Quad Aspen Douglas fir	Aspen density circles Photopoints	X X			1 3
Bridger-Teton NF North Zone	SW Dry Quad Aspen Douglas fir	Aspen density circles Photopoints	X X			1 6

Bridger-Teton NF North Zone	Diamond L Aspen	Aspen density circles & browse Photopoints			X X	
Bridger-Teton NF East Zone	Monument Ridge Sagebrush	Sage density circles Ground cover transects Cover & Composition plots			X X X	2 1 1
Bridger-Teton NF East Zone	Willow Creek Rim Aspen	Aspen density circles & browse Photopoints			X X	1 3
Bridger-Teton NF East Zone	Wood Draw Willow Aspen	Willow transects Photopoints	X X	X X	X	1 3
Bridger-Teton NF East Zone	Maki Creek Aspen Sagebrush	BFH sagebrush macroplots Photopoints (all other pre data collected 2006)	X X			2 2
Bridger-Teton NF East Zone	Chicken Creek Aspen Sagebrush	Aspen density circles & browse Ground cover transects Photopoints	X X X			1 1 3
Bridger-Teton NF East Zone	Cottonwood II Aspen	Aspen density circles & browse Photopoints	X X			2 2
Bridger-Teton NF East Zone	Half Moon Sagebrush	BFH sagebrush macroplots Photopoints			X X	2 2
Bridger-Teton NF East Zone	Boulder Ridge Sagebrush	BFH sagebrush macroplots Photopoints			X X	3 3
Bridger-Teton NF East Zone	Jim Creek WFU	CBI burn severity plots			X	13
Bridger-Teton NF West Zone	Weiner Creek Aspen	Photopoints Aspen density circles & browse		X		4
Bridger-Teton NF West Zone	Lower Cottonwood Bitterbrush-Sage Juniper Mtn. Mahogany	Juniper density circles Shrub cover transects Mtn mahogany density circles Photopoints	X X X X			1 1 1 4
Total	29 projects	Photopoints All other plots				179

Table 3. Fire Ecology Staffing 2007

Monitor	Starting Date	Ending Date	# of Pay Periods	Training and Development
Diane Abendroth GS 8 Fire Effects Monitor	n/a	n/a	26	Completed graduate school coursework at CSU, ICT5 Taskbook, Coordinated S290 and S131
Kate Cueno GS 6 (seasonal) Fire Effects Crew Lead	Jan 7 May 14 Nov 26	May 11 Nov 14 Dec 31	7 (BTNF) 13 (GTNP) 2.5 (BTNF) 22.5 total	S212, S133, S131, S490, FFT1/ICT5 taskbook opened, FALA
River-Joy Osborn GS 5 Fire Effects Crew Member	May 14	Nov 9	11	S290, S133, Initiated FEMO taskbook
Katie Brandt GS 5 Fire Effects Crew Member	May 29	Oct 26	9	S271, S131, S133, HECM taskbook opened, FFT1/ICT5 taskbook opened
Cynthia Malleck GS 5 Fire Effects Crew Member	June 11	Aug 9	4.5	S290
Sam Coffin GS5 Fire Effects Crew Member*	May 21 Aug 13	June 1 Oct 12	6	S133; *shared 3 rd crew member position with C. Malleck; Spent 4.5 PPs primarily as a research assistant.

Table 4. Management Objectives and Monitoring Results 2006

For each project, monitoring is conducted to ensure adequate sample sizes to allow 80% statistical significance determinations for all variables that have specific stated objectives. In some cases data is collected for additional variables without this standard. Table 4 gives a summary of the objectives and results for projects for which data was analyzed in 2006. Detailed reports with narrative information and results interpretation are provided for each of these projects in the appendix.

Unit	Project	Objective Monitored in 2007	Analysis (BOLD = 80% statistically significant difference)	Objective Achieved?
Grand Teton NP	Wolff Ridge	<u>Sagebrush:</u> - Increase percent cover of native grasses by at least 25% in burned shrub fields within 2 years post burn. - Remove 40-60% of live sage cover within the burn area. <u>Aspen:</u> - Increase aspen seedling density per acre by at least 30% two years post burn - Recruit pole sized aspen density of at least 2000 stems per acre ten years post burn	-Grass and forb cover not significantly different . - Live mature sagebrush is reduced from pre burn by 71% in year 5. - Sagebrush cover is unchanged from year 2. - Live aspen suckers per acre: 5224 – 8094 . - 594 +/- 143 live aspen suckers over 2 meters tall in year 5.	No Yes Yes Probably in Year 10

Grand Teton NP	Kelly	-Reduce total live sagebrush cover by at least 60% in the burned portion within one year post burn -Increase native forbs species diversity and percent cover by 25% 2 years post burn.	-Sagebrush cover reduced by 31% in year 5. -Sagebrush density not significantly reduced - Native forb cover reduced by 25% in year 5. - Species richness unchanged in year 5.	Yes No No
Grand Teton NP	Elbo East & West	-Increase percent cover of native grasses by at least 25% in burned areas within 2 years post burn. - Increase percent cover of native forbs by at least 25% in burned areas within 2 years post burn. - Increase percent cover of native shrubs by at least 10% in burned areas within 2 years post burn	- Native grasses were mostly absent from monitoring plots pre burn – year 5. - No significant difference in native forb cover pre to post burn. - Native shrubs were too sparse for adequate sampling using FMH brush plots. A non-significant reduction was measured.	Unknown No No
Grand Teton NP	Lost Creek	-Increase percent cover of native grasses by 25%	No significant difference between burned and control plots	No
Grand Teton NP	Eynon Ridge	Conifer mortality in Douglas Fir Stands Simulated fire behavior parameters	Lower percent of conifer mortality than desired Reduced fire behavior, specifically probability of torching smoke production, and predicted mortality.	No Yes
Grand Teton NP	Bar-BC	-remove 60-90% of live sage cover -increase native grasses by 25% in burned shrub areas	-ocular estimates by burn boss, FEMO and aerial photos -3 species of non-native grasses present in estimated cover of 15-30%	No n/a
Fossil Butte NM	Rock Creek	-Treat 30-60% of burn unit on BLM and 25-35% on FOBU. -Regenerate 70% of snowberry & serviceberry at yr02 and 50% of bitterbrush. -Regenerate 1000 stems/acre sagebrush at yr05	-Ocular estimates by burn boss, FEMOs indicate both met. -In yr02: 55% recovery of pre-burn snowberry cover, 62% recovery of serviceberry density, and 600% increase in bitterbrush cover. -Yr02 sagebrush density of 1225 +/- 727 and 29% recovery of sagebrush cover.	Yes No & Yes TBD, on track
Bighorn Canyon NRA	East Trail Creek	- Increase horizontal visibility to 70-90% as measured by a Sightability board in vegetation greater than 32” in height within targeted fuels.	-In year 2: No significant difference in shrub density or cover. Significant increase in forb cover (7.5 fold).	No
Bighorn Canyon NRA	Barry’s Island-Chain Canyon	- Burn in a mosaic pattern between 4 70% of the targeted acreage, to be measured immediately post burn. -Achieve 70-90% juniper mortality in dense stands across the unit immediately post burn	-Installed 5 plots. Live juniper cover 28.8% +/- 4.2 . Live mature juniper density 728/acre +/- 215.	Pre-burn
Bridger-Teton NF North Zone	Lower Gros Ventre, units J & K	-avoid limber pine mortality of trees > 16 in. dbh.	-delineation of limber pine stands through mapping; installed 3 limber pine photopoints	Pre-burn
Bridger-Teton NF North Zone	South Burro Hill	-immediate post burn severity of 3 or less -reduce live sagebrush density by 50% at yr01	-imm-post burn severity of vegetation = 3.3 +/- 0.3 & substrate = 4.0 +/- 0.2 -pre-burn sage density is 9693 +/- 1647	No

		-increase native forb/grass cover by $\geq 25\%$ by yr01	-pre burn estimated native forb cover is 10%; native grass cover is 30%	Pre-burn
Bridger-Teton NF North Zone	NE Quad	-50-80%overstory aspen and $\geq 85\%$ total conifer mortality 1-2 yrs post-burn -2000-5000 aspen stems/acre >6 ft. tall in 3 years (add'l for 15yrs)	Pre-burn densities: - 14 +/- 7 overstory aspen stems / acre; 129 +/- 30 conifer stems / acre - 923 +/- 166 aspen suckers/acre	Pre-burn
Bridger-Teton NF North Zone	SW Dry Quad	-50-80%overstory aspen and $\geq 85\%$ total conifer mortality 1-2 yrs post-burn -2000-5000 aspen stems/acre >6 ft. tall in 3 years (add'l for 15yrs)	Pre-burn densities: - 29 +/- 12 overstory aspen stems / acre; 310 +/- 67 conifer stems / acre - 1169 +/- 227 aspen suckers/acre	Pre-burn
Bridger-Teton NF North Zone	Diamond L	-Kill 50-80% of the overstory aspen trees (over 5.9" dbh) and 85% of conifers in the identified stands. -Regenerate 2000-5000 live stems per acre over 10 feet in height within 15 years post fire. - Maintain less than 20% bare soil within 5 years post fire.	- No significant difference in overstory aspen or conifer density - Two stands show promising regeneration: JIHI3 57% increase in sucker density to 5085 +/- 862 . JIHI4 increased 86% to 6897 +/- 901 . JIHI 5 had no significant difference but sucker density is 6747 +/- 1611 stems / acre. - Bare soil less than 1% in year 2.	Unknown Unknown Yes
Bridger-Teton NF East Zone	Monument Ridge	- Burn 30-60% of the sagebrush communities having >15% canopy cover in a mosaic pattern within the project area. - Attain $\geq 80\%$ mortality of sagebrush in burned areas by 1 years post burn. - Attain 60% ground cover in sage/grass communities after the second growing season post-burn and 80% ground cover after the fifth growing season post-burn.	40-50% blackened Mountain big sagebrush 92% reduced 1 year Post burn ground cover 63%	Yes Yes Yes
Bridger-Teton NF East Zone	Willow Creek Rim	-Treat 30-50% sagebrush with canopy cover >15% canopy cover -recover 60% ground cover in 2 yrs and 80% in 5 yrs -1000 stems/acre aspen suckers ≥ 10 ft. tall in 15 yrs post burn	-not measured (hard to measure & very little sagebrush in unit) -yr02 ground cover: 89% +/- 6% -yr02 aspen sucker density: 1187 +/- 2043 stems/acre, 77% under 3 ft. tall	Unk Yes TBD, on-track
Bridger-Teton NF East Zone	Wood Draw	-attain willow height $\geq$ pre-burn within 10 yrs post burn -attain 30% increase in proportion of live to dead willow stems in 3 yrs post burn		Pre-burn & TBD
Bridger-Teton NF East Zone	Maki Creek	-maintain/increase ground cover to 60% at yr02 and 80% at yr05 post burn in Mtn. Big Sage communities -decrease density of sage in mature/decadent age classes by 40-60% yr01 post burn.		Pre-burn
Bridger-Teton NF East Zone	Chicken Creek	(Draft Monitoring Plan...) -Treat 30-50% sagebrush -recover 60% ground cover in 2 yrs and 80% in 5 yrs	-Pre-burn ground cover: 79% +/-5%	Pre-burn

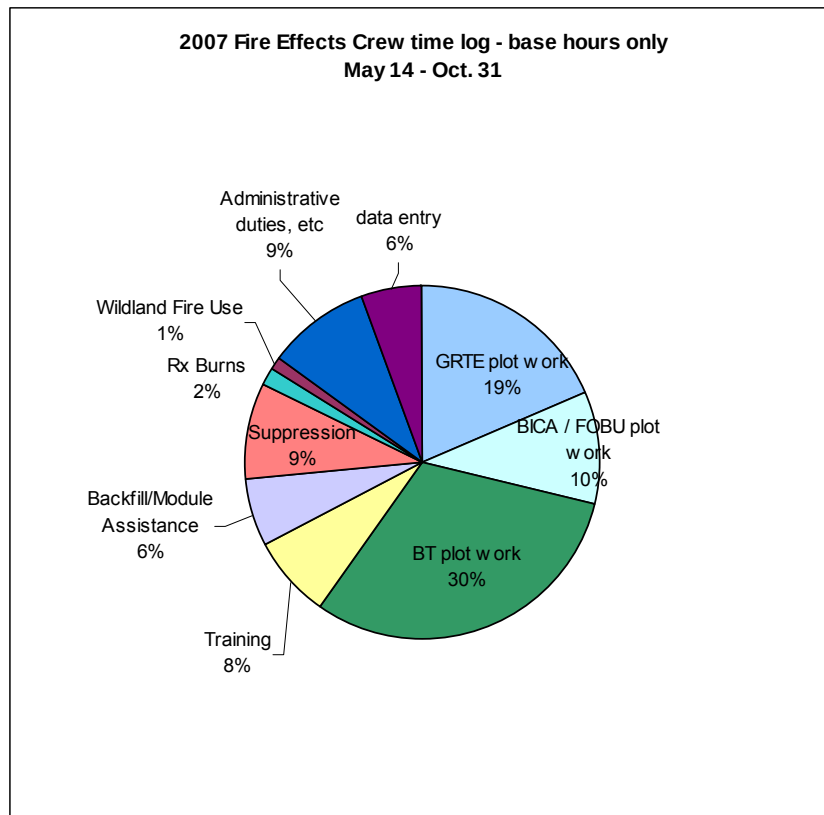
		-1000 stems/acre aspen suckers ≥10 ft. tall in 15 yrs post burn	-Pre-burn aspen sucker density: 2818 +/- 509 stems/acre, 80% 1-6 ft. tall	
Bridger-Teton NF East Zone	Cottonwood II	(Draft Monitoring Plan...) -1000 stems/acre aspen suckers ≥10 ft. tall in 10-15 yrs post burn	-Pre-burn aspen sucker density in stand 1 = 2512 +/- 557, in stand 2 = 3007 +/- 630 stems/acre, both 70-75% 1-6 ft. tall	Pre-burn
Bridger-Teton NF East Zone	Jim Creek WFU	-CBI plots	-additional data collection may be collected in 2008.	n/a
Bridger-Teton NF West Zone	Weiner Creek	-Blacken 75 & 50% of aspen in high & moderate priority areas, respectively	-Imm-post aerial photos and ocular estimates	No
Bridger-Teton NF West Zone	Lower Cottonwood	-60-80% mortality of conifer (juniper!) trees in treated areas -restore 50% of pre-burn bitterbrush cover 10 yrs post burn -restore broad-leaved shrubs (SYOR, AMAL, PRVI) to pre-burn cover in 20-30 yrs post burn -if rocky sites burn, restore mountain mahogany to pre-burn density in 25 yrs post burn	Pre-burn “live” data: -Juniper density: 98 +/- 18 stems/acre -Bitterbrush cover: 13 +/- 3% -SYOR: 26 +/- 4% , AMAL: 3 +/- 1% ; PRVI: 1 +/- 0.6% -Mountain mahogany density: 151 +/- 36 stems/acre	Pre-burn

Fire ecologist accomplishments and areas of focus

Table 5. Fire Ecology Accomplishments/Focus Areas

Category	Percent Time	Accomplishments and/or areas of activities
Planning		Participation with BTNF VDDT model development, sage grouse guidelines for Upper Snake River Area, Vegetation map updates protocols team.
Presentations		GYA FMO presentation about burn severity mapping, FVS fuel reduction monitoring, local fire ecology, BTNF Leadership Team FX monitoring and burn mapping
NPS Meetings/task groups		Fire Ecology Statistics Workshop, Fort Collins AFE Conference, San Diego Veg. map update working group
Fire Assignments		* FEMO on 1 prescribed burn and one WFU in GRTE * FFT1 on 2 wildland fires including a type II hand crew assignment. * FFT2 on 1 extended wildland fire * PIO on one prescribed burn
Research		MS Research in Burn Severity mapping, Coordinated invasive species forecasting research in burned areas of GTNP, Reviewed several JFSP proposals, sage grouse habitat mapping for Upper Snake River.
Data entry		5 projects
Data Conversion		On hold until FFI
Data analysis		13 projects for 2006 data
Supervision/Admin		Crew lead, 4 crew members, hired one term crew lead
Training		Safety training for supervisors
Miscellaneous		SAFE member, Colorado State University

Fire effects crew accomplishments and areas of focus.



Fire effects crew accomplishments

Category	Notes
Fire Assignments	* Crew members assisted on 5 prescribed burns * Crew members assisted on 4 local fire suppression assignments * Three crew members went on 14-day, out-of-area assignments with the Teton Interagency hand crew * Crew assisted with 1 GRTE Wildfire Use Fire * Crew actively volunteered fire response assistance on a B-T zone where they were currently monitoring * Crew provided interagency assistance on a Sublette County wildland fire
Fuels Project work	* Crew members assisted the Fuels Crew with various fuels projects, and prescribed burn prep for a total of 1-2 weeks * Crew members assisted with fall pile burning
Data entry	* FX crew entered 80% of project data * Crew lead entered all remaining data
Data analysis	* Crew Lead completed approximately of the data analysis and reporting.....
Supervision/Admin	* The Crew Lead oversaw 4 GS-5's, one volunteer, and coordinated numerous interagency helpers * Special emphasis on wildland fire preparedness & responsiveness in a busy local and national fire season

Training	* S290 - R. Osborn, C. Malleck * FEMO taskbook opened - R. Osborn * S271 and HECM taskbook opened - K. Brandt * S212 and FALRA achieved – K. Cueno * S133 – K. Cueno, R. Osborn, S. Coffin, K. Brandt * S131 and FFT1/ICT5 taskbook opened – K. Cueno, K. Brandt * S490 – K. Cueno * Crew participated in local botany training with GRTE Park Botanist
Miscellaneous	* The Fire Effects Crew successfully completed the busiest monitoring workload in the history of GRTE-BTNF fire effects! * Crew prepared, educated, and led the Youth Conservation Program in fire ecology education and data collection for one day. * Crew lead coordinated with other module leads (engines, fuels crew) to provide cross-training and project/monitoring assistance throughout the season * During the fire season, crew members backfilled on engines, fuels crew, in the fire cache, and as needed to assist with high priority fuels projects * Fire Effects shared one crew member position as a research assistant for a NASA- funded research project on fire effects on weeds.

Appendix: Project Summaries 2007

Grand Teton National Park

Immediate Post Burn monitoring: Bar-BC

The Bar BC prescribed burn was designed as a hazard fuels reduction for the protection of the historic Bar BC Dude Ranch. The ranch dates to 1912 and is a cultural resource under the preservation and protection of Grand Teton NP. The area is surrounded by sagebrush. The purpose of the burn is to convert fuels from shrub to grass in order to create a more defensible space in the event of a wildland fire. Burn objectives, as outlined in the burn plan include:

- 1) *Remove 60-90% of live sage cover to be measured immediately post burn.*
- 2) *Increase percent cover of native grasses by at least 25% in burned shrub areas by two years post burn.*

Because the unit is very small, approximately 20 acres, photopoints and ocular estimates rather than vegetation plots were used to evaluate fire effects. Three permanent photopoints were installed. Two are located on the bench above the BarBC ranch, with broad views of the unit below. The third photopoint is located on the sagebrush flats south-southwest of the ranch with a view of the BarBC historic structures and the sagebrush directly in front of it, in terms of the most likely path of fire with the area's prevalent southwest winds. A non-native plant survey was also estimated by the fire effects crew. The small unit was grided by the crew who identified all non-native species and reported an ocular estimate of the percent cover of each non-native species throughout the entire unit. The non-native plants, *Bromus inermis*, *Poa pratensis*, and *Poa bulbosa* were identified in the unit pre-burn and were assigned as estimated cover of 5-10% each. The non-native forb, *Potentilla argentea* was estimated to have a pre-burn cover of 10-15% throughout the unit, and isolated plants of *Carduus nutans*, commonly known as musk thistle were found near the historic structures. Another non-native species grid should be conducted in yr02 when photos are re-taken.

The burn was ignited on September 14, 2007. Low wind speeds and non-continuous fuels (sagebrush) created somewhat unfavorable burning conditions. Fuel consumption was good in the initial firing area of the unit, where sagebrush was relatively dense (top, R portion of unit in the aerial photo below). Also, see photos below. As the burn progressed through the unit, however, sparse fuels and continuously low wind speeds created inconsistent and infrequent consumption. The highest sustained wind speed recorded for the day was 6 mph. Although some sagebrush was certainly removed, burn mosaic objectives were not met and the burn was terminated that afternoon. The unit was completed, but without meeting objectives. The prescribed burn may be attempted again in 2008 or in another future year.



Immediate post burn aerial photo of the BarBC burn

BarBC photopoint #2: south-southwest path to BarBC



BARBC #2, pre-burn, 2005



*BARBC #2, imm-post burn, 2007;
some shrub consumption*

Yr01 Post Burn monitoring: Eynon Ridge

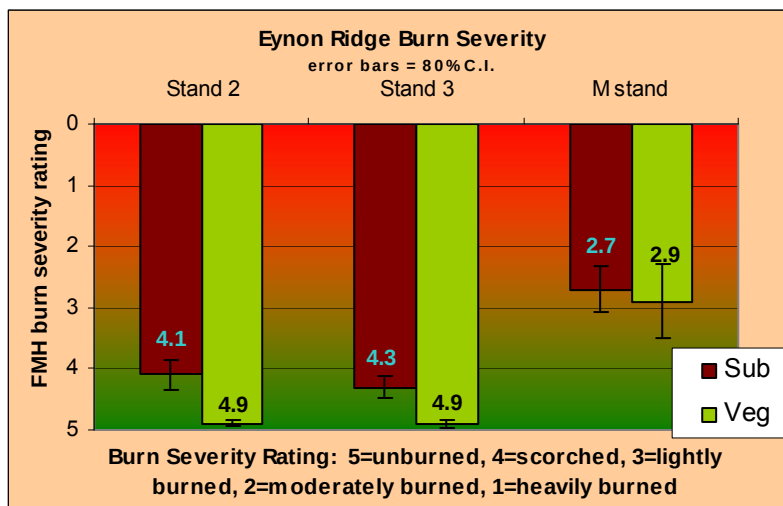
The Eynon Ridge project was a collaborative effort between Grand Teton National Park, Bridger-Teton National Forest, and the Jackson Interagency Habitat Initiative, a local working group. The 806 acre project combined mechanical thinning and prescribed burning treatments. Mechanical thinning was completed in areas of conifer-encroached aspen in 2005. Felled trees were left to cure for one year in order to create an additional fuel bed to encourage increased fire behavior during the prescribed burn. The prescribed burn was completed in the fall of 2006.

Burn goals were focused on aspen and mixed-conifer vegetation types. Specific vegetation objectives, taken directly from the burn plan, include:

1. Create disturbances which mimic natural fire severity in Douglas fir stands within the project area.
2. Use prescribed fire to simulate a natural fire occurrence within conifer encroached aspen stands in order to restore fire to former aspen communities as a way to maintain these communities within the landscape by setting succession back to an early seral stage.

Monitoring objectives outlined percentage targets of targets conifer mortality for the conifer stands. In general, however, burning conditions were less severe than those desired to meet objectives. A random, non-permanent sampling scheme was used to determine immediate post burn severity in stands 2 and 3. In addition, burn severity was conducted in a small conifer stringer, designated as the “M stand” on the map. The M stand was monitored post-burn because fire managers agreed that it typified desired fire behavior of “severe” burn severity. See chart below for results. Stands 2 and 3 had very similar burn severity results: both had almost “unburned” vegetation, and “scorched” substrate. The M stand had burn severity just a little more severe than lightly burned for both substrate and vegetation. See the 2006 Fire Effects Burn Severity Report for additional information.

Yr01 post burn monitoring was conducted in 2007. Stand exams were completed in Douglas fir stands #2 and #3. All photopoints were re-taken. In addition, a photopoint in the “M stand” was installed to aid in future monitoring. Stand exam data was input into the Forest Vegetation Simulator (FVS) for stand analysis. The fire and fuels extension of FVS was utilized to simulate a fire in 2008. The simulated fire used local, 90th percentile fire weather and FVS-determined “dry fuels” which correspond to between 75-90th percentile fire weather in the Teton Interagency area.



90th Percentile Weather Inputs:

Temp, 82°F

Wind Speed, 11.4 mph

FVS “dry” Fuel Moistures:

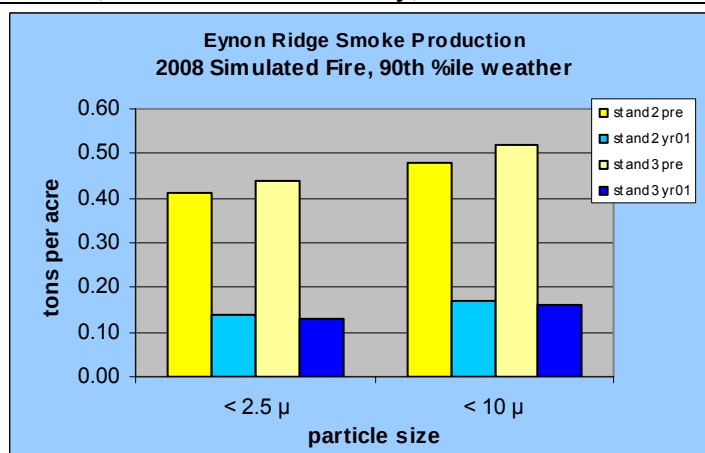
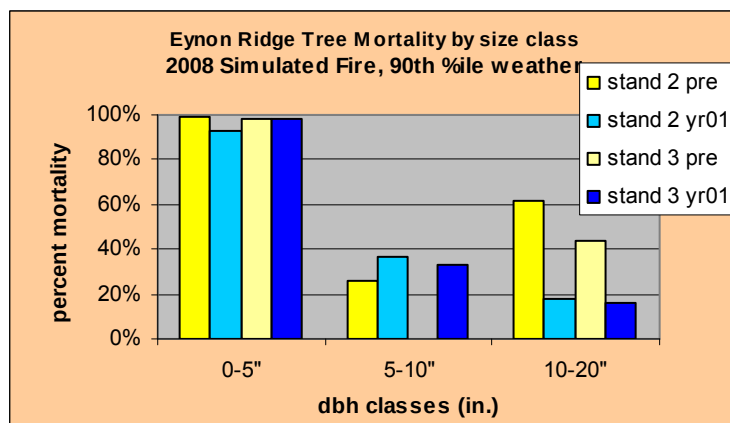
1 hr, 5%

10 hr, 6%

100 hr, 8%

1000 hr, 15%

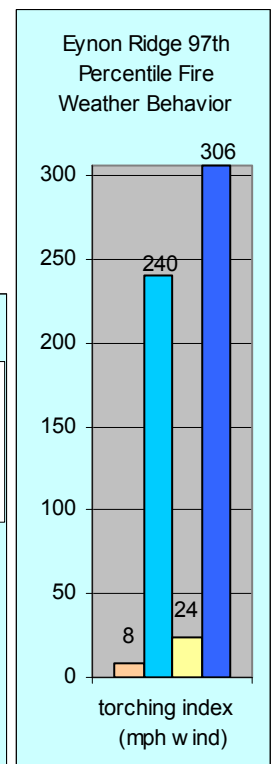
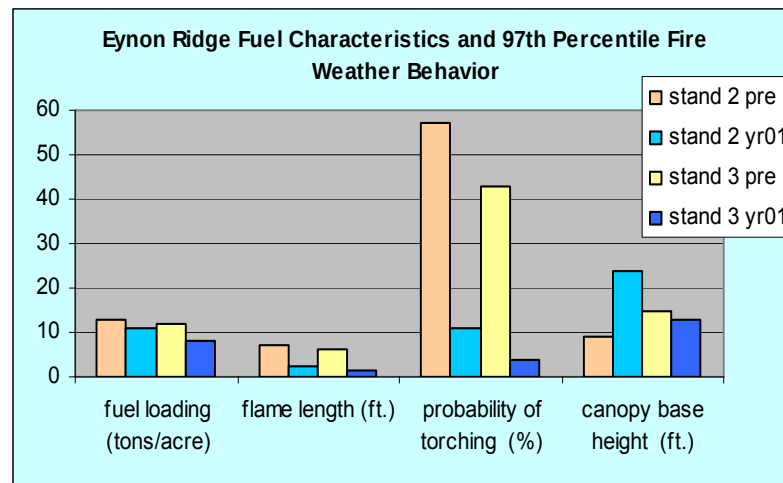
live woody, 90%



The simulated 2008 fire outputs compared between pre-treated stands and one-year-post-treated stands gives an indication of some of the more subtle changes on the landscape. Tree mortality by size class shows that the mechanical thin and prescribed burn treatment hasn’t changed the percent mortality of seedling and pole-sized trees (≤ 5 in. dbh), but it has greatly reduced the mortality of larger diameter trees (10-20” dbh). This indicates a reduction of ladder fuels and a decrease in the probability of torching. Smoke production from a simulated 90th percentile fire is also greatly reduced with treatment. There appears to be less fuel to consume and therefore less smoke to produce.

FVS can also be used to model the fire potential of a “severe” fire. If local 97th percentile fire weather is used to model this severe fire the model can again indicate some of the subtle changes made on the landscape within stand 2 and 3. See the charts below. Fuel loading was slightly decreased with thinning and prescribed burning, although it wasn’t very high to begin with, 11-13 tons/acre. Treatment has decreased the flame length of a 97th percentile fire and greatly reduced the probability of torching. Stand 2 has a two-fold increase in canopy base height, but stand 3 has almost no change in canopy base height. Finally, the torching index, or wind required to cause trees to torch, has greatly increased in both stands following treatment.

In conclusion, although burn severity and conifer mortality objectives were not met in the Douglas fir stands, it does appear that treatment has caused some subtle changes on the landscape. Following thin and burn treatment, both stands have less fuel loading and appear to be less susceptible to fire in most ways. It is probably true that succession has been set back a least a bit in both stands.

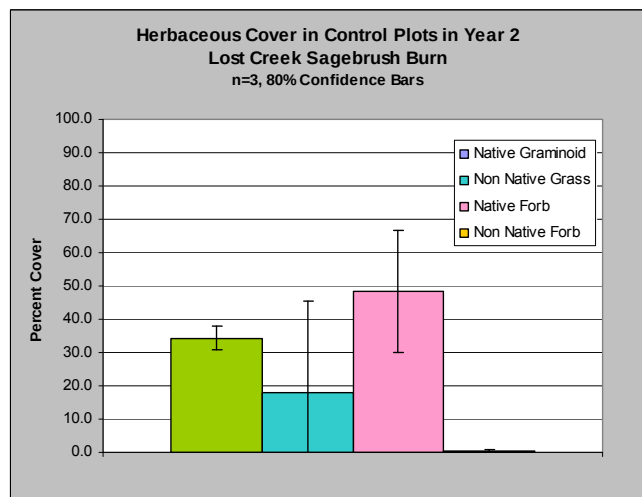
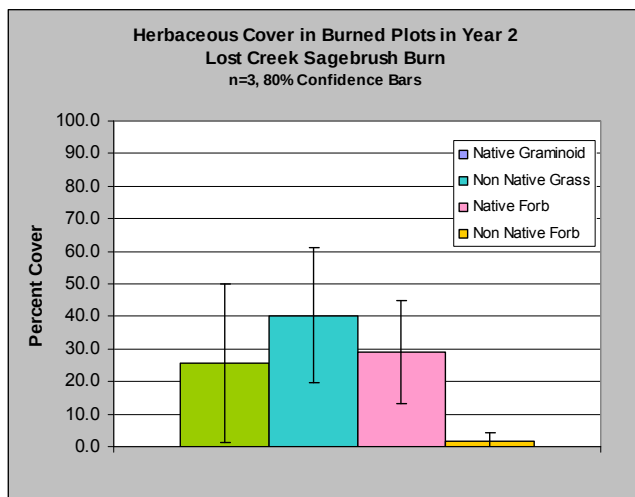


2008 monitoring of Eynon Ridge will include assessment of the treated aspen areas. Long-term monitoring and assessment of aspen suckering may show even more changes on the landscape at this project area.

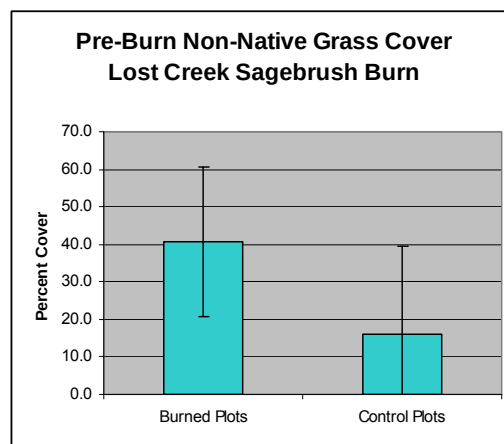
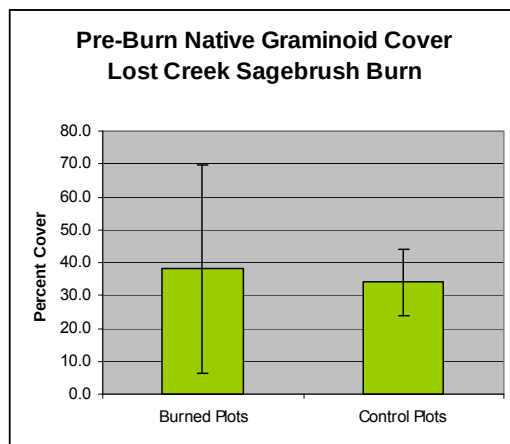
Yr02 Post Burn monitoring: Lost Creek

The Lost Creek prescribed burn was completed in the fall of 2005. The project was located in sagebrush vegetation on federal and adjacent private land inclusive of high value homes. The burn was a coordination of federal, state, county, and private agencies. Burn objectives for Lost Creek called for a “mosaic of burned and unburned areas” within the sagebrush community of the burn area, as well as a conversion of a portion of the sagebrush community to native forb and grass communities. In 2006, shrub mortality objectives were monitored using standard FMH brush plots and non-permanent sagebrush density circles. The targeted reduction in live sagebrush density was achieved.

In 2007, herbaceous data was collected at the FMH plots to evaluate the objective: *Increase percent cover of native grasses by at least 25% in burned shrub fields within 2 years post burn.*



The charts above show the two-year post burn percent cover for burn plots (left) and control plots (right). With three burned and three control plot transects a significant difference could not be detected. The apparent reverse proportions of native and exotic grass cover in burn and control plots are most likely due to the pre burn distribution, rather than the effects of the fire. The pre-burn grass distribution is as follows:



5 Years Post Burn: Kelly, Wolff Ridge, Elbo

Kelly Prescribed Burn:

The Kelly prescribed burn was implemented on September 28 2002. The unit is approximately 120 acres of sagebrush and bitterbrush vegetation to the west of the town site of Kelly. The goals of the burn were centered on fuels reduction to increase containment opportunities in case of wildland fire. Additionally, a mosaic of burned and unburned areas was desired to improve vegetation diversity through the reintroduction of fire. Monitoring objectives were as follows:

- * *Blacken 60-80% of the unit*
- * *Reduce total live sagebrush cover by at least 60% in the burned portion within one year post burn*
- * *Obtain a post burn severity rating of at least 3 ("lightly burned" on the FMH scale) in burned areas.*

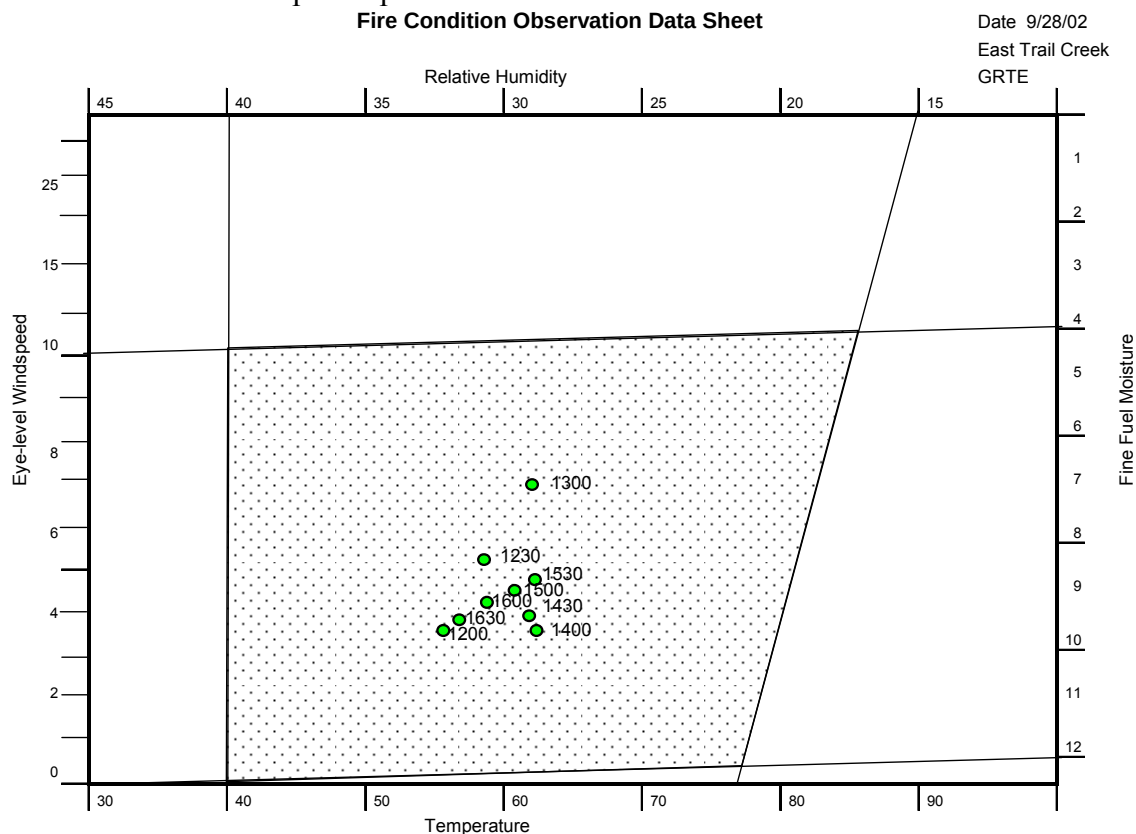
* *Increase native forbs species diversity and percent cover by 25% 2 years post burn.*

Four FMH permanent brush-style plots were installed in the burn unit in 1999 and 2001. These included photopoints, shrub line intercept trasects for percent cover estimation, shrub density belts, point intercept transects for percent cover by species, and list of all plant species encountered in a 10m x 30m subplot.

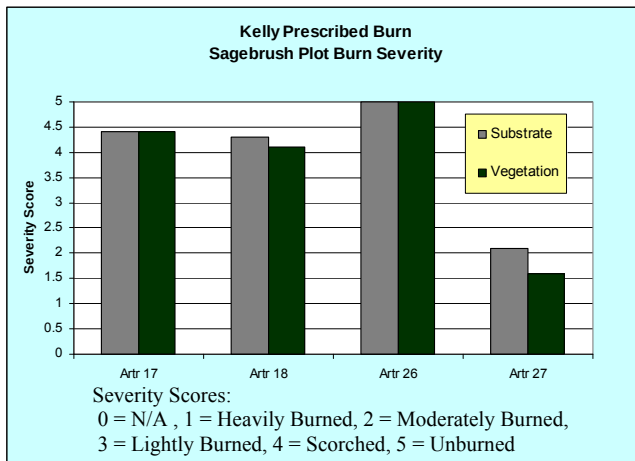
The burn prescription called for the following conditions:

Prescription Element	HOT	COOL	OPTIMUM	ACTUAL
Dry Bulb Temp	77	40	72	59-64
RH	15	40	25	28-37
Wind Speed	10	0	8	3-7
1 Hour FM	4	12	8	6-10
10 hour FM	7	16	9	
100 Hour FM	30	125	50	
Live FM	30	125	50	

The weather conditions during the fire operations are shown on the following diagram. They are centered within the middle of the prescription window.

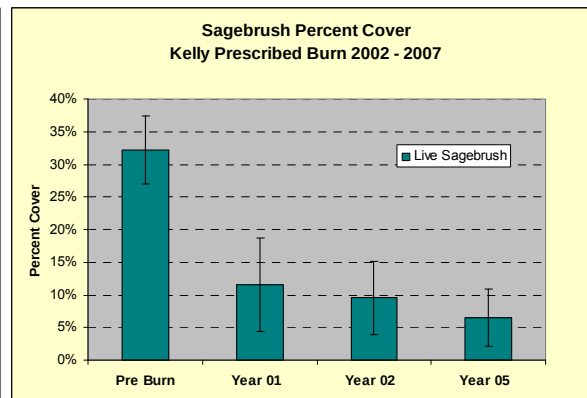
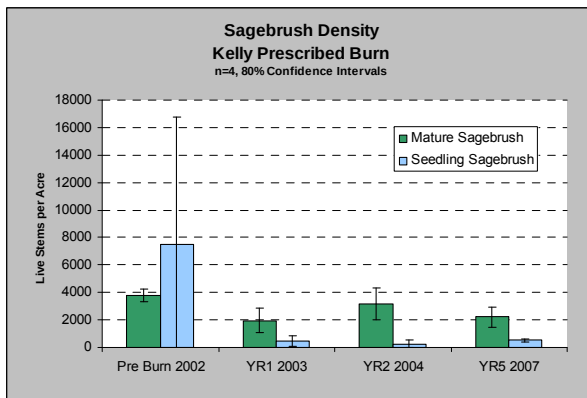


Burn severity data from the four plots shows that only one of them had a severity rating of 3 or higher. One plot did not burn. Severity Scores are as follows: 0 = N/A , 1 = Heavily Burned, 2 = Moderately Burned, 3 = Lightly Burned, 4 = Scorched, 5 = Unburned.

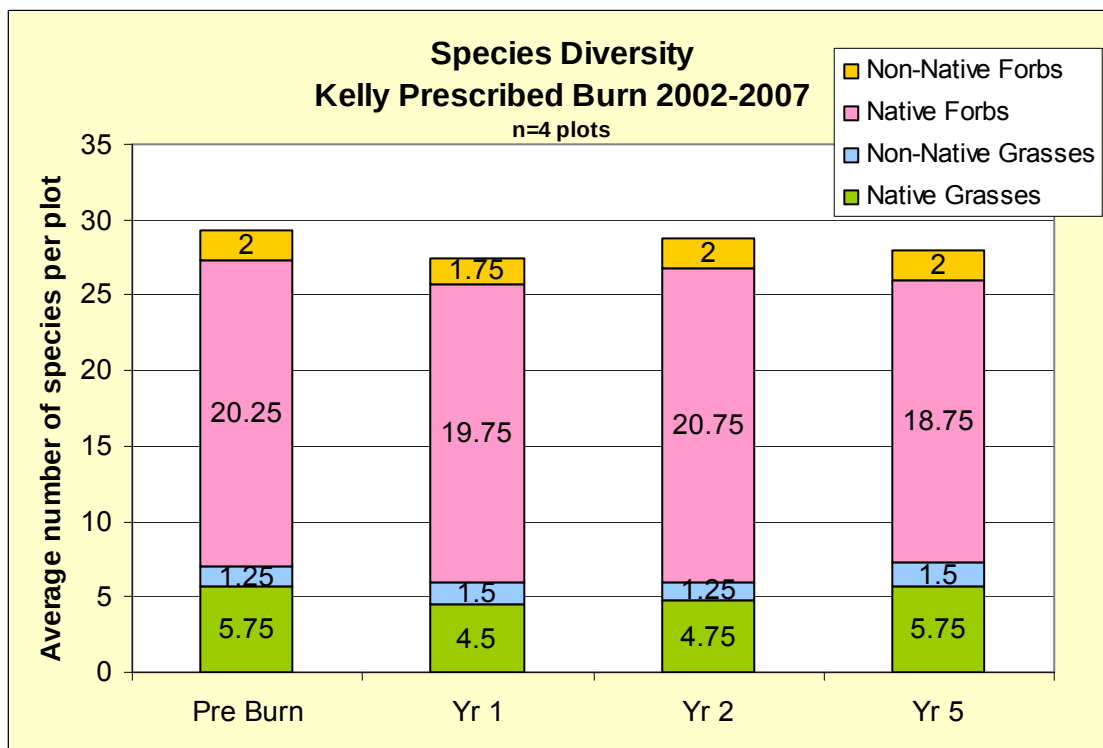
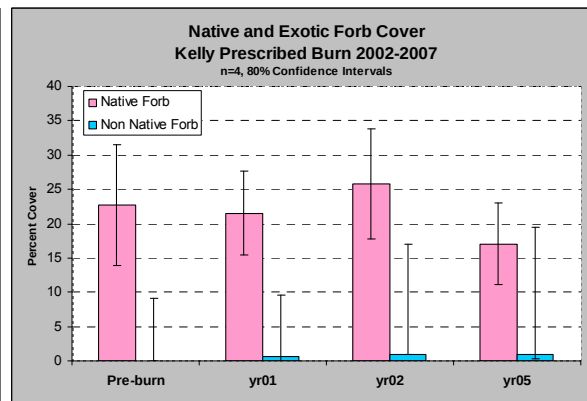
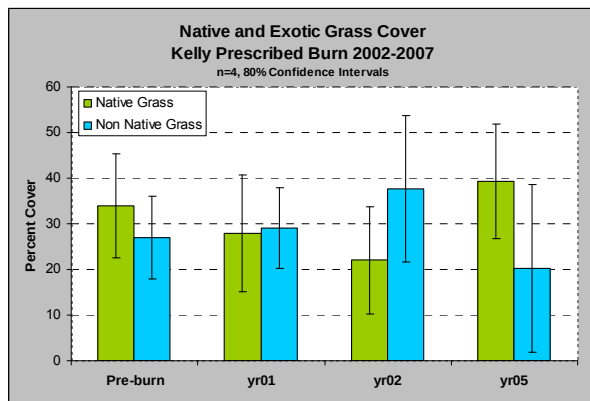


The burn mosaic at the Kelly project, shown in the aerial photograph, suggests a burn mosaic of 30-40% blackened.

Shrub density from the four belt transects shows no significant differences from pre-burn through year five post burn. Four shrub belts may not be an adequate sample size for evaluating this objective, unfortunately. One of the plots did not burn, so only three belts remain to show the change in density. Percent cover is often a more useful measure of fire effects in shrub vegetation. Shrub line intercept transects from the four plots shows a significant reduction in percent cover post burn, in line with project objectives.



To measure the percent cover of grasses and forbs, point intercept transect data was summarized into categories of plants rather than individual species. These categories include: Native grasses (including sedges), non-native grasses, native forbs, and non-native forbs. The four plots do not show significant differences in the cover of these plants from 2002 – 2007. Fortunately, very few non-native forbs are present.



A diverse assortment of native plants is found at Kelly. Exotic bluegrasses and brome are remnants of agricultural use prior to the expansion of the park in 1950. A few species of naturalized exotic forbs include common dandelion (*Taraxicum officinale*), salsify (*Tragopogon dubius*) and field pennycress (*Thlaspi arvense*). In 2007 bull thistle (*Cirsium vulgare*) was found at one plot.

In summary, the Kelly prescribed burn was well within the prescription parameters, however the mosaic of the burn was lighter than desired. Significant differences in sagebrush density, grass cover, and forb cover could not be detected using four FMH-style plots. A marked reduction (more than 60%) in sagebrush cover was documented, which appears to have met the specified fuels objective.

Wolff Ridge Prescribed Burn

The Wolff Ridge Prescribed Burn was many years in development. The first burn plan was written in 1997. It was finally implemented on September 24-25, 2002. The vegetation in the 1700 acre unit is divided into

roughly equal parts of aspen, sagebrush, and conifer, with a few moist meadows. Project goals were centered on wildlife habitat and fuels reduction. They included reintroduction of fire's disturbance to the landscape, regeneration of aspen communities, and decreasing fuel loading and continuity. Objectives for these vegetation types are as follows:

Sagebrush:

1. Increase percent cover of native grasses by at least 25% in burned shrub fields within 2 years post burn.
2. Remove 40-60% of live sage cover within the burn area.

Aspen:

1. Increase aspen seedling density per acre by at least 30% two years post burn
2. Recruit pole sized aspen density of at least 2000 stems per acre ten years post burn
3. Reduce conifer seedling and pole density in burned aspen stands by at least 60% within one year post burn
4. Increase percent cover of native grasses by at least 25% in burned areas within 2 years post burn
5. Reduce downed woody fuel loading by 40-80% post burn.

Conifer:

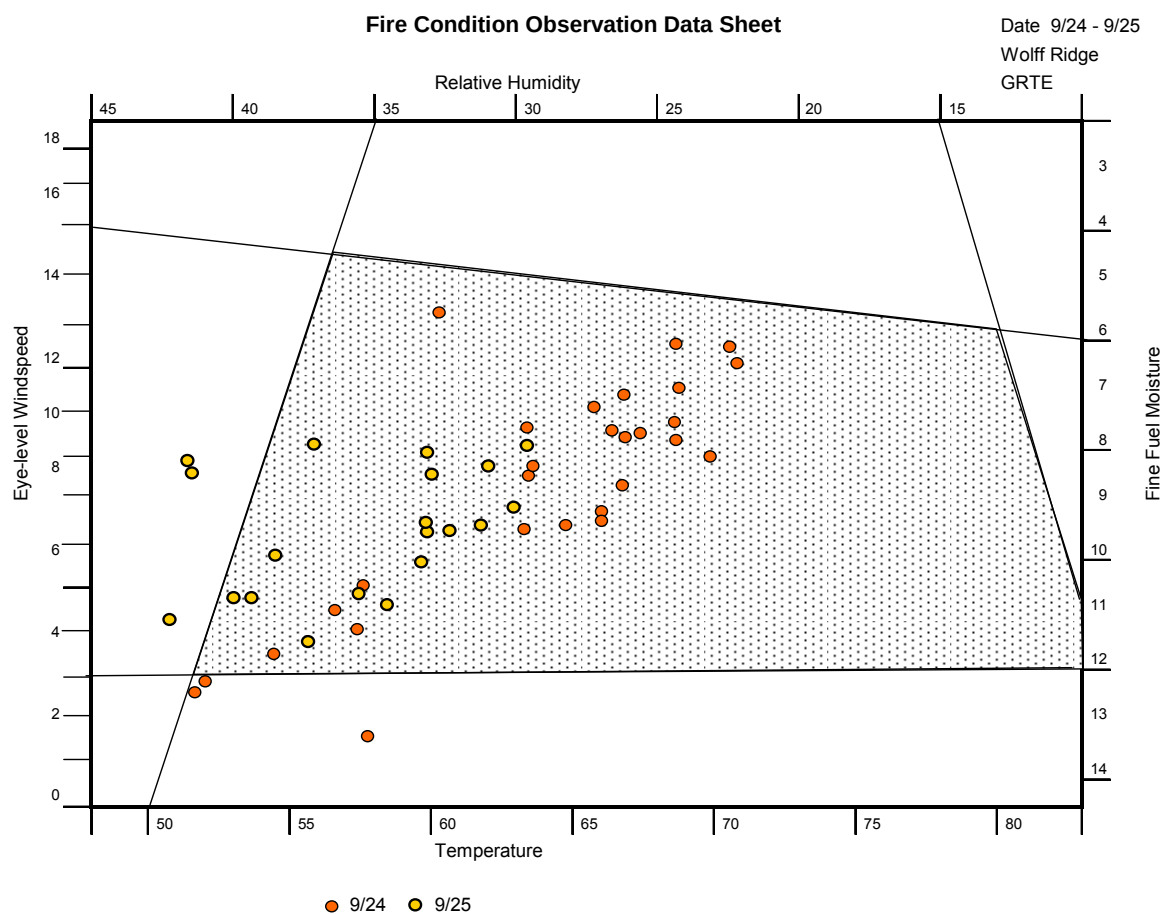
1. Limit the mortality of overstory conifers larger than 50 cm dbh to less than 20%
2. Reduce conifer seedling and pole density (ladder fuels) by at least 40% two years post burn.
3. Reduce downed woody fuel loading by 40-80% post burn.

Monitoring protocols in the Wolff Ridge unit included six FMH-style brush plots in sagebrush, five FMH forest plots in aspen, and two FMH forest plots in lodgepole pine. Additional aspen monitoring post burn used non-permanent circular plots to measure sucker density and browse.

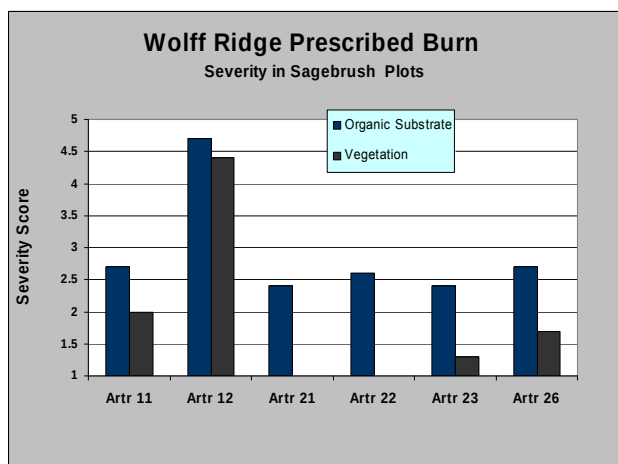
The burn prescription for the Wolff Ridge burn is shown in the table below. During burn observations of fire weather are compared to a graphic "prescription window" in the fire conditions diagram. Burning conditions were well within the prescription window except for initial morning operations. September 24th conditions were more optimal than those of September 25th.

Prescription Element	HOT	COOL	OPTIMUM	<i>ACTUAL</i>
Dry Bulb Temperature	85	50	72	<i>51-68</i>
Relative Humidity	15%	35%	25%	<i>21-53</i>
Wind Speed	15	3	8	<i>0-16</i>
1 hour fuel moisture	6	12	8	<i>5-10</i>
10 hour fuel moisture	7	13	9	<i>North side 9/23 - 11</i>
100 hour fuel moisture	7	15	11	
1000 hour fuel moisture				<i>Aspen stand 9/11 - 13.3% Timber Stand 9/14 - 17.2%</i>

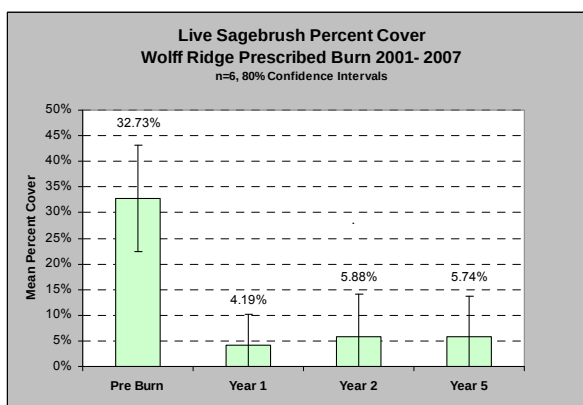
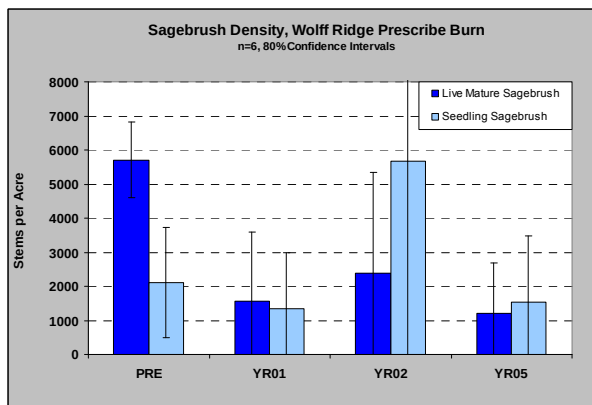
				<i>North side 9/23 – 22%</i>
Live woody fuel moisture	50	150	65	<i>Live sage 9/11 - 81.9 % Live spruce 9/14 - 118.1% Live shrubs north side 9/23 – 140%</i>
Live herbaceous fuel moisture	25	125	50	<i>Grass in sage 9/11 – 103.7% Grass in aspen 9/11 – 114% Grass in timber 9/14 – 125.5% Grasses north side 9/23 – 150%</i>



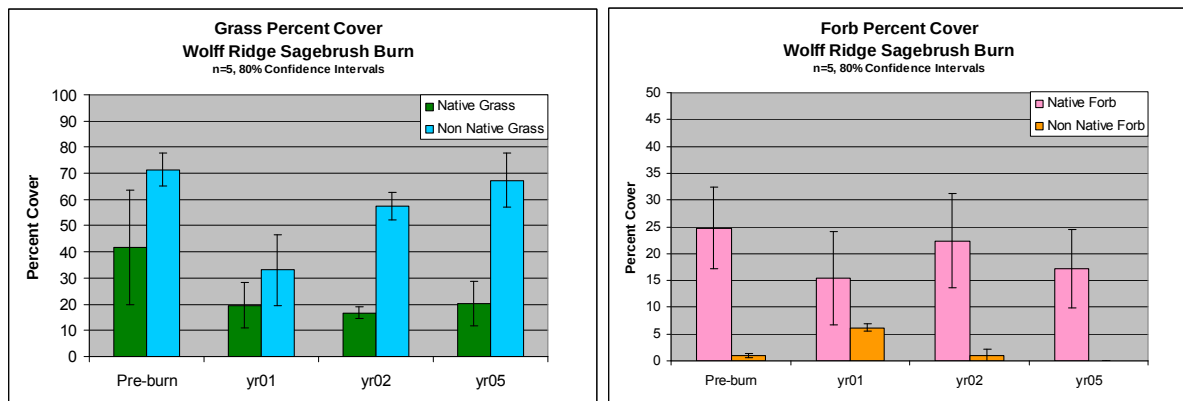
Sagebrush at Wolff Ridge was tall and dense with a thick understory of grasses that carried fire effectively. All six of the brush plots burned. Severity assessments from these plots show light to moderate effects. The mosaic objectives of 40-60% black were over-achieved, and unfortunately a no-burn area caught fire during the night of September 24th.



Live sagebrush density was reduced substantially after the burn. In 2004 moist conditions allowed abundant sage seedling establishment in some plots, but apparently not all of these individuals survived. With permanent belt transects such as those used at Wolff Ridge, density data does not show the effects of fire on the plant community or fuel bed as well as percent cover data does. Line intercept transects were adopted by Grand Teton National Park for FMH brush plots to help show such effects. Five years post burn, live sagebrush percent cover is still considerably reduced from pre-burn levels. More samples are needed to make statistically useful density or cover estimates for sagebrush.

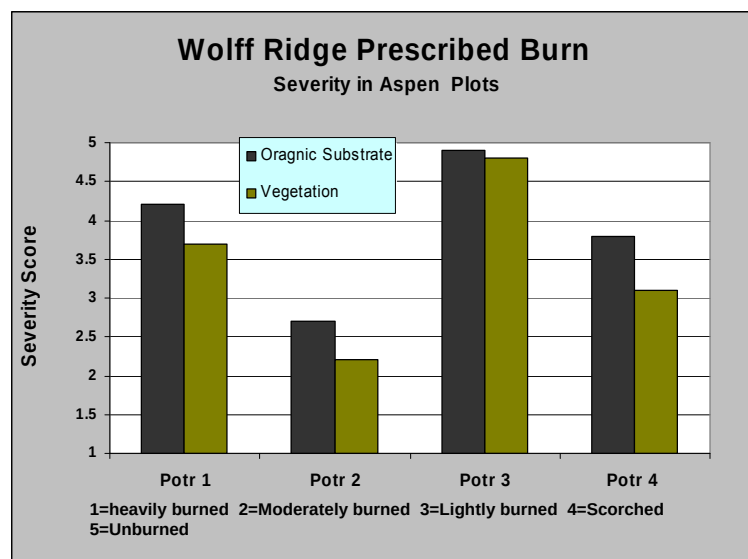


Herbaceous cover objectives called for a 25% increase in native grass cover two years post burn. The plot data (n=5 point intercept transects) showed no significant difference from pre-burn to year two, however non-native bluegrass cover was significantly higher than the native grass cover in year two. In year five, this has not changed. Year one post burn shows that all exotic grasses were significantly suppressed by the burn, however. This potentially would have been a window of opportunity for management such as seeding native grasses, if such actions were desired.

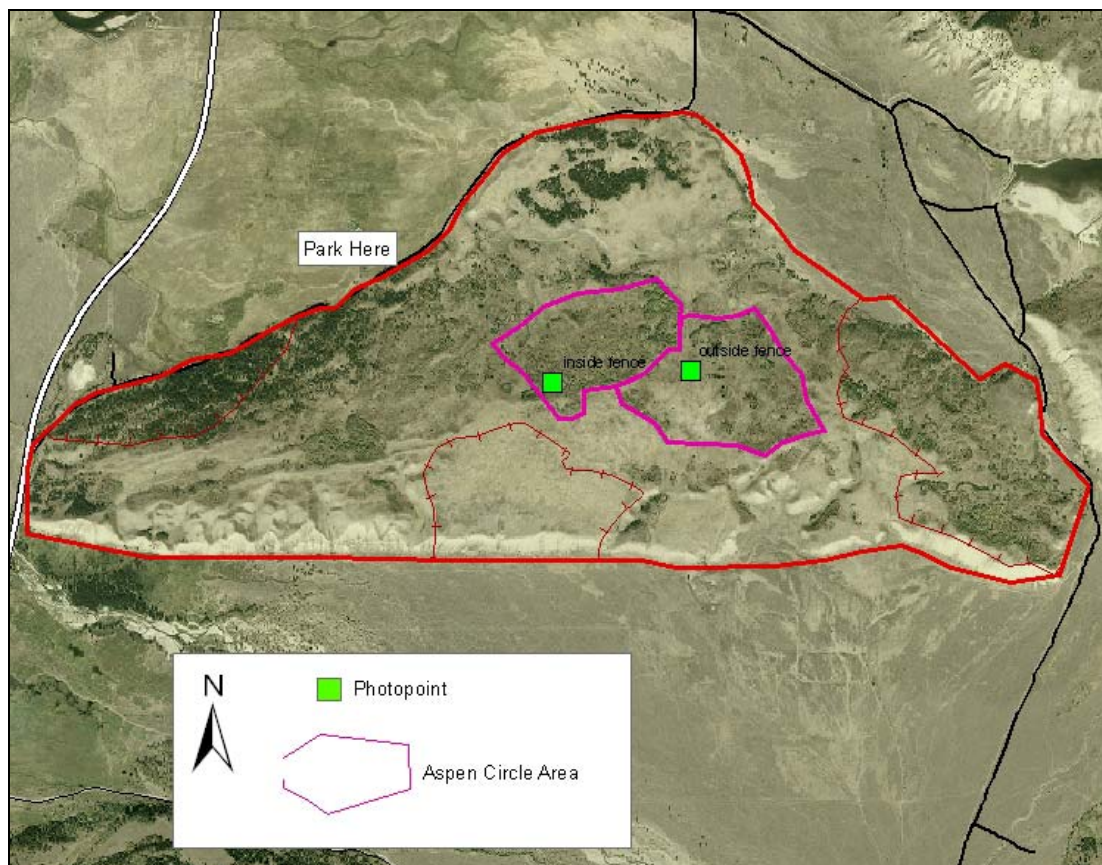


Native forb cover does not appear to have a significant change post burn according to the 5 plots. Most likely, this cover changes with annual precipitation patterns, making fire effects assessments difficult. Exotic forb cover increased significantly one year post burn, but these plants dropped out of the plots in year 5.

Severity in the FMH aspen plots immediately post burn was between moderately burned and lightly scorched. All four plots in the targeted stands experienced fire.



When Wolff Ridge was burned in 2002, there was concern about overbrowsing by ungulates suppressing the aspen response, and ultimately degrading the aspen communities. In the fall of 2003, an electric fence was installed as an attempt to protect approximately 60 acres of burned aspen. This provided an opportunity for intensive monitoring inside and outside of the fence using non-permanent circular density plots. Average live aspen sucker height, percent browse, and stems per acre were estimated within and outside of the fence for two years. When the fence proved to be unable to withstand invasion by elk, moose, and bison, it was removed in 2005. Aspen sucker monitoring has continued, however. This data has provided statistically useful data for assessment of aspen recovery.



In May of 2007, the Fire Effects Crew made a five year post burn assessment of aspen browse levels and sucker heights. Aspen were sampled in 100th acre circular plots according to a random sampling scheme. The study area includes the area formerly fenced to prevent winter browsing, as well as the adjacent control area. The fence was removed in the fall of 2005.

Some areas of the burn had tall aspen suckers and apparently less browsing than others. This was not related to where the electric fence had been. Rather, it is likely that this difference is related to growing sites quality and snow deposition in some way.



Aspen in the 1-2 meter height class



One of the taller stands

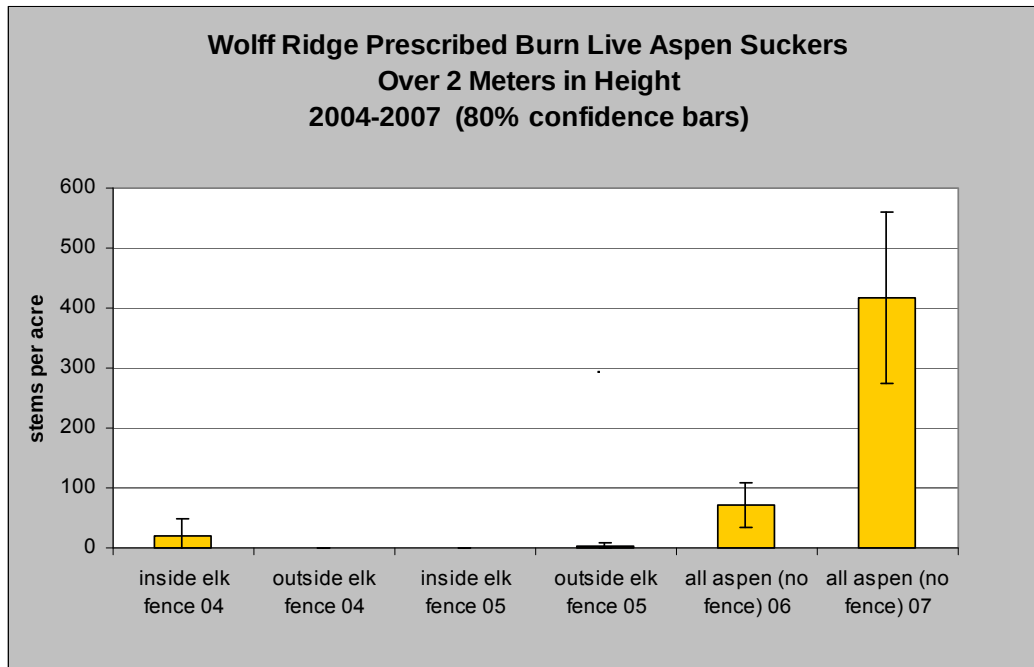


Aspen stand with shorter suckers



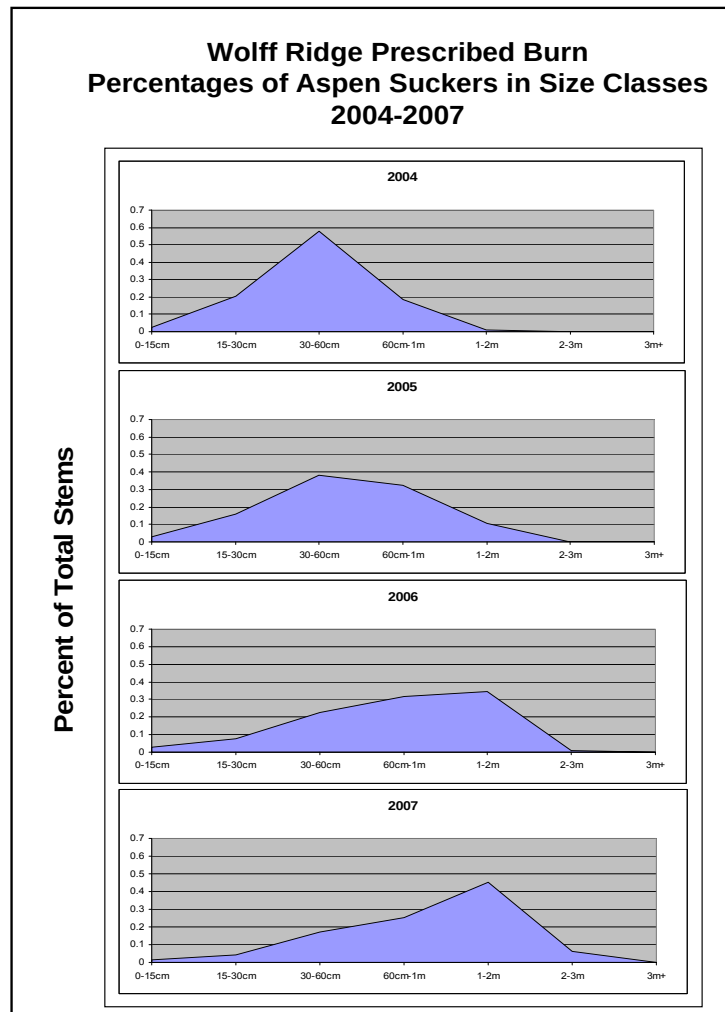
Some areas such as this have heavier browsing

Aspen density and browse was measured in burned aspen clones only. Interspersed sagebrush or meadow areas were not included. Five years post burn, the estimated density of aspen suckers with 80% confidence is between 5224 and 8094 stems per acre. 39% of the measured stems were browsed, which is a similar rate to 2004 – 2006 estimates.



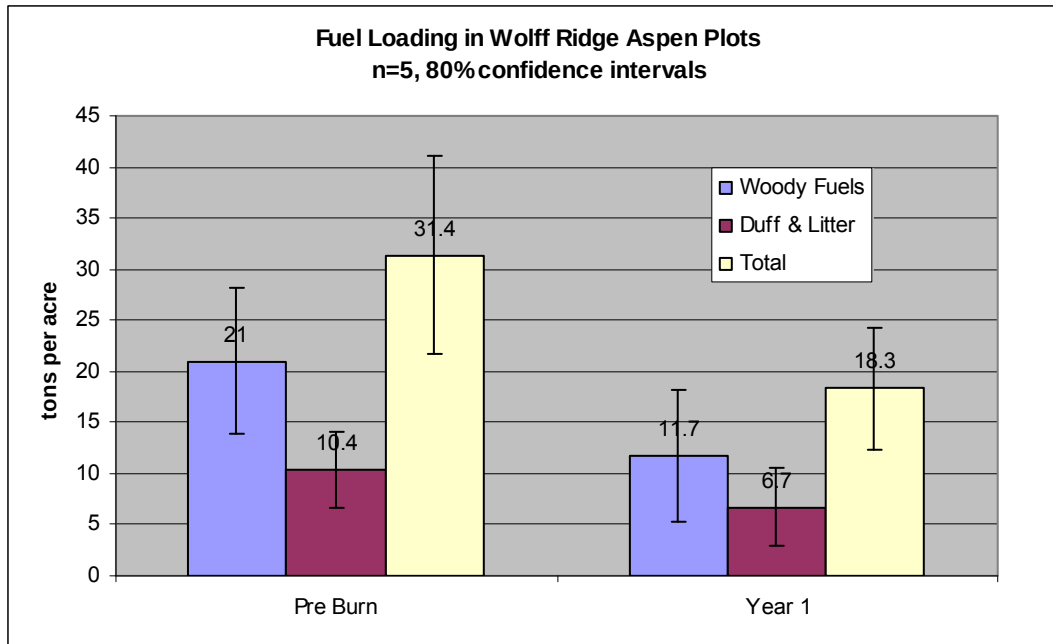
More stems have reached the greater than 2 meter height level in 2007 than was noted last year. This is shown in the diagram below with 80% confidence bars. The Wolff Ridge Prescribed Burn aspen objectives call for more than 1000 stems per acre over 2 meters in height ten years post burn. At five years, there may be about half that many. The 1-2 meter height class currently has roughly 3000 stems per acre.

The percent of stems in each height class is shown for the past four years in the following diagram. The mode height class has move from shorter to taller categories, as many aspen in productive soils have evaded severe browsing.



It appears that post-fire aspen suckering is likely to lead to desired objectives within ten years post burn if browse and growth trends continue as they have. Other aspen objectives may be monitored in 2008 when the FMH plot will be revisited.

Two-year post-burn rereads in the FMH aspen plots showed that conifer seedling and pole reduction was not adequately monitored using the FMH methods, because the sample size was not attainable. Fuel loading was also not statistically reduced in year one according to the plots, however newly fallen burned aspen may have been a factor in the lack of significant difference post burn.



The two conifer FMH plots in lodgepole pine at Wolff Ridge were unburned. The stand will be evaluated in 2008 and reread as priorities dictate.

Elbo Ranch Brome Burn:

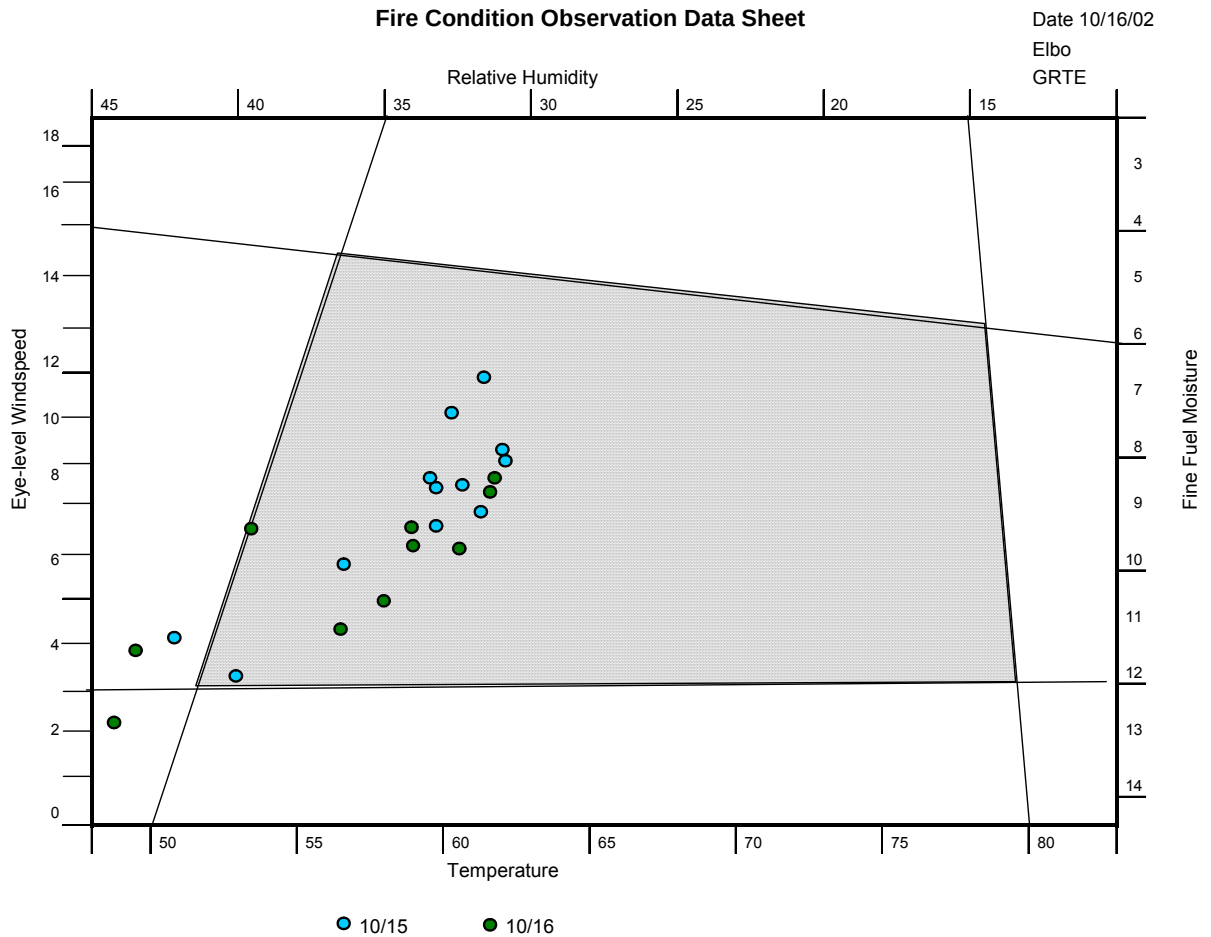
In the fall of 2002 two former hayfields that were once part of the Elbo Ranch inholding were treated with fire. The vegetation consists of smooth brome grass (*Bromus inermis*) and Canada bluegrass (*Poa compressa*), with very few other species. Prior to settlement, it was sagebrush steppe.

The goals of the Elbo burn were to manipulate bison distribution by reducing thatch accumulation and providing lush grass growth. The project objectives were as follows:

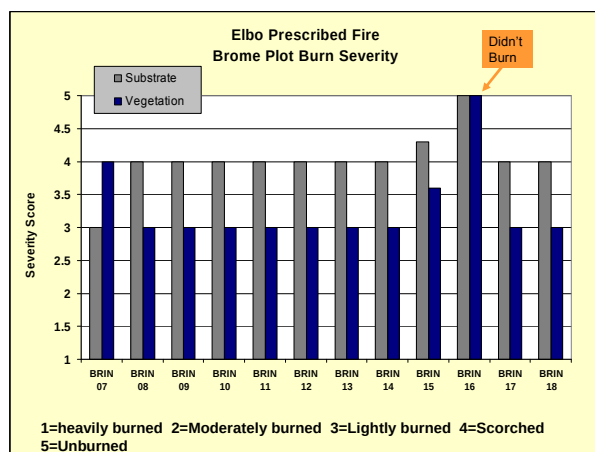
1. Increase percent cover of native grasses by at least 25% in burned areas within 2 years post burn.
2. Increase percent cover of native forbs by at least 25% in burned areas within 2 years post burn.
3. Increase percent cover of native shrubs by at least 10% in burned areas within 2 years post burn.

The burn prescription and actual fire weather observations are shown in the following table and chart. Burning conditions were on the lower end of the prescription window except when winds gusted a few times on the first day. The first day was windier and hotter than the second. The target area was uniformly blackened, but a layer of moist unburned thatch remained on the ground.

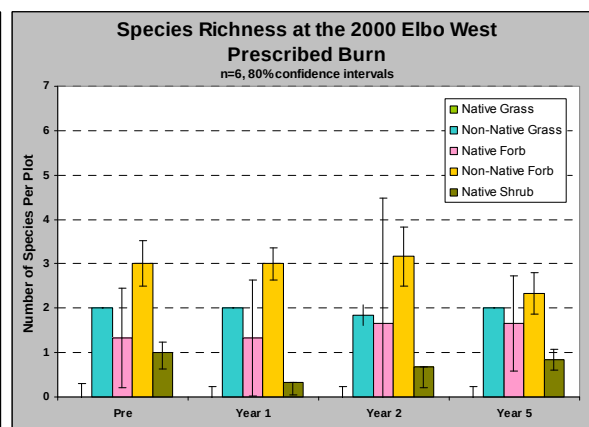
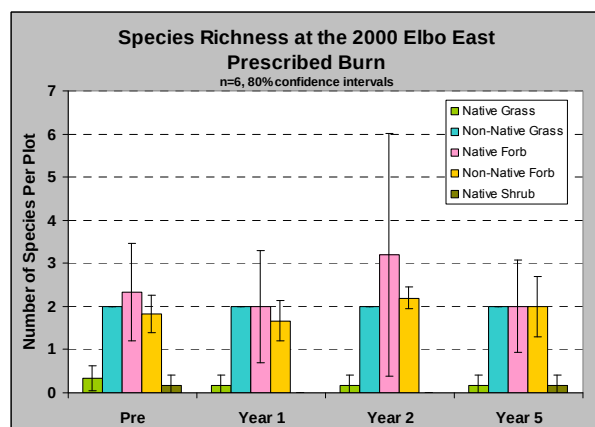
Prescription Element	HOT	COOL	OPTIMUM	<i>Actual</i>
Dry Bulb Temperature	85	50	72	48-60
RH	15	35	25	25-38
Wind Speed	15	3	8	2-G16
1 hour fuels	6	12	8	6-9
10 hour fuels	7	13	9	
100 hour fuels	7	15	11	
Live Woody Fuels	50	150	65	
Live Herbaceous fuels	24	125	50	



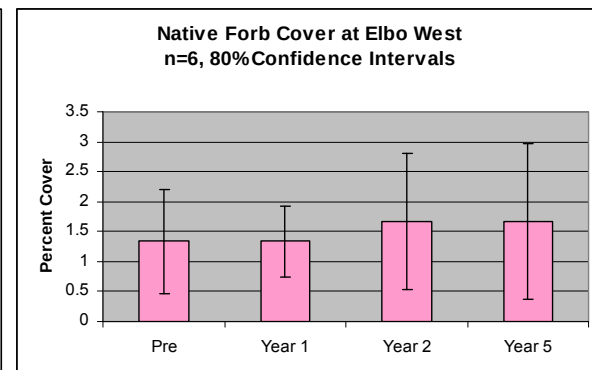
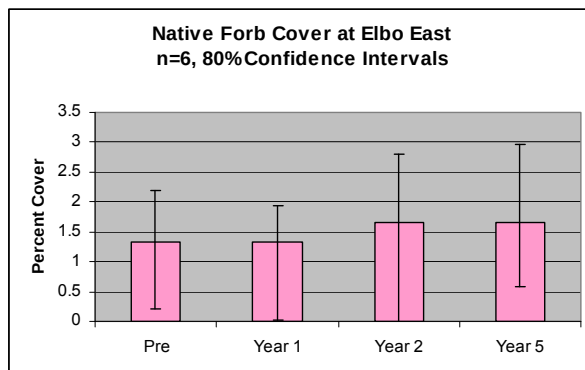
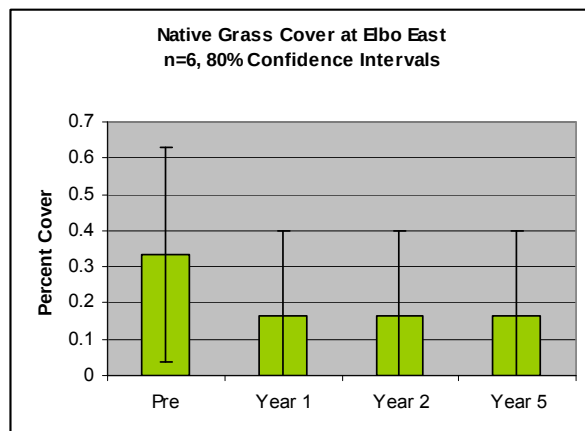
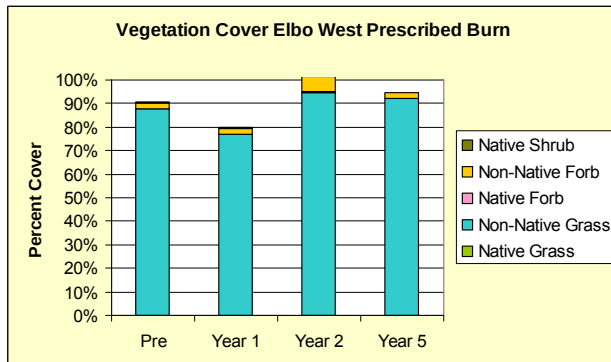
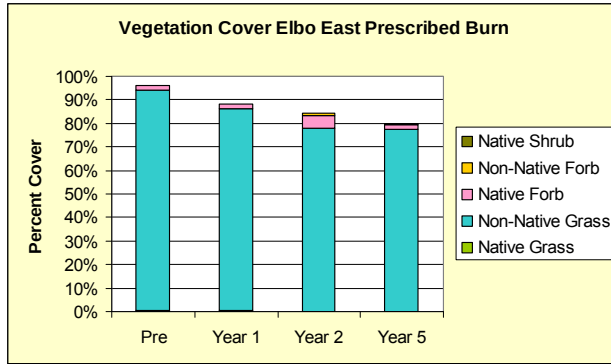
Twelve FMH-style brush plots were installed in the burn unit to monitor vegetation response. These included 5x30 meter shrub belts, point intercept transects, line intercept transects for shrubs, and 10x30 meter species composition plots. Severity assessments were made at each of the plots, with results shown below. One plot did not burn. The vegetation at most plots was lightly burned, but the substrate was only scorched.



The Elbo Ranch hay fields have very low species richness due to use for agriculture, that may have occurred as late as 1974. The twelve plots show that exotic smooth brome (*Bromus inermis*) and Canada bluegrass (*Poa compressa*) are by far the most common species.



Native grass (in this case sedge – or *Carex hoodii*) percent cover was very low in the east unit, and non-existent in Elbo West. No significant differences were measured from pre burn through year five. Native forb cover was also very low, and did not change significantly. Too few shrubs were present to obtain useful data about change due to the fire. Elbo West had more sagebrush than Elbo East.



Bighorn Canyon National Recreation Area

1 Year Post Burn: East Trail Creek Juniper Prescribed Burn

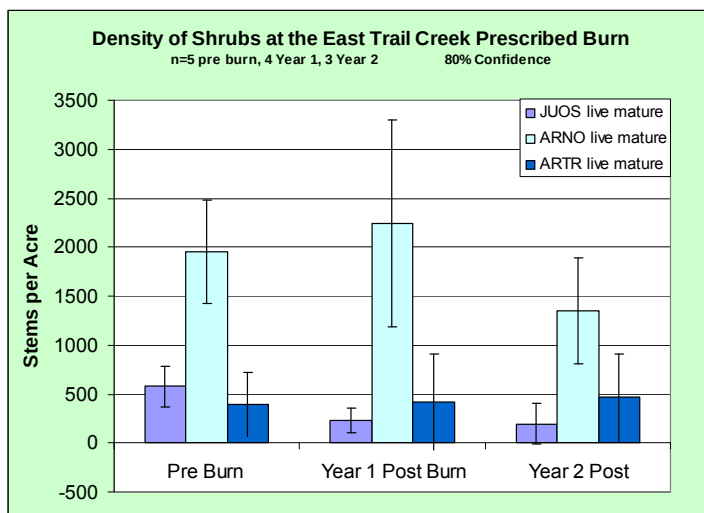
The East Trail Creek prescribed burn took place on October 16, 2005. The project area is 1600 acres, including 924 acres of Utah juniper (*Juniperus osteosperma*) with black sage (*Artemisia nova*), Wyoming big sage (*Artemisia tridentata* var. *Wyomingensis*) and a sparse grass and forb understory. The burn was completed in the fall of 2006.

Specific fire effects monitoring objectives for the East Trail Creek burn are as follows:

- 1) Achieve 70-90% juniper mortality in dense stands across the unit immediately post burn
- 2) Increase horizontal visibility to 70-90% as measured by a Sightability board in vegetation greater than 32" in height within targeted fuels.

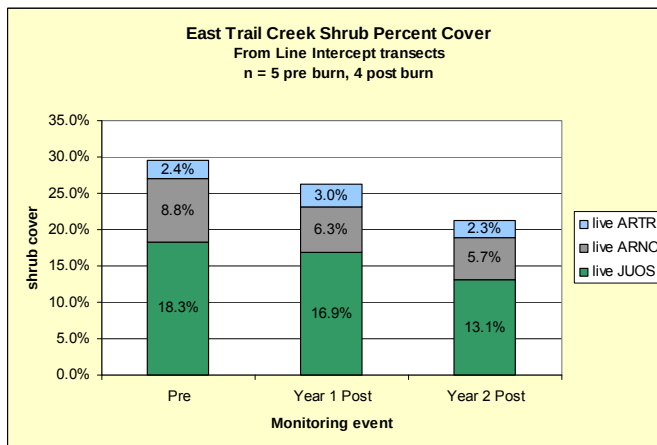
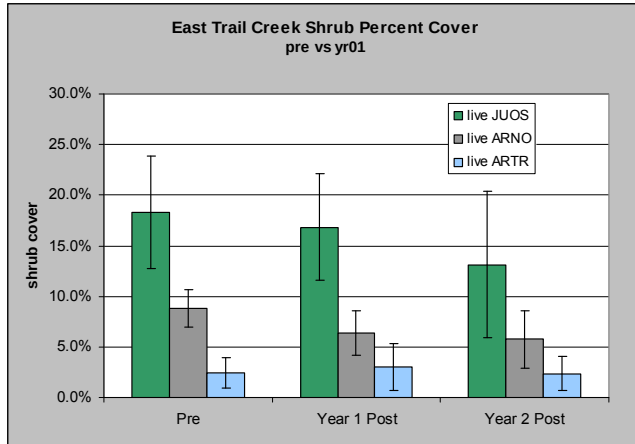
Five fire effects plots were installed in the East Trail Creek area. They include point intercept vegetation transects, species lists for 10m x 30m plots, 5 m x 30 m shrub density belts, photopoints, and shrub line intercept transects. Additionally, sightability data and ungulate pellet counts were recorded at each plot for wildlife habitat assessment. This summary describes the results of the two years post burn monitoring.

In year two post burn, four of the plots were revisited. Plot JUOS6 was not burned because of a change in the project perimeter, so it was abandoned. Due to adverse weather during field work, plot JUOS 8 does not have a species richness list for 2007.



The shrub density from the four remaining plots is not significantly different from pre burn. Utah juniper density is difficult to measure consistently due to the multi-stemmed growth habit. Therefore, it is more reliable to monitor fire effects using percent cover. Four shrub belts is also probably not an adequate sample size.

Line intercept transects at the four plots show a possible small reduction in percent cover; however the change is not statistically significant.

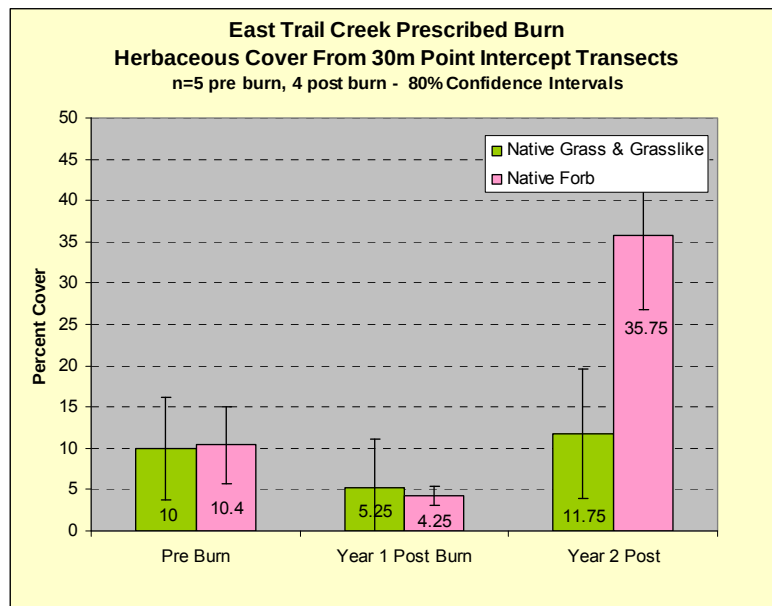


New plot protocols for the Utah Juniper vegetation type at Bighorn Canyon call for two belts per plot rather than one. Hopefully this will help to obtain large enough sample sizes to detect changes due to fire. At East Trail Creek, the fire effects were not particularly severe, so more plots probably would not have registered a sizeable change in the shrub community. It is not likely that the juniper mortality objective was met for this project in the fall of 2005. Plans call for a second treatment in the future.

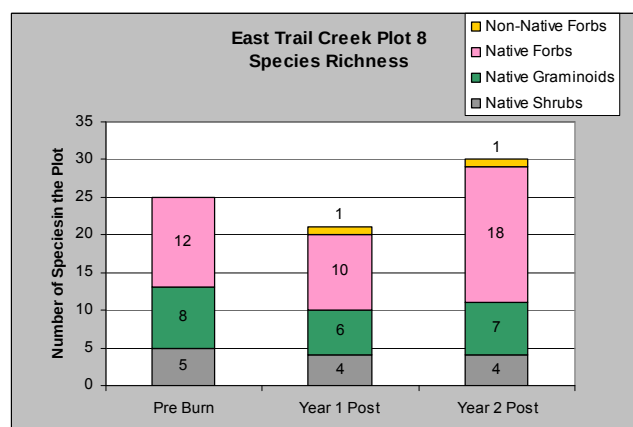
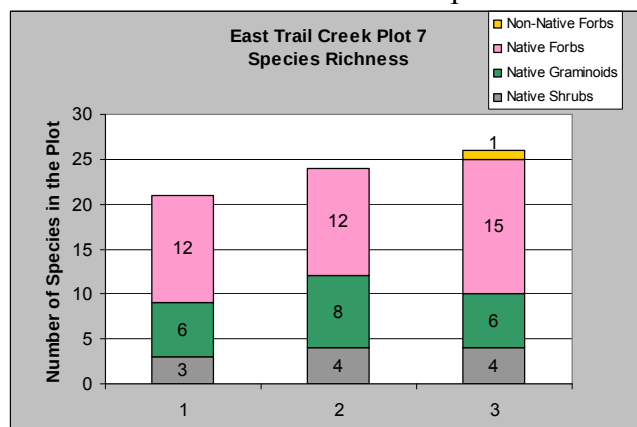
Percent cover of grasses and forbs was measured using 30 meter point intercept transects. Again, the sample size is not large enough to demonstrate whether the apparent decline the first year after the burn was statistically significant.

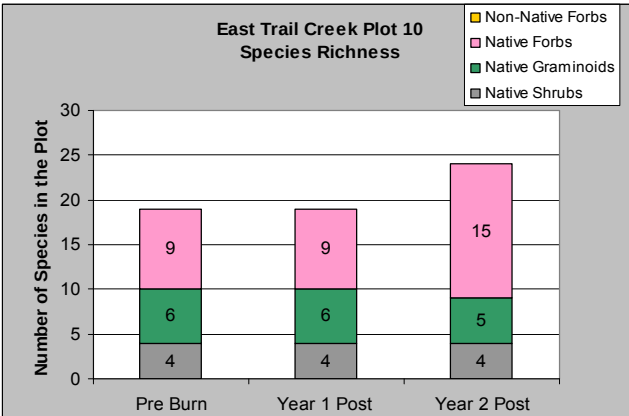
In year two post burn, forb cover was statistically different and much higher than previously measured. Bighorn Canyon personnel informed us that the summer of 2007 was unusually moist, which likely influenced forb production.

Species richness data was collected on three of the plots at East Trail Creek.



The following charts show that the richness of species increased slightly since the burn occurred on each of the three plots where this data was collected. Forbs had the greatest increase in number of species. In year two post burn, the first non native forb species was recorded on each of these plots. Prickly lettuce (*Lactuca serriola*) is a naturalized member of the dandelion family. The high rainfall during this summer may also have increased its presence. It is common in recently burned areas and does not indicate a threat to native plants.





Pre Burn: Barry's Island / Chain Canyon Prescribed Burn

The Barry's Island and Chain Canyon unit is approximately 450 acres of Utah juniper-dominated desert. The area is important for bighorn sheep, and the burn is intended to improve habitat for this species. Specific monitoring objectives are as follows:

1. Burn in a mosaic pattern between 40-70% of the targeted acreage, to be measured immediately post burn.
2. Achieve 70-90% juniper mortality in dense stands across the unit immediately post burn

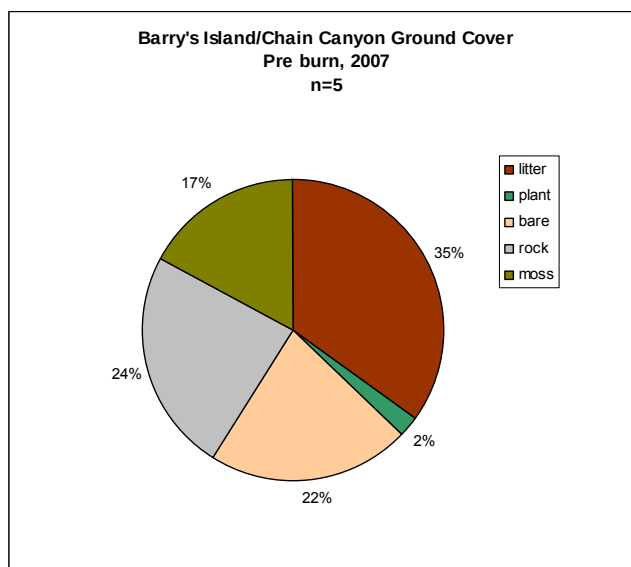
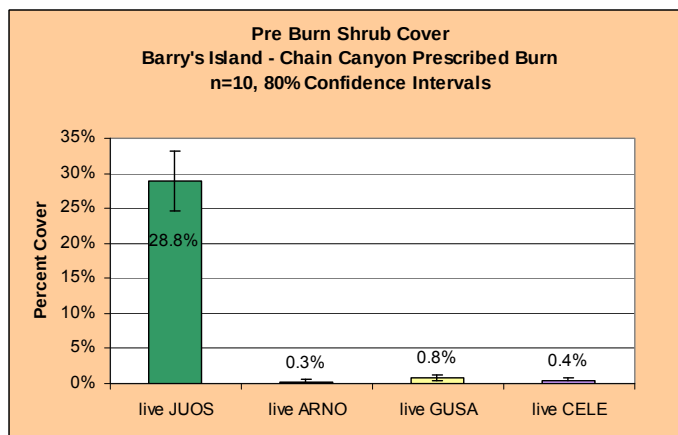
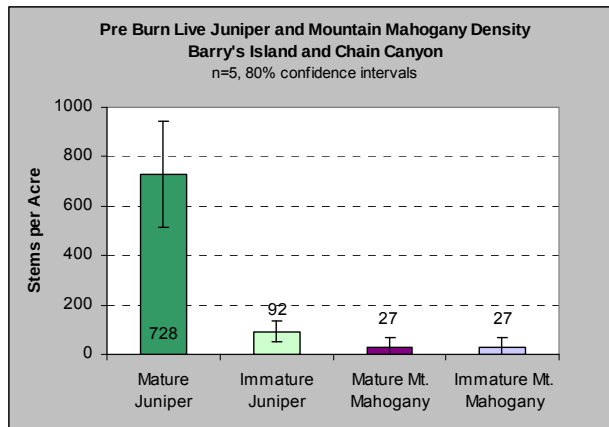
Five FMH-style fire effects plots were installed in the unit pre burn in 2007. These plots resemble to East Trail Creek plots, however they were modified to include an extra 30 meter transect for shrub density and line intercept. Also, ground cover was recorded along with vegetation intercepts. The plots were intentionally located in denser juniper stands, because those are considered the target of the prescribed burn treatment. It is likely that the some of the sparser juniper stands in the unit will not carry fire to the degree that these will.

Barry's Island - Chain Canyon Prescribed Burn Unit

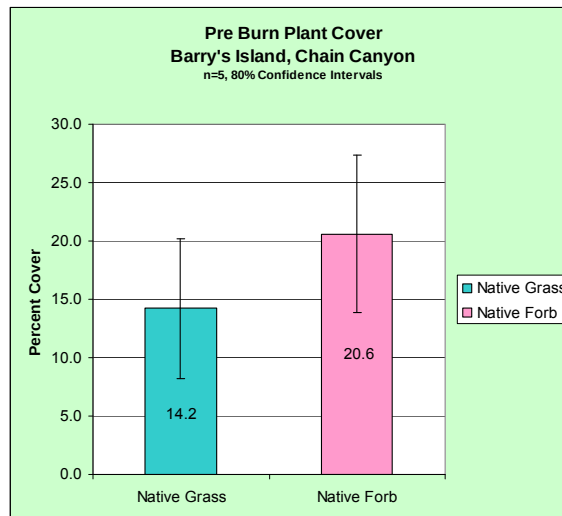


Pre burn shrub density and cover were both measured at Barry's Island and Chain Canyon. Aside from Utah juniper (*Juniperus osteosperma*), the dominant shrubs include curl-leaf mountain mahogany (*Cercocarpus ledifolius*), skunkbush sumac (*Rhus trilobata*), and broom snakeweed (*Gutierrezia sarothrae*). Unlike the nearby East Trail Creek juniper communities, there is not much sagebrush (*Artemisia nova* and *A. tridentata* var. *Wyomingensis*) found in the plots in this unit.

Juniper and mountain mahogany density is shown in the figure, below. It was measured in 5 x 30 meter belts. It is difficult to count Utah juniper because of the multi-stemmed nature of the shrub growth, so percent cover is probably more useful for detecting change due to fire. The shrub canopy is dominated by juniper, with only traces of black sage (*Artemisia nova* – ARNO), broom snakeweed (GUSA), and mountain mahogany (CELE).



Ground cover at Barry's Island and Chain Canyon includes 22% bare soil and 24% rock. This ground surface is difficult to burn without wind to carry the fire.



Fossil Butte National Monument

Rock Creek

The Rock Creek interagency prescribed burn was conducted in September, 2005. The Rock Springs Bureau of Land Management, Wyoming Game & Fish, Bridger-Teton National Forest, Fossil Butte National Monument, and Grand Teton National Park fire personnel collaborated to plan and complete this 12,000 acre prescribed burn on BLM and FOBU land near Kemmerer, WY. Prescribed burn objectives included reducing hazard fuels, achieving a burn mosaic to rejuvenate decadent shrub communities, and improving habitat. The Rock Creek prescribed burn area is critical big game winter and transitional range. The local elk herd is the only herd on the Bridger-Teton without a permanent feed ground. Habitat treatment goals included improving forage for mule deer, elk, moose, and antelope, as well as improving brood rearing habitat for sage grouse. The treatment area encompasses a variety of vegetation types and the prescribed burn focused on treating aspen, sagebrush/bitterbrush, and conifer-encroached sagebrush/mountain shrub communities.

Specific monitoring objectives outlined in the monitoring plan include:

- 1) *Blacken 30-60% of the unit of BLM land, and 25-35% on Fossil Butte land.*
- 2) *Shrub regeneration:*
 - a. *Achieve 70% resprout density of pre-burn serviceberry and snowberry two-years post burn.*
 - b. *Achieve 50% resprout density of pre-burn bitterbrush two years post burn.*
 - c. *Achieve at least 1000 sagebrush stems per acre five years post burn.*

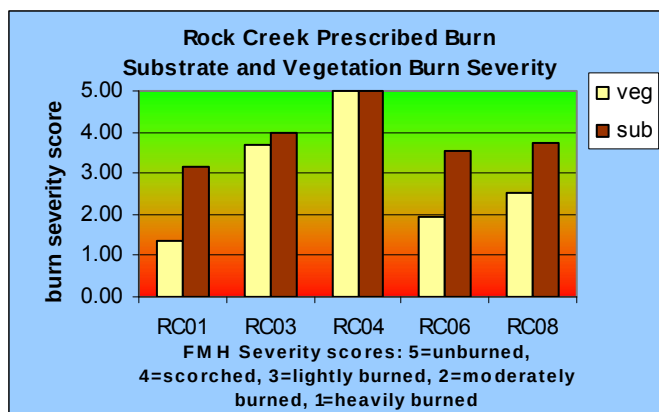
Aspen monitoring objectives were not outlined in the monitoring plan, but aspen monitoring could be conducted in the future if desired. Treated aspen stands are easily located on burn maps and in post-burn aerial photos.



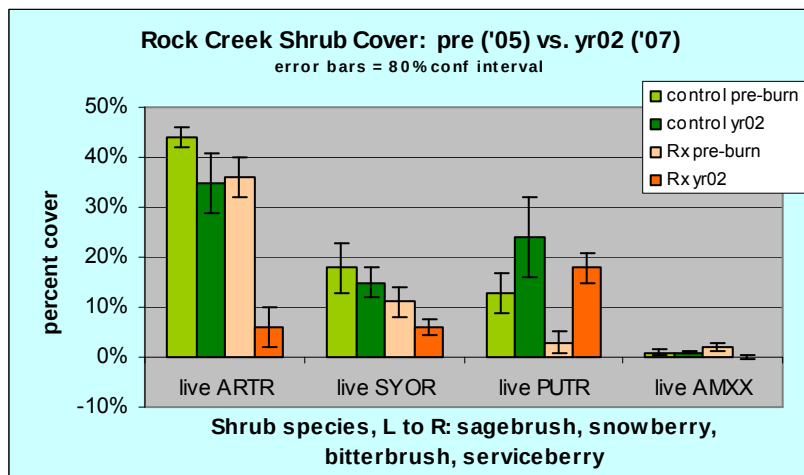
Although burn severity mapping was not formally conducted with aerial photos and GIS layers, ocular estimates by aerial resources, the burn boss, and FEMOs indicate that the burn mosaic objective was met on BLM land and likely exceeded on Fossil Butte land.

Burn severity monitoring was conducted by fire effects and FEMO personnel immediately post burn. Each of the five treatment plots was assessed with FMH burn severity protocols and scoring. Average burn severity rating of the plots

resulted in an average Rock Creek burn severity score of 3, or lightly burned, for vegetation and 4, or scorched, for substrate. Because plot RC04 was not burned, it was removed from long-term monitoring and analysis along with its paired control, RC05. If plot RC04 is removed from the burn severity scores, average burn severity is 2.4 for vegetation, between lightly and moderately burned, and 3.6 for substrate, between scorched and lightly burned.



Shrub results are based on several monitoring methods employed at Rock Creek. Plots are grouped by shrub community types: sage/bitterbrush and sage/conifer encroached mountain shrub. Within each community type treatment plots were paired with control plots. Two measurements of shrub cover were conducted: point intercept and line intercept. One measurement of shrub density was conducted: shrub belt tally. FMH brush-style plots were modified by adding two shrub transects per plot in order to increase the sample size of line intercept and shrub belt measurements. In most cases the more intensive line intercept sampling of shrub cover is the most appropriate result to report. However, in the case of serviceberry, which appears on the landscape with fairly low cover, shrub density is more useful to report. In the case of sagebrush, both cover and density are reported due to the specifically stated monitoring objective of “1000 stems per acre”.



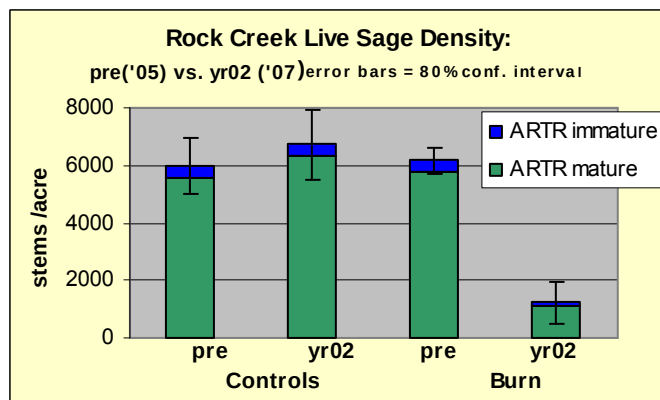
Shrub cover results for snowberry (SYOR) show no significant difference from pre-burn to yr02 within burned areas. Comparing average snowberry shrub cover pre- and two-years- post burn indicates that the snowberry regeneration objective is not achieved at two years. Two-year post-burn snowberry cover is 55% of pre-burn cover: 6% cover at two years vs. 11% cover pre-burn. The two-year monitoring objective outlined 70% recovery

of pre-burn cover. Snowberry density was not measured as it can be difficult to distinguish between individual snowberry plants. Year five monitoring will measure any continued snowberry regeneration.

The bitterbrush regeneration objective was achieved two years post burn. In fact, yr02 bitterbrush percent cover was six times greater than pre-burn cover. Pre-burn cover was 3% and two-year post burn percent cover increased to 18%. Although there is no significant difference in the control plots from pre-burn to yr02, control plots do show the same trend of increasing cover seen in treated plots. It appears that burning may have caused an increase in bitterbrush cover, but there may be additional contributing factors. Although other factors cannot be definitively determined, it is possible that an improvement in environmental factors, such as increased spring rain fall, or decreased competition with sagebrush may be contributing to the large increase in bitterbrush cover. Further investigation may be warranted. Comparison of fire effects plot data with the Wyoming Game & Fish elk collaring study in the burn unit could prove interesting. As outlined by the monitoring plan, additional vegetation monitoring will be conducted in yr05.

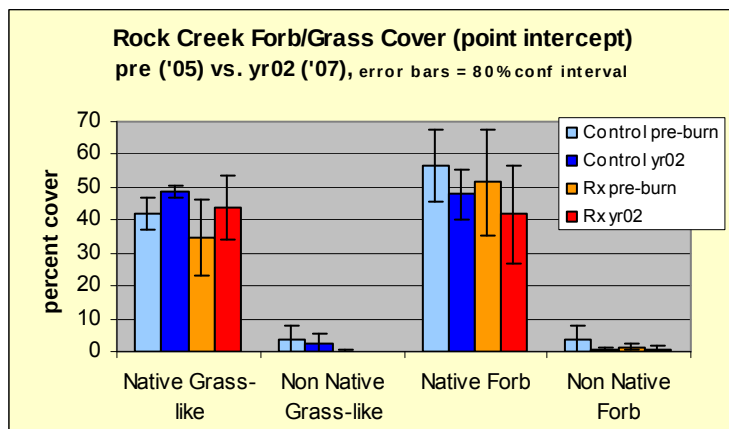
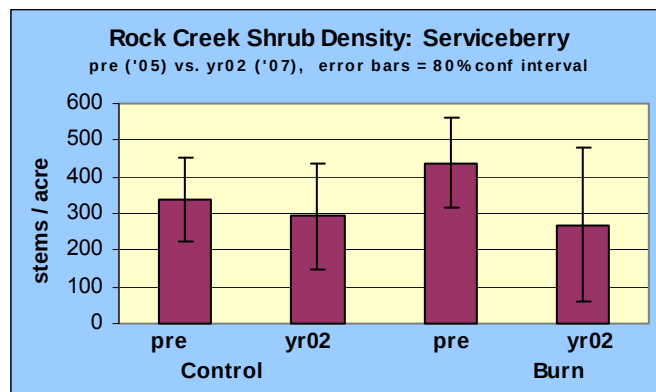
Sagebrush cover has been significantly decreased two years post burn. The average pre-burn sagebrush cover of 36% has been reduced six-fold to 6% two years post burn. The removal of sagebrush is visually apparent in some burned areas. See photos below for an illustration. Of the four plots burned, two plots, RC01 and RC08 each have less than 2% sagebrush cover at yr02. This decrease correlates with the burn severity scores reported for RC01 and RC08. Only RC06 has a more severe vegetative burn severity score than RC08. Because one of the three transects of plot RC06 was mostly unburned, the plot average sagebrush cover does not reflect its average burn severity score.

Control plots also show a decrease of sagebrush cover, although in this case the difference is significant. Aside from burning, other factors are likely linked to sagebrush cover decrease. Density measurements also show a large and statistically significant decrease in sagebrush density two years post burn vs. pre-



Serviceberry density results indicate no significant difference in pre-burn and yr02 density. Due to the small number of serviceberry plants present on the landscape and in plots, error bars are quite large. Using the average density of serviceberry stems per acre, the serviceberry regeneration objective is not met two years post burn. However, it is close to the objective and may be achieved in one to two additional years of normal growth. Two-year post burn serviceberry density is 270 +/- 208 stems per acre, reported as an 80% confidence interval. Yr02 average density is 62% of pre-burn density, but the error bars are quite large. Serviceberry density will be monitored at yr05 and may determine if the objective of 70% regeneration of pre-burn density is reached.

burn. Sagebrush regeneration is on track to achieve the monitoring objective, *1000 stems per acre five years post burn*. Two-year post burn sagebrush density is between 498-1952 stems per acre, reported as an 80% confidence interval. Sagebrush density will likely achieve 1000 stems per acre by five years post burn.



Forb and grass percent cover were also monitored at Rock Creek. There continues to be very little cover of non-native plant species at Fossil Butte. There is no significant difference in pre- and post- burn cover of either native grasses or forbs. Both control and treatment plots show the same trend in percent cover change: a non-significant increase in grass cover and a non-significant decrease in forb percent cover. This is surprising given the large amount of sagebrush cover removed. It

appears that in some cases an increase in bare ground may be part of the explanation. Although there was no ground cover data collected, it is apparent from some of the plot photos that there is a visible increase in bare ground. See photos below.

Post-burn fire effects monitoring will be conducted in yr05, in 2010. Yr05 results may shed more light on yr02 vegetative results.

Photopoints showing decrease in sagebrush cover
Plot RC08:



pre-burn, 2005



immediate post burn, 2005



yr02, 2007

Photopoints showing increase in bare ground
Plot RC01:



pre-burn, 2005



yr02, 2007

Plot RC03:



pre-burn, 2005



yr02, 2007

Bridger-Teton National Forest

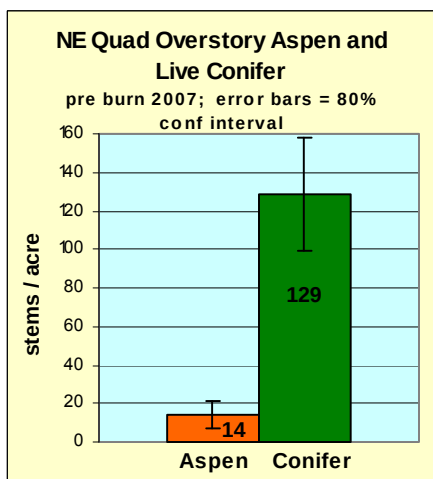
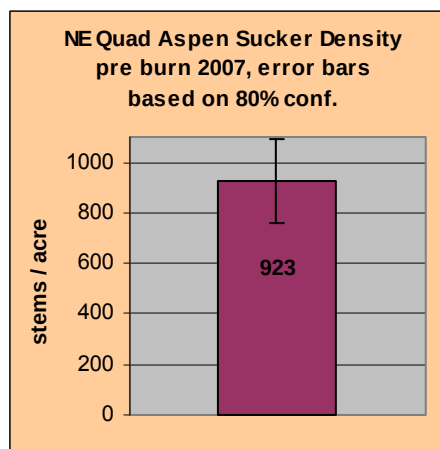
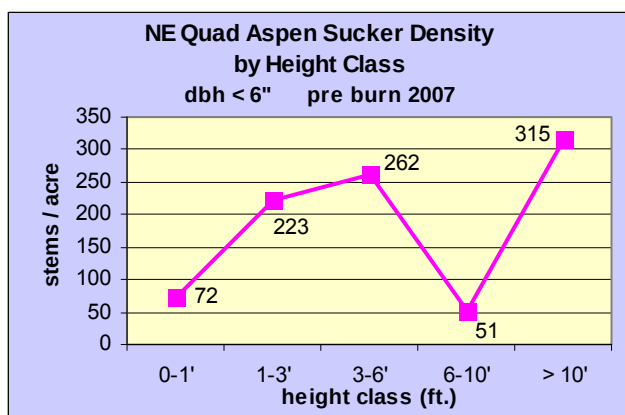
North Zone B-T

Pre-burn monitoring: Northeast Quad, Dry (Southwest) Quad, Lower Gros Ventre,

Northeast Quad & Dry Quad

Northeast Quad and Dry Quad projects are complex projects incorporating timber sale, thin & scatter, thin & pile burn, and prescribed burn. Unit boundaries, stand boundaries, and specific burn/monitoring objectives are still being outlined, but initial pre-burn monitoring was conducted in 2007 in both areas. Both projects, Northeast Quad and Dry Quad have similar burn objectives and identical monitoring objectives. Broad objectives include: 1) conifer and overstory aspen mortality in treated aspen stands, 2) long-term aspen regeneration, measured as density and height of aspen suckering 3) aspen stand recovery, measured as ground cover recovery, and 4) minimum maintenance of Douglas fir stand basal area, density, and fuel loading.

Pre-burn aspen monitoring was conducted in the Northeast Quad unit in a designated aspen monitoring stand. Photopoints were installed in two designated Douglas fir / aspen stands.

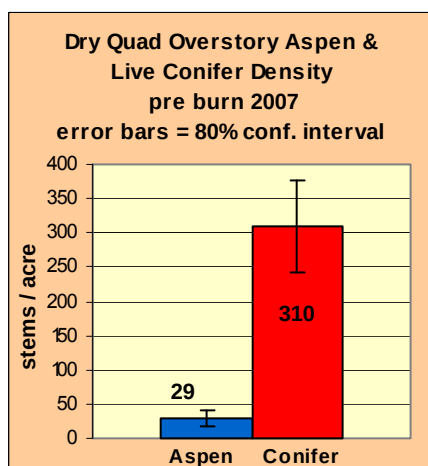
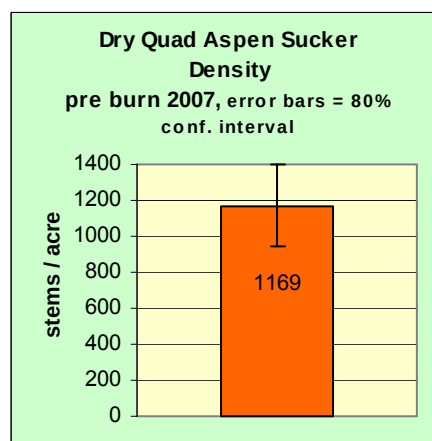
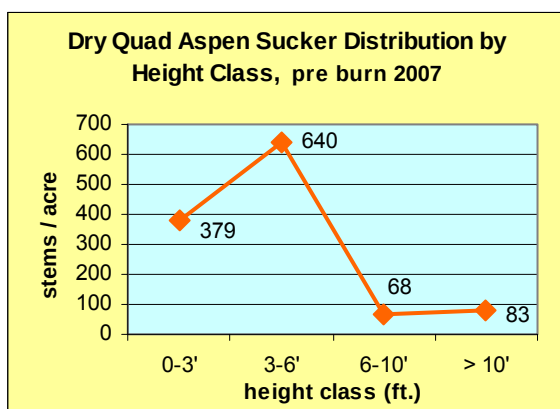


NE Quad photopoint of aspen monitoring stand

The data indicate that the pre-treatment aspen sucker density in this stand is between 757 – 1089 stems per acre, reported as an 80% confidence interval. Although a good portion of aspen suckers in this unit are greater than 10 feet in height, overall the number of aspen suckers is small. Long-term project objectives aim to greatly increase the pre-burn number of aspen suckers to *attain 2000-5000 aspen stems per acre $\geq$ 6 feet tall within 3-years of treatment and to attain 1000-2000 aspen stems per acre $\geq$ 10 feet tall within 15-years of treatment.* Additional aspen monitoring may be installed post burn in additional treated areas.

Overstory aspen and all conifer trees were also tallied in the aspen monitoring stand. Post-burn objectives in treated aspen areas include: 1) *attain $\geq$ 50-80% mortality of aspen trees ($>5.9''$ dbh) within one year of burn*, and 2) *attain $\geq$ 85% conifer mortality within one year of burn.* Pre-burn density in the monitored stand is 7-28 stems per acre overstory aspen and 99-159 stems per acre conifer trees. Again, additional monitoring may be installed in treated aspen areas post burn.

Pre-burn monitoring was also started in the Dry Quad area. Two general stands were designated for treatment, “stand one,” slated for the aspen prescription and “stand three,” slated for the Douglas fir prescription. Due to a mix-up, pre-treatment aspen monitoring was conducted in the SE corner of the “Douglas fir” stand in 2007. This area does have an aspen sub-stand where pre-treatment aspen sucker density is between 942 – 1396 stems per acre, reported as an 80% confidence interval. This monitored sub-stand may be a good candidate for aspen regeneration.



Additional aspen monitoring will be conducted in aspen stand, “stand one” in 2008. Monitoring will also be conducted in order to determine how many conifer are removed, killed, and how much of the stand is opened up in order to achieve good fire behavior in the aspen stand. Determination of specific data collection methods and a monitoring plan are in progress.

Both Northeast Quad and Dry Quad projects also have Douglas fir prescriptions outlining thin and understory burn treatment combined with timber sale. Overall objectives include reducing the risk of beetle infestation as well as returning the stand to “natural conditions [where] frequent ground fires maintained an open, savannah-like setting” (vegetation prescription). The specific prescription requires thinning to a basal area of 60 ft², followed by burning to reduce fuel-loading to 13 tons per acre. Monitoring objectives call for conducting stand exams and Brown’s transects in order to determine if objectives have been met. The B-T collect stand exam data at Dry Quad in 2007, but additional pre-treatment monitoring may be conducted in 2008. Post-thin and pre-burn monitoring data may be collected at Northeast Quad in 2008.

Lower Gros Ventre, Units J & K

The majority of pre-burn monitoring for Lower Gros Ventre units J & K was completed in 2006. Most pre-burn results, including aspen and sagebrush pre-burn densities in targeted monitoring stands, can be found in the 2006 Lower Gros Ventre monitoring summary on the K: drive.

Additional pre-burn monitoring photopoints were installed in 2007 for limber pine. Limber pine stands were delineated throughout units J & K using a vegetation map and on-the-ground scouting. Three limber pine photopoints were installed in or with views of determined limber pine stands. Photopoints will assist in monitoring the limber pine objective that states: *Avoid killing limber pine trees > 16”DBH.*



LGV05, limber pine photopoint



LGV07, limber pine landscape photopoint

In the fall of 2007 a portion of unit J was burned, including a stand of dense sagebrush and conifer encroached foothills between Horsetail Creek and Russold Hill. Unfortunately, no monitoring had been done in this area pre burn. The sagebrush area included dense and tall plants with a consistent grass understory, which burned hot and consumed a large proportion of the fuels. The remaining acreage of the prescribed burn will be completed when a prescription window is open.

Pre & Immediate Post monitoring: South Burro Hill



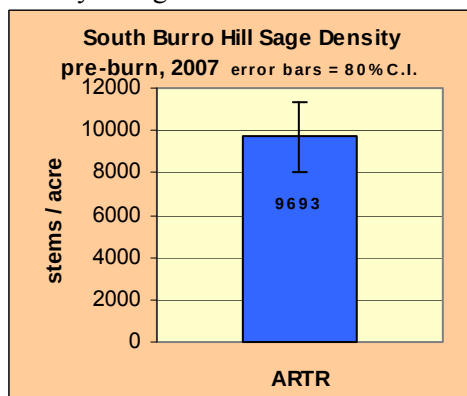
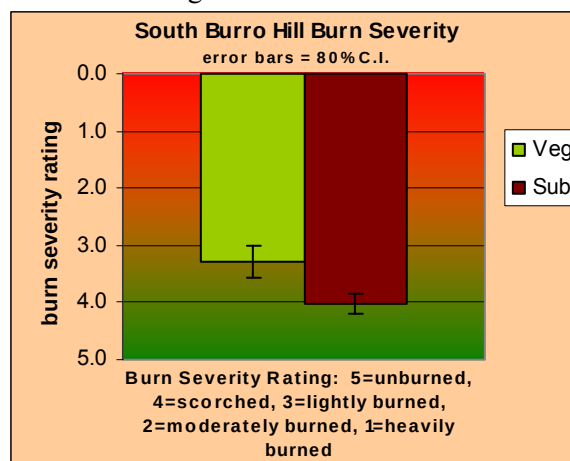
The South Burro Hill prescribed burn was completed in September, 2007. The burn took place over two days and incorporated terra torch, hand lighting, and heli-torch firing techniques. Weather and dry fuels combined for favorable burning conditions and resulted in the desired burn mosaic in sagebrush.

Draft monitoring objectives include:

- 1) *Obtain an immediate post burn severity rating of 3 or less across sagebrush in the burn unit.*
- 2) *Within sagebrush vegetation in project area reduce total live sagebrush density by a minimum of 50% one-year post burn.*
- 3) *Increase forb and native grass cover in burned sagebrush by at least 25% one-year post burn.*

Burn Severity monitoring was conducted immediately post burn across the burn unit with a random, non-permanent sampling method. Average burn severity rating across the unit was 3.3 +/- 0.3 for vegetation and 4.0 +/- 0.2 for

substrate, reported as 80% confidence intervals. The immediate post burn severity rating objective was just met, as it falls within the lowest end of the 80% confidence interval for vegetation. It is possible, and has been questioned in the past, whether fire managers have a slightly inflated view of burn severity ratings, i.e. the objectives call for more severe burning than actually desired for fire effects. The burn mosaic, as seen in the above aerial photo, and as discussed with fire managers immediately post burn, appears to have achieved the desired effect. Yr01 results will outline whether vegetative objectives are met with this burn severity rating.



Pre-burn monitoring included sampling sagebrush density and installing two permanent vegetation composition and cover plots. Pre-burn sagebrush density was 9693 +/- 1647 stems per acre. Yr01 objectives outline a 50% reduction in sagebrush density to 4847 stems per acre. Additional shrubs occur across the landscape at South Burro Hill and were sampled in the shrub density circles. Rubber rabbitbrush, yellow rabbitbrush, bitterbrush, serviceberry, rose, and horsebrush were all sampled in density plots, but none were prevalent in density results. They ranged in density from approximately 10-600 stems per acre.

Vegetation composition and cover plots involve identification of all plants in a 1/10th acre circular plot and ocular estimates of the percent cover range for all plant species as well as estimates of percent cover

for all life form classes. See results in table below. Both permanent plots were burned. Yr01 monitoring will determine whether objectives to increase estimated native forb and grass cover by 25% are met.

South Burro Hill Veg Comp & Cover Summary				
Pre-burn, 2007	# of species		estimated cover class	
	SBH01	SBH02	SBH01	SBH02
shrubs	5	4	30	20
grasses	9	7	30	30
non-native grasses	1	1	0	10
forbs	16	18	10	10
non-native forbs	1	1	0	0

SBH01, veg comp & cover plot & photopoints:



pre-burn, 2007



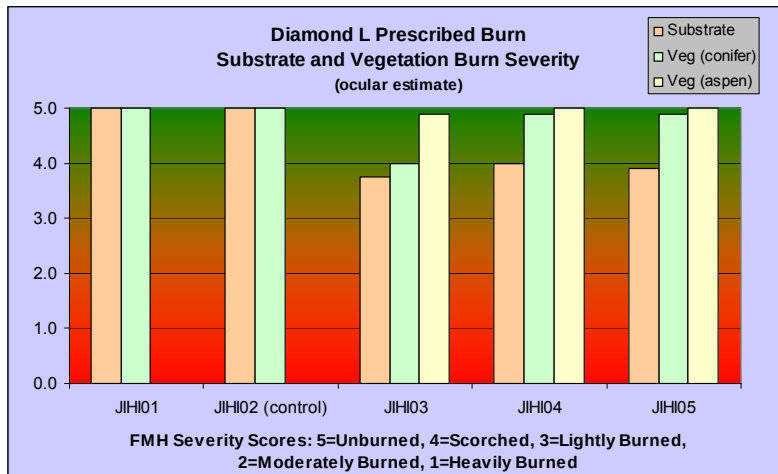
immediate post-burn, 2007

Post-burn monitoring (yr10): Diamond L

The Diamond L prescribed burn was implemented in October 2005 using a helicopter-mounted PSD and hand-ignition for blacklining. The unit consists of approximately 1260 acres of aspen, sagebrush, and Douglas fir vegetation in an area of high priority elk habitat. The Jackson Interagency Habitat Initiative group promoted the project and developed monitoring objectives for aspen. Five aspen stands were selected for monitoring, including one control stand.

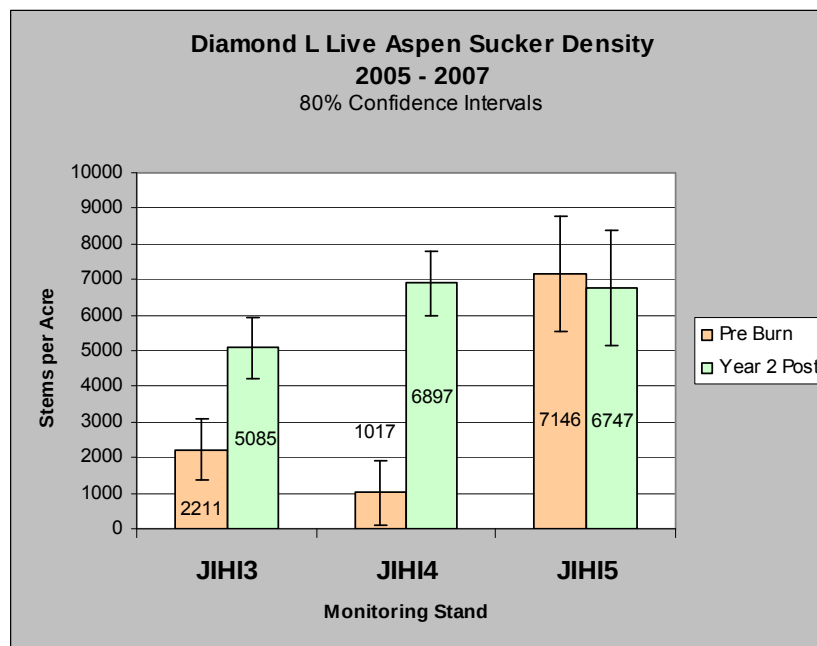
Objectives for aspen treatment were to kill 50-80% of the overstory trees (over 5.9" dbh) and 85% of conifers in the identified stands. Desired aspen recovery was stated to be 2000-5000 live stems per acre over 10 feet in height within 15 years post fire. A ground cover objective of less than 20% bare soil within 5 years post fire was also stipulated.

After the burn, severity estimates were recorded using FMH ratings for the five stands.



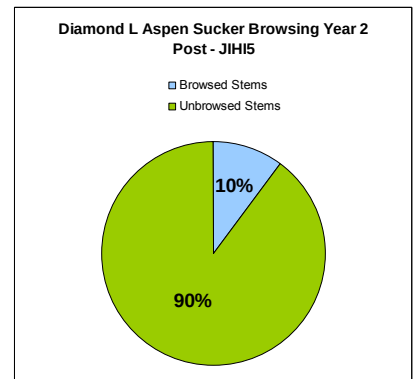
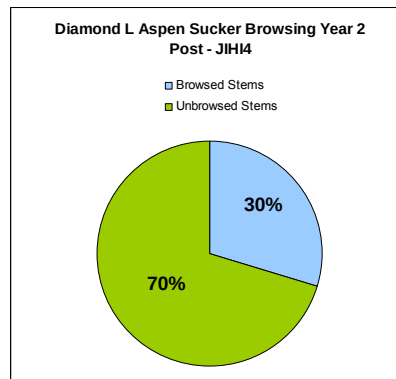
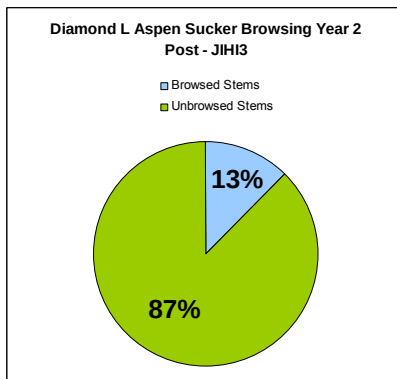
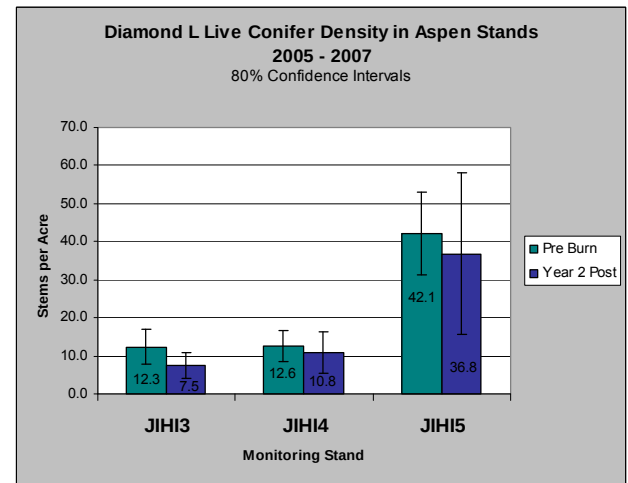
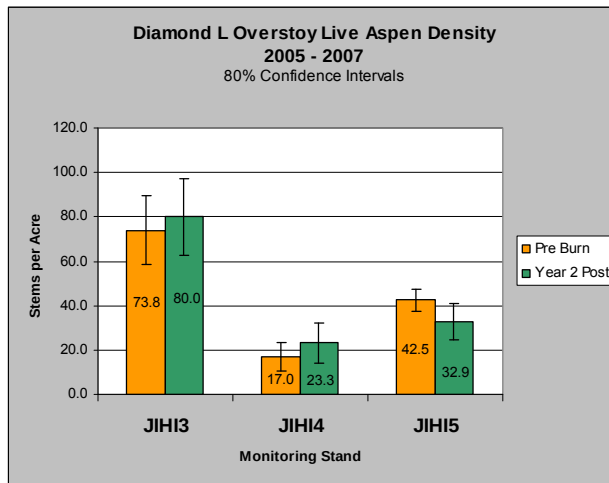
Three of the five aspen stands experienced fire effects. The severity was generally not considered hot enough to meet objectives; however some overstory trees and conifers were killed. Year two monitoring results from these three stands show that there are significantly more aspen suckers in two of the stands, JIHI3 and JIHI4.

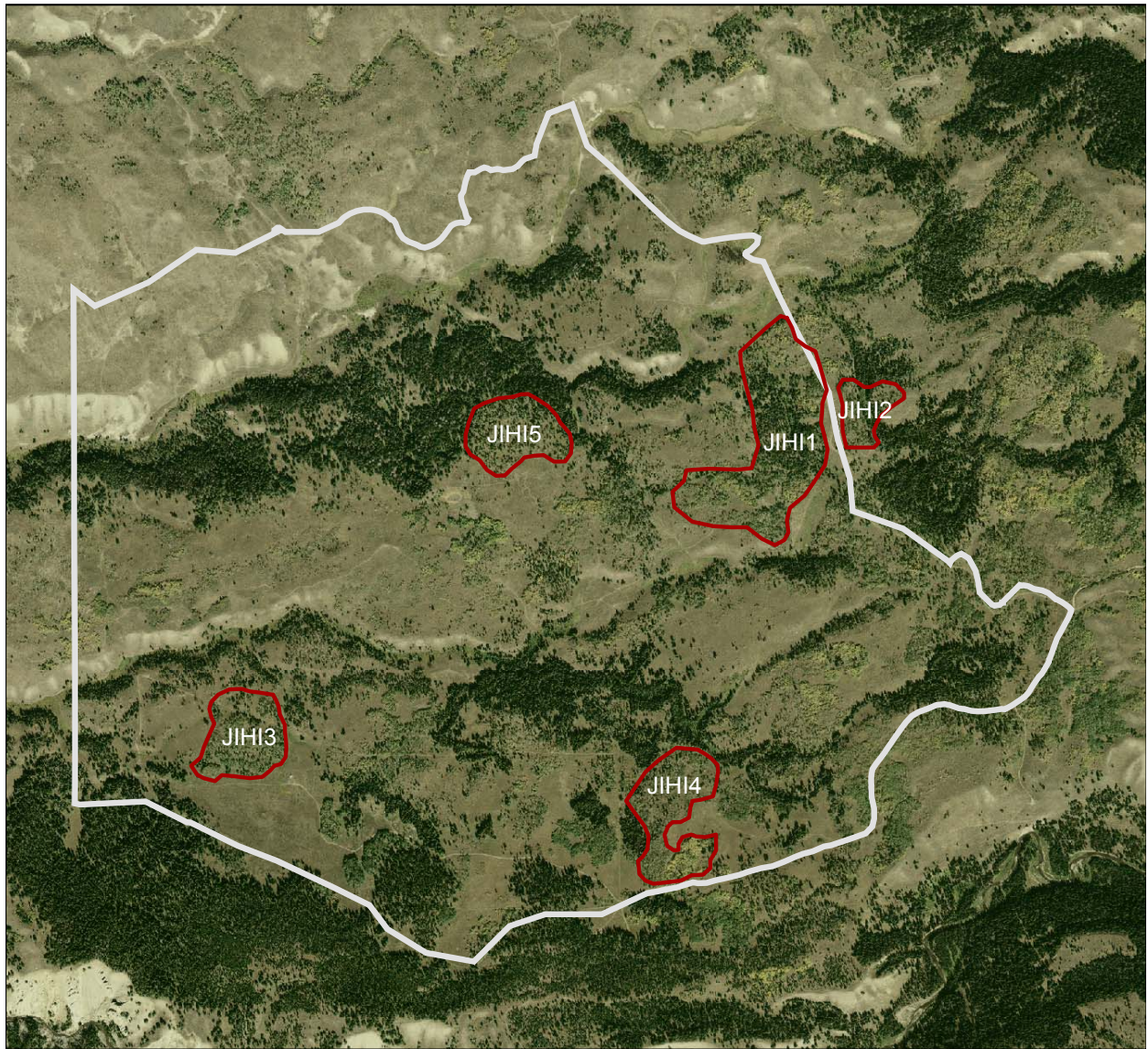
JIHI 5 showed no significant difference in sucker density post burn. However, this stand had a high density of suckers prior to the fire. As long as the aspen suckers in these stands are able to grow high enough to escape browsing, it appears that aspen objectives will be achievable, even though there was no significant reduction in conifers or overstory aspen following the burn.



Aspen browse data was collected at the JIHI project in 2007, however current annual growth made it difficult to accurately determine whether terminal leaders had been consumed. The percentages of browsed aspen suckers appear to be reasonably low, however, with 13%, 30%, and 10% for the three stands.

Percent ground cover in the three aspen stands was less than 1% bare ground two years post burn.



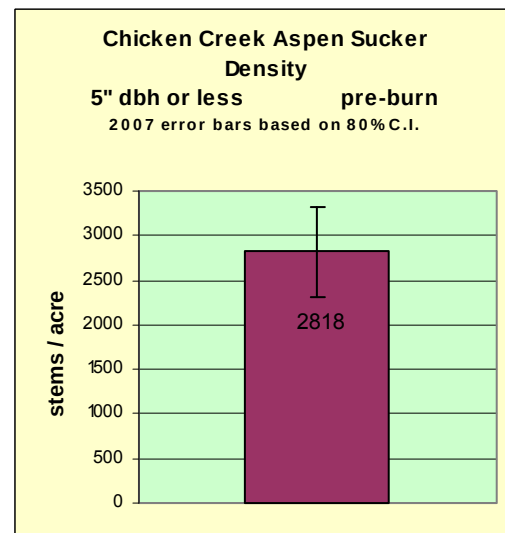
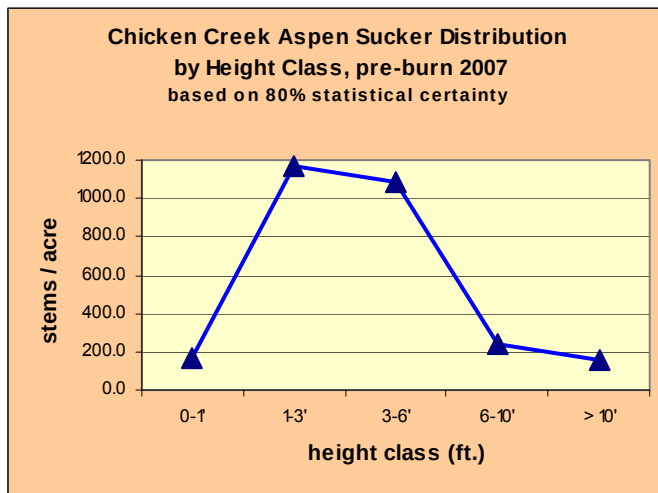


East Zone B-T

Pre-burn monitoring: Chicken Creek, Cottonwood II, & Maki Creek

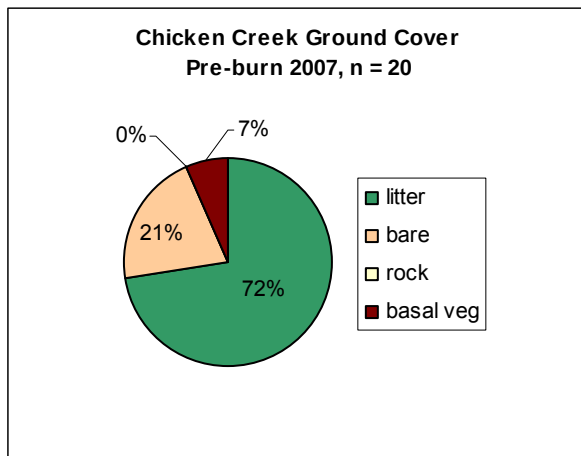
Chicken Creek

Chicken Creek is a new prescribed burn project proposed by the Pinedale Ranger District. Burn goals include aspen regeneration and a desired burn mosaic in sagebrush. The monitoring plan is currently being written, so specific monitoring objectives are not available for this report. However, they are likely to be similar to those written for the Willow Creek Rim prescribed burn (see below). Browse utilization of aspen suckers will also be monitored.



Long-term objectives for aspen regeneration are likely to be standard, such as: *Achieve 1000 aspen stems per acre $\geq$ 10 feet tall in treated areas within 15 years post burn.* Pre-burn data indicate that aspen sucker density (less than 5 inches dbh) is between 2309-3327 stems per acre (80% confidence interval). Most of those aspen suckers are currently in the 1-6 feet height range. Less than 200 stems per acre fall into the greater than 10 feet tall height class. Prescribed burning will attempt to rejuvenate aspen suckering to eventually obtain a greater number of aspen stems per acre that are out of reach of browsing ungulates. Of the total pre-burn aspen suckers, 19% show browsing on the terminal leader.

Chicken Creek long-term objectives will also specify a ground cover recovery for treated sagebrush areas. Pre-burn ground cover data indicate 80% cover of litter and basal vegetation, with 20% bare ground. See figure below. Long-term objectives will likely call for a return to pre-burn ground cover within 5 years.

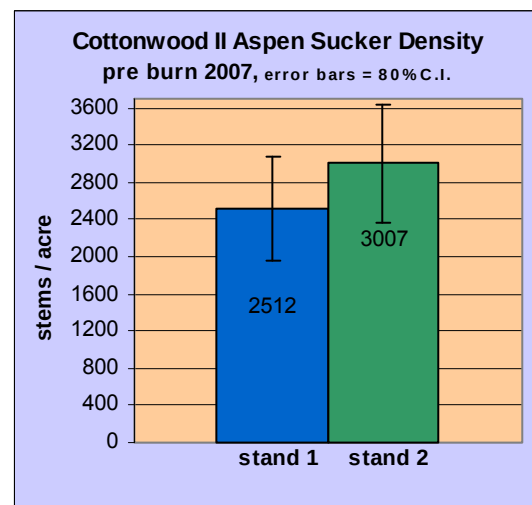
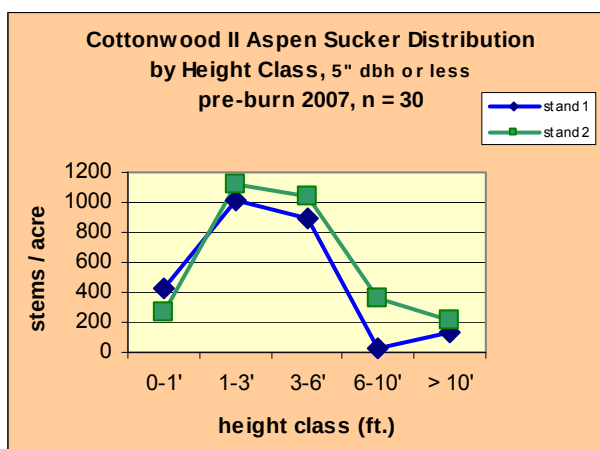


Chicken Creek photopoint showing sagebrush & aspen

Cottonwood II

Cottonwood II is a new mechanical thinning and prescribed burn project, an immediate follow-up to the Maki aspen enhancement project. Both projects outline similar objectives and utilize similar implementation tools to expand the treatment across additional acres on the landscape. Like Chicken Creek, the monitoring plan is currently being written, so specific monitoring objectives are not available for this report. However, aspen monitoring objectives are likely to be similar to those written for Maki Creek.

Two stands within the Cottonwood II burn unit were targeted for treatment and monitoring: stand one, in the Sjolberg drainage and stand two, in the Nylander drainage. The aspen sucker data collected at these stands are very similar to one another and to those reported for Chicken Creek. Stands one and two have pre-burn aspen sucker density ranges of 1955 – 3069 and 2377 – 3637 stems per acre, respectively. The values are reported as 80% confidence intervals. Both stands also have the majority of aspen suckers distributed in the height classes between 0-6 feet tall. Only a small number of aspen suckers per acre are over 10 feet in height. Browse utilization of total aspen suckers is 17% in stand one and 13% in stand two.



Maki Creek (written by Eric Maichak, WGFD)

This project is a collaboration between the USFS and WGFD to achieve the primary goals of; 1) rejuvenating decadent aspen stands and adjacent vegetation communities on a 2,200 ac project area; and 2) reducing the dependency of elk to feed at the adjacent Jewett feedground. Similar to the Cottonwood II project, treatments include mechanical falling of conifers (initiated summer 2005, completed autumn 2007) followed by prescribed burning (scheduled spring 2008) within about 1,000 ac of aspen stands. Unlike Cottonwood II, this project will also treat about 750 acres of mountain big sagebrush communities with prescribed fire. Specific monitoring objectives for the sagebrush component of this project are

- 1) Maintain or increase ground cover (basal vegetation, mosses, lichens, rock greater than $\frac{3}{4}$ inch, and litter) to $\geq 60\% \leq 2$ yrs post-burn
- 2) Increase ground cover to $\geq 80\% \leq 5$ yrs post-burn, and
- 3) Decrease density of sagebrush in mature and decadent age-classes by 40-60% 1yr post-burn.

In July 2007, the fire effects crew assisted WGFD personnel (Maichak) with pre-burn monitoring of the sagebrush component of this project. One BFH-style macroplot (permanent baseline with five random sub-transects) was established on each treatment and control site. To address specific monitoring objectives, line-point (one “point” every 0.25m along each 25-m transect) and shrub belt (1-m wide, right side of each transect) methodologies were used to gather data on ground cover and sagebrush densities, respectively. Additional data collected included vegetation composition and species richness (concurrent line-point sampling) and herbaceous production (clippings collected in October).

We found that ground cover was greater than 95% on each site. Densities of sagebrush were 25,440 plants/ha and 24,240 plants/ha on the treatment and control sites, respectively. Similar to visual estimates throughout the central Wyoming Range, size/age classes of sagebrush plants were dominated by those classified as mature.



Our additional data collection effort showed that overall species richness was identical on both sites ($n = 22$ species). Production estimates appeared to differ between the treatment and control sites. The treatment site had an estimated 195 kg/ha (174 lb/ac) and 366 kg/ha (326 lb/ac) production of

forbs and grasses, respectively. The control site had an estimated 333 kg/ha (297 lb/ac) and 204 kg/ha (182 lb/ac) production of forbs and grasses, respectively.

Immediate-post & year 01 monitoring: Little Flat Top Project: (Willow Creek Rim & Wood Draw)

The Little Flat Top prescribed burn project was divided into two burn units that were implemented in consecutive spring burns. Willow Creek Rim unit was burned in spring 2006 and Wood Draw unit was burned in spring 2007. Both units have burn mosaic, ground cover, and aspen regeneration objectives. Additionally, Wood Draw has willow regeneration objectives. Objectives for both units include:

- 1) *Treat 30-50% of sagebrush with 15% canopy cover or greater, to be measured one-year post burn.*
- 2) *Attain 60% ground cover in burned aspen areas within 2-years post burn and 80% within 5-years post burn.*
- 3) *Attain 1000 stems per acre in burned aspen areas $\geq$ 10 feet tall within 15-years post burn.*

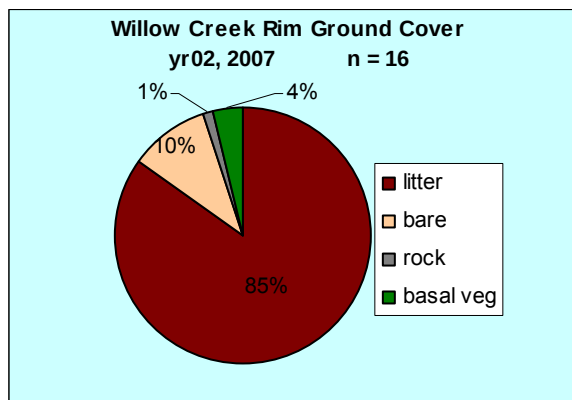
Willow objectives for Wood Draw also include:

- 4) *Within burned areas, attain willow height greater than or equal to mean pre-burn willow height within 10-years post burn.*
- 5) *Attain at least 30% increase in the proportion of live to dead willow stems within 3-years post burn.*

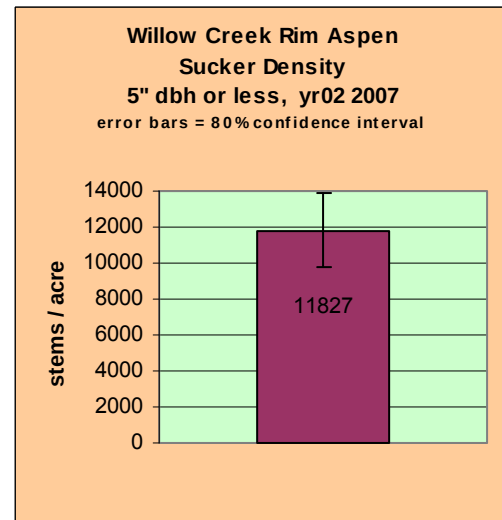
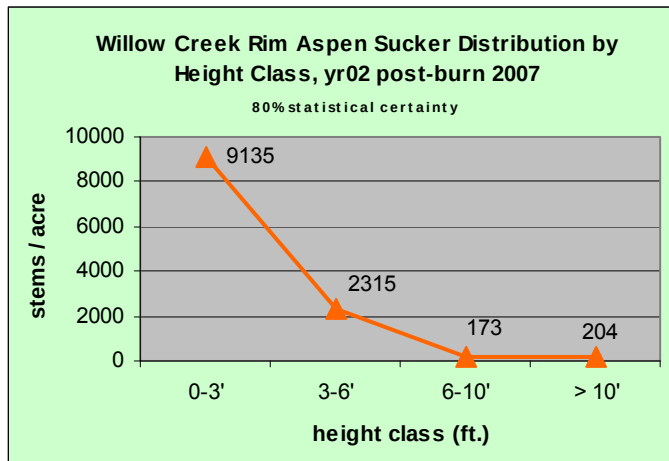
Willow Creek Rim

At the Willow Creek Rim project area aspen suckers are numerous in treated areas. Two years post burn, a burned aspen stand was selected for monitoring with non-permanent circular plots. Density in burned areas is between 9,784 - 13,870 stems per acre (80% confidence interval). In 2007 most aspen suckers are less than 3 feet tall. However, the large numbers of suckers per acre indicate a good chance for sucker survivorship and growth to reach burn objectives within 15-years post burn. Only 1% of aspen suckers showed signs of browse utilization in 2007.

Willow Creek Rim long-term ground cover objectives appear to have been achieved within two years. Five-year ground cover objectives for 80% were exceeded, with 89% cover in year two. Pre-burn ground cover was not measured.



Aspen suckering in the Willow Creek Rim burn unit.



Wood Draw

Pre-burn and immediate-post burn monitoring at the Wood Draw burn unit was comprised of willow transect data and photos. Aspen density and ground cover monitoring will be installed two years post burn in 2008. Prior to the burn, willow height was measured along a transect with a maximum of 11 feet. Therefore all stems taller than that were recorded as 11. The overall average height was 6.67 feet. This is not a true average height, but it is the standard against which future willow height recovery will be measured. The percent of live versus dead willow stems was 68:32.



Wood Draw, photopoint #3, pre-burn 4/2007



Wood Draw, photopoint #3, imm-post burn 4/2007



Wood Draw, photopoint #3, yr01 9/2007



Wood Draw willow regeneration, 7/2007

Post-burn monitoring (yr01): Monument Ridge

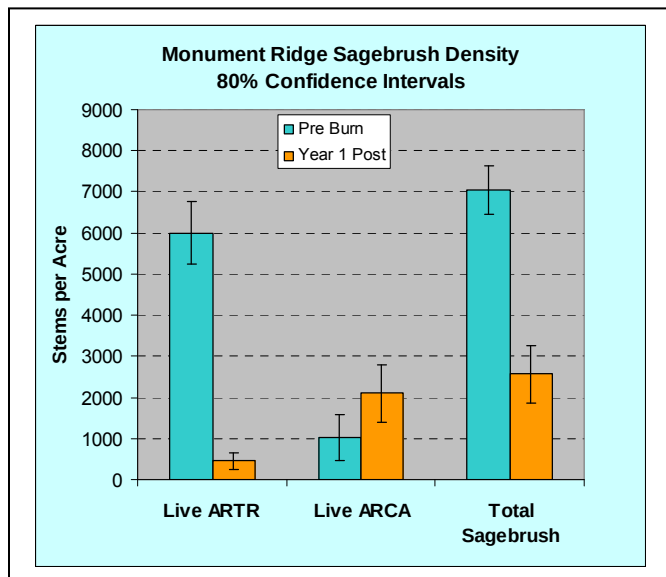
Monument Ridge

The first unit of the Monument Ridge project was burned in the fall of 2006. Unit 1 is a toe-slope of Monument Ridge dominated by sagebrush that parallels the highway in a northwest to southeast direction. It is dissected by several intermittent draws with aspen and Douglas fir pockets on north facing aspects.

The monitoring objectives for this burn unit were:

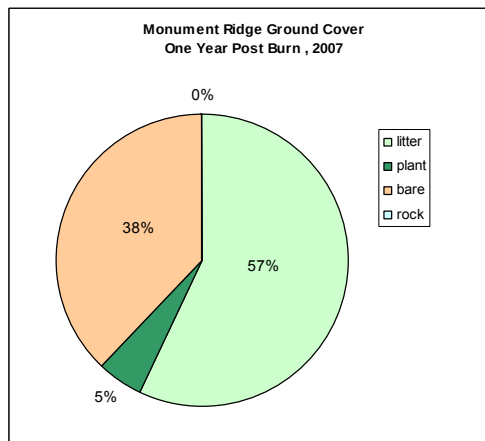
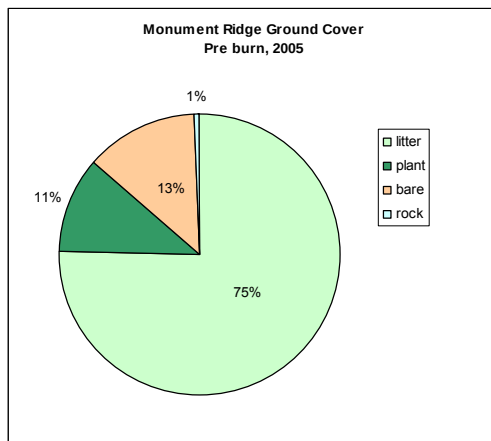
1. Burn 30-60% of the sagebrush communities having >15% canopy cover in a mosaic pattern within the project area.
2. Attain $\geq 80\%$ mortality of sagebrush in burned areas by 1 years post burn.
3. Attain 60% ground cover in sage/grass communities after the second growing season post-burn and 80% ground cover after the fifth growing season post-burn.
4. Attain a diverse array of native successional plant species in burned areas.

From the 2007 field visit, it appeared that approximately 40-50% of the sagebrush was blackened, with very little aspen or conifer affected by fire. The burn mosaic objective was therefore achieved. Non-permanent circular sagebrush density plots were used to estimate sagebrush density in burned areas compared to pre burn. Two sage species present include mountain big sagebrush (*Artemisia tridentata* ssp *vaseyana* – ARTR), and silver sagebrush (*Artemisia cana* - ARCA). The results of 38 post burn circles and 26 pre-burn circles are shown below.



Within the blackened areas, mountain big sagebrush estimates show a 92% reduction. Silver sagebrush density increased by 51%. This can be attributed to the vigorous post-burn resprouting habit of the species. Overall, sagebrush in the unit (both species) was reduced by 64%. This is less than the objective of 80%, however the resprouting of silver sage skews this toward a lower percent mortality.

Ground cover was measured using point intercept transects co-located with sage circles pre and one year post burn. Pre burn ground cover (non-bare or rock) was estimated to be 86%. The post burn ground cover was 63%, which meets the objective of > 60%.



Species composition and cover plots showed the following species richness at Monument Ridge:

Pre Burn	Pre Burn	Year 1 Post
Shrubs	8	2
Native Grasses	10	9
Exotic Grasses	2	2
Forbs	22	22
Exotic Forbs	3	3
Total Species	45	38

It is expected that the burned plant community will continue to recover in the next few years, so additional species should appear. It is encouraging that the number of exotic species was unchanged.

In summary, the Monument Ridge Unit 1 burn has met most of its stated objectives in year 1 post burn. Future monitoring will clarify the remaining ones.

Post-burn monitoring (yr10): Boulder Ridge & Half Moon

The fire effects crew assisted Wyoming Game & Fish (J. Rogerson) with 10-year post burn monitoring at two sagebrush treatment units: Boulder Ridge and Half Moon. BFH macroplots were conducted to collect long-term data on shrub density, ground cover, and vegetation cover. Contact J. Rogerson for results.

West Zone B-T

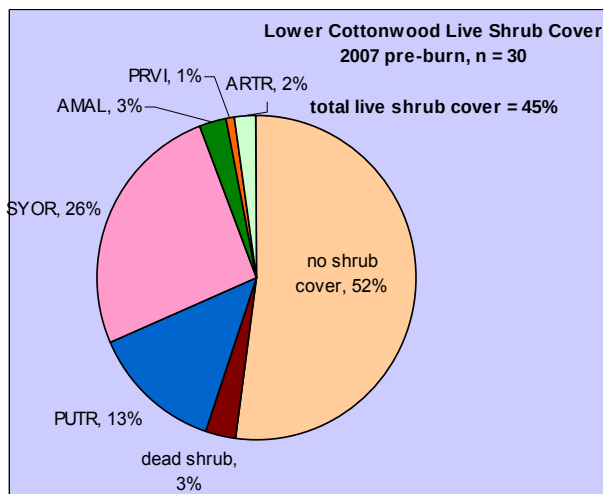
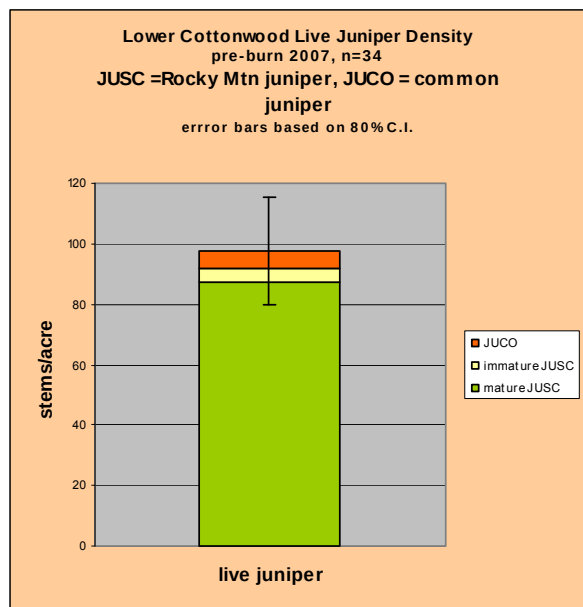
The Fire Effects Crew monitored two projects on the West Zone in 2007. Pre-burn plots were installed at Lower Cottonwood and immediate-post-burn monitoring was conducted at Weiner Creek.

Lower Cottonwood

The Lower Cottonwood prescribed burn project is located in an area of mountain shrub vegetation in the foothills of the Salt Range. The area is experiencing vegetative changes due to fire exclusion. Juniper has expanded into mountain shrub communities that are important for wintering ungulates. Mountain mahogany has also expanded somewhat from the steep and rocky sites that a historic fire return interval would restrict it to.

Burn objectives call for restoration of 400 acres of this landscape using fire. Specific objectives address: 1) a decrease of juniper density by 60-80%, 2) long-term restoration of both bitterbrush and “broad-leaved” (i.e., palatable) shrub cover, and 3) treatment of mountain mahogany sites established in deeper soil (present due to fire exclusion), but avoidance of mountain mahogany in rocky, gravelly sites (historic range).

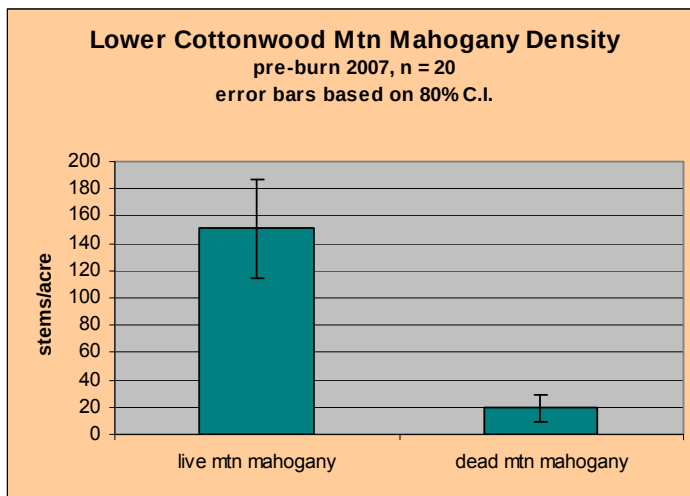
Pre-burn live juniper density is 80-116 stems per acre, reported as an 80% confidence interval. Juniper at Lower Cottonwood is comprised of common juniper and Rocky Mountain juniper (*Juniperus communis* and *J. scopularum*, respectively). A decrease of 60-80% juniper, as stated in the monitoring plan objectives, would require a post-burn juniper density of less than 48 stems per acre (the upper range of an 80% confidence interval).



Scientific names “uncoded”: PUTR = bitterbrush, SYOR = snowberry, AMAL = serviceberry, PRVI = chokecherry, ARTR = sagebrush

Pre-burn shrub cover monitoring was conducted in vegetation areas with a significant cover of bitterbrush as indicated by a vegetation map and on-the-ground scouting. The data indicate that live shrub cover in these areas is currently 45% and comprised mostly of snowberry. The remaining live

shrub cover, in order of decreasing cover, is bitterbrush, serviceberry, sagebrush, and chokecherry. According to burn objectives, a return to current bitterbrush cover is desired within 20 years. Post-burn monitoring will measure for the specific objective of 8% cover of bitterbrush within 10 years post burn and a return to 14% cover within 20 years post burn. Post-burn monitoring will also measure for a return of total “broad leaved shrub cover” (chokecherry and serviceberry) to pre-burn levels of 4% within 20 to 30 years.



Lower Cottonwood mountain mahogany stand & photopoint

Mountain mahogany density was measured pre burn in targeted treatment areas. Pre-burn density is 115-187 stems per acre. Quantitative data was not collected for historic mountain mahogany sites with rocky, gravelly soil. Instead, photopoints were taken and will be used to document any changes due to prescribed burning. More work is needed to clearly outline treated vs. untreated mountain mahogany sites for all fire managers before prescribed burn implementation.

Weiner Creek

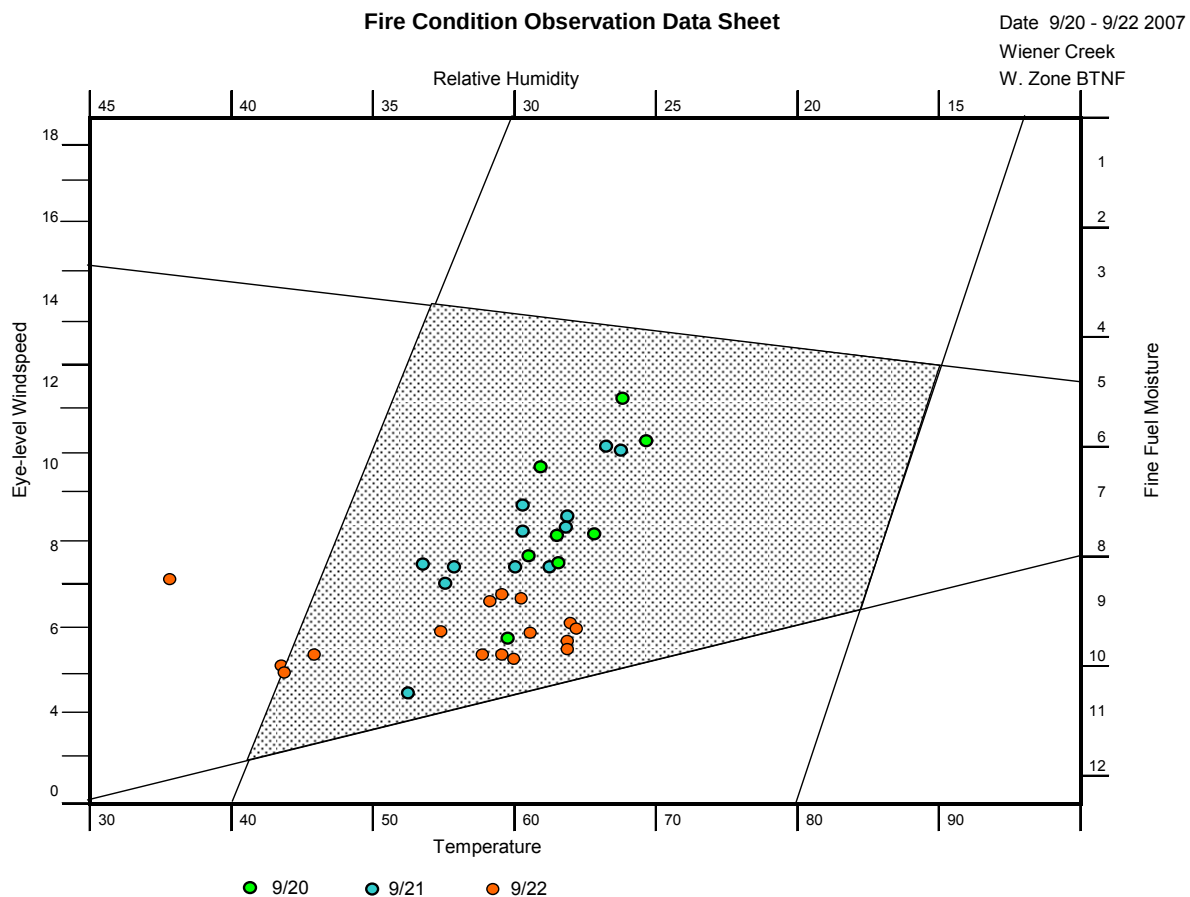
Prescribed burn operations were conducted in September, 2007 at the Weiner Creek burn unit. Aspen regeneration objectives were the main focus of the burn. Specific immediate-post-burn objectives included:

- Blacken at least 75% of the aspen stands within the identified high priority area.*
- Blacken at least 50% of the aspen in the moderate priority areas.*

Long-term objectives designated 70-90% tree mortality of overstory aspen trees and > 85% mortality of conifer trees within two years. Three aspen stands were pre-identified in the burn unit for monitoring the stated objectives. One was a control stand outside the project perimeter. In future years, aspen regeneration will be measured according to aspen sucker density and height: $\geq 1,000$ stems per acre of 10-foot-tall aspen suckers within 15 years post burn.

Weather and fuel guidance parameters in the burn plan called for the following conditions:

Element	Low	High	Desired	Actual
Temperature	40-80	80	40-80	51 - 68
RH	30	12	15	23 - 72
Wind	0-5	10-15	5-10	0-gust 20
1 hour fuels	8	5	6	
10 hour fuels	10	6	7	
100 hour fuels	15	10	12	
1000 hour fuels	20	12	15	
Live woody	75-100	75-100	75-100	



The fire conditions chart above shows that the third day was cooler than the first two. In fact, there was rain the third day. Gusty winds led to spotting outside the perimeter on days one and two.

Immediate post-burn fire effects monitoring included aerial photos of the burn unit (taken within two weeks of the burn), on-the-ground scouting, and a re-take of photopoints. Although a burn mosaic map was not created, aerial photos and on-the-ground scouting provided an estimate of the burn extent and percent blacked within identified vegetation types. According to this estimate, immediate post-burn objectives were not met. As post-burn aerial photos show, much less than 75% of priority aspen stands and 50% of moderate priority aspen stands were blackened by the Wiener Creek prescribed burn. (The K: drive will be updated with Wiener Creek aerial photos by February, 2008.)



Weiner Creek Rx burn immediate post-burn



aerial photos taken within 2 weeks of the burn

Additionally, during immediate post-burn monitoring it was discovered that none of the aspen stands targeted for density monitoring were affected by the prescribed burn. However, long-term objectives may still be measured in future years. Scouting will be needed to determine how monitoring will be prioritized in the coming years. Burning was concentrated in the upper one-third of the unit, so it may be necessary to relocate aspen plots and photopoints to this area.



What a great year!...what a great four years!!...I'll miss it greatly!!! -- Kate