

Fire Ecology Annual Report

Calendar Year 2011



TABLE OF CONTENTS

A. Summary.....	3
Table 1 - Fire Effects Plot Workload (2011) and Total Plots Installed.....	5
Table 2- Fire Ecology Staffing 2011.....	6
Table 3 - 2011 Management Objectives and Monitoring Results.....	7
B. Fire Ecologist Accomplishments and Areas of Focus.....	11
Table 4 - Fire Ecologist 2011 Accomplishments/Focus Areas.....	11
C. Fire Effects Crew Accomplishments and Areas of Focus.....	11
Table 5 - Fire Effects Crew Accomplishments/Focus Area.....	12
D. Additional Program Information.....	12
Table 6 - Planning – 2011.....	13
Table 7 - Monitoring – 2011.....	13
Table 8 - Communicating Results – 2011.....	13
Table – 9 Research – 2011.....	13
E. 2012 Direction.....	14
F. Optional Information.....	14

A. Summary

The Teton Interagency Fire Ecology Program serves both Grand Teton National Park and the Bridger-Teton National Forest. In 2011, the program was staffed by Diane Abendroth, Fire Ecologist, Jon Freeman, Lead Fire Effects Monitor, Ron Steffens, Fuels Monitor, Kal Stromberg, Assistant Lead Monitor, Fire Effects Crew Members Jessica Haddon and Carly Monahan, and SCA Intern Joe Vaughn. In addition to these employees, Fire Ecology work depends on collaboration with numerous fire and resource managers and crews on the park and forest as well as Wyoming Game & Fish Department. This year the Lead Fire Effects Monitor was filled as a GS-7 permanent employee for the first time. There was also a seasonal Assistant Lead Monitor. As a result, there was an immediate and tangible improvement in the crew's efficiency, fire preparedness, training, morale, and overall functionality. Also this year there were no injuries to report.

The Fire Effects program provides science-based data collection for the evaluation of fire management treatment objectives. The crew also functions as red-carded wildland firefighters. In 2011, they visited 25 locations on the park and forest for plot work, and participated in numerous unplanned fires locally and in the Southwest. Special emphasis was placed on fire preparedness this year, and the crew responded by obtaining saw gear and rostering a qualified IA squad nearly every day of the season. They practice their engine, helicopter management, and cutting skills by helping out the other modules when time allowed. They also brought some of the other seasonal firefighters into the field with them so they could learn plot methods.



The 2011 Seasonal Fire Effects Crew (Joe Vaughn, Kal Stromberg, Jessica Haddon, and Carly Monahan) on an early summer field day in the Tetons.



SCA Intern Joe Vaughn maintaining the Fire Effects Crew's saw during YCP Day at the Beaver Creek Fuels reduction Project.

Fire Effects Crew members Jessica Haddon and Jon Freeman created a new geodatabase for all of Grand Teton National Park's mechanical fuels treatments going back to the early 1990's. The source data was located in old files, numerous GIS files, and the heads of local fire personnel, and required exhaustive research. This geodatabase be used to greatly assist with fire management decision making in the future.

During the spring, Jon Freeman travelled to Natchez Trace Parkway to detail as a firefighter for several weeks. This exchange provided him with valuable experience and training, while shortening his furloughed period. In May, Kal Stromberg and Diane Abendroth assisted Grand Canyon National Park's Fire Effects Crew in Arizona for a week to complete pre-burn plots prior to the implementation of a spring burn. This trip facilitated an outstanding opportunity to network and learn about the Canyon's fire ecology.

Fuels Monitor Ron Steffens returned for his 20th season working for Fire Management, and joined the Fire Ecology Program. Ron was responsible for producing seasonal and monthly fire weather outlooks and live fuels sampling, as well as development and maintenance of the tetonfires.com website. In June, Ron traveled to Arizona, where he worked as a Geospatial Analyst (GSAN) to assist the Southwest Geographic Area Coordination Center with predicting the growth of large fires. In August, Ron was a Division Supervisor and Incident Commander for the local Red Rock Complex.



Fuels Monitor Ron Steffens taking live woody samples

Fire Ecologist Diane Abendroth was also able to travel to the Southwest GACC to assist with fire behavior predictions. She worked as an intern with a group of specialists from the Wildland Fire Management Research, Development & Application Center. This training allowed her to serve as a GSAN on several local fires including the Red Rock Complex.

On the Red Rock Fire, Diane Abendroth and Jon Freeman were involved in the creation of a new Teton Wildland Fire Module with Teton Interagency Fire. Jessica Haddon, Kal Stromberg, and Carly Monahan participated as module members. The initial successes of this module led to a call to formalize a suite of protocols and objectives that will enable future fire modules to provide a higher level of data collection on local incidents.

In the summer of 2011, Diane finished the Fire Ecology and Ecosystem Processes chapter in the BTNF Teton to Snake Fuels Project EA. This is the first such chapter in a USFS NEPA document.

Table 1. Fire Effects Plot Workload (2011) and Total Plots Installed

Park/Forest	Monitoring Unit	Plot Type	Pre-Burn 2011	Immed. Post 2011	Post (1-20 yrs) 2011	Annual Total 2011	Total Plots
Grand Teton National Park	Eynon Ridge Rx	Aspen Circles, Photopoints			41	41	41
	Phelps Moraine Rx	Browns, Photopoints		2	11	13	13
	Airport Sage Strips	Weed Survey, Photopoints			102	102	102
	Teton Science School Rx	Shrub Intercept, Photopoints			46	46	46
	Beaver Creek Mech	Stand Exams	10			10	10
	Colter Bay Housing Mech	Photopoints	2			2	2
	Leeks Marina Mech	Photopoints	2			2	2
	Flagg Ranch Mech	Stand Exams		3		3	10
	Shadow Mountain Rx	Burn Severity, Photopoints		19		19	19

Bighorn Canyon NRA	Sorenson Rx	FMH Brush Plots			5	5	5
North Zone Bridger-Teton NF	Ann Mountain Mech	Stand Exams, Photopoints	10			10	10
	North Willow Mech	Stand Exams, Photopoints	10			10	10
	Dry Quad Mech and Rx	Browns, Groundcover, Photopoints	20			20	20
	Deer Creek Mech	Stand Exams, Photopoints	5			5	5
	Beaver Mountain Rx	Aspen Circles, Stand Exams, Weed Survey, Photopoints	38			38	38
	Red Rock Complex	Photopoints	15	21		36	21
	Bull Fire	Browns, Photopoints			15	15	15
	Upper Palmer Rx	Photopoints		3		3	3
West Zone Bridger-Teton NF	Bradley Mountain Rx	Aspen Circles, Photopoints			39	39	39
	Kelley Mech	Stand Exams, Photopoints	14			14	14
East Zone Bridger-Teton NF	Maki Creek Rx	BFH Macroplots, Photopoints			2	2	2
	Monument Ridge 1 Rx	Shrub Intercept, Photopoints			34	34	34
	Monument Ridge 2 Rx	Shrub Intercept, Groundcover, Photopoints			51	51	51
	Wood Draw Rx	Aspen Circles, Groundcover, Willow Transects, Photopoints			49	49	49
	Chicken Creek Rx	Aspen Circles, Groundcover, Photopoints			50	50	50
						TOTAL: 619	

Table 2. Fire Ecology Staffing 2011

Ecologist and Monitors	Starting Date	Ending Date	# of Pay Periods	READ Qual? (Yes or No)	Training and Development
Diane Abendroth	1/1/11	12/31/11	26	YES	NM GSAN Detail Red Rock Complex GSAN ICT5 Signed off Opened FIRB taskbook L-380 S-131 Instructor READ Instructor USFS Wilderness Training USFS NEPA Training 44 Fire Operational Periods
Jon Freeman	1/1/11	12/31/11	23	YES	SE Region Detail (ENGBt/FIRBt) Teton Crew (1 and 4) and Module (2) Detail Completed FIRB, FALB taskbooks READ Qualified S-270 66 Fire Operational Periods
Kal Stromberg	5/16/11	10/20/11	11 ½	NO	Engine 3 Detail Teton Crew (4) and Module (2) Detail Completed FEMO taskbook Opened FFT1, HECM, and FALB taskbooks S-131, S-270, S-271 49 Fire Operational Periods
Jessica Haddon	5/31/11	10/20/11	10 ½	NO	Helitack Detail Teton Module (1) Detail

					Completed HECM taskbook Opened CRWB and FEMO taskbook S-390 38 Fire Operational Periods
Carly Monahan	5/31/11	10/20/11	10 ½	NO	Teton Module Detail Completed FFT1 taskbook Opened HECM, FEMO taskbooks S-270, S-271 27 Fire Operational Periods
Joe Vaughn	5/16/11	8/11/11	6 ½	NO	FFT2 Qualified Opened FALA taskbook S-130/190, S-212 0 Fire Operational Periods

Table 3. 2011 Management Objectives and Monitoring Results

Note that some vague objectives were used for older projects. In those cases, results are for protocols that most closely answer those questions. All results shown are 80% confidence intervals. For 2011”pre-only” projects, summarized data can be found in the individual project reports included in the appendices.

Park/Forest	Monitoring Unit	Management Objective	Monitoring Results	Objective Achieved?	Year Last Analysis Completed
Grand Teton National Park	Eynon Ridge Rx	Mimic natural fire severity in Douglas fir stands	Mixed severity Rx did include PSME stands.	YES	2011
		Re-introduce fire in conifer encroached aspen stands	87% reduction in conifers	YES	2011
	Phelps Moraine Rx	Consume 25-50% of 1000-hr fuels	Post-fire data will be collected in 2012	N/A	N/A
		Reduce crown bulk density by 25%	Post-fire data will be collected in 2012	N/A	N/A
		30-50% mortality in 0-3” trees	Post-fire data will be collected in 2012	N/A	N/A
		0-30% mortality in 3-6” trees	Post-fire data will be collected in 2012	N/A	N/A
		Monitor noxious weeds pre- and post-burn	Post-fire data will be collected in 2012	N/A	N/A
	Airport Sage Strips	Monitor changes in the frequency of exotic plants	Cheatgrass frequency significantly reduced for Year 1 and Pre levels	YES	2011
		Monitor changes in the percent cover of all plant species	Not measured in 2011	N/A	2010
	Teton Science School Rx	Track the recovery of shrub fuels in the treated area over time	Shrub cover in burn v. Control: Sagebrush 0.2%/36.8% Bitterbrush 1.2%/21.8%	YES	2011
		Determine how many years are needed for the height and percent cover of sagebrush and bitterbrush to return to pre-burn levels.	Shrub height in burn v. Control: Sagebrush .41m/.7m Bitterbrush .53m/.56m	N/A	2011
	Beaver Creek Mech	Reduce woody fuel loading to 10 tons/acre	Post-Treatment data will be collected in 2012	N/A	N/A
		Reduce crown bulk density to < 0.049 kg/m ³	Post-Treatment data will be collected in 2012	N/A	N/A
		Increase canopy base height to > 6 feet	Post-Treatment data will be collected in 2012	N/A	N/A
	Colter Bay Housing Mech	Reduce woody fuel loading	Post-Treatment data will be collected in 2012/13	N/A	N/A
		Increase canopy base height	Post-Treatment data will be collected in 2012/13	N/A	N/A
		Increase tree spacing	Post-Treatment data will be collected in 2012/13	N/A	N/A

	Leeks Marina Mech	Reduce woody fuel loading	Post-Treatment data will be collected in 2012/13	N/A	N/A
		Increase canopy base height	Post-Treatment data will be collected in 2012/13	N/A	N/A
		Increase tree spacing	Post-Treatment data will be collected in 2012/13	N/A	N/A
	Flagg Ranch Mech	Reduce woody fuel loading to 10 tons/acre	Reduced from 16.31 to 6.57 tons/acre	YES	2011
		Increase canopy base height	Reduced from 9 feet to 8 feet	NO	2011
		Increase tree spacing to 1500 stems/acre	Reduced from 2866 to 450 stems/acre	YES	2011
	Shadow Mountain Rx	Reduce live sagebrush cover to <5, <10, and <15% in units 1, 2, and 3 respectively	Post-Treatment data will be collected in 2012	N/A	N/A
		Reduce live sagebrush height by 50% in units 1 and 2	Post-Treatment data will be collected in 2012	N/A	N/A
		Obtain an FMH burn severity score of <3, <4, and <4 in units 1, 2, and 3 respectively	FMH scores of 3, 3.5, and 3.5 in units 1, 2, and 3 respectively	YES	2011
		Monitor noxious weeds pre- and post-burn	Post-Treatment data will be collected in 2012	N/A	N/A
Bighorn Canyon NRA	Sorenson Rx	Reduce the percent cover of Utah juniper in burned areas by at least 60% one year post	JUOS cover reduced by 78%	YES	2011
		Reduce the density of shrubs two years post burn by 30-50%	Juniper density reduced by 83%, Black sagebrush decreased by 64%	YES	2011
		Increase herbaceous cover by at least 30% two years post burn	No significant difference could be detected in grass or forb cover	NO	2011
North Zone Bridger-Teton NF	Ann Mountain Mech	Reduce woody fuel loading to 5 – 7 tons/acre	Post-Treatment data will be collected in 2012/13	N/A	N/A
		Increase canopy base height to 10 feet	Post-Treatment data will be collected in 2012/13	N/A	N/A
	North Willow Mech	Reduce woody fuel loading to 5 – 7 tons/acre	Post-Treatment data will be collected in 2012/13	N/A	N/A
		Increase canopy base height to 10 feet	Post-Treatment data will be collected in 2012/13	N/A	N/A
	Dry Quad Mech and Rx	50-80% mortality in overstory aspen	Post-Treatment data will be collected in 2012/13	N/A	N/A
		85% mortality in conifer (all size classes)	Post-Treatment data will be collected in 2012/13	N/A	N/A
		Increase aspen regeneration to 2000 suckers/acre over 6' tall by three years post-burn	Post-Treatment data will be collected in 2015	N/A	N/A
		Increase aspen regeneration to 1000 suckers/acre over 10' tall 15 years post-burn	Post-Treatment data will be collected in 2027	N/A	N/A
		Increase ground cover to achieve <20% bare ground three years post-burn	Post-Treatment data will be collected in 2015	N/A	N/A
		Create a downed woody fuel bed depth of 12-36" post-thin and pre-burn	Stands A and E averaged 6.2 and 7.3 inches, respectively	NO	2011
		Obtain an FMH burn severity score of at least 2 (moderately burned)	Post-Treatment data will be collected in 2012/13	N/A	N/A
	Deer Creek Mech	Reduce woody fuel loading to 5 – 7 tons/acre	Post-Treatment data will be collected in 2012/13	N/A	N/A
		Increase canopy base height to 10 feet	Post-Treatment data will be collected in 2012/13	N/A	N/A
		Increase overstory tree spacing to 194 trees/acre (15 x 15 feet spacing)	Post-Treatment data will be collected in 2012/13	N/A	N/A

	Beaver Mountain Rx	Reduce live conifers by 20-60% in aspen stand #1	Post-Treatment data will be collected in 2012/13	N/A	N/A
		Increase aspen regeneration to 1000 suckers/acre over 10’ tall 15 years post-burn	Post-Treatment data will be collected in 2027	N/A	N/A
		Blacken 40-80% of the sagebrush in a mosaic pattern	Post-Treatment data will be collected in 2012/13	N/A	N/A
		Achieve 10-30% canopy fire effects in conifer stand #2	Post-Treatment data will be collected in 2012/13	N/A	N/A
		Monitor noxious weeds pre-and post-burn	Post-Treatment data will be collected in 2012/13	N/A	N/A
	Red Rock Complex	Allow fire to play its natural role in the ecosystem as a process of ecological change, especially in the Gros Ventre Wilderness	Photo points and burn severity mapping show large scale, mixed severity fire, mimicking historic fire regimes	YES	2011
	Bull Fire	Allow fire to play its natural role in the ecosystem as a process of ecological change, especially in the Gros Ventre Wilderness	Photo points, fuels transects, and burn severity mapping show large scale, mixed severity fire, mimicking historic fire regimes	YES	2011
	Upper Palmer Rx	Blacken 40-80% of the sagebrush in a mosaic pattern	81% of the sagebrush burned in a mosaic pattern	NO	2011
		Achieve at least 40% conifer mortality in encroached sagebrush areas.	Post-Treatment data will be collected in 2012	N/A	N/A
		Reduce live conifers by 20-60% in aspen stand #1 and 2	Post-Treatment data will be collected in 2012	N/A	N/A
		Reduce overstory aspen density by 70% post-burn	Post-Treatment data will be collected in 2012	N/A	N/A
		Increase aspen regeneration to 3000 suckers/acre two years post-burn	Post-Treatment data will be collected in 2013	N/A	N/A
		Increase aspen regeneration to 1500 suckers/acre over 6’ tall 5 years post-burn	Post-Treatment data will be collected in 2016	N/A	N/A
		Increase aspen regeneration to 1000 suckers/acre over 10’ tall 15 years post-burn	Post-Treatment data will be collected in 2026	N/A	N/A
		Maintain aspen browse levels to <30%	Post-Treatment data will be collected in 2012	N/A	N/A
West Zone Bridger-Teton NF	Bradley Mountain Rx	Blacken 30-60% of the unit in a mosaic pattern	Mosaic mapping indicates 46% of the unit burned	YES	2011
		Increase aspen regeneration to 1000 suckers/acre over 10’ tall 15 years post-burn	Post-Treatment data will be collected in 2024	N/A	N/A
		Maintain current distribution of veg types (aspen, sage, mountain shrubland)	Burn was distributed equally across all veg types	YES	2011
		Achieve at 40-80% conifer mortality in encroached aspen areas.	No pre-burn data collected. Cannot assess.	N/A	N/A
		Restore shrub cover to pre-burn levels by 25-40 years post-burn	Post-Treatment data will be collected in 2034	N/A	N/A
	Kelley Mech	Create defensible space around cabins and improve firefighter safety	Post-Treatment FVS (predicted fire behavior) data will be collected in 2012	N/A	N/A
East Zone Bridger-Teton NF	Maki Creek Rx	Increase aspen regeneration to 1000 suckers/acre over 10’ tall 10-15 years post-burn	Post-Treatment data will be collected in 2018/19	N/A	N/A
		Increase ground cover to achieve <20% bare ground	Objective achieved in sage unit. Continuing to	YES/NO	2011

		by five years post-burn	monitor in aspen unit		
		Decrease sagebrush density by 40-60% 1 year post-burn			
		Compare pre-burn (post slashing) fuel bed depth to post-burn severity in treated aspen-conifer stands.	Slight positive correlation between pre-burn fuel bed depth and burn severity	YES	2010
		Measure woody surface fuel reduction between pre-burn (post-slashing) and post-burn in treated aspen-conifer stands.	Fuel bed depth reduced from 26 to 9 inches. 1000-hr fuels reduced from 20 to 16 tons/acre	YES	2010
	Monument Ridge 1 Rx	Blacken 30-60% of the sagebrush in the unit in a mosaic pattern	64% decrease in overall sagebrush density in year 1 post-burn	NO	2008
		80% mortality of sagebrush in burned areas 1 year post-burn	64% decrease in overall sagebrush density in year 1 post-burn	NO	2008
		Increase ground cover to achieve <40% bare ground by 2 years post-burn and <20% bare ground by 5 years post-burn	12% bare ground 2 years post-burn	YES	2008
		Attain a diverse array of native successional plant species in burned areas.	Not monitored	N/A	N/A
	Monument Ridge 2 Rx	Blacken 30-60% of the sagebrush in the unit in a mosaic pattern	Mosaic mapping indicates 41% of the unit burned	YES	2011
		Measure the reduction of big sagebrush height and canopy cover 1 and 5 years post burn	Canopy cover reduced from 25% to 10%	YES	2011
		Increase ground cover to achieve <40% bare ground by 1 years post-burn and <20% bare ground by 5 years post-burn	27% bare ground 1 year post-burn	YES	2011
		Increase aspen regeneration to 1000 suckers/acre over 10' tall 15 years post-burn	Post-Treatment data will be collected in 2025	N/A	N/A
		Increase aspen regeneration to 3000 suckers/acre over 6' tall 5 years post-burn	Post-Treatment data will be collected in 2015	N/A	N/A
	Wood Draw Rx	Increase aspen regeneration to 1000 suckers/acre over 10' tall 15 years post-burn	Post-Treatment data will be collected in 2021	N/A	N/A
		Increase ground cover to achieve <40% bare ground by 2 years post-burn and <20% bare ground by 5 years post-burn	7% bare ground in year 3 post-burn	YES	2009
		Attain willow height greater than or equal to mean pre-burn willow height within 10-years post burn.	Post-Treatment data will be collected in 2016	N/A	N/A
		>30% increase in the proportion of live to dead willow stems within 3-years post burn.	From 68% live stems pre-burn to 99% live stems in year 3 post-burn	YES	2009
	Chicken Creek Rx	Blacken 30-50% of the sagebrush in the unit in a mosaic pattern	Mosaic mapping did not occur, so objective cannot be analyzed	N/A	N/A
		Increase ground cover to achieve <40% bare ground by 2 years post-burn and <20% bare ground by 5 years post-burn	2 years post-burn: 28% bare ground in Stand 1. 75% in Stand 2	YES/NO	2011
		Increase aspen regeneration to 1000 suckers/acre over 10' tall 15 years post-burn	Post-Treatment data will be collected in 2024	N/A	N/A

B. Fire ecologist accomplishments and areas of focus

Table 4. Fire Ecologist 2011 Accomplishments/Focus Areas

Category	Percent Time	Accomplishments and/or areas of activities
Planning	25%	• IDT Member on Teton to Snake EA • IDT Member on Star Valley Front EA • IDT Member on Alpine Fuels EA • GRTE Fire Management Working Group – Project planning
Presentations	5%	• Monitoring Unplanned Fires Poster at AFE Interior Great Basin Conference • Fire Mosaic Mapping Poster at BTNF Fire Management Public Meeting • Fire Ecology and Fire Effects Presentation to BTNF Leadership • Fire Ecology presentation to NPS Academy • Presentation on Bark Beetles and Fire Behavior
NPS Meetings/ task groups	5%	• GRTE Wilderness Committee
Interagency work	50%	
Wildfire assignments	10%	GSAN – Las Conchas, Red Rock Complex, Nowlin, Vail READ – Las Conchas ICT5 – West Jenny FEMO – Upper Palmer RX, Red Rock Complex FIRBt – Hunter RX, Phelps Morain RX FFT1 – Shadow RX RXB3t – Shadow Piles, Signal Mt. Piles
Prescribed fire projects	15%	Planning RX Projects: 8 days Implementation: 16 days Monitoring: 60 days
Non-fire fuels projects	10%	Implementation: 2 days Monitoring: 20 days
Research	5%	Field assistance: Turner Group Bearpaw Fire Study – 2 days, Donato beetle study-1 day Proposal Writing: 5 proposals, 1 funded so far (15 days) Data assistance: 2 projects (1 day)
Data collection	5%	Office prep: 8 days Field data collection: 18 days
Data entry	1%	2 days
Data analysis	3%	6 days
Supervision/Admin	20%	20 days
Training	5%	20 days – Fire Training plus USFS Wilderness Training, USFS NEPA training
Travel out-of-park for plot or project work	2%	7 days (GRCA) 10 days BTNF
Miscellaneous	10%	Park support

C. Fire effects crew accomplishments and areas of focus

2011 was a groundbreaking year for the fire effects crew. After years of persistence, and some assistance from the US Forest Service, the crew was able to hire a GS-7 permanent, subject to furlough lead monitor.

This, combined with hiring a temporary seasonal GS-6 assistant lead, places the Teton Interagency crew much closer to the national standard for fire effects crew staffing.

The crew also participated in the NPS Academy program, which aids in bringing diverse employees to the NPS. The NPS Academy funds current college students from diverse backgrounds to work in the parks, and the Teton Interagency crew hired a student from a college in Georgia. This employee came in with minimal experience and ended up working out extremely well. All of these improvements allowed the crew to function with five full time employees throughout the summer season, greatly improving productivity and efficiency.

2011 was also a busy fire season for Teton Interagency Fire resources. Fire effects crewmembers detailed to handcrews, engine crews, helitack crews, and held lead the push to put together a local wildland fire module. The module was employed for 2 consecutive 2-week assignments on a local type 3 fire, and fire effects crew members led the module in collecting very useful fire effects information.

Table 5. Fire Effects Crew 2011 Accomplishments/Focus Areas

Category	Percent Time	Notes
FMH plots	2%	NPS only
NPS plots, misc.	12%	Aspen circles, brown's lines, stand exams, shrub intercepts, photopoints
USFS plots, misc.	28%	Aspen circles, brown's lines, stand exams, shrub intercepts, photopoints
Wildfire assignments	18%	1 helitack assignment, 1 engine crew assignment, 3 T2IA handcrew assignments, 4 Wildland Fire Module (WFM) assignments
Prescribed fire projects	6%	3 NPS (all Grand Teton NP), 1 USFS
Non-fire fuels projects	3%	1 NPS project (Grand Teton NP)
Travel	2%	Bighorn Canyon NRA, misc. USFS projects
Data entry	7%	FFI, FVS, Excel
Data analysis	1%	FFI
Supervision/Admin	5%	Timekeeping, travel, evaluations, gear/vehicle maintenance and upkeep
Training	16%	S-130/190 (1), S-212 (1), S-131 (1), S-270 (3), S-271 (2), S-390 (1), READ (1), misc. NPS/crew/botany training
Miscellaneous	0%	

D. Additional Program Information

Table 6. Planning - 2011

Park	Does Park have written DFCs? (yes or no)	Date Park-level Monitoring Plan completed (or revised)	Total # of Project- or Community-level Monitoring Plans (not just 2011)	Assisted with how many BAER plans in 2011?
Grand Teton National Park	YES	In draft	31	0
Bighorn Canyon NRA	NO	N/A	4	0
Bridger-Teton NF – N Zone	YES	1990	21	0
Bridger-Teton NF – W Zone	YES	1990	9	0
Bridger-Teton NF – E Zone	YES	1990	17	0

Table 7. Monitoring - 2011

Park	% 2011 Data Entered	% 2011 Data Quality Checked	# Prescribed Fires Monitored*	# Non-fire Fuels Treatments Monitored*	# Wildfires Monitored*	# BAER Treatments Monitored*
Grand Teton National Park	100%	100%	4	5	0	0
Bighorn Canyon NRA	100%	100%	1	0	0	0
Bridger-Teton NF – N Zone	100%	100%	3	4	2	0
Bridger-Teton NF – W Zone	100%	100%	1	1	0	0
Bridger-Teton NF – E Zone	100%	100%	5	0	0	0

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

Table 8. Communicating Results - 2011

Unit	# of Project Monitoring Reports completed in 2011	# of Annual meeting(s) with Park staff	# of Formal presentations of results	Do you use Minitab?*
Grand Teton National Park	0	3	2	No
Bridger-Teton national Forest	0	4	5	No
Bighorn Canyon NRA		0	0	No
Fossil Butte NM		1	0	No

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

Table 9. Research - 2011

Unit	Are research needs identified in FMP or Monitoring Plan? (yes or no)	# of Proposals Submitted in 2011	# of Proposals Funded in 2011	# of Research Projects Supported in 2011*	Additional Comments
Grand Teton National Park	No	5	0	1	Fuels Geodatabase funded, Threat Assessment Funded
Bridger-Teton national Forest	No	2	0	0	
Bighorn Canyon NRA	No	0		0	
Fossil Butte NM	No	0		0	

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

E. 2012 Direction

Fire Ecology:

- Map GRTE's successional classes according to Landfire PNVGs and Vegetation map data. Determine the degree of departure from historic proportions
- Complete dNBR Burn Severity Atlas for GRTE and BTNF
- Develop and test objectives for unplanned fire monitoring by wildland fire modules. Implement in WFDSS.
- Develop Fire Ecology Posters for use by Fire Info Officers
- Identify Douglas-fir forests in need of fire treatment (planned or unplanned)
- Model fire behavior as part of Focus Area Concept for project planning
- Increase research project coordination
- Research fire ecology of weeds and provide white papers and presentations

Fire Effects:

- Develop and test protocols for unplanned fire monitoring by wildland fire modules
- Rewrite BTNF Fire Effects Monitoring Plan to incorporate weed monitoring and standard protocols
- Refine Rapid CBI protocols and test them
- Pursue needed permanent Assistant Lead Monitor position
- Continue to provide a fire-ready IA squad
- Pursue FFI and field data entry improvements
- Streamline fire effects monitoring protocols, equipment, datasheets, etc.

Fuels Monitoring

- Develop additional web information on fuel moistures, outlooks, and fire behavior
- Integrate with park research projects
- Pursue tablet use in fire monitoring operations

F. Optional Information

Please see the attached appendices for complete fire effects monitoring reports for all projects visited by the Fire Effects Crew in 2011.

Appendix A
Grand Teton National Park
2011 Project Level Fuels & Fire Effects Monitoring Reports

2006 Eynon Ridge Prescribed Burn- Year 5 Post Burn



The Eynon Ridge prescribed burn project was a collaborative effort between Teton Interagency Fire and the Jackson Interagency Habitat Initiative, a local interagency 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.

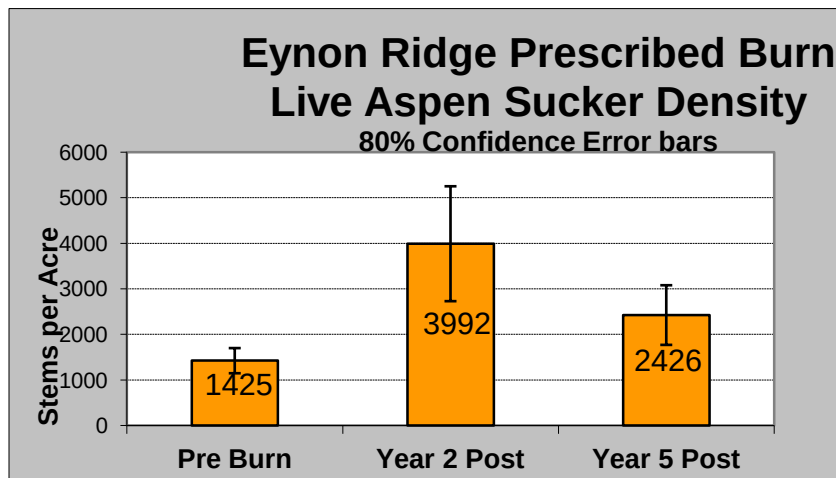
Burn goals were focused on aspen and mixed-conifer vegetation types. Specific vegetation objectives, taken directly from the burn plan, include:

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.

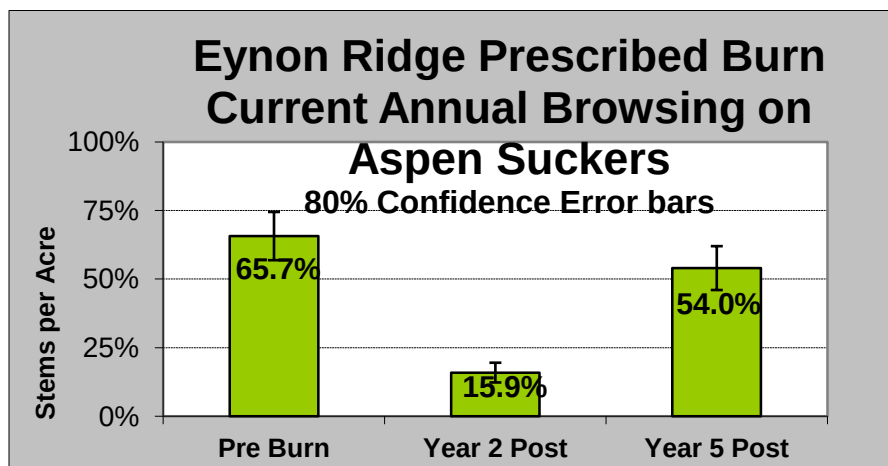
In 2011, post burn aspen monitoring was conducted in a designated stand, where pre-burn data had been collected in 2005 and post burn data had been collected in 2008. Non-permanent circular density plots were used to estimate live aspen sucker and overstory tree density, as well as conifer tree density. These plots were randomly located with a sample size sufficient for 80% confidence on aspen sucker density.

According to the aspen data, average live sucker density decreased, though not significantly, between 2008 and 2011 by roughly 1500 stems per acre. This is to be expected, as Aspen stands self-thin as a normal part of post-

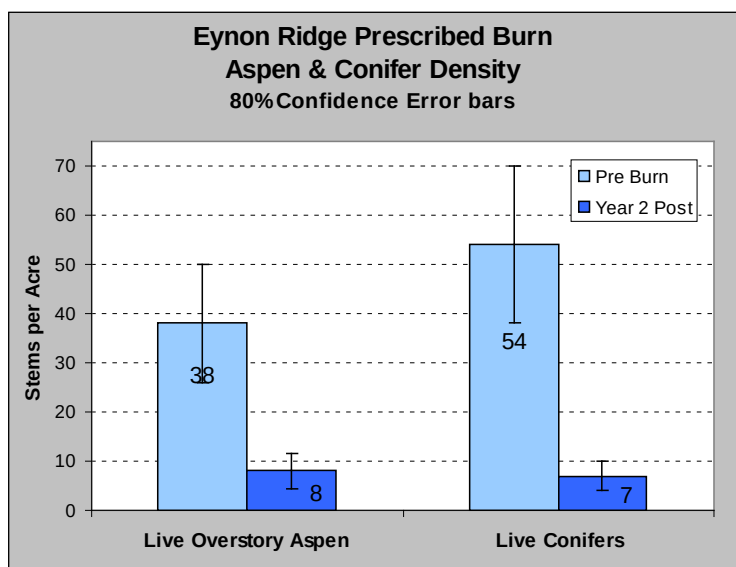
burn ecosystem processes. Aspen suckers were tallied by height classes (0-3, 3-6, 6-10, and 10+ feet tall). The most common (mode) height class was the 3-6ft class, up from the 0-3ft class both pre burn and year 2 post burn. This is a good sign as browsing, though intense, isn't completely deterring the aspen from growing into the taller size class.



The average annual percent browsing on terminal leaders was 65% pre burn (measured in 2005) and only 15% 2 years post burn. Unfortunately by year 5 post burn, browsing has increased to 54%, a very high level, but not quite to pre burn levels.



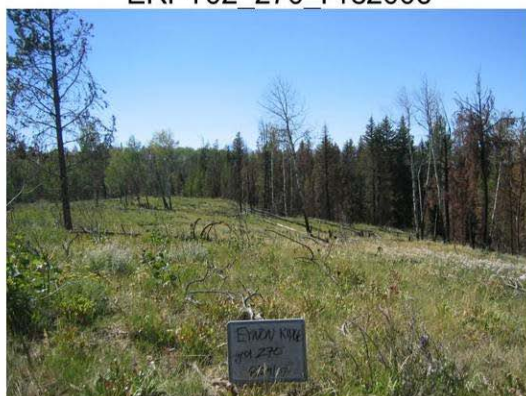
Conifer and overstory aspen density data was also collected in the aspen stand at Eynon Ridge, though not in 2011. Density of all live conifers (seedlings, poles, and overstory trees) decreased by 87.0%, while live overstory aspen stems per acre declined 78.9%. These significant reductions were due to both mechanical felling and fire.



Eynon Ridge



ERPT02_270_Pre2006



ERPT02_270_yr01.2007

ERPT2_270°



ERPT02_270_ImmPost2006



ERPT02_270_01yr05.2011

2011 Phelps Moraine Prescribed Burn – Immediate Post Burn

This project is a prescribed burn intended to enhance the fuel break created by the adjacent Death Canyon Road mechanical thinning and pile burning treatments. With a substantial fuel break, it will be far more likely that a future lightning-caused fire in the Phelps Moraine area would be allowed to burn.

Objectives of the Phelps Moraine burn are as follows:

- Minimize overstory tree mortality in the mechanical treatment buffer so that <10% of the tree canopy is impacted.
- Consume 25% - 50% of 1000 hr fuels within the treatment area.
- Reduce crown bulk density by 25% through group torching.
- Achieve moderate burn severity conditions across the project area (30 - 50% mortality in the 0-3" diameter trees and 0 – 30% mortality in the 3– 6" diameter trees).
- Detect the distribution of noxious weeds in the treatment units before and after the burn.

The Phelps Moraine burn unit contains two forest types; lodgepole pine and spruce-fir. Five stand exams were completed in each type to measure canopy fuels, down woody fuels, and tree density.

Unfortunately, the results of a weed survey showed an extensive infestation of St. John's Wort that was expected. Consequently, much of the burn had to be postponed until the weed can be better controlled. Managers decided to go ahead with a smaller prescribed burn, though during the test burn on September 27, 2010, fire behavior exceeded the desired objectives for tree mortality. The burn was called off and contained at approximately 2 acres.

Despite only burning 2 acres, the fire effects crew was able to read 20 post burn brown's lines in 2011, with an average fuel loading of 38.3 tons/acre. This is a 10 ton/acre reduction over pre-burn levels (48.6 tons/acre burn unit-wide).

2011 Update

On September 29th, 2011, Teton fire staff once again attempted to burn a portion of the Phelps project unit, and after 3 days of ignition, completed 58 acres of spruce-fir forest, shown below in blue. The prescribed burn looks to have met objectives with respect to reducing overstory tree density and surface fuel loading. Photo points were retaken post burn, and stand exam data will be collected during the summer of 2012 to determine whether objectives were met.

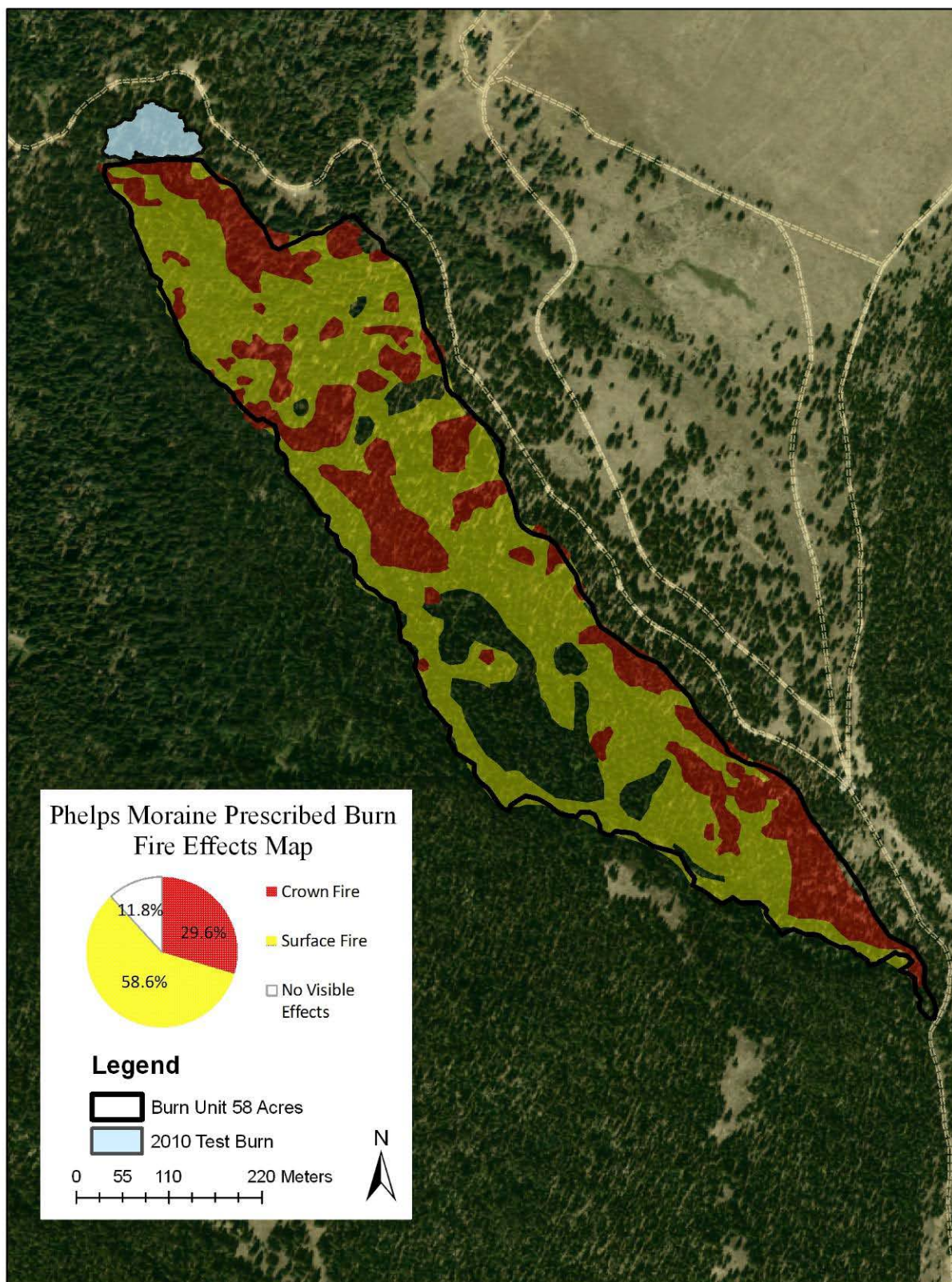


Photo Points



Pre-burn (2010)



Post-burn (2011)



Pre-burn (2010)



Post-burn (2011)



Pre-burn (2010)



Post-burn (2011)

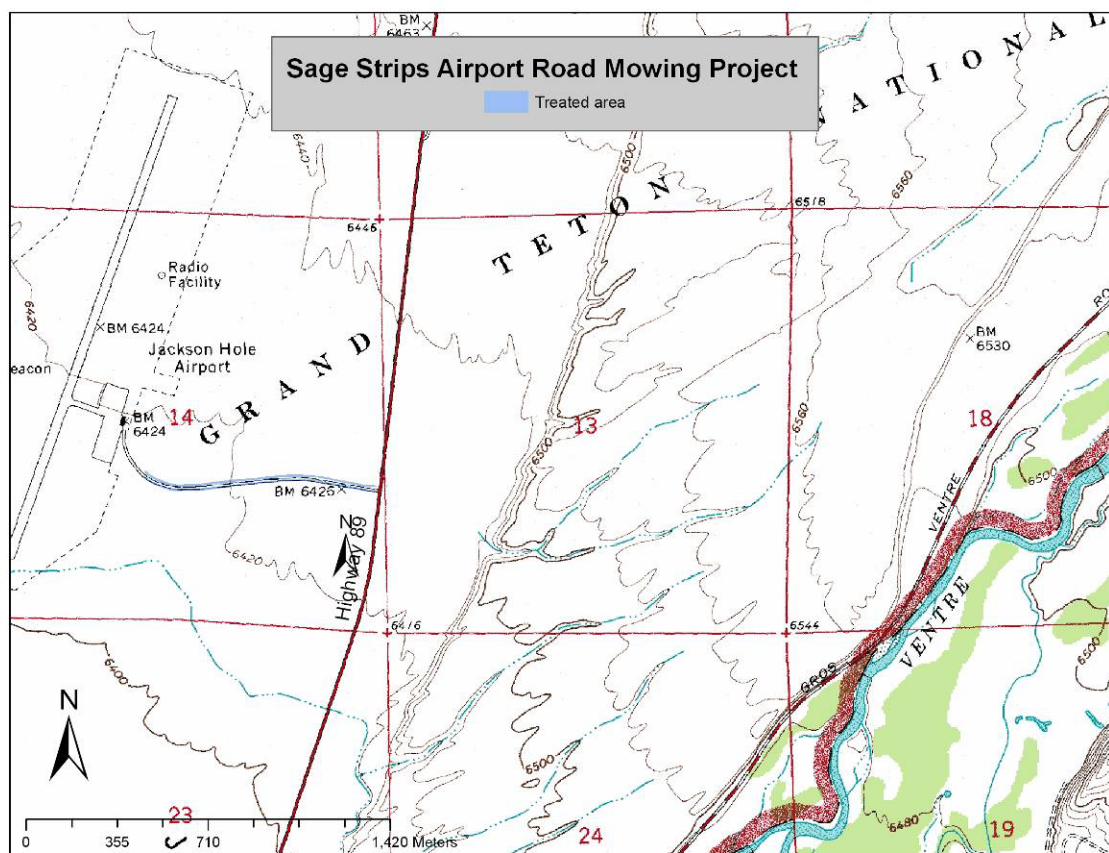
2009 Sage Strips Mowing Treatment – Year 2 Post

The sage strips project is a roadside fuels reduction treatment intended to improve control options in the case of a wind-driven sagebrush fire. Dense, tall sagebrush is known to produce flame lengths over 30 feet, which can allow fire to spread across roads when wind pushes them over. As part of this project, both sides of Airport Road were mowed to widen the existing fuel break to a total of 80 feet (the road itself is included in this buffer).

The airport road treatment included a total of approximately 3.8 acres of mowing along the paved access to the Jackson Hole Airport. Four mower widths were treated, with two on each side of the road. A buffer was left in the sparse vegetation between the pavement and these mow lines, in order to avoid disturbing invasive species that had established there, particularly cheatgrass and Japanese brome (*Bromus tectorum* and *B. japonicum*). In the two years since the mowing project took place, the buffer was maintained by airport personnel, a utility line was buried, and several herbicide treatments were applied to control cheatgrass and a variety of noxious weeds.

Monitoring objectives for the sage strips project are as follows:

1. Monitor changes in the frequency of exotic plants
2. Monitor changes in the percent cover of all plant species



Fire effects monitoring in 2011 involved revisiting 100 randomly-located nested frequency plots on both sides of the road and recording exotic species found. No monitoring was done on overall plant species composition in 2011.

The major species of concern is cheatgrass, which was very much in evidence in 2010. As the following photopoint shows, however, herbicide treatments (Plateau) in the fall of 2010 successfully killed much of the target species.

Sage Strips

SSAR01, 264°



SSAR01 : 264 PRE, 2009



SSAR01 : 264 IMMPOST, 2009



SSAR01 : 264, YR01, 2010



SSAR01 : 264, YR02; 2011

Nested frequency comparisons were made for cheatgrass (*Bromus tectorum* and *Bromus japonicas*, which are difficult to reliably distinguish) between pre and post treatment within the mowed (and sprayed) zone. The following tables shows the species with statistically significant differences:

$P = .10$

	10x10cm Plot	25x25cm Plot	50x50cm Plot	1x1m Plot
Pre Treatment to Year 1 Post	Increase	Increase	Increase	Increase
Pre Treatment to Year 2 Post	Decrease	Decrease	Decrease	No Difference
Year 1 to Year 2 Post	Decrease	Decrease	Decrease	Decrease

It is likely that the herbicide treatments in the fall of 2010 were very successful in reducing cheatgrasses.

2001 Teton Science School Prescribed Burn - Year 10 Post Burn

The Teton Science School prescribed burn was implemented on October 10, 2001. It was a roughly 100 acre area of sagebrush (*Artemisia tridentata*) and bitterbrush (*Purshia tridentata*) vegetation, with a grass-forb understory. It is located adjacent and southwest (upwind) of the park's Teton Science School compound on the edge of the Jackson Hole Valley in Grand Teton National Park.

The goal of the project was to improve the defensible space around the TSS by removing shrubs, thereby reducing potential flame lengths. Grass and forb vegetation, which naturally dominates post fire, has much shorter flame lengths. A secondary goal for the project was to improve grass forage for big game (such as bison) by stimulating an earlier successional stage with increased grasses.

The monitoring objectives for the Teton Science School were developed in the late 1990's as part of a sagebrush steppe monitoring type identified according to FMH protocols:

Monitoring Objectives: Sagebrush Steppe (FARTR1D02)

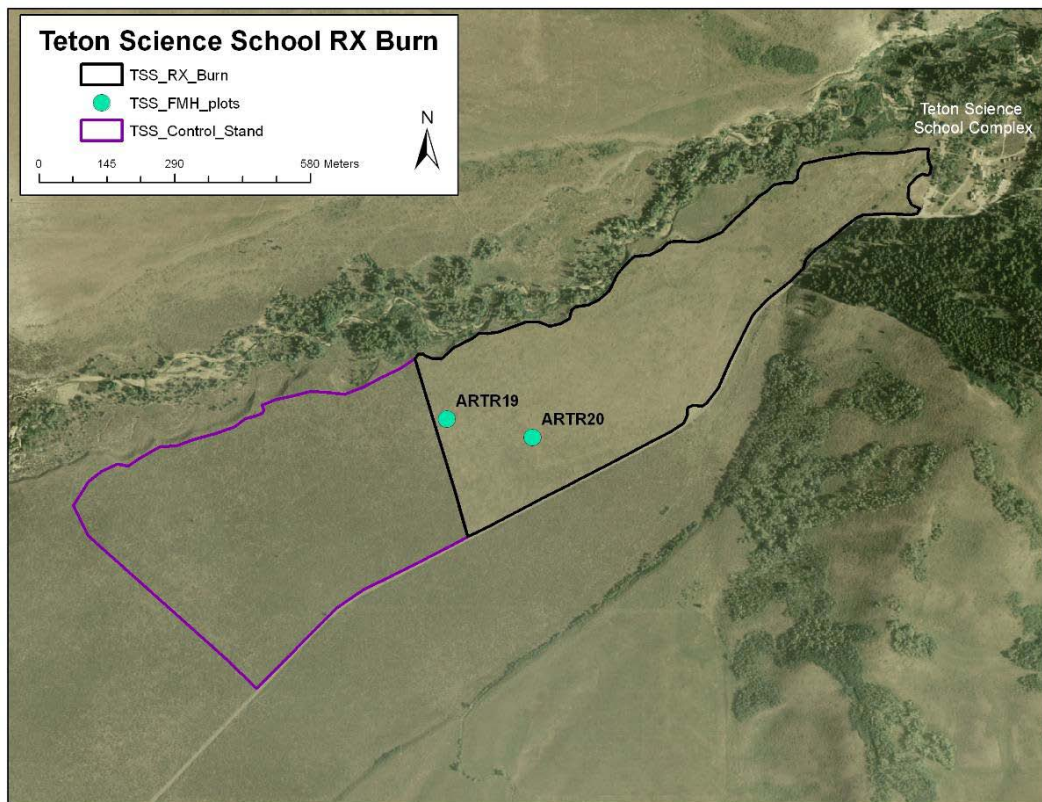
1. 40% reduction in sagebrush density and cover from preburn to year two
2. 10% increase in total native grass cover from preburn to year two
3. 10% increase in total native forb cover from preburn to year two
4. A mean post fire severity rating of at least 3 ("lightly burned") in burned plots

Fire effects data was last collected in 2006, five years post burn. Two FMH Brush-style plots were used to measure shrub density by species, burn severity, and herbaceous cover. At that time, it appeared that the burn met its stated objectives.

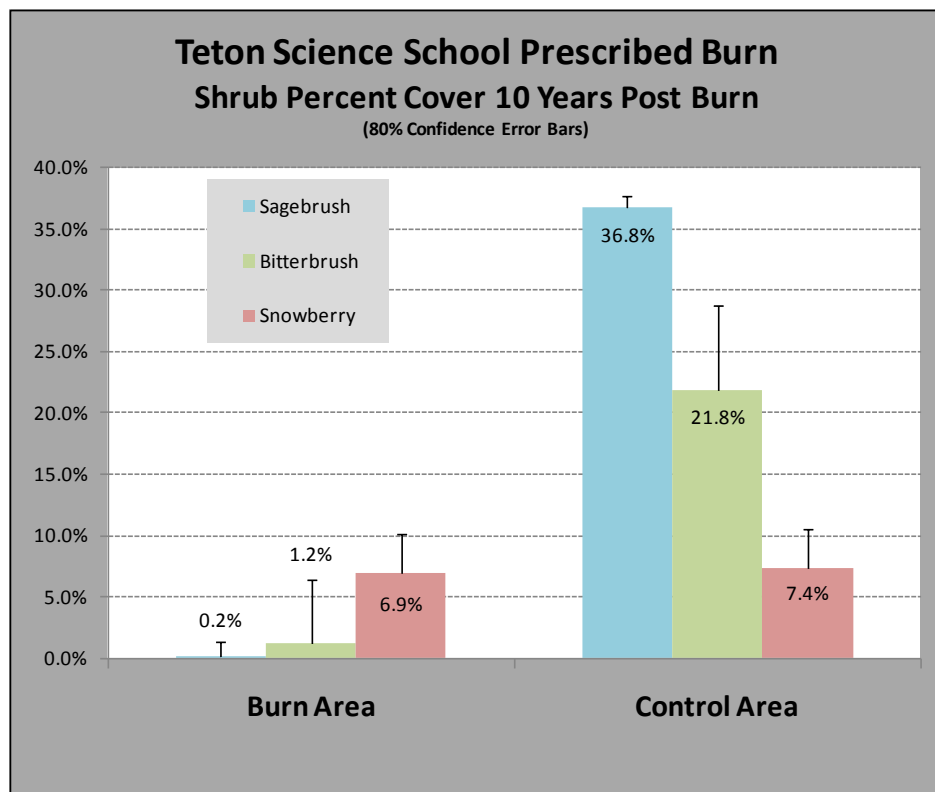
In 2011, the fire effects crew returned to the site, with a different approach. The two FMH plots were removed (except for photopoint stakes), and randomly-located non-permanent shrub line intercept transects were used instead to compare the percent cover of sagebrush and bitterbrush in the burn to an adjacent unburned area located across the mowed fireline to the west.

The new monitoring objectives were:

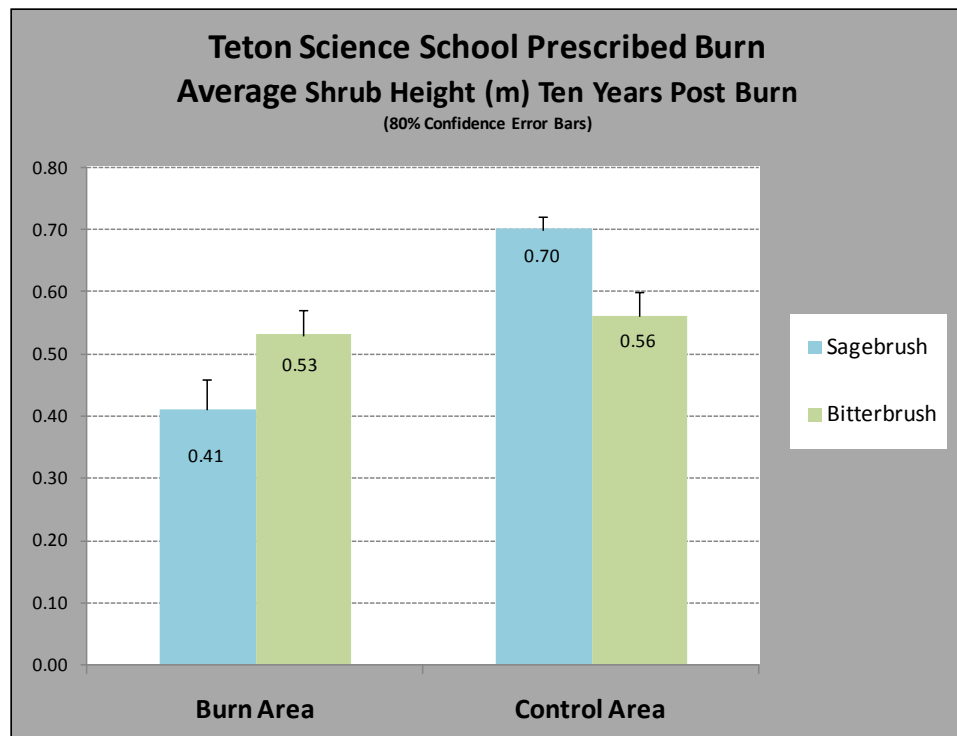
1. Track the recovery of shrub fuels in the treated area over time
2. Determine how many years are needed for the height and percent cover of sagebrush and bitterbrush to return to pre-burn levels.



Ten years post burn sagebrush had recovered .5% of the average percent cover found in the adjacent unburned area. Bitterbrush had reached 5.5% of the average control area cover, and snowberry cover in the burn was 6.8% greater.



Sagebrush and bitterbrush height was still significantly shorter for sagebrush in the burned area versus the control, however average bitterbrush heights are now not significantly different.



Photopoints retaken at the original FMH plot # ARTR19 show the treatment area though a time series:



Pre Burn 1999



Immediate Post Burn, Fall 2001



Year 1 2002



Year 2 2003



Year 5 2006



Year 10 2011

The adjacent unburned control area in 2011:



Looking South



Looking East

Beaver Creek Block 1 (Phase 2) Mechanical Thinning – Pre Treatment

The Teton Interagency Fire program, through a combined effort by the fuels, fire effects, hazard tree, engine 3, and engine 4 crews, completed the 40-acre Beaver Creek Block 1 (Phase 2) thinning project in the summer of 2011. Block 1 is on the south and west side of the Beaver Creek developed area and was previously treated in 1991-1993. This second entry (Phase 2) addressed the regeneration of the mixed conifer after almost 20 years post treatment of the first phase.

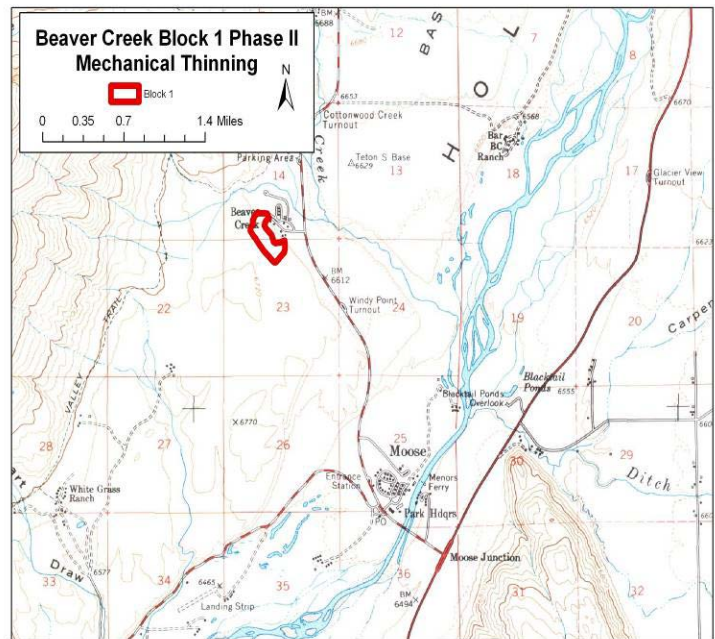
220 hand piles were created and will be burned during winter 2012/2013. The Teton Interagency Fuels Crew and Fire Effects Crews installed 10 plots and collected pre-treatment fuel loading, stand exam, sightability, and photo point data in 2011. treatment data will be collected in the summer following pile burning so that treatment effectiveness can be analyzed.

The purpose of this project is to thin out conifer regeneration to maintain defensible space around the south and side of the Beaver Creek Developed Area. modification of the fuels will be around the structures so that fire behavior is reduced, allowing suppression resources to safely protect structures during a wildland fire event.

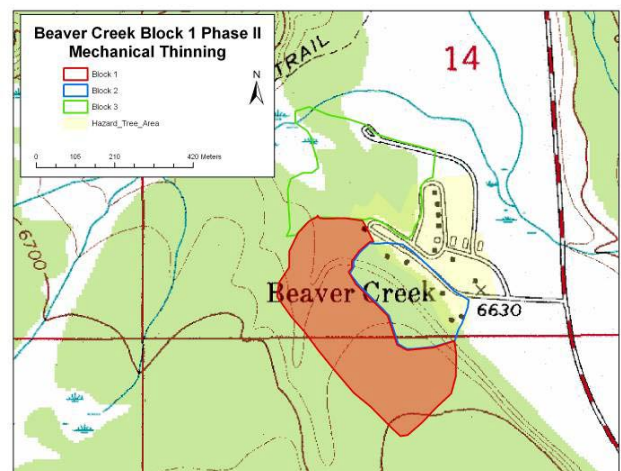
Objectives:

1. Reduce the dead and down fuel loading within the treatment area to 10 tons per acre.
2. Reduce the crown bulk density to $< 0.049 \text{ kg/m}^3$, by increasing the tree spacing and removing the smaller diameter trees and conifer regeneration.
3. Increase the canopy base height to $> 6'$, by removing ladder fuels (limbing trees, and removing conifer regeneration).

Treatment methods included limbing and felling trees with chain saws, and subsequently burning the slash in piles. Monitoring methods used to evaluate project effectiveness involved modeling of fuel loading and expected fire behavior using the Forest Vegetation Simulator (FVS) Fire and Fuels Extension (FFE) program, as well as sightability transects that give an indication of ladder fuels. FVS inputs require stand exam and Brown's transect data, which was collected pre-burn (ten stand exams per event, with two Brown's transects



Post-
the
west
The



each). Visual obscenity transects were co-located with the Brown's transects.

Pre-treatment fuels characteristics are summarized in the table below. Beaver Creek Block 1 (Phase 2) is composed of primarily mixed conifer overstory, with limited amounts dead and down fuels. Moderate to dense stands of conifer regeneration exist in pockets throughout the unit. The site is primarily flat and is located on top of the bench immediately to the south of the Beaver Creek Development Footprint.

	Pre-treatment - 2011	Post-treatment - 2013
Fuel Model	8 (52%) 10 (48%)	
Litter Tons/ac	3.81	
Duff Tons/ac	11.49	
1, 10, & 100 Hour Fuels Tons/ac	2.02	
1000 hour Fuels Tons/ac	13.81	
Total Woody Fuels Tons/ac	15.84	
Canopy base Height, ft	4	
Canopy Bulk Density kg/m3	0.133	

Fire behavior predictions for moderate, and severe weather conditions indicate a moderate potential for torching, with a potential for 50% mortality.

	PRE-TREATMENT		POST-TREATMENT	
	Mod. 75 th %	Severe 97 th %	Mod. 75 th %	Severe 97 th %
Surface Flame Length, ft	1.2	1.6		
Fire Type	<i>Surface Fire</i>	<i>Surface Fire</i>		
Probability of Torching	40%	43%		
Torching Index, mph*		15.2		
Crowning Index, mph*		18.8		
Potential mortality, % of BA	52%	53%		
Potential Smoke tons per acre <2.5	0.21	0.21		

*The 20-foot wind speed required to initiate the torching of some trees or to initiate active crown fire.

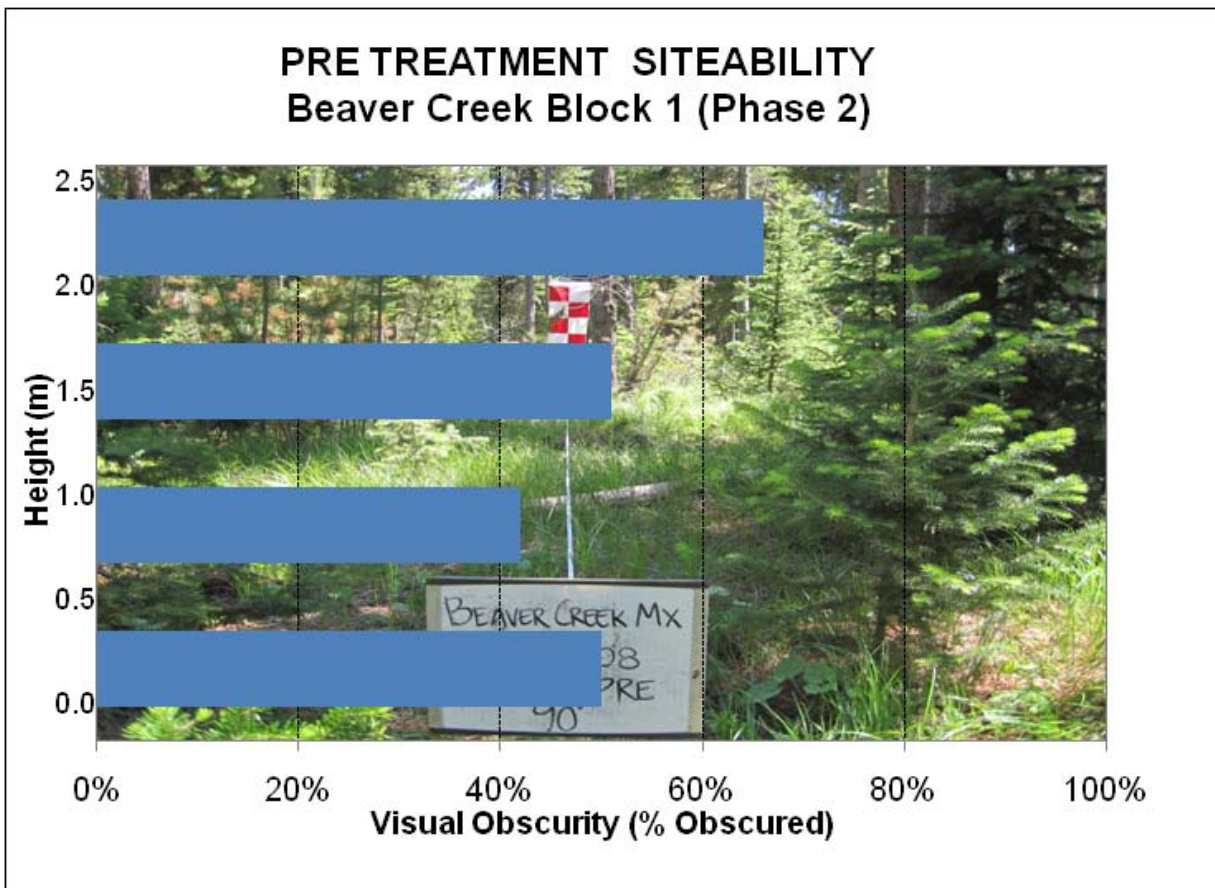
Photo points

Pre-thinning photo points taken in the Beaver Creek Block 1 (Phase 2) project show the results of a 20 year old thinned area. The two-aged stand is evident. Post-thinning photos should show a much more open understory.



Sightability

The following graphs show the average visual obscurity at four height levels from the sightability transects pre-treatment.



Colter Bay Housing Mechanical Thinning – Pre Treatment

The 30-acre Colter Bay Housing mechanical fuels thinning project was implemented in the summer of 2011. Prior to the treatment, the Fire Effects Crew collected photo point data in order to evaluate treatment effectiveness.



The goals of this mechanical thinning project are to reduce fuels around the wildland interface and remove hazard trees (mostly beetle-killed) at the Colter Bay Employee Housing Area. Fuel reduction is intended to create defensible space and improve firefighter and public safety, by increasing fire containment opportunities during wildland fire events. Objectives for the mechanical treatment are as follows

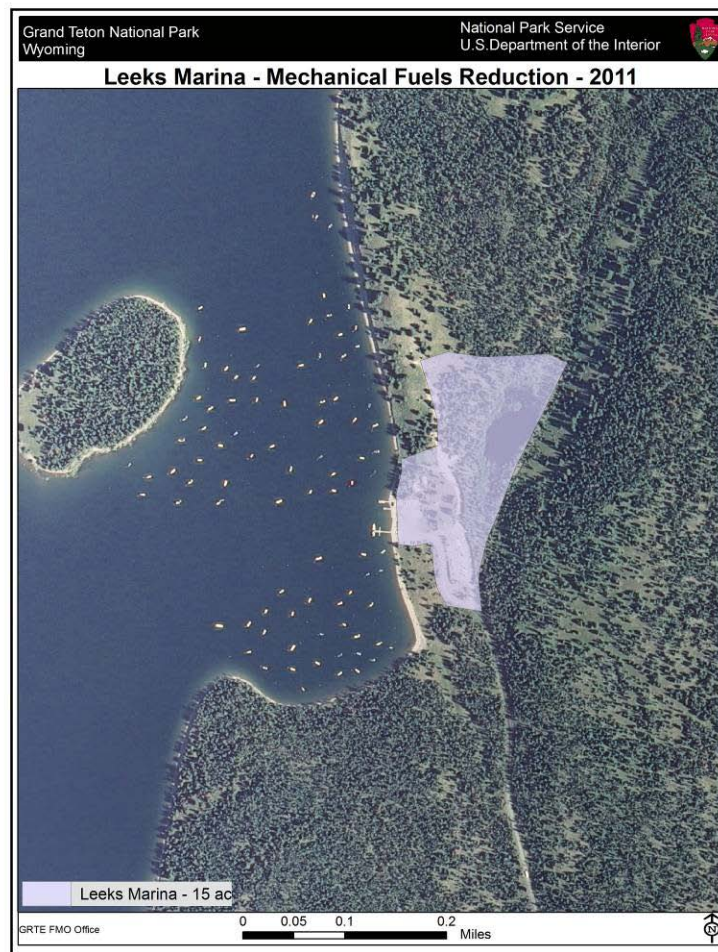
- Reduce dead and down fuel loading
- Remove all ladder fuels (limb trees, remove conifer regeneration)
- Increase tree spacing

Treatment methods included limbing and felling trees with chain saws. 33 hand piles were produced and will be burned during the winter of 2012/2013. Pre-treatment photo points in the Colter Bay Housing stand show the characteristics of the dense, young mixed conifer forest. The third photo point also shows dense regeneration growing in close proximity to structures. These photo points will be retaken following pile burning.



Leeks Marina Mechanical Thinning – Pre Treatment

The 15-acre Leeks Marina mechanical fuels thinning project was implemented in the summer of 2011. Prior to the treatment, the Fire Effects Crew collected photo point data in order to evaluate treatment effectiveness.



The goals of this mechanical thinning project are to reduce fuels around the wildland interface at the Leeks Marina developed area. Fuel reduction is intended to create defensible space and improve firefighter and public safety, by increasing fire containment opportunities during wildland fire events. Objectives for the mechanical treatment are as follows

- Reduce dead and down fuel loading
- Remove all ladder fuels (limb trees, remove conifer regeneration)
- Increase tree spacing

Treatment methods included limbing and felling trees with chain saws. 7 hand piles were produced and will be burned during the winter of 2012/2013.

Pre-treatment photo points in the Leeks Marina developed area show the characteristics of a fairly open lodgepole pine forest. On site observations also lead us to believe prior treatments have occurred in this area in the past, though several stands of dense regeneration have grown up in close proximity to the structures. These photo points will be retaken following pile burning.



2011 Phelps Moraine Prescribed Burn – Immediate Post Burn

This project is a prescribed burn intended to enhance the fuel break created by the adjacent Death Canyon Road mechanical thinning and pile burning treatments. With a substantial fuel break, it will be far more likely that a future lightning-caused fire in the Phelps Moraine area would be allowed to burn.

Objectives of the Phelps Moraine burn are as follows:

- Minimize overstory tree mortality in the mechanical treatment buffer so that <10% of the tree canopy is impacted.
- Consume 25% - 50% of 1000 hr fuels within the treatment area.
- Reduce crown bulk density by 25% through group torching.
- Achieve moderate burn severity conditions across the project area (30 - 50% mortality in the 0-3" diameter trees and 0 - 30% mortality in the 3- 6" diameter trees).
- Detect the distribution of noxious weeds in the treatment units before and after the burn.

The Phelps Moraine burn unit contains two forest types; lodgepole pine and spruce-fir. Five stand exams were completed in each type to measure canopy fuels, down woody fuels, and tree density.

Unfortunately, the results of a weed survey showed an extensive infestation of St. John's Wort that was expected. Consequently, much of the burn had to be postponed until the weed can be better controlled. Managers decided to go ahead with a smaller prescribed burn, though during the test burn on September 27, 2010, fire behavior exceeded the desired objectives for tree mortality. The burn was called off and contained at approximately 2 acres.

Despite only burning 2 acres, the fire effects crew was able to read 20 post burn brown's lines in 2011, with an average fuel loading of 38.3 tons/acre. This is a 10 ton/acre reduction over pre-burn levels (48.6 tons/acre burn unit-wide).

2011 Update

On September 29th, 2011, Teton fire staff once again attempted to burn a portion of the Phelps project unit, and after 3 days of ignition, completed 58 acres of spruce-fir forest, shown below in blue. The prescribed burn looks to have met objectives with respect to reducing overstory tree density and surface fuel loading. Photo points were retaken post burn, and stand exam data will be collected during the summer of 2012 to determine whether objectives were met.

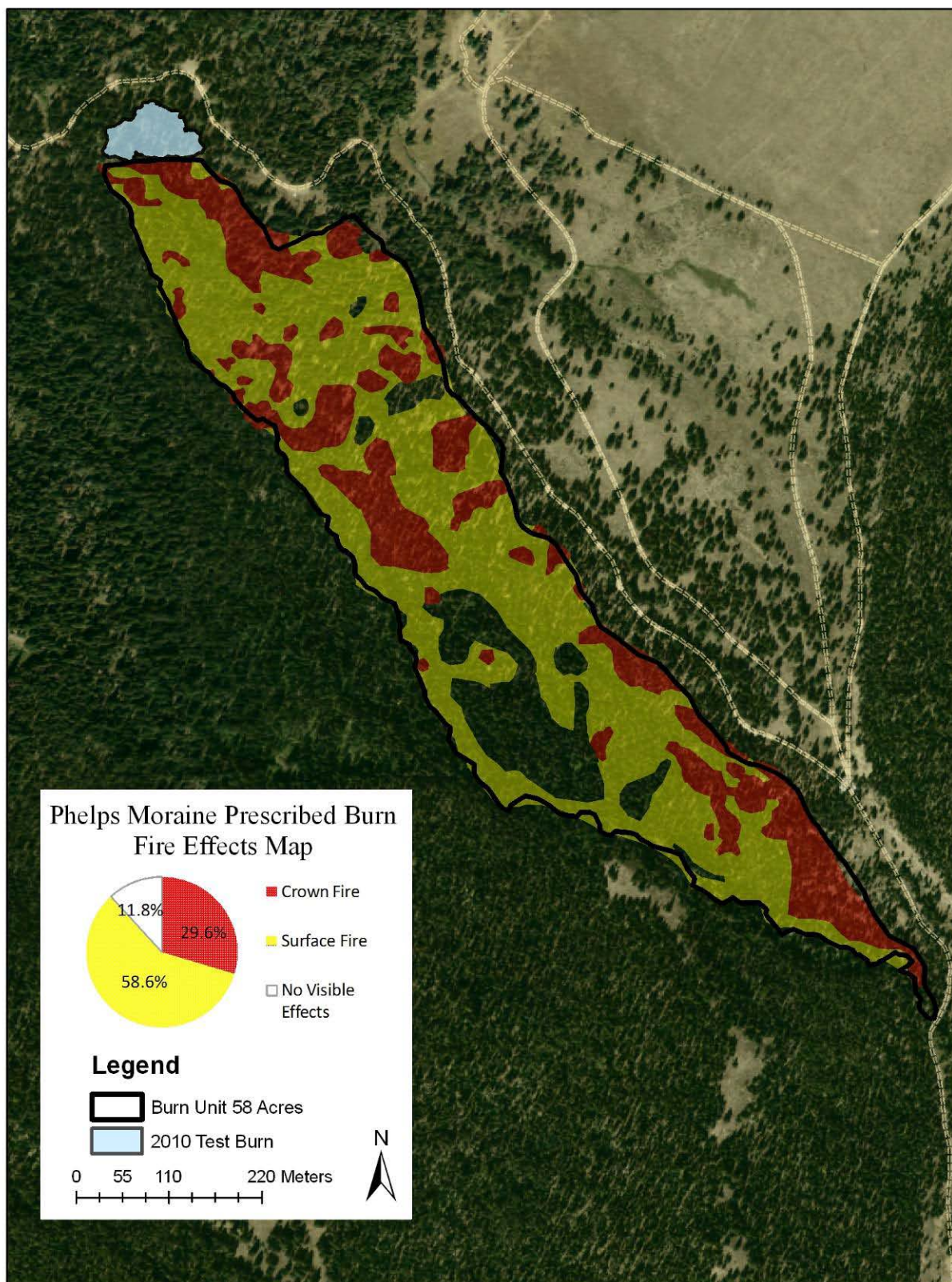


Photo Points



Pre-burn (2010)



Post-burn (2011)



Pre-burn (2010)



Post-burn (2011)



Pre-burn (2010)



Post-burn (2011)

Flagg Ranch Block III Mechanical Thinning – Post Treatment

The 27-acre Flagg Ranch (Block 3) mechanical fuels thinning project was implemented in the summer of 2009 and completed in 2010. Prior to treatment, the Fire Effects Crew collected stand exam and sightability data. Post-treatment data was collected in 2010 and 2011 in order to evaluate how the treatment affected fuel loading and potential fire behavior.

The goals of this mechanical thinning project were to reduce fuels around the wildland interface at the Flagg Ranch village in the John D. Rockefeller Parkway (JODR). Fuel reduction is intended to create defensible space and improve firefighter and public safety, by increasing fire containment opportunities during wildland fire events. Objectives for the mechanical treatment were as follows:

- Reduce dead and down fuel loading to 10 tons per acre
- Remove all ladder fuels (limb trees, remove conifer regeneration)
- Increase tree spacing distance to 10-12 feet (1500 stems per acre) between trees or groups of trees.

Treatment methods included limbing and felling trees with chain saws, hand piling, and pile burning. The Forest Vegetation Simulator (FVS) Fire and Fuels Extension (FFE) program is used with stand exam data to compare pre- and post-treatment fuel loading, and predicted fire behavior. Sightability transects provide additional information with respect to reducing ladder fuels.

Results are inconclusive, and a likely result of sampling only 10 random plots in non-permanent locations. It is unlikely that after mechanical thinning in a lodgepole stand that canopy base height would decrease and canopy bulk density would double. For this reason, beginning in 2011, permanent plots are being installed so that data collection occurs in exactly the same location year to year. The post-treatment data is still valuable in and of itself, but errors such as these make it impossible to draw comparisons between the pre- and post-treatment data.

Fuel Loading

The fuel loading summary for Flagg Ranch Phase III pre treatment is summarized in the table, below:

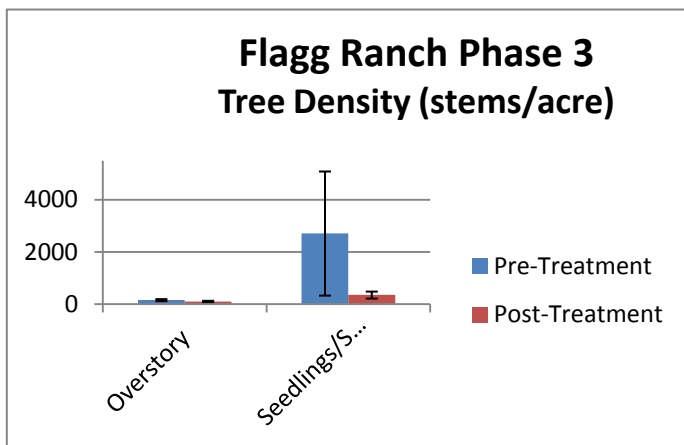
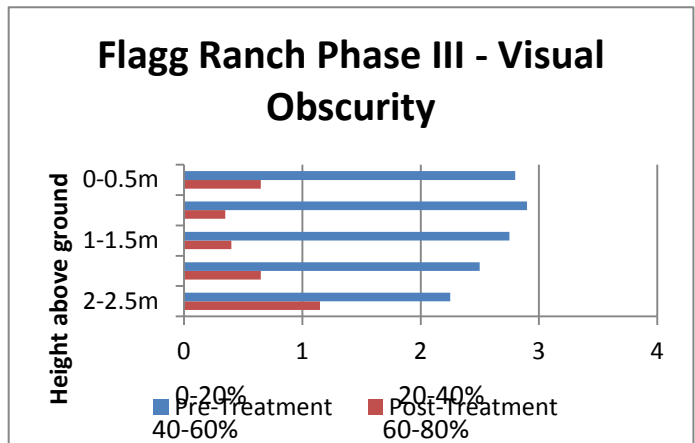
	Pre-treatment - 2009	Post-treatment – 2010/11
Fuel Model	FM10 58%, FM2 42%	FM2 95%, FM10 5%
Litter Tons/ac	5.13	3.78
Duff Tons/ac	8.96	8.19
1, 10, & 100 Hour Fuels Tons/ac	2.15	2.09
1000 hour Fuels Tons/ac	14.16	4.48
Total Woody Fuels Tons/ac	16.31	6.57
Canopy base Height, ft	9	8
Canopy Bulk Density kg/m3	0.029	0.056

This unit did not have particularly heavy downed woody fuel loading pre-burn, however it is located very close to developed areas and employee housing, making it a priority for treatment. The post-treatment data indicates that fuel loading objectives were met, as the total was reduced to 6.57 tons/acre, well below the stated objective of 10 tons/acre.

Sightability

Objective 2 addressed removing ladder fuels, which is usually assessed post-treatment by reviewing the change in canopy base height. Again, FVS data were compromised, as it is extremely unlikely that the thinning treatment resulted in a lower canopy base height.

Sightability plots, however, show a drastic reduction in ladder fuels between 0 and 2.5 meters above ground post-treatment. Photo points also show a noticeable decrease in ladder fuels.



Stand Density

Objective 3 looked at reducing overall tree density post-treatment. The graph below shows that stem density (overstory, sapling and seedling trees combined) was lower post-treatment, though not significantly so. It is possible to say that objective three was met, as post-treatment stem density was reduced from a pre-treatment level of 2866 to 450 stems/acre, well below the stated objective of less than 1500 stems per acre.

FVS – Fire Behavior Predictions

FVS shows a near complete type conversion to fuel model 2. The resulting effect on predicted fire behavior is summarized below.

	PRE-TREATMENT		POST-TREATMENT	
	Mod. 75 th %	Severe 97 th %	Mod. 75 th %	Severe 97 th %
Surface Flame Length, ft	1.8	2.3	1.9	2.3
Fire Type	Surface Fire	Surface Fire	Surface Fire	Surface Fire
Probability of Torching	7%	31%	44%	50%
Torching Index, mph		9.5		9.5
Crowning Index, mph		57.0		35.1
Potential mortality, % of BA	65%	68%	62%	64%
Potential Smoke tons per acre <2.5	19	18	0.13	0.13

Photo Points

Pre- and post-treatment photo points show a significant reduction in ladder fuels. Note that there is a 2m x .5m red and white sightability board in each photo (located 50ft from the camera location), which is much easier to see post-treatment.



Pre-Treatment (2009)



Post-Treatment (2010)



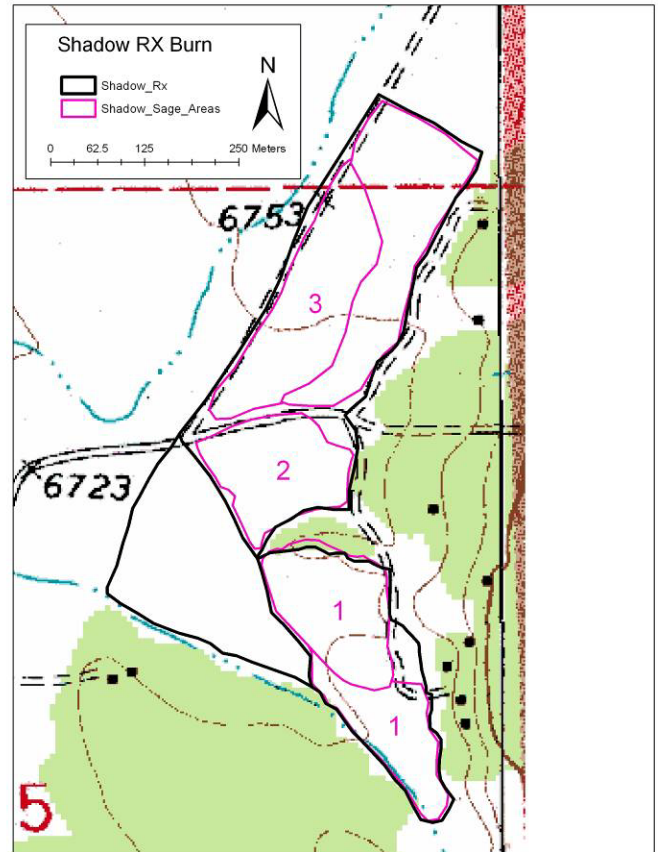
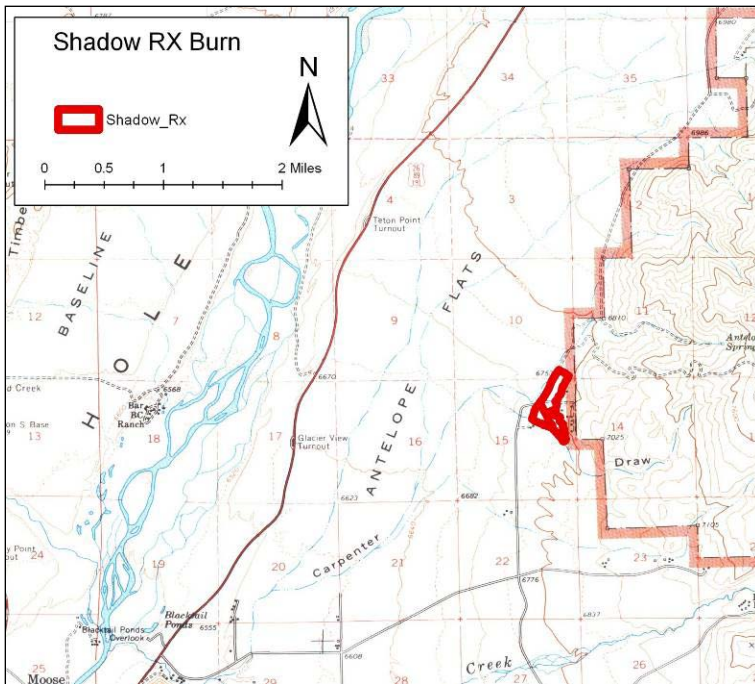
Pre-Treatment (2009)



Post-Treatment (2010)

Shadow Mountain Prescribed Burn – Immediate Post Burn

The 46-acre Shadow Mountain Prescribed Burn was planned for the spring of 2011 and took place on September 21st, 2011. It is located in sagebrush vegetation on the east side of Grand Teton National Park where the valley floor meets the base of Shadow Mountain. Several inholdings with homes are located just to the east. A mechanical fuels thinning project was implemented in this adjacent forest to reduce fuels around the structures, however the sagebrush fuels still present a risk of fast-moving fire with flame lengths over 30 feet.



For monitoring, the burn unit was divided into three units with somewhat similar sagebrush density and understory plant communities. Unit 1 includes tall and dense sagebrush, with a large patch of understory smooth brome (*Bromus inermis*). The south portion of Unit 1 was burned in the 1994 Row Fire and consists of much lower fuel loadings. Unit 2 also has mature, dense sagebrush, but the understory is low and sparse. Unit 3 has less dense sagebrush with an understory dominated by Idaho fescue (*Festuca idahoensis*) which is low-growing and requires strong wind to carry fire. The wedge-shaped unit to the west of Units 1 and 2 also burned in the Row Fire, and was included in the 2011 project area to take advantage of its convenient boundaries for holding resources. Fuel loading in this block was extremely low. The block east of Unit 3 had a much higher fuel load, and was also included in the 2011 project for convenience purposes, as well as to aid in reducing the sage fuel load and potential fire behavior adjacent to the homes. Neither of these unnamed blocks had any resource objectives tied to them.

The objectives of this burn project are as follows:

- Reduce the cover of live sagebrush:
 - Reduce live sagebrush cover to less than 5% percent in in the northern portion of polygon 1
 - Reduce live sagebrush cover to less than 10% percent in polygon 2
 - Reduce live sagebrush cover to less than 15% percent in polygon 3
- Reduce the average height of sagebrush plants by 50% post burn in units 1 and 2

- Burn Severity:
 - o Obtain an FMH burn severity score of 3 (lightly burned) or less in the northern portion of area 1
 - o Obtain an FMH burn severity score of 4 (scorched) or less in areas 2 & 3
- Map and track the spread of cheatgrass, thistle, and other noxious weeds in the burn unit. Cooperate with GRTE's Invasive Species Program to eliminate these infestations.
- Map and track the spread of smooth brome (*Bromus inermis*) in the southern end of the burn unit.

2011 Update:

Immediately following the prescribed burn, photo points were retaken and burn severity transects were measured. Burn severity was also mapped. Objectives related to sagebrush cover and invasive species will be remeasured beginning in 2012. Results relating to severity are discussed below.

Photo Points

UNIT 1 – NORTHERN PORTION (DENSE SAGE / SMOOTH BROME)



Pre-burn (2010)



Post-burn (2011)

UNIT 2



Pre-burn (2010)



Post-burn (2011)

UNIT 3



Pre-burn (2010)

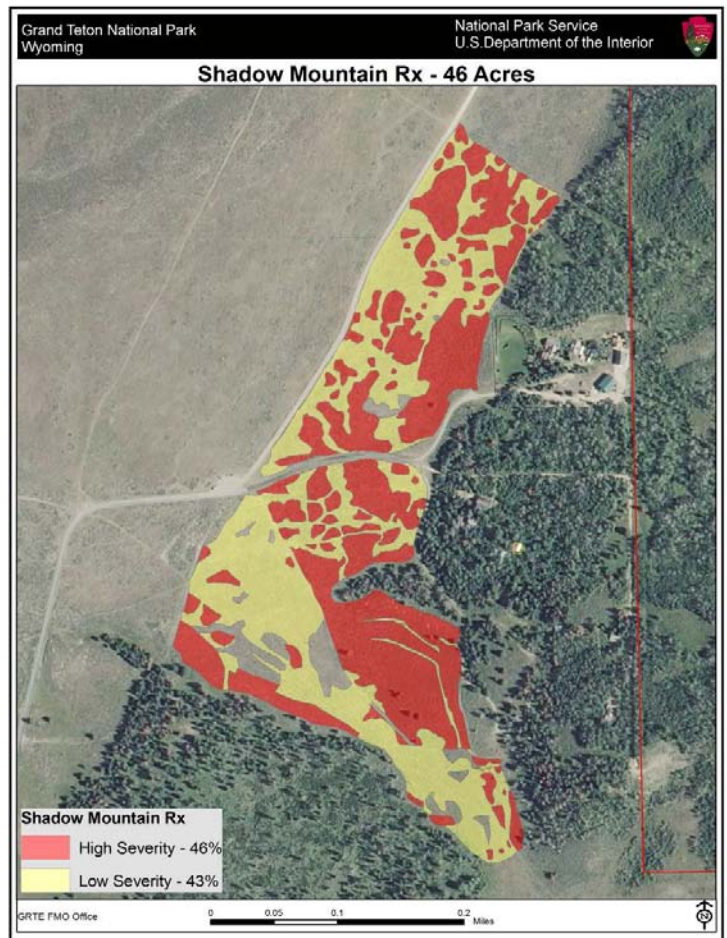


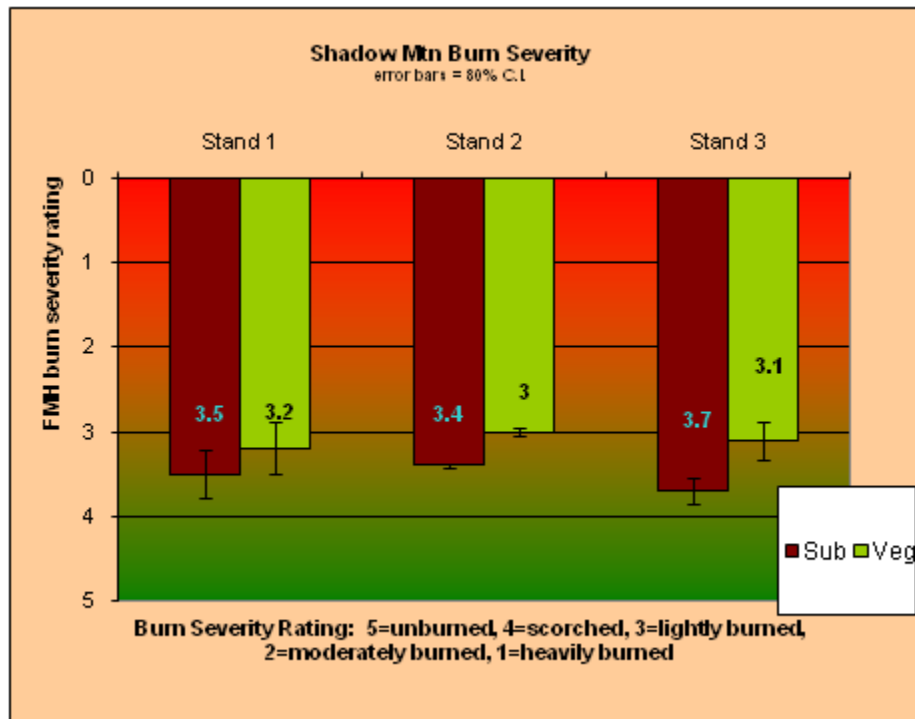
Post-burn (2011)

Burn Mosaic Mapping

Immediately following the burn, the Teton Interagency helicopter was used to conduct an aerial photography flight of the burn unit. These photos were used to map the mosaic of the burn. Of the 46 acres, 5 acres (11%) did not burn. The following map shows a fairly even distribution of black over the remaining 41 acres. As was predicted, unit 1 (Row Fire) experienced patching effects overall. It is also noteworthy that the largest concentration of high severity was nearest the homes. This bodes well for the long term reduction in potential fire intensity near the homes, should a wildfire occur.

The severity mapping data was reinforced by severity transect plots placed in all three stands in the burn unit. Severity scores were given for both vegetation and substrate impacts and summarized for each stand. As the map would indicate, a mix of high and low severity averaged out to a score of “lightly burned” for both vegetation and substrate for all three stands.





Results show that objectives related to burn severity were met in Units 2 and 3 (average score below 4). We didn't achieve the desired burn severity in Unit 1, where we were seeking an average score below 3. This can be explained by a simple error in post-burn sampling. By consulting the mosaic map of burn severity, it is clear that the northern portion of Unit 1 was categorized as almost completely high severity. Unfortunately the post burn severity transects were placed in both the northern and southern portions of the unit. This artificially raised the score, as the southern portion of the unit was categorized as almost exclusively low severity. So while the numbers give us one result, reality tells us that the objective was met, and if sampling had occurred in only the northern portion, the score would have been much lower (higher severity).

Appendix B

Bighorn Canyon National Recreation Area

2011 Project Level Fuels & Fire Effects Monitoring Reports

2001 Sorenson Prescribed Burn - Year

The Sorensen prescribed burn was conducted in the fall of 2001 in the Bighorn Canyon National Recreation Area. The burn unit is 1750 acres and is located to the south of Layout Creek at the base of a large cliff face. The slopes are steep to gradual with elevation ranges from 3720-5100 feet within the unit.

The vegetation is characterized by an overstory of Utah juniper and black sagebrush (*Juniperus osteosperma* and *Artemisia nova*). It is believed that as a result of fire suppression and livestock/wild ungulate grazing, juniper has expanded in the last century into areas that were once mainly grasslands and sage. The area is important habitat for bighorn sheep, and a primary intent of the burn was to improve forage by increasing grasses and reducing visual barriers caused by juniper encroachment.

Bighorn Canyon's vegetation is vulnerable to invasive plants such as cheatgrass, and herbicide treatments have been used in the burn unit over recent years.

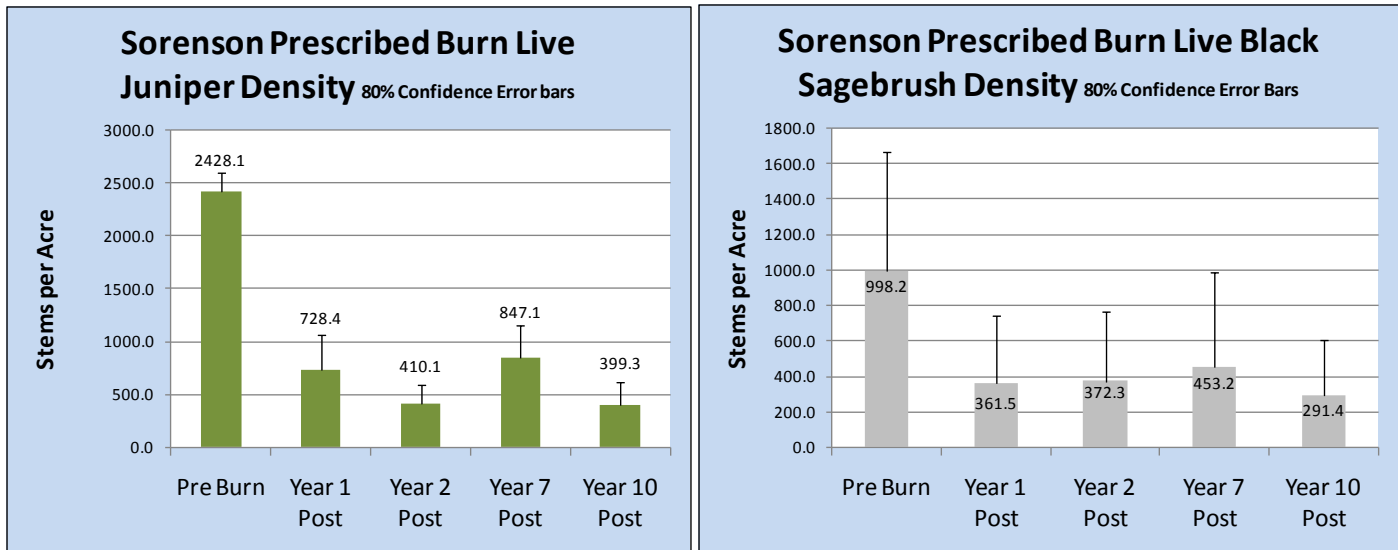
Five FMH-style brush plots were installed within the unit and were read Pre-, YR01, YR02, YR07, and YR10. Objectives were outlined 2000 as follows:

- 1) Detect with 80% certainty that the percent cover of Utah juniper in burned areas was reduced by at least 60% one year post burn within 20% of the population mean.
- 2) Detect with 80% certainty that the density of shrub species was reduced two years post burn by 30-50%, within 20 % of the population mean.
- 3) Detect with 80% certainty that an increase of at least 30% herbaceous cover occurred two years post burn, within 25% of the population mean.



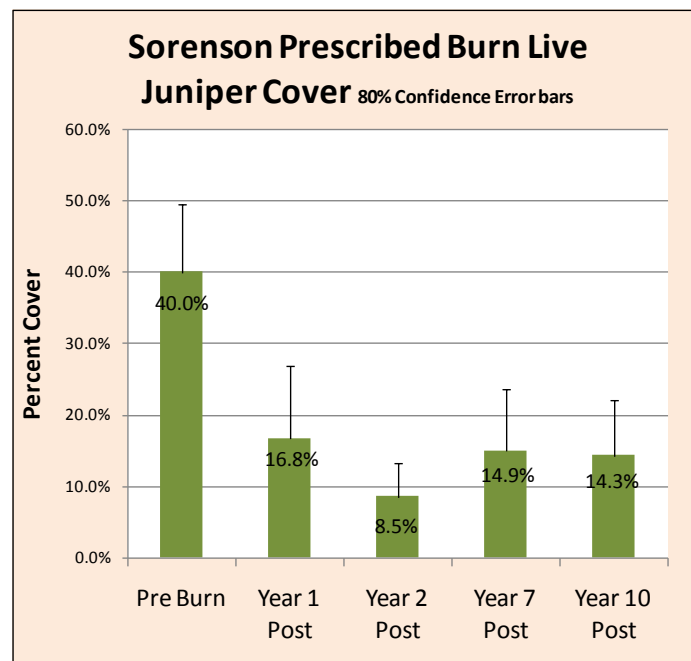
Shrub Density

Shrub density was measured using 5x30 meter belt transects at the five FMH plots. According to the data the two-year reduction objective of 30-50% was met and probably exceeded. In the years since, density has varied but no statistically significant differences have been detected. See the following figures showing Utah juniper and black sagebrush density over time:



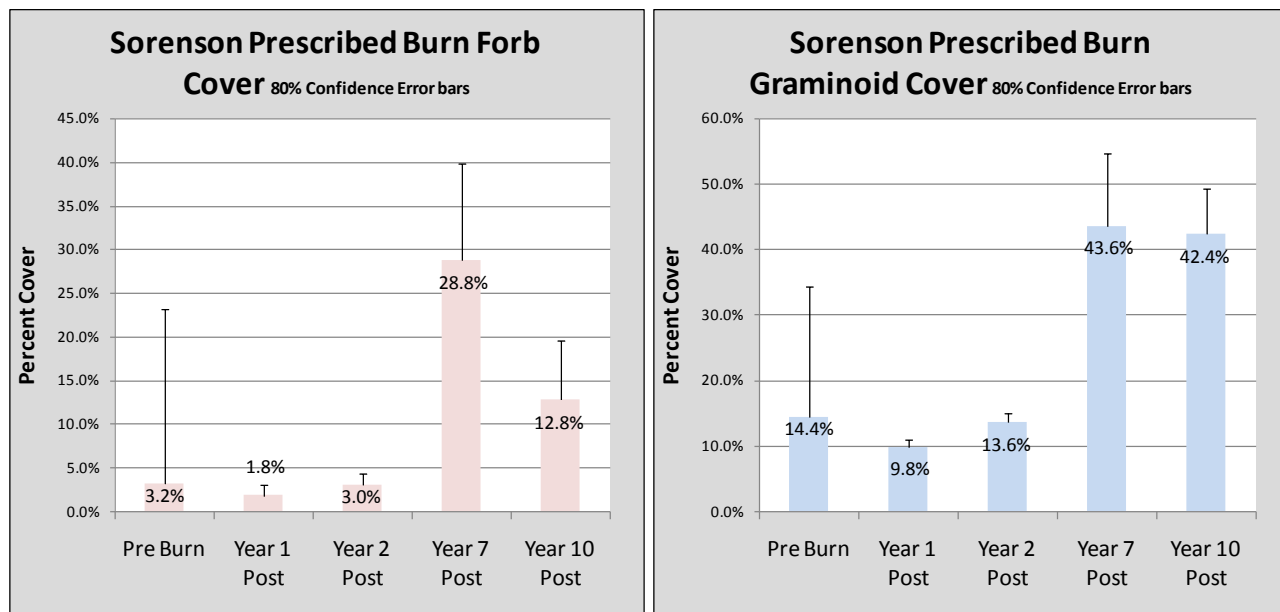
Utah Juniper Cover

Shrub cover was monitored using 30-meter line-intercept transects (one per plot). Utah juniper cover decreased significantly post-burn, with an average of 81.4% less live cover in YR02 (meeting the YR02 objective of at least 60%).



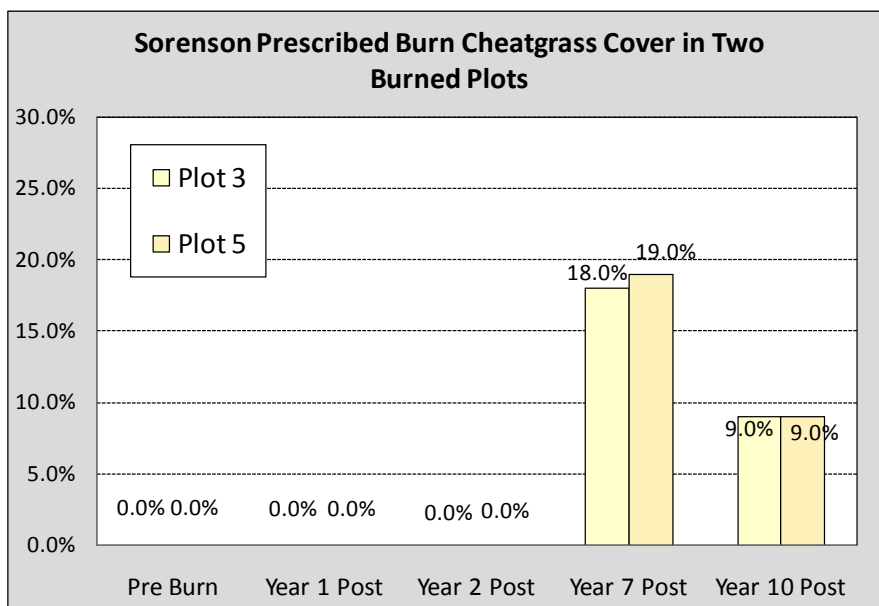
Herbaceous Cover

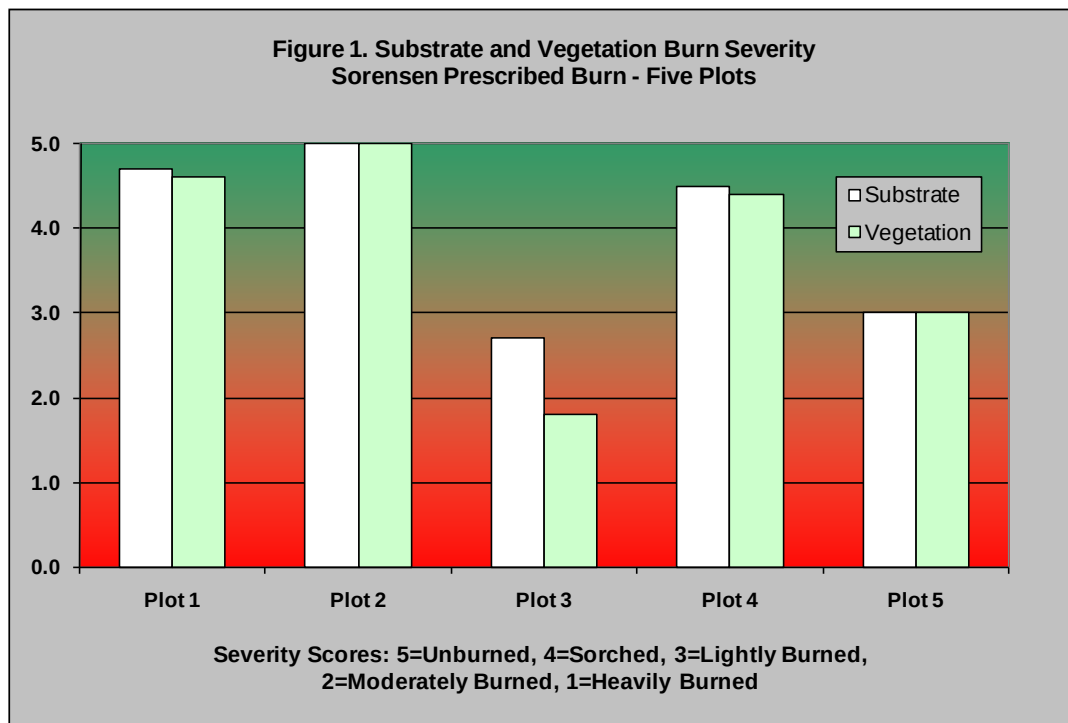
Herbaceous cover was measured using a line point transect protocol along five 30-meter transects. After an initial small reduction in grass cover in YR01, there was no significant increase in grasses or forbs by YR02 as desired in objectives. There was, however, a statistically significant increase in both by YR07. In YR10, both grass and forb cover was also quite elevated. Both these growing seasons were considerably wetter than average, which suggests the differences were associated with precipitation rather than fire.



Cheatgrass

In year 7 post burn, cheatgrass (*Bromus tectorum*) was first found on two of the five monitoring plots (JUOS-03 and JUOS-05). These two plots had the highest burn severity levels measured immediately post fire in 2001. While still present, percent cover of the weed was much lower in 2011.





The following photopoints were taken at JUOS 5, and show the effects of the burn over 10 years:



BJUOS05: 30P-0P, Pre Burn, 2000



BJUOS05: 30P-0P, YR01, 2002



BJUOS05: 30P-0P, YR07, 2008



BJUOS05: 30P-0P, 01YR10, 2011

Appendix C

Bridger-Teton National Forest North Zone

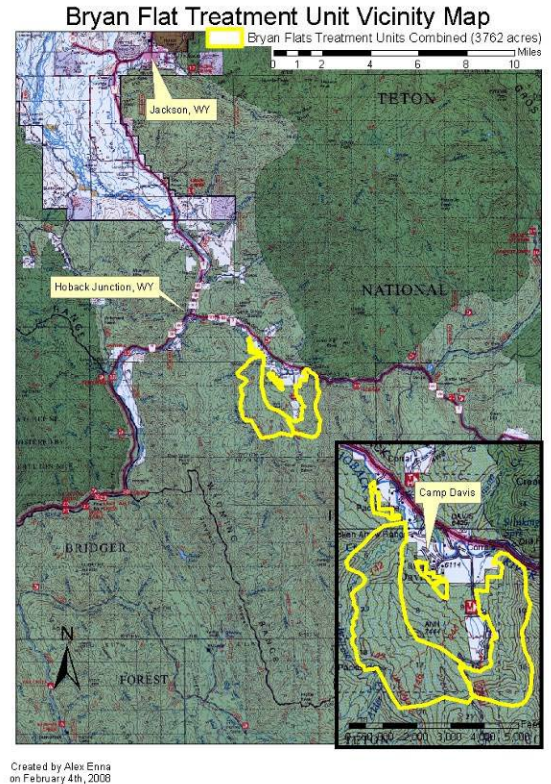
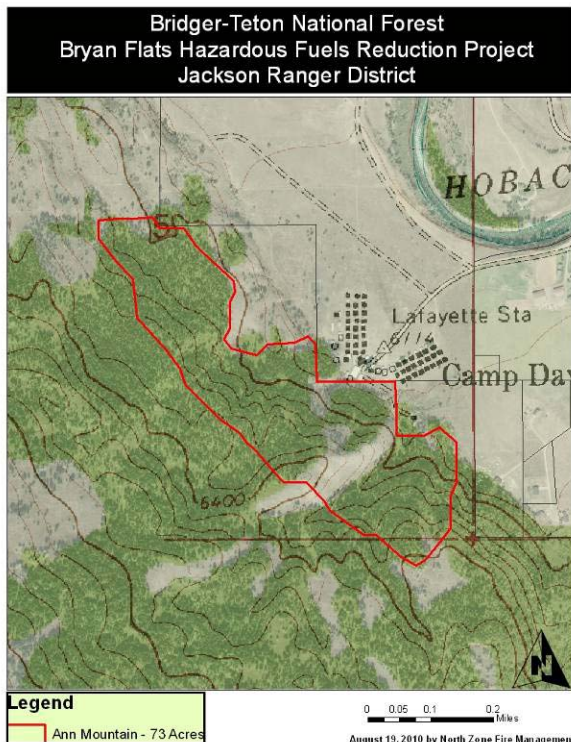
2011 Project Level Fuels & Fire Effects Monitoring Reports

Ann Mountain Mechanical Thinning – Pre Treatment

The 73-acre Ann Mountain mechanical fuels thinning project, located on the North Zone of the Bridger-Teton National Forest (BTNF), was implemented in the summer of 2011. It is part of the greater Bryan Flats Fuels Reduction Project, which encompasses 3763 acres of mechanical and prescribed burning fuels treatments in the Hoback Junction area.

The goals of this mechanical thinning project, and the Bryan Flats project in general, are to increase defensible space adjacent to private lands in the Hoback Junction area through understory mechanical thinning. Fuels reduction is also intended to improve firefighter and public safety by increasing fire containment opportunities during wildland fire events, subsequently reducing the overall costs of firefighting. Conifer-encroached aspen stands will also be thinned to promote aspen regeneration. Objectives for the mechanical treatment are as follows:

- Reduce dead and down fuel loading to between 5-7 tons/acre
- Remove all ladder fuels (limb trees, remove conifer regeneration) and achieve an average canopy base height of 10 feet.



Treatment methods included limbing and felling trees with chain saws and hand piling of the cut material. Piles will be burned during the winter of 2012/2013. Conifers will be removed from areas where they are encroaching on aspen stands, though no measurable objectives relate to this management action.

Prior to the treatment, the Teton Interagency Fire Effects Crew collected stand exam, fuel loading, sightability, lynx habitat assessment, and photo point data in order to evaluate how the treatment will affect fuel loading and fire behavior. Post-treatment data will be collected in the summer following pile burning so that treatment effectiveness can be analyzed.

Monitoring methods used to evaluate project effectiveness involved modeling of fuel loading and expected fire behavior using the Forest Vegetation Simulator (FVS) Fire and Fuels Extension (FFE) program, as well as sightability transects that

give an indication of ladder fuels. FVS inputs require stand exam and Brown's transect data, which was collected pre-burn (ten stand exams per event, with two Brown's transects each). Visual obscuration transects were co-located with the Brown's transects.

Pre-treatment fuels characteristics are summarized in the table below.

	Pre-treatment - 2011	Post-treatment - 2013
Fuel Model	FM10 72% FM12 28%	
Litter Tons/ac	7.46	
Duff Tons/ac	13.80	
1, 10, & 100 Hour Fuels Tons/ac	3.89	
1000 hour Fuels Tons/ac	23.24	
Total Woody Fuels Tons/ac	27.13	
Canopy base Height, ft	7	
Canopy Bulk Density kg/m3	0.059	

Ann Mountain is composed of primarily lodgepole pine overstory, with a minor aspen component and a significant amount of dead and down fuels (note FVS assigning 28% of the unit to a slash fuel model). Moderate to dense stands of conifer regeneration exist in pockets throughout the unit. The site is moderately steep and located immediately uphill and to the southwest of the University of Michigan's summer campus.

Based on pre-treatment data, in order to meet objectives, the treatment will have to remove roughly 75% of the woody fuel loading, and canopy base height will have to improve only slightly. Pre-treatment total stand density (overstory, sapling, and seedling tree species) is 1555 tree stems/acre.

Fire behavior predictions for moderate and severe weather conditions indicate a fairly high probability for crown fire pre-treatment.

	PRE-TREATMENT		POST-TREATMENT	
	Mod. 75th%	Severe 97th%	Mod. 75th%	Severe 97th%
Surface Flame Length, ft	2.1	2.6		
Fire Type	<i>Surface Fire</i>	<i>Surface Fire</i>		
Probability of Torching	68%	74%		
Torching Index, mph*		9.0		
Crowning Index, mph*		34.1		
Potential mortality, % of BA	35%	36%		
Potential Smoke tons per acre <2.5	0.30	0.30		

*The 20-foot wind speed required to initiate the torching of some trees or to initiate active crown fire.

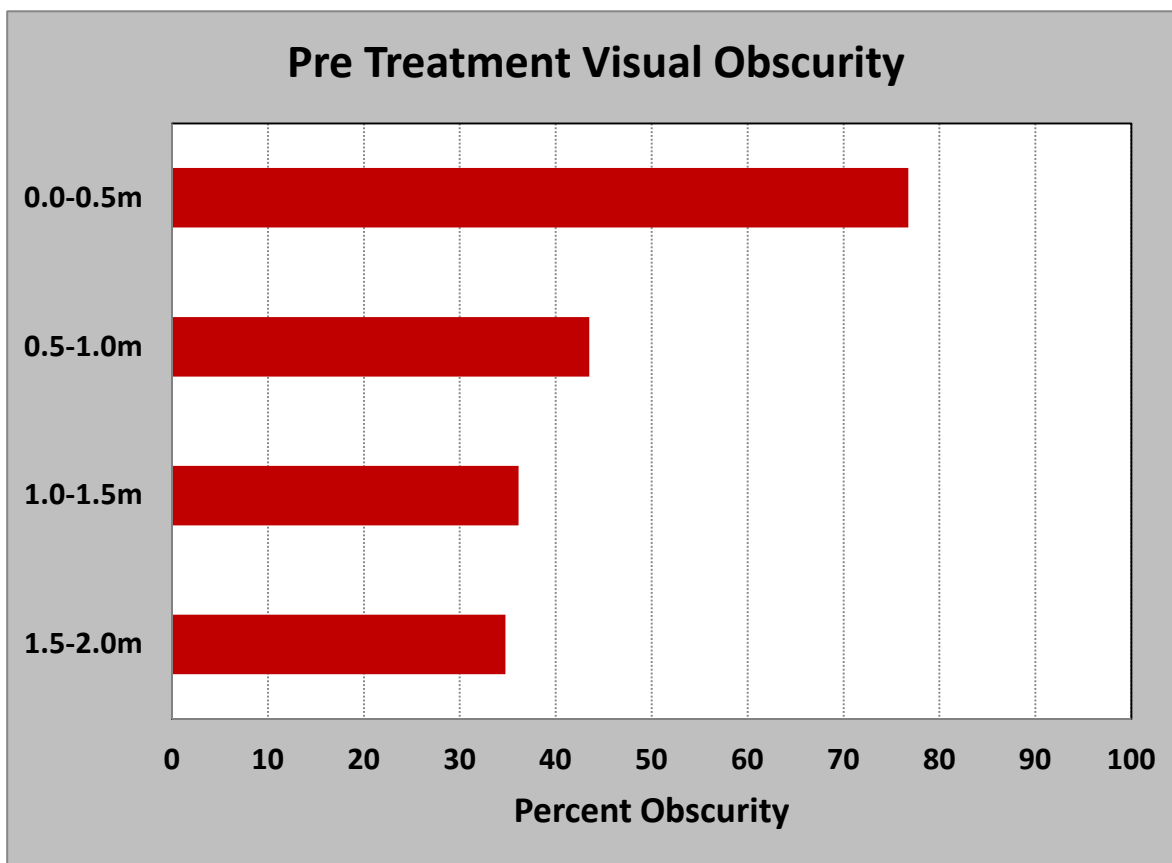
Photo points

Pre-thinning photo points taken in the Ann Mountain project show a moderately dense lodgepole pine overstory and moderate fuel loading. Post-treatment photos should show a much more open understory.



Sightability

The following graphs show the average visual obscurity at four height levels from the sightability transects pre-treatment.



Dry Quad Slashing and Prescribed Burn – Post Slashing, Pre Burn

The Dry Quad project area is located along the boundary between the Bridger-Teton National Forest and Grand Teton National Park near Spread Creek. It is a north-facing hillside with aspen and mixed conifer vegetation. The area is also transitional and migration habitat for elk. The intent of the project is to reduce the conifer component and regenerate aspen.

A total of five different treatments are planned for the Dry Quad project area (see map below).

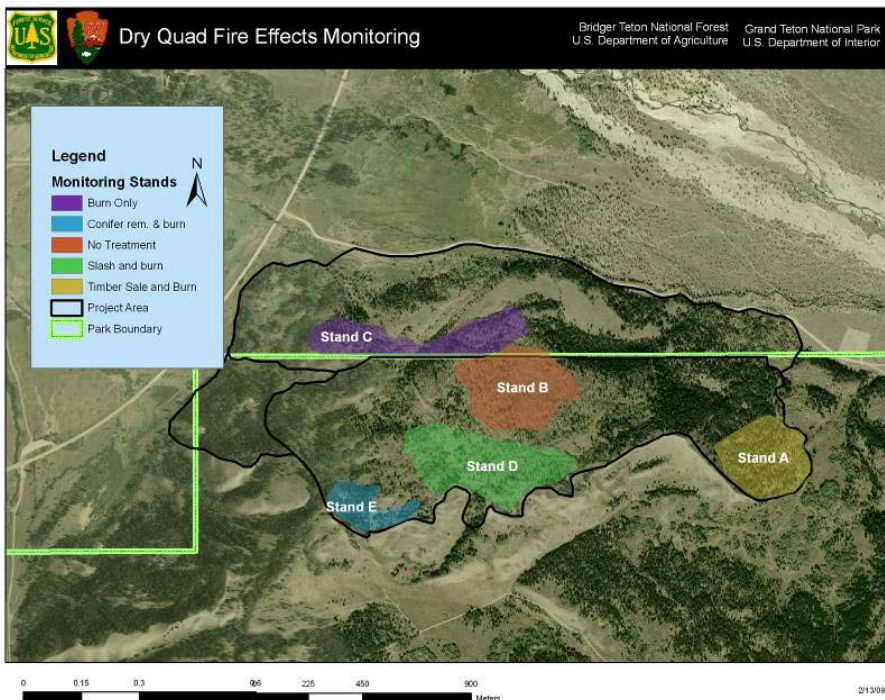
Timber sale and prescribed burn – monitored in Stand A

No treatment – monitored in Stand B

Prescribed burn only – Stand C

Conifer removal, slashing, and prescribed burn – monitored in Stand E

Slashing and prescribed burn – monitored in Stand D



Objectives include the following:

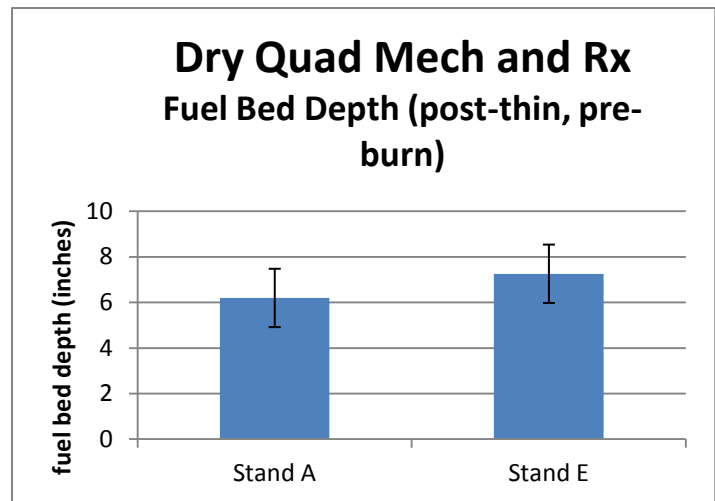
- Attain ≥ 50 -80% mortality of aspen trees (> 5.9 " DBH) and 85% conifer mortality (all size classes) within one year of burn in all treated stands (A, B, E, D)
- Attain at least 2000 aspen suckers/acre over 6 ft in height 3 years post burn (All stands).
- Attain at least 1000 aspen suckers/acre over 10 ft in height 15 years post burn (All stands).
- Attain $\leq 20\%$ bare ground cover, within 3 years post-treatment (All stands).
- Create a down woody fuel bed with an average depth between 12-36

inches in mechanically treated stands post treatment (pre burn) (A, E, D).

- Map the extent of fire effects on the burn unit
- Attain a vegetation and substrate severity level of at least 2.0 (moderately burned) in treated areas (A, B, E, D).

Between 2007 and 2010, pre-implementation monitoring data was collected for the 5 treatments at Dry Quad. Data collection consisted of aspen and conifer overstory tree density, live aspen sucker density and photo points. In 2011, the Teton Interagency Fire Effects Crew collected additional photo points showing the post-thin and slash (but pre-prescribed burning) results in stands A and E. Fuel loading data was also collected pre-burn in stands A and E.

Fuel Bed Depth



The only objective that can be assessed in 2011 is whether a fuel bed depth of 12-36 inches was achieved post-thinning and pre-burning. Data was collected in stands A and E, and results indicate that objectives were not met. Stand A averaged 6.2 inches and stand E averaged 7.3 inches. The goal of 12-36 inches was to insure a sufficient surface fuel load to carry broadcast fire across the stand. When the unit is burned, fire effects monitors will assess whether the 6-7 inches of slash will be sufficient to carry fire.

Photo Points

Dry Quad – Stand A



Pre-Treatment, 2009



Post-Thin and Slash (Pre-Burn), 2011

Dry Quad – Stand E



Pre-Treatment, 2009



Post-Thin and Slash (Pre-Burn), 2011

Fuel Loading

	Stand A	Stand E
1, 10, & 100 Hour Fuels Tons/ac	3.66	10.67
1000 hour Fuels Tons/ac	4.44	8.89
Total Woody Fuels Tons/ac	8.10	19.56

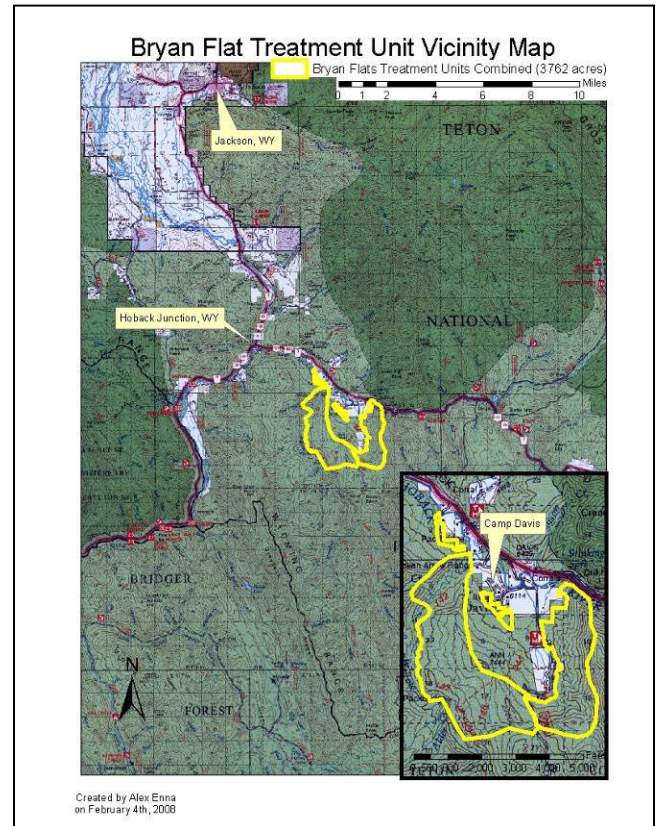
North Willow Mechanical Thinning – Pre Treatment

The 59-acre North Willow mechanical fuels thinning project, located on the North Zone of the Bridger-Teton National Forest (BTNF), was implemented in the summer of 2011. It is part of the greater Bryan Flats Fuels Reduction Project, which encompasses 3763 acres of mechanical and prescribed burning fuels treatments in the Hoback Junction area.

The goals of this mechanical thinning project, and the Bryan Flats project in general, are to increase defensible space adjacent to private lands in the Hoback Junction area through understory mechanical thinning. Fuels reduction is also intended to improve firefighter and public safety by increasing fire containment opportunities during wildland fire events, subsequently reducing the overall costs of firefighting. Conifer-encroached aspen stands will also be thinned to promote aspen regeneration. Objectives for the mechanical treatment are as follows:

- Reduce dead and down fuel loading to between 5-7 tons/acre
- Remove all ladder fuels (limb trees, remove conifer regeneration) and achieve an average canopy base height of 10 feet.

Treatment methods included limbing and felling trees with chain saws and hand piling of the cut material. Piles will be burned during the winter of 2012/2013. Conifers will be removed from areas where they are encroaching on aspen stands, though no measurable objectives relate to this management action.



Prior to the treatment, the Teton Interagency Fire Effects Crew collected stand exam, fuel loading, sightability, lynx habitat assessment, and photo point data in order to evaluate how the treatment will affect fuel loading and fire behavior. Post-treatment data will be collected in the summer following pile burning so that treatment effectiveness can be analyzed.

Monitoring methods used to evaluate project effectiveness involved modeling of fuel loading and expected fire behavior using the Forest Vegetation Simulator (FVS) Fire and Fuels Extension (FFE) program, as well as sightability transects that give an indication of ladder fuels. FVS inputs require stand exam and Brown's transect data, which was collected pre-burn (ten stand exams per event, with two Brown's transects each). Visual obscuration transects were co-located with the Brown's transects.

Pre-treatment fuels characteristics are summarized in the table below.

	Pre-treatment - 2011	Post-treatment - 2013
Fuel Model	FM2 51% FM10 49%	
Litter Tons/ac	7.51	
Duff Tons/ac	18.59	
1, 10, & 100 Hour Fuels Tons/ac	2.71	
1000 hour Fuels Tons/ac	8.31	
Total Woody Fuels Tons/ac	11.02	
Canopy base Height, ft	4	
Canopy Bulk Density kg/m3	0.115	

North Willow is composed of a mix of dense aspen and mixed conifer stands and a moderate amount of dead and down fuels. Moderate to dense stands of conifer regeneration exist in pockets throughout the unit. The site is moderately steep and located immediately uphill and to the southwest of the Bryan Flats residential area. A canopy base height of four feet is extremely low and can lend itself to torching and crown fire initiation under much more moderate fire weather conditions.

Based on pre-treatment data, in order to meet objectives, the treatment will have to remove roughly half of the woody fuel loading, and canopy base height will have to improve drastically. Pre-treatment total stand density (overstory, sapling, and seedling tree species) is 1994 tree stems/acre.

Fire behavior predictions for moderate and severe weather conditions indicate a very high probability for torching and potential crown fire pre-treatment, which is likely due to the extremely low canopy base height and the high canopy bulk density.

	PRE-TREATMENT		POST-TREATMENT	
	Mod. 75 th %	Severe 97 th %	Mod. 75 th %	Severe 97 th %
Surface Flame Length, ft	1.8	2.3		
Fire Type	<i>Surface Fire</i>	<i>Surface Fire</i>		
Probability of Torching	97%	98%		
Torching Index, mph*		6.1		
Crowning Index, mph*		21.0		
Potential mortality, % of BA	38%	40%		
Potential Smoke tons per acre <2.5	0.27	0.27		

*The 20-foot wind speed required to initiate the torching of some trees or to initiate active crown fire.

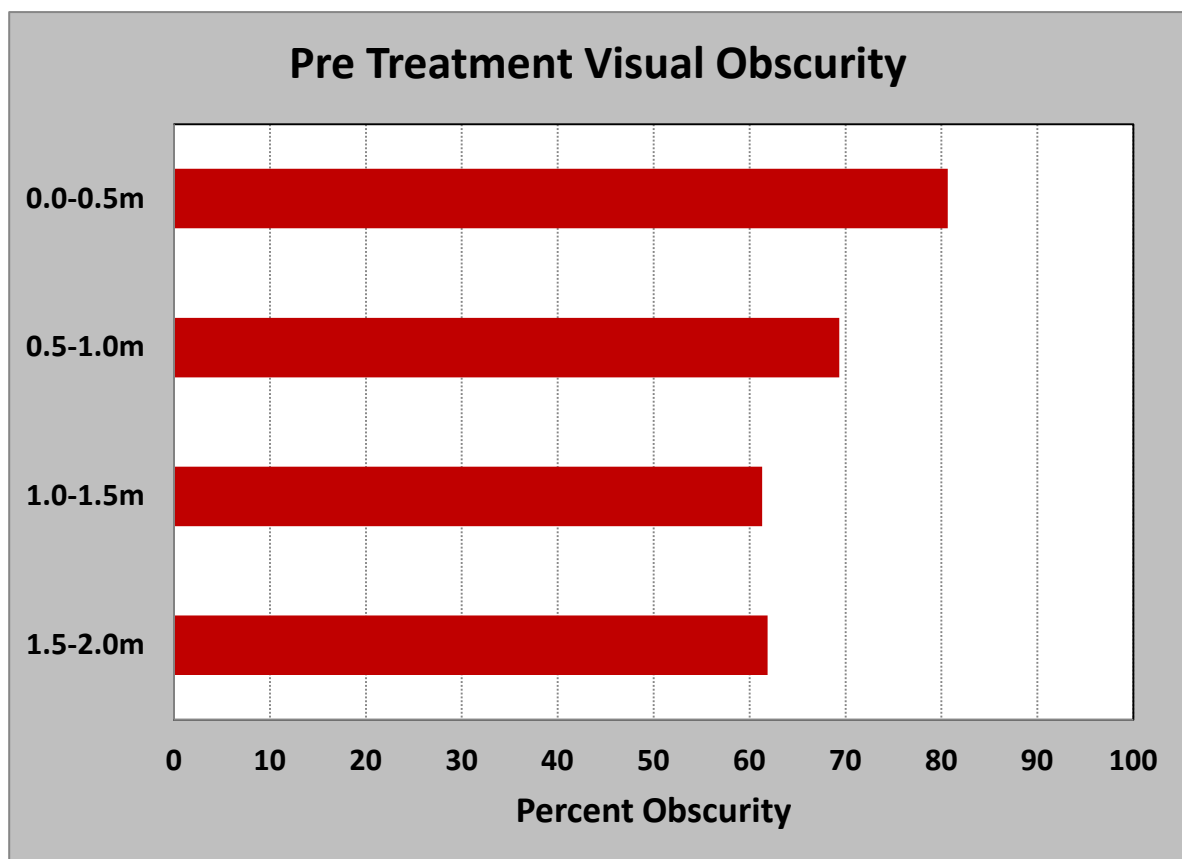
Photo points

Pre-thinning photo points taken in the North Willow project show a relatively diverse stand, with pockets of dense aspen as well as mixed conifer. Post-treatment photos should show a much more open understory.



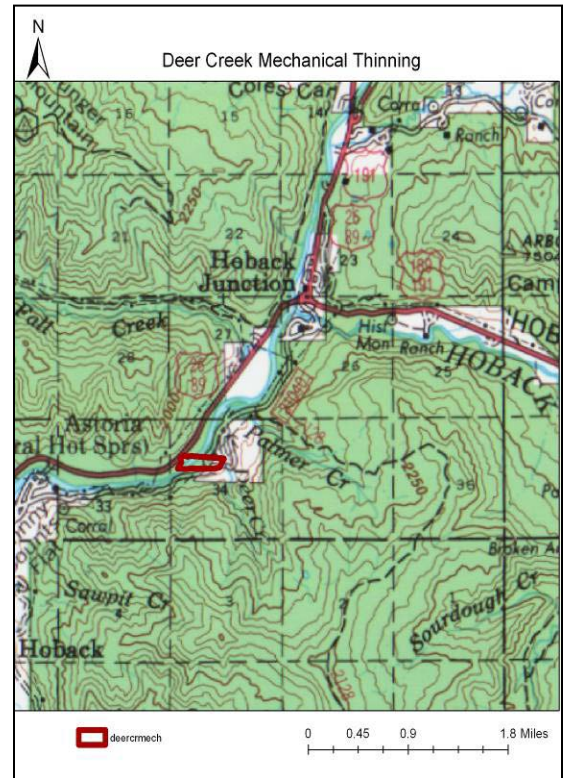
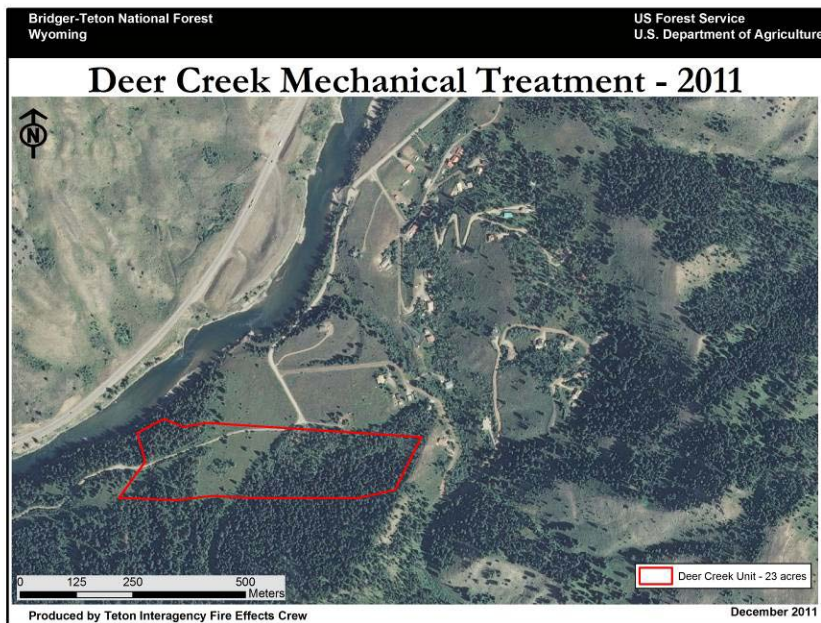
Sightability

The following graphs show the average visual obscurity at four height levels from the sightability transects pre-treatment. These are relatively high obscurity scores, and should be reduced drastically following treatment.



Deer Creek Mechanical Thinning – Pre Treatment

The 23-acre Deer Creek mechanical fuels thinning project, located on the North Zone of the Bridger-Teton National Forest (BTNF) in the Hoback Junction area, was implemented in the summer of 2011. Prior to the treatment, BTNF staff and the Fire Effects Crew collected stand exam, fuel loading, sightability, and photo point data in order to evaluate how the treatment will affect fuel loading and fire behavior. Post-treatment data will be collected in the summer following pile burning so that treatment effectiveness can be analyzed.



The goals of this mechanical thinning project are to increase defensible space in the Hoback Junction area through understory mechanical thinning. Fuels reduction is also intended to improve firefighter and public safety, by increasing fire containment opportunities during wildland fire events. Objectives for the mechanical treatment are as follows

- Reduce dead and down fuel loading to between 5-7 tons/acre
- Remove all ladder fuels (limb trees, remove conifer regeneration) and achieve an average canopy base height of 10 feet.
- Increase tree spacing to 15 x 15 feet (194 trees/acre)

Treatment methods included limbing and felling trees with chain saws and hand piling of the cut material. Piles will be burned during the winter of 2012/2013. Conifers will be removed from areas where they are encroaching on aspen stands, though no measurable objectives relate to this management action.

Monitoring methods used to evaluate project effectiveness involved modeling of fuel loading and expected fire behavior using the Forest Vegetation Simulator (FVS) Fire and Fuels Extension (FFE) program, as well as sightability transects that give an indication of ladder fuels. FVS inputs require stand exam and Brown's transect data, which was collected pre-burn (ten stand exams per event, with two Brown's transects each). Visual obscuration transects were co-located with the Brown's transects.

Pre-treatment fuels characteristics are summarized in the table below.

	Pre-treatment - 2011	Post-treatment - 2013
Fuel Model	FM8 55% FM10 45%	
Litter Tons/ac	5.80	
Duff Tons/ac	10.01	
1, 10, & 100 Hour Fuels Tons/ac	3.83	
1000 hour Fuels Tons/ac	6.81	
Total Woody Fuels Tons/ac	10.65	
Canopy base Height, ft	6	
Canopy Bulk Density kg/m3	0.066	

Deer Creek is composed of primarily mixed conifer overstory, with moderate amounts of dead and down fuels. Moderate to dense stands of conifer regeneration exist in pockets throughout the unit. The site is moderately steep and located immediately uphill and to the southwest of a subdivision.

Based on pre-treatment data, in order to meet objectives, woody fuel loading will have to be cut nearly in half, and canopy base height will have to nearly double. Pre-treatment total stand density (overstory, sapling, and seedling tree species) is 1831 tree stems/acre.

Fire behavior predictions for moderate and severe weather conditions indicate a low probability for crown fire pre-treatment.

	PRE-TREATMENT		POST-TREATMENT	
	Mod. 75 th %	Severe 97 th %	Mod. 75 th %	Severe 97 th %
Surface Flame Length, ft	1.2	1.6		
Fire Type	<i>Surface Fire</i>	<i>Surface Fire</i>		
Probability of Torching	0%	2%		
Torching Index, mph*		30.2		
Crowning Index, mph*		31.5		
Potential mortality, % of BA	32%	32%		
Potential Smoke tons per acre <2.5	0.17	0.17		

*The 20-foot wind speed required to initiate the torching of some trees or to initiate active crown fire.

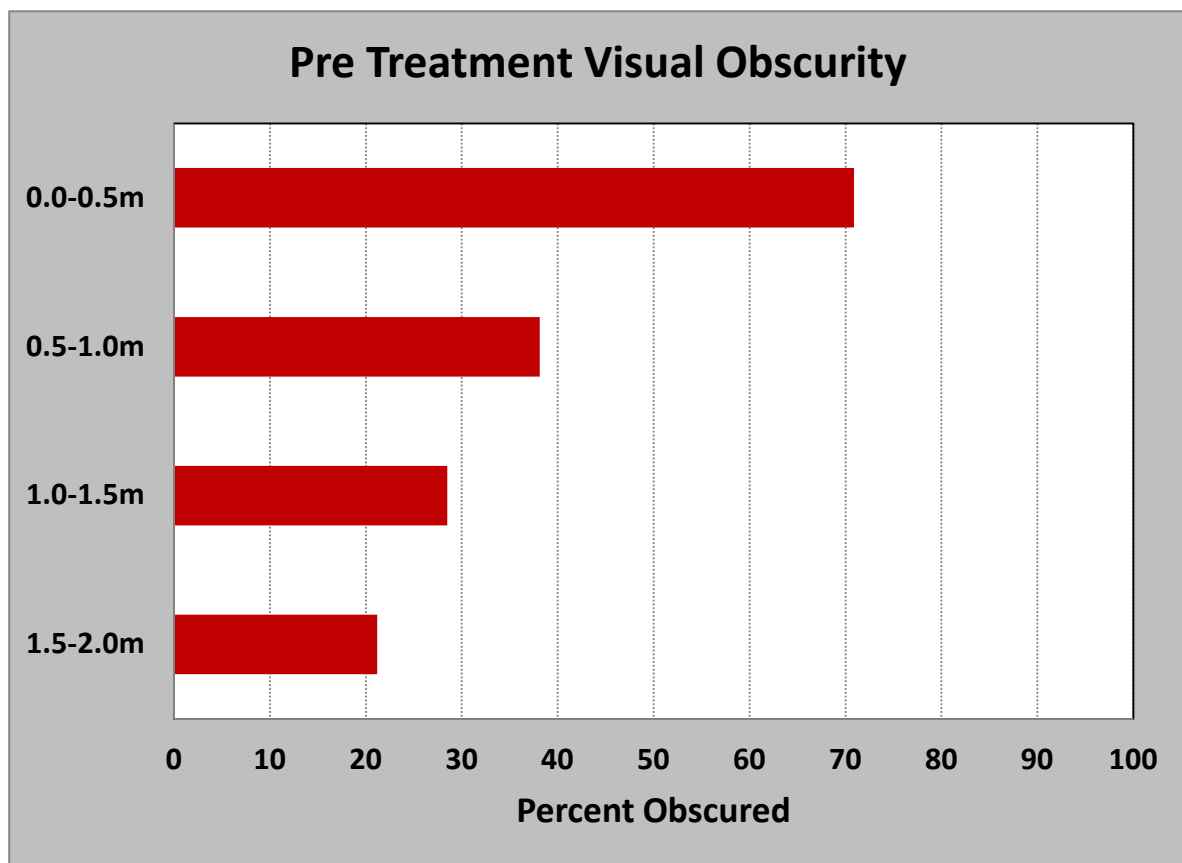
Photo points

Pre-thinning photo points taken in the Deer Creek project show a moderately dense mixed conifer understory and moderate woody fuel loading. Post-treatment photos should show a much more open understory.



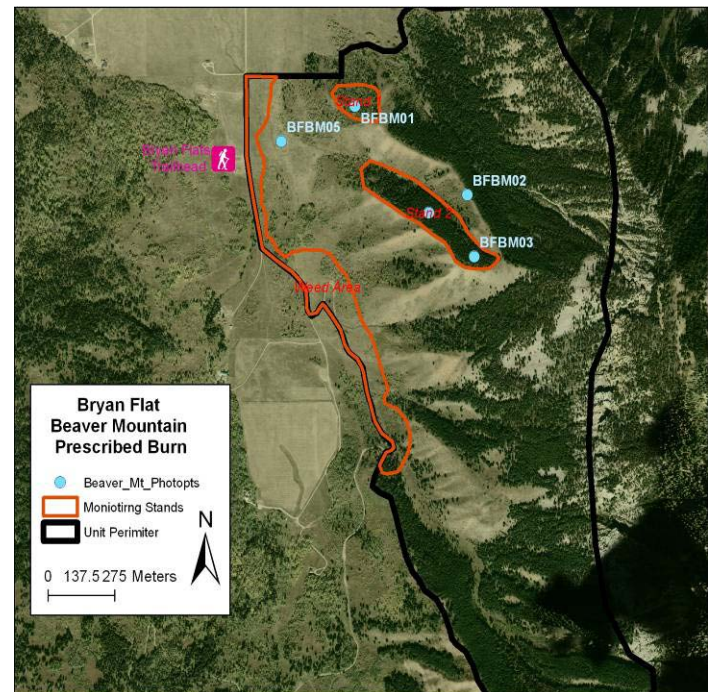
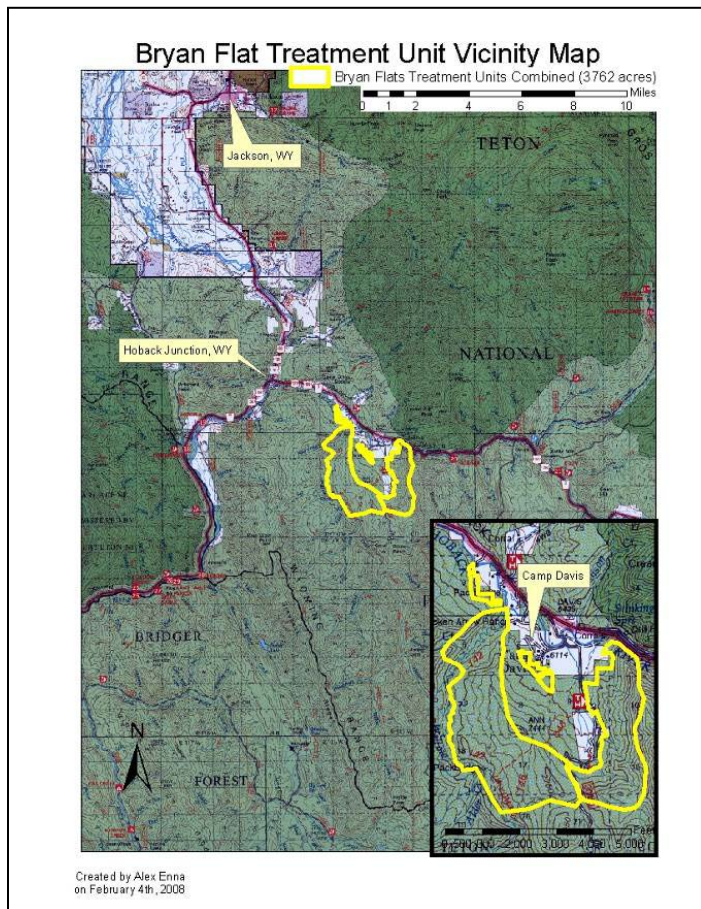
Sightability

The following graphs show the average visual obscurity at four height levels from the sightability transects pre-treatment.



Beaver Mountain Prescribed Burn – Pre Burn

The Beaver Mountain Prescribed burn is part of the overall Bryan Flats Fuels Reduction Project, located south of Jackson Wyoming near the University of Michigan Geology Field Camp (Camp Davis), and a cluster of private homes that have recently been built up in the wildland urban interface alongside USFS land in the Jackson Ranger District. The Beaver Mountain unit has also been identified in the past as important wildlife habitat that would benefit from treatment with fire.



Monitoring objectives for the burn are as follows:

- Reduce live conifer by 20% - 60% in designated aspen stand #1, (see map) to promote aspen health and vigor.
- Regenerate at least 1000 aspen suckers/acre over 10' in height 15 years post burn
- Blacken between 40% and 80% of the sagebrush within in the burn unit, in a mosaic pattern.
- Achieve 10-30% canopy fire effects in representative stand #2 (see map). Increase crown base height and decrease crown bulk density.
- Detect and treat noxious weeds or cheatgrass along the road portion of the burn.

In 2011 the Teton Interagency Fire Effects Crew collected aspen circle, stand exam, fuel loading, sightability, and lynx habitat assessment data in order to evaluate how the treatment will affect the stated objectives. Weeds were also mapped in the area noted on the map above. Photo points were collected in 2009. Post-treatment data, including mosaic mapping to address objective #3, will be collected following prescribed burning so that treatment effectiveness can be analyzed.

Monitoring methods used to evaluate project effectiveness involved modeling of fuel loading and expected fire behavior using the Forest Vegetation Simulator (FVS) Fire and Fuels Extension (FFE) program, as well as sightability transects that give an indication of ladder fuels. FVS inputs require stand exam and Brown's transect data, which was collected pre-burn (ten stand exams per event, with two Brown's transects each). Visual obscuration transects were co-located with the Brown's transects.

Photo Points

In 2009, the fire effects crew installed five permanent photopoints in identified priority locations in the burn unit (see map, above). These photographs will help to track fire effects and changes in the fuel conditions.



BFBM-01 - Aspen in Stand 1



BFBM-02 – Overview of Stand 2 (mixed conifer and aspen)



BFBM-03 – Mixed conifer in Stand 2



BFBM-04 – Larger-diameter Douglas-fir in Stand 2



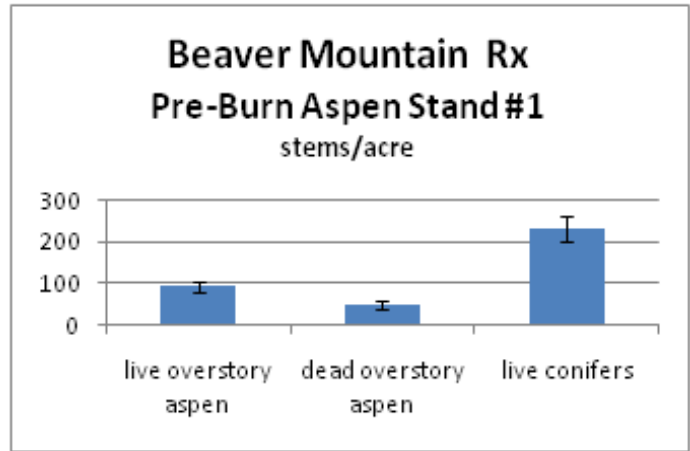
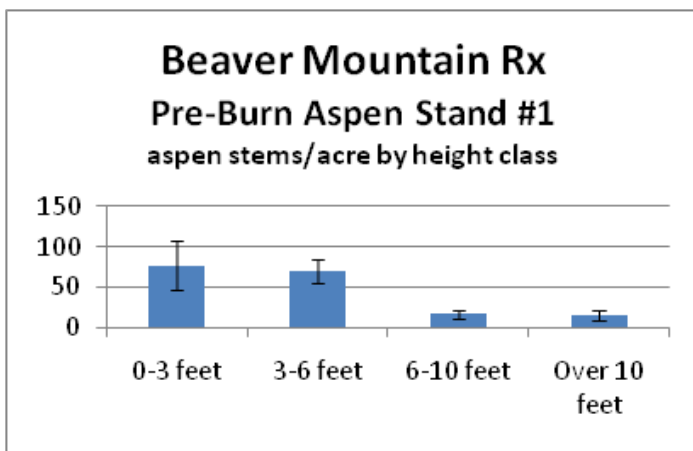
BFBM-05 – Overview of sagebrush area looking south



Looking northwest

Aspen (Stand #1) Objectives

To assess the success of meeting objective 1, pre-burn stem density for both aspen and conifer was measured in aspen stand #1. Pre-treatment, there are over twice as many conifer stems/acre than there are aspen. Post-treatment data collection will assess whether the 20-60% reduction in conifer stems was achieved.



Objective two seeks to obtain over 1000 aspen suckers over 10 feet in height by 15 years post-burn. The second graph illustrated the pre-burn aspen sucker cohort. Pre-burn results indicate that there are very few aspen suckers of a mature height. This combined with fairly intense pre-burn browsing levels (41%) indicate that reaching 1000 aspen suckers over 10 feet in height may be difficult to achieve.

Conifer (Stand #2) Objectives

Pre-treatment fuels characteristics for stand #2 are summarized in the table below.

	Pre-treatment - 2011	Post-treatment - 2013
Fuel Model	FM8 53% FM10 47%	
Litter Tons/ac	6.76	
Duff Tons/ac	18.24	
1, 10, & 100 Hour Fuels Tons/ac	4.49	

1000 hour Fuels Tons/ac	3.21	
Total Woody Fuels Tons/ac	7.70	
Canopy base Height, ft	8	
Canopy Bulk Density kg/m3	0.067	

Beaver Mountain is an extremely diverse burn unit, with stands of pure conifer, pure aspen, conifer-encroached aspen, and sage and grass flats. The timbered portion of the unit is quite steep.

Based on pre-treatment data, in order to meet objectives, canopy base height will have to improve only slightly. Pre-treatment total stand density (overstory, sapling, and seedling tree species) is 1006 tree stems/acre.

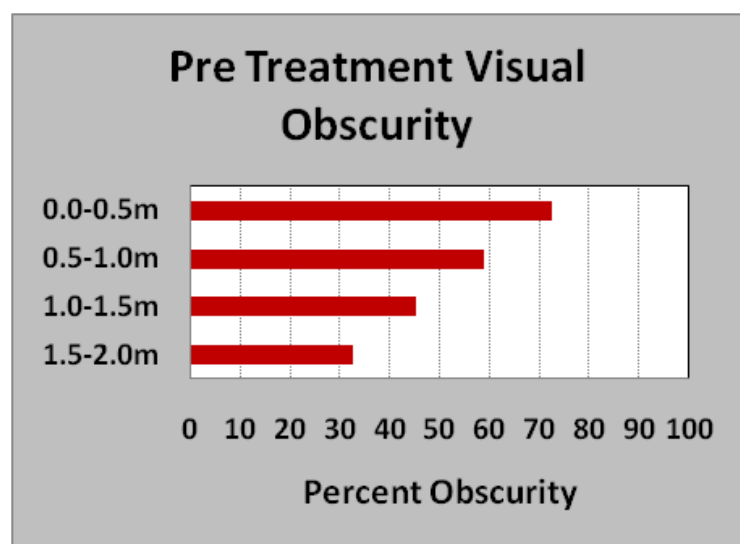
Fire behavior predictions for moderate and severe weather conditions for stand #2 indicate a very low probability for crown fire pre-treatment.

	PRE-TREATMENT		POST-TREATMENT	
	Mod. 75th%	Severe 97th%	Mod. 75th%	Severe 97th%
Surface Flame Length, ft	1.2	1.6		
Fire Type	<i>Surface Fire</i>	<i>Surface Fire</i>		
Probability of Torching	0%	3%		
Torching Index, mph*		41.3		
Crowning Index, mph*		31.1		
Potential mortality, % of BA	26%	26%		
Potential Smoke tons per acre <2.5	0.26	0.26		

*The 20-foot wind speed required to initiate the torching of some trees or to initiate active crown fire.

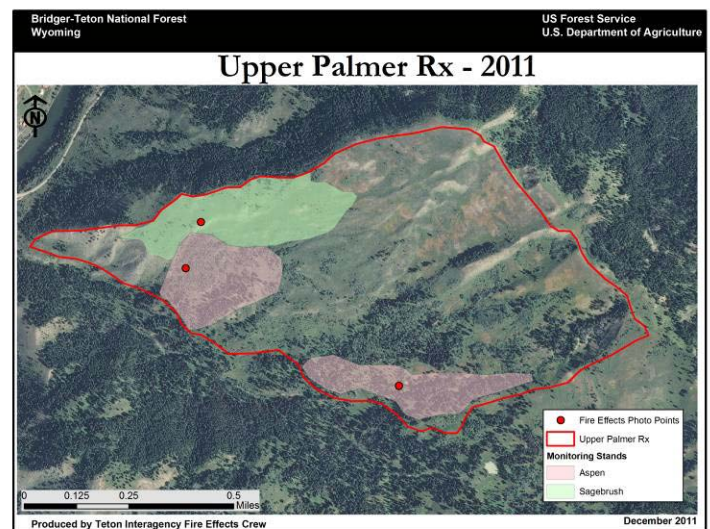
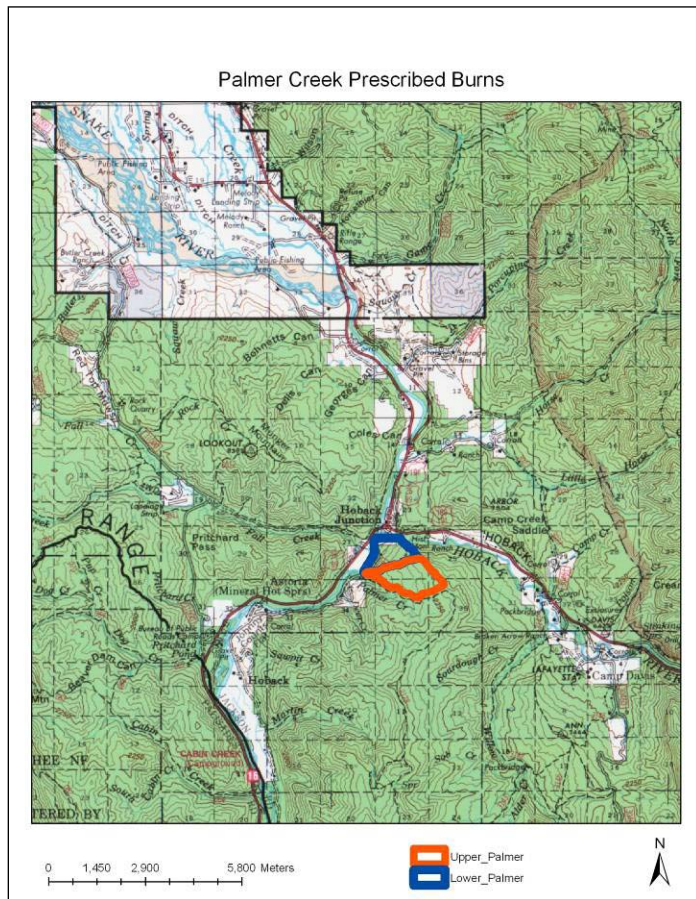
Sightability

The following graphs show the average visual obscurity at four height levels from the sightability transects pre-treatment.



Upper Palmer Prescribed Burn – Immediate Post Burn

The 360-acre Upper Palmer Prescribed Burn was planned for the spring of 2011 and took place September 23rd – 25th, 2011. The project area is located at Hoback Junction, near a small community in the wildland urban interface south of Jackson, Wyoming. The vegetation consists mainly of sagebrush, with several forested draws where aspen and Douglas-fir are succeeding to mixed conifer. The prescribed burn is intended to reduce fuel loading and continuity in the vicinity of private homes. The area is also yearlong habitat for big game.



Objectives for Upper Palmer Creek are given as follows:

Sagebrush Objectives:

- Blacken between 40% and 80% of the sagebrush in the burn unit, in a mosaic pattern.
- Achieve at least 40% conifer mortality in encroached sagebrush areas.

Aspen Objectives:

- Reduce live conifer between 20% and 60% in designated aspen stands #1 and #2 (see map) to promote aspen health and vigor.
- Reduce overstory aspen density (stems > 5.9" DBH) by 70% post-burn.
- Attain more than 3000 aspen suckers/acre in the designated aspen stands two years post burn.
- Attain more than 1500 aspen suckers per acre over 6 feet tall 5 years post burn.
- Attain at least 1000 aspen stems/acre at 10 ft or taller within 15 years post treatment.
- Maintain aspen browse levels at less than 30% on terminal leaders.

In 2009, the fire effects crew installed 4 photopoints and measured the density of aspen suckers, overstory aspen, and conifer trees in the aspen monitoring stands. In 2010, the crew added an additional pre-burn protocol to assess percent cover of shrubs in order to determine whether the burn would meet the objective of blackening 40-80% of the burn unit.

In 2011, immediately following the prescribed burn, photo points were retaken and burn severity was mapped using aerial photography provided by the Teton Interagency helicopter. Objectives related to conifer mortality,

aspen regeneration, browse levels, and sagebrush cover will be remeasured beginning in 2012. Photo point and severity data are summarized below.

Photo Points

SAGEBRUSH UNIT



Pre-burn (2009)



Post-burn (2011)

SAGEBRUSH UNIT



Pre-burn (2009)



Post-burn (2011)

CONIFER UNIT



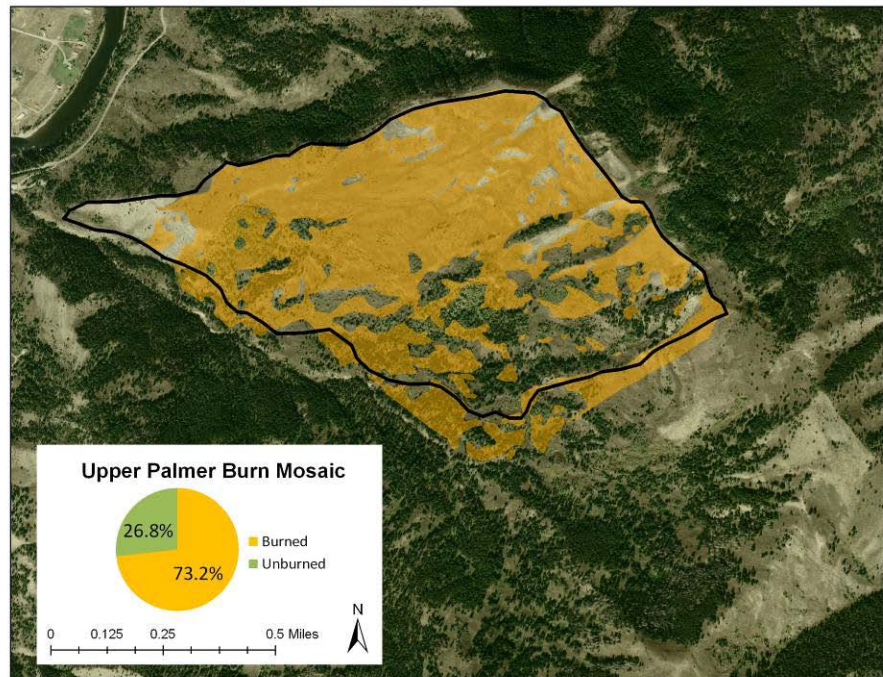
Pre-burn (2009)



Post-burn (2011)

Burn Mosaic Mapping

Immediately following the burn, the Teton Interagency helicopter was used to conduct an aerial photography flight of the burn unit. These photos were used to map the mosaic of the burn. Of the 360 acres, 97 acres (27%) did not burn. The following map shows that the sagebrush areas carried much more fire than the aspen and conifer fuel types. Overall, 73% of the unit was blackened, while 81% of the sagebrush in the unit burned. This slightly exceeds the objective of blackening between 40 and 80% of the sagebrush in the unit.



Appendix D

Bridger-Teton National Forest East Zone

2011 Project Level Fuels & Fire Effects Monitoring Reports

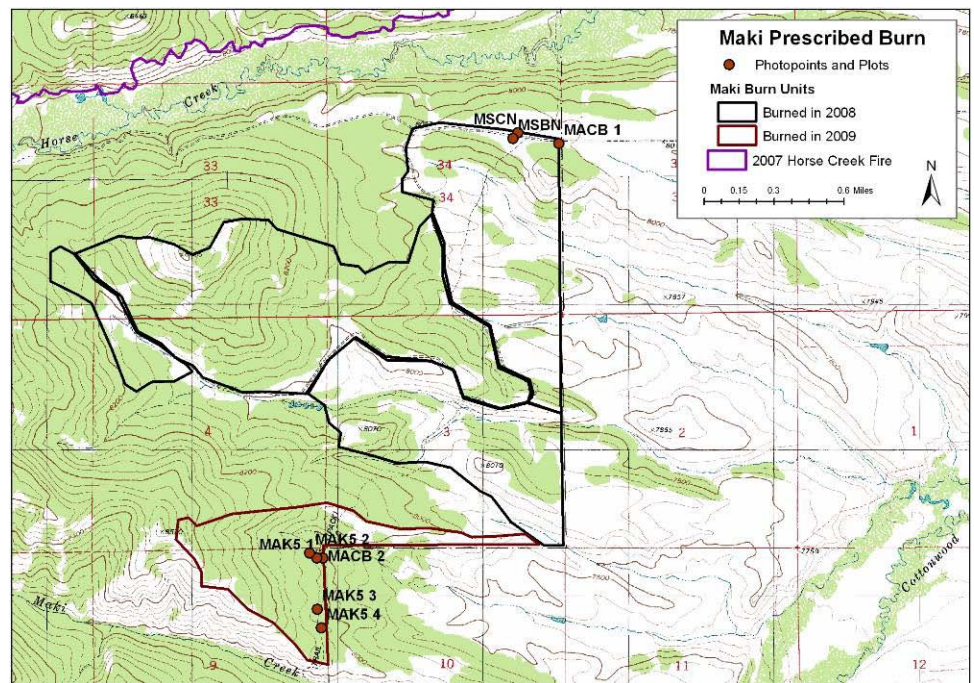
Maki Creek Prescribed Burn- Years 2&3 Post Burn

Maki Creek is an aspen and sagebrush enhancement treatment project located on the Big Piney Ranger District in the foothills of the Wyoming Range. Aspen treatments were targeted for heavily conifer-encroached aspen stands throughout the burn unit. Conifer trees within these stands were mechanically slashed, allowed to cure for one to three seasons, and subsequently burned. Several hundred acres of adjacent mountain big sagebrush was also included in the burn. Monitoring was spearheaded by the Wyoming Game & Fish Department's Big Piney BFH Biologist. The field data were collected through a joint effort of G & F and the Teton Interagency Fire Effects Crew.

Monitoring Objectives address aspen and sagebrush communities:

1. Obtain aspen sucker density (≥ 10 ft) of at least 1000 stems/acre 10-15 years post-burn and/or post-thin.
2. Obtain basal ground cover of $\geq 80\%$ within 5yrs post-burn in aspen and sagebrush habitats.
3. Decrease density of sagebrush by 40-60% 1yr post-burn in Mountain Big Sage habitats.
4. Compare pre-burn (post slashing) fuel bed depth to post-burn severity in treated aspen-conifer stands.
5. Measure woody fuel reduction between pre burn (post-slashing) and post burn in treated aspen-conifer stands.

A portion of the Maki Creek prescribed burn project was implemented in the late fall of 2008, while the remaining acres were burned in the summer of 2009.



Aspen Monitoring

In 2010, aspen monitoring was completed in three aspen stands using nonpermanent circular density plots (two treated and one control). While it is only 2-3 years post-burn, aspen regeneration numbers are encouraging. Time will tell whether objectives related to aspen recruitment will be met.

Ground Cover

The objective relating to basal ground cover ($\geq 80\%$ within 5yrs post-burn) has already been met in the sage unit (Fig 1) in 2011, and is close to being met in the aspen units (Fig 2). Ground cover monitoring will continue in the aspen units at least through year 5 post-burn.

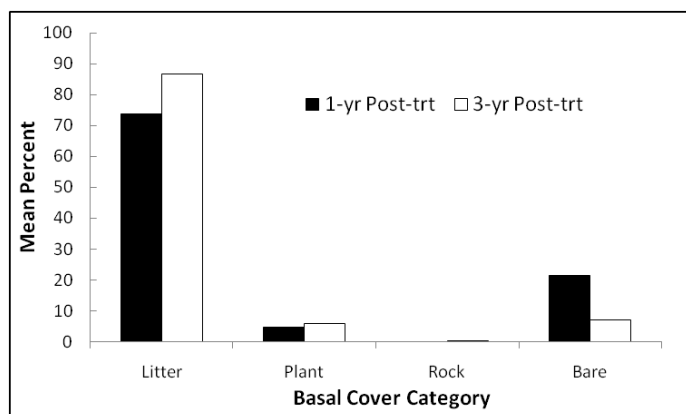


Figure 1

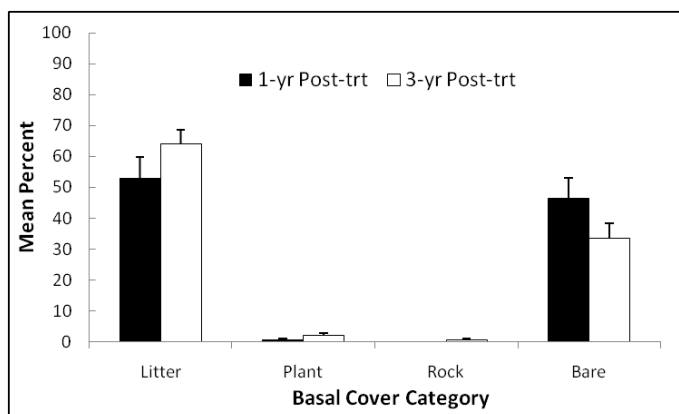


Figure 2

Sagebrush Density

Sagebrush cover was measured pre- and post-burn in the sage units. Results indicate that this objective was accomplished. Data indicates that sagebrush areas that did burn experienced near 100% consumption/reduction in sage cover. However, mosaic mapping of the burn unit indicate that 40-60% of the unit burn as a whole. This would suggest that there was an overall reduction of sagebrush cover of 40-60%, which meets objective #3 for the burn unit.

Fuel Loading

Data relating to pre- and post-burn fuel loading was collected for the last time in 2010. Results are summarized in the 2010 Maki Creek report, and are not included in the 2011 report.

Monument Ridge Unit II RX – Year 1 Post Burn

The second Monument Ridge prescribed burn unit was treated during the fall of 2010. The vegetation is dominated by mountain big sagebrush (*Artemisia tridentata* spp. *Vaseyana*) with some silver sagebrush in moister areas. The understory consists of forbs, native grasses and bluegrass. There are several aspen stands on north aspects, one of which was pre-treated by slashing the conifer trees. Willows are found in several east-flowing draws.

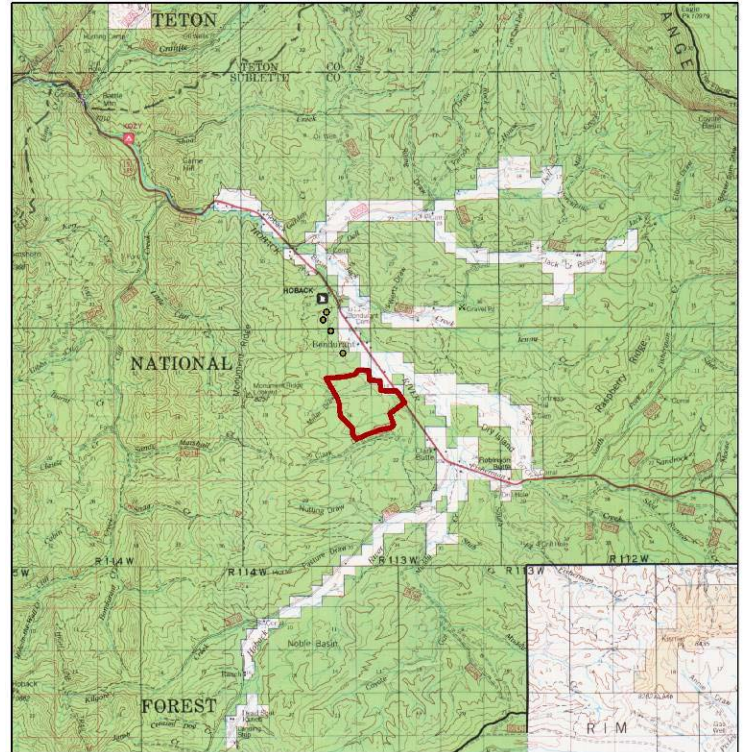
Originally the size of the project was slated to be 1025 acres; however portions of the unit were excluded from the ignition plan. The area within the blackline was 677 acres.

Monitoring objectives for Unit II focused on reducing the percent cover of shrubs:

- Burn 30-60% of the sagebrush communities in a mosaic pattern within the project area.
- Measure the reduction of big sagebrush (*Artemisia tridentata* var. *vaseyana* and *Artemisia cana*) height and canopy cover 1 and 5 years post burn in treated areas.
- Attain less than 40% bare ground in burned sage/grass communities one year post burn, and less than 20% bare ground after the fifth growing season post-burn.

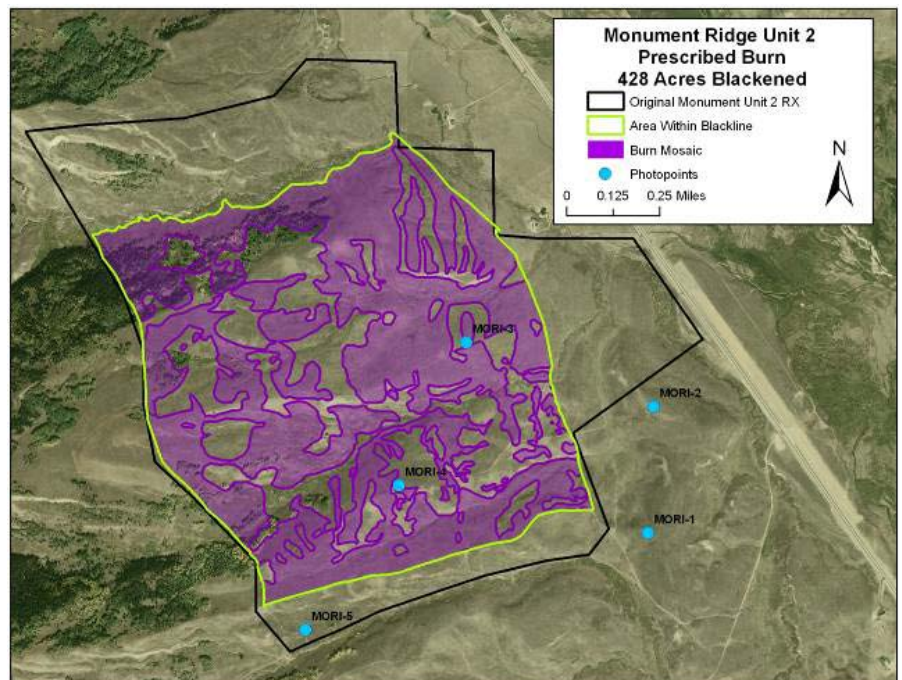
Additional aspen objectives will be monitored in future years:

- Attain 1000 stems per acre in burned aspen areas that are 10 feet tall within 15 years.
- Attain 3000 aspen stems/acre at 6 feet in height over 70% of the treatment areas within 5 years post-burn



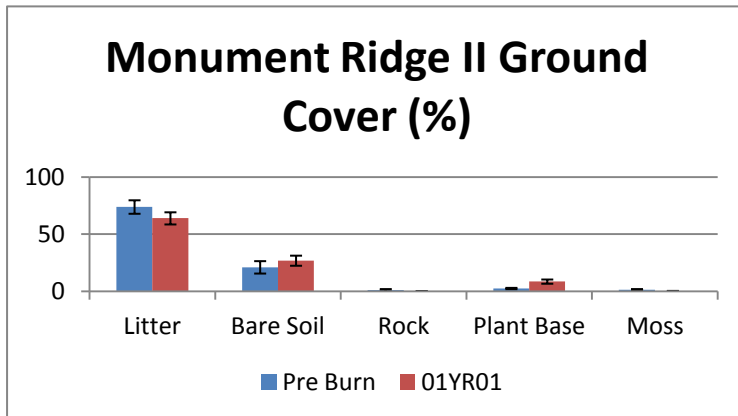
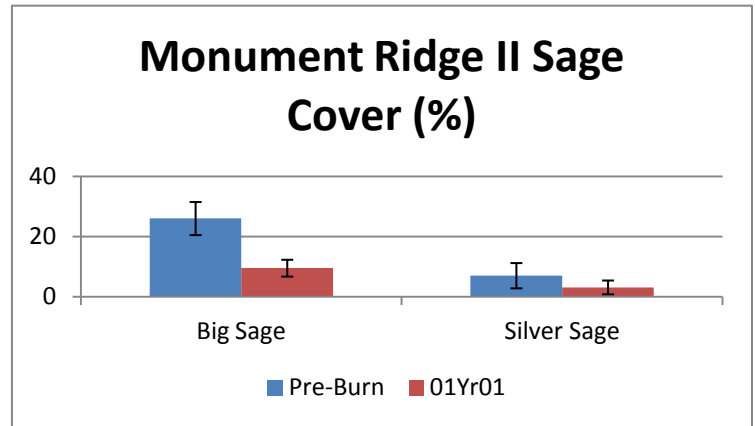
Mosaic Mapping

The burn mosaic was mapped using post-treatment aerial photographs. According to GIS analysis, 428.3 acres were blackened. This is 41% of the planned Monument II unit, and 63% of the acreage within the blackline area, which meets the objective of blackening 30-60% of the entire project area.



Sagebrush Cover

Big sagebrush cover was measured pre-burn in 2009 and again in 2011, one year post-burn. Results are shown below. The vague objective (“measure the reduction of big sagebrush”) doesn’t allow us to state whether or not we met the “objective”, but results show a significant reduction in big sage, and we will continue to track big sagebrush reduction/recovery into the future to improve sagebrush objectives for this and other projects.



Ground Cover

Ground cover was measured in 2009 and again in 2011, one year post-burn. Bare soil did increase (from 21% to 27%) post-burn, but to a level well below the stated objective (less than 40% bare ground one year post-burn). We will measure ground cover percentage again five years post burn, as the objective changes for that time period (less than 20% bare soil).

Photo Points

Only two of the permanent photopoints were located within the final burn perimeter (MORI 2 and MORI 3). Two of the other photopoints provided a distance view of the burned landscape. A new photopoint was installed in the aspen stand post burn.



MORI-3_90_PRE_2009



MORI-3_90_ImmPost_2010



MORI-3_90_01YR01



MORI-3_180_PRE_2009



MORI-3_180_ImmPost_2010



MORI-3_180_01YR01



MORI-6_270_ImmPost_2010



MORI-6_270_01YR01



MORI-6_180_ImmPost_2010



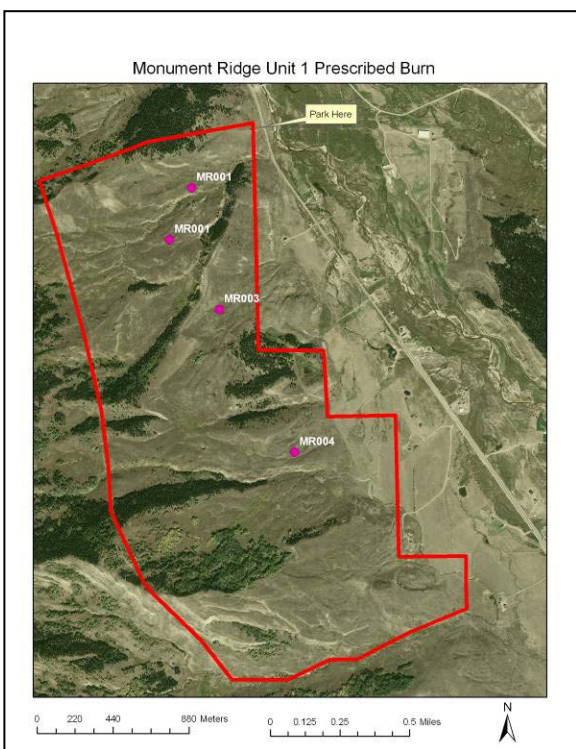
MORI-6_180_01YR01

Monument Ridge Unit 1 Prescribed Burn – Year 5 Post Burn

Monument Ridge Unit 1 was burned in the fall of 2006. It is located on the southwest side of US Highway 189-191 near Bondurant, Wyoming. The vegetation consists of mainly sagebrush with several parallel draws with Douglas-fir on the north-facing slopes and willows in the drainage bottoms.

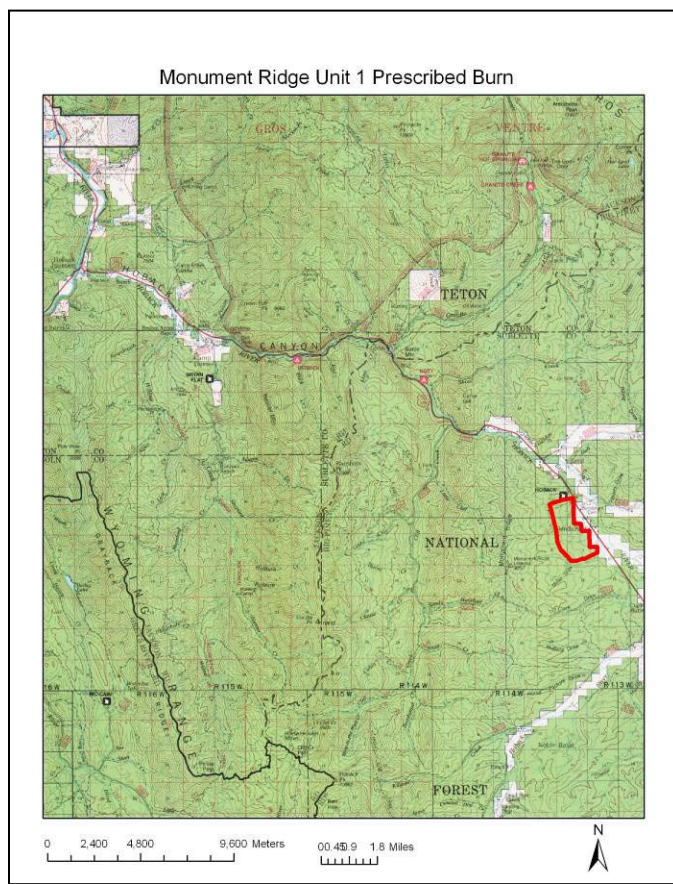
The monitoring objectives for this burn unit were:

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.

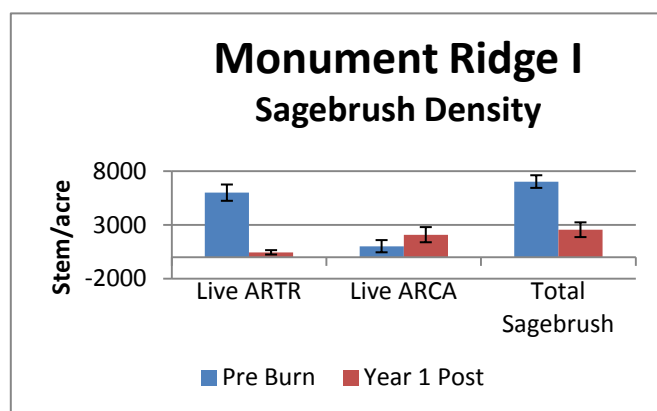


Sagebrush Cover

The way that objectives #1 and #2 are written makes it very difficult to directly address them. The Teton Interagency Fire Effects Crew also no longer measures sagebrush “density” (stems/acre) and instead monitors sagebrush percent cover. Cover data is a much more repeatable method of sampling and therefore a more accurate method for describing fire’s effects on a landscape.



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.



The sagebrush density graph shows a significant (92%) reduction in big sagebrush density one year post-fire. The non-significant (51%) increase in silver sage density post-fire was not enough to combat the significant (64%) decrease in overall sage density. These numbers indicate that objectives related to sagebrush reduction were likely met, though it's difficult to say so definitively. While not comparable to the above data, in 2011 (5 years post-burn), big sagebrush cover was 15.8% and silver sage cover was 7.2%.

Ground Cover

In 2008, the fire effects crew visited Monument Ridge to retake photopoints and measure ground cover. Ground cover was measured using twelve point intercept transects. Immediately post-burn, groundcover was measured at 63%, which rose to 88% two years post-burn. Pre-burn ground cover was only 86%, so it appears that the litter and plant cover has recovered, and the ground cover objective has been met with statistical significance.

Species Richness

Due to the difficulty associated with finding any statistical significance in post-burn species richness and cover data, this objective was abandoned in 2011. This has allowed for more in depth and statistically sound data collection with respect to the other variables, in particular, sagebrush cover, which has been universally considered to be more relevant to land managers.

Photo Points



01Pre



01ImmPost



01Yr01



01Yr02



01Yr05

Wood Draw (Little Flat Top) Prescribed Burn – Year 3 Post Burn

The Wood Draw portions of the Little Flat Top prescribed burn project area were burned in the spring of 2007. Included were a 742 acre area of aspen forest and a 147 acre willow community along Willow Creek in the foothills of the Wind River Mountains.

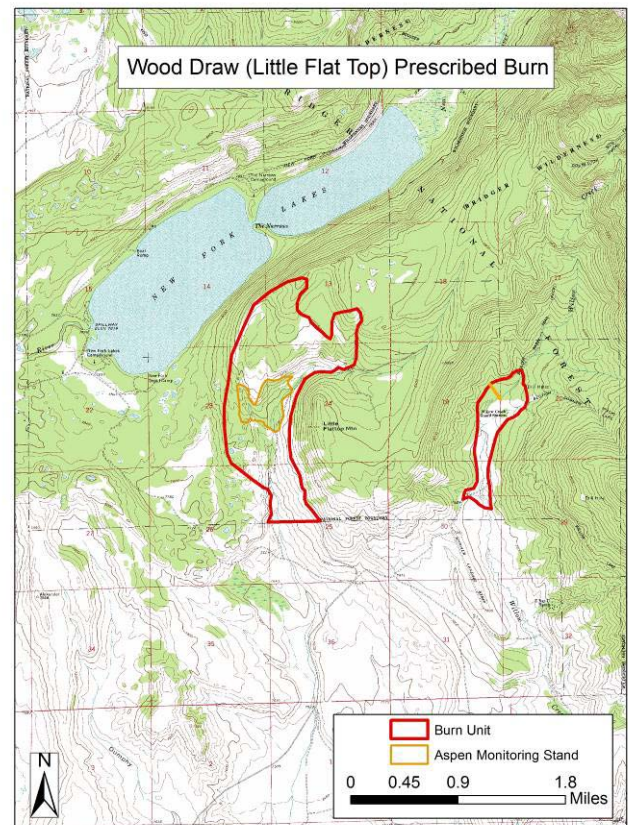
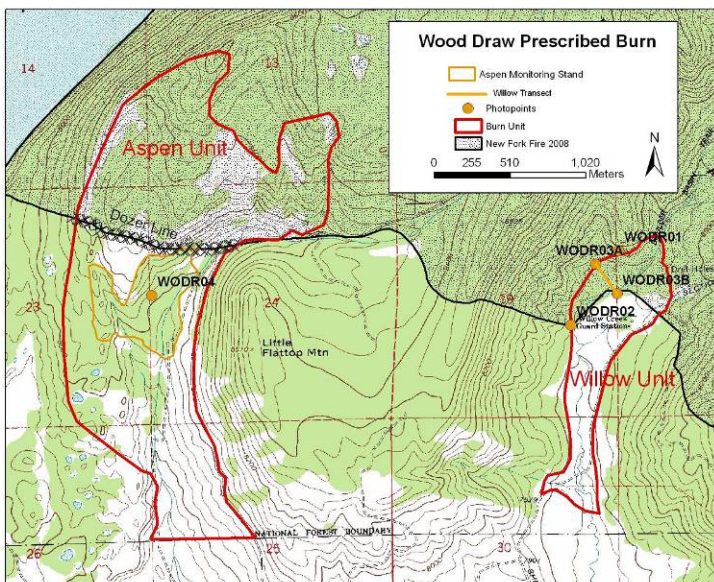
Aspen objectives:

- 1) *Attain 1000 stems per acre in burned aspen areas $\geq$ 10 feet tall within 15-years post burn.*
- 2) *Attain 60% ground cover in burned aspen areas within 2-years post burn and 80% within 5-years post burn.*

Willow objectives:

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

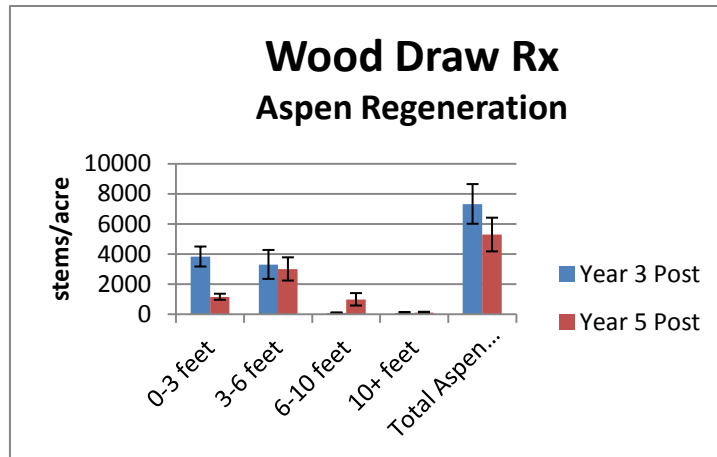
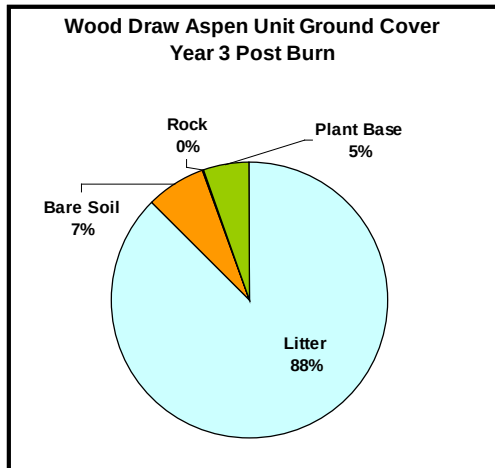
In 2008 the 15,089-acre New Fork wildland fire prevented Year 2 post burn aspen, willow, and ground cover monitoring at Wood Draw. In 2009 and 2001, this data was collected by the Teton Interagency Fire Effects Crew and Wyoming Game & Fish biologists.



Aspen Regeneration

Aspen data is summarized in the two graphs below. There is a non-significant reduction in overall aspen suckers, but that is expected as the stand begins to self-thin. It is encouraging that there is a significant increase in 6-10 foot aspen and a non-significant increase in 10+ foot aspen. It is also encouraging elk browsing levels are quite low, and that there was a non-significant reduction in browsing, from 11.5% to 10.5% of the stems showing signs of browsing.

Ground Cover



Ground cover met the Year 5 post-burn objective of 80% cover by year 3 post-burn, and was therefore not monitored in 2011.

Willow Regeneration:

Willow height significantly increased from year 3 to year 5 post-burn. In fact, overall willow height is nearing pre-burn levels, and it seems likely that willow objective #1 (Within burned areas, attain willow height greater than or equal to mean pre-burn willow height within 10-years post burn) is likely to be achieved.

Willow objective #2 (Attain at least 30% increase in the proportion of live to dead willow stems within 3-years post burn) was achieved in 2009.

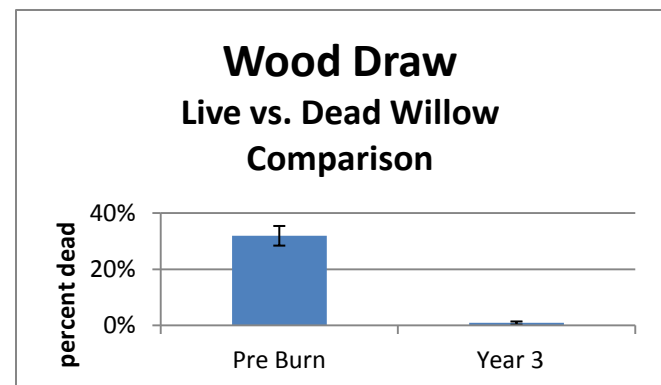
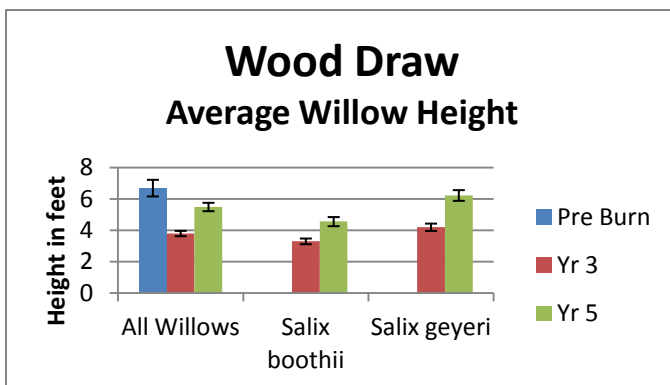


Photo Points

Several photo points were taken and clearly show the willow regeneration.

Wood Draw; WODR02; 168°



pre, 2006



immpost



yr01, 2007



yr03, 2009



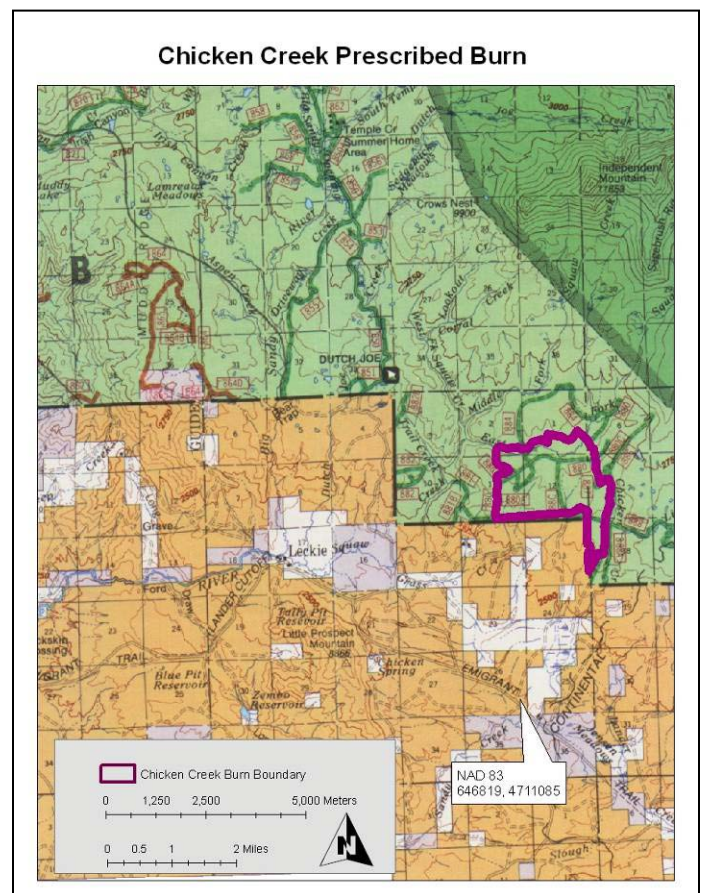
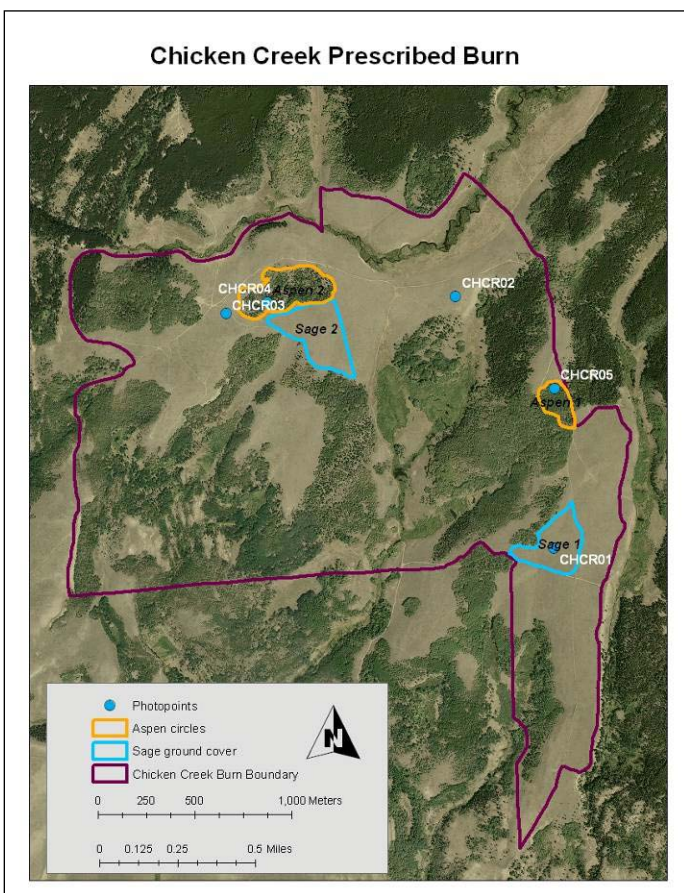
01YR05, 2011

Chicken Creek Prescribed Burn – Year 2 Post Burn

The Chicken Creek prescribed burn was implemented in the fall of 2009. It was a 1285 acre project with sagebrush, aspen, conifer, and willow vegetation. Much of the aspen was encroached by conifers (mainly limber pine). Many of the aspen stands also showed reduced vigor compared to the sizes of boles on the ground remaining from decades earlier.

The objectives of the Chicken Creek burn were as follows:

- Treat 30-50% of sagebrush with 15% canopy cover or greater in a mosaic pattern over the landscape
- Attain 60% ground cover in treated sagebrush/grass areas within 2 years post burn and 80% within 5 years post burn
- Attain 1000 stems per acre in burned aspen areas that are 10 feet tall within 15 years.

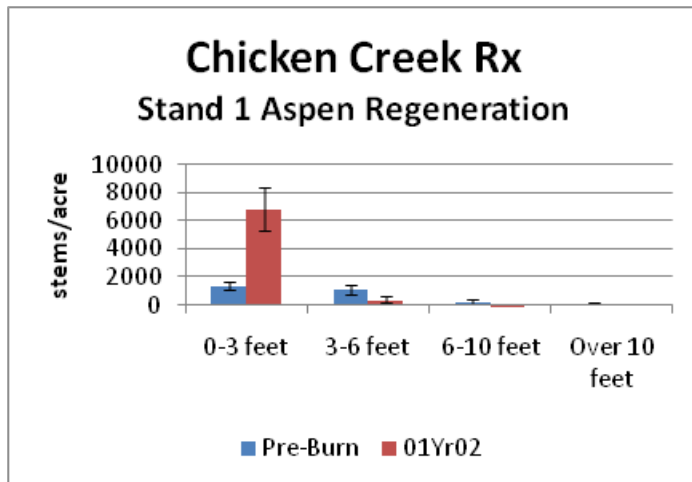
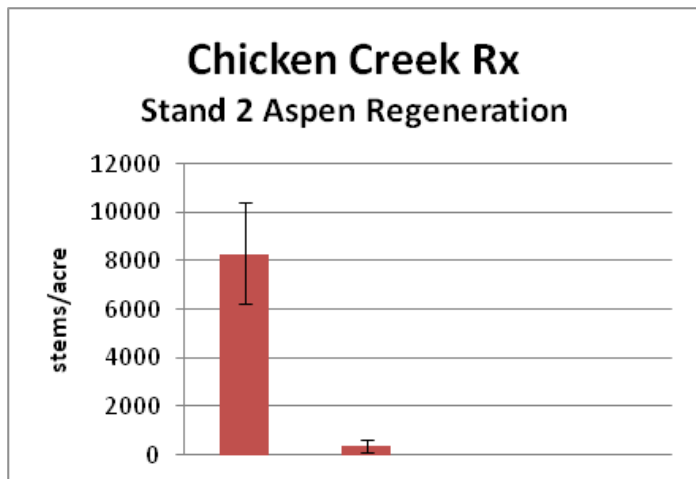


Burn Mosaic:

Using photographs taken from an airplane, it was possible to make a partial map of the burn mosaic at Chicken Creek. Unfortunately, snow shortly after the burn prevented a final mapping flight, so it was not possible to determine the success of objective #1 (Treat 30-50% of sagebrush with 15% canopy cover or greater in a mosaic pattern over the landscape).

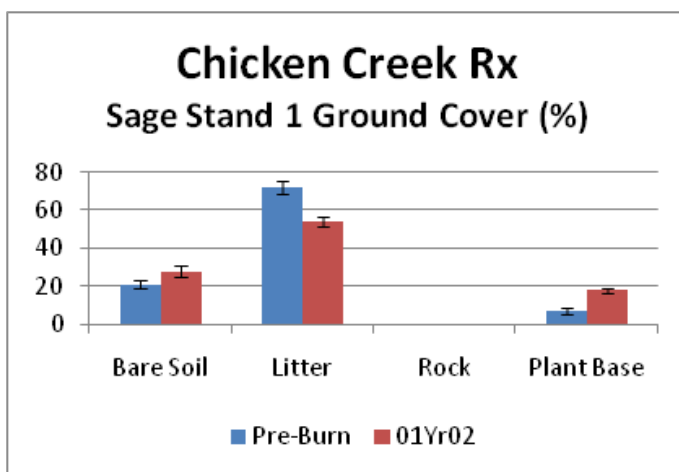
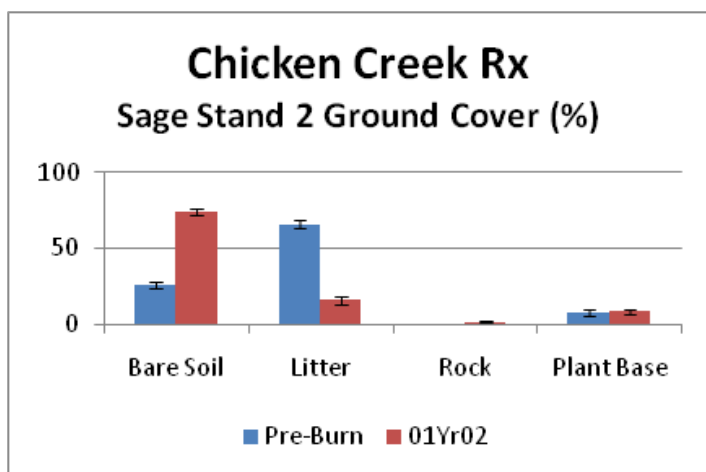
Ground Cover

Ground cover objectives were met in “stand 1” (less than 40% bare soil), where bare soil levels were 28% two years post-burn. Unfortunately bare soil made up almost 75% of the ground cover in “stand 2”. This bears close monitoring as managers were aiming for 20% or less bare ground by year 5 post-burn. The photo points below clearly show how the extremely high severity in Stand 2 is directly responsible for the high post-burn bare ground numbers.



Aspen Regeneration

The year two post-burn data shows a significant increase in aspen regeneration in Stand 1. With roughly 6900 aspen stems/acre recruited into the 0-3 foot size class, there is potential for objective related to aspen regeneration to be met (Attain 1000 stems per acre in burned aspen areas that are 10 feet tall within 15 years). Unfortunately pre-burn data does not exist for aspen stand two. Even without this information, managers will still be able to monitor aspen regeneration over time. Stand 2, with over 8300 aspen in the 0-3 foot size class, also has a very good chance of meeting the aspen regeneration objective. Unfortunately, elk browsing levels have also increased significantly following fire. Pre-burn, elk were browsing on 19% of the stems, while two years following fire, elk are browsing on 43% of the stems. Managers consider anything over 30% to be a significantly high browsing pressure, and this could pose problems for the smaller aspen reaching the taller size classes.



Photopoints

Photo points taken in both the sage and aspen stands show vegetation changes over time. CHCR-01 is from the low severity sage stand 1, while CHCR-02 is from the high severity sage stand 2.

Chicken Creek



CHCR-01: 20, PRE, 2007



CHCR-01: 20, 01YR02, 2011

CHCR-01, 20°



CHCR-01: 20, IMMPOST, 2009

Chicken Creek



CHCR-02: 73, PRE, 2007

CHCR-02, 73°



CHCR-02: 73, IMMPOST, 2009



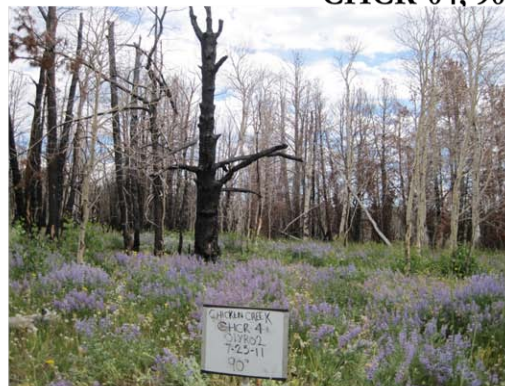
CHCR-02: 73, 01YR02, 2011

Chicken Creek



CHCR-04: 90, IMMPOST, 2009

CHCR-04, 90°



CHCR-04: 90, 01YR02, 2011

Chicken Creek



CHCR-05: 10, IMMPOST, 2009

CHCR-05, 10°



CHCR-05: 10, 01YR02, 2011

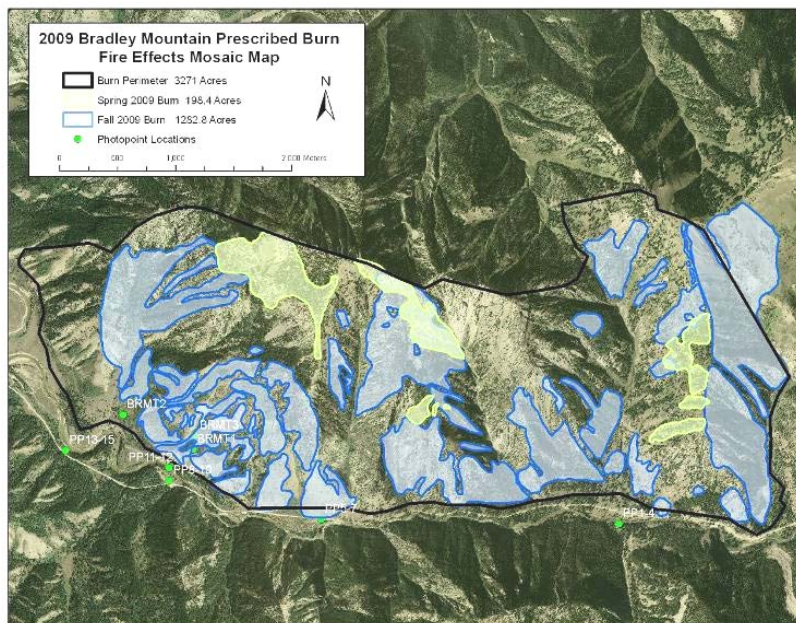
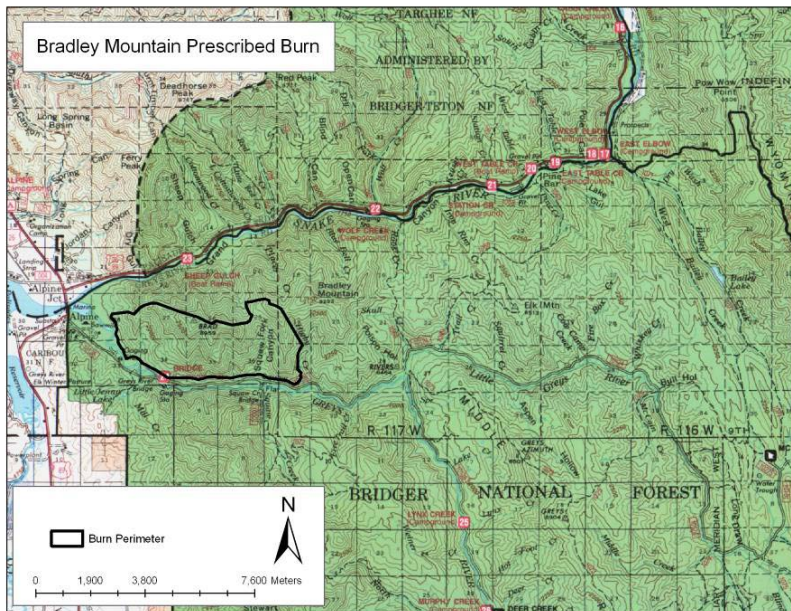
Appendix E

Bridger-Teton National Forest West Zone

2011 Project Level Fuels & Fire Effects Monitoring Reports

Bradley Mountain Prescribed Burn – 2 Year Post Burn

The Bradley Mountain prescribed burn was implemented in two stages in the spring and fall of 2009. The project area is 3271 acres on the south facing slopes of a long ridge that separates the Snake River Canyon from the mouth of the Greys River, near Alpine, Wyoming. The vegetation consists of mountain shrubs, aspen, and mixed conifer. The fire effects objectives are as follows:



1. Treat 30-60% of the project area, with a focus on the highest and moderate priority areas east of the Alpine viewshed, while also treating lower priority areas to the extent feasible.

2. Attain 10 foot tall aspen sucker density of at least 1000 stems per acre at or before 15 years post burn.

3. Maintain, at a minimum, the existing distribution and extent of aspen, mountain shrubland, and big sagebrush vegetation types, recognizing that they will remain in early succession for several years.

4. Achieve 40-80% mortality of encroaching conifers.

5. Restore canopy cover of shrubs to pre-burn levels within 25-40 years, at a minimum, and increase shrub canopy cover to the extent that conifer canopy cover is reduced.

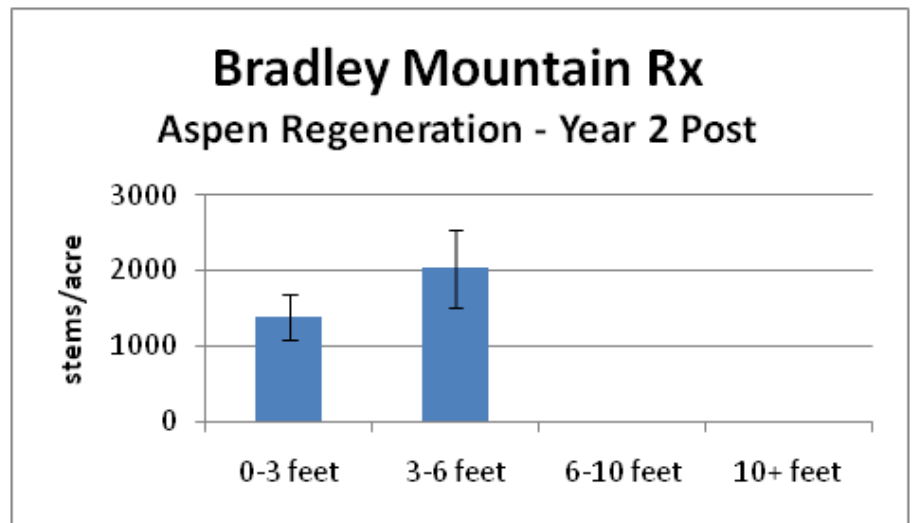
Burn Mosaic Mapping

Post-burn mapping indicates that 46% of the unit was burned during the spring and fall operations, with 1% actually being treated twice. This successfully falls within the stated objective of burning 30-60% of the unit.

Aspen Regeneration, Conifer Encroachment

Pre-burn aspen and conifer data was not collected due to the steep and remote terrain and uncertainty about the burn mosaic. Aspen data collection began in 2011 (2 years post-burn) and will continue into the future. Conifer data will not be collected, as this post-burn data is not useful without pre-burn data to compare it to. For this reason, we will be unable to address objective #4.

Aspen regeneration numbers two years post-burn are summarized in the attached graph. Having roughly 3600 total stems/acre, combined with only 2% browsing, is encouraging. Attaining 1000 ten foot tall stems/acre 15 years post-burn is quite possible, if browsing does not increase significantly.



Vegetation Distribution

Spatial analysis of the burn mosaic and its relationship to vegetation is summarized below. The burn appears to have been equally distributed across all vegetation types, and didn't burn a large percentage of any single type. While objective #3 (Maintain, at a minimum, the existing distribution and extent of aspen, mountain shrubland, and big sagebrush vegetation types, recognizing that they will remain in early succession for several years) is somewhat vague and doesn't mention a specific target, it is possible to say that we likely met this objective.

Type	Total Acres in Bradley Project	Acres Burned in 2009	Percent of Total Burned
Mountain Shrub Vegetation*	181.4 ac	75.2 ac	41%
Aspen Vegetation*	680.7 ac	359.3 ac	53%
Conifer Vegetation*	1817.4 ac	713.8 ac	39%
High Priority Habitat**	634.8 ac	193.0 ac	30%
Moderate Priority Habitat**	1487.6 ac	683.5 ac	46%
* Vegetation management classes according to the BTNF 2007 Vegetation Map ** Priority habitat types identified for treatment and mapped by BTNF and WGFD			

Shrub Cover

Traditional shrub monitoring protocols are unlikely to capture the cover of mountain maple, Bradley Mountain's primary shrub species, and so no pre-burn shrub cover plots were installed. The most accurate way to monitor objective #5 (Restore canopy cover of shrubs to pre-burn levels within 25-40 years, at a minimum, and increase shrub canopy cover to the extent that conifer canopy cover is reduced) will be with aerial photo analysis. Pre-burn aerial photos will be compared against photos taken 25-40 years post burn to assess shrub cover.

Photo Points

Several photo points were installed both in the burn unit, and in “overlook” locations along the highway.

Bradley Mountain



BRMT-1: 315, PRE, 2006

BRMT-1 315°



BRMT-1: 315, IMMPOST, 2009



BRMT-1: 315, YR01, 2010



BRMT-1: 315, YR02, 2011

Bradley Mountain



BRMT-3: 202, PRE, 2006



BRMT-3: 202, YR01, 2010

BRMT-3 202°



BRMT-3: 202, IMMPOST, 2009



BRMT-3: 202, YR02, 2011

Bradley Mountain



BRMT-4: 324, MAPLE, PRE, 2006



BRMT-4: 324, YR01, 2010

BRMT-4 324°

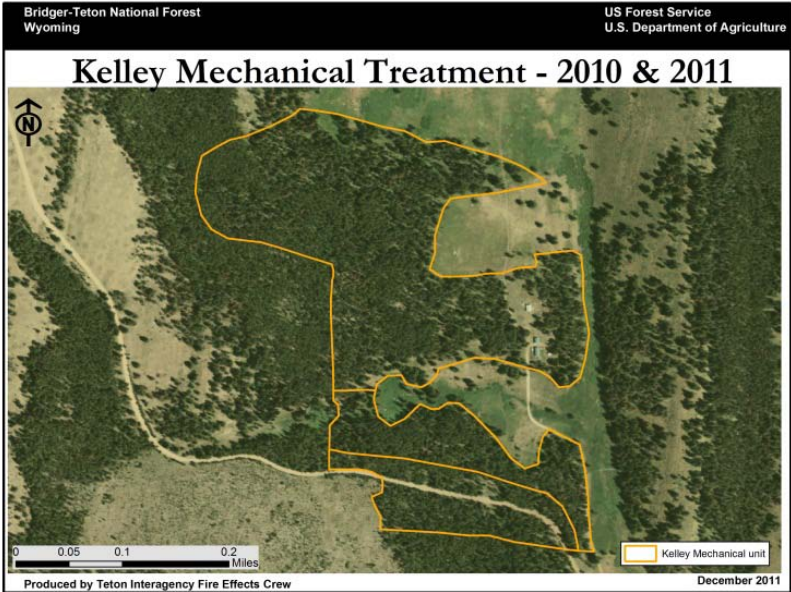
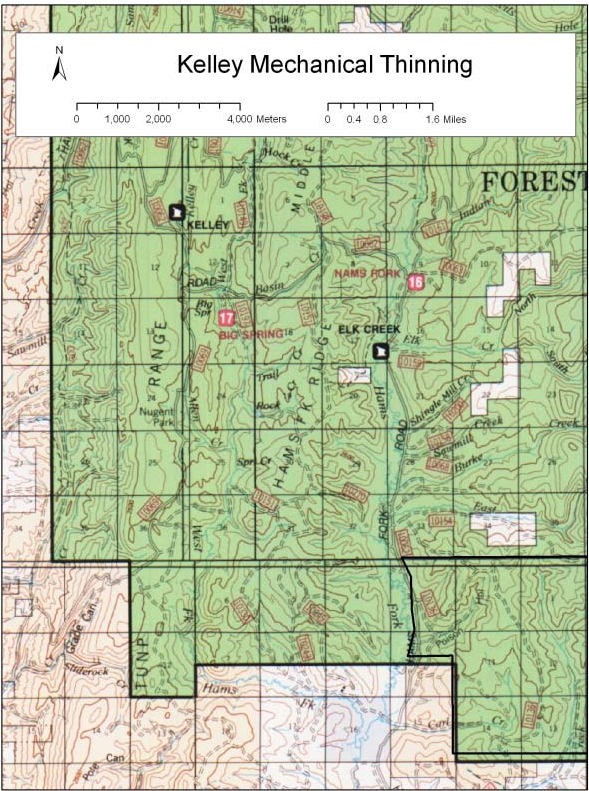


BRMT-4: 324, IMMPOST, 2009

Kelley Mechanical Thinning

The goals of this thinning project are to reduce fuels around the cabin to create defensible space, and improve firefighter and public safety by increasing fire containment opportunities during wildland fire events.

Treatment methods included removing small and dead trees, and limbing remaining conifers. Slash piles are to be burned or hauled away. Monitoring methods used to evaluate project effectiveness involved common stand exams and Brown’s fuel transects. Photo points were also installed.



The Teton Interagency Fire Effects Crew installed five permanent fuels monitoring plots at the Kelley Guard Station mechanical treatment during 2010. 14 additional plots were installed in the northernmost treatment units in 2011.

The data will be analyzed using the Forest Vegetation Simulator (FVS) Fire and Fuels Extension (FFE) program to model fuel loading and expected fire behavior pre- and post-treatment.

Pre-treatment fuels characteristics and predicted fire behavior are summarized in the tables below.

	Pre Treatment		Post Treatment
Fuel Model	FM10 69%	FM8 31%	
Litter Tons/ac	5.33		
Duff Tons/ac	12.15		
1, 10, & 100 Hour Fuels Tons/ac	3.76		
1000 hour Fuels Tons/ac	11.14		
Total Woody Fuels Tons/ac	14.90		
Canopy base Height, ft	7		
Canopy Bulk Density kg/m3	0.058		

Fire behavior is predicted using FVS under moderate and severe fire weather:

	PRE-TREATMENT		POST-TREATMENT	
	Mod. 75 th %	Severe 97 th %	Mod. 75 th %	Severe 97 th %
Surface Flame Length, ft	1.4	1.9		
Fire Type	<i>surface</i>	<i>surface</i>		
Probability of Torching	53%	54%		
Torching Index, mph*		18.5		
Crowning Index, mph*		34.3		
Potential mortality, % of BA	60%	60%		
Potential Smoke tons per acre <2.5	0.22	0.22		

*The 20-foot wind speed required to initiate the torching of some trees or to initiate active crown fire.

Sightability

Pre-treatment sightability results show that the stand is fairly open even before thinning.

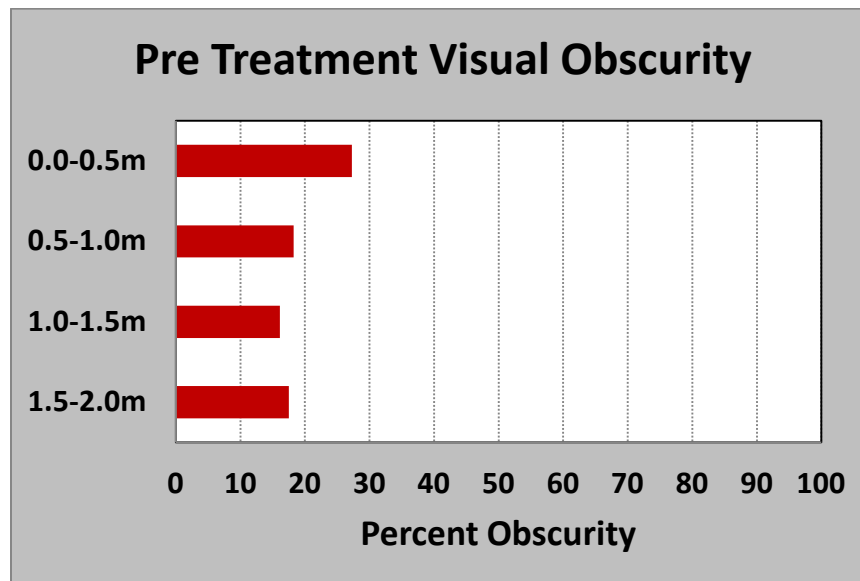


Photo Points

Permanent photo points taken in the Kelley project show the fuels prior to the thinning project. Some areas are quite open (KEMX03) while others are quite dense (KEMX33).

Kelly MX



90, PRE, 2010



270, PRE, 2010

KEMX03



180, PRE, 2010



360, PRE, 2010

Kelley MX



90, PRE, 2011



270, PRE, 2011

KEMX33



180, PRE, 2011



360, PRE, 2011