



National Park Service Teton Interagency Fire Fire Ecology Annual Report Calendar Year 2016

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A. Summary

The Teton Interagency Fire Ecology Program is dedicated to supporting wildland fire management for Grand Teton National Park and the Bridger-Teton National Forest in northwest Wyoming. The Ecology team accomplishes this mission through fire and fuels treatment effects monitoring, fire intelligence (weather and fuels), and planning analysis. They also serve as wildland firefighters for local, GACC, and national incidents.

Fire Ecology staffing (Table 1) in 2016 included two permanent employees, three seasonal biological technicians, one seasonal Fire Monitor, and one SCA Volunteer from the NPS Academy program. We collaborate with Fuels AFMOS and Prescribed Fire Technicians from the Bridger-Teton National Forest and Grand Teton National Park. We also leverage field assistance from Wildlife Habitat Biologists with the State of Wyoming Game & Fish Department. Many hands are needed to collect data on dozens of projects for project level monitoring over the long term.

Table 1. Fire Ecology Staffing 2016

Ecologist and Monitors	Starting Date	Ending Date	# of Pay Periods	READ Qual (Yes or No)	Training and Development
Diane Abendroth Fire Ecologist	1/1/16	12/31/16	26	YES	20 fires of LTAN work as part of WFNRDA Detail Final LTAN trainee assignment – signed off 1 PIOF Assignment 1 FFT1 Assignment
Ron Steffens Fire Monitor	5/23/16?	9/9/16	5.5	NO	2 ICT3 Assignments 2 LTAN Assignments 2 PIOF T Assignments

					Duty Officer numerous times
Alex Spannuth Lead Fire Effects Monitor	4/11/16	11/9/16	18	NO	Tablet training and implementation Winter avalanche, scuba dive and EMS training Berry Fire 10 days (FEMO + ICT5 signoff) RXB3 singoff @ Signal Mountain Piles IA of 6 fires (2 as FX, 2 W/ engine and 2 W/ helitack) 17 Fire Operational periods 1 RX on BTNF 13 days and 23 logged dives with GRTE Dive Team
Drew Narduzzi Senior Fire Effects Monitor	5/31/16	9/30/16	9	NO	Tablet training and implementation Lead Fire Effects Detail in August 1 Saguaro Wildland Fire Use Assignment IA 5 fires (2 W/ FX, 3W/ helitack) 22 Fire Operational Periods Worked on FFT1, ICT5, and HECM
Alisha Marshall Fire Effects Monitor	5/31/15	10/14/16	10	NO	1 Saguaro Wildland Fire Use Assignment S-290, S-212 IA 2 Fires (as FX) 18 Fire Operational Periods Worked on FEMO
Jill Stephenson Fire Effects Monitor	5/31/16	10/28/16	11	NO	1 Teton crew assignment (FFT2) S130/190 IA 5 fires (2 W/ FX, 3 W/ engine) 26 Operational Periods Worked on getting firefighting experience
James Moxley SCA NPS Academy Intern	5/31/16	8/5/16	5	NO	NPS Intern accomplished all monitoring S-130/190, S-212 1 Operational Period

Fire Effects Program:

The 2016 Fire Effects crew had a busy and highly productive season in the field and on the fireline. Collectively they were able to support GRTE, BTNF, and BICA by collecting and analyzing data on 25 projects which encompassed 574 plots of varying designs, objectives and complexities (Table 2). Due to a special request by BTNF East Zone fuels and timber personnel Fire Effects was able to expeditiously collect and analyze stand exam data resulting in the implementation of a time sensitive project only months after monitoring, demonstrating the transparency of monitoring and implementation while strengthening interagency relationships. In addition to scheduled plot work and special projects Wyoming saw one of the most active fire seasons of the last decade providing great training experiences and opportunities to gain qualifications.

With a busy IA season and multiple Type II fires in Forest and on Park Fire Effects was able to provide much needed support for severity, Type 2 crews, Saguaro Wildland Fire Module, Park Engines (E-3 and E-4) and Teton Helitack. The Berry Fire Use was the largest fire in GRTE recorded history providing Fire Effects the prime opportunity to hone FEMO skills, complete an ICT5 taskbook, Support Saguaro Wildland Fire Module with two consecutive detailers, conduct structure protection at Flagg Ranch with E-3, and monitor the success of fuels treatments around historic structures. In addition to the Berry Fire Effects Supported the IA of 9 fires, participated in the Teton Type II handcrew and supported the only BTNF fall Rx amounting to 83 total operational shifts on the fireline.

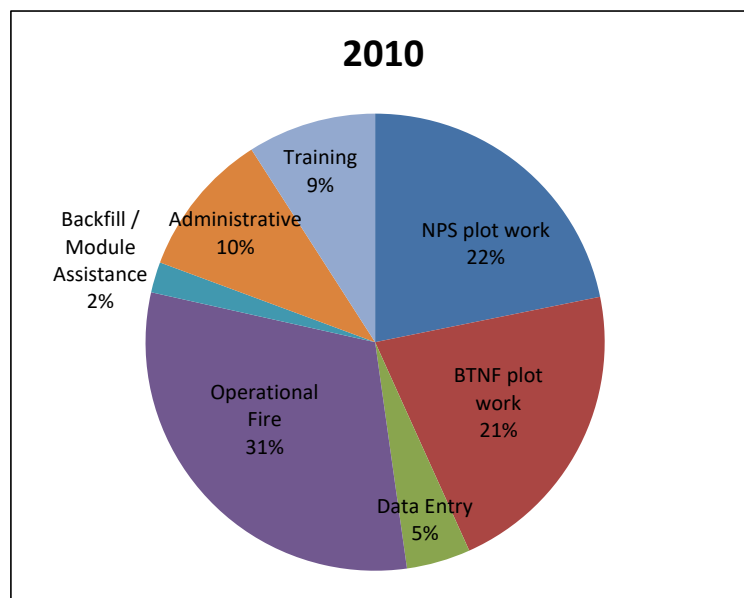
In addition to fire effects monitoring and wildland fire operations the Fire Effects crew participated in several training opportunities including S130/190, S-215, S-290, tablet training and a NPS Dive leadership course. Fire Effects also facilitated FEMO training with the Teton Wildland Fire Module, attended the 13th Biennial Scientific Conference on the GYE, mentored our third NPS Academy intern, and provided inter-crew trainings in order to achieve a high standard of teamwork, safety, and integrity within Teton Interagency Fire and Grand Teton National Park.

Table 2. Fire Effects Plot Workload (2016) and Total Plots Installed

Park/Forest	Monitoring Unit	Plot Type	Pre-Burn/ MX 2016	Immed. Post 2016	Post (1-20 yrs) 2016	Total 2016	Total Plots
Grand Teton National Park	Matilda Rx	Photopoints Stand Exams			9 9	18	18
	Signal Mt. Summit Rd	Stand Exams Photopoints			10 2	12	12
	Signal Mt. SMT Chipping	Chip Transects			10	10	10
	Signal Mt. Brinkerhoff	Stand Exam Photopoints Chipping	10 2 3			15	15
	Eynon Ridge RX	Aspen Circles Photopoints			30 11	41	61
	Phelps Moraine RX	Photopoints			4	4	25
	Shadow Mountain RX	Photopoints			5	5	40
	Teton Science School RX	Shrub line intercept transects photopoints			60	60	60
	Seligman Mx	Stand Exams Photopoints	9 5			14	14
Bighorn Canyon NRA	East Trail Creek RX	FMH Brush TX			6	6	6
	Sorenson RX	FMH Brush TX			6	6	6
Fossil Butte NM	Not visited in 2016						
North Zone	Northeast Quad Rx Aspen	Aspen Circles Photopoints			30 1	31	33

Bridger-Teton NF	Dry Quad RX	Aspen Circles - 2 stands			60	60	81
	Upper Palmer RX	Aspen Circles - 2 stands Photopoints			60 3	63	93
	Flagstaff Fire (NE Quad)	Photopoints		2		2	2
	South fall Creek RX	Photopoints Shrub Intercepts		5 30		35	35
	Green Knoll Fire	Photopoints			15	15	15
West Zone Bridger-Teton NF	Alpine Fuels	Photopoints		4		4	4
	Pole Creek Rx	Aspen Circles Photopoints	30 2		4	36	78
	Hams Fork slash/RX	Aspen Circles Photopoints	30 2			32	32
East Zone Bridger-Teton NF	Monument Ridge I RX	Photopoints Shrub Intercept			4 30	34	38
	Cottonwood II Unit 11 +13 Rx	Aspen Circles Photopoints Ground Cover			30 2 10	42	42
	Cottonwood II Unit 4 Rx	Photopoints			2	2	2
	Skyline Drive Mx	Stand Exams Photopoints	16 4			20	20
	Wood Draw RX	Aspen Circles Photopoints			30 5	35	95
	Freemont II RX	Aspen Circles			30	30	74
						TOTAL: 574	853

Fire Effects Crew Hours are summarized in the pie chart below. With two major local fires, including the Berry Fire, a substantial percent of crew time was spent on wildfire assignments, but much of this occurred later in the season, after plot work was mostly completed.



Monitoring Data Findings

See the following summary table for each monitoring unit that was visited in 2016 (Table 3). These results will be presented to Zone and Park Fire Managers in the Spring of 2017.

Table 3. 2016 Management Objectives and Monitoring Results

Park/Forest	Monitoring Unit	Management Objective	Objective Achievement and Monitoring Results (Results with 80% confidence interval in bold)	Objective Achieved ?	Year Analysis Completed (Range of Data [Yrs] Included in Analysis)
Grand Teton National Park	Matilda Rx	-CWD <10 T/A) -Fuel bed depth to less than 2" -Reduce the probability of torching by at least 50%, and torching and crowning indexes to greater than 30 mph under the 90 th percentile fire weather conditions -Reduce visual obscurity in the available forest understory (conifer regeneration and branches) to less than 20% below 1.5 m (as an index of stand ladder fuels) -Monitor the distribution of exotic thistle species in the unit pre and post treatment up to 2 years post -Attain at least 1000 aspen suckers per acre over 10' in height by 15 years post treatment in the designated stand.	- Increased post burn - Partial reduction -Partial reduction in burned plots only - Did not reach objective in burned plots only - No significant weed issue detected in 2016 - To be monitored in 2017	No Yes N/A	2016 (2012 – 2016)
	Signal Mt. Summit Rd	-Reduce fuels around values at risk to better manage natural ignitions in the vicinity -Reduce average visual obscurity to less than 20% below two meters over the treatment area -Reduce seedling and pole tree density (< 3" DBH) to less than 200 trees per acre -Reduce 1000 hour down woody fuels to less than 10 tons per acre	- YES , fuels have been reduced around values at risk. (<i>n=10 stand exams</i>) - Yes , average visual obscurity was reduced to ~5.8% below two meters (excluding the bottom 0.5 m covered w/grass/ forb). (<i>n=10 stand exams</i>) - NO and YES , Seedlings below 0.2 m not treated and prevented seedling accomplishment (Also, opening of canopy promotes seedling establishment). Poles reduced to 100 tpa (<i>n=10 stand exams</i>) - NO , 1000 hr fuels reduced from 46 to 25 t/a (<i>n=10 stand exams</i>)	Yes and No	2016 (2014-2016)
	Signal Mt.	Measure the depth of and	- YES, chip depth measured and	Yes	2016

SMT Chipping	photograph wood chips to monitor effects on understory vegetation and tree regeneration	photographed documenting minimal effects of chips on vegetation growth. (n= 10 chipping transects)		(2014-2016)
Signal Mt. Brinkerhoff (Pre)	-Reduce average visual obscuration to less than 20% below 2 meters over the treatment area -Reduce seedling and sapling tree density (<3" DBH) to less than 200 trees per acre post thin -Reduce 1000 hour down woody fuels to less than 10 tons per acre	N/A and YES , percent obscured is currently less than 10%, pre thinning. (n= <u>10</u> stand exams) N/A, Pre thinning, the average density of seedlings was around 2000 seedlings per acre. The average density of saplings was 210 saplings per acre. (n= <u>10</u> stand exams) N/A and YES , Thousand hour fuels pre thinning were 4 tons per acre. (n= <u>10</u> stand exams)	Pre Data Only	2016
Eynon Ridge RX	-Attain 1000 aspen stems/acre at 10 feet height within 15 years post prescribed fire treatment. -Maintain ungulate herbivory levels on aspen suckers at ≤ 30% browse levels of terminal, main leader.	N/A and on track, the stand is well positioned to attain the desired 1000 stems/acre over 10 ft tall 15 years post burn. Currently most of the aspen suckers are between 3 and 10 ft tall (~1500 stems per acre), but a large number (~880 stems per acre) are already above the 10 ft objective. (n= <u>30</u> aspen circles) YES , Year 10 browsing levels dropped to 26% indicating that browsing objectives have been met (at least during the last two growing seasons). (n= <u>30</u> aspen circles)	Yes	2016 (2005-2016)

Phelps Moraine RX	-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.	YES, Fire was excluded from the mechanically treated buffer using a handcrew and progressive hoselay. No trees were killed in the buffer area. YES plus some, 1000-hour fuels were reduced from 20.3 to 9.1 tons/acre; a 55% reduction, which is only slightly outside the 25-50% objective window. <i>(n=5 stand exams) only 5 plots were burned</i> YES, Post-burn crown bulk density was 0.038 kg/m³, a 32% reduction when compared to pre-burn CBD. <i>(n=5 stand exams) only 5 plots were burned</i> YES, With only a four plot sample size, we were able to show a non-significant, though very large, reduction in pole-sized trees. The plots averaged 450 stems/acre pre-burn (lumping both above-mentioned size classes). The average density on those same plots post-burn was only 50 stems/acre. This is an 89% mortality rate for pole-sized trees in the burn unit. <i>(n=4 plots)</i> ONGOING, Pre-burn weed surveys found large infestations of noxious weeds, especially St. John's Wort. This is the primary reason that the targeted acres were reduced as well as located in the portion of the unit least infested pre-burn.	Yes	2016 (2011-2016)
Shadow Mountain RX	-Reduce the average height and cover of sagebrush -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 (<i>Bromus inermis</i>) in the southern end of the burn unit. -Measure and analyze Burn Severity	YES, The sagebrush reduction objectives were met for all three units according to the shrub line intercept transect data from Year 1 Post Burn. <i>(n=30 shrub intercepts)</i> YES, noxious weeds have been continuously documented and treated with help of the GRTE Invasive Species Program YES, smooth brome patches were track logged and mapped in 2016. YES and NO, 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.	Yes	2016 (2011 - 2016)
Teton Science School RX	-40% reduction in sagebrush density and cover from preburn to year two -10% increase in total native grass cover from preburn to year two -10% increase in total	YES, Live sagebrush cover in the burn is approximately half of what is found in the control. Bitterbrush in the burn has roughly 10% of the control percent cover. <i>(n=30 shrub line intercept transects)</i> PROBABLY, (grass and forb objectives), Concerns about the	Yes	2016 (2001 - 2016)

		native forb cover from preburn to year two -A mean post fire severity rating of at least 3 ("lightly burned") in burned plots -Determine how many years are needed for the height and percent cover of sagebrush and bitterbrush to return to pre-burn levels.	accuracy of species identification in the 1999 pre burn data led to the decision to eliminate it from the analysis. It is unfortunate that pre and post burn comparisons therefore cannot be made. Post burn native forb cover has remained consistent from year 1 to year 5, at approximately 40% ($n=2$ FMH Plots) YES, Burn severity transects for the two FMH plots had a mean value of 2.3 for substrate and 1.5 for vegetation. These correspond to "moderately burned" and "heavily burned" respectively. ($n=2$ FMH Plots) ONGOING, Bitterbrush and sagebrush heights are slowly increasing to preborn levels (approx. 92% and 71% respectively) while percent cover is taking longer to recover (6.1% and 4.1% of preborn levels respectively) ($n=30$ Shrub Intercepts)		
	Seligman Mx (Pre)	-Reduce surface fuels and snags adjacent to the Seligman South and East property boundary to reduce fire intensity and potential, and to improve firefighter and public safety -Reduce fuels around values at risk to better manage natural ignitions in the vicinity -Reduce density of trees $\leq 3"$ DBH to less than 200 trees/acre -Reduce 1,000 hour fuels to less than 12 tons/acre -Reduce average visual obscenity to less than 20% post treatment	N/A, fire behavior modeled for unit pre-treatment, post fire behavior modeling required to measure objective accomplishment N/A, Fuel loading measured pre treatment ($n=10$ stand exams) N/A, the 2016 average, including seedlings and saplings, is 1256 trees/acre. A decrease of approximately 1000 trees/acre will be needed post treatment to meet this objective. ($n=10$ stand exams) N/A, the overall average visual obscenity in 2016 was 37%, therefore a 17% post treatment decrease will be needed to meet this objective. ($n=10$ stand exams)	Pre Data Only	2016
	Berry Fire Use	-Install Photopoints to document first order fire effects and provide the foundation to analyze / document over time fire interactions with various veg types, environmental conditions and previous fire history	YES , Photopoints were installed pre-fire while crewmembers were on detail with Saguaro WFM. ($n=10 \pm$ photopoints)	Unk.	2016
Bighorn Canyon NRA	East Trail Creek RX	FMH Brush TX			6
	Sorenson RX	FMH Brush TX			6
Fossil Butte NM	Not visited in 2016				

North Zone Bridger- Teton NF	Northeast Quad Rx Aspen	-Attain $\geq$ 50-80% mortality of aspen trees ($> 5.9"$ DBH) within one year of burn. -Attain $\geq$ 85% conifer mortality within one year of burn. -Attain > 2000 live aspen stems/acre at 6 ft in height over 70% of the treatment area with a strong terminal leader within 5 years of burn. -Attain at least 1000 live aspen stems/acre over 10 ft in height within 15 years post-treatment. -In treated aspen stands, attain $\leq$ 20% bare ground cover, within 5 years post-treatment.	YES, there was an 87% reduction in aspen overstory trees within two years of the burn. (n=30 aspen circles) YES, two years post burn shows a 96% decrease in overstory conifer density. (n=30 aspen circles) N/A but on track, Data collected two years post-burn indicates an average of 4567 aspen suckers of height 0-3 ft, and an average of 983 aspen sucker of height 3-6 ft. browsing of these suckers has decreased by 11% from 2007 to 2016. (n=30 aspen circles) N/A, Ground cover data was not collected post burn, and therefore this objective cannot be evaluated for success or failure at this point.	Yes	2016 (2014- 2016)
	Dry Quad RX	- Create a down woody fuel bed with an average depth between 12-36 inches in mechanically treated stands post treatment (pre burn). -Attain $\geq$ 50-80% mortality of aspen trees ($> 5.9"$ DBH) within one year of burn -Attain $\geq$ 85% conifer mortality within one year of burn -Attain at least 2000 aspen suckers/acre over 6 feet in height 3 years post burn -Attain at least 1000 aspen suckers/acre over 10 feet in height 15 years post burn -Attain $< 20\%$ bare ground cover within 3 years of burn	NO, Pre-burn fuel bed depth results indicated that objectives were not met. Stand A averaged 6.2 inches and stand E averaged 7.3 inches. (n=10 Browns transects) NO, In the two stands monitored no statistical difference was observed in overstory aspen composition between Pre and YR03 post. The two stands totaled ~ 92 stems per acre while YR03 totaled ~ 110 stems per acre. (n=30 aspen circles) NO but not measured imm post, Live conifer mortality was much more successful with an $\sim 54\%$ reduction averaged across the two stands. YR 03 conifer data does include post burn regeneration which may not accurately reflect true post burn mortality. (n=30 aspen circles) NO but close, majority of saplings are still in the 3-6 ft height class, with ~ 1143 stems per acre and 883.3 stems per acre in stands A and E above 6 ft. (n=30 aspen circles) MAYBE, Ground cover data not collected in 2016. Ocular estimates suggest the objective was accomplished due to a robust grass and forb regeneration and litter accumulation.	No	2016 (2007 – 2016)
	Upper Palmer RX	<u>Sagebrush Objectives:</u> -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. -Track the reduction and recovery of shrub cover. <u>Aspen Objectives:</u> -Reduce live conifer between 20% and 60% in	<u>Sagebrush Objectives:</u> YES, 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, but is within the margin of error. (n=30 shrub intercepts) N/A, conifer encroachment was not monitored post burn. YES, Snowberry was the only species to respond positively to		2016 (2011-2016)

		designated aspen stands #1 and #2 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.	fire, doubling its cover from 5% to 10%. All other species, especially sagebrush, were greatly reduced post-burn. (n=30 shrub intercepts) <u>Aspen Objectives:</u> YES AND NO, in live conifer density in each aspen stand. In Stand 1, live conifer density was reduced by 95% over five years post-treatment. Stand 2 had a low density of live conifers prior to treatment, and the percent change post-treatment is not statistically significant. Thus, the objectives for live conifer reduction were met in Stand 1, but not in Stand 2. (n=30 aspen circles) YES AND NO, Stand 1, which had a relatively low pre-burn density of live overstory aspen, the percent change over five years was not statistically significant. In Stand 2, in which pre-burn density was much greater, a 97% reduction was recorded over five years post-treatment. Thus, the objective of a 70% reduction in overstory aspen density was met in Stand 2, but not in Stand 1. (n=30 aspen circles) NO, In aspen stands 1 and 2, the density of aspen suckers over 6ft in height were 800 and 397 stems/acre, respectively, falling well short of the target minimum and failing to meet the objective. (n=30 aspen circles) NO, Five years post-burn aspen browsing has increased significantly in both stands and falls above the target maximum for browsing on terminal leaders. (n=30 aspen circles)	Yes and No	
	Flagstaff Fire (NE Quad)	-Document first order fire effects and subsequent regeneration with Photopoints	YES, The Flagstaff Fire was an arson initiated fire started on August 29th, 2016. The fire burned low to moderate intensity, with occasional high severity pockets. Teton Interagency Fire Effects Crew installed 2 photo points on September 1st, 2016	Imm. Post data only	2016
	South fall Creek RX	-burn less than 40 percent of the sagebrush community in the project unit (524 acres) -blacken 70 percent of aspen stands to create earlier successional stages and perpetuate natural fuels	YES, The final burn effective acre accomplished was calculated at 50.16% (297 acres) including pockets of aspen and conifer. YES, Targeted aspen stands sustained ground fire through ~ 70 percent of the understory. – From Steve's report **No FX report – Shrub data hard to compare due to reduced size of unit in comparison to pre-read**	Yes	2016 (2015-2016)
	Green Knoll Fire	-Show vegetation regeneration and	YES, All photopoints were retaken and formatted.		2016 (2001-2016)

		response to unplanned ignition by retaking 16 Photopoints originally from 2002 CBI analysis		Yes	
West Zone Bridger-Teton NF	Alpine Fuels	-Reduce fuels around the town of Alpine, WY, to provide a small merchantable timber sale, to create defensible space, and improve firefighter and public safety by increasing fire containment opportunities during wildland fire events. (Monitoring methods used to evaluate project effectiveness were limited to photo points due to the small size of the units.)	Yes , photos show the successful effects of the fuels reduction project	Yes	2016 (2013-2016)
	Pole Creek Rx	-Blacken 30-60% of mountain shrubs and sagebrush, 80% of conifer forest, and >80% of conifer-encroached aspen. -Reduce live conifer and overstory aspen trees -Regenerate > 1000 live aspen suckers per acre over 10ft tall, 15 years post burn -Track the fire effects on the sagebrush community and subsequent recovery	**Project is only partially completed and objectives cannot be evaluated yet**	Partial data only	2016
	Hams Fork slash/RX (Pre)	-Stimulate aspen regeneration to achieve a density of >1000 stems/ac within 15 years post-burn. -Maintain ground cover at <40% bare soil at two years post-burn, and <20% bare soil at 5 years post-burn.	N/A, Current aspen conditions indicate there are 2226 stems per acre in unit 11 and 1693 stems per acre in unit 15 (within 80% confidence). Browsing is apparent in both units with approximately 51% of unit 11 and 35% of unit 15 browsed. (n=30 aspen circles per unit) N/A, unit has not burned N/A, unit has not burned	Pre Data Only	2016
East Zone Bridger-Teton NF	Monument Ridge I RX	-Burn 30-60% of the sagebrush communities having >15% canopy cover in a mosaic pattern within the project area. -Attain ≥ 80% mortality of sagebrush in burned areas by 1 years post burn. -Attain 60% ground cover in sage/grass communities after the second growing season post-burn and 80% ground cover after the	Probably , 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. One year post-fire a 64% decrease in overall sage density was measured, these numbers indicate that objectives related to sagebrush reduction were likely met, though it’s difficult to say so definitively. YES, Immediately post-burn,	Yes	4 30

		fifth growing season post-burn. -Attain a diverse array of native successional plant species in burned areas.	groundcover was measured at 63%, which rose to 88% two years post-burn. N/A, 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.		
	Cottonwood II Unit 11 +13 + 4 Rx	-Attain > 1000 stems per acre in burned aspen areas ≥ 2 meters tall within 15 years post burn. -Attain 60% ground cover in burned aspen areas within 2 years post burn and 80% within 5 years post burn.	N/A but on track, 2 years post burn an average of 3940 stems per acre (+or- 949 80% CI) are present in the unit. Browsing was observed at 21% throughout the stand, mostly in the 0-3 and 3-6 ft height classes. (n=30 aspen circles per unit) YES, Ground cover objectives were achieved in year two post burn. Approximately 94% of the ground is covered. (n=30 cover transects)	Preliminary data only	2016 (2014-2016)
	Skyline Drive Mx (Pre)	- Monitor current and future stand conditions -Reduce flame length to <4ft -Reduce torching index and crowning index >30 mph	YES, current conditions consist of approx. 330 overstory TPA and 20 T/A CWD (primarily in 1000 and 100 hr fuels). N/A, Fire behavior of current conditions modeled with FVS	Pre data only	2016
	Wood Draw RX	-Attain 1000 stems per acre in burned aspen areas ≥ 10 feet tall within 15-years post burn. -Attain 60% ground cover in burned aspen areas within 2-years post burn and 80% within 5-years post burn. -Within burned areas, attain willow height greater than or equal to mean pre-burn willow height within 10-years post burn. -Attain at least 30% increase in the proportion of live to dead willow stems within 3-years post burn.	N/A but on track, 10 years post burn an average of 3000 SPA are present in the unit, with ~500 SPA in the 10+ ft height class. (n=30 aspen circles per unit) YES, By the third year post burn, 93% ground cover was attained, surpassing the objective of 80% cover within 5 years of the burn. (n=30 cover transects per unit) YES, overall willow height seemed to be trending toward pre-burn height levels at 5 years post burn (n= between 60 and 90 willow stops per unit) YES, There was a 46% increase in the proportion of live to dead willow stems within 3 years post burn, surpassing the objective of attaining at least a 30% increase within 3 years. (n= between 60 and 90 willow stops per unit)	Yes	2016 (2006 – 2016)
	Fremont II RX	-Attain >80% ground cover in sagebrush/grass communities and aspen communities within 5 years post-burn. -Attain 10+ foot tall aspen sucker density of at least 1000/ac at or before 10 years post-burn (in burned stands).	YES, Plot SLLS4 still has 29% bare ground. The other plots all show less than 20% bare. This meets the objectives but is not as much ground cover as the unburned plot. NO but within 80%CI, At 11 years post-burn, the density of aspen suckers over 10ft tall is 950 stems/ac.	Not yet	2016 (2005-2016)

		-Increase aspen suckering from 100-200 stems/acre to at least 5,000 stems/ac three years post-burn.	N/A, aspen suckering not measured three years post burn		

B. Program Information

Table 4 below shows the monitoring summary for 2016.

Table 4. Monitoring - 2016

Park/Forest	% 2016 Data Entered	% 2016 Data Quality Checked	# Prescribed Fires Monitored*	# Non-fire Fuels Treatments Monitored*	# Wildfires Monitored *	# BAER/BAR Treatments Monitored*
Grand Teton National Park	100%	100%	5	3	1	0
Bridger-Teton National Forest	100%	100%	11	2	2	0
Bighorn Canyon NRA	100%	100%	2	0	1	0

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

Monitoring results are generally communicated in spring meetings where the Lead Fire Effects Monitor and the Fire Ecologist give presentations that include the objectives and results for each project that was monitored in the previous field season. We invite colleagues from other agencies and groups to contribute to presentation topics. These meetings are done for each Zone of the BTNF and the GRTE resource and fire managers. Table 5 below shows presentations that were made in the spring of 2016 covering projects that were monitored in 2015.

Table 5. Communicating Results - 2016

Location	# of Project Monitoring Reports completed in 2016	# of Annual meeting(s) with staff	# of Formal presentations of results	Do you use Minitab?*
GRTE and North Zone BTNF	10	1	1	No
East Zone BTNF	6	1	1	No
West Zone BTNF	3	1	1	No
Fossil Butte NM	1	1	0	No

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

Fire Ecology research is important for ensuring that the best available science informs fire management. Teton interagency fire ecology staff collaborate with research partners to find answers to questions about fire regimes, fuels, and fire behavior. In 2016, work was continued on the Douglas-fir fire history project with Teton Science School and Colorado State University (See appendix F). Additional Fuels Reserve dollars were requested for a project that will study the ecological role of smaller fires that burn in average fire seasons in the Northern Rocky Mountains.

Table 6. Research - 2016

Park	Are research needs identified in FMP or Monitoring Plan? (yes or no)	# of Proposals Submitted in 2016	# of Proposals Funded in 2016	# of Research Projects Supported in 2016*	Additional Comments
Grand Teton NP and the Bridger-Teton NF	yes	1	0	1	Park-requested project with University of Wisconsin. YELL and DENA are also involved

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

Reserve Fund Research

The ongoing research project, “Fire history of Grand Teton National Park and surrounding areas” will be completed in 2017. This project has two phases that are funded by the Fuels Reserve Program. Phase 1 has been completed. It is a study that demonstrated patterns of forest fire history and regeneration that used a historic map of burned areas from the late 1800’s. Please see the progress report in Appendix F for more information. The findings of this study exposed interesting patterns in Douglas-fir fire regimes that instigated the second phase, which is comparing how fire has burned in the foothills of Jackson Hole. Data collection was completed in 2016 and the final results will be presented to local fire managers in spring 2017. A publication is forthcoming thereafter.

C. Fire ecologist accomplishments and areas of focus

In the summer of 2016 Diane did a remote detail with the Wildfire Fire Management Research and Development group. She worked approximately 50% of her hours doing fire behavior analysis and other research projects. Diane was involved with an ID team for a fire and fuels treatment project on the Bridger-Teton National Forest. It was a contentious and complex large landscape scale project that involves mechanical thinning and prescribed fire. Diane was involved in developing the updated interagency Fire Danger Rating plan. She also provided input for the LANDFIRE updates to Biophysical Settings.

Diane is a faculty member on several national and regional NWCG cadres and assists with a variety of local fire effects and fire behavior classes as well. She is on the Wilderness Committee and GRTE, and belongs to the Interagency Aspen Management Working Group

which has successfully launched community outreach programs and grant proposals that have been funded.

Table 8. Fire Ecologist 2015 Accomplishments/Focus Areas

Category	Percent Time	Accomplishments and/or areas of activities
Planning	10%	- Teton to Snake EIS specialist report, public meetings, response to comments. - GRTE Prescribed Fire and Mechanical Fuels Planning - Teton Interagency Fire Danger Rating Plan Revision Group
Presentations	5%	- Fire Effects Results – Formal presentations for each zone on the BTNF. - Aspen Days field Trip, Pinedale WY - Lynx habitat and burn severity presentation
NPS Meetings/ task groups	5%	- GRTE Wilderness Committee - GRTE Fire Management Committee - Teton Interagency Fire Danger Planning Committee
Interagency work	4%	Extensive with USFS, State of Wyoming, BLM, Teton County
Wildfire assignments	10%	LTAN – T and LTAN - 3 long assignments, 20 remote incident support fires PIOF – 1 Assignment FFT1- 1 Assignment
Prescribed fire projects	2%	Planning projects with Park and USFS colleagues.
Non-fire fuels projects	0%	
Research	10%	- Fire History of the Jackson Hole Area with the Teton Science School - Fire Regimes of Douglas-fir forests – TSS and CSU - Aspen research with WGFD – using Fire Effects data - Effects of low severity small fires with U of Wisconsin (Hansen) - Resilience in the face of climate change in GYE with U of Wisconsin (Turner et al). - Co-author on Aspen Ecology paper
Data collection	2%	Assist with Feld work during shoulder seasons when crew is out of pay status
Data entry	0%	Just for a few obscure protocols
Data analysis	2%	Extensive for GRTE, FOBU, and BTNF
Supervision/Admin	10%	Re-hiring Lead Monitor. Assist with GRTE Law Enforcement Specialist hiring panel.
Training	15%	Fire Classes: Taught S290, RX510 Took: S590 Steering Committee: S495
Travel out-of-park for plot or project work	0%	
Miscellaneous	20%	Fuel Treatment Effectiveness Success Story – Berry Fire Detail with WFMRDA June-September

D. Fire effects crew accomplishments and areas of focus

Table 8. Fire Effects Crew 2016 Accomplishments/Focus Areas

Category	Percent Time	Notes
FMH plots	2%	FMH brush plots in BICA
NPS plots	15%	Aspen circles, brown's lines, stand exams, shrub intercepts, photopoints. Scheduled reads and new installs.
USFS plots	31%	Aspen circles, brown's lines, stand exams, shrub intercepts, photopoints. Scheduled reads and new installs.
Wildfire assignments	12%	1 T2IA handcrew assignment, 2 Wildland Fire Module (WFM) assignments, 3 in park FX crew support fire.
Prescribed fire implementation	0.5%	1 RX (Dew Ranch Rx)
Module Support	6.5%	Fuels reduction projects, backfill/step up staffing (E3, E4, Module, Helitack), SAR, Signal Mtn thinning, GRTE Dive Team. -excludes weekend/lieu day staffing
Data entry	13%	FFI, FVS, Excel – 100% complete including checking and tracking
Data analysis	3%	FFI, FVS, Excel
Supervision, Administration	7%	Timekeeping, travel, conferences/presentations/meetings, evaluations, gear/vehicle maintenance and upkeep
Training, Teaching	10%	S-130/190, S-212, S-290, EMS Refresher, fire operations, misc. NPS training, teaching Browns / stand exams to TWFM.

E. 2017 Direction

The Teton Interagency Fire effects program has a few areas for future improvement that will be challenging and exciting. Data management continues to improve with tablet use, and this will be ongoing. We hope to explore new ways to analyze stand exam data, perhaps with the STANDFIRE program. It is also time to update the BTNF Fire and Fuels Monitoring Guidebook.

Fire ecology will be focusing on Grand Teton's Fire Management Plan update and Forest Plan revision for the BTNF. These will be time consuming projects. New research projects are expected in the Berry Fire and having to do with defining and monitoring resilience. We hope to play a role in these efforts.

F. Overall Data Entry Status and FFI suggestions

The Teton Interagency Fire Effects program uses FFI to store most of its field data, with the exception of aspen stand data that is entered into Excel. Currently FFI does not provide a useful macroplot design for our non-permanent aspen circular plots, of which there are generally 30 per stand, and often several stands per project. Excel files are located in project folders on a network

drive that receives regular backups. Photos are also stored on the network. Paper folders are still in use for field work.

When analyzing data, we usually export the entire record of data using the query process. We then use Excel to delete extraneous records and perform statistical analysis. The query builder process is so very difficult that we usually export ALL of the data rather than try to get the program to calculate density or percent cover. We must therefore enter zeroes into all plots that do not have data for variables we wish to summarize. This could be improved. For fuels data and tree data, the FFI Reports and Analysis exports to Excel are quite useful.

G. Optional Information



Three members of the Fire Effects crew discuss first-order fire effects after the Flagstaff fire on the Buffalo Ranger District, Bridger-Teton National Forest.