National Park Service
Yellowstone National Park
Fire Ecology Annual Report
Calendar Year 2010

Prepared by Jessica Page, Lead Fire Monitor
November 2010

Summary

The Fire Effects crew of 2010 had a rather busy season in what many crews might deem a slow fire year. Most of our time was spent collecting information to support fire management decisions in the Park. This consists mostly of fuels and weather data but we were able to visit several post fire vegetation monitoring plots as well. Due to the lack of prescribed fire at Yellowstone these plots are not necessarily the focus of the program but they do provide baseline information on long term ecosystem changes which may prove valuable in future studies.

Staffing and Training

2010 was a year of many accomplishments for the Fire Ecology Program. None of which would have been possible without the hard work and dedication of the crew. This team is made up of the Lead Fire Monitor, two seasonal crewmembers, and for a very short part of the year a Fire Ecologist. Tonja accepted a new position with the Forest Service and departed for greener pastures in May.

In support of Fire Management Operations we collected fuel samples from 4 sites around the park biweekly, set up and maintained 5 manual weather stations, performed annual maintenance on 3 RAWS stations and prepared a site and set up a 4th station in the NE corner of the park. We tracked daily fire weather indices and other pertinent weather information, updated and error checked the WIMS and Fire Family Plus databases, collected fire and weather observations from 5 fires in Yellowstone, and collected data from 3 FMH plots and 1 mechanical thinning project area. Additionally, we were red carded and expected to maintain fire readiness throughout the season. The lead and crewmembers were able assist on suppression and resource benefit fires to maintain currency in their red card qualifications. Both Matt and Tim were able to finish at least one taskbook this year and start working toward

new qualifications. Additionally, we assisted in suppression activities on 3 fires in the Park, one fire in Montana, and one in Colorado.

Table 1 Fire ecology staffing 2010

Ecologist and Monitors	Starting & Ending Date	Number of Pay Periods Worked	Number of Pay Periods Funded	READ Qualified (Y or N)	Personal Training and Development
Tonja Opperman Fire Ecologist (GS-11) PFT	01/01/10-05/08/10	09	**26**	No	
Jessica Page Lead Fire Monitor (GS-7) TERM	03/14/10-11/20/10	18	15	No	S-372, S-200, S-260, GIS workshop, Behave+ Workshop, GYE climate conference, maintained currency as FWRS, HECM, FFT1, ICT5, FEMO, WFR, opened HMGB taskbook and completed 2 training assignments
Matthew Heinz Crewmember (GS-5) Seasonal	05/09/10-10/09/10	11	7	No	S-260, WIMS, RAWS, expanded knowledge of FFI, Excel databases, training assignments with YELL helitack, opened ENGB taskbook
Timothy Pankey Crewmember (GS-5) Seasonal	05/09/10-10/23/10	12	7	No	S-290, S-270, opened and completed HECM taskbook, opened FEMO taskbook, training assignment with YELL helitack, familiarization with WIMS, Fire Family plus, FFI

Fire Effects Plots and Data

Plots at Yellowstone have taken on many forms and functions throughout the history of the Fire Ecology program and each year we get closer to understanding and documenting them all in a central location. These plots range in purpose from monitoring the effects of fire line explosives (FLE), mechanical thinning, vegetation response to fire (Despain), and standard FMH plots. The table below summarizes the number and type of each.

Table 2 Fire Effects plot workload (2010) and total plots installed

			Visited in 2010			
Park	**Monitoring Unit**	**Type of Plot (FMH, photo point, other)**	**Pre-burn**	**Immed. Post**	**Postburn (1-20 yrs)**	**Total Plots**
YELL	(Not Specified)	FMH Mechanical				26
	(Not Specified)	FMH WFRB			3	23
	(Not Specified)	FMH PSME				7
	(Not Specified)	FMH BARTR				5
	(Not Specified)	FMH PICO				7
	Norris RX	FMH LP 0				4
	Nez Perce thinning	Photo point			13	13
	(Not Specified)	Despain				14
	(Not Specified)	Photo series				12
	(Not Specified)	FLE				9
	Grant	Mechanical thinning				24
Total					**16**	**144**

Phlox WFRB

This plot is located in the Thoroughfare area of the park in the 2002 Phlox Fire. It is one of our higher elevation plots at 9800' and is of interest because of the whitebark pine (PINALB) population in the area. The pre fire data suggests that 11 of the 35 overstory PINALBs in the plot were dead at installation with insect damage noted on many. Post fire all trees were dead but we included a table (Table 4) summarizing the seedling density in the plot. This read is not a standard year but we had the opportunity to get shuttled to the plot on the helicopter which was already in the area on another mission. The last read that was done on the plot was a year 02 in 2004 so the 2010 read will be a year 08.

Travel logistics can be daunting with plots located as far in the backcountry as this one is and since they were originally installed during active fire incidents the helicopter costs were able to be absorbed by the fire. This plot would be particularly difficult to access without air resources as it is around 22 miles one way from the nearest trailhead or 12 miles and a boat ride across the lake which is a significant time commitment. We will hopefully be able to visit it again in 2012 for the 01YR10 read but due to the uncertainty I'm pleased we were able to get there this year.

Figure 1 shows the tree fall rate in this one plot. All tree species were combined into “live,” “dead,” and “dead and down” categories. Once a tree is coded dead and down it is no longer included in the tree analysis and becomes part of the fuel loading calculations. Fuel loading for the Phlox plot is summarized in Table 3. The following photos show pre fire, 1, 2, and 8 year post fire conditions at the Phlox plot.

Phlox plot 01PRE00 0P- Origin

Phlox plot 01YR01 0P-Origin

Phlox plot 01YR02 0P-Origin

Phlox plot 01YR08 0P-Origin

Figure 1. Tree fall rate on 1 plot in the Phlox Fire

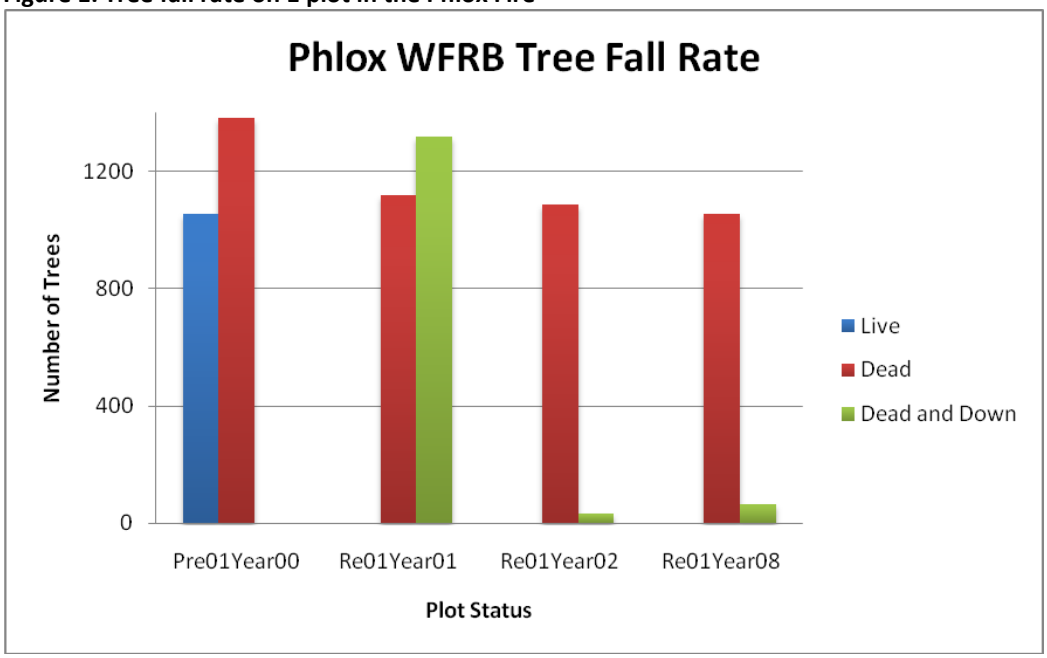


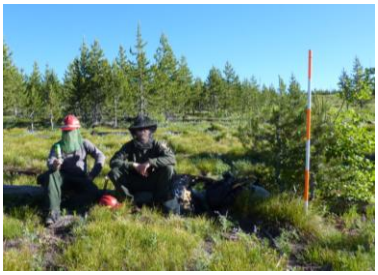
Table 3 Phlox WFRB fuel loading T/acre

Monitoring Status	1 HR	10 HR	100 HR	1-100 HR	1000 HR sound	1000 HR Rotten	Total Tons/acre 1-1000HR	Duff	Litter	Total All
Pre01Year00	0.15	0.55	0.31	1.01	9.36	8.93	19.30	17.17	2.38	38.85
Re01Year01	0.08	0.56	1.55	2.20	9.61	0.00	11.80	0.00	0.70	12.50
Re01Year02	0.12	0.46	3.16	3.74	14.42	0.00	18.16	0.00	0.39	18.55
Re01Year08	0.12	1.02	4.07	5.21	22.52	0.00	27.74	0.07	0.32	28.14

Table 4 Phlox WFRB seedlings per acre (species)

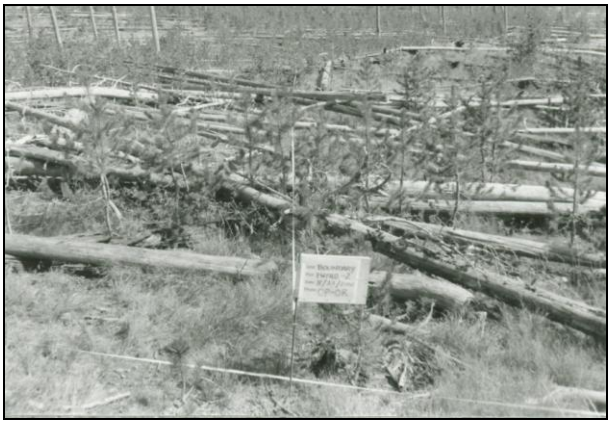
Monitoring Status	Species	Status	Seedlings/acre
Pre01Year00	ABILAS	L	1781
Pre01Year00	PINALB	L	405
Re01Year08	PINALB	L	324

Boundary WFRB Plots 2 and 3

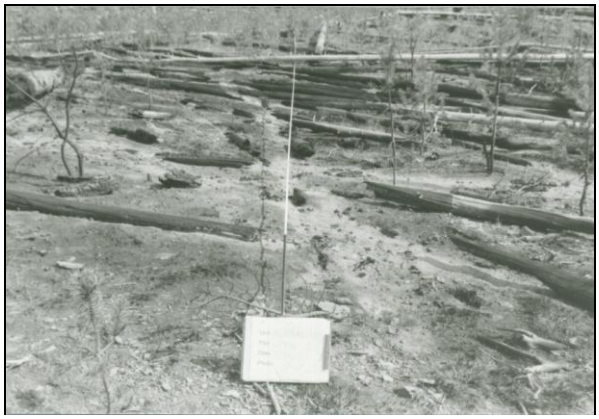


The Boundary plots are located at the south end of the park near Grassy Lake Reservoir. The Boundary fire burned around 350 acres in 2000 and had burned previously in 1988. These plots are "easily" accessible when compared to the rest of Yellowstone's FMH plots, only a 3 hour drive and a skip across the river! Next time we'll train the mosquitoes to carry us across- there are enough of them to do it.

These plots are upslope of the Falls River in Lodgepole regeneration and sedge meadow. The understory has a very diverse component of sedge, grass, and other forbs. Beargrass wasn't found in the plot but is plentiful around the perimeter. While there are no living overstory trees in the plots yet we tagged about 50 pole size trees that had grown up since the last read in 2004. The information from the plots was averaged and charted as follows.



Boundary 2 01PRE00 0P-Origin



Boundary 2 01POST00 0P-Origin

Boundary 2 01YR03 0P-Origin

Boundary 2 01YR10 0P-Origin

Figure 2 Tree Fall Rate in Boundary 2 and 3 plots

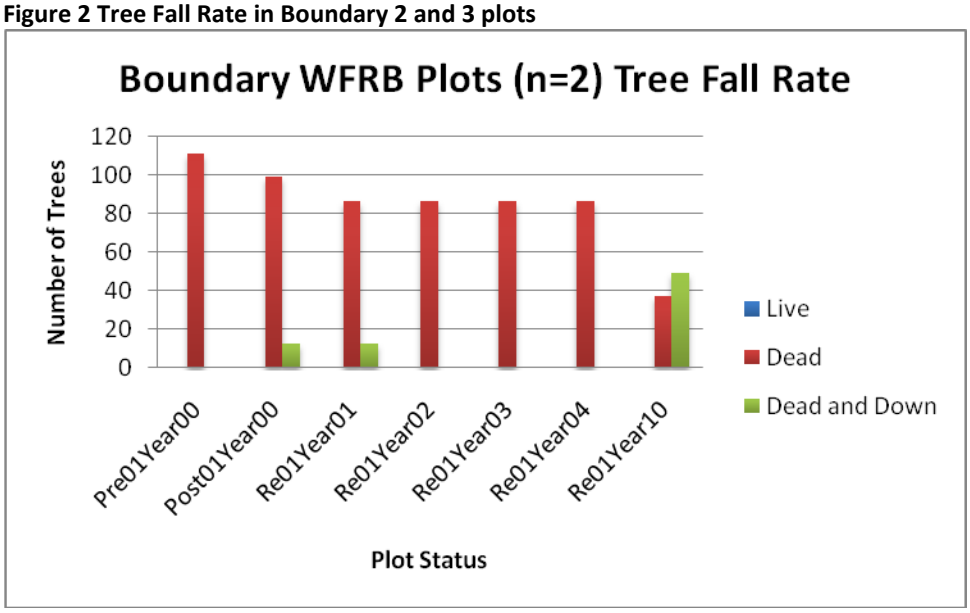


Table 5 Boundary WFRB fuel loading T/acre (2 plots)

Monitoring Status	1 HR	10 HR	100 HR	1-100 HR	1000 HR sound	1000 HR Rotten	Total Tons/acre 1-1000HR	Duff	Litter	Total All
Pre01Year00	0.1	1.2	1.4	2.6	26.9	6.7	36.2	6.3	2.5	45.0
Post01Year00	0.1	0.7	0.9	1.7	20.6	1.4	23.7	0.5	0.5	24.7
Re01Year01	0.1	1.1	1.1	2.3	23.4	0.0	25.6	1.3	0.7	27.6
Re01Year02	0.1	1.3	1.1	2.5	29.3	0.9	32.7	0.5	1.2	34.4
Re01Year03	0.1	0.6	0.8	1.5	21.3	4.9	27.7	1.6	0.6	29.9
Re01Year04	0.1	0.3	0.9	1.4	24.5	1.4	27.3	0.2	0.6	28.1
Re01Year10	0.0	0.4	1.1	1.5	1.8	21.6	24.8	0.1	0.5	25.5

Table 6 Boundary WFRB seedlings/acre (POPTRE)

Monitoring Status	Species	Status	Seedlings /acre
Pre01Year00	PINCON	L	2509
Post01Year00	PINCON	L	2550
Re01Year01	PINCON	L	2023
Re01Year02	PINCON	L	1659
Re01Year03	PINCON	L	1578
Re01Year04	PINCON	L	1578
Re01Year10	PINCON	L	850

Table 7 Boundary WFRB seedlings/acre (PINCON)

Monitoring Status	Species	Status	Seedlings /acre
Pre01Year00	POPTRE	L	243
Post01Year00	POPTRE	L	243
Re01Year01	POPTRE	L	243
Re01Year02	POPTRE	L	567
Re01Year03	POPTRE	L	445
Re01Year04	POPTRE	L	648
Re01Year10	POPTRE	L	364

Weather And Fuel Sampling

A significant amount of Fire Effects time is dedicated to weather and weather related duties that provide critical information to fire management personnel. These tasks include collecting weather observations, calculating fire indices, updating the information board (weather, lightning, precipitation, climate, etc), overseeing the WIMS station catalogs and FF+ databases, tracking the fuel moisture trends, and creating the pocket card.

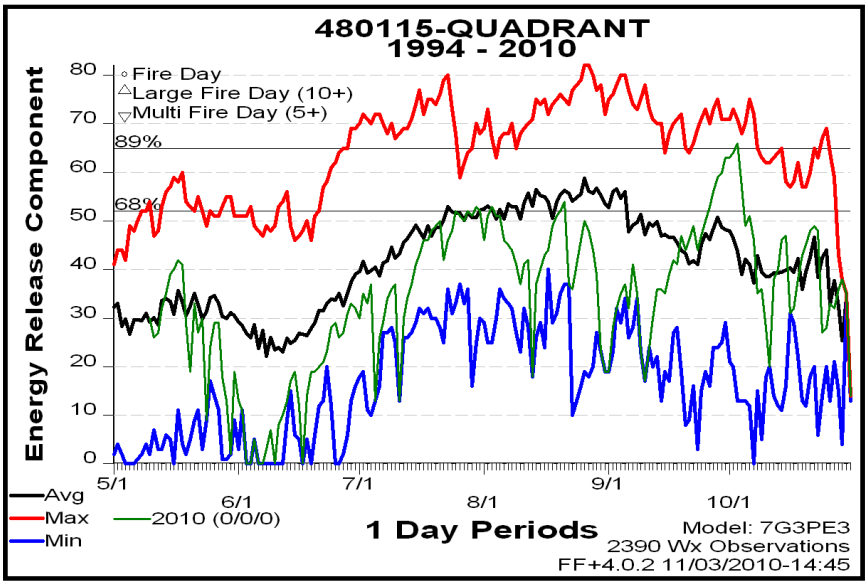
Weather Stations

The upkeep of the weather network in Yellowstone is the responsibility of the Fire Effects Crew. This entails setting up the 5 manual weather stations and training the volunteers how to record the observations as well as keeping an inventory of the equipment and purchasing any needed supplies. We also provide annual and emergency maintenance for the four RAWS stations in the park and keep detailed records of the sensors that are swapped out regularly.

The highlight of the season for us was being able to finally (after many delays and technical difficulties) place the Soda Butte RAWS at a site in the NE corner of the park. It has been transmitting hourly data ever since! Another big win this season was being able to purchase three new RAWS stations. One of these will be placed on the Central Plateau to provide us with hourly data that will improve our ability to model and predict fire behavior in the area. The other two will be used to replace the current stations that are in need of an upgrade to maintain compliance with the NWCG standards for NFDRS stations.

Fire Weather

Figure 3 ERC Chart From Quadrant RAWS



This year the fire effects crew transferred the Mammoth weather collection and data entry aspect of the 1300 fire weather to the dispatch office. This was a huge help as it freed up the crew to be in the field at 1300 and not need to leave someone behind to take observations and transfer the information for the other 4 manual stations to WIMS before 1430. We still keep track of the station catalogs and make sure the herbaceous codes and dates are correct as well as error checking the entries and performing recalculations in WIMS as needed.

The crew is also tasked with charting the ERC values and reporting current conditions at the daily staff meeting. We utilize WIMS and Fire Family Plus to obtain the pertinent indices. Mild early spring conditions and below average snowpack threatened a busy fire season, however by late May a pattern of cold and wet weather settled in to stay for much of the summer. This put

a literal damper on the 2010 fire season as shown by figure 3. We set several minimum records for ERC's at the Quadrant station throughout the summer before the fuels cured in late September setting up good conditions for lightning started fires to crackle to life and cause a bit of excitement.

Fuel Sampling

The crew sampled each of the four fuel moisture sites biweekly for a combined total of 44 plot visits between May and October. By adding a fourth site this year we now have a better representation of each of the major fuel types in the park. We were also able to set up an account with the National Fuel Moisture Database and enter our observations there so that visiting fire resources are able to obtain that information more efficiently and anyone interested in the status of fuels in our area can do so. In addition to the four sampling sites we have four 1000 Hr logs at each manual weather site and the Bechler Ranger station. The following table shows the calculated 1000 Hr moistures from these sites. Mammoth is the lowest elevation site and the fuels reflect the warmer drier climate observed there. At the end of the season we graphed the logs individually and removed the ones that consistently gave us outlier values. Some of the logs were created ~10 years ago and have become rotten enough to remove from service. We then made up a batch to replace them for next season as per Parkhurst et al in "A Comprehensive System to Monitor 1000 Hour Fuel Moistures in Yellowstone National Park." We also had the chance to help the Gallatin National Forest set up a fuel sampling program for the East Zone. We provided training in proper protocols and helped them make up 1000Hr logs for their sites.

Figure 4 Average 1000 Hour Log Moisture From 8 stations throughout Yellowstone NP

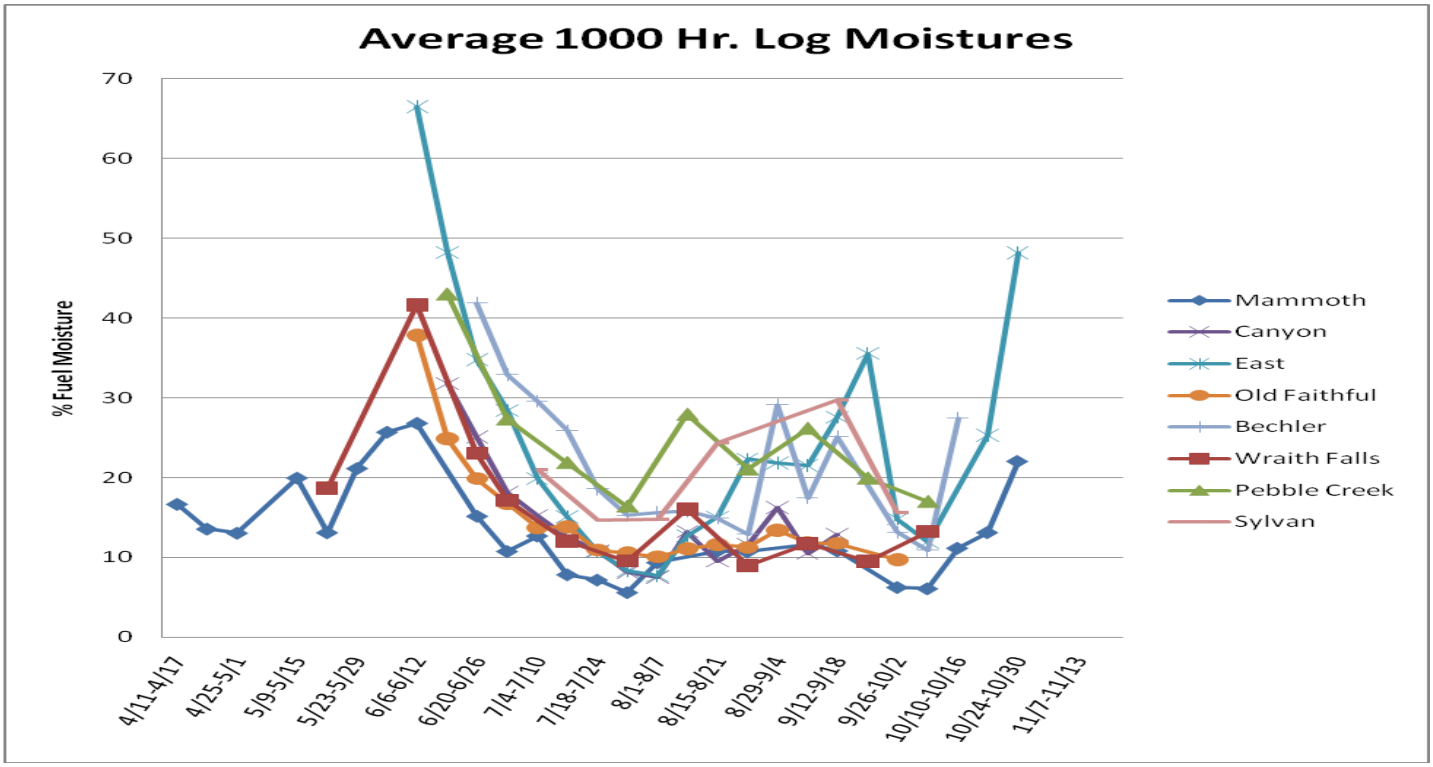


Table 8 2010 Fire effects crew accomplishments and areas of focus

Category	Percent Time	Notes
FMH plots	4%	• Phlox 01YR08 • Boundary plots 1 and 2 01YR10
WUI plots	1%	• Nez Perce photopoints
CBI plots	0%	
Other plot work	0%	
Fire Assignments	30%	• 1 crew member assisted on one RX burn as FEMOt • Lead detailed on 3 day assignment as HMGBt • 2 Crew members staffed Park helicopter on 2 week out of park assignment. • Crew provided ICT5, FFT1, FEMO, HECM and HMGB support for 5 fires in YNP
Fuels work	2%	• Crew collected and processed fuel moisture samples bi-weekly at four sites
Data entry	2%	• Input data for 100% of 2010 data and began cleaning up data from previous years. 98% of quality checks on 2010 data completed.
Data analysis	1%	• Ran analysis on Phlox and Boundary plots
Supervision/Admin	7%	• Lead monitor supervised two crewmember, • Miscellaneous travel and time, and credit card paperwork (audits) • Wrote 2010 annual report for region and YNP • Completed 2010 Yellowstone research permit report
Training	10%	• Each crew member had refresher training and miscellaneous administrative training • One crewmember took S290 and S-271 • One crewmember took RAWS training, WIMS • Lead took S-372 and Wilderness First Responder refresher
Weather	10%	• Maintained 4 RAWS stations, 5 manual • Trained volunteers and cache personnel in protocols for taking afternoon fire weather

		• Corrected and quality checked weather information in WIMS and weather coder • Administered WIMS station catalogues and updated ERC charts as needed. • Rewrite RAWS manuals • Create annual weather recording logbook
Office/Miscellaneous	30%	• Completed yearly inventory of fire effects equipment (and fire cache wide inv); purchased new gear; • moved offices and reorganized office, lab, and storage space; • janitorial duties of fire cache; • search and rescue functions; • updated fuel moisture database, • plot data sheets; • gave presentation to YCC about firefighting and fire ecology, • Placed temperature sensors for topoclimatic survey (Zack Holden) • time off

Additional Information

Table 9 . Data Entry and Projects Monitored

Park	% 2010 Data Entered	% 2010 Data Quality Checked	# Prescribed Fires Monitored*	# Non-fire Fuels Treatments Monitored*	# Wildfires Monitored*	# BAER Treatments Monitored*
Yellowstone National Park	100%	98%	0	1	5	0

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

Success's and Challenges for the future

Success's

-Fire Monitoring

Antelope Fire 9/14/2010

This year we had a unique opportunity to monitor several wildland fires that were being managed for resource benefits. Even though Yellowstone usually has several fires a season that aren't immediately suppressed it can be challenging to get to them both safely and efficiently. And there aren't always sufficient vantage points to monitor both weather and fire behavior. The Antelope fire offered both access and adequate safety zones which allowed us to observe fire behavior in a wide array of fuel types. Most notably lodgepole regen from the 1988 fires. We haven't seen this fuel type burn very often and it usually inhibits extensive fire spread but that wasn't the case with this fire. Being able to get to the fire perimeter and walk through the burned area was a great learning opportunity for the crew.

Antelope Fire 09/21/2010

-Collaboration with the Fire Science Lab in Missoula, MT. Before departing Yellowstone the Fire Ecologist arranged with Zack Holden of the Fire Science Lab to place temperature sensors throughout the Park as part of a topo-climatic study. We were able to place 23 of these sensors at varying elevations and locations within Yellowstone. It was a great opportunity to work with Zack and also to explore areas of the Park that we don't usually get to. We look forward seeing the results of the study when the data is processed

-Sharing 1300 weather duties with fire dispatch

Leaving one of our crewmembers behind to take the weather was a very inconvenient- especially since we only have three people. So having dispatch take care of the Mammoth weather and entering the observations from the other manual stations into WIMS really freed us up to get out into the field earlier and without worry that the weather duties would be forgotten.

-Soda Butte RAWS is operational!

After a very long and arduous process the station is up, transmitting, and where it needs to be.

-Obtain funding for FTS RAWS stations to upgrade current Vaisala stations

We were able to fund and purchase three new stations that will allow us to provide better weather information from the interior of the Park as well as make upgrades to our current stations.

-Trainer/trainee opportunities

We have been able to develop a good working relationship with the Gallatin National Forest and provide them with FEMO training both on Park fires and on Rx burns in the GNF. In turn we have had training opportunities with them as HECMs and HMGBs.

Challenges

-Plots

Access to plots is often difficult and occasionally only feasible via helicopter. This is very costly and not always an option. We are sometimes able to piggyback with other projects which helps to defray the costs but is not always an option either. When we are able to hike to plots it sometimes takes three days just to travel to and read one plot. In years with a high number of reads we may need a bigger crew to be able to keep up with plots and other duties. Without additional funding for travel, flight time, or additional personnel this will most likely be an ongoing problem.

-Funding for seasonals

The two Fire Effects seasonals are only funded for 7 payperiods (as GS-05s). We have so much work that needs to be done before the fire season gets underway that it is necessary to bring them on in May which means that funding runs out sometime in August. In order to complete our projects a more realistic end date would be October 1. With shrinking budgets I know that money will always be tight but a solution to guarantee just a few more payperiods is a goal I'd like to work towards in 2011.

Conclusion

2010 was a productive season for the fire effects crew despite losing the leadership of the fire ecologist. We look forward to having the position filled so that the Yellowstone Fire Ecology program can continue to develop and evolve to better support resource management decisions.