



**National Park Service
Rocky Mountain National Park
Fire Ecology Annual Report
Calendar Year 2008**

Summary

The Rocky Mountain fire effects crew focused monitoring efforts during the 2008 season at Dinosaur National Monument and Rocky Mountain National Park. The crew traveled to Dinosaur National Monument to re-read plots in the Bighorn Basin, Disappointment Draw, Iron Springs Bench, Pearl Park, and Slaughter Wall prescribed burns as well as the Bear and Peterson wildfires. The remainder of the summer was spent at Rocky establishing FMH plots, conducting post-burn plot reads, revisiting photo-points, monitoring live and dead fuel moistures, and participating in fire assignments.

Plot work

ROMO	11 FMH Pre-Burn Installs
	11 FMH Post-burn visits
	7 FMH YR01 visits
	0 FMH YR02 visits
	0 FMH YR05 visits

Year 1 plot visits were conducted in 7 plots in the Lower Montane Mixed Conifer type (FPICM1T08) these plots were burned in the Horseshoe prescribed burn in the fall of 2007; eleven plots were installed (or previously installed plots were revisited) in the Front Range Ponderosa Pine type (FPIPO1T09), Ponderosa Savanna type (FPIPS1T02), and Big Sagebrush type (FARTR1D05). These plots were established within the Estes Valley prescribed burn unit. Post-burn plot visits were conducted following the Estes Valley prescribed burn. Photo-points on Emerald Mountain were also relocated and photographed.

DINO	10 YR01 visits (5 experimental, 5 control)
	10 YR02 visits (5 experimental, 5 control)

10 YR04 visits (5 experimental, 5 control)
 6 YR05 visits (3 experimental, 3 control)
 16 YR06 visits (8 experimental, 8 control)
 11 YR13 visits (5 experimental, 6 control)

The fire effects crew made 2 trips to Dinosaur National Monument to resample monitoring plots associated with the re-read plots in the Bighorn Basin, Disappointment Draw, Iron Springs Bench, Pearl Park, and Slaugh Wall prescribed burns and the Bear and Peterson wildfires.. Data were collected following existing protocols developed by DINO resource management personnel.

Fuel moisture monitoring

The crew continued live fuel moisture monitoring on both sides of the park (ROMO). Species monitored throughout the fire season were ponderosa pine (*Pinus ponderosa*), lodgepole pine (*Pinus contorta*), sagebrush (*Artemisia tridentata* ssp. *vaseyana*), and bitterbrush (*Purshia tridentata*). See graphs of seasonal trends in Appendix A.

Several different methods have been tried over the years to get the fuels moisture data out to interested folks in the field. In 2008 we began posting data online via the National Fuel Moisture Database (<http://72.32.186.224/nfmd/public/index.php>). All data collected in 2008 was posted online, however some previous years' data entry remains.

Sampling of 10-, 100-, and 1000-hour fuel moistures continued using the Delmhorst electronic moisture meter over the course of the 2007 field season. Dead and down fuels were sampled approximately every 2 weeks at the following locations: Wild Basin Entrance Station (8300'), Willow Park (10,700'), Kawuneeche Visitor Center (8600'), and the Estes Valley prescribed burn unit (8200').

Smoke monitoring

In an effort to monitor smoke output (and potential health impacts) from the Estes Valley prescribed burn, a DataRAM 2000 particulate monitor was placed at the Interagency Fire Center on Mills Drive. Data was collected continuously from approximately 17:00 on 9/16/2008 to 11:30 on 9/23/2008. The DataRAM was down from 9/23 to 10/1. Particulate sampling was reinitiated at approximately 10:00 on 10/1/2008 and is still collecting data as of 10/8/2008. (see Appendix B for results).

Table 1. Fire Effects Plot Workload 2008

Park	Monitoring Unit	Type of Plot	Pre-treatment	Immediate Post	Post-treatment (1+ yrs)	Total Plots
Colorado	Liberty Cap Rx	Transect				7
	Ute Mesa Rx	Transect				15
Total						22

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Park	Monitoring Unit	Type of Plot	Pre-treatment	Immediate Post	Post-treatment (1+ yrs)	Total Plots
Dinosaur	Bear Fire	Transect			6	6
	Bighorn Basin Rx	Transect			10	10
	Buster Flats	Transect				10
	Chew Basin	Transect				15
	Disappointment Draw	Transect			10	10
	Dry Woman	Transect				10
	East Cactus	Transect				10
	Green Mountain Slope	Transect				9
	Iron Mine Draw	Transect				5
	Iron Springs Bench	Transect			11	11
	Lower Disaster Falls	Transect				10
	Pearl Park Rx	Transect			10	10
	Peterson	Transect			6	6
	Pot Creek	Transect				10
	Ruple Ranch	Transect				8
	Slaugh Wall Rx	Transect			10	10
	Split Mountain	Age analysis				20
	Success	Transect				9
	Thanksgiving	Transect				8
	Triple C	Transect				9
	West Cactus I	Transect				10
	West Cactus II	Transect				10
	Zenobia Basin	Transect				8
Total			0	0	63	224

Park	Monitoring Unit	Type of Plot	Pre-treatment	Immediate Post	Post-treatment (1+ yrs)	Total Plots
Florissant Fossil Beds	Mixed Conifer - Manual Treatment	FMH Forest plot				4
	Mixed Conifer - Manual Treatment	Photo point				70
	Ponderosa Pine	FMH Forest plot				2
	Ponderosa Pine - Manual Treatment	FMH Forest plot				3
	Ponderosa Savanna	FMH Forest plot				3
Total						82

Park	Monitoring Unit	Type of Plot	Pre-treatment	Immediate Post	Post-treatment (1+ yrs)	Total Plots
Great Sand Dunes	Pinyon Flats HFR	Photo point				7
	San Luis Valley - Ponderosa Savanna	FMH Forest plot				6
	San Luis Valley - Rabbitbrush Prairie	FMH Forest plot				2
Total						15

Park	Monitoring Unit	Type of Plot	Pre-treatment	Immediate Post	Post-treatment (1+ yrs)	Total Plots
Rocky Mountain	Front Range Ponderosa Pine	FMH Forest plot	4	4		19
	Ponderosa Savanna	FMH Forest plot	5	5		14
	Eastside Lodgepole Pine – Manual Treatment	FMH Forest plot				6
		Photo point			73	73
	Big/Common Sagebrush	FMH Forest plot	2	2		8
	Lower Montane - Mixed Conifer	FMH Forest plot			6	21
		Photo point				3
	Grand Lake HFR	Rapid Assessment				8
	Lodgepole Pine – West Slope	FMH Forest plot				14
	Deer Mtn HFR	Rapid Assessment				12
Total			11	11	79	178

All Parks	All Monitoring Units	All Plot Types	Pre-treatment	Immediate Post	Post-treatment (1+ yrs)	Total Plots
Total all Parks			11	11	142	521

Table 2. Fire Ecology Staffing 2008

Monitor	Starting Date	Ending Date	# of Pay Periods	Training and Development
Carol Fields	5/12/08	11/21/08	14	Refresher, First Aid/CPR; FFI workshop, Yellowstone Fire Conference; RADO taskbook initiated, ICT5 taskbook completed
Sam Coffin	5/12/08	10/24/08	12	Refresher, S-212, S-290, S-131, Search and Rescue, First Aid/CPR; FALA taskbook initiated, FEMO taskbook initiated and completed
Nathan Williamson	N/A	N/A	26	Refresher, S-290 coordinator/instructor, S-491 instructor; RAWS training, Supervisory training, M-3; RAWS coordinator workshop, FFI workshop, FPA workshop, WFDSS workshop, JFSP Front Range Roadshow, Yellowstone Fire Conference; FFT1 trainee assignment



Table 3. Management Objectives and Monitoring Results 2008

Monitoring Unit	Management Objective	Monitoring Results (80% C.I.)	Objective Achieved?
Front Range Ponderosa Pine	40-80% total fuel reduction	24.7% reduction in total fuel load (<i>n</i> =9; 7 burns)	NO
	Limit overstory PIPO mortality to 5% within 5 years post-burn	28.6% reduction in overstory PIPO (<i>n</i> =1; 1 burn)	NO , but data from only one plot
	generate 5-35% mortality in pole-sized trees within 5 years post-burn	100% reduction in pole-sized trees (<i>n</i> =1; 1 burn)	NO , but data from only one plot
Ponderosa Savanna	40-80% total fuel reduction	19.4% reduction in total fuel load (<i>n</i> =7; 4 burns)	NO
	Limit overstory PIPO mortality to 5% within 5 years post-burn	5.9% reduction in overstory PIPO (<i>n</i> =4; 2 burns)	NO
	generate 5-30% mortality in pole-sized trees within 5 years post-burn	12.5% reduction in pole-sized trees (<i>n</i> =4; 2 burns)	YES
Lodgepole Forest Westside	40-80% total fuel reduction	54.1% reduction in total fuel load (<i>n</i> =4; 2 burns)	YES
	generate 10-45% mortality in overstory trees within 5 years post-burn	1% increase in overstory trees (<i>n</i> =3; 1 burns)	NO
Eastside Lodgepole Pine Manual Treatment	80-100% woody fuel reduction	24% reduction in woody fuel load (<i>n</i> =5; 1 treatment)	NO (Note: when considering fuels > 1", fuels reduction is 69.2%)
		24.1% reduction in overstory trees (<i>n</i> =5; 1 treatment)	N/A (objectives not specifically tied to overstory density)
		73.3% reduction in pole-sized trees (<i>n</i> =5; 1 treatment)	N/A (objectives not specifically tied to pole-sized tree density)
Lower Montane Mixed Conifer	40-80% total fuel reduction	52.2% reduction in total fuel load (<i>n</i> =6; 2 burns)	YES
	generate 10-25% mortality in overstory trees within 5 years post-burn	42.6% reduction in overstory trees (<i>n</i> =2; 1 burn)	NO , but data from only two plots
	generate 10-25% mortality in pole-sized trees within 5 years post-burn	30.3% reduction in pole-sized trees (<i>n</i> =2; 1 burn)	NO , but data from only two plots

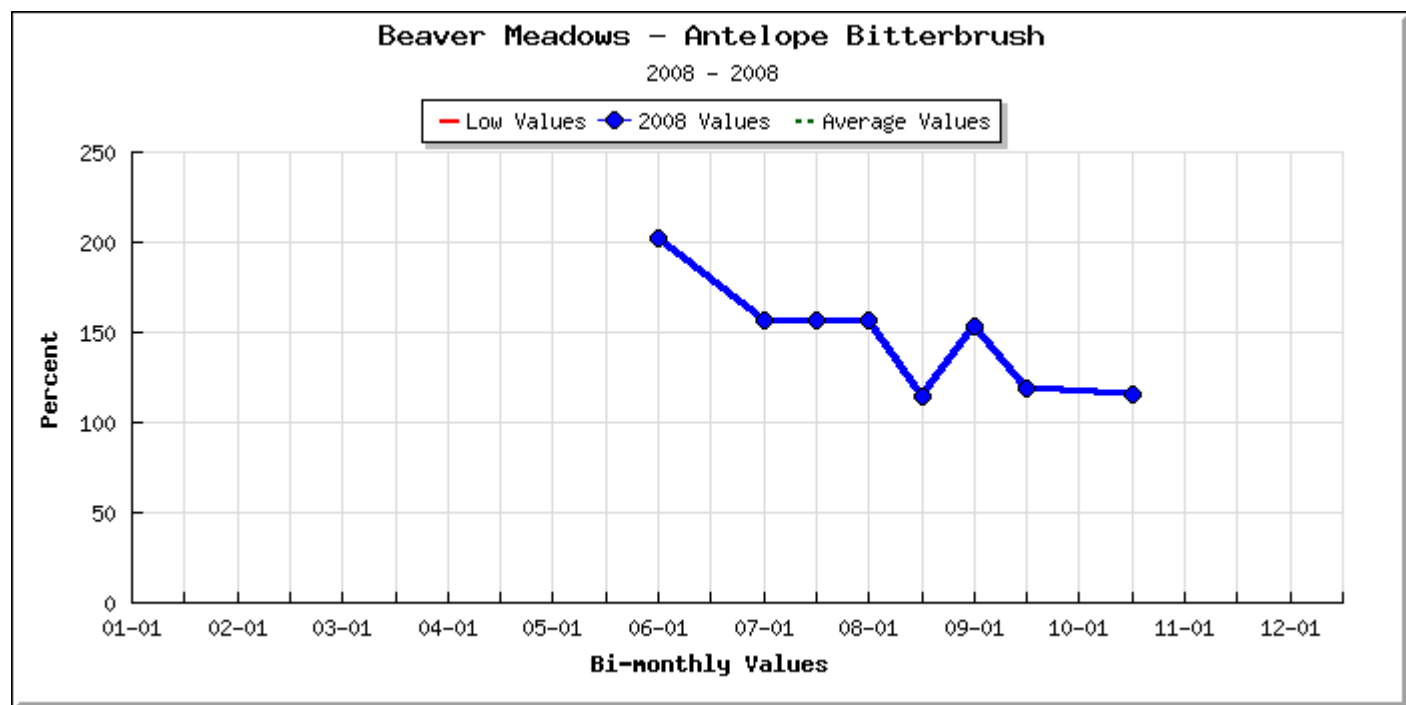
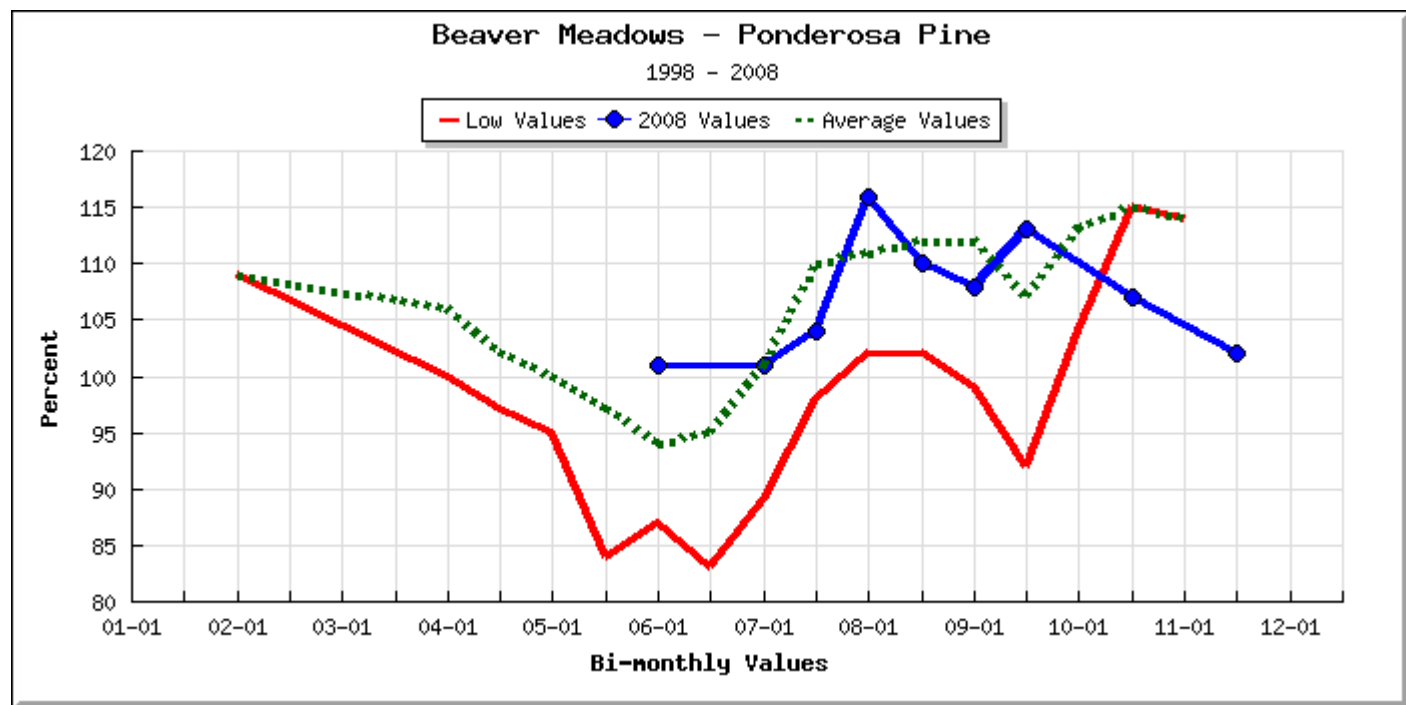
Table 4. Fire Ecologist Accomplishments/Focus Areas

Category	Percent Time	Accomplishments and/or areas of activities
Planning	20%	• Currently writing EA for ROMO FMP • Internal scoping for ROMO FMP and FMP EA • Participated in development of fuels plans, review of burn plans for ROMO, FLFO, GRSA
Presentations	5%	• Fire ecology presentations for local CWPP meetings
Interagency work	10%	• Assisted in data development/entry/analysis of interagency FPA data • Attended FPA workshops • Attended Front Range Fuels Treatment Partnership meetings, conference calls as a core team member
Fire Assignments	10%	• FFT1 on Northern Type 2 Crew assignment • Lead FEMO on in-park prescribed burn operations
Research	<5%	• Assisted with JFSP proposal (federal collaborator, fiscal representative)
Data entry	5%	• Monitors completed bulk of data entry
Data Conversion	<5%	• All FMH data converted to FFI (still have non-FMH data in need of conversion from DINO)
Data analysis	10%	• Completed annual report, continuing analyses of previous season's data
Supervision/Admin	20%	• Supervised monitoring crew, completed evaluations • Developed work schedule, priorities • Travel and time paperwork
Training	5%	• FFI Workshop • RAWS maintenance training • WFDSS Workshop • Incident Commander refresher • Firefighter refresher • Supervisory Training (in-park)
Miscellaneous	15%	• IMR RAWS Coordinator • Rural Fire Assistance/Community Assistance grant coordination • Attended National RAWS Coordinator Workshop • Attended Yellowstone Fire Conference • Attended ROMO Climate Change Workshop • GRSA RAWS maintenance • S491 Cadre member • S290 Cadre member/Course Coordinator • Acting Fire Management Officer duties • Other duties as assigned...

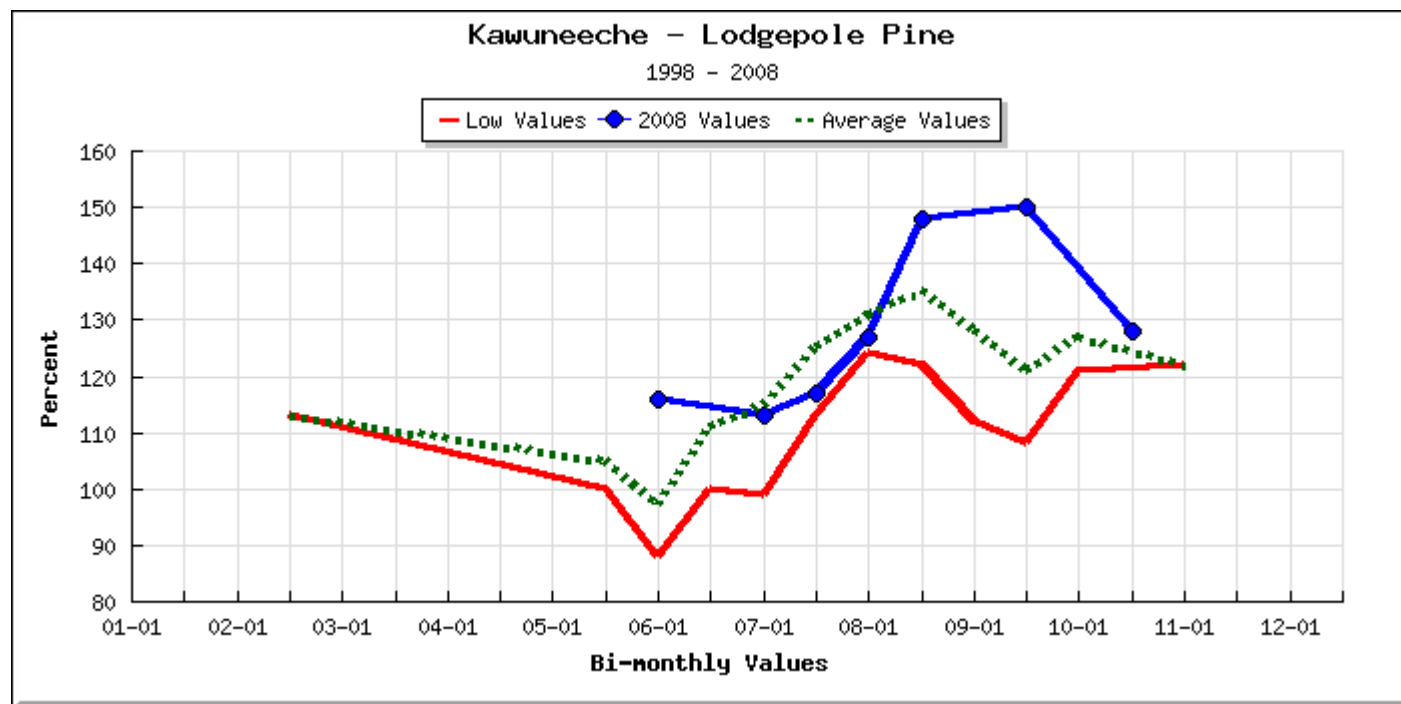
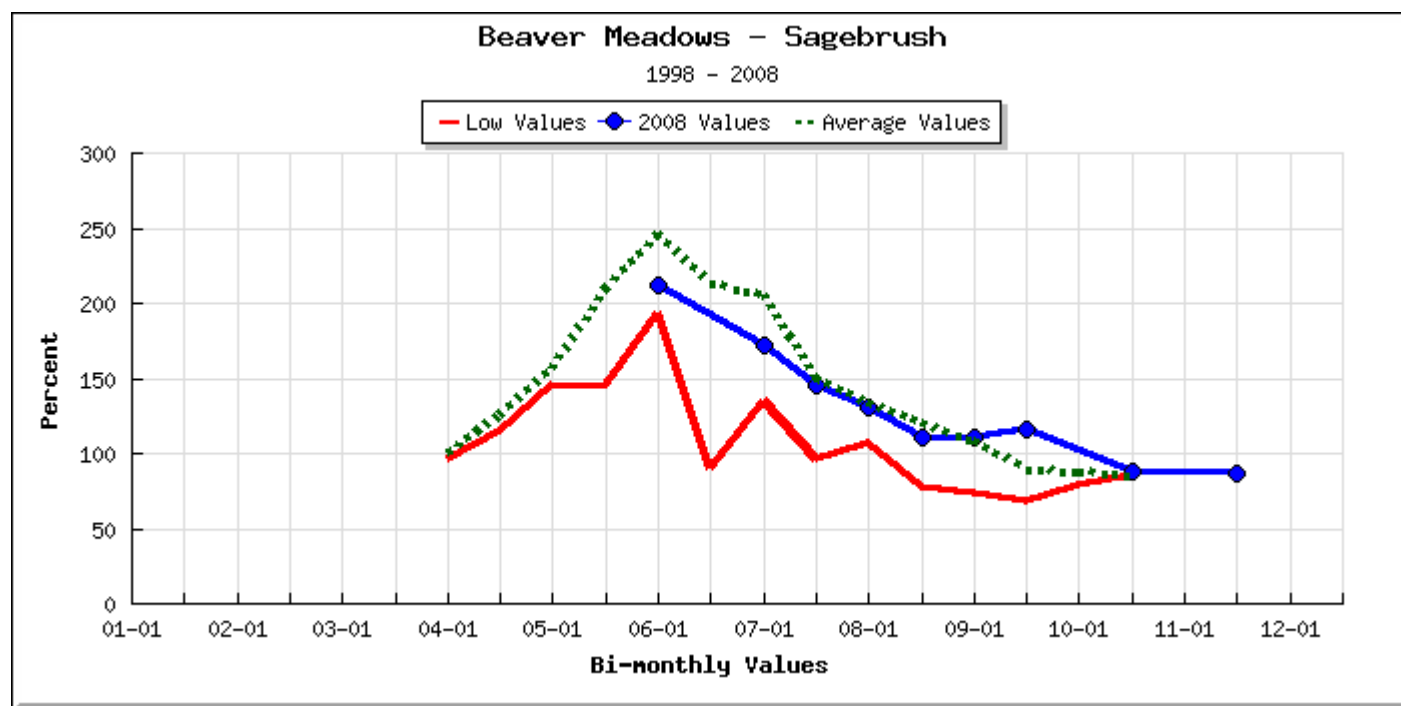
Table 5. Fire Effects Crew Accomplishments/Focus Areas

Category	Percent Time	Notes
FMH plots	20%	Estimated amount of time spent collecting plot data; includes any preparation time.
WUI plots	<5%	
CBI plots	0%	
Other plot work	25%	DINO fire effects monitoring plots
Fire Assignments	15%	FEMO, FFT2, RADO assignments
Fuels Project work	0%	Fuels project work (all fuels work done by crew as OT on project accounts)
Data entry	15%	Estimated amount of time spent entering data from paper to PC
Data conversion	5%	Estimated amount of time to convert FEAT data to FFI; includes verification of protocols, error checking, etc.
Data analysis	<5%	This is expected to be very low number or zero for fire effects crew/lead monitor
Supervision/Admin	5%	Travel, payroll, etc.
Training	10%	List all training courses attended including in-park, NPS/interagency, and non-government
Miscellaneous	5%	Things that don't fit in other categories – search and rescue, assisting other work groups, etc.

Live Fuel Moisture Trends



Appendix A.



2008 Beaver Meadows Prescribed Fire – PM_{2.5} Monitoring

The Beaver Meadows subunit of the Estes Valley Fuels Project was an approximately 600 acre burn conducted in several subunits from mid-September through early October 2008. The burn area is located in Rocky Mountain National Park, south of Trail Ridge Road and north of Upper Beaver Meadows Road. Ignition occurred by hand on 9/17, 9/18, 9/24, 9/25, 10/1, and 10/2. Project goals were to:

- Provide for public and personnel safety
- Increase protection for cultural and natural resources
- Reduce hazardous fuels
- Return fire to the ecosystem for ecological benefit
- Coordinate and collaborate with neighboring agencies and land owners in fire planning and hazard mitigation

In an effort to monitor smoke output (and potential health impacts) from the Beaver Meadows prescribed burn, a DataRAM 4000 particulate monitor was placed next to the Interagency Fire Center in the Utility Area on Mills Drive. This location was selected in consultation with Sarah Gallup from the Air Pollution Control Division of the Colorado Department of Public Health and Environment. Data was collected continuously from approximately 17:00 on 9/16/2008 to 11:30 on 9/23/2008. The DataRAM was down from 9/23 to 10/1. Particulate sampling was reinitiated at approximately 10:00 on 10/1/2008 and is still collecting data as of 10/8/2008.

It should be noted that the DataRAM is an optical “real-time” particulate sampler and is not an Environmental Protection Agency (EPA) approved device for determining airborne particulate concentrations. Particulate data generated from DataRAMs can overestimate actual particulate concentrations by 20 – 90% (Trent et al. 2000). For these reasons, this data is not intended to ascertain whether ambient air-quality standards were met or exceeded (Pat McGraw, Air Pollution Control Division, personal communication). The best use for these instruments is to determine whether the local particulate concentrations are relatively high or low and whether concentrations are going up or down.

The DataRAM was configured to monitor airborne particulate matter up to 2.5 micrometers in diameter (PM_{2.5}). PM_{2.5} are small enough to be inhaled deeply into the lungs and can result in adverse health effects, especially in children, the elderly, and those with respiratory or cardiovascular conditions (see Table 1 for PM_{2.5} levels and corresponding health advisory categories and visibility values).

In September 2006, the EPA lowered the National Ambient Air Quality Standard for PM_{2.5} from 65 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) to 35 $\mu\text{g}/\text{m}^3$ averaged over a 24-hour period. Corresponding Air Quality Index (AQI) values are currently under revision to reflect the lower threshold. Until the revised AQI values are released, the old values are still being used (Table 1). The 24-hour threshold of 35 $\mu\text{g}/\text{m}^3$ was not exceeded on

Appendix B.

any of the days monitored (Table 2). The maximum 24-hour average recorded was a value of 18.9 $\mu\text{g}/\text{m}^3$ on 10/3 which is considered a “Moderate” value. All other days monitored recorded a 24-hour average below 15.4 $\mu\text{g}/\text{m}^3$ and fell into the “Good” category. Figures 1 and 2 represent rolling 24-hour averages for the time periods monitored.

Table 1. PM_{2.5} health advisory levels and corresponding visibility values.

Air Quality Index Categories with Corresponding Visibility Values and PM _{2.5} levels			
Adjective Rating	Air Quality Index Values	Visibility (miles)	PM _{2.5} (24-hr average)
Good	0 - 50	10+	0 - 15.4
Moderate	51 - 100	6 - 9	15.5 - 40.4
Unhealthy for Sensitive Groups	101 - 150	3 - 5	40.5 - 65.4
Unhealthy	151 - 200	1.5 - 2.5	65.5 - 150.4
Very Unhealthy	201 - 300	0.9 - 1.4	150.5 - 250.4
Hazardous	301 - 500	0.8 or less	over 250.5

Table 2. 24-hour average PM_{2.5} concentrations for Beaver Meadows prescribed fire.

Date	24-hour concentration	Adjective Rating
9/16/2008	2.2	Good
9/17/2008	4.5	Good
9/18/2008	3.5	Good
9/19/2008	2.3	Good
9/20/2008	1.6	Good
9/21/2008	1.3	Good
9/22/2008	2.1	Good
10/2/2008	15.2	Good
10/3/2008	18.9	Moderate
10/4/2008	13.4	Good
10/5/2008	4.6	Good
10/6/2008	1.4	Good

Appendix B.

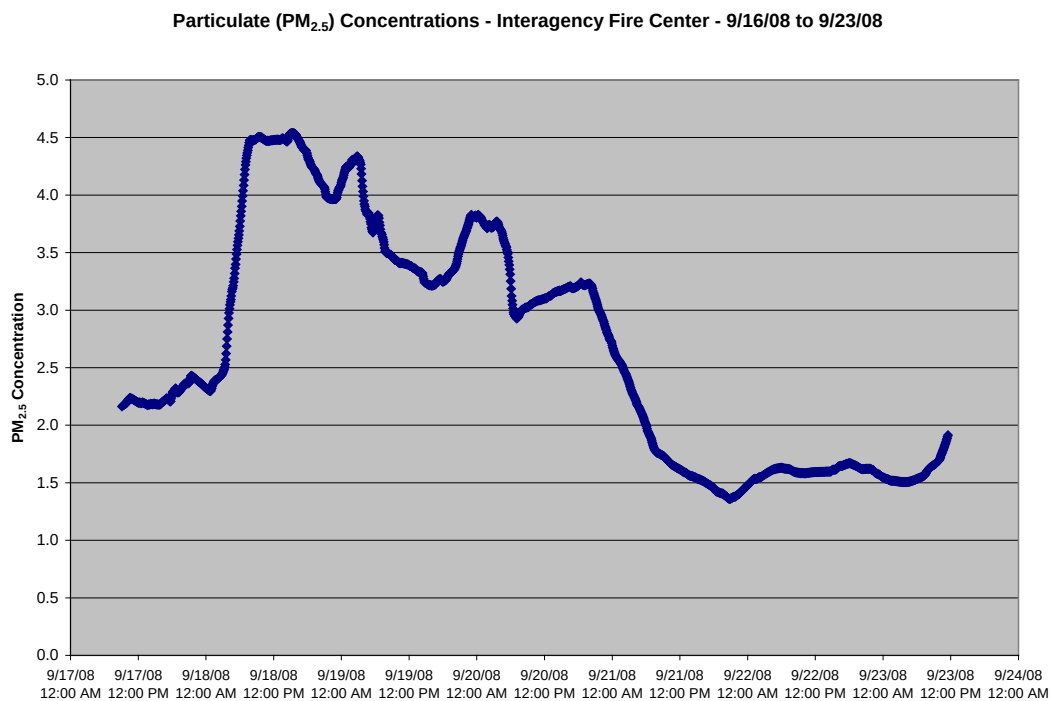


Figure 1. Particulate concentrations 9/16/2008 – 9/23/2008

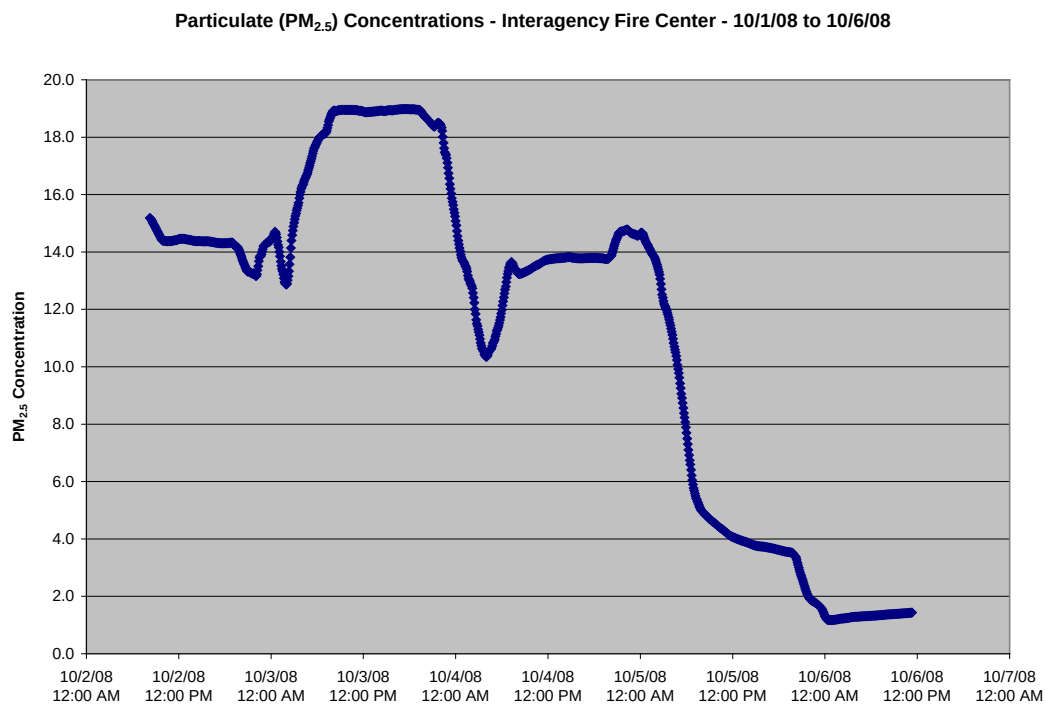


Figure 2. Particulate concentrations 10/1/2008 – 10/6/2008

Appendix B.

Contacts/References

McGraw, Pat. Colorado Department of Public Health and Environment, Air Pollution Control Division:
303-692-3235

Trent, Andy ; Davies, Mary Ann; Fisher, Rich ; Thistle, Harold W.; Babbitt, Ronald .
2000. Evaluation of Optical Instruments for Real-Time Continuous Monitoring of Smoke Particulates. 0025 2860. Missoula, MT: U.S. Department of Agriculture, Forest Service, Missoula Technology and Development Center. 38 p