



**National Park Service
Fire Ecology Annual Report
Calendar Year 2006**

SUMMARY

Rocky Mountain National Park's fire effects crew (mostly a crew of one!) kept busy during the 2006 field season with a number of varied tasks. In addition to typical fire effects plot work, the crew spent a substantial amount of time on compliance work associated with mechanical fuels treatments, including post-treatment surveys for exotic plant species. Fire effects staff also participated in several fire use, suppression, and search and rescue assignments. The following is a short review of the 2006 field season.

Plot work

ROMO 3 FMH Installs
 0 FMH Post-burn visits
 0 FMH YR01 visits
 0 FMH YR02 visits

Two new plots were installed in the Lower Montane Mixed Conifer type (FPICM1T08 #27, 28, 29). These plots were established within the proposed Horseshoe Park prescribed burn unit. No prescribed burning occurred at Rocky Mountain National Park in 2006 and as a result, the crew did not conduct any immediate post-burn plot reads during the field season.

DINO 10 YR01 visits (5 experimental, 5 control)
 10 YR02 visits (5 experimental, 5 control)
 4 YR04 visits (2 experimental, 2 control)

In June the fire effects crew traveled to Dinosaur National Monument to resample monitoring plots associated with the 2004 Pearl Park and 2005 Bighorn Basin prescribed burns. The crew also resampled 4 plots established to monitor post-fire vegetation response to the 2002 Bear fire (wildfire). Data were collected following existing protocols developed by DINO resource management personnel.

In May the fire effects crew traveled to Colorado National Monument to install monitoring plots within the proposed Liberty Cap prescribed burn unit. Transect data were collected using a modified version of the protocols developed and in use at DINO. See Appendix A for an initial analysis of the data.

Post-treatment Invasives surveys

Aspen Glen/Fall River	5 acres
Deer Mountain	503 acres
Eagle Cliff	29 acres
Emerald Mountain	271 acres

The fire effects crew completed the second season of invasive plant surveys following pile burning on Eagle Cliff, the second season of surveys on Deer Mountain, Aspen Glen/Fall River, and the third year of surveys in the Emerald Mountain hazard fuels treatment area (ROMO). Over 800 acres were surveyed. Conservation measures included in 2002 WUI EA call for invasives monitoring annually for the first 3 years following treatment and then every other year for the next six years thereafter. All exotics encountered were identified, photographed, a GPS waypoint was recorded, and an estimate of patch size (if more than one individual) was recorded. This information is then passed on to the exotics crew lead for inclusion in the park exotics database.

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 B.

Sampling of 10-, 100-, and 1000-hour fuel moistures continued using the Delmhorst electronic moisture meter over the course of the 2006 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 Moraine Park 2F prescribed burn unit (8200'). In an effort to address past inconsistencies in 1000-hr fuel sampling, 1000-hr sampling "stations" were installed at several locations throughout the park in 2004. The stations consisted of three 6-8" diameter logs elevated off the ground. Material consisted of Douglas-fir and lodgepole logs salvaged from ongoing fuels treatment projects in the park. Sampling sites were located at: Beaver Meadows Visitor Center (7800', next to RAWS weather station), Wild Basin Entrance Station (8300'), Willow Park (10,700'), Kawuneeche Visitor Center (8600'), Dunraven (North Fork) Trailhead (7900'), and the Moraine Park 2F prescribed burn unit (8200').

The external electrodes for the moisture meter are somewhat fragile and after breaking another early in the season we switched from the 3-1/4" electrode (Type 18-ED) to the 1-1/8" electrode (Type 26-ES). The shorter electrode appears to be a little more field worthy and still provides satisfactory results. Due to the large number of samples that can be processed using the moisture

meter this will remain the primary means of determining 1000-hr fuel moisture, although we will continue to cut and oven-dry 1000-hr samples on occasion to validate the device.

Stream turbidity monitoring

Stream turbidity sampling continued in 4 tributaries of the Colorado River on the west side of the park (ROMO). The original intent of the monitoring was to gather baseline water quality data that could then be compared to measurements following prescribed fire. Data collected is passed on to Karl Cordova (Biologist) who maintains water quality records. Sampling protocols on file in the Fire Effects Office.

Fire dispatches

Fire effects crew members assisted with several suppression and prescribed fire assignments both in and out of park in 2006. Wendy Middleton (crewmember) participated in several local initial attack assignments as well as a 14 day detail in Wyoming with the Black Hills Fire Use Module as a FEMO trainee. Nate Williamson (fire ecologist) participated in one local initial attack assignment as well as a 15 day detail with the Black Hills FUM in Idaho as a FEMO.

Table 1. Management Objectives and Monitoring Results 2006
(Please see Appendix A for an analysis of DINO's 2006 fire effects data)

Monitoring Unit	Management Objective	Monitoring Results (80% C.I.)	Objective Achieved?
Front Range Ponderosa Pine	40-80% total fuel reduction	38.9% reduction in total fuel load (n=5; 3 burns)	NO , but minimum sample size not achieved
	Limit overstory PIPO mortality to 5% within 5 years post-burn	28.6% reduction in overstory PIPO (n=1; 1 burn)	NO , but minimum sample size not achieved
	generate 5-35% mortality in pole-sized trees within 5 years post-burn	100% reduction in pole-sized trees (n=1; 1 burn)	NO , but minimum sample size not achieved
Ponderosa Savanna	40-80% total fuel reduction	28.2% reduction in total fuel load (n=5; 3 burns)	NO
	Limit overstory PIPO mortality to 5% within 5 years post-burn	5.9% reduction in overstory PIPO (n=4; 2 burns)	NO , but minimum sample size not achieved
	generate 5-30% mortality in pole-sized trees within 5 years post-burn	12.5% reduction in pole-sized trees (n=4; 2 burns)	NO , but minimum sample size not achieved
Lodgepole Forest Westside	40-80% total fuel reduction	54.1% reduction in total fuel load (n=4; 2 burns)	YES , but minimum sample size not achieved
	generate 10-45% mortality in overstory trees within 5 years post-burn	1% increase in overstory trees (n=3; 1 burns)	NO
Eastside Lodgepole Pine Manual Treatment	80-100% woody fuel reduction	24% reduction in woody fuel load (n=5; 1 treatment)	NO , but minimum sample size not achieved (<i>Note: when considering fuels > 1", fuels reduction is 69.2%</i>)
		24.1% reduction in overstory trees (n=5; 1 treatment)	N/A (<i>objectives not specifically tied to overstory density</i>)
		73.3% reduction in pole-sized trees (n=5; 1 treatment)	N/A (<i>objectives not specifically tied to pole-sized tree density</i>)
Lower Montane Mixed Conifer	40-80% total fuel reduction	53.0% reduction in total fuel load (n=2; 1 burn)	YES , but minimum sample size not achieved
	generate 10-25% mortality in overstory trees within 5 years post-burn	42.6% reduction in overstory trees (n=2; 1 burn)	NO , but minimum sample size not achieved
	generate 10-25% mortality in pole-sized trees within 5 years post-burn	30.3% reduction in pole-sized trees (n=2; 1 burn)	NO , but minimum sample size not achieved

Table 2. Fire Effects Plot Workload 2006

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				15
	Ponderosa Savanna	FMH Forest plot				14
	Lodgepole Pine – West Slope	FMH Forest plot				14
	Eastside Lodgepole Pine – Manual Treatment	FMH Forest plot				6
		Photo point				73
	Big/Common Sagebrush	FMH Forest plot				8
	Lower Montane - Mixed Conifer	FMH Forest plot	3			16
		Photo point				3
	Grand Lake HFR	Rapid Assessment				8
	Deer Mtn HFR	Rapid Assessment				12
Florissant Fossil Beds	Ponderosa Pine	FMH Forest plot				2
	Ponderosa Savanna	FMH Forest plot				3
	Ponderosa Pine - Manual Treatment	FMH Forest plot				3
	Mixed Conifer - Manual Treatment	FMH Forest plot				4
	Mixed Conifer - Manual Treatment	Photo point				70
Great Sand Dunes	San Luis Valley - Rabbitbrush Prairie	FMH Forest plot				2
	San Luis Valley - Ponderosa Savanna	FMH Forest plot				6
	Pinyon Flats HFR	Photo point				7
Dinosaur*	Bear WF	Transect			4	4
	Bighorn Basin Rx	Transect			10	10
	Pearl Park Rx	Transect			10	10
Colorado	Liberty Cap Rx	Transect	7			7
Black Canyon						0
Curecanti						0
Total			10	0	24	297

* Need add other existing plots at DINO thanks to Jenny Byington's detective work.

Table 3. Fire Ecology Staffing 2006

Monitor	Starting Date	Ending Date	# of Pay Periods	Training and Development
Wendy Middleton	5/1/06	9/30/05	11	Refresher, Grasses of Rocky Mountain National Park, First Aid; fire use detail
Bill Raiter	5/1/06	6/22/06	4	S-130/190, First Aid
Nathan Williamson	N/A	N/A	26	Refresher, S-260, S-491, Safety for Supervisors, S-131, First Aid, Grasses of Rocky Mountain National Park, L-280, Biological Assessment Writing Workshop, M-410; fire use detail

Table 4. Fire Ecologist Accomplishments/Focus Area

Category	Percent Time	Accomplishments/Focus Areas
Planning	20%	• Biological Assessment for ROMO fuels management activities • Fuels planning (ROMO) • Vegetation map/Fuels crosswalks (ROMO) • Fire danger risk assessments during fire season
Presentations	<5%	• Presented mechanical fuels treatment data/analysis at Fire Use Workshop • Presented fire ecology lecture as part of Rocky Mountain Nature Association seminar
NPS Meetings/ task groups	10%	• Internal scoping for Estes Valley Elk/Veg EIS planning process • Participated in ROMO/FLFO Watershed Condition Assessment process • NPS Fire Management Mentoring Program Orientation • FEAT/Stats Workshop • Fire and Fire Use Workshop
Fire Assignments	5%	FEMO on fire use assignment; FFT2 on in-park suppression assignment
Data entry	5%	• Rapid Assessment plots • DINO fire effects transects • COLM
Data Conversion	5%	• FEAT
FMH Plot Work	10%	Includes fire effects work at DINO, COLM
WUI Plot Work	5%	Rapid Assessment plots
Data analysis	5%	• Rapid Assessment analysis • DINO fire effects analysis
Supervision/Admin	20%	• Supervised fire effects crew, completed evaluations • Travel and time paperwork
Training	10%	• S-260 • S-491 • S-131 • L-280 • M-410 • Supervisory Training
Miscellaneous	5%	• Search and Rescue, other duties “as assigned”

Publications

Innes, J.C., M.P. North and N. Williamson. in review. Effect of silvicultural treatments and prescribed fire on woody debris and snag dynamics in a sierran old-growth mixed-conifer forest. Canadian Journal of Forest Research.

Table 5. Fire Effect Crew Accomplishments

Category	Percent Time	Notes
FMH plots	20	
WUI plots	5	
Other plot work	30	• Exotics surveys
Fire Assignments	10	• Fire use assignment with Black Hills FUM • Local IA
Data entry	15	• FMH plot data • Exotics occurrence data
Training	10	• S-130/190 • Grasses of Rocky Mountain National Park
Miscellaneous	10	• Search and Rescue, other duties “as assigned”

APPENDIX A.

Initial Results (Pre-burn Monitoring) of the Liberty Cap Prescribed Fire Project, Colorado National Monument

INTRODUCTION

In May of 2006 ROMO's fire effects monitoring crew established and sampled 7 fire effects monitoring transects within the Liberty Cap prescribed burn unit. No control transects were established outside the unit due to the fact that the unit comprised all available sagebrush habitat in the area.

MONITORING METHODS

Transect data were collected following a modified version of protocols developed by DINO Resource Management personnel. Due to the size and shape of the Liberty Cap unit, 50-meter sampling transects were used rather than the 100-meter transects called for in the DINO protocols. One reading was taken at 1-m intervals along the transect for a total of 50 sample points per transect. At each sample point, the plant species or substrate intercepted was recorded. Multiple species may be recorded at each sample point; however substrate was only recorded in the absence of vegetation.

RESULTS

Cheat grass (*Bromus tectorum*) was found throughout the Liberty Cap burn unit and accounted for the highest percent cover of any species in the unit, averaging over 62% cover (range: 42-76%; Table 1.). Sagebrush (*Artemisia tridentata*) was the next most prevalent species encountered with an average of 34% total cover (28% live, 6% dead). Native forbs and grasses accounted for just under 18% cover combined. Please see Table 2 for a list of species encountered.

Table 1. Average percent cover values for the Liberty Cap burn unit.

	Average Percent Cover						
	Native perennial grass	Native annual grass	Cheat grass	Native forb	Sagebrush	Biological soil crust	Bare ground
Liberty Cap Pre-burn	8.0	1.4	62.6	8.3	34.0	70.3	9.4

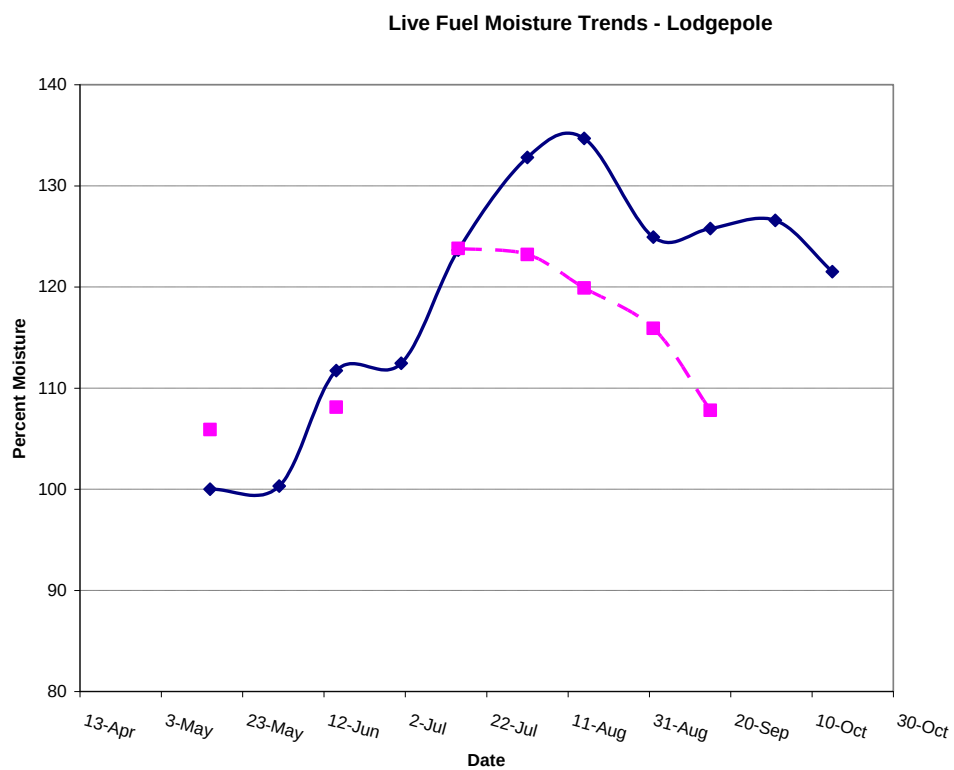
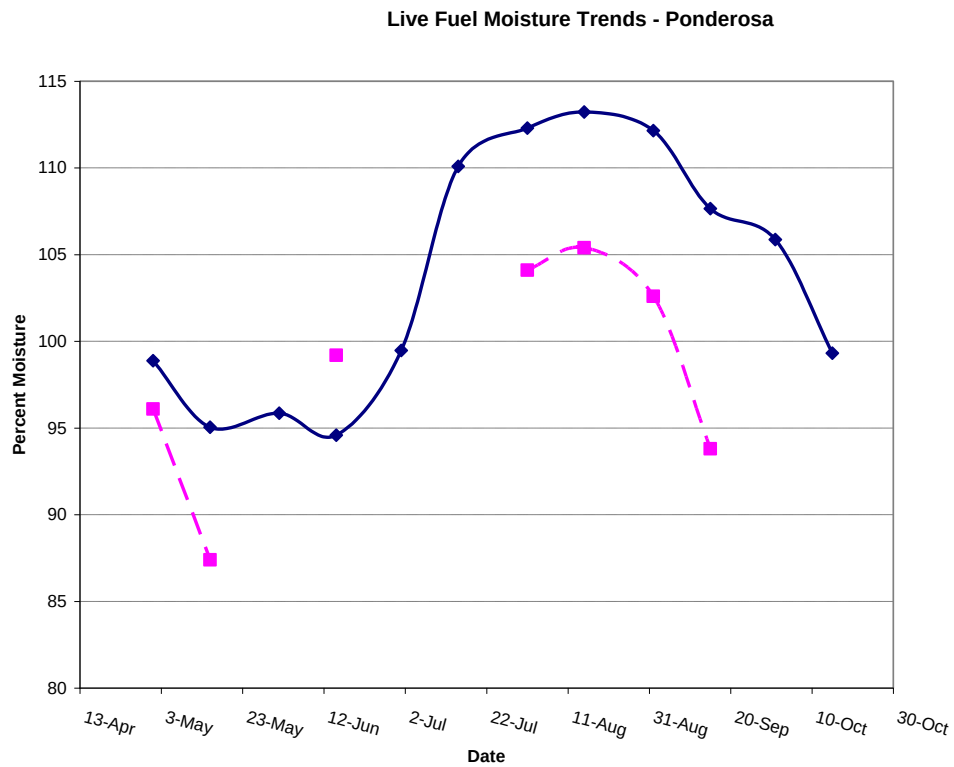
Table 2. Species encountered in Liberty Cap burn unit.

Grasses	Synonym	Common name
<i>Achnatherum hymenoides</i>	<i>Oryzopsis hymenoides</i>	Indian ricegrass
<i>Bromus tectorum</i>		cheat grass
<i>Koeleria macrantha</i>		Junegrass
<i>Leymus salinus</i>	<i>Elymus salinus</i>	Saline wildrye
<i>Poa sp.</i>		unknown bluegrass
<i>Vulpia octoflora</i>	<i>Festuca octoflora</i>	sixweeks fescue
Forbs		
<i>Gutierrezia sarothrae</i>		broom snakeweed
<i>Plantago patagonica</i>		woolly plaintain
<i>Senecio spartioides</i>		broomlike ragwort, groundsel
Shrubs		
<i>Artemisia tridentata</i>	<i>Seriphidium tridentatum</i>	big sagebrush
<i>Opuntia polyacantha</i> var. <i>erinacea</i>	<i>Opuntia erinacea</i>	grizzlybear pricklypear
Trees		
<i>Juniperus osteosperma</i>	<i>Sabina osteosperma</i>	Utah juniper
<i>Pinus edulis</i>		twoneedle pinyon

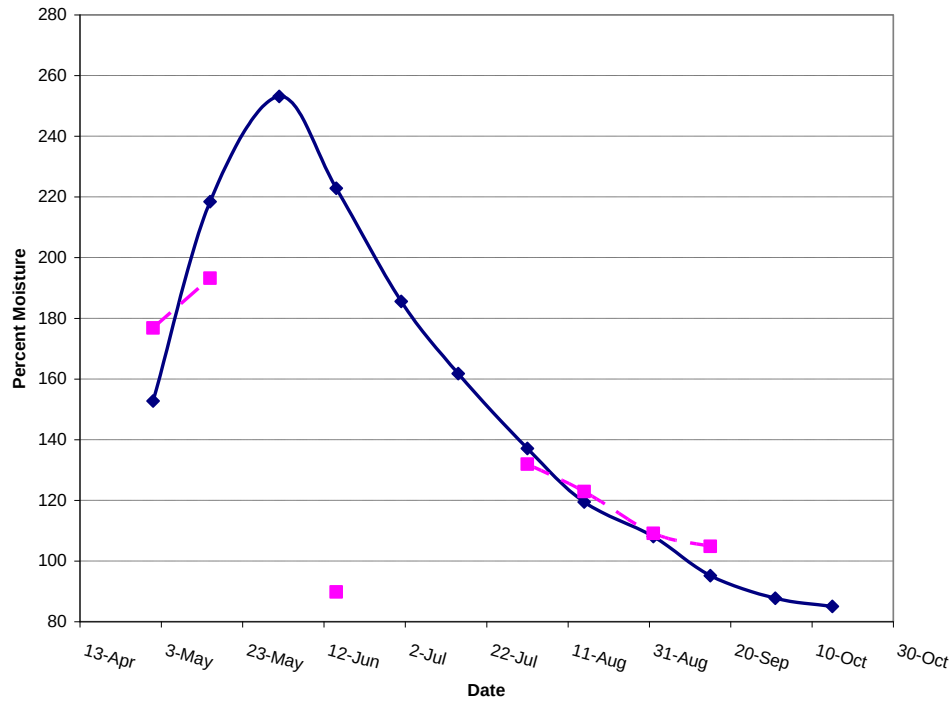
Table 3. UTM Locations of Liberty Cap burn unit vegetation monitoring transects (NAD 83, Zone 12S).

Transect	Easting	Northing
1	700152	4326117
2	700106	4326191
3	700054	4325983
4	699948	4326108
5	699761	4326000
6	699443	4325953
7	699432	4325862

APPENDIX B.



Live Fuel Moisture Trends - Sagebrush



Live Fule Moisture Trends - Bitterbrush

