



**National Park Service
Fire Ecology Annual Report
Northern Great Plains
Calendar Year 2004**

Synopsis

Great Plains plant communities have a degree of resilience that allows them to rebound from grazing, fire, invasion by non-native species, and drought. This past year we have seen effects of all of these stressors in our fire effects monitoring. In a year characterized by widespread drought, plant diversity and vegetative production declined throughout the Northern Great Plains. However, a cool, moist fall allowed many plants to flower and produce seed after a summer of limited rainfall. This presents a challenge for comparative analysis of areas before and after fire when a dominant driver of the ecosystem is precipitation. Though we would like to primarily address fire and its role in influencing vegetation change, many factors determine the composition of this system and the fire monitoring program assesses the changes in vegetation regardless of the source.

In 2004, in the Northern Great Plains, we monitored 7 prescribed fires (Fig. 1) in 5 parks where 15 long-term monitoring plots burned, installed 19 new plots, and remeasured 70 plots in postburn status which included 22 plots at 5 years postburn. In addition to prescribed fire operations and vegetation monitoring duties, crew members served in a variety of roles on 10 wildfires and 11 fire use fires.

Other accomplishments included the Fire Ecologist and Lead Monitor participating on the working team for the development of the Fire Ecology database software known as FEAT, a bi-weekly fuel moisture sampling program at Wind Cave National Park from late April through early November (Fig. 2), and providing fire monitoring assistance to Ozark National Scenic Riverways and Buffalo National River during the spring prescribed fire season.

Table 1. Fire Effects Plot Workload 2004

Park	Monitoring Unit	Type of Plot	Pre-burn	Immed. Post	Postburn (1-5 yrs)	Total Plots*
Badlands	Mixed grass prairie	FMH grass plot	3	1	12	25
	Smooth Brome	Daubenmire sample			10	10
Devils Tower	Ponderosa Pine	FMH Forest plot			3	8
	Non-native grassland	FMH grass plot			2	5
Fort Union	Non-native grassland	Photo point			1	2
Knife River	Non-native grassland	Modified Daubenmire sample			9	9
	Mixed grass prairie	FMH grass plot			6	6
Scottsbluff	Mixed grass prairie	FMH grass plot			1	8
	Snowberry shrubland	FMH shrub plot			1	3
Theodore Roosevelt	Silver sage shrubland	FMH shrub plot	3		2	10
	Non-native grassland	FMH grass plot			3	4
	Mixed grass prairie	FMH grass plot	4	3	3	10
	Snowberry shrubland	FMH shrub plot			1	1
	Silver sage shrubland	Modified shrub plot	6			6
	River Corridor	Modified tree plot	2			2
Wind Cave	Native grass, cool season	FMH grass plot		3	3	7
	Native grass, warm season	FMH grass plot			2	7
	Non-native grassland	FMH grass plot		1	3	5
	Ponderosa Pine	Seedling mortality		7	7	7
	Ponderosa Pine	FMH Forest plot	1		1	9
Total			19	15	70	

*Total Plots lists the number of plots installed in the monitoring unit over the life of the monitoring program.

Table 2. Fire Ecology Staffing 2004

The Northern Great Plains Fire Ecology program had 3 returning seasonal staff members and filled one new position by welcoming Tyler Schmitt to serve as the Assistant Lead Monitor. He brings experience from Sequoia-Kings Canyon National Park, Ozark Scenic River, and the Nature Conservancy. Three staff members completed the taskbook for Fire Effects Monitor (FEMO) on prescribed fire and fire use assignments this year.

Personnel	Starting Date	Ending Date	# of Pay Periods	Training and Development
Cody Wienk	1/1/04	12/31/04	26	RX-310
andy thorstenson	1/1/04	12/31/04	22	Plant taxonomy course, online Access database training
Tyler Schmitt	4/19/04	12/10/04	17	S-212, S-290, RX-310, completed FEMO taskbook
Bob Kobza	4/26/04	9/17/04	11 ½	S-234
Martha Jakobek	4/26/04	9/17/04	11 ½	S-260, completed FEMO taskbook
Katie Johnson	4/12/04	11/10/04	14 ½	GIST training, completed FEMO taskbook, online ESRI GIS course

Table 3. Management Objectives and Monitoring Results 2003

As we continue to work with the FEAT database software, data collected in 2004 and stored in FEAT will be combined with previous years' data currently stored in the FMH database. The following Table shows monitoring units where new data was collected in the 2004 field season with results where applicable. Many of the vegetation objectives relate to “percent cover” of a certain class of vegetation. This measure is highly dependent on rainfall and will fluctuate annually making it difficult to link changes in this variable specifically to prescribed fire.

Monitoring Unit	Management Objectives	Number of Plots Timeframe	Monitoring Results	Objective Achieved?
Badlands Western wheatgrass grassland	Reduce relative cover of non-native grasses by at least 20%	n=13 plots, 4 fires at 2 yr n=8 plots, 2 fires at 5 year n=22 plots installed	71% Decrease at year 2	y
	Increase relative cover of native grasses by at least 10%		3% Increase at year 2	n
	Increase relative cover of native forbs by at least 30%		39% increase at year 2	y
Devils Tower Ponderosa pine savannah	Reduce dead and down fuel loading by 30-70% immediate postburn	n=5 plots, 3 fires at 5 year n=6 plots, 4 fires at 2 year 8 plots installed	52% reduction at year 1	y
	Maintain density of overstory trees within 30% of preburn at year 5		unassessed	n/a
	Reduce pole-size ponderosa by 30-70% at year 2		43% Decrease at year 2	y
Non-native Grassland	Increase cover of native grass by at least 10% at year 2	n=2, 2 fires at 5 year n=3, 3 fires at year 2 n=5 plots installed	75% Increase	y
	Decrease cover of non-native grass by at least 20% at year 2		60% decrease	y
	Increase cover of native forbs by at least 20% at year 2		131% increase	y
Knife River Native Grassland	Increase cover of native grass by 25% at 2 years	n=6, 2 fires at 5 year n=6 plots installed	5% Decrease at year 2	n
	Increase cover of native forbs by 25% at 2 years		61% Increase at year 2	n
Riparian Smooth Brome Forest	Increase cover of native grass	n=9, 2 fires at 2 year n=9 plots installed	Not assessed	n
	Decrease cover of non-native grass specifically smooth brome		No decrease	n

Monitoring Unit	Management Objectives	Number of Plots Timeframe	Monitoring Results	Objective Achieved?
Theodore Roosevelt Silver sage shrubland	Reduce silver sage by 40-60% at 2 years post burn	n=2 plots, 1 fire at 5 year n=4 plots, 2 fires at 2 year n=10 plots installed	Decrease by 51% at 2 year	Minimum plots not met
	Reduce non-native cover by at least 25% at 2 years post burn		Increase by 48% at 2 year	No Minimum plots not met
	Increase native herbaceous cover by at least 20% 2 years post burn		Decrease by 13% at 2 year	No Minimum plots not met
Crested wheatgrass	Increase cover of native grass by 20% at 2 years post burn	n=3 plots, 2 fires at year 2 n=4 plots installed		Not yet assessed
	Decrease cover of non-native grass by 20% at 2 year post bur n			Not yet assessed
Mixed grass grassland	Increase cover of native grass by 20-30% at 2 year	n=6, 2 fires n=6 plots installed	Decrease by 5% at 2 year	Minimum plots not met
	Decrease cover of non-native grass by 20-30% at 2 year		Increase by 2% at year 2	Minimum plots not met
Cottonwood forest	Reduce total fuel loading by 60-80% immediate post burn	n=2, 1 fire at 2 years n=3 plots installed	10% decrease at 1 year	Minimum plots not met
	Limit mortality of deciduous overstory trees to 20% 2 years post		0% mortality in cottonwood	Minimum plots not met
Wind Cave Warm-season Grassland	Increase native grass cover by 50-90%	(n=4, 2 fires at year 2)	11% Increase at year 2	n
	Decrease non-native grass cover by 50-90%		67% reduction at year 2	y
	Increase native forb cover by 50%		4% Reduction at year 2	n
Ponderosa pine savannah	Decrease fuel loading by at least 30% immediate postburn	(n=3, 3 fires at 2 year)	42% Reduction immediate postburn	y
	Achieve at least 70% mortality of seedling ponderosa pine at year 1		99% Reduction in 7 seedling plots	y
	Achieve at least 50% mortality of pole-size ponderosa pine at year 2		Insufficient sample size	Not yet assessed
	Increase percent cover of native herbaceous species by 25% at year 2		unassessed	Not yet assessed
Non-native Grassland	Reduce Kentucky bluegrass to <25% of cover	(n=2, 1 fire at 5 year) (n=4, 2 fires at 2 year)	Decrease of 15% from 91% preburn to 77% at year 2	n
	Increase native grass to ≥75% cover in areas of cool-season grass		78% increase from 55% cover to 100% cover of native grass	y

Ecologist Accomplishments. It was a very busy year, both professionally and personally, highlighted by the addition of a baby boy to my family and two amazing fire assignments with the Black Hills Fire Use Module. I expect that our program will continue to communicate with the NGP Inventory & Monitoring and Exotic Plant Management Team networks as we develop ways that our programs can collaborate and potentially integrate. Working with parks to develop desired conditions and objectives will also remain a high priority for me.

Planning and Scientific Meetings

- Participated in MWR Fire Ecology Program Review, Wilson's Creek.
- Began discussions with Northern Great Plains Inventory and Monitoring Network Coordinator about collaborating or integrating I&M with Fire Effects.
- Attended Integrated Fire and Resource Management Workshop in Nebraska City, NE.
- Participated in FEAT development meeting in Boise, ID March 2-4, 2004
- Attended Desired Future Conditions Scoping Meeting at KNRI – April 5-8, 2004
- Attended FPA meeting at BADL – April 20-21, 2004
- Attended a planning meeting at THRO for River Corridor & Jones Creek – June 28-29, 2004
- Coordinated 2nd Annual Black Hills Ecologist & Botanist Workshop, with participation from 3 federal agencies, 2 state agencies, 2 universities, & 3 NGOs
- Attended FRCC Reference Condition Workshop in Laramie, WY – Sept. 7-10, 2004

Planning Documents Produced

- Completed SCBL Fire Effects Monitoring Plan
- Completed basic monitoring plans for JECA and DETO

Publications and Presentations

- Presented poster 'Monitoring Mechanical Fuel Reduction Projects in Ponderosa Pine Forests of Devils Tower National Monument and Mount Rushmore National Memorial' at the 2nd International Wildland Fire Ecology and Fire Management Congress in Orlando, Florida.
- Manuscript 'Evaluating the role of cutting treatments, fire and soil seed banks in an experimental framework in ponderosa pine forests of the Black Hills, South Dakota' accepted for publication in *Forest Ecology and Management* (192:375-393)
- Oral presentation at Black Hills Ecologist & Botanist Workshop 'Monitoring Mechanical Fuel Reduction Projects at Mount Rushmore and Devils Tower' – March 11, 2004

Other

- Member of FEAT Software Working Group
- Member of South Dakota Project Learning Tree Board of Directors
- Continued to build and maintain NGP Fire Management website

Final Remarks

In 2004 we continued to collect vegetation data, photograph areas before and after fires, input field data into a computer database, and catalog photos. We hope that this information will serve not just as archival record of fire management activities and vegetation change, but also as a dynamic resource for land managers to utilize for writing management plans, making decisions, and developing realistic alternatives.

We look forward several new challenges in 2005. We plan to begin field data collection or pilot sampling in collaboration with the Inventory and Monitoring program, will produce a poster and/or presentation for the Tall Timbers/Association for Fire Ecology meeting on fire in grassland ecosystems in October 2005, and will begin multi-year analyses of fire monitoring data in the Access-based FEAT software program. With the capabilities of the new software, we hope to complete a comprehensive review of our monitoring program.

Figure 1. Southeast Corner Prescribed Fire. Theodore Roosevelt National Park. April 23, 2004



Figure 2. 2004 fuel moisture. Wind Cave National Park.

