



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

Summary

The 2006 Alaska fire season looked like it was going to be another big year, with a 1,310 acre fire (Meshik River, Fire Code: CL4Z) in Aniakchak National Monument & Preserve during May. This was the first fire ever recorded in Aniakchak. But summer rains and cool temperatures slowed the fire season and only one other fire was recorded in the Alaska National Parks, a 12 acre fire in Lake Clark National Park & Preserve. Statewide only 266,268 acres were burned (Alaska Situation Report 2006), down significantly from the 4.3 million acres burned in 2005.

The purpose of the Alaska Region Fire Ecology program is to obtain baseline data on the natural variability of fire on the landscape, to monitor the effects of fire or mechanical treatments on vegetation, fuels and soil parameters, and to provide fire ecology information to fire managers, other park staff, and the public. Accomplishments this year included the re-measurement of 16 fire effects plots (YUCH (4), DENA (10) and WRST (2)) and 15 hazard fuels monitoring plots in Denali. The regional fire ecologist (Jennifer Allen) and fire communication/prevention specialist (Morgan Miller) coordinated the re-measurement and analysis of fire effects plots with the Eagle school, and added 3 more plots in the 2004 Woodchopper Fire near Coal Cr in YUCH.

Fire ecology outreach for this year included the following: 2 posters of the Denali hazard fuels monitoring, presentation of Denali fire effects monitoring, a technical report on Noatak Tundra Fire monitoring written (Racine, Allen and Dennis 2006), and various presentations to parks, fire management, and inventory and monitoring networks (See Appendix 1 for list of presentations/reports). In addition, the regional fire ecologist was involved in 5 NPS and Interagency committees and task groups, instructed for RX-310 (AK) and RX-510 (NAFRI), assisted with BAER invasive plants planning, collaborated on 3 successfully funded research proposals, and received funding for a Tundra Fire History Study in Noatak and Bering Land Bridge from the Joint Fire Science Program.

Management Objectives and Monitoring Results 2006

The objectives for monitoring varied for the projects monitored in 2006. For the Denali hazard fuels plots we established plots to determine if prescription parameters were met, assess changes in fire behavior as a result of fuels treatments through the use of fire behavior models, and identify short and long-term treatment effects on vegetation and soil parameters. The purpose of the wildland fire effects plots in Yukon-Charley Rivers, Denali and Wrangell-St. Elias were to determine successional trends, assess impacts of repeat burns, and survey for invasive plants. The results of some of the monitoring are shown in Table 1 and the numbers of plots monitored in 2006 are shown in Table 2.

Hazard Fuels Reduction Monitoring

The Denali Hazard Fuels Reduction monitoring results are shown for pre-thinning and 1-yr post thinning (Table 1). In 2004 the Denali National Park fire management implemented a hazard fuels reduction project to create defensible space around the headquarters and front country structures in order to minimize property damage and improve safety for employees, visitors and fire crews. The hazard fuels prescription called for the thinning and limbing of vegetation in two zones within the treatment area, based upon Firewise standards. Zone 2 included an area 30 feet out from the structure in which combustible vegetation such as trees were to be thinned to a 30 foot spacing (~50 trees/acre) and limbed, and tall shrubs were removed. Zone 3 extends an additional 70 feet from Zone 2 for a minimum distance of 100 feet from each structure. Trees were to be thinned to a 20 foot spacing (~110 trees/acre) and limbed up to 6 feet in Zone 3. Fire Management staff installed pre-treatment plots in 2003 and post-treatments plots in 2005. The results of the monitoring show that the spruce tree densities in the Zone 2 (closest to the structures) have been reduced from an average of 881 trees/acre to 205 trees/acre, and trees in Zone 3 were thinned from an average of 997 trees/acre to 379 trees/acre (See Table 1). The results indicate that we thinned less than planned; but fire behavior modeling indicated that crown fire was still reduced with the resulting tree densities. In the fall results of these and other monitoring studies were presented to the fire staff in Alaska. An outcome of the monitoring and discussions is that fire management officers and fuels specialists plan to modify some of the hazard fuels treatment parameters.



Figure 1. Example of thinning in Denali Front Country. Left photo is pre-thinning in 2003 and right photo is post-thinning in 2005, Zone 3 (NPS photos).

Table 1. Management Objectives and Monitoring Results 2006.

Monitoring Unit	Management Objectives	Monitoring Results (80% confidence interval)	Objective Achieved?															
DENA-HZF: Mechanical thinning, White spruce/ Deciduous	Treated spruce density: Zone 2: < 50 spruce tree/ac Zone 3: <110 spruce tree/ac	<i>Density of Spruce Trees/Acre</i> <table><tr><th><i>Treatment</i></th><th><i>n</i></th><th><i>Pre-Thinning</i></th><th><i>1-yr Post Thinning</i></th></tr><tr><td>Zone 2</td><td>5</td><td>581-1180</td><td>76-334</td></tr><tr><td>Zone 3</td><td>11</td><td>708-1285</td><td>259-449</td></tr></table>	<i>Treatment</i>	<i>n</i>	<i>Pre-Thinning</i>	<i>1-yr Post Thinning</i>	Zone 2	5	581-1180	76-334	Zone 3	11	708-1285	259-449	No – See text. High variability.			
	<i>Treatment</i>	<i>n</i>	<i>Pre-Thinning</i>	<i>1-yr Post Thinning</i>														
Zone 2	5	581-1180	76-334															
Zone 3	11	708-1285	259-449															
	Reduce crown fire potential to zero	Zone 3 - Modeled fire behavior using FMAPlus, Fuel Model 9, 90 th % weather. Assumed: Post-treatment Crown Base Height = 4 ft. <table><tr><th></th><th><i>Pre-treatment</i></th><th><i>Post-treatment</i></th></tr><tr><td><i>Crown Fire Type</i></td><td>Passive</td><td>Surface</td></tr><tr><td><i>Crown ROS</i></td><td>4.8 ch/hr</td><td>--</td></tr><tr><td><i>ROS</i></td><td>2.3 ch/hr</td><td>4.7 ch/hr</td></tr><tr><td><i>Flame length</i></td><td>1.8 ft</td><td>2.3 ft</td></tr></table>		<i>Pre-treatment</i>	<i>Post-treatment</i>	<i>Crown Fire Type</i>	Passive	Surface	<i>Crown ROS</i>	4.8 ch/hr	--	<i>ROS</i>	2.3 ch/hr	4.7 ch/hr	<i>Flame length</i>	1.8 ft	2.3 ft	Yes – Crown base height needs to be re-assessed.
	<i>Pre-treatment</i>	<i>Post-treatment</i>																
<i>Crown Fire Type</i>	Passive	Surface																
<i>Crown ROS</i>	4.8 ch/hr	--																
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DENA-WFU: Backcountry fire effects plots – Black Spruce	Determine common successional phases for sites burned 3-19 years previously.	<i>Percent of the 35 burned plots:</i> <i>26% Low shrub-tussock</i> <i>17% Low shrub birch-ericaceous</i> <i>17% Deciduous – Spruce Mix</i>	NA															

Table 2. Fire Effects Plot Workload 2006. The number of fire and fuels treatment plot measured in 2006. Most of the monitoring units are established by projects.

Park	Monitoring Unit Project Vegetation Types	Type of Plot (FMH, photo point, other)	Pre-burn	Immed. Post	Postburn/ Post Treatment (1-20 yrs)	Total Plots
Denali	White spruce	HZF Mechanical thinning			12	27
Denali	Black Spruce	WFU monitoring (Videography)			10	40
Yukon-Charley Rivers	Black spruce & Deciduous (BEPA)	WFU monitoring (Pre/Post Plots)			4	7
Wrangell-St. Elias NP	White & Black spruce	WFU monitoring (1980's paired plots)			2	85
Total					18	159



Figure 2. Fire plots established in 2005 in Denali NP/P were burned later in the season by the 2005 High Power Fire. The left photo shows spruce-aspen regeneration 15 years after a fire (1986 fire A185) that was measured in 2005. The site burned a few weeks after establishment and the right photo shows the site in 2006 (NPS photos).

Wildland Fire Effects Monitoring

Denali National Park & Preserve - VDM

The purposes of the Denali videography/moose pilot study was to test the use of videography as a method for fuels and landcover classification, validate successional patterns compared to burn severity, and identify fire effects on moose browse under varying age of burn. Forty-three plots were measured in 2005, during that summer 10 of the plots were burned again by the 114,000 acre Highpower Creek fire. In order to determine the impacts of shortened fire return intervals on vegetation, these plots were re-measured in 2006 (Figure 2). Understanding the natural variability related to fire is necessary in order to identify potential abnormal effects associated with long-term climate change or management activities.

Findings:

- Heterogeneous vegetation post fire
- Increased shrub cover 15 yr post fire
- Increased moose browse availability 15 yr post fire
- Increased fire return intervals results in low tree seedlings

Yukon-Charley Rivers National Preserve – Pre/Post Plots

Four of the seven fire effects plots established in the 2004 Woodchopper Fire were re-measured in 2006. The goals of the study are to 1) validate predictive fire models used by fire managers, 2) determine the vegetative and structural components that are important to fuel models, and 3) identify fire effects under varying burn severity levels. For most of the plots we found

insignificant changes in the vegetation between the first and second year reading. As a result we are recommending re-measuring these plots 5 years post burn date (See Figure 3).

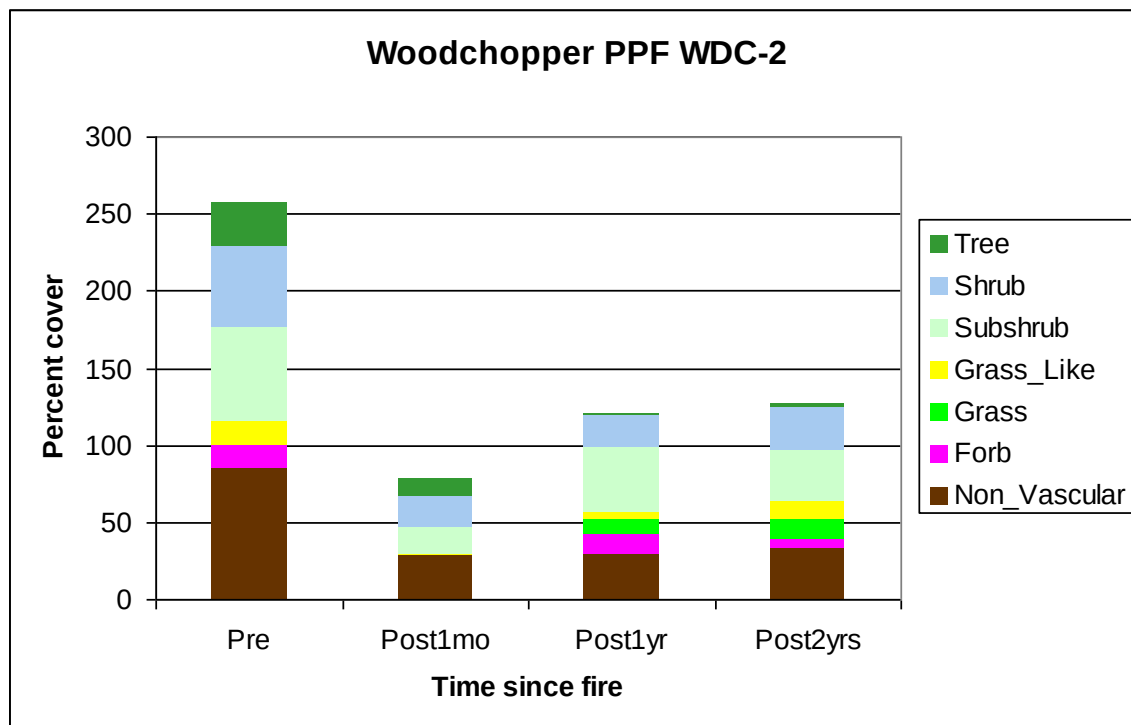


Figure 2. Percent cover by life form for four different monitoring times since fire.

Wrangell-St. Elias National Park & Preserve – Paired Plots

The fire effects paired plot project began in 1981 under the direction of Gary Ahlstrand – NPS Alaska Regional Research Ecologist, over 500 plots were installed throughout 9 parks. During 2006 one set of permanently marked plot pairs in Wrangell's was relocated and monitored (1986 Boulder Creek – BCB/BCA). The purposes of re-measuring these plots are to determine the vegetative and fuels components that have changed over time since fire and to utilize data to develop fire successional models to update landcover vegetation maps and fuels maps. This small sample size does not provide enough information to report on for vegetation succession, however we found that the 1986 burn plot increased in shrub cover from <1% immediately post burn to 41% twenty years post burn.

Fire Ecology Staffing 2006

The Alaska NPS fire ecology program does not have funded fire effect monitoring crews. The monitoring work is accomplished by the NPS Fire/Fuels technicians and staff, under the guidance of the Regional Fire Ecologist. The NPS Western and Eastern Area Fire Management Zones have multi-disciplinary forestry technicians and fuels technicians that provide a part of their time to fire ecology projects. During 2006 a seasonal biological technician was hired to assist the Fire Ecology program. Table 3 provides the staffing of the fuels and forestry

technicians that were involved in the fire ecology project work. The sharing of resources has worked well in general.

Table 3. *Estimated time allocated by fuels and forestry technicians from Eastern and Western Area fire management programs for Fuels and Fire Ecology work. Time includes field prep, field work, and data entry.*

Fuels/Forestry Technicians	GS-Level	#PP for 2006
Western –Supervisory Forest Tech - Weddle	PLFT GS-7	2.5
Western- Helicopter Manager - Reynar	PLFT GS-6	2
Western – Fuels tech	Temp GS-5	1
Western – Fuels tech	Temp GS-5	2
Western – Fuels tech	Temp GS-5	2
Eastern – Fuels tech	Temp GS-6	2
Eastern – Bio tech	Temp GS-5	6

Regional Fire Ecologist Focus Areas/Accomplishments

Tables 4 and 5 provide summaries of the Regional Fire Ecologists focus areas and accomplishments.

Table 4. *Regional fire ecologist focus areas generalized.*

Category	Percent Time	Focus Areas
Planning	8%	RM-18, CE, Research Permits, Contracts/Agreements, Field Logistics, BAER reports
Presentations	22%	Posters and presentations at scientific, park, and interagency meetings, Reports, Instructor for RX-310 and RX-510.
NPS Meetings/ task groups	16%	FESC, FEAT, Adaptive Management, RM-18 Chapter 11, I&M tech committee & workshops
Interagency work	10%	LANDFIRE, AWFCG Research Committee, AWFCG Fire Effects Task Group
Fire Assignments	0%	
Research	15%	JFSP, NASA
Data entry	3%	Estimated amount of time spent entering data from paper to PC
Data Conversion	0%	
Data analysis	13%	Several projects data were analyzed
Supervision/Admin	7%	Training field crew, field logistics, field work
Training	5%	Fire training, Fuels Software Training
Miscellaneous		

Table 5. Examples of Fire Ecologist Accomplishments/Focus Area

Category	Percent Time	Accomplishments/Focus Areas
Planning	8%	• Wrote cooperative agreement with University of Illinois for Joint Fire Science funding. • Submitted compliance and research permits for 2 projects • Reviewed and made comments on RM-18, Chapter 11 • Field logistics for monitoring • ARCN vital sign protocol development
Presentations/ Reports	22%	• DENA Hazard Fuels Monitoring poster • DENA Fire Effects Monitoring – AK Park Science Symposium • Overview of AK Fire Ecology Program (Park, National Office Visit, Seasonal Training) • Fire ecology & Fuels Monitoring Results (EAAR) – NPS Fire Management Staff • I&M presentations -ARCN Tundra Fire, CAKN Monitoring and Fire • Noatak Tundra Fire Monitoring Technical Report • AK Interagency Monitoring presentation – Fire Ecology Congress, San Diego • RX-510 faculty • RX-310 faculty
NPS Meetings/ task groups	16%	• NPS Fire Ecology Steering Committee • NPS Adaptive management task group • NPS Effectiveness monitoring task group (Task group leader) • NPS RM-18 Chapter 11 re-write task group • I&M Arctic Network technical committee • I&M Central Alaska Network – advisory role
Interagency work	10%	• AWFCG Fire Research Committee (Chair) • AWFCG Fire Effects Task Group • Alaska LANDFIRE committee • AK burn severity working group
Fire	0%	• No fire assignments
Research	15%	• Designed and input data for the Alaska Fire Research Plot – ArcIMS web page as part of JFSP project (PI: Olson, FireHouse). • Federal lead on JFSP Tundra Fire History study – wrote CESU and planning field study sites (PI: Hu, Lake Coring). • Met with NASA invasive plant prediction model PIs in Alaska • Collaborator/Co-PI on 3 JFSP and 1 NASA project
Data entry	3%	• Time spent developing templates and instructions for data entry • Data QC
Data analysis	13%	• Denali hazard fuels plots • Denali videography wildland fire effects plots • Noatak tundra fire study (Racine)
Supervision/Ad min	7%	• Hiring of GS-5 • Training field crews • Determined field logistics • Travel and time paperwork
Training	5%	• RX-510, FCCS, I-Suite refresher, Fire Line Refresher

Appendix 1.

List of presentations, posters, and reports completed in 2006

Presentations

“Fire and Fire Effects Monitoring Central Alaska Network”. Central Alaska Network Inventory & Monitoring 2006 summary meeting. Glennallen, AK. May 23, 2006.

“Fire Ecology & Fuels Monitoring Program”. Denali Seasonal Training. Denali Park, AK. May 24, 2006.

“NPS Alaska Region Fire Ecology Program”.

- NPS Alaska Fire meeting with NIFC. Fairbanks, AK. June 6, 2006.
- Yukon-Charley Rivers and Gates of the Arctic - All Employees Meeting. Fairbanks, AK. October 2006.
- NPS Alaska Fall Fire Review. Anchorage, AK. October 2006

Allen, J.L. and L. Weddle. 2006. “Post fire vegetation and moose browse utilization on recent fires in Denali”. Alaska Park Science Symposium. Denali Park, AK. September 13, 2006.

Allen, J.L., K. Murphy, and R. Jandt. 2006. “Interagency fire management & monitoring in Alaska”. Fire Ecology & Management Congress. San Diego, AK. November 2006.

“Developing an Interagency Monitoring Program and Monitoring Techniques at Denali NP Alaska”. RX-510 Unit IIIIE. Tucson, AZ. February 2006.

“Monitoring Fire Effects: goals and objectives”. RX-310 Unit 3B. Fairbanks, AK. September 2006.

Posters

Weddle, L., J.L. Allen, and M. Miller. 2006. Poster. *Adaptive Management in the Denali National Park and Preserve Wildland Fire Urban Interface*. Alaska Park Science Symposium. Denali Park, AK. September 13, 2006.

Weddle, L., J.L. Allen, and M. Miller. 2006. Poster. *Adaptive Management in the Denali National Park and Preserve Wildland Fire Urban Interface*. National Park Service 2006 Wildland Fire Workshop. Chandler, AZ. December 2006.

Reports

Allen, J.L. 2006. *Annual report on vital signs monitoring of the extent, severity, and effects of wildland fire in Yukon-Charley NP, Denali NP/P & Wrangell-St. Elias NP/P*. Central Alaska Network Inventory and Monitoring Annual Reports.

Racine, C., J. L. Allen, and J. G. Dennis. 2006. *Long-term monitoring of vegetation change following tundra fires in Noatak National Preserve, Alaska*. Arctic Network of Parks Inventory and Monitoring Program, National Park Service, Alaska Region. Report no. NPS/AKRARC/NRTR-2006/02.

Appendix 2

A list of current and past fire monitoring projects in the Alaska region since 2002. Progress in analyzing and reporting on the projects are indicated with an X for completed.

Title	Purpose	# Plots	Data Entry	Analysis	Report	Repeat Monitoring
DENA hazard fuels plots	Effectiveness and effects of fuels thinning	27	X	X	Presentations	Yes
YUCH hazard fuels plots	Effectiveness and effects of fuels thinning	36	X	X		No
DENA fire effects & moose	Vegetation mapping, succession, moose browse	40	X	X	Presentations	Selected plots
YUCH historic fire effects (Paired Plots)	Succession, fire effects	5	X			Yes
YUCH pre/post fire effects	Succession, fire effects, fuel moisture	6	X	Partial		Yes
NOAT pre/post fire effects	Succession, WFU fire effects	6	X			Yes
NOAT Racine fire plots	Succession, WFU fire effects	8	X	X	X	Yes
Burn Severity	Field validation of burn severity mapping: NOAT, BELA, YUCH, DENA	286	X	X	X	No