



**National Park Service
Alaska Region
Fire Ecology Annual Report
Calendar Year 2007**

Summary

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. During 2007 the NPS Alaska Fire Ecology program assessed vegetation and environmental changes at 55 Composite Burn Index (CBI) plots from 2000 and 2001 fires in Denali, re-measured 6 permanent wildland fire use plots in Noatak, re-measured 15 permanent fire effects plots from a 1999 fire in Yukon-Charley Rivers NP, coordinated a lake coring project, and participated in several interagency projects and meetings. The science education program with the Community of Eagle School continued this year; fourteen students and NPS staff boated to Coal Cr in Yukon-Charley Rivers NP and learned about fire effects, cultural resources, and water quality. In addition a peer-reviewed manuscript titled “Assessing the differenced Normalized Burn Ratio’s ability to map burn severity in the boreal forest and tundra ecosystems of Alaska’s national parks” was submitted to the International Journal of Wildland Fire and will be published in 2008.



Photo 1: Yukon-Charley Rivers NP, Woodchopper 2 Fire, June 19, 2007

Fire Season

Under the Alaska Interagency Fire Management Plan over 75% of National Park Service lands are designated as Limited Suppression Option, where wildland fires are allowed to burn within predetermined areas. During 2007, Alaska NPS had a total of 37 wildland fires and 32,409 acres burned in seven park units (BELA, DENA, GAAR, LACL, NOAT, YUCH, WRST). Of the total area burned, 27,265 acres were designated as Wildland Fire Use and 5,144 acres were suppression fires.

Monitoring

NOAT Uvgoon WFU plots

In 2004, NPS fire staff established six plots after the 2004 Uvgoon Creek fire (Fire #127) in Noatak P&Pr. These plots were setup post fire as 3 pairs of burned and unburned tussock tundra plots. The plots were re-measured in 2007. Access to the plots was by helicopter. Plot data collected included: general site descriptions, photographs of plot, point intercept every 0.5-m along the 30-m transect to measure vegetation and ground percent cover, tree density (if present) by diameter size class and species on 30-m x1-m belt transects, and thaw depths at 10 points along the 30-m transect. Data entry has been on-hold until the FEAT dataset is converted to FFI.

DENA - Landcover-CBI WFU Plots

In July of 2007 we installed 55 fire/vegetation plots in Denali. Plot locations were based on the 2002 CBI plots established on 4 fires in Denali that burned in 2000 and 2001. The purpose was to determine 5 yr succession patterns under varying burn severities. Plot methods utilized AWFCG FETG plot methods. We plan to use the data to develop a landcover change matrix for vegetation and fuels mapping purposes. Data entry has been on hold until a completed version of FFI was available.



Photos 2 and 3: Burned high severity black spruce plot from the 2001 Herron River Fire in Denali National P&Pr, 1 year post fire and six years post fire. (NPS photos)

YUCH – Witch Fire 1999 Plots.

During the 1999 fire season approximately 120 thousand acres within the Yukon-Charley River National Preserve were burned by wildfires. In September 1999 fifteen post-fire plots were established in the Witch Fire (B242) to look at long term changes due to fire in a black spruce dominated ecosystem. During 2007, the plots were re-measured. Data entry has been completed and analysis of the data set is scheduled for 2008. The goal of this study was to document post fire changes in vegetation composition of boreal forest habitats along the Yukon River within the Preserve. The project objectives are as follows:

- 1) To monitor vegetation recolonization rates and succession;
- 2) To evaluate fire fuel types and quantity for fire management purposes;
- 3) To determine post fire changes in permafrost depth;

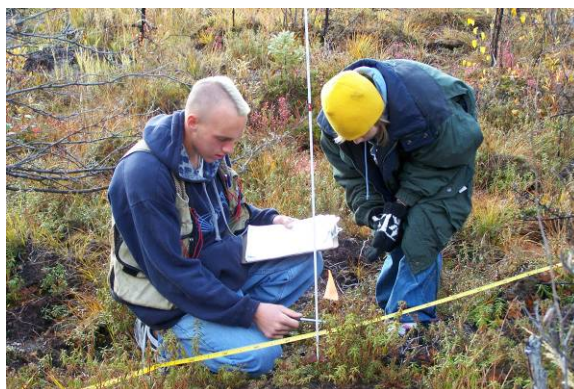
Table 1. Fire Effects Plot Workload 2007

Park	Monitoring Unit	Type of Plot (FMH, photo point, other)	Pre-burn	Immed. Post	Postburn (1-20 yrs)	Total Plots
Yukon-Charley Rivers NP	1999 Witch Fire	WFU - Other – 20-m diam. plot			15	15
Denali NP/P	2000-2001 CBI (CBI-LC)	WFU - Other - FETG			55	55
Noatak NP	2004 Uvgoon Fire	WFU - Other - FETG			6	6
Total					76	

Collaboration

Eagle School – Fire Ecology Program

We facilitated and continued a field based fire effects education program with the Eagle Community School from Eagle, AK. In September of 2007, a group of fourteen students and NPS staff boated to Coal Creek in Yukon-Charley Rivers NP to study fire effects, cultural resources and water quality. Three fire effects plots from the 2004 Woodchopper Fire were re-measured. In addition, three plots that were established in 2004 in the King Creek fire along the Taylor Highway were also re-measured by the school group.



40 Fuel Model Guidebook

In April 2007, Brad Cella (Regional FMO) organized an interagency meeting of fire behavior, fuel, fire ecology and GIS specialists to develop a standard interagency fuels crosswalk that could be applied statewide by various disciplines. The group met in Anchorage and worked with Joe Scott from Systems for Environmental Management (SEM) to assign fuel models to vegetation classifications used statewide. For each vegetation class, the participants discussed the fuel characteristics, vegetation structure and fire behavior. The crosswalk produced by the workshop includes 56 distinct fuel types; it was distributed for review during the summer of 2007. NPS has funded the completion of the fuel model guide book and is expected to be produced in 2008.

Inventory and Monitoring Networks & Fire

The Regional Fire Ecologist served as a Technical Committee member on the Arctic Network Inventory & Monitoring program (ARCN). She provided input and wrote sections of the Arctic Network I&M annual report. Prepared and wrote ‘Protocol Development Summaries’ for Fire Extent, Severity and Effects monitoring, and Vegetation Monitoring protocols for ARCN.

Research

Lake Coring Tundra Fire History (NOAT, BELA)



In order to address the limited understanding of fire history and fire regimes in tundra ecosystems a collaborative proposal was developed by the National Park Service Alaska Regional Fire Ecologist (Jennifer Allen), University of Illinois (Dr. Feng Sheng Hu), Montana State University (Dr. Phil Higuera) and University of Alaska (Dr. Scott Rupp) and funded by the Interagency Joint Fire Science Program (JFSP) in 2006. This study capitalizes on the ability to reconstruct both vegetation and fire history using lake-sediment records from the past 5,000 years. The project focuses on two

tundra types across the Seward Peninsula (Bering Land Bridge National Preserve) and within the Noatak National Preserve. During 2007 field work in Noatak was completed by Phil Higuera (MSU) (shown in photo), Melissa Chipman (UI), Alaska NPS Western Area Fire Management staff and regional fire ecologist. We surveyed 80 lakes using a fixed wing to select lakes that were greater than 5 m deep and smaller than 20 ha in size. Four lakes were selected and cored between the Kelly River and east to the Grand Canyon area of the Noatak River. Lakes were accessed by helicopter and a crew of 3-4 people camped at each lake for 2-3 days. Preliminary results suggest that short fire return intervals (<100 yrs) can be sustained in tundra ecosystems of Noatak, although current mean fire return intervals range from 112 to 247 years. This work will continue in 2008 in Bering Land Bridge NP.

Modeling Future Fire Regimes

Fire and land management goals are hindered by the limited understanding of how future climate changes could impact fire regimes within National Park lands in Alaska. Understanding fire's linkage to climate and influence on land cover, as well as associated feedbacks, can provide an avenue future planning. Dr. Scott Rupp (University of Alaska-Fairbanks) has developed the computer model BorealALFRESCO to simulate the response of vegetation to changes in fire management, ignition frequency, and climate. The BorealALFRESCO model is a spatially explicit, frame-based model, capable of integrating climate-change scenarios within simulations of fire-vegetation interactions across time scales of years to centuries and spatial scales of hectares to 1000s of square kilometers. A CESU agreement was written to use BorealALFRESCO to run climate change/fire simulations for the following National Parks: Denali NP/P, Yukon-Charley Rivers NP, Gates of the Arctic NP/P, Bering Land Bridge NP, Wrangell-St. Elias NP/P. Three climate change scenarios will be depicted including 1) no change; 2) moderate-high change as represented by the IPCC A2 emission scenario; and 3) moderate-low change as represented by the IPCC B2 emissions scenario. GIS layers and maps that depict the predicted changes of vegetation states, stand ages, and fires at 25, 50, 75 and 100 year increments under each climate scenario will be developed for each park.

NASA Invasives and Burned Lands

A project, entitled “Using NASA’s Invasive Species Forecasting System to support National Park Service decisions on fire management activities and invasive plant species control,” was initiated in FY2006 to investigate the relationship between invasive plants and fire for three NPS areas: Yellowstone/Grand Teton NPs, Sequoia/Kings Canyon NPs, and Alaska NPS units. Three Alaska parks were selected for this analysis – Denali NP&Pr, Gates of the Arctic NP&Pr, and Yukon-Charley Rivers NPr. The purpose of the project is to predict vulnerable burned lands and suitable habitat characteristics for white sweetclover (*Melilotus alba*), bird vetch (*Vicia cracca*), and narrowleaf hawksbeard (*Crepis tectorum*) susceptibility in Interior Alaska. Although fires regularly occur in these parks, due to the low level of propagule pressure (existing invasive plants) near the fires in these parks we needed to improve our field data to include areas that had propagule pressure from invasive plants. In 2007 we wrote a CESU agreement with the University of Alaska to survey along road systems that had recent fire activity. The results of this survey are being used to generate new prediction models for invasives.

Highway Surveyed	No Invasives Present	Invasives Present	Total Number Sites Surveyed
Dalton Highway	153	19	172
Parks Highway	14	8	22
Stees Highway	28	0	28

Fire Ecology Staffing

The Alaska NPS fire ecology program does not have a funded fire effect monitoring crew. 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 Fire Management Areas have multi-disciplinary forestry technicians and fuels technicians that provide a part of their time to fire ecology projects. During 2007 a seasonal biological technician was hired to assist the Fire Ecology program. Table 2 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 2. Fire Ecology Staffing 2007

Monitor	Starting Date	Ending Date	# of Pay Periods	Training and Development
Jennifer Mitchell	4/30/07	12/21/07	17	Fireline refresher, completed HECM taskbook
Fuels tech GS-5			2	From Western Area Fire Management
Fuels tech GS-4			3	From Western Area Fire Management

Management Objectives and Monitoring Results 2007

During 2007 a majority of data entry work was focused on entering the 1980s fire effects data (Paired Plots). This data set contains more than 500 plots and has important fire effects data from across the parks in Alaska. In addition we completed the final analyses of the burn severity data sets for the preparation of a manuscript. Overall we found that the remotely sensed differenced Normalized Burn Ratio (dNBR) values that were obtained from ten fires occurring in or near four national park areas in Alaska were strongly correlated to field measures of severity in both boreal forest and tundra vegetation.

The following presentations and reports were completed during 2007.

- “Fire Mediated Changes in Tundra: 24 yr perspective” Arctic Network of Parks Inventory and Monitoring Program, State of the Arctic Parks Workshop, February 16, 2007
- “Developing an Interagency Monitoring Program and Monitoring Techniques at Denali NP Alaska”. RX-510 Unit IIIE. Tucson, AZ. February 2007.
- “Fire Ecology & Fuels Monitoring Program” Alaska Fire Seasonal Training. Fairbanks, AK. May 21, 2007.
- “NPS Alaska Region Fire Ecology Program” NPS Alaska Fall Fire Review. Anchorage, AK. October 2007
- Allen, J.L. and Sorbel, B. In review. Assessing landscape scale burn severity of wildland fires in Alaska National Parks using the differenced Normalized Burn Ratio. International Journal of Wildland Fire.
- Alaska Interagency Fire Effects Task Group, 2007. Fire Effects Monitoring Protocol (version 1.0). Editors: J. Allen, K. Murphy and R. Jandt. 43 pp.

Regional Fire Ecologist Focus Areas/Accomplishments

Tables 3 and 4 provide summaries of the Regional Fire Ecologists focus areas and accomplishments for the calendar year of 2007.

Table 3. *Regional fire ecologist focus areas generalized.*

Category	Percent Time	Focus Areas
Planning	12%	CE, Research Permits, Contracts/Agreements, Field Logistics
Presentations	10%	Presentations at scientific, park, and interagency meetings, Publications, Reports, Instructor for RX-510.
NPS Meetings/ task groups	13%	FESC, I&M tech committee & workshops, AKRO NPS Fire meetings
Interagency work	17%	LANDFIRE, AWFCG Research Committee, AWFCG Fire Effects Task Group, AK 40 Fuel Model Guidebook production
Fire Assignments	7%	HELB and HECM assignments
Research	13%	JFSP Tundra Fire History, JFSP Fire History, NASA Invasives Project
Data entry	2%	Estimated amount of time spent entering data from paper to PC
Data Conversion	2%	Converting FEAT data and NPS AK Paired Plot data set
Data analysis	3%	Burn severity and Noatak Tundra fire plots
Supervision/Admin	16%	Training field crew, field logistics, field work, hiring
Training	5%	Fire training, Fuels Software Training

**2007 Focus Area Time Allocation
NPS Alaska Regional Fire Ecologist**

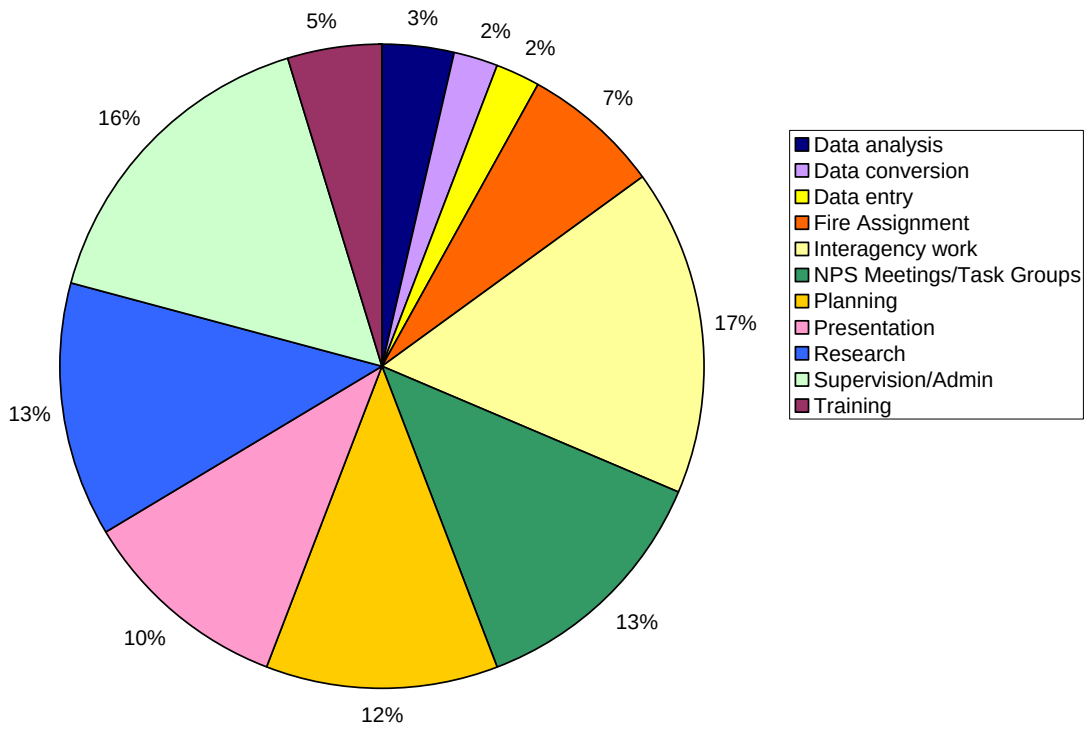


Table 4. Examples of Fire Ecologist Accomplishments/Focus Area

Category	Percent Time	Accomplishments/Focus Areas
Planning	12%	• Wrote cooperative agreement with University of Alaska Fairbanks for Fire Regime study with Dr. Scott Rupp. • Submitted compliance and research permits for 2 projects • Field logistics for monitoring • ARCN vital sign protocol development
Presentations/ Reports	10%	• Preparation of burn severity (dNBR/CBI) manuscript in International Journal of Wildland Fire • Overview of AK Fire Ecology Program (Park, Seasonal Training) • I&M presentations -ARCN Tundra Fire • RX-510 faculty
NPS Meetings/ task groups	13%	• NPS Fire Ecology Steering Committee • NPS Alaska Fire Management meetings • I&M Arctic Network technical committee • I&M Central Alaska Network – advisory role
Interagency work	17%	• 40 Fuel Model Workbook for Alaska • AWFCG Fire Research Committee • AWFCG Fire Effects Task Group • LANDFIRE workshops • AK burn severity working group
Fire	7%	• Helicopter Boss and HECM assignments
Research	13%	• Federal lead on JFSP Tundra Fire History study – wrote CESU and planning field study sites (PI: Hu, Lake Coring). • CESU for NASA invasive plant surveys in Alaska • Collaborator/Co-PI on 2 JFSP and 1 NASA project
Data entry	2%	• Paired plot data set, FFI conversion • Data QC
Data analysis	3%	• CBI and dNBR vegetation analysis • Noatak tundra fire study (Racine)
Supervision/Admin	16%	• Hiring • Training field crews • Determined field logistics • Travel and time paperwork
Training	5%	• RX-510, I-Suite refresher, Fire Line Refresher