



**National Park Service  
Alaska Region  
Fire Ecology Annual Report  
Calendar Year 2009**

**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 2009 the NPS Alaska Fire Ecology program re-measured hazard fuel reduction plots in Denali NP, established two mechanical thinning monitoring projects in Wrangell-St. Elias NP, continued with the 3<sup>rd</sup> decade of monitoring post-fire tundra plots in Bering Land Bridge, and participated in several interagency projects and meetings. The science education program with the Community of Eagle School continued this year with a new twist; we established several post-flood plots near Yukon-Charley Rivers NP in response to the recent flooding of the community.

**2009 Fire Season**



**Figure 1:** *Wrangell-St. Elias NP, Chakina Fire, July 30, 2009*

Although the 2009 fire season started out cool and rainy, fire weather was intense in July and August which resulted in a very active fire season. In Alaska, there were 522 recorded fires with 2,951,582 acres burned. Alaska NPS had a total of 26 wildland fires, with 155,898 acres burned within four park boundaries (DENA, NOAT, WRST, and YUCH). This year was a stark contrast to the 2008 NPS fire season which had a total of 8 wildland fires and 1,486 acres burned. A striking example of this year's fire behavior was the Chakina Fire (Figure 1) which was the only 2009 NPS fire that required

suppression action. The Chakina fire was the largest fire (56,413 acres) recorded within the Wrangell-St. Elias Park boundary since

the inception of the park in 1981.

## Projects

### Denali Hazard Fuels Monitoring: Post-thinning Monitoring at Frontcountry Structures



**Figure 2.** Reduced shrub cover, and increased graminoid and forb cover resulting from thinning treatment.

zones, although not to the prescribed extent (Table 3). It is interesting to note that a number of large trees in thinned areas succumbed to a 2009 windstorm. This raised the question of whether trees in the thinned areas were more susceptible to winds due to a sudden increase in exposure. There are no study results to directly support this; nevertheless we recommend that future thinning treatments are conducted incrementally, to ensure gradual tree acclimatization to exposure. We detected a significant post-thinning increase in graminoid cover (esp. *Calamagrostis canadensis*) (Figures 2 and 3) which is intriguing since *C. canadensis* can present a fire hazard where dead grass accumulates. More results from this study, including discussion of the post-thinning increase in active layer depth and forb cover, are compiled in the 2010 Report.

The focus of the Alaska NPS Fire Ecology Program is to utilize monitoring techniques to assess the condition of vegetation and fuels and document the effects of natural and human-applied treatments. A primary application is the Denali Hazard Fuels Reduction monitoring study. The purpose of the thinning treatment was to create defensible space around park frontcountry infrastructure and to diminish wildland fire risk, while minimizing visual and ecological impacts. Accordingly, two of the primary goals of this study are; 1) to determine if prescription parameters were met and 2) to identify treatment effects on vegetation and soil. Monitoring plots were established within thinning treatment zones. The most intensive thinning treatment was applied closest to buildings; Zone 2 (High thinning: 10-20 ft from structure) and Zone 3 (Moderate thinning: 55-73 ft) (See Table 3 for specific Monitoring Objectives and Monitoring Results for Tree Density and Shrub Cover). To date plots have been visited 3 times; pre-thinning in 2003, and post thinning in 2005 and 2009. The predominant vegetation classes, before and after the thinning treatment, was white spruce dominated Open Needleleaf and Needleleaf Woodland.

The tall shrub cover reduction prescription was met in the moderately thinned Zone 3 (Table 3) and tree density was substantially decreased in both treatment

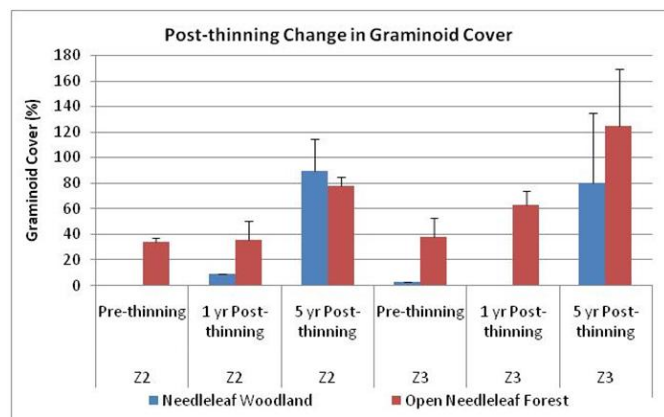


**Figure 3.** Increased graminoid % cover in post-thinning needleleaf forest community types. Error bars indicate standard error ( $p < 0.05$ ).

### Wrangell-St. Elias NPP Hazard Fuels Monitoring: Pre-Thinning Monitoring at Headquarters

In anticipation of the 2010 mechanical thinning of 18 acres near Wrangell-St. Elias NPP Headquarters structures the Regional Fire Ecology Program established 18 monitoring plots (6 control plots and 12 treatment plots) in June 2009. Plots were established in a variety of forest communities including Open Quaking Aspen, Open and Closed Quaking Aspen and Spruce, Open Black Spruce, Open Balsam Poplar and Spruce, as well as Open, Closed and Woodland White Spruce. Monitoring parameters included: Ocular Vegetation and Fuels Cover Estimates, Tree Measurements, Tree Density, and Seedling Density. Based on results from Denali Headquarters post-thinning monitoring, the Fire Ecology Program has advised implementation of a gradual thinning (over the course of up to 5 years). Following the thinning process the monitoring plots will be re-measured for baseline effects of thinning on forest structure. This data has already been used to develop stand models of what thinning would look like and was presented to the Wrangell-St. Elias NP staff in July, 2009 (Fig. 4a and 2b).

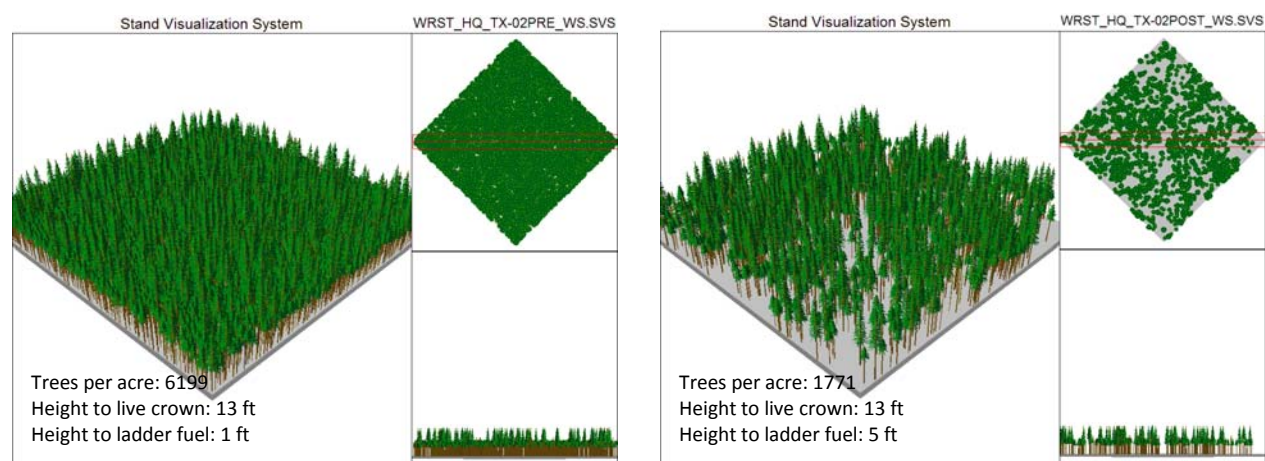


**Figure 4(a and b).** a. Pre-thinning stand model using actual tree densities (6199 trees/acre) from plot data to model the dense spruce stands around the WRST headquarters area. b. An illustration of how the stand may look post thinning, at 5' foot crown thinning prescription (1771 trees/acre).

### Wrangell-St. Elias NPP Hazard Fuels Monitoring: Pre-thinning monitoring at Smith Park Border

#### Property:

In May 2009, prior to the July 2009 mechanical thinning treatment of 3.4 acres of parkland adjacent to Susan Smith's private property, NPS Regional fire ecologists and fire personnel established 13 monitoring plots (3 control plots and 11 treatment plots). Prior to thinning forest communities included Open Spruce and Birch, Open Spruce and Balsam Poplar, White Spruce Woodland, Open White Spruce, and Open Black Spruce. Parameters measured included: Ocular Vegetation and Fuels Cover Estimates, Tree Density, and Brown's Transects for Woody Fuels. In 2010 the plots will be revisited and the same parameters measured for baseline information on treatment effects and evaluation of whether project objectives were met.

#### Research

### Alaska Fire Science Information Consortium: Pilot Year

In 2009 the Alaska Regional Fire Ecologist, Jennifer Barnes, co-lead the pilot year of the Alaska Fire Science Information Consortium. The Consortium was a collaborative effort between the Alaska Interagency Coordination Center, the Bureau of Land Management-Alaska Fire Service, the U.S. Fish & Wildlife Service, the National Park Service, the U.S. Geological Survey, and Universities of Alaska and Idaho (FRAMES). In October 2009 the NPS Fire Ecology program hosted the inaugural Fire Science in

Alaska Delivery and Technology Transfer Workshop which was attended by over 50 representatives from the University of Alaska Fairbanks, Alaska State and Federal agencies, and an Alaska Native Corporation. The pilot stage of the Consortium has been successfully completed and full funding is being sought from the Joint Fire Science Program.

| <b>Consortium Pilot Year Goals</b> |                                                                                                                                      |
|------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| ○                                  | <b><i>Establish a base-line assessment of end-user knowledge and understanding of existing fire science information products</i></b> |
| ○                                  | <b><i>Identify end-user community information needs and priorities</i></b>                                                           |
| ○                                  | <b><i>Identify end-user preferences for and receptivity to diverse modes of science communication</i></b>                            |

### **Alaska Inventory and Monitoring Networks & the Alaska Regional Fire Ecology Program**

The Regional Fire Ecologist serves as a Technical Committee member on the Arctic Network Inventory & Monitoring program (ARCN) since “Fire Extent and Severity” is one of ARCN’s vital signs selected for long term monitoring. Development of a long-term fire-effects monitoring program that dove-tails with other aspects of the I & M Networks’ monitoring plan has progressed. For example, in June 2009, fire ecologist, Jennifer Mitchell, worked the ARCN and Gates of the Arctic NPP to implement a pilot study, “Firebird” which was designed to monitor fire-effects on habitat use by birds and mammals. Also, an established fire ecology related ARCN projects has continued; in July 2009, Jennifer Barnes orchestrated a field visit to Bering Land Bridge NXP “Long-term monitoring of 1977 tundra fires in the Northwest Alaska Parks”. Overviews of both the pilot “Firebird” and long-term “Tundra Fires” projects are provided below.

### **Long-term monitoring of 1977 tundra fires in the Northwest Alaska Parks**

The frequency and size of lightning-caused tundra fires could increase with climate warming and result in major ecosystem changes in vegetation, soils, and wildlife habitat over large areas of the Arctic. Two of the longest monitored sites (28-32 years) in Arctic Alaska for vegetation change and post-fire tundra succession are located in the Bering Land Bridge (BELA) and Noatak (NOAT) National Preserves in northwest Alaska. These permanent vegetation plots were established following widespread tundra and



**Figure 5.** (a) 1973 pre-fire dominated by dry dwarf shrub tundra mat. (b) 1978 one year post-fire severe burn, early successional mosses and liverworts. (c) 1983 six years post-fire, dominated by sedges and grasses. (d) 2009 thirty-two years post-fire, what once was dwarf shrub tundra at this site is now tall willow.

forest fires in 1977, when one million acres burned during extreme drought in NW Alaska (Racine et. al. 1987; Racine et. al. 2004). Recently the NPS Arctic Network Inventory and Monitoring Program has supported the re-measurements of these sites. The sites were revisited in 2009 by the Regional Fire Ecologist and an original researcher, Chuck Racine.

The BELA site on the Seward Peninsula is located where a large 1977 tundra fire burned a 2000-m long hillslope along Imuruk Lake (Nimrod Hill). Pre-fire vegetation and soils along this slope ranged from moist tussock-shrub tundra on the lower slopes to dwarf shrub tundra (Fig. 5a) on the steeper upper-slope (12%) and wet sedge

meadow on the ridgetop. We sampled vegetation before the fire in 1973 and at eight sites following the fire at irregular time intervals from one year to 32 years. Over the monitoring period we have seen dramatic changes in vegetation on Nimrod Hill, particularly on the severely-burned upper-slope. Immediately after the fire the upper-slope sites were dominated by pioneering mosses and liverworts (Fig. 5b), followed by sedges and grasses within a decade (Fig. 5c). Twenty to thirty years after the fire both deciduous and evergreen shrubs expanded dramatically at all sites on the hill, particularly on the upper slope where fast growing willows (*Salix pulchra*) now up to 1.5 m tall, currently cover 30 to 40% of the slope (Fig. 5d). The thaw depths and active layer thickness have recovered to pre-fire levels at the lower-slope tussock tundra sites; however there is evidence for major permafrost thawing and surface subsidence on the well-drained slope in the area colonized by willows. This long-term record of change after fire provides valuable documentation of fire effects in vegetation, permafrost, and wildlife habitat during an era of rapid climate warming in the Alaskan Arctic.

#### **Firebird: Long-term fire-effects and habitat-use monitoring in Northern Alaska Parks**

In June, fire ecologist Jennifer Mitchell, designed and implemented a pilot study dubbed "Firebird". The project was established in an effort to collocate and correlate field measures and ecological trends in: 1) breeding bird density 2) secondary fire effects and 3) herbivory by moose, hare, and caribou. The pilot study was successfully conducted in the boreal forest (including 2 areas burned in 1991, and one in 1969) along the Kobuk River in Gates of the Arctic NP in June. The protocol summary for future application at select rivers in ARCN parks is being written and was presented at the 2009 4<sup>th</sup> International Fire Ecology and Management Congress in Savannah, GA.

**Table 1. Fire Effects Plot Workload 2009**

| <b>Park</b>                | <b>Monitoring Unit</b>                             | <b>Type of Plot (FMH, photo point, other)</b>          | <b>Pre-burn/treatment</b> | <b>Immed. Post</b> | <b>Postburn /Treatment (1-40 yrs)</b> | <b>Total Plots</b> |
|----------------------------|----------------------------------------------------|--------------------------------------------------------|---------------------------|--------------------|---------------------------------------|--------------------|
| <b>Denali</b>              | DENA Frontcountry: Hazard Fuels (HZF)              | Post-mechanical thinning monitoring: AK NPS HZF method |                           |                    | 28                                    | 28                 |
| <b>Wrangell-St. Elias</b>  | WRST Headquarters Hazard Fuels                     | Pre-mechanical thinning monitoring: AK NPS HZF method  | 18                        |                    |                                       | 18                 |
| <b>Wrangell-St. Elias</b>  | NPS lands adjacent to Smith Private Property – HZF | Pre-mechanical thinning monitoring: AK NPS HZF method  | 13                        |                    |                                       | 13                 |
| <b>Gates of the Arctic</b> | Firebird Monitoring Pilot Study                    | Other method                                           |                           |                    |                                       | 37                 |
| <b>Wrangell-St. Elias</b>  | Chakina Fire                                       | Pre-fire plots: AKFETG method                          | 4                         |                    |                                       | 4                  |
| <b>Bering Land Bridge</b>  | Long-Term Post-Fire Monitoring                     | Tundra Plot<br>Other Method                            |                           |                    | 8                                     | 8                  |
| <b>Total</b>               |                                                    |                                                        | <b>35</b>                 |                    | <b>36</b>                             | <b>108</b>         |

#### **Fire Ecology Staffing**

The Alaska NPS Fire Ecology Program does not have a designated fire effects monitoring crew. Therefore, fire ecology monitoring fieldwork is largely accomplished by NPS Fire/Fuels seasonal

technicians and permanent staff, under the guidance of Regional Fire Ecologists. This is readily accomplished since the NPS Western and Eastern Fire Management Areas select multi-disciplinary technicians and allocate an appropriate amount of their time to fire ecology projects. In general, this sharing of resources has worked well. Table 2 provides an overview of the use of personnel that assisted with fire ecology project work.

**Table 2. Fire Ecology Staffing 2009**

| Ecologist and Monitors                   | Starting Date | Ending Date | # of Pay Periods | READ Qualified (Yes or No) | Training and Development        |
|------------------------------------------|---------------|-------------|------------------|----------------------------|---------------------------------|
| Jennifer Mitchell (Fire Ecologist- Term) | 12/31/08      | 12/24/09    | 22               | No                         | Rx-510, completed FEMO taskbook |
| Forestry Tech – AWAFFM (5)               | 4/15/09       | 12/17/09    | 5                | No                         |                                 |
| Forestry Tech – AEAFFM (4)               | 4/15/09       | 7/02/09     | 4                | No                         |                                 |

### Collaboration

#### ***Eagle School –Ecology Program***

In 2009 the Fire Ecology program conducted the 5<sup>th</sup> year of a field-based education program for the Eagle Community School in Eagle, AK. The program was established in 2004 when the town was threatened by wildfire. Since 2004, we have annually lead a group of students to visit fire effects plots close to the community. This NPS field-based education program has received a warm reception from the Eagle community as a fun and informative way for students to become more familiar with the surrounding ecosystem. A focus of the program is to demonstrate that natural events like fire and flood are not necessarily going to have a negative effect on the environment they rely on for sustenance.



**Figure 6 (a-c).** (a) monitoring pre-flood Open White Spruce communities (b) Eagle community students (combined 7-12 grades) on flood-affected Belle Island (c) monitoring post-flood bare substrate (formerly open white spruce forest) .

In May, 2009 the Eagle community, which is located on the banks of the Yukon River, was inundated by a rare and nearly devastating spring flood which impacted the homes of many Eagle residents. NPS Alaska Fire program personnel responded to the flood as an All-Risk Incident. Later, the Fire Ecology program decided to incorporate post-flood forest recovery monitoring into the education program. So, in September 2009, the combined 7<sup>th</sup> through 12<sup>th</sup> grade class of 15 students and their instructor accompanied NPS personnel to establish and gather data from 4 new flood effects plots on nearby Belle

Island. Prior to the fieldtrip Jennifer Mitchell gave a classroom presentation about the flood and lead a discussion about the importance of emergency preparedness. Additionally, aerial video footage taken during the flood by an NPS L.E. Ranger was shown to the students. We intend to alternate our annual field trips between revisiting the fire- and flood-effects plots.

### Management Objectives and Monitoring Results 2009

The focus of the Alaska NPS Fire Ecology Program is to assess the condition of vegetation and fuels and how they are affected by wildland fires, prescribed fires or mechanical treatments. Over the past 7 years, we have monitored the effects of both wildland fires and mechanical treatments within several parks. To date, no prescribed fires have been implemented in any of the parks in the Alaska Region. However, it's worth noting that the Alaska Eastern Area Fire Management Program is currently in the proposal and planning stages for two prescribed fires; one each in Yukon-Charley NPP and Wrangell-St. Elias NPP.

In the body of this Annual Report we provide written summaries of several projects that the Alaska Regional Fire Ecology Program is currently involved with in Alaska's parklands. We also take the opportunity to provide a more comprehensive list of projects conducted since 2001 in Appendix A. Appendix A lists projects by name, data entry status, database type, data analysis status, and whether reports or presentations have been completed for the project. Below we provide summaries of two ongoing monitoring projects in Denali NPP; one of which addresses the wildfire effects and the other of which summaries the impact of a mechanical thinning treatment application.

### Fuels and vegetation modeling utilizing plots, burn severity, and time since fire in Denali NPP

Spatially explicit fire behavior modeling tools require fuels and/or vegetation GIS information. Wildland fire fuels and vegetation maps atrophy over time and become less relevant in fire prone areas, due to burned areas no longer representing the appropriate vegetation or fuel types. In Denali a predictive model of wildland fire effects on vegetation communities has been developed to update spatial vegetation maps over time. Fire effects plots in burns of varying ages and severities were established in 2005 and 2007 by the Denali Fire Crew. The data was used to develop a landcover change matrix for vegetation that predicted changes in vegetation type based on pre-fire vegetation type, burn severity (using dNBR mapping products), and time since fire. The model has been used to develop an updated landcover vegetation map that will also be used for fuels mapping purposes. The maps below show the change from a 2005 pre-fire vegetation map, burn severity map, and the resulting change in vegetation post fire.

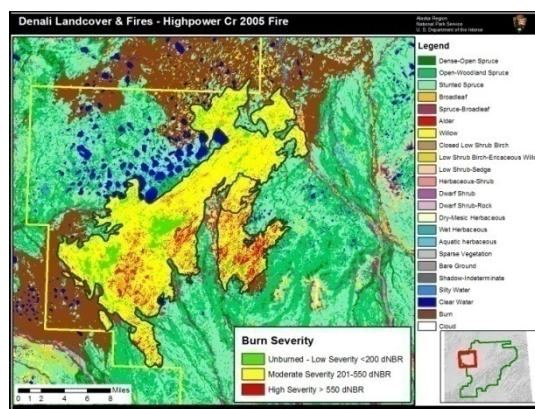


**Table 3. Management Objectives and Monitoring Results 2009** Detailed background information, results and management implications of the Denali Hazard Fuels Reduction monitoring study are provided in the Summary Section of this report. Table 3 provides an overview of results from the Denali Hazard Fuels Reduction monitoring study for treatment Zones 2 and 3 (Control plots are not shown). All results shown are 80% confidence intervals of the mean.

| Monitoring Unit                                           | Management Objectives             | Monitoring Results<br>(80% confidence interval) |          |                           |                           | Objective Achieved?       |
|-----------------------------------------------------------|-----------------------------------|-------------------------------------------------|----------|---------------------------|---------------------------|---------------------------|
| DENA-HZF:<br>Mechanical thinning,<br>Spruce/<br>Deciduous | Treated spruce density:           | <i>Density of Spruce Trees/Acre</i>             |          |                           |                           | No                        |
|                                                           | Zone 2: < 50 spruce tree/acre     | <b>Treatment</b>                                | <b>n</b> | <b>Pre-Thinning</b>       | <b>1-yr Post Thinning</b> |                           |
|                                                           | Zone 3: <110 spruce tree/acre     | Zone 2                                          | 7        | 518-997                   | 132-411                   |                           |
|                                                           |                                   | Zone 3                                          | 9        | 612-990                   | 212-332                   |                           |
|                                                           | Treated shrub cover:              | <b>Treatment</b>                                | <b>n</b> | <b>1-yr Post Thinning</b> | <b>5-yr Post Thinning</b> | No: Zone 2<br>Yes: Zone 3 |
|                                                           | Zone 2: 80% shrub cover reduction | Zone 2                                          | 7        | 43-66                     | 48-59                     |                           |
|                                                           | Zone 3: 50% shrub cover reduction | Zone 3                                          | 9        | 41-64                     | 46-55                     |                           |
|                                                           |                                   |                                                 |          |                           |                           |                           |

**B. Regional Fire Ecologist Focus Areas/Accomplishments** Tables 4 (a & b) provide summaries of the Alaska Regional Fire Ecology Program focus areas and accomplishments for the calendar year of 2009.

**Table 4a. Alaska Regional fire ecologist's generalized focus areas (Barnes)**

| Category                     | % Time | Focus Areas                                                                                                                             |
|------------------------------|--------|-----------------------------------------------------------------------------------------------------------------------------------------|
| Planning                     | 18%    | Fire management and fire monitoring plans, Developing protocols for fuels monitoring, Contracts/Agreements, Field Logistics, Compliance |
| Presentations                | 11%    | Presentations at scientific, park, and interagency meetings, Publications, Reports, Instructor for RX-510.                              |
| NPS Meetings/<br>task groups | 9%     | FESC, I&M tech committee & workshops, AKRO NPS Fire meetings                                                                            |
| Interagency work             | 6%     | AWFCG Research Committee, AWFCG Fire Effects Task Group, Landfire data calls, Landfire cross-walk to fuels layer for AK                 |
| Fire Assignments             | 13%    | Wildland fire assignments – DMOB(t), ICT4(t); RX – FEMO                                                                                 |
| Research                     | 4%     | JFSP Tundra Fire History, JFSP Fire History, JFSP Regional Consortium, JFSP proposals                                                   |
| Field Work*                  | 11%    | BELA fire effects plots, Chakina fire plots                                                                                             |
| Data entry                   | 1%     | Estimated amount of time spent entering data from paper to PC                                                                           |
| Data conversion              | 0%     |                                                                                                                                         |
| Data analysis                | 8%     | Denali fire effects plots and landcover change matrix, BELA Racine plots, WRST hazard fuels plots.                                      |
| Supervision/Admin            | 11%    | Supervision, training field crew, field logistics, field work                                                                           |
| Training                     | 7%     | Fire training, RX-510 instructor, Operational Leadership, Procurement Training, Mandatory Training                                      |

**Table 4a (continued). Assistant regional fire ecologist's generalized focus areas (Mitchell)**

| Category                  | % Time | Focus Areas                                                                                                             |
|---------------------------|--------|-------------------------------------------------------------------------------------------------------------------------|
| Planning                  | 19%    | Fire management and fire monitoring plans, Developed protocols for ecology and fuels monitoring, Field work, Compliance |
| Presentations             | 11%    | Oral and Poster presentations at scientific, park, and interagency meetings, Reports                                    |
| NPS Meetings/ task groups | 3%     | FESC, I&M tech committee & workshops, AKRO NPS Fire meetings                                                            |
| Interagency work          | 3%     | AWFCG Fire Effects Task Group, Meetings                                                                                 |
| Fire Assignments          | 10%    | Wildland fire assignments – HECM, FEMO<br>Prescribed Fire Detail- FEMO, FF Type II                                      |
| Research                  | 4%     | JFSP Regional Consortium, JFSP proposals                                                                                |
| Field Work*               | 19%    | Ecological monitoring, Fire effects monitoring, Pre- and post-mechanical thinning monitoring                            |
| Data entry                | 15%    | Estimated amount of time spent entering data from paper to PC                                                           |
| Data conversion           | 0%     |                                                                                                                         |
| Data analysis             | 8%     | Thinning treatment effects on forest community, Pilot data analysis for long-term ecological monitoring study           |
| Supervision/Admin         | 3%     | Training field crew, field logistics, field work                                                                        |
| Training                  | 5%     | Fire training, Mandatory Training                                                                                       |

**Table 4b. Regional Fire Ecologist's Specific Accomplishments/Focus Area (Barnes)**

| Category                  | % Time | Accomplishments and/or areas of activities                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---------------------------|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Planning                  | 18%    | <ul style="list-style-type: none"> <li>Submitted compliance for BELA fire effects plots, WRST RX burn pre-monitoring</li> <li>I&amp;M collaboration - Planning for vegetation and fire monitoring with ARCN I&amp;M network</li> <li>Prepared draft of Fire Monitor Plan - YUCH</li> <li>Reviewed climate change strategy documents for the region.</li> <li>Fire effects monitoring - Logistics, compliance, planning, training, field work</li> </ul>       |
| Presentations             | 11%    | <ul style="list-style-type: none"> <li>Reporting EAAR - Presentation of results to FMOs and area staff</li> <li>AK Park Science Article on BELA fire effects plots submitted</li> <li>Tundra Fire Regimes- Lake Core JFSP - Alaska Park Science Symposium (Poster), FETG Tech Transfer presentation</li> <li>RX-510 Instructor - Preparation and instructing</li> <li>S-248 SCKN Instructor – Preparation and instructing</li> <li>See appendix B.</li> </ul> |
| NPS Meetings/ task groups | 9%     | <ul style="list-style-type: none"> <li>NPS Fire Ecology Steering Committee</li> <li>NPS Alaska Fire Management meetings</li> <li>I&amp;M Arctic Network technical committee</li> <li>I&amp;M Central Alaska Network – advisory role</li> </ul>                                                                                                                                                                                                                |
| Interagency work          | 6%     | <ul style="list-style-type: none"> <li>AWFCG Fire Research Committee – Revised research priorities for AK fire management, reviewed potential JFSP</li> </ul>                                                                                                                                                                                                                                                                                                 |

| Category          | % Time | Accomplishments and/or areas of activities                                                                                                                                                                                                                                                                                                                                                 |
|-------------------|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                   |        | <ul style="list-style-type: none"> <li>proposals</li> <li>• AWFCG Fire Effects Task Group – Presentations</li> <li>• AK Fire Science Consortium – JFSP Regional Consortium, co-lead.</li> <li>• LANDFIRE workshops</li> </ul>                                                                                                                                                              |
| Fire Assignments  | 13%    | <ul style="list-style-type: none"> <li>• DMOB(t) with AK Type 1 team</li> <li>• ICT4(t) WF Chakina</li> <li>• FEMO, RX JFSP experimental burn</li> </ul>                                                                                                                                                                                                                                   |
| Research          | 4%     | <ul style="list-style-type: none"> <li>• Federal lead on JFSP Tundra Fire History study (PI: Hu, Lake Coring) – Compliance, field work, meetings, CESU agreement and JFSP grant, analysis</li> <li>• Rupp - Fire regime, climate modeling NPS - Meetings and cooperative agreement follow-up CESU</li> <li>• JFSP 2010 - 1 proposal submitted</li> </ul>                                   |
| Data entry        | 1%     | <ul style="list-style-type: none"> <li>• Data QC on several projects in FFI and Access databases</li> </ul>                                                                                                                                                                                                                                                                                |
| Field Work        | 11%    | <ul style="list-style-type: none"> <li>• BELA fire effects plots</li> <li>• Chakina fire plots</li> <li>• Assessing proposed RX in YUCH</li> </ul>                                                                                                                                                                                                                                         |
| Data analysis     | 8%     | <ul style="list-style-type: none"> <li>• Analyzed data to update landcover for Denali.</li> <li>• Cross-walked LANDFire EVT vegetation to fuels types in preparation for FSPRO/WFDSS for 2009 fire season (fuels layers not available yet)</li> <li>• Analyzed tundra BELA data for presentation at Fire Ecology &amp; Management Symposium and article for Alaska Park Science</li> </ul> |
| Supervision/Admin | 11%    | <ul style="list-style-type: none"> <li>• Training field crews, oversaw data entry</li> <li>• Field crew logistics</li> <li>• Travel and time paperwork</li> </ul>                                                                                                                                                                                                                          |
| Training          | 7%     | <ul style="list-style-type: none"> <li>• RX-510 instructor</li> <li>• Operational Leadership</li> <li>• Procurement Training</li> <li>• Other - Mandatory, Trimble Training</li> </ul>                                                                                                                                                                                                     |

**Table 4b (continued). Assistant Regional Fire Ecologist's Specific Accomplishments/Focus Area (Mitchell)**

| Category      | % Time | Accomplishments and/or areas of activities                                                                                                                                                                                                                                                                                                                                                        |
|---------------|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Planning      | 19%    | <ul style="list-style-type: none"> <li>• I&amp;M collaboration - ARCN Fire/Bird/Habitat-Use Monitoring Protocol (pilot study design and implementation)</li> <li>• Prepared draft of Fire Monitor Plan – YUCH</li> <li>• Gear Purchase and Inventory</li> <li>• Mechanical thinning effects pre-treatment monitoring WRST: Susan Smith and Headquarters- Logistics, planning, training</li> </ul> |
| Presentations | 11%    | <ul style="list-style-type: none"> <li>• ARCN Fire/Bird/Habitat-Use Monitoring Protocol (pilot) poster and oral presentations</li> </ul>                                                                                                                                                                                                                                                          |

| Category                  | % Time | Accomplishments and/or areas of activities                                                                                                                                                                                                                                                              |
|---------------------------|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| NPS Meetings/ task groups | 3%     | <ul style="list-style-type: none"> <li>• NPS Alaska Fire Management meetings</li> <li>• I&amp;M Arctic Network technical committee</li> </ul>                                                                                                                                                           |
| Interagency work          | 3%     | <ul style="list-style-type: none"> <li>• AWFCG Fire Effects Task Group Presentations</li> <li>• AK Fire Science Consortium – JFSP Regional Consortium</li> <li>• Interagency Fall Fire Review</li> </ul>                                                                                                |
| Fire Assignments          | 10%    | <ul style="list-style-type: none"> <li>• Chakina Fire (WF), AK: FEMO and HECM</li> <li>• Great Smokey Mountain Fire Use Module/NPS Detail: FEMO(t), Type II FF</li> </ul>                                                                                                                               |
| Research                  | 4%     | <ul style="list-style-type: none"> <li>• JFSP Regional Consortium</li> <li>• JFSP WRST Spruce Bark Beetle Proposal</li> <li>• Rupp - Fire regime, climate modeling NPS - Meetings</li> </ul>                                                                                                            |
| Data entry                | 19%    | <ul style="list-style-type: none"> <li>• Data entry WRST pre-treatment monitoring</li> <li>• Data Quality Control/Entry DENA Hazard Fuels Reduction Project</li> <li>• Created FFI data entry manual for AKRO Fire Ecology Program</li> </ul>                                                           |
| Field Work                | 15%    | <ul style="list-style-type: none"> <li>• Chakina fire plots</li> <li>• ARCN Fire/Bird/Habitat-Use Monitoring Pilot Study</li> <li>• DENA hazard fuels reduction post-treatment monitoring</li> <li>• Mechanical thinning effects pre-treatment monitoring WRST: Susan Smith and Headquarters</li> </ul> |
| Data Conversion           | 0%     |                                                                                                                                                                                                                                                                                                         |
| Data analysis             | 8%     | <ul style="list-style-type: none"> <li>• Denali Post-thinning Treatment Effects Monitoring Study, ARCN Fire/Birds/Herbivory Pilot</li> </ul>                                                                                                                                                            |
| Supervision/Admin         | 3%     | <ul style="list-style-type: none"> <li>• Training field crew, field crew logistics, field work</li> <li>• Travel, time, and purchasing paperwork</li> </ul>                                                                                                                                             |
| Training                  | 5%     | <ul style="list-style-type: none"> <li>• Mandatory training</li> <li>• Rx-510</li> </ul>                                                                                                                                                                                                                |

### Communication Venues

The Alaska Region conducts an Annual Fall Fire Review meeting which is attended by all Alaska Fire Management staff. At this meeting each Program is allocated time for discussion. The Fire Ecology program uses this venue to present and discuss monitoring or research results to Alaska NPS Fire personnel. Venues used to communicate fire ecology related results to non-fire NPS staff include the Alaska Park Science Symposiums and NPS Network meetings.

### Supplement and Appendices

Included with this report is the “2009 Annual Report Supplement.xls”. Also included are Appendices A and B which respectively summarize “NPS AKRO Fire Ecology Projects completed from 2001-2009” and “Fire Ecology Presentations from 2009”.

**Appendix A. List of NPS AKRO Fire Ecology Projects completed from 2001-2009.** Appendix A briefly lists, describes, and provides a timeline for the monitoring and inventory projects that have been conducted the establishment of the NPS Alaska Regional Fire Ecology program in 2001.

| <b>Park</b> | <b>Title</b>                          | <b>Project ID</b> | <b>Purpose</b>                                                        | <b>Year Started</b> | <b>Last Monitored</b> | <b># Plots Total/Re-measured</b> | <b>Data-base</b> | <b>Analysis complete</b> | <b>Report</b>         | <b>Repeat Monitoring</b>        |
|-------------|---------------------------------------|-------------------|-----------------------------------------------------------------------|---------------------|-----------------------|----------------------------------|------------------|--------------------------|-----------------------|---------------------------------|
| BELA        | BELA Racine Fire Plots                | BELA-Racine       | Succession, WFU Tundra fire effects                                   | 1978                | 2009                  | 8                                | Excel            | Partial                  | Publication           | Yes                             |
| DENA        | DENA hazard fuels plots               | DENA-HZF          | Effectiveness and effects of fuels thinning                           | 2003                | 2005                  | 27                               | Access           | Yes                      | Presentations         | Yes                             |
| DENA        | DENA fire effects & moose             | DENA-VDM          | Vegetation mapping, succession, moose browse                          | 2005                | 2006                  | 43/10                            | FFI              | Yes                      | Presentations         | Selected plots reburned in 2005 |
| DENA        | DENA Landcover CBI plots              | DENA-LC-CBI       | Vegetation mapping, succession, CBI plots revisited 7-8 yrs post fire | 2007                |                       | 55                               | FFI              | Partial                  | Presentation          | Possibly, not marked            |
| DENA        | DENA, CBI Burn Severity               | DENA-CBI          | Assess remote sensed dNBR severity                                    | 2002                |                       | 84/55* see DENA LC-CBI           | Access           | Yes                      | Publication           | No, see DENA LC-CBI plots       |
| GAAR        | Firebird-Fire effects and habitat use | GAAR-Habitat      | Mammalian and avian habitat use in post-fire stands                   | 2009                | 2009                  | 37                               | Access           | Partial                  | Presentations         | Possibly                        |
| NOAT        | NOAT pre/post fire effects            | NOAT-PPF          | Succession, WFU Tundra fire effects                                   | 2004                | 2007                  | 6                                | FFI              | Partial                  |                       | Yes                             |
| NOAT        | NOAT Racine fire plots                | NOAT-Racine       | Succession, WFU Tundra fire effects                                   | 1982                | 2005                  | 8                                | Excel            | Yes                      | Report/ Presentations | Yes                             |
| NOAT        | NOAT (SewardP), CBI Burn              | NOAT-CBI          | Assess remote sensed dNBR severity                                    | 2003                |                       | 93                               | Access           | Yes                      | Publication           | No                              |

| Park | Title                                     | Project ID     | Purpose                                              | Year Started | Last Monitored | # Plots Total/Re-measured | Data-base  | Analysis complete | Report        | Repeat Monitoring              |
|------|-------------------------------------------|----------------|------------------------------------------------------|--------------|----------------|---------------------------|------------|-------------------|---------------|--------------------------------|
|      | Severity                                  |                |                                                      |              |                |                           |            |                   |               |                                |
| WRST | WRST historic fire effects (Paired Plots) | WRST-PP        | Succession, fire effects. 2006 - 2 plots re-measured | 1980s        | 2006           | 85/2                      | FFI/Access | Partial           |               | Selected plots                 |
| YUCH | YUCH hazard fuels plots                   | YUCH-HZF       | Effectiveness and effects of fuels thinning          | 2005         |                | 42                        | Access     | Partial           | Presentations | No                             |
| YUCH | YUCH historic fire effects (Paired Plots) | YUCH-PP        | Succession, fire effects, 2005 - 5 plots re-measured | 1980s        | 2005           | 52/5                      | FFI/Access | Partial           |               | Yes                            |
| YUCH | YUCH pre/post fire effects                | YUCH-WDC       | Succession, fire effects, fuel moisture              | 2004         | 2008           | 7                         | FFI        | Partial           | Presentations | Yes                            |
| YUCH | YUCH 1999 Fire Effects - B242             | YUCH-1999-B242 | Succession, burn severity                            | 1999         | 2007           | 15                        | Excel      | Partial           |               | Yes, problems locating in 2007 |
| YUCH | YUCH, CBI Burn Severity                   | YUCH-CBI       | Assess remote sensed dNBR severity                   | 2001         |                | 119                       | Access     | Yes               | Publication   | No                             |

**Appendix B. List of Fire Ecology Presentations from 2009.** From Dec 2008 through Dec 2009 a number of presentations, posters, and reports were completed and presented by the Alaska Region Fire Ecology program and various collaborators and are listed below. Note: During this time period Jennifer Allen changed her name to Jennifer Barnes.

- Allen, J. 2009. Vital sign: Fire Extent, Severity, and Effects (Presentation). ARCN Technical Committee Meeting. Fairbanks, AK, October 2009.
- Allen, J. 2009. Fire Ecology & Fuels Monitoring Program (Presentation). Alaska NPS Fire Seasonal Training. Fairbanks, AK, May 2009.
- Allen, J. 2009. Monitoring NPS Hazard Fuels Projects (Presentation). Alaska Interagency Fire Effects Task Group, May 2009.
- Allen, J. and Mitchell, J. 2009. NPS Alaska Region Fire Ecology Program (Presentation). NPS Alaska Fall Fire Review, Anchorage, AK. September 2009
- Allen, J. and Weddle, L. 2009. Fuels and Vegetation Modeling Utilizing Plots, Burn Severity, and Time Since Fire in Denali NP/P (Presentation). George Wright Society Meeting, Portland, OR, March 2009.
- Chipman, M. L., P. E. Higuera, J. L. Allen, M. Urban, S. Rupp, and F. S. Hu. 2009. Tundra fire regimes and interactions with late-Holocene climate and vegetation change in the Alaskan Arctic. Pages 144 in 94th Annual Meeting of the Ecological Society of America Albuquerque, MN.
- Higuera, P. E., M. Chipman, J. L. Allen, S. Rupp, and F. S. Hu. 2008. Tundra fire regimes in the Noatak National Preserve, northwestern Alaska, since 6000 yr BP. Pages 77 in International Association of Wildland Fire Jackson Hole, WY.
- Higuera, P. E., M. L. Chipman, J. L. Allen, T. S. Rupp, M. Urban, and F. S. Hu. 2009. Beyond boreal forests: Holocene fire history in Alaskan tundra. Pages 40 in Wildfires in boreal ecosystems: past, present and future fire regimes Lac Hebecourt, Quebec, Canada.
- Higuera, P. E., M. L. Chipman, J. L. Allen, T. S. Rupp, M. Urban, and F. S. Hu. 2009. Tundra Fire Regimes: the Holocene perspective (Presentation). Alaska Fire Consortium Workshop (JFSP). Fairbanks, AK, October 2009.
- Mitchell, J., J. Barnes, M. Flamme, N. Guldager. 2009. Firebird: Collocating and Correlating Fire, Avian and Mammalian Long-term Monitoring in the Arctic (Poster). 4<sup>th</sup> Annual Fire Ecology and Management Congress. Savannah, GA, December 2009.
- Mitchell, J., J. Allen, M. Flamme, N. Guldager. 2009. Firebird: Collocating and Correlating Fire, Avian and Mammalian Long-term Monitoring in the Arctic (Presentation). ARCN Technical Committee Meeting. Fairbanks, AK, November 2009.
- Racine, C., Allen, J., Jandt, R., and Dennis, J. 2009 (in review). Long-term monitoring of 1977 tundra fires in the Northwest Alaska Parks. Alaska Park Science.
- Rupp, S. and Springsteen, A. 2009. Projected Vegetation and Fire Regime Response to Future Climate Change in Alaska (Presentation). NPS Tech Transfer, Fairbanks, AK. March 2009.
- Trainor S., T. Rupp, K. Murphy, J. Allen, E. Miller, R. Jandt, D. Olson, C. Kolden. 2009. Wildland Fire Science Delivery and Outreach in Alaska (Poster). 4<sup>th</sup> Annual Fire Ecology and Management Congress. Savannah, GA, December 2009.