



# National Park Service Alaska Region Fire Ecology Annual Report Calendar Year 2017

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## A. Summary

### Overview

The National Park Service (NPS) Alaska region fire ecology program provides science-based information to guide fire and land management planning, decisions and practices in order to maintain and understand fire-adapted ecosystems in Alaska.

During the 2017 field season, the Alaska NPS fire ecology program conducted assessments at repeat burn sites (burned in 2009 and 2016) in Wrangell-St. Elias (Figure 1), re-monitored legacy 40 year post-fire tundra fire effects plots in Noatak, continued to collect seasonal fuel moisture samples, and assisted with fire research projects. The regional fire ecologists were involved with preparing monitoring protocols, agreements and research proposals, instructing classes, and participating on several agency and interagency committees. This annual report provides a brief summary about the NPS Alaska 2017 fire season, fire ecology monitoring results, fire research projects, and fire ecology program activities and outreach.



**Figure 1.** Monitoring the effects of fire in Wrangell-St. Elias, eight years after the 2009 Chakina fire (NPS photo 2017).

## 2017 Fire Season

The 2017 fire season proved to be a relatively “normal” season, with hot and dry spells balanced with periodic rainfall that moderated fire activity in Alaska. The season began slowly with few fire starts in May due to lingering snowpack but steadily increased into June (AICC 2017 Fire Season Weather Summary, <https://fire.ak.blm.gov/>). The majority of the acres burned occurred in July with significantly warm temperatures in the 90 degree range and strong winds in the eastern Interior. The end of season rains began in early August, slowing fire season to a halt. Though Alaska recorded one of the highest number of lightning strikes this summer, precipitation and high fuel moistures proved to limit ignitions and fire growth. By the end of the season, a total of 362 fires were reported with 653,147 acres burned, falling below the ten year average of approximately 1.2 million acres but just above the median annual area burned (AICC Situation Report Dec 22, 2017, <https://fire.ak.blm.gov/>).



**Figure 2.** View from the Yukon River of the smoke column building on the Trout Creek Fire July 15, 2017. (NPS Photo).

National Park Service in Alaska had a very light fire season, with the majority of fire starts (6) occurring in Yukon-Charley Rivers National Preserve. Overall, nine wildfires spanned across four park units for a total of 4,057 acres that burned within and adjacent to park boundaries (Table 1). Of the area burned, 4,008 acres were on NPS owned lands. The largest fire, Trout Creek in Yukon-Charley National Preserve, started within a recent 2015 fire scar and burned 2,980 acres (Figure 2). The Western Area fire management staff carried out prescribed fire pile burns in Denali and Lake Clark during 2017 (Table 1) for a total of 23 acres and accomplished fuels reduction projects at several sites in the parks.

**Table 1.** Wildfires and prescribed fires in Alaska park units from 2017.

| Park Unit                                    | Number of Wildfires <sup>1</sup> | Total Acres Burned <sup>1</sup> | Number of Wildfires started on NPS Lands <sup>2</sup> | Acres Burned NPS Lands <sup>2</sup> | Number of Prescribed Fire Units | Acres of Prescribed Fires |
|----------------------------------------------|----------------------------------|---------------------------------|-------------------------------------------------------|-------------------------------------|---------------------------------|---------------------------|
| Denali National Park & Preserve              | 1                                | 79                              | 1                                                     | 79                                  | 1 (Admin Rd)                    | 22                        |
| Gates of the Arctic National Park & Preserve | 1                                | 492                             | 1                                                     | 488                                 | -                               | -                         |
| Wrangell-St. Elias National Park & Preserve  | 1                                | 1                               | 1                                                     | 1                                   | -                               | -                         |
| Yukon-Charley Rivers National Preserve       | 6                                | 3,485                           | 5                                                     | 3,440                               | -                               | -                         |
| Lake Clark National                          | 0                                | 0                               | 0                                                     | 0                                   | 1 (Chinitna                     | 1                         |

| Park Unit               | Number of Wildfires <sup>1</sup> | Total Acres Burned <sup>1</sup> | Number of Wildfires started on NPS Lands <sup>2</sup> | Acres Burned NPS Lands <sup>2</sup> | Number of Prescribed Fire Units | Acres of Prescribed Fires |
|-------------------------|----------------------------------|---------------------------------|-------------------------------------------------------|-------------------------------------|---------------------------------|---------------------------|
| Park and Preserve       |                                  |                                 |                                                       |                                     | Bay)                            |                           |
| <b>Total for Region</b> | <b>9</b>                         | <b>4,057</b>                    | <b>8</b>                                              | <b>4,008</b>                        | <b>2</b>                        | <b>23</b>                 |

<sup>1</sup> Includes total number of fires and acres of all wildfires that burned within or partially within the boundaries of the park unit. NPS boundaries include inholdings of lands not owned or managed by NPS. <sup>2</sup> Number of wildfires started and acres burned on NPS owned lands (WFMI stats).

## B. Monitoring & Inventory

**Monitoring** and inventories are utilized by the fire ecology program to provide feedback to the NPS fire management program on activities such as fuels treatments and to continue to gain a better understanding of the effects of wildfire on the landscape. Table 2 provides a list of the number of plots measured in 2017 and the total number of fire/fuels monitoring or inventory plots established in Alaska parks since 2003.

During 2017 the NPS Alaska fire ecology program measured plots in an area that recently burned twice in Wrangell-St. Elias and re-measured long term tundra fire plots in Noatak. Brief descriptions and preliminary results from the two monitoring projects are provided below.

**Table 2.** Fire effects and fuels treatment (TX) plot workload (2017) and total monitoring plots Installed 2003-2017.

| Park                 | Monitoring Unit                       | Type of Plot (FMH, photo point, other) | Pre-burn/TX 2017 | 1yr Post 2017 | Post (2-20 yrs) 2017 | Annual Total | Total Plots |
|----------------------|---------------------------------------|----------------------------------------|------------------|---------------|----------------------|--------------|-------------|
| Lake Clark           | Currant Cr Fire 2013                  | CBI, AKR Fire & Fuels Plots            |                  |               |                      |              | 43          |
|                      | Kristin Cr Fire 2013                  | CBI & Cover                            |                  |               |                      |              | 7           |
| Wrangell-St. Elias   | Carl Cr RX                            | AKR Carl Cr Plots                      |                  |               |                      |              | 29          |
|                      | Chakina Fire 2009                     | CBI & Cover                            |                  |               |                      |              | 56          |
|                      | Chakina 2009/Steamboat 2016           | AKR Fire & Fuels Plots                 |                  | 26            | 16                   | 42           | 42          |
|                      | Susan Smith – Hazard Fuels Plots - TX | AKR SS Hazard Fuels Plots              |                  |               |                      |              | 13          |
|                      | Headquarters – TX                     | AKR Hazard Fuels Plots                 |                  |               |                      |              | 19          |
|                      | Fire Effects – Paired Plots           | AKR Paired Plots                       |                  |               |                      |              | 2           |
|                      | McCarthy University Subdivision - TX  | AKR Hazard Fuels Plots                 |                  |               |                      |              | 27          |
| Yukon-Charley Rivers | 2004 Woodchopper Fire                 | AKR Fire & Fuels Plots                 |                  |               |                      |              | 7           |
|                      | 1999 Witch Fire                       | Fire effects - other                   |                  |               |                      |              | 15          |
|                      | 2004 Fire – Paired Plots              | AKR Paired Plots                       |                  |               |                      |              | 5           |
|                      | 1999 Fires Landcover-CBI              | AKR Fire & Fuels Plots                 |                  |               |                      |              | 30          |
| Denali               | Headquarters – TX                     | AKR Hazard Fuels Plots                 |                  |               |                      |              | 27          |
|                      | VDM Highpower fire reburns            | AKR Fire & Fuels Plots                 |                  |               |                      |              | 10          |

| Park               | Monitoring Unit               | Type of Plot (FMH, photo point, other) | Pre-burn/TX 2017 | 1yr Post 2017 | Post (2-20 yrs) 2017 | Annual Total | Total Plots |
|--------------------|-------------------------------|----------------------------------------|------------------|---------------|----------------------|--------------|-------------|
|                    | Landcover-CBI                 | AKR Fire & Fuels Plots                 |                  |               |                      |              | 55          |
|                    | BeaverLog Fire 2013           | CBI & Cover                            |                  |               |                      |              | 13          |
|                    | Toklat R. East Fire 2013      | CBI & Cover                            |                  |               |                      |              | 25          |
| Noatak             | 2010 Fires                    | CBI & Cover                            |                  |               |                      |              | 34          |
|                    | 2004 Uvgoon Fire              | AKR Fire & Fuels Plots                 |                  |               |                      |              | 6           |
|                    | 2012 Uvgoon/ Kungiakrok Fires | CBI & Cover                            |                  |               |                      |              | 22          |
|                    | 1977 Fires Racine Plots       | Racine Plots                           |                  |               | 8                    | 8            | 8           |
| Bering Land Bridge | 1977 Fire Racine Plots        | Racine Plots                           |                  |               |                      |              | 8           |
|                    | Fairhaven Ditch Cabins- TX    | AKR Hazard Fuels Plots                 |                  |               |                      |              | 4           |
| <b>Total</b>       |                               |                                        |                  | <b>26</b>     | <b>24</b>            | <b>50</b>    | <b>507</b>  |

### Wrangell-St. Elias Repeat Fires – Chakina and Steamboat Creek

Spruce forests in Interior Alaska generally have a fire return interval (the time between successive fires) between 60-150 years. The Southcentral boreal forests of Wrangell-St. Elias generally have a longer time between fires, approximately 150-200 years. So when the 2016 Steamboat Fire ignited and burned nearly 18,000 acres within an area of Wrangell-St Elias that had previously burned in 2009, fire managers and park staff were interested to know what was burning and the potential impacts of the shortened fire return interval (just seven years) on the landscape. Plots established to monitor burn severity and effects of the 2009 Chakina Fire provided a foundation to determine what was burning in the 2016 Steamboat Fire. During this past summer (2017), Alaska Region fire ecology program and USGS researchers measured 42 plots in areas that were once- and twice-burned to assess the effects on vegetation and soils.

Monitoring goals for the project were to determine what fuels and vegetation carried the second fire and how once and twice burned sites may vary in recovery. The objectives of the study were to:

- Document vascular and non-vascular plant cover changes
- Monitor tree seedling establishment
- Document changes in tree densities by diameter size class
- Document changes in active layer depths and soil temperatures

**Table 3.** Number of plots sampled by forest type and time since fire in Wrangell-St. Elias. Black spruce pre-burn plot data includes plots from a 1997-1998 spruce beetle study in the area that did not burn.

| Time since fire (Graph label)  | Year Sampled     | Black Spruce Plot Numbers | White Spruce Plot Numbers |
|--------------------------------|------------------|---------------------------|---------------------------|
| Pre-Burn (PreBurn)             | 1997, 1998, 2009 | 15                        | 7                         |
| Post Burn 1 Year (BurnYr01)    | 2010             | 2                         | 5                         |
| Post Burn 8 Years (BurnYr08)   | 2017             | 9                         | 7                         |
| Twice Burned 1 Year (Burn2Yr1) | 2017             | 10                        | 16                        |



**Figure 3.** This white spruce forest was burned in 2009 by the Chakina fire in Wrangell St. Elias NP. The site was originally monitored as part of spruce beetle project in 1998. Photos from monitoring site (SPB-3683-1) are shown from left to right; pre-fire (1998), 1 year post fire (2010) and 8 years post fire (2017).



**Figure 4.** This black spruce forest was burned in 2009 by the Chakina fire in Wrangell St. Elias NP. The site was established in front of the 2009 fire. Photos from monitoring site (362-1) are shown from left to right; pre-fire (2009), 1 year post fire (2010), and 8 years post fire (2017).



**Figure 5.** This white spruce forest was burned in 2009 by the Chakina fire and burned again in 2016 by the Steamboat Creek fire in Wrangell St. Elias NP. Photos from monitoring site (G-06) are on the left - 1 year post fire (2010) and on the right - 1 year post two burns (2017).



**Figure 6.** This black spruce forest was burned in 2009 by the Chakina fire and burned again in 2016 by the Steamboat Creek fire in Wrangell St. Elias NP. Photos from monitoring site (G-07) are on the left - 1 year post fire (2010) and on the right - 1 year post two burns (2017).

The plots sampled were of two general vegetation types prior to the fires - upland white spruce (Figures 3 and 5) and mesic black spruce (Figures 4 and 6), and as show in Table 2. The general changes in vegetation cover by dominant life form are shown in the graph in Figure 7, while Figure 8 shows the average cover of the common species of the non-vasculars, herbaceous plants, dwarf shrubs, and shrubs at the sites. One year after the initial fire the live tree cover was reduced to nearly zero percent cover. Most of the late successional feathermosses (*Hylocomnium splendens* HYS70) were consumed and early successional mosses (*Ceratodon purpureus* CEPU12) and liverworts (*Marchantia polymorpha* MAPO16) (Figure 8A) and some fireweed (*Epilobium angustifolium*

EPAN2) (Figure 8B) were establishing one year after the first fire. Eight years after the 2009 fire the upland white spruce plots had a dense cover of fireweed (average cover 27%), willow (*Salix* spp) (26%), with aspen and young white spruce trees establishing in the understory. The black spruce sites had more horsetails (*Equisetum* spp.) (22% cover) and Labrador tea (*Ledum palustre*) (4% cover) established than the white spruce sites. The dwarf shrub (subshrub) cover was reduced at both the black and white spruce sites after the fire.

The down trees and the dead thatch of fireweed from prior year's growth likely provided the fuel for the 2<sup>nd</sup> fire to burn. The second burn consumed much of the smaller dead and down woody material (1 – 10 hour fuels), and at some sites even consumed some of the larger diameter down woody debris (100 and 1000 hour fuels). At many of the twice burned sites the ground was carpeted by early successional mosses (*Ceratodon purpureus* and *Marchantia polymorpha*). Fireweed seedlings and re-sprouts were prevalent, some willows and aspen were still able to re-sprout at the twice burned sites. Overall there was more vascular and non-vascular plant cover at the twice burned sites one year after the second fire, than was found one year after the first fire (See Figures 5 and 6 photos and Figure 7 graph).

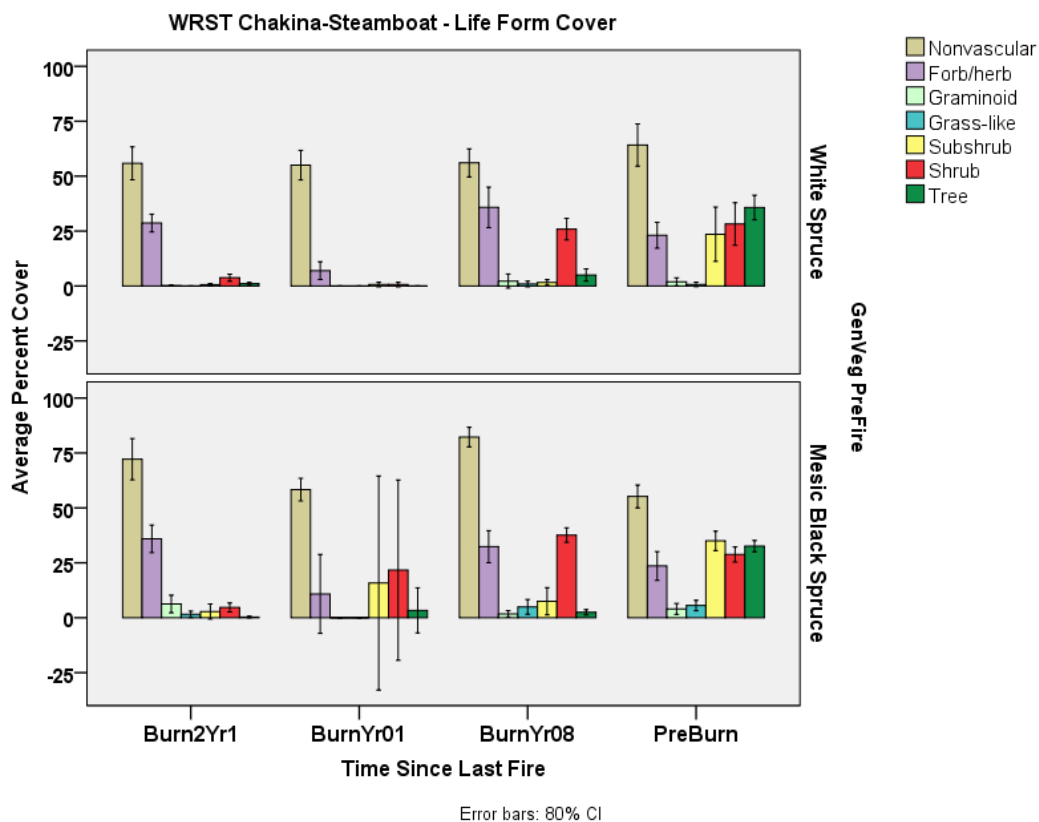


**Figure 7.** Point intercept vegetation cover data summarized for average cover by life form from the Chakina-Steamboat Creek fire monitoring plots in Wrangell-St. Elias.

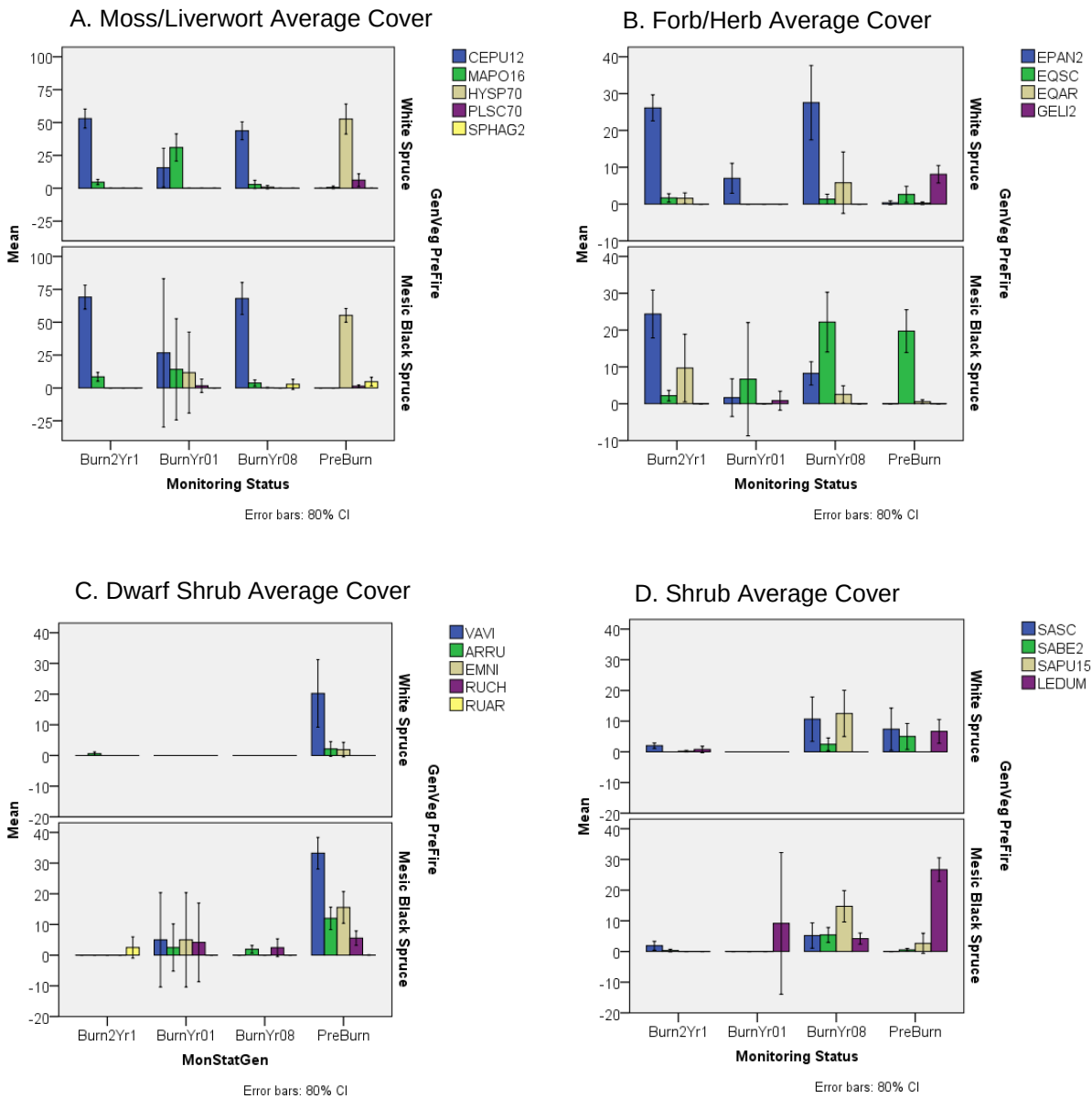


**Figure 8.** The average cover graphs of dominant species of non-vasculars (moss/liverworts), forbs, dwarf shrubs, and shrubs. Species codes are four letter acronyms of genus and species (plants database: <https://plants.usda.gov/java/>).

Tree seedlings are important for the future forest that will occur after a fire. The average density of tree seedlings was quite variable (Table 4) among the plots and across the time since fire. Only 7 sites were sampled for tree seedlings in 2010, however none of the plots had seedlings present one year after the initial fire. Eight years after the fire more trees reproduction was evident. The white spruce sites were dominated by deciduous tree regeneration, primarily aspen (*Populus tremuloides*) with an average of 44,642 (80% CI 14,009 - 75,274) aspen “seedlings” per hectare. White spruce seedlings were present as well with an average of 2,730 (80% CI 237 - 5,222) seedlings per hectare.

The black spruce sites eight years after the fire had a high level of white spruce seedlings present along with black spruce and aspen establishing (Table 4). The identification of spruce seedling species can be problematic, so there could be some errors in the species identifications.

Preliminary analysis indicates that even with a second burn, some black spruce seedlings survived or regenerated after the second fire. The dominant seedling trees were re-sprouting aspen. The average density of aspen “seedlings” at the twice burned white spruce sites was 6,824 aspen/hectare and at the black spruce sites had an average of 2,017 aspen/hectare.

**Table 4.** Average seedling densities (trees less than 1.37 m tall) per hectare by forest type and time since fire(s).

| Forest Type and Time since fire | Number of Plots | White spruce seedlings/hectare (80% Confidence Interval) | Black spruce seedlings/hectare (80% Confidence Interval) | Deciduous tree seedlings/hectare (80% Confidence Interval) |
|---------------------------------|-----------------|----------------------------------------------------------|----------------------------------------------------------|------------------------------------------------------------|
| <b>White Spruce Plots</b>       |                 |                                                          |                                                          |                                                            |
| Pre-Burn                        | 7               | 1,561 (823 - 2,299)                                      | 56 (0.05 - 113)                                          | 741 (210 – 1,270)                                          |
| Post Burn 1 Year                | 5               | 0                                                        | 0                                                        | 0                                                          |
| Post Burn 8 Years               | 7               | 2,730 (237 - 5,222)                                      | 0                                                        | 44,642 (14,009 - 75,274)                                   |
| Twice Burned 1 Year             | 15              | 0                                                        | 354 (-122 - 829)                                         | 6,824 (2,320 - 11,327)                                     |
| <b>Black Spruce Plots</b>       |                 |                                                          |                                                          |                                                            |
| Pre-Burn                        | 15              | 42 (-3 - 88)                                             | 22,485 (16,599 - 28,371)                                 | 0                                                          |
| Post Burn 1 Year                | 2               | 0                                                        | 0                                                        | 0                                                          |
| Post Burn 8 Years               | 9               | 22,308 (13,473 - 31,144)                                 | 10,144 (3,420 -16,867)                                   | 15,080 (9,975 - 20,185)                                    |
| Twice Burned 1 Year             | 10              | 0                                                        | 106 (-40 - 253)                                          | 2,017 (789 - 3,244)                                        |

### Noatak Tundra Fire Long Term Monitoring

Dr. Charles Racine and colleagues established a series of tundra post-fire vegetation and permafrost monitoring sites within two Alaska parks - Bering Land Bridge and Noatak during the late 1970s and early 1980s. These sites have been monitored several times over the past 40 years and provide the longest set of monitoring data for tundra fire effects study in Alaska.

In 1978 Racine and others established 8 permanently marked plots in a 1977 fire along a topographic gradient on Nimrod Hill, on the east side of Imuruk Lake in Bering Land Bridge NPr (BELA). Pre-fire data was available from a 1973 soils and vegetation survey. The Nimrod Hill BELA plots were re-measured in 1979, 1981, 1983, 2001, and 2002. As part of the Arctic Network Inventory & Monitoring Program, Racine and NPS fire personnel re-measured the plots in 2009.

Following the study in BELA, the same researchers established tundra fire plots in Noatak NPr (NOAT) during 1981 and 1982. Eight sites were established in areas of varying time since fire, ranging from 4 weeks post fire, 4-5 years and 10 years post fire (1972, 1977 and 1982 fires). These sites were not re-measured again until 2005. As part of the Arctic Network Inventory & Monitoring Program (ARCN), Racine and NPS fire personnel relocated and re-measured the Noatak fire plots in 2005. These plots were monitored again in 2017 by ARCN and NPS fire staff. Some of the sites have burned again since the early fires.

For both study areas, ten 1-m x 1-m quadrats were sampled per plot. Data collected within the quadrats include: ocular estimates of vascular and non-vascular species cover, maximum height and stem density estimates of selected shrubs, tree density, active layer depth measurements, site descriptions (soil samples in 1981-82), and photographs.

The purpose of these ground-based permanently marked fire effects plots were to detect major changes in structure and composition of vegetation within the representative areas. This includes changes in the cover of vascular plants by species or lifeform, changes in cover of non-vascular plants by selected species or groupings, changes in density of trees and heights of shrubs, and changes in active layer depth over time.

For preliminary analyses the data from the Noatak Racine plots was summarized by average cover by lifeform in three major categories: unburned, burned once and twice burned. The data was then divided into groups of time since the last fire or measurement for the unburned plots (Table 5). The unburned sites had the lowest forb cover, but conversely had the greatest shrub cover. For the once burned sites, the early years after the fire there were more true grasses and rushes (graminoids), which significantly declined by 20 years post fire. Shrubs and dwarf shrubs increased by 20 years post fire in both the once and twice burned sites and appear to be similar to the average cover of shrubs in the unburned plots. It appears that the twice burned plots have greater cover of tussock forming sedges (*Eriophorum vaginatum* and *Carex bigelowii*) than the once burned and unburned sites (Table 5 and Figure 9).

These sites have been incorporated into the Arctic Network long term monitoring protocols for future monitoring.

**Table 5.** Average percent cover of vascular plants by life form types for sites that were unburned, burned 1 time and 2 times over the past 40 years at the Noatak Racine plots. The number of plots are shown as “n” in the table. The 80% confidence intervals are shown in parentheses.

| UnBurned               | n | Forb/herb         | Graminoid         | Sedge                | Dwarf Shrub         | Shrub               |
|------------------------|---|-------------------|-------------------|----------------------|---------------------|---------------------|
| 1982                   | 2 | 0.2<br>(-0.3-0.6) | 0                 | 32.7<br>(-14.7-80.1) | 3.4<br>(-6.9-13.6)  | 36.4<br>(7.6-65.3)  |
| 2005, 2017             | 3 | 1.0<br>(0.02-2.0) | 0.1<br>(-0.1-0.3) | 31.2<br>(22.5-39.9)  | 7.4<br>(3.1-11.7)   | 42.1<br>(35.3-49.0) |
| <b>Burned Once</b>     |   |                   |                   |                      |                     |                     |
| PostBurn 0-10 years    | 8 | 4.2<br>(2.2-6.3)  | 7.9<br>(4.0-11.8) | 25.7<br>(15.4-36.0)  | 2.1<br>(0.5-3.7)    | 10.2<br>(6.7-13.6)  |
| PostBurn 20-30 years   | 5 | 7.9<br>(3.5-12.3) | 0.8<br>(0.2-1.4)  | 31.4<br>(13.9-48.9)  | 6.6<br>(1.6-11.7)   | 37.8<br>(22.9-52.7) |
| PostBurn 40 years      | 4 | 8.6<br>(3.2-13.9) | 0.2<br>(0.03-0.4) | 26.7<br>(9.6-43.8)   | 6.6<br>(1.7-11.4)   | 39.3<br>(8.0-70.6)  |
| <b>Burned Twice</b>    |   |                   |                   |                      |                     |                     |
| Twice Burn 0-5 years   | 2 | 1.7<br>(1.5-1.8)  | 1.5<br>(-0.2-3.3) | 67.2<br>(-7.9-142.0) | 0.03<br>(-0.05-0.1) | 5.2<br>(-5.6-16.1)  |
| Twice Burn 20-30 years | 2 | 2.3<br>(1.0-3.6)  | 0.8<br>(0.3-1.2)  | 52.5<br>(6.6-98.4)   | 5.3<br>(4.9-5.7)    | 40.6<br>(14.4-66.7) |

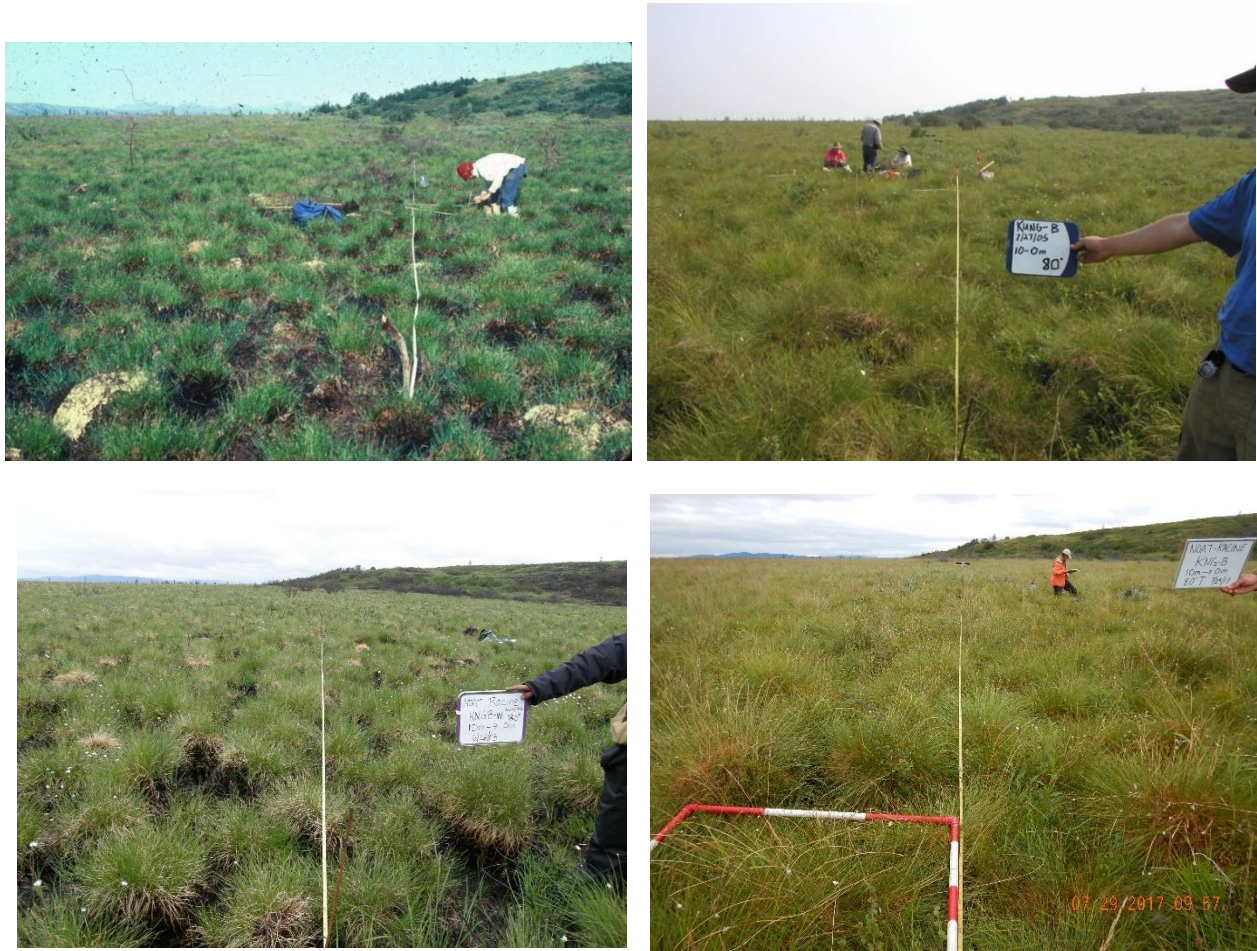


**Figure 9.** The Kungiakrok burn site (KNG-B) from the Noatak Racine plots was initially monitored a few weeks after a small fire in 1982 (upper left photo). The site was remeasured in 2005 (upper right) and the tussocks and shrubs were recovered 23 years after the fire. In 2012 the site was burned again and remeasured 1 year after the fire (lower left photo) in 2013 and again in 2017, 5 years after the 2<sup>nd</sup> fire (lower right photo). Five years after the 2<sup>nd</sup> fire the tussocks are dominant, but dwarf and low shrubs are re-establishing.

## Data Management

Data for all 2017 monitoring projects have been entered into FFI (FEAT/FIREMON Integrated) - a plot-level monitoring sequel server software tool designed to assist managers with collection, storage and analysis of ecological information (<http://www.frames.gov/partner-sites/ffi/ffi-home/>). Digital archives and metadata for the AK databases were uploaded to the NPS Data Store IRMA in January 2017. The Alaska Eastern Area fire ecology data set is located here and includes data for YUCH and WRST: <https://irma.nps.gov/DataStore/Reference/Profile/2249969> and the Alaska Western Area fire ecology data set includes data for DENA, NOAT, BELA, and LACL: <https://irma.nps.gov/DataStore/Reference/Profile/2249968>. The updated FFI databases reflect the recent data additions and QC to the AK NPS fire ecology databases (Table 6).

**Table 6.** Monitoring Data Entry and Number of Treatment Units Monitored for 2017

| Park/Project                                             | % 2017 Data Entered | % 2017 Data Quality Checked | # Prescribed Fires Monitored | # Non-fire Fuels Treatments Monitored | # Wildfires Monitored | # BAER Treatments Monitored |
|----------------------------------------------------------|---------------------|-----------------------------|------------------------------|---------------------------------------|-----------------------|-----------------------------|
| Wrangell-St. Elias Chakina/Steamboat – Repeat Fire Plots | 100%                | 100%                        | 0                            | 0                                     | 1                     | 0                           |
| Noatak (Racine) Long-term Tundra Fire Effects            | 100%                | 100%                        | 0                            | 0                                     | 1                     | 0                           |

## C. Research & Technology

The AKR fire ecology program coordinates **research** and facilitates the use of scientific data, modeling and technology to address the needs of the fire management program. In 2017 a shared fire research proposal with the Intermountain West was submitted to the NPS fire reserve funds and was funded (see Table 7). Funding from FWS-LCC to assess the extent, cause and impacts of shortened fire return intervals in boreal forests provided funds for field work in Wrangell-St. Elias in 2017 to assess changes after fires that occurred in 2009 and 2016 (as described under the monitoring section of this report). Researchers from University of Montana have completed the tree ring analysis from the tree cores and cross-sections from Wrangell-St. Elias McCarthy University Subdivision fuels treatment area that was funded in FY15 with NPS Reserve Fuels Research. The final CESU report is expected in February of 2018.

Both fire ecologists are part of the interagency Fire Research, Development and Application Committee (FRDAC) for the Alaska Wildland Fire Coordinating Group (AWFCG) and are on the board for the JFSP Alaska Fire Science Consortium. Both ecologists participated in workshops and meetings for an interagency effort to update the Alaska Fuel Model Guide Book.

**Table 7.** Research workload in 2017.

| Park                    | Are research needs identified in FMP or Monitoring Plan? | # of Proposals Submitted in 2017 | # of Proposals Funded in 2017 | # of Research Projects Supported in 2017 <sup>1</sup> | Additional Comments                         |
|-------------------------|----------------------------------------------------------|----------------------------------|-------------------------------|-------------------------------------------------------|---------------------------------------------|
| Wrangell-St. Elias NPPr | yes                                                      | 0                                | 0                             | 2                                                     | NPS FY15 Reserve Fund FWS-LCC repeat fires. |
| Denali NPPr             | Under revision                                           | 1                                | 1                             | 1                                                     | NPS FY17 Reserve Fund                       |

<sup>1</sup>Number of funded research projects, new or ongoing, supported by the fire ecology program including logistical info or support, staffing, etc.

## D. Communicating Results

Communicating results of projects or research is an important aspect the fire ecology program in order to provide **information and outreach** to fire managers, park staff, and the public. Table 8 lists the number of monitoring reports and presentations completed by park/affiliated group.

As park staff began to ramp up for the summer season, the fire ecology program pitched in with two train-the-trainer sessions. In May, the assistant fire ecologist presented park-specific Alaska fire ecology, fire behavior, and fire regime information to Wrangell-St. Elias interpreter staff to help field visitor questions. The group also took a tour of the fuel treatment surrounding park headquarters. The regional fire ecologist also had an opportunity to interact with Denali park staff during the Ask-A-Scientist event.



**Figure 12.** Teachers in Denali count tree rings from a tree core to determine the age of spruce trees.

Later in June, the regional fire ecologist participated in a teacher intensive in Denali National Park.

Teachers learned about fire in the park through a day-long field trip learning about boreal forests (Figure 12). The fire ecology program also provided fuel moisture sampling assistance in the form of field demonstrations and one-on-one instruction to interagency fire management partners (State of Alaska, Division of Forestry – Fairbanks Area).

In addition to these activities, formal oral presentations were given at the Interagency Fall Fire Review (October) and the Association for Fire Ecology Conference (November) summarizing preliminary results of field work in Denali and Wrangell-St. Elias on the impacts of repeat fires. This project was also featured in the Fall 2017 issue of High Latitude Highlights, entitled “Once-burned.....Twice-burned Forests in a Changing Landscape”. Finally, the regional fire ecologist gave a webinar presentation for the AWFCG (Alaska Wildland Fire Coordinating Group) Fire Modeling and Analysis Committee on comparing and testing Alaskan fuel models and fire behavior based on fuel moisture adjustments. This webinar was hosted in conjunction with JFSP Alaska Fire Science Consortium. Both the regional and assistant fire ecologists serve as advisory board members and are actively involved in Alaska Fire Science Consortium activities.

See Appendix A for a list of reports, presentations, and other forms of communication completed in 2017.

**Table 8.** Communicating Results - 2017

| Park                                  | # of Project Monitoring Reports completed in 2017 | # of Annual meeting(s) with Park staff | # of Formal presentations of results | Do you use Minitab?* |
|---------------------------------------|---------------------------------------------------|----------------------------------------|--------------------------------------|----------------------|
| Yukon-Charley Rivers                  | 0                                                 | 0                                      | 0                                    | No                   |
| Denali                                | 0                                                 | 0                                      | 1                                    | No                   |
| Noatak                                | 1                                                 | 0                                      | 0                                    | No                   |
| Lake Clark                            | 0                                                 | 0                                      | 0                                    | No                   |
| Wrangell-St. Elias                    | 1                                                 | 0                                      | 1                                    | No                   |
| Alaska Regional Office                | 0                                                 | 2                                      | 0                                    | No                   |
| Arctic Inventory & Monitoring Network | 1                                                 | 0                                      | 0                                    | No                   |

\*This information will help to assess Minitab multi-user license needs.

## E. Planning and Compliance

The fire ecology program participates in **planning** activities for the Fire Management and Park Land Management Programs. Table 9 has a list of parks with fire management plans and the status for fire monitoring plans and Desired Future Conditions within the plans or other planning documents (<http://www.nps.gov/policy/DOrders/draftDO2-1.html>).

**Table 9.** Fire Management Plan - Fire Monitoring Plan Status as of 2017

| Park                              | Does Park have written Desired Future Conditions (DFCs)? (yes or no) | Date Park-level Monitoring Plan completed (or revised) | Total # of Project- or Community-level Monitoring Plans | Assisted with how many BAER plans in 2017? |
|-----------------------------------|----------------------------------------------------------------------|--------------------------------------------------------|---------------------------------------------------------|--------------------------------------------|
| Denali                            | Yes in RSS                                                           | Planned for 2018                                       | 4                                                       | 0                                          |
| Gates of the Arctic               | Yes - Interim Fire Desired Conditions in FMP                         | 2014                                                   | 1                                                       | 0                                          |
| Katmai                            | Yes – Suggested Fire Desired Conditions in FMP                       | 2012                                                   | 0                                                       | 0                                          |
| Lake Clark                        | No - Fire Management Objectives in FMP                               | 2010                                                   | 1                                                       | 0                                          |
| Western Arctic National Parklands | Yes - Interim Fire Desired Conditions in FMP                         | 2012                                                   | 4                                                       | 0                                          |
| Wrangell-St. Elias                | No - Fire Management Objectives in FMP                               | 2010                                                   | 5                                                       | 0                                          |
| Yukon-Charley Rivers              | No - Fire Management Objectives in FMP                               | 2010 (under revision for 2017-18)                      | 2                                                       | 0                                          |

## F. Fire ecology accomplishments and areas of focus

### Fire Ecology Staffing 2017

The Alaska NPS Fire Ecology Program has a regional fire ecologist and a subject-to-furlough assistant regional fire ecologist. In general the fire ecology fieldwork has been accomplished with the assistance of the NPS fuels seasonal technicians or fire staff under the guidance of the regional fire ecologists. This has worked well, since the NPS Alaska Western Area (AWAFM) and Eastern Area Fire Management (EAFM) programs have generally hired multi-disciplinary fuels seasonal staff and allocated some of their time to fire ecology projects. Table 10 provides an overview of the personnel that work on or have assisted with fire ecology projects in 2017.

**Table 10.** Fire Ecology Staffing 2017

| Ecologist and Monitors                              | Starting Date | Ending Date | # of Pay Periods | READ Qualified (Yes or No) | Training and Development   |
|-----------------------------------------------------|---------------|-------------|------------------|----------------------------|----------------------------|
| Jennifer Barnes (Regional Fire Ecologist)           | 1/1/2017      | 12/31/2017  | 26               | No                         | NEPA training              |
| Jennifer Hrobak (Assistant Regional Fire Ecologist) | 1/1/2017      | 12/31/2017  | 24.5*            | No                         | ATR, ArcGIS/Remote Sensing |
| 1 AWAFM Fire Crew Member                            | 7/9/2017      | 7/18/2017   | 1                | No                         | -                          |
| 1 AWAFM Staff Member                                | 7/24/2017     | 8/1/2017    | 1                | No                         | -                          |
| 2 EAFM Detailed Fire Staff                          | 7/9/2017      | 7/18/2017   | 2                | No                         | -                          |

\*13 pay periods on base funding, additional pay periods on I&M funds, fire and other project funds.

## Regional Fire Ecologists Accomplishment/Focus Areas

The Alaska regional fire ecologist facilitates planning, monitoring, research and outreach for the *region* and *park* programs. This position is responsible for monitoring plans, protocol development, compliance, administration, field instruction, field work, data analysis, and reporting on projects for the parks and region. In 2017, the regional fire ecologist finalized the Arctic Network Inventory & Monitoring (ARCN) fire monitoring protocols; prepared and taught lessons for three fire classes (S-495, RX310 and Canadian S290); planned and implemented two field projects; prepared cooperative agreements for research projects; and prepared presentations. Table 11 provides a summary of the Alaska Regional Fire Ecologist focus areas and accomplishments for the calendar year of 2017.

**Table 11.** Fire Ecologist 2017 Accomplishments/Focus Areas (J. Barnes)

| Category                                  | Percent Time | Accomplishments and/or areas of activities                                                                                                                                                                                                                                                               |
|-------------------------------------------|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Planning                                  | 20%          | I&M Network Fire Monitoring Protocols – ARCN<br>Compliance for field work<br>Field prep for field work – Project Aviation Safety Plans, etc.<br>Glacier Bay Fire Management Plan – meetings and prep                                                                                                     |
| Presentations/ Reports                    | 13%          | Presentations: NPS, Public, Interagency Meetings<br>Annual reports for Fire Ecology program and I&M network<br>Teacher education classes – DENA<br>Articles for NPS High Latitude Highlights<br>Association for Fire Ecology presentation                                                                |
| NPS Meetings/ task groups                 | 10%          | AKRO Regional and Park Fire Meetings<br>Regional Fire Ecologist conference calls<br>I&M Technical Committee meetings<br>BELA, WEAR RSS followup                                                                                                                                                          |
| Interagency work                          | 11%          | S495 Geospatial Analysis - Cadre<br>CANS290 Canadian Fire Behavior – Cadre<br>RX310 - Cadre<br>AWFCG Fire Research, Development & Application Committee<br>AWFCG Fire Modeling and Application Committee<br>Alaska Fire Science Consortium (Board member)<br>LANDFIRE calls<br>Interagency fire meetings |
| Wildfire assignments                      | 6%           | GSAN 2 days, RESL Oregon 2 weeks                                                                                                                                                                                                                                                                         |
| Prescribed fire projects (implementation) | 0            |                                                                                                                                                                                                                                                                                                          |
| Non-fire fuels projects (implementation)  | 0            |                                                                                                                                                                                                                                                                                                          |
| Research                                  | 6%           | USGS/FWS-LCC Repeat Fire research coordination<br>WRST Tree Ring project coordination<br>NASA AbOVE tree seedling data<br>Proposal reviews and letters of support                                                                                                                                        |
| Data collection                           | 7%           | WRST Chakina/Steamboat repeat fire monitoring<br>NOAT Racine tundra fire plot monitoring<br>Fuel Moisture Sampling                                                                                                                                                                                       |
| Data entry                                | 1%           | Data entry supervision and database assistance<br>QC of data                                                                                                                                                                                                                                             |
| Data analysis                             | 7%           | NOAT Racine tundra fire plots<br>WRST and DENA Repeat fire plots                                                                                                                                                                                                                                         |

| Category                                    | Percent Time | Accomplishments and/or areas of activities                                                          |
|---------------------------------------------|--------------|-----------------------------------------------------------------------------------------------------|
|                                             |              | Burn severity and fire history stats                                                                |
| Supervision/Admin                           | 12%          | Supervision STF GS-9 Fire Ecologist<br>Paperwork and administrative (time, travel, email)<br>Budget |
| Training                                    | 5%           | NEPA Training<br>Annual NPS Spring Training (RT-130, etc.)<br>Bear & Shotgun Safety Training        |
| Travel out-of-park for plot or project work | 2%           | All field work requires a travel authorization, multi-day trips away from duty station.             |
| Miscellaneous                               | 1%           |                                                                                                     |

### Assistant Fire Ecologist Accomplishments/Focus Areas

The subject-to-furlough assistant regional fire ecologist works for the regional fire ecologist in Alaska. This position helps plan and implement fire effects and fuels monitoring projects. This position also assists in the development of park fire management plans, fire monitoring plans, and compliance for fire ecology activities. The majority of work in 2017 shifted to fire assignments, supporting multiple incident management teams (32%) during a long and intense lower 48 fire season. Outside of fire support, the primary workload focused on field planning/preparation for 2 remote field projects (Noatak and Wrangell-St. Elias) and data entry/processing. Other notable accomplishments include completing SOPs for the ARCN Fire Extent, Severity and Effects Monitoring Protocol and developing a SOP for entering remote risk assessments for the NPS Alaska Region.

**Table 12.** Assistant Fire Ecologist Accomplishments/Focus Areas 2017 (J. Hrobak)

| Category              | Percent Time | Accomplishments and/or areas of activities                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-----------------------|--------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Planning              | 10%          | WRST – Repeat Burn Project (Compliance, Logistics, Flight Planning, Project Aviation Safety Plan, Task Order, Sampling Locations, Gear Prep, Maps, Field Crew Coordination, etc.)<br>NOAT – Tundra Long-Term Fire Effects Project (Compliance, Logistics, Flight Planning, Project Aviation Safety Plan, Task Order, Gear Prep, Maps, Field Crew Coordination, etc.)<br>Annual Spring Training Preparation (Presentation materials, handouts, meeting logistics, etc.)<br>Annual Field Project Preparation (Trimble and Garmin updates, CartoPac, ArcGIS updates, data dictionary editing, camera settings, Garmin waypoint organization, etc.)<br>GLBA Fire Management Plan preparation. |
| Presentations/Reports | 7%           | Standard Operating Procedures for ARCN Fire Frequency and Extent, Burn Severity, and Fire Effects Monitoring Protocol<br>Standard Operating Procedures for Remote Risk Assessments in NPS Alaska<br>Fire Ecology Presentation for WRST Interpretive Staff<br>CFFDRS FWI: Anticipating Extreme Fire Behavior Presentation (NPS Spring Training)<br>Fuel Moisture Sampling and Plant ID demonstrations (NPS Spring Training)<br>NPS Remote Risk Assessments Demonstration (NPS Spring Training)<br>Fire Ecologist panelist for AK Remote Sensing Workshop<br>RX-310 Course Units                                                                                                            |

| Category                  | Percent Time | Accomplishments and/or areas of activities                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|---------------------------|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                           |              | CFFDRS (CAN290) Course Units                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| NPS Meetings/ task groups | 5%           | AKRO Regional Staff Meetings (weekly)<br>AK Region Fire Management Meetings (monthly)<br>AKRO Fire Annual In-Person Staff Meetings (semiannual)<br>Miscellaneous Project Conference Calls (STARFire, Risk Assessments, CartoPac, etc.)<br>GLBA Fire Management Plan meetings                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Interagency Work          | 6%           | AK Fuel Model Guide Book Revision Meetings<br>Alaska Fire Science Consortium – Advisory Board Member<br>AWFCG Fire Research, Development & Application Committee (Vice-Chair)<br>AWFCG GIS Committee (Alternate)<br>AWFCG Fire Modeling and Analysis Committee (Participant)<br>Alaska Incident Management Team Meetings<br>Alaska Interagency Fall Fire Review<br>Alaska Fire Science Consortium Workshops<br>NPS Representative for IARPC<br>RX-310 Course Cadre (Course Prep, Meetings, Instructor)<br>CFFDRS Course Cadre (Course Prep, Unit Edits, On-line Faculty Resources, Post-course Coordination, Prep for 2018 Course)<br>US National Vegetation Classification System – AK Workshop<br>NASA Alaska Remote Sensing Workshop |
| Wildfire Assignments      | 32%          | Three 14-Day Fire Assignments as RCDM(t) to Lower 48. Taskbook completed. (Lolo Peak Fire, Desolation Fire, Chetco Bar Fire)<br>Fire Behavior Observation and Mapping in AK (Trout Creek Fire, YUCH)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Prescribed fire projects  | 0%           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Non-fire fuels projects   | 0%           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Research                  | 1%           | USGS/FWS-LCC Repeat Fire Research Meetings<br>W. Hansen Denali Suppression Effects Modeling Project Meetings                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Data Collection           | 6%           | Fuel Moisture Sampling<br>WRST Chakina/Steamboat Repeat Fire Project<br>NOAT Long-term Tundra Fire Effects (Racine Plots)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Data Entry/Processing     | 10%          | FFI Data Entry (2017 WRST & NOAT, 1980's & 2005 NOAT – Racine legacy data)<br>FFI Database QC (merging databases, correcting legacy data, etc.)<br>Photo and GPS Processing (2016 WRST, 2017 WRST & NOAT)<br>Datasheet Scans/File Processing<br>Fuel Moisture Sampling Data Entry<br>QC ARCN History WFMI fire report records                                                                                                                                                                                                                                                                                                                                                                                                           |
| Data Analysis             | 6%           | Facility Risk Assessment Analysis for WRST<br>Repeat Fires Project – NW Boreal LCC Geospatial Data Analysis<br>Data assembly for STARFire Project                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Supervision/Admin         | 2%           | Quick Time, Travel Authorizations/Vouchers, Credit Card Statements, Fire Physicals, Email, etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Training                  | 6%           | NASA Alaska Remote Sensing Workshop – Hands on Training<br>NIFC AGOL/Collector Training<br>Aviation Courses (A-100, A-110, A-200, A-311, A-312 )<br>Annual NPS Spring Training (RT-130, First Aid, CPR, etc.)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

| Category                                    | Percent Time | Accomplishments and/or areas of activities                                                                                                                                                                                                                          |
|---------------------------------------------|--------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                             |              | Bear Safety Training<br>Shotgun Certification<br>Telework Fundamentals<br>DOI Required Courses (FISSA+, Sexual Harassment, EEO, Privacy for Systems Managers, Records Management, CUI Awareness Training, Privacy Awareness)<br>Agreements Technical Representative |
| Travel out-of-park for plot or project work | 9%           | Travel to WRST & NOAT for field projects<br>Travel to L-48 for 3 Fire Assignments (Montana and Oregon)<br>Travel to Glennallen, AK for presentations<br>Travel to NPS Fire Management Annual Meetings (Anchorage)<br>Travel for ATR Training (Anchorage)            |
| Miscellaneous                               | 1%           |                                                                                                                                                                                                                                                                     |

## G. 2018 Fire Ecology Program Direction

The primary goal for 2018 will be to complete the final Arctic Network I&M Fire Protocols, data management for plot locations and FFI databases, and writing up technical reports or publications from past field work. Minimal field work is planned for this year to provide more time for data analysis and completion of projects. See lists below for the proposed direction of the AKR fire ecology program for 2018.

### Planning

- ARCN Fire Monitoring Protocols & SOPs
- Compliance for field work
- Glacier Bay Fire Management Plan and EA

### Projects and Data Entry

- Project: Fire Ecology Plot Locations Geodatabase
- Project: Yukon-Charley Woodchopper Fire plots
- Data Entry: Global fixes for known FFI database errors
- Data Entry: Complete QC of all FFI databases
- Data Entry: Convert additional databases to FFI

### Reports/Outreach

- Outreach: WRST Repeat Fire Project Story Map
- Presentations
- Report: WRST Fuels Treatment Effects
- Report: Repeat fire in Alaska Parks

## F. Overall Data Entry Status and FFI suggestions

### Data Entry Status

Data from this field season along with older legacy data was entered and quality checked in both “FFI\_AKRO” and “FFI\_AKWest” databases in 2017.

Table 13 estimates the number of fire ecology/fuels plots and projects since the mid-1980s that have been entered into FFI or another database format for the Alaska region parks. The vast majority of data not currently included in FFI are from 2000-2003 era CBI plots. Other remaining non-FFI datasets are from fire effects projects that were implemented prior to 2003. Only one known project has not been entered into any database, which includes fire behavior, weather and vegetation observations from a 2007 fire in Yukon-Charley Rivers.

**Table 13.** Number of known fire ecology or fuels plots and number of projects from the Alaska NPS Region and database formats.

| Database Type | Number of Plots | Number of Projects | % Plots | % of Projects |
|---------------|-----------------|--------------------|---------|---------------|
| Access        | 513             | 8                  | 34%     | 26%           |
| Excel         | 15              | 1                  | 1%      | 3%            |
| FFI           | 985             | 22                 | 65%     | 71%           |
| Totals        | 1513            | 31                 |         |               |

It is desirable to convert some of the Access database projects into FFI, particularly the CBI plots. The highest priority is to have global fixes completed for data already entered into FFI. There are multiple projects with data entered in different units of measurement that need to be converted to meters and projects where belt and quad area fields need to be fixed to calculate density correctly (see below).

### FFI Feedback

The following are some suggestions from the user’s perspective to improve FFI, additional suggestions may be sent later. The Alaska Region has not used FFI-Lite.

- Provide fields for circular plot dimensions in density protocols (and likely other protocols) or other alternative. The current protocols only allow for square or rectangular plot dimensions (length and width).
- Clearly identify what fields are used for density calculations in reports in the FFI User Guide or within the system itself.
- Update the FFI User Guide to give definitions of data fields and their intended uses. For example, it is very unclear within the individual tree protocol what the data fields are intended for, particularly the canopy and ladder fuel fields.
- Allow the user to set each protocol header fields (e.g., plot area, plot dimensions, UV fields) and apply them to all sample events within a project (still allowing for individual sample

event modifications as needed). A huge amount of time is wasted entering the same header field information on the data entry forms over and over again. There is also no global fix/replace when something was entered incorrectly.

- When the Default Monitoring Status on a sample event is changed, it does NOT change the Monitoring Status Assignment in the Reports and Analysis function or vice versa. User must manually make the change in two different places.
- Suggested improvements for Macro Plot level fields:
  - Place the Latitude field before the Longitude field.
  - Allow the CTRL + V key board function to paste values to the Latitude and Longitude fields.
  - Make text boxes in the Directions, Metadata and Comments tab expandable with scroll bars (similar to the All Project Units and All Macro Plot tabs under Project Management). Currently users must use arrows on the key box to scroll/view text beyond the fixed dimensions of the text boxes. It is difficult to read and know if there is additional information.
  - Create additional optional Latitude/Longitude fields (and editable descriptors) to capture additional coordinates (i.e., plot corners, transect ends, etc.). Currently additional coordinates are entered as text on the Directions tab.
- Improve the output for the CSV exports. Having the plot meta data headers above each row of data for a plot makes very little sense and always needs to be cleaned up for use of the data. Possibly export the plot metadata headers as one sheet and the data as another CSV.
- Improve the query format so it is more user friendly or provide clear instructions in the FFI User Guide on how to create queries.
- Improve User Guide to include detailed/advanced instructions on FFI data entry, QC, analysis, and all other functions.
- Make FFI-Lite available on iPADS.

## **Appendix A. Reports, publications, or presentations completed in 2017 in conjunction with the Alaska Region Fire Ecology Program.**

- Barnes, J.L. 2017. Burn Severity Mapping with Landsat Imagery and the Normalized Burn Ratio. (Presentation). RX-310 Class. Fairbanks, AK. March 2017.
- Barnes, J.L. 2017. Carlson Lake Fire 2015 – Fuel Model Tests and More. (Webinar Presentation). AWFCG Fire Modeling and Analysis Committee Webinar. Fairbanks, AK. May 2017.
- Barnes, J.L. 2017. Conducting your own Assessment of a Fire Situation. (Presentation). CAN290 – CFFDRS Class. Fairbanks, AK. April 2017.
- Barnes, J.L. 2017. Fire Ecology & Fuels Monitoring Program. (Presentation). NPS Alaska Fire Refresher. Fairbanks, AK. April 2017.
- Barnes, J.L. 2017. Fire History & Fire Ecology in Denali National Park. (Presentation & Field Day). Denali Teachers Intensives. Denali National Park, AK. June 2017.
- Barnes, J.L. 2017. Near Term Fire Behavior Analysis – Predicting Fire Growth Based on Forecast Conditions. (Presentation). S-495 Class. Tucson, AZ. April 2017.
- Barnes, J.L. 2017. Once-burned... Twice-burned Forest in a Changing Landscape. (Article). High Latitude Highlights. Fall 2017.
- Barnes, J.L. 2017. Spruce Bark Beetle and Fire in South-Central Alaska. (Presentation). RX-310 Class. Fairbanks, AK. March 2017.
- Barnes, J.L. 2017. Too Short of Time – Resilience or Change? Impacts of Shorten Fire Return Intervals in Alaska. (Presentation). Association for Fire Ecology Conference. Orlando, FL. November 2017.
- Barnes, J.L. 2017. What is Fueling Repeat Fires? Shortened Fire Return Interval in Copper River Basin and Denali. (Presentation). Interagency Fall Fire Review. Fairbanks, AK. October 2017.
- Hrobak, J.L. 2017. Alaska Fire and Fuels (MesoWest) Website Demonstration. (Presentation). CAN290 – CFFDRS Class. Fairbanks, AK. April 2017
- Hrobak, J.L. 2017. Alaska Manual/Remote Facility Risk Assessment Data Entry. (Report).
- Hrobak, J.L. 2017. CFFDRS Fire Weather Index: Anticipating extreme Fire Behavior. (Presentation and Materials). NPS Alaska Fire Refresher. Fairbanks, AK. April 2017
- Hrobak, J.L. 2017. Fire Effects Monitor. (Presentation and Materials). RX-310 Class. Fairbanks, AK. March 2017.

Hrobak, J.L. 2017. Fire in Wrangell-St. Elis – past, present and future. (Presentation & Field Site Visit). WRST Interpreter Training. Glennallen, AK. May 2017.

Hrobak, J.L. 2017. Monitoring Fire Effects: Goals and Objectives. (Presentation). RX-310 Class. Fairbanks, AK. March 2017.

Hrobak, J.L. 2017. NPS Alaska Remote Risk Assessment Demonstration. (Presentation). NPS Alaska Fire Refresher. Fairbanks, AK. April 2017.