



National Park Service Interior Region 11 (Alaska) Fire Ecology Annual Report Calendar Year 2023

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Members of the Eastern and Western Area Fire Management Ecology teams at the Biederman Allotment fire break near the Upper Yukon River in Yukon Charley National Park and Preserve. NPS, Mariana Perez

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The National Park Service (NPS) Division of Fire and Aviation Management relies on science and long-term monitoring to inform an adaptive management approach for assessing and improving fire management programs and activities at park units. Adaptive management, along with policies, standards, and responsibilities for monitoring are described in Chapter 8 of [Reference Manual 18](#). The NPS Fire Ecology Program is responsible for the collection, analysis, and interpretation of fire effects monitoring data for park managers to use for program evaluation and decision making. This annual report is intended to partially fulfill reporting requirements for the Fire Ecology Program and does not constitute a complete analysis of any NPS fire management program or activity. Additional interpretation and reporting can be found in previous annual reports at [NPS DataStore](#) or by contacting the author(s) of this report.

Table of Contents

A. Summary	3
2023 Fire Ecology Program Overview	3
2023 Alaska Fire Season	4
Fuel Treatments	6
B. Monitoring Results and Recommendations	6
2023 Overview	6
2023 Monitoring Sites and Results.....	10
Western Area Fire Management – Monitoring	11
Denali FY21 Post-treatment Monitoring (Thin and Pile Burn).....	12
Denali Frontcountry Treatments (FC-TX) Pre-treatment Monitoring (Thin and Pile Burn)	14
Denali Frontcountry Piles Pre-treatment Monitoring (Pile Burn).....	14
Coastal Area Fire Management – Monitoring.....	14
Katmai Brooks Camp Post-thinning Pile Burn Monitoring	15
Eastern Area Fire Management – Monitoring.....	16
Wrangell-St. Elias McCarthy Road Fuels Treatment Monitoring.....	17
Yukon-Charley Biederman Fuels Treatment Monitoring	18
Data Management.....	19
C. Research, Planning and Communication.....	20
Research Contributions and Development	20

Planning and Compliance.....	22
Outreach and Communicating Results	22
D. Future Direction	23
Appendix A. Staffing and Accomplishments	25
Regional Fire Ecologist Accomplishments/Focus Areas	25
Assistant Fire Ecologist Accomplishments/Focus Areas	27
Eastern Area Fire Ecologist Accomplishments/Focus Areas	27
Western Area Fire Ecologist Accomplishments/Focus Areas.....	28
Appendix B. History of Fire Effects Monitoring Plots.....	30
Appendix C. Reports, Publications, or Presentations Completed in 2023.....	32
Articles and Publications	32
Presentations.....	32
Alaska NPS Fire Success Stories	32
AKR Monitoring Protocol and Dataset References	33

A. Summary

2023 Fire Ecology Program Overview

This annual report is a summary of fire ecology projects and activities conducted in the Alaska National Park Service (NPS) Interior Region 11 fire ecology programs in 2023. The purpose of the fire ecology program is to provide scientific information to land and fire managers in making decisions that incorporate understanding fire-adapted ecosystems, promote the maintenance of natural fire activity, and provide adaptive-feedback for fuels treatment implementation. Preliminary results of monitoring and research activities in 2023 are provided.

The NPS Alaska Region (AKR) fire ecology program had an unprecedentedly productive field season. This was the direct result of the addition of two fire ecologists to the statewide program that had, for the last two decades (since program inception), been spearheaded entirely by the NPS Alaska Regional Fire Ecologist, Jennifer Barnes, and an Assistant Regional Fire Ecologist, with informal assistance from the Area Fire Management Program staff. It would be an understatement to say that additional fire ecology expertise is welcome; a state as large and fire prone as Alaska was much in need of additional contributors.



Figure 1. Seasonal biological technicians (from left to right) Sarah Martin, Mariana Perez, and Olivia Lawrence transport to the Biederman Bluff allotment for monitoring work. YUCH employee Mike McDougall captains the boat.

In early 2023, two new “Area” or “Park-level” fire ecologists were selected. Fleur Nicklen is now the fire ecologist for the Eastern Area Fire Management Program, and Sarah Stehn is the fire ecologist for the Western Area Fire Management Program. Much of the project-level work has been transferred to these area ecologists. The Regional Fire Ecologists will continue to function in their roles as overarching ecologists for the Alaska region and will serve at the “Park” level for the Coastal Area Fire Management Program.

Fire ecology highlights from across the state include a new project

designed to elucidate the natural fire regime in the Denali frontcountry using paleorecords derived from lake cores, as well as several fuels treatment monitoring projects in Denali National Park & Preserve, Katmai National Park and Preserve, Wrangell-St. Elias National Park & Preserve, and Yukon Charley National Park & Preserve. Additionally, the fire ecology program continues to utilize terrestrial LiDAR technology and has made strides towards refining calibration of the technology with traditional data collection methods.

The fire ecologists worked collaboratively to begin to implement electronic data collection methods, incorporating hand-held devices into their workflow and the monitoring work performed by fuels crews. Efforts were made by technicians to streamline data entry by using MS Excel, and then R, to transform data for direct import into FFI. This work continues into 2024, with the goal of collecting most datastreams digitally in the field and completing all FFI data entry and QA/QC by October of each year.

In 2023, the Area fire ecology programs enjoyed the assistance of three seasonal biological science technicians and selected a new permanent Lead Fire Effects Monitor. All three technicians and one of the regional fire ecologists responded to fire assignments in Alaska and the Lower 48. In addition to leading four field projects across four parks, the fire ecologists provided input on fuels treatment activities, risk assessments, wrote resource briefs, published papers, taught classes, provided scientific outreach, and participated on regional and national committees.

2023 Alaska Fire Season



Figure 2. The Biederman fire in Yukon-Charley Rivers viewed from a side channel of the Yukon River. This ignition occurred during the late July lighting event which triggered an unexpected late fire season in Interior Alaska.

The 2023 fire season in Alaska was below the decadal average for the number of fires and area burned. Statewide, there was a total of 343 fires and 295,767 acres burned, well below the decadal annual average of 501 fires and 1.5 million acres (Alaska Fire Numbers 2023). Although June and early July are normally the most active months of the fire season, only ~2,000 acres burned prior to July 15 in 2023. By July 10, given low levels of fire activity, fire suppression managers downsized resource availability in the state and changed the Management Option from Full to Limited, effectively allowing for fires to burn more freely on the

landscape in anticipation of wetter, cooler weather at the end of July and through August. This is standard practice and based on the well-evidenced assumption that, given general weather trends, in a “normal fire year early season ignitions are more likely to spread to the point that they threaten values than late season ignitions”.

However, 2023 proved to be very much *not* a “normal fire year”. A very warm period occurred in late July, contributing to what was the 3rd warmest summer on record for the interior Alaska community of Fairbanks. Hot, dry weather persisted into August, fuels became exceedingly dry, and drought stress was visibly evident in vegetation communities. Amidst these circumstances, a

remarkable statewide lightning event occurred on July 24, 2023, with over 18,000 strikes in a single day. The remainder of the acres which burned in 2023, nearly the entirety of the ~300,000 acre annual total, was the result of these lightning ignitions in late July. A fire history map depicts the 2023 fires as well as historical fires across the state (Figure 3).

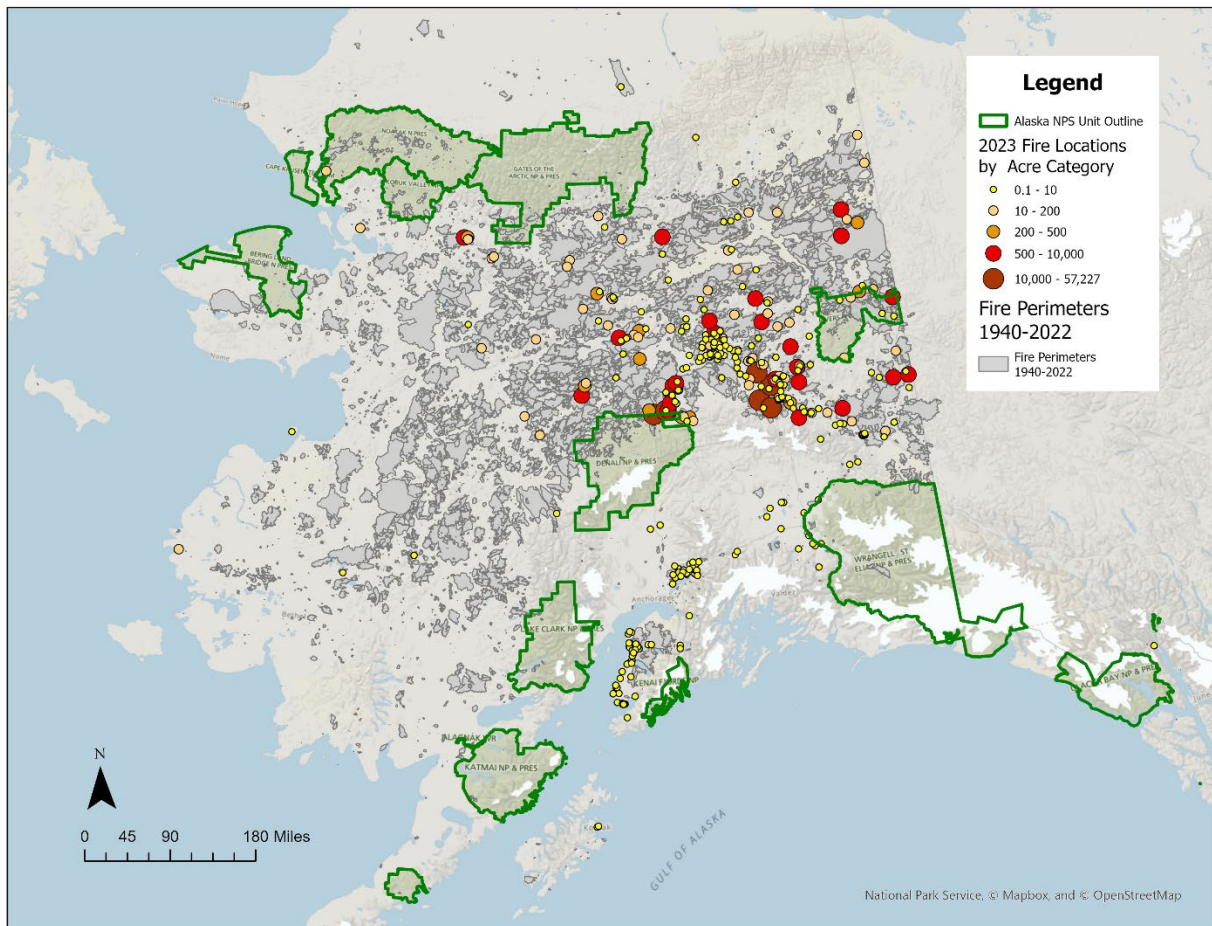


Figure 3. 2023 wildfire locations in Alaska, scaled by size of fire. In 2023, 5 fires occurred, and 1,230 acres burned on NPS lands in Alaska.

The number of fires and area burned within the National Parks in Alaska were also below average in 2023. The ten-year average (2012-2022) on NPS lands in Alaska is 53,035 acres burned per year, with an average of eleven fires per year. In 2023, only 1,230 acres burned in a total of six fires on NPS lands (Table 1). The largest of these fires was the Clear Creek Fire in Denali, which burned a total of 53,289 acres, although only 1,082 acres were on park lands. Four of the six fires on NPS lands occurred in Yukon-Charley Rivers, amounting to a cumulative 136 acres burned.

Table 1. 2023 Wildfire activity, fuels treatments, and pile burning in Alaska NPS Units.

Park	Number of Wildfires ¹	Total Acres Burned ¹	Number of Wildfires Started on NPS Lands ²	Acres Burned on NPS Lands ²	Acres of Fuels Treated (Thin/Lop/Scatter) ³	RX Pile Burning in the park
Denali	1	53,289	0	1,082	10.0	Yes
Gates of the Arctic	0	0	0	0	4.0	No
Lake Clark	0	0	0	0	13.0	No
Katmai	0	0	0	0	8.0	Yes
Noatak	1	12	1	12	0	No
Wrangell-St. Elias	0		0	0	55.0	Yes
Yukon-Charley Rivers	4	136	4	136	0.7	No
Totals	6	53,437	5	1,230	90.7	

1. Value is 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.
2. Number of wildfire ignitions and acres burned on NPS managed lands.
3. Acres fuels treatment for thinning or lop/scatter as reported in NFORS in the fuels treatment completed polygons, hand-piling not included.

Fuel Treatments

In 2023, the three NPS area fire management programs completed several fuels treatment projects including thinning, lop and scatter, and hand piling debris (NFORS Completed Treatment GIS Acres 2023). Fuels treatments are implemented to reduce the potential impacts of wildfires on infrastructure and values of concern in the parks. NPS Alaska Eastern Area Fire Management (EAFM) implemented mechanical fuels reduction in Gates of the Arctic, Wrangell-St. Elias, and Yukon Charley Rivers National Park and Preserves. NPS Alaska Western Area Fire Management (WAFM) implemented mechanical fuels reduction within the frontcountry and backcountry of Denali National Park and Preserves and in Lake Clark. Also in 2023, NPS Alaska Coastal Area Fire Management continued their efforts to reduce fuels around Brooks Camp in Katmai National Park and Preserve. Acreages of fuels reduction treatments conducted in 2023 per park unit is provided in Table 1.

Pile burns were conducted by all area programs as a means of removing the woody debris from treated areas. In 2023, EAFM conducted 0.8 acres of pile burning in Gates of the Arctic National Park at Narvak Lake. The importance of the work conducted at Narvak Lake and around structures in other remote areas of the parks is highlighted in a NPS Success Story. Pile burning was also conducted by WAFM in the Denali frontcountry near the local post office. This burn provided for several meaningful contacts with park visitors and residents. Parks which were treated using pile burning are listed in Table 1.

B. Monitoring Results and Recommendations

2023 Overview

Results from in-house monitoring, in combination with published research, are utilized by the fire ecology program to provide feedback to the NPS fire management program and interagency partners

regarding management activities and the effects of wildfire on natural resources. Since 2001, the Alaska Regional fire ecology program has established more than 1000 monitoring sites; the full summary of monitoring sites is provided in Appendix B. The data gleaned from these sites has been utilized in myriad ways including but not limited to assessment of burn severity, monitoring of post-fire or post-treatment changes to vegetation and soil properties, as well as fuels treatment effectiveness. A list of fuels treatment and fire effects monitoring plots sites established or revisited in 2023 is provided in Table 1. Figure 4 and Figure 5 depict all Alaska fire ecology plots established to date by both park and plot type.

In 2023, the NPS Alaska fire ecology program performed critical post-treatment monitoring in the Denali frontcountry area as fire management staff work to extend the footprint of thinning activities beyond the “FireWise” zones. The expanded treatment footprint aligns with national guidance to parks to follow a “Fire Adapted Communities” framework that accommodates increased needs for adequate structure protection and ingress/egress routes. Post-treatment monitoring also continued in Katmai, where thinning, hand-piling, and pile burning has been underway since 2021. Staff from the fire ecology program conducted a systematic review of pile burn scars there, quantifying burn depths, nearby tree damage, and one season of vegetation recovery.

The fire ecology program took steps toward assessing the effects of different fuel treatment types (i.e., shaded vs. unshaded fuel breaks) on soils and vegetation in Yukon-Charley. This included investigating a previous fuels treatment project and subsequent wildfire response that occurred at the Biederman Bluffs Allotment. With the growth in staffing and funding associated with the Bipartisan Infrastructure Law (BIL), continued (or increased) monitoring and dissemination of results with practitioners through an adaptive management framework will be critical.

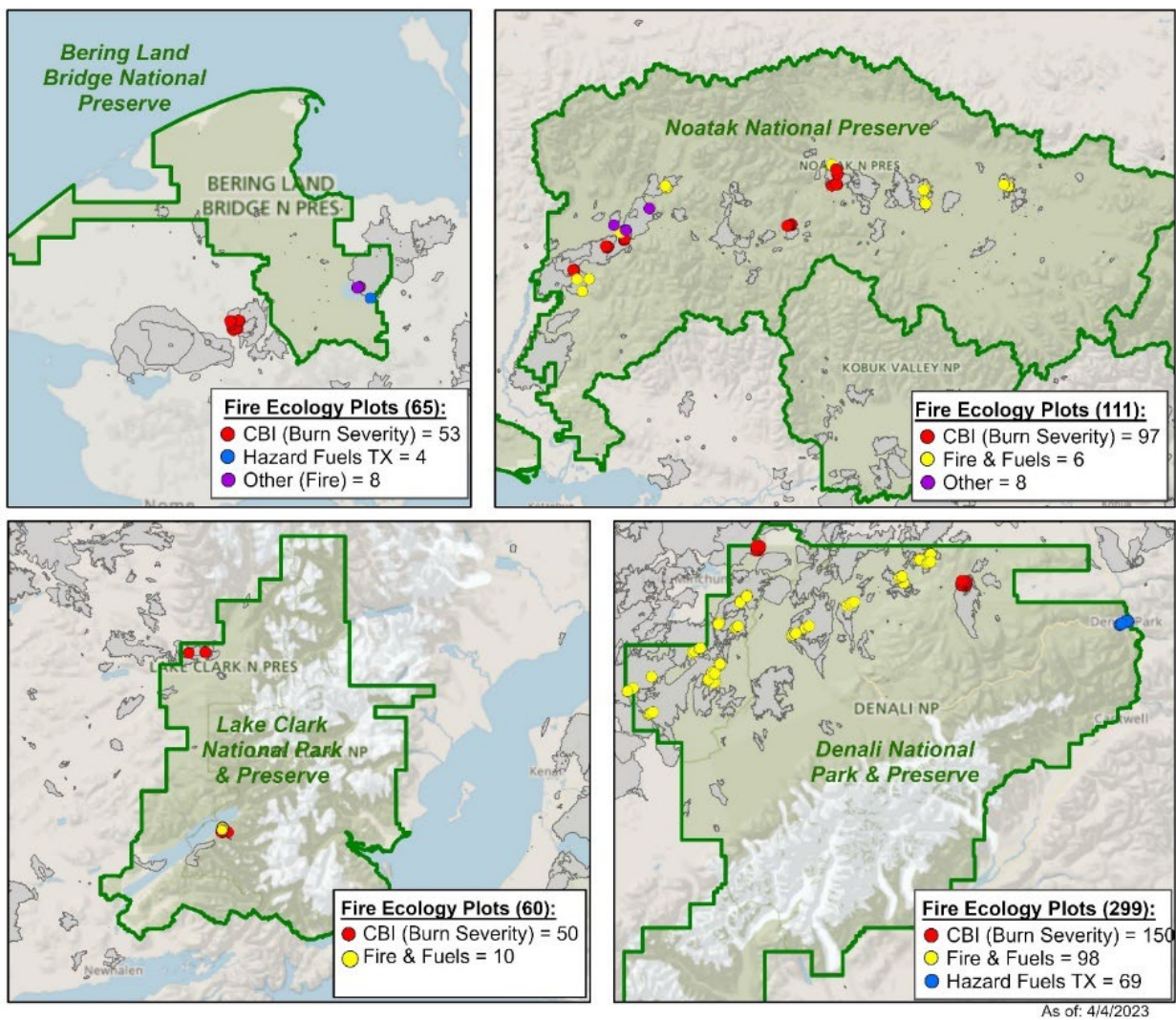


Figure 4. Fire and fuels monitoring sites (by type) visited since 2001 within Alaska park units managed by the Western Area Fire Management Program.

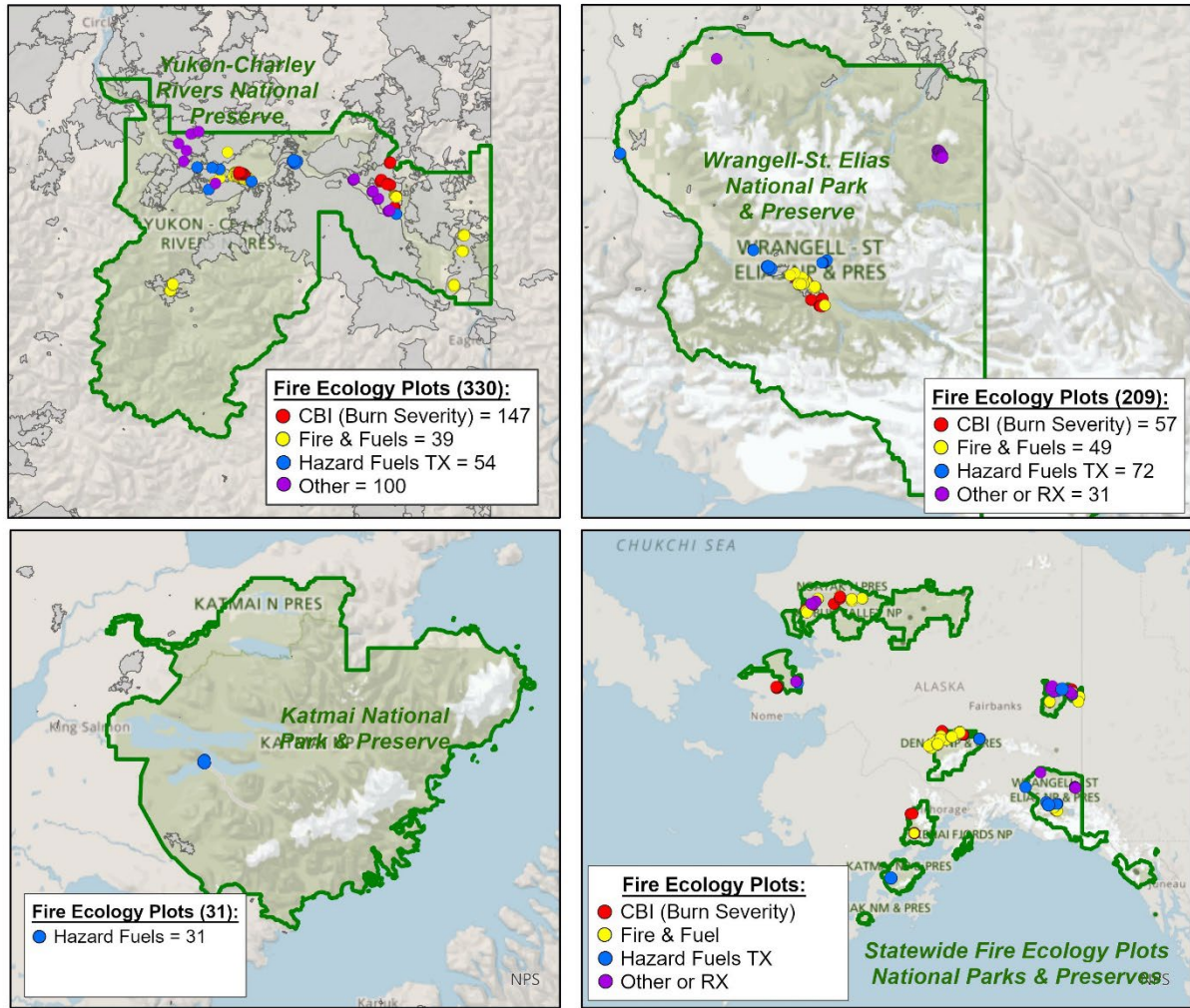


Figure 5. Fire and fuels monitoring sites (by type) visited since 2001 within Alaska park units managed by the Eastern Area Fire Management Program and the Coastal Area Fire Management Program.

2023 Monitoring Sites and Results

Table 2. Monitoring sites established or revisited in 2023 by the Alaska NPS Fire Ecology Programs.

Park	Monitoring Unit	Type of Plot (FMH, photo point, other)	Pre-Treatment	Post-Treatment	Visited in 2023	Total Plots in Project
Denali	FY21 Hazard Fuels	AKR Hazard Fuels Circular Plots	0	16	16	23
Denali	Frontcountry Treatments	AKR Hazard Fuels Circular Plots (mod. 2023)	2	0	2	2
Denali	Frontcountry Piles	Burn Pile Circular Plot	8	0	8	8
Katmai	Brooks Camp Pre-treatment Inventory	AKR Hazard Fuels Circular Plots	4	0	4	31
Katmai	Brooks Camp Pile Burn Monitoring	Pile Burn Assessment – Intensive and Quick	0	102	102	102
Wrangell-St. Elias	Moose Lake/Crystal Cr Allotments (McCarthy Rd Allotments)	AKR Hazard Fuels Circular Plots (mod. 2023)	13	0	13	13
Yukon-Charley Rivers	Biederman Allotment	AKR Hazard Fuels Circular Plots (mod. 2023)	0	15	15	15
2023 Total Plots			27	133	156	194

Table 3. 2023 Management objectives and monitoring results.

Monitoring Unit	Management Objective	2023 Monitoring Results (values are averages with 80% confidence intervals)	Progress Towards Meeting Objectives
Pre-treatment WRST McCarthy Rd Allotments Fuels Reduction	538-1210 spruce/ac (>6 ft bole spacing, 3-5 ft crown spacing)	508 (371-645) spruce/acre n=13 plots	objective met prior to treatment
	6-foot (183 cm) ladder fuel height on spruce	dead ladder fuel height: 0.4 (0.3-0.6) ft n=223 trees	treatment not yet started
Post-treatment DENA FY21 Hazard Fuels Reduction (partial)	258 spruce/acre (10-foot crown spacing)	523 (463-584) spruce/acre n=16 plots	objective not yet achieved (partial monitoring results)
	>6-foot (~183 cm) ladder fuel height on spruce	dead ladder fuel height: 3.8 ft (3.1-3.6 ft) n=115 trees	objective not yet achieved (partial monitoring results)
	90% reduction of 100hr and 1000hr fuels	100hr fuel reduction: 50% 1000hr fuel reduction: 40% n=16 plots	objective not yet achieved (partial monitoring results)
	20% retention of understory spruce <10 cm dbh	spruce <5cm dbh retained: 19 (15-24) % spruce 5-10cm dbh retained: 46 (44-50) % n= 16 plots	objective not yet achieved (partial monitoring results)
Post-treatment KATM Brooks Camp Pile Burn	minimize disruption to volcanic ash layer	cover of volcanic ash: 1.5% n= <u>36</u> plots	objective met
	avoid establishment of invasive plants	no invasive plants detected. n= <u>36</u> plots	objective initially met

Fuel reduction objectives/results are comparisons of mean values from pre-treatment to post-treatment. Stand density objectives/results are for immediately post-treatment stand density. 80% confidence intervals of the mean are shown in parentheses. An underlined number of plots indicates that the minimum sample size has been attained for that variable.

Western Area Fire Management – Monitoring

The Western Area Fire Management program, based in Denali National Park and Preserve, oversees fire management responsibilities in Denali National Park and Preserve, Bering Land Bridge National Preserve, Cape Krusenstern National Monument, Kobuk Valley National Park, Noatak National Preserve, and Lake Clark National Park and Preserve. Sarah Stehn serves as the WAFM fire ecologist. Highlights from fire ecology projects conducted in a subset of these parks are provided below.

Denali FY21 Post-treatment Monitoring (Thin and Pile Burn)

In FY21-FY23, the WAFM fuels crew conducted forest thinning in and around high-risk structure groups within the Denali National Park Frontcountry service area. In 2023, WAFM and EAFM fire ecology staff conducted post-treatment monitoring at 16 of the 23 previously installed plots. The seven plots not measured were treated in 2023 with hand-piling and pile burning and will be measured 1yr-post treatment in 2024. The location of treatment units proximal to Denali visitor services (i.e., the visitor center, Riley Creek mercantile, Denali



Figure 6. Shannon Courtney, visiting detailer from the GRSM WFM, reads post-treatment vegetation cover data while EAFM technician Olivia Lawrence records.

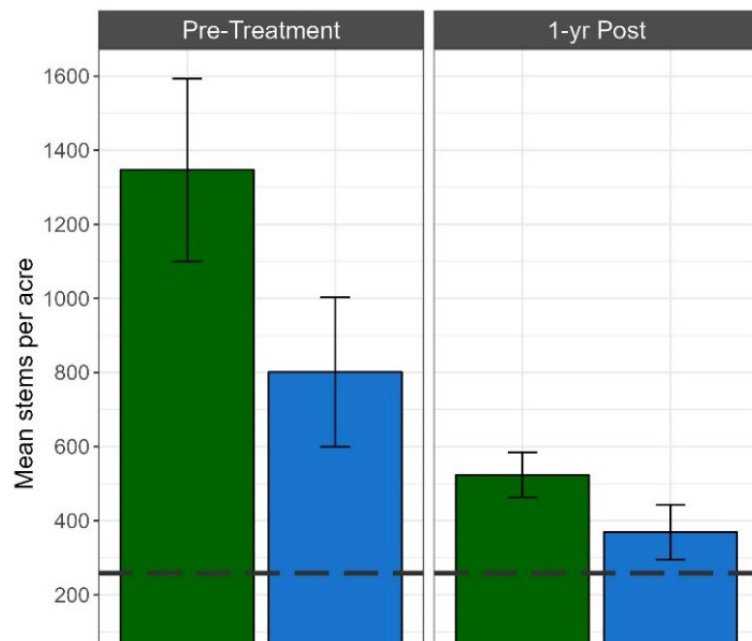


Figure 7. Comparison of mean stems per acre of needleleaf vs. deciduous stems pre- and post-treatment DENA-HZF-FY21 plots (n=16). Error bars show an 80% confidence interval about the mean value. The management objective of 10ft crown spacing (as estimate

Park post office) made for a highly visible work environment with ample opportunity for visitor, staff, and local resident contacts.

Overall, objectives for this project have proven difficult to meet in the first round of treatment. Crown spacing was reduced but is still double the prescribed amount (Figure 7). Similarly, ladder fuels were reduced, but trimming work remains to reach the management objective of a 6ft ladder fuel height (Figure 8).

Woody debris cover (as measured on transects) increased in most size classes (e.g., 1-hr, 10-hr, 1000-hr fuels; Figure 9) demonstrating that effects of thinning work were still apparent. For example, the increase

in 1- and 10-hour fuels cover was likely due to the removal and processing of thinned material. An increase in 1000-hour fuels could indicate post-thinning windthrow, or other stochastic events.

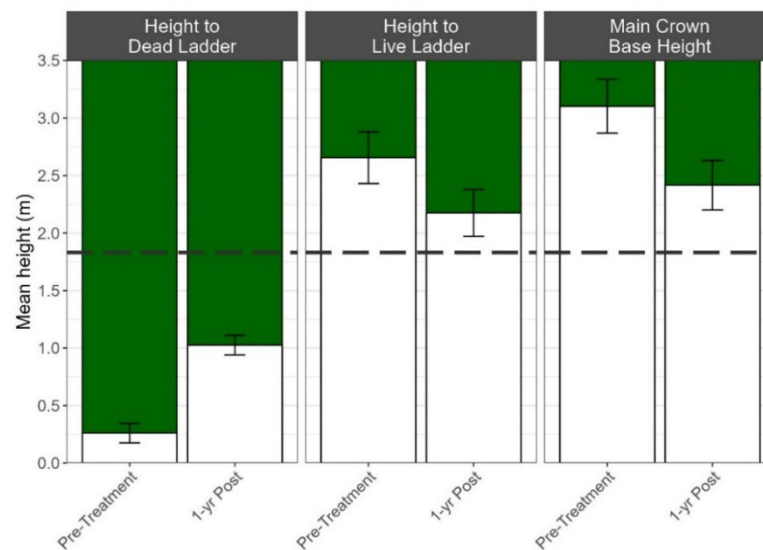


Figure 8. Comparison of mean height to ladder fuels in conifer stems pre- and post-treatment DENA-HZF-FY21 plots (n=16). Error bars show an 80% confidence interval about the mean value. The management objective of a 6ft ladder fuel height is shown as a dashed horizontal line. Note the lower live ladder and main crown base heights post-treatment that reflect the variation in tree canopies, as the exact trees are not measured each time.

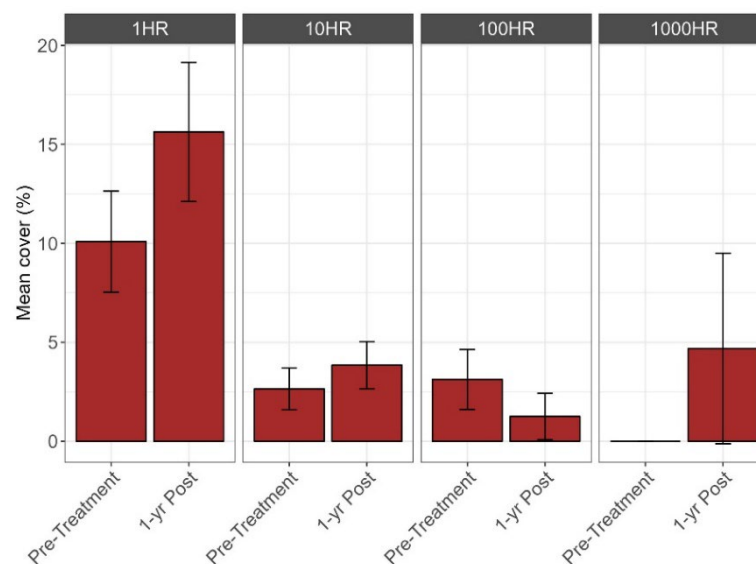


Figure 9. Comparison of mean cover of woody debris types at pre- and post-treatment DENA-HZF-FY21 plots (n=16). Error bars show an 80% confidence interval about the mean value.

Denali Frontcountry Treatments (FC-TX) Pre-treatment Monitoring (Thin and Pile Burn)

Western Area Fire Management and Denali NP are engaged in a long-term plan to expand the footprint of previous fuel treatments (i.e., within 100 ft of at-risk structures), to incorporate a broader swath of lands encompassing critical ingress/egress routes and operational safety zones. The additional mitigations reflect national shifts in wildland fire risk mitigations towards the “Fire Adapted Communities” concept.

In June 2023, EAFM and WAFM fire ecology staff joined together in Denali to install two plots in this expanded treatment area. Installation of additional plots will proceed in pace with planned fuel treatments to ensure pre- and post-treatment measurement is conducted. Note that some plots from previous projects will be resampled for inclusion with the new FC-TX project. For example, several of the control plots installed in the DENA-HZF project are now being treated for the first time. The Denali Frontcountry Treatments project will be the first in which on-site pile burning occurs at scale in DENA, and so monitoring will include measures of pile density in relation to plot location, pile burn severity, and pile burn induced tree damage/mortality.



Figure 10. Piles created within the scope of the Denali FY21 Hazard Fuels Project burn in October 2023. This burn was the first application of prescribed fire (pile burning) in the Denali Frontcountry services area.

Denali Frontcountry Piles Pre-treatment Monitoring (Pile Burn)

The easy-to-access and highly visible location of the Denali Frontcountry Treatments make those units ideal for detailed monitoring. WAFM fire ecology staff engaged in a pilot study to directly track the effects of pile burning on vegetation and soils in DENA FC-UNIT12 near the Schaeffer Building and C-camp. Staff worked with fuels technicians to identify sites where piles would be placed. At each of those eight sites, fire ecology staff performed a subset of standard plot measurement and observation protocols. After thinning and piling at those locations was completed, staff recorded pile size, condition, and density of nearby piles. These sites will be incorporated into additional monitoring once the piles have been burned and the data collected will be utilized to investigate how pre-pile vegetation conditions may interact with burn depth and post-burn recovery.

Coastal Area Fire Management – Monitoring

The Coastal Area Fire Management program, comprised of Alaska Region fire staff in Anchorage and Fairbanks who function dually at the regional and park levels, oversees fire management responsibilities in Aniakchak National Monument, Glacier Bay National Park and Preserve, Katmai

National Park and Preserve, Kenai Fjords National Park, Klondike Gold Rush National Historic Park, and Sitka National Historic Park. Staff includes Regional Fire Ecologist, Jennifer Barnes, and Assistant Regional Fire Ecologist, Jennifer McMillan. Highlights from a fire ecology project conducted in one of these parks is provided below.

Katmai Brooks Camp Post-thinning Pile Burn Monitoring

In recent years, the Coastal Area Fire Program has engaged with Katmai NP&P to conduct a fuels reduction treatment at the famous Brooks Camp, a highly visible site which attracts visitors who wish to view brown bears feeding in their natural habitat.

2023 marked the third year of efforts to reduce hazard fuels around infrastructure and along the Brooks Camp trail network. A substantial spruce bark beetle infestation has led to nearly impenetrable hazard fuels buildup around infrastructure and related safety issues; thus, this work is critical to the park and is planned to continue into 2024 and 2025. Prior thinning and piling efforts and fire ecology monitoring results are detailed in the 2022 Fire Ecology Annual Report, as well as in several NPS Fire Success Stories (Section C).

In March of 2023, the debris piles that had been created in prior years were burned. Pile burning led to the creation of pile burn scars scattered throughout the thinned area. Park and fire managers had questions about how the piles might recover, with particular concern about the potential for invasive plants to become established in the newly exposed substrate. Depth of the burn scars from the pre-treatment forest surface was also of interest, since disruption of the volcanic ash layer which resulted from the 1912 eruption can be associated with impacts to archaeological resources in the park.

It was requested that the regional fire ecologists address the monitoring questions posed by park and fire managers. The regional ecologists augmented the proposed study with a few additional monitoring questions regarding burn severity, fire effects on adjacent vegetation, changes to soil chemistry that might influence vegetation recovery, and wildlife attraction to disturbed areas. With the assistance of both Eastern and Western area, fire ecology staff set out to conduct this work in August of 2023, five months after the piles were burned.

The regional fire ecology program collected post-burn monitoring data at 102 pile burn scars (~33% of the total in the treatment area). Pile burn assessments were conducted on two monitoring levels. Sixty-nine pile burn scars were assessed using an abbreviated or “quick” assessment approach as recorded on tablet devices using Survey123. Additionally, 32 pile burn scars were assessed using a more detailed or “intensive” approach recorded largely on paper datasheets. The following results are predominantly derived from the “intensive” approach except as noted.

Preliminary Results

Burn severity was consistently “moderately burned” with some exceptions where severity was light. On average, fuel bed depth was reduced by roughly half because of pile burning. Fuel bed (live and dead moss in combination with upper and lower duff) was 6.47 (80% CI 5.07-7.86) cm within pile burn scars compared to 17.5 (80% CI 15.8-19.2) cm in the undisturbed areas surrounding the pile

burn. The volcanic ash layer was rarely exposed because of pile burning; volcanic ash comprised 1.5 (80% CI 0.8-2.2) % of pile burn scar cover.

Fire consumption of woody debris was largely complete such that total cover of 1hr, 10hr, 100hr fuels averaged 26.6 % cover (80% CI 15.8-19.2). Little vegetation recovery had transpired between pile burn activity and monitoring; live vegetation comprised only 6.3 (80% CI 4.9-7.7) % of burn scar cover. No recruitment of spruce was detected; however, Kenai birch seedling density was high with 14,418 (80% CI 7982-20,853) seedlings per acre.

Soil pH was higher within the piles than outside the piles (Figure 12) which may influence post-fire vegetation recruitment. Despite the presence of some invasive plant species in disturbed areas at Brooks Camp, pile burn scars were largely offset from trails or roads by at least 1 m and no invasive species were detected ~5 months post-burn.

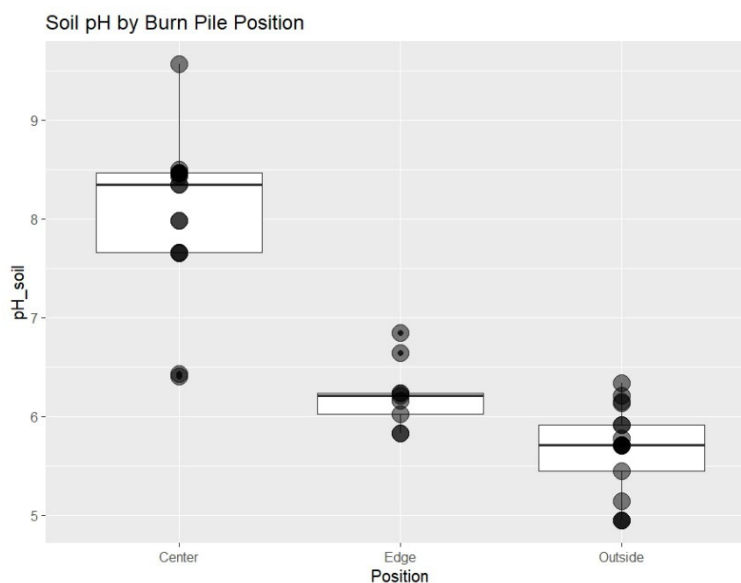


Figure 11. Comparison of soil pH at the center, edge and outside of the burn piles. Soil at the center of the burn piles was distinctly more acidic than in surrounding unburned soils.

Although no quantitative objectives directly pertaining to this monitoring project were formally established by management, it is apparent that pile-burning was largely successful based on qualitative concerns. Little woody debris remained, the volcanic ash layer was largely undisturbed, and vegetation recruitment was detectable but did not include any invasive plant species. If it is decided that continued monitoring should occur, the data collected will serve as a good baseline for post-burn recovery at these burn scar sites. At a minimum, the Brooks Camp burn scars should be revisited to ensure that later recruitment of invasive species does not occur.

For future similar projects, the fire ecology team recommends allowing a longer interval post-fire before visiting sites, theorizing this timescale may be better for detecting long term recovery within the burn scars.

Eastern Area Fire Management – Monitoring

The Eastern Area Fire Management program, based in Fairbanks, oversees fire management responsibilities in Yukon-Charley Rivers National Preserve, Gates of the Arctic National Park and Preserve, and Wrangell-St. Elias National Park and Preserve. Fleur Nicklen serves as the EAFM fire ecologist. Highlights from fire ecology projects conducted in a subset of these parks are provided below.

Wrangell-St. Elias McCarthy Road Fuels Treatment Monitoring

Eastern Area Fire Management and Wrangell-St. Elias NP are engaged in a long-term plan to mitigate wildland fire risk to private land and allotments. Shaded fuel breaks are planned around a handful of allotments adjacent to the McCarthy Rd. In July of 2023, a team of four installed 13 pre-treatment monitoring plots around two allotment clusters. Initial assessment of stand density indicates little thinning is necessary to achieve the management goals of conifer spacing (Figure 14A), however limbing dead ladder fuels is still needed to meet management objectives (Figure 14B) as well as creating a 5 ft hosing corridor. Some areas around the Crystal Creek Allotment have a high number of dead and down spruce from the late 1990s bark beetle outbreak. Further assessment of tree density and growth response to treatment will be made in years following the treatment implementation.



Figure 12. Overview of the Moose Lake and Crystal Cr Allotment area north of the McCarthy Rd. The Allotment edge runs from the photographer to the exposed rock on the near hillslope. Vegetation type transition along the allotment is visible from foreground to background.

Management take home: The average stand density is already below the management objectives. Focus should be on limbing dead ladder fuels, clearing a 0-5ft corridor for hosing adjacent to the allotment, removing dead trees, and some live spruce removal in patches of high density.

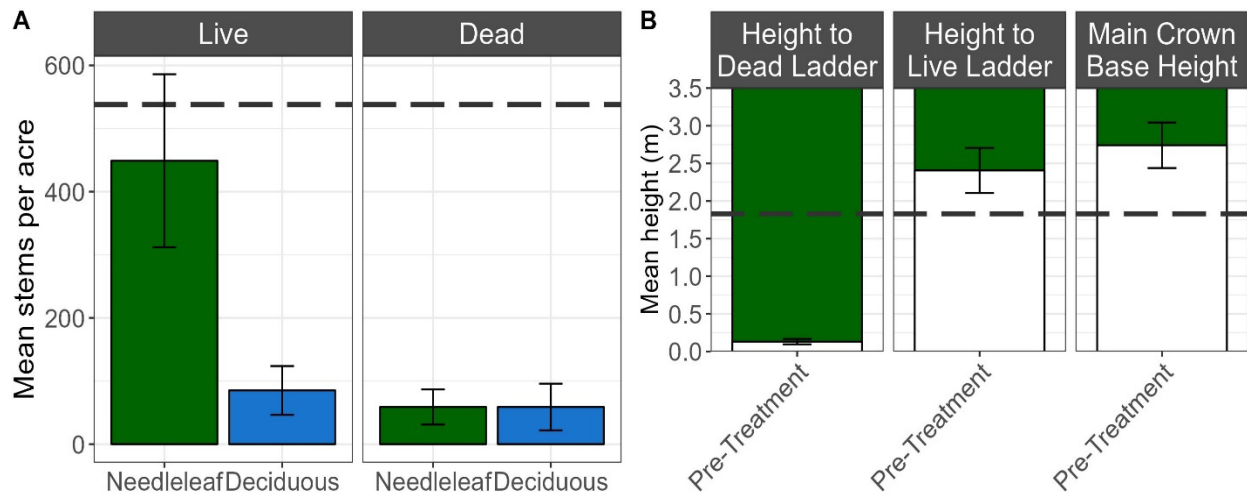


Figure 13. A) Pre-treatment stand density at the McCarthy Rd Allotments (Moose Lake and Crystal Creek). Conifer stand densities are below the management objectives (dashed line). B) Pre-treatment ladder fuels measured at the Moose Lake and Crystal Cr treatment areas. Dashed line shows the 6ft limbing management objective.

Yukon-Charley Biederman Fuels Treatment Monitoring

The historic and privately owned Biederman Allotment was once part of the dog-sled mail carrying route along the Yukon River between Eagle and Circle, AK. This site has been threatened by wildfire three times in the last 16 years. In 2014 a shaded fuel break was installed around the allotment; however, during the most recent wildfire event near the site (2022), firefighters clearcut the remaining trees in the shaded fuel break and initiated a backburn. The area is dominated by black spruce and underlain by nearly continuous permafrost, which strongly influences plant species composition, forest productivity, and harbors large amounts of carbon in the organic rich frozen soils. EAFM and WAFM ecology teams visited the area in July 2023 for the first time to install monitoring plots to compare the ecological attributes of the untreated control forests, the clearcut fuel break, and

the small patch of remaining shaded fuel break. They set up data loggers to monitor air and soil temperature and relative humidity in the shaded and clearcut fuel break. They also measured the active layer depth, which is the layer of seasonally thawed soil above permafrost. While analysis of species composition and microclimate are ongoing, the team immediately saw a difference in active layer thickness in the treatment areas, with active layer thickness significantly thicker in the unshaded or clearcut fuel break, indicating more permafrost thaw in this treatment relative to the control (Figure 15). The fragment of remaining shaded fuel break had intermediate levels of permafrost thaw.

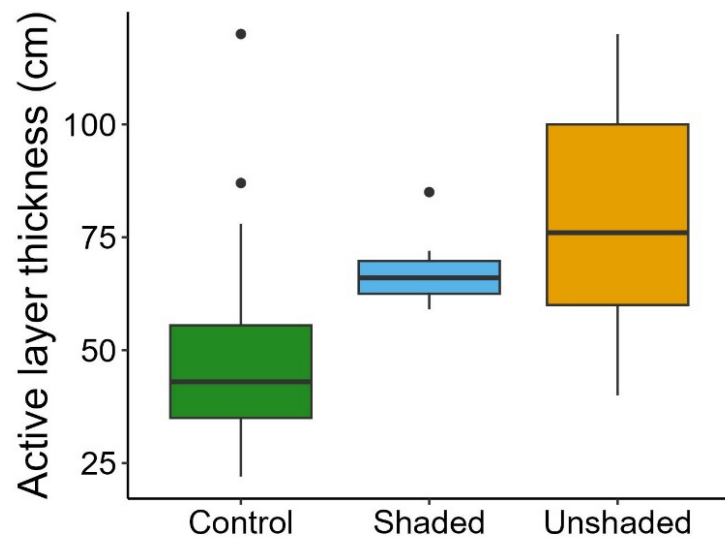


Figure 14. Active layer thickness, or depth to permafrost, in the plots in natural forest (in green) and in the shaded (in blue) and unshaded (in orange) fuel breaks. Active layer thickness was significantly greater in the unshaded fuel break relative to the control due to thawing permafrost.

Management take home: *These initial findings indicate permafrost thaw increases with increased tree clearing and lends support to the NPS use of shaded fuel breaks over other types of fuel breaks as shaded fuel breaks cause less disruption to ecological systems, while still reducing the risks of wildfire.*

Data Management

In 2023, all data was entered into [FEAT/FIREMON Integrated](#) (FFI) which is a program designed to assist with collection, storage and analysis of ecological information. New FFI projects were created for the KATM Brooks Camp pile burn impact assessment, the DENA frontcountry expanded fuels treatment area, the McCarthy Rd Allotment hazard fuel reduction project, and the Biederman fire break study. The updated FFI databases for 2023 will be posted to IRMA for archiving. The following databases are from the 2022 archived FFI datasets:

The Alaska Eastern and Coastal Area fire ecology data set includes data for WRST, YUCH, and KATM: <https://irma.nps.gov/DataStore/Reference/Profile/2298608>

The Alaska Western Area fire ecology data set includes data for DENA, LACL, BELA, and NOAT: <https://irma.nps.gov/DataStore/Reference/Profile/2298610>

C. Research, Planning and Communication

Research Contributions and Development



Figure 15. Nancy Bigelow, researcher from University of Alaska Fairbanks takes notes on a lake sediment core collected near Denali National Park. Cores are analyzed for evidence of charcoal to estimate fire history.

Research is a focal point for the fire ecology program. Among other projects, the program received funding in FY23 from NPS Research Reserve Funding for a project entitled “What is the natural regime of fires and spruce beetle infestation in the Denali Front Country? Informing fuels treatments and FMPs”. This research was designed to discern natural historic fire regimes in the Denali frontcountry based on paleorecords derived from lake cores for at least the last 1,000 years (Figure 16). Lake core records are considered the most effective way to discern paleo fire history in this boreal region where

stand-replacing fires are the norm. Preliminary results indicate three periods of elevated charcoal accumulation (fragments/cm²/yr) that are above background levels, with the peaks centered at 7.5 cm (~AD 1883), 16.0 cm (~AD 1640), and 32.0 cm (~AD 1060). These results significantly extend the known fire history for this region, a widely valuable contribution to the understanding fire ecology in Alaska; with a few exceptions, fire history records across the state have been limited to ~70 years before present. Moreover, this project will directly inform Denali fire and resource managers who are considering large-scale fuels treatments including prescribed fire and fuels reduction treatments that will be designed to stay in keeping with a natural fire regime, per park direction. A web article was produced describing the lake coring project in 2023 ([The story at the bottom of the lake: Detecting past fires through lake coring in Denali \(U.S. National Park Service\) \(nps.gov\)](#)).

Additional research proposals submitted, and research projects supported are listed in Table 4.

The Alaska NPS Fire Ecology team continues to collaborate on an integrated monitoring site in the 2018 Andrew Cr burn area Yukon-Charley Rivers NP. In the fall of 2023, EAFM ecologist assisted an NPS Inventory and Monitoring permafrost scientist and limnologist to collect data on permafrost and lake chemistry in the burned area as well as control sites. The EAFM ecologist retrieved five years of soil temperature data from monitoring sites in the burn. These data showed rising soil temperatures in all burn severity levels, related to the interaction of the recent fire and two years of above average snow depths in the area (Figure 17).

Fire-CAKN Integrated Monitoring Andrew Cr Burn Study Site Soil Temperature from 2018-2023

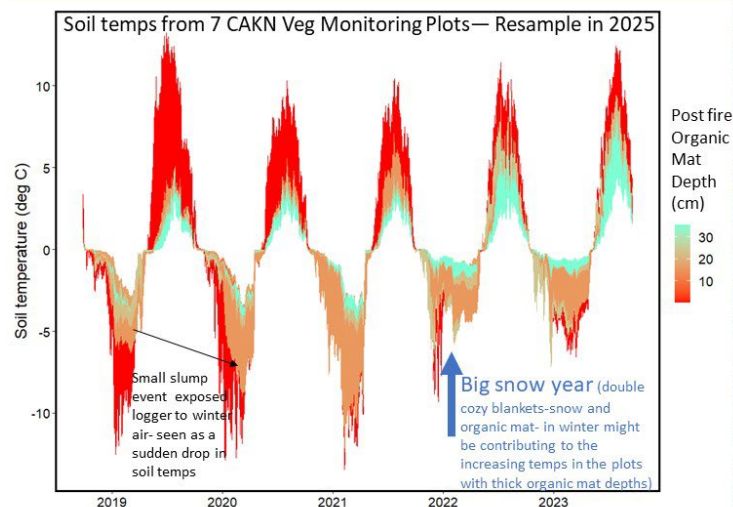


Figure 16. Slide showing, at right, an image of Yedoma permafrost degradation post-fire, and at left, a graph of five years of soil temperatures (10 cm depth) from areas with different organic mat consumption within the 2018 Andrew Creek fire area.

All four NPS Alaska fire ecologists are active contributors to internal and external collaborative efforts to further the collective understanding of fire ecology in Alaska. Both regional fire ecologists are members of the Alaska interagency Fire Research, Development and Application Committee (FRDAC) for the Alaska Wildland Fire Coordinating Group (AWFCG) and are on the advisory board for the JFSP Alaska Fire Science Consortium. The fire ecology program also participates in other team efforts including the Fire Modeling and Analysis Committee (AFWCG), Fire and Invasive Committee (AWFCG), NPS Fire and Climate workgroup, Geographic Area Editor, and the Arctic-Boreal Vulnerability Experiment (ABOVE).

Table 4. NPS AKR Fire Ecology Program research proposals and projects in 2023.

Park	Are research needs identified in FMP or Monitoring Plan?	# of Proposals Submitted in 2023	# of Proposals Funded in 2023	# of Research Projects Supported in 2023	Additional Comments
Denali	Yes	1	1	2	RRF proposal submitted to investigate how season of pile burn effects soil condition. 2022 RRF proposal funded for lake-coring project to investigate historic fire regime. Year 1 of field work commenced with field work. administrative, and logistical assistance provided.
Wrangell-St. Elias	Yes	1	0	0	RRF proposal submitted to investigate the role of postfire root-associated fungi in forest regeneration.

Multi-Park		2	0	0	1. Proposal submitted for 3-year post-doctoral funding with the Scientists in the Park to a) to assess the topographic, vegetative, and weather drivers of historic wildfire patterns in Alaska National Parks and statewide by ecoregions, b) to look for changes over time in these patterns, and 3) to create a predictive spatial model of wildfire risk under different weather scenarios. 2. PMIS proposal submitted for NPS natural resource funding to add a new dendrometer sensor network to six existing NPS weather stations to precisely link white spruce phenology and high-resolution growth dynamics to weather conditions.
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¹ Number of funded research projects, new or ongoing, supported by the fire ecology program including logistical info or support, staffing, etc.

Planning and Compliance

The fire ecology program participates in planning activities for the Fire Management Program and their respective park units. In 2023, the Regional fire ecologist conducted a site visit to Klondike Goldrush National Historic Park to examine fuel conditions in the area. The results from this visit are being utilized to inform in-progress development of a Fire Management Plan for the park. The Denali Fire Management Plan (FMP) underwent a comprehensive update from its last published version (2004) to which the WAFM made significant contributions. Additionally, service-wide, all FMPs had to be transferred into a new template. Fire ecology staff contributed to this work for all parks in their respective areas. All completed FMPs for Alaska are available on IRMA.

Due to their expertise in biological systems and conducting research and monitoring in Alaska parks, members of the fire ecology program are often called in by their park compliance teams to review park actions and to serve as research liaisons for non-NPS initiated research. For example, the WAFM fire ecologist served as research liaison for six research projects occurring in Denali in 2023.

Research and monitoring initiated internally at NPS must also go through a compliance process. In 2023, WAFM fire management staff completed a 5-yr programmatic agreement for all desired fuels treatment and monitoring activities, with significant input by the fire ecologist.

Outreach and Communicating Results

Sharing NPS fire ecology work is an important goal of the NPS Alaska fire ecology program. A comprehensive list of reports, presentations, publications, and other forms of communication completed in 2023 by the fire ecology program is provided in Appendix C. Featured here are a few communication highlights from 2023.

Work in Denali NP&P was described in two success stories. One describes the first year of a newly funded research project, [The story at the bottom of the lake: Detecting past fires through lake coring in Denali \(U.S. National Park Service\) \(nps.gov\)](#). The other focuses on an ongoing outreach program

and highlights the fire ecology program’s ongoing collaboration with Project Learning Tree, [NPS regional fire ecologists teach fire science to Alaska educators \(U.S. National Park Service\)](#).

Additionally, 2023 fire ecology monitoring work is highlighted in two success stories: [Alaska fire ecology teams monitor ecological shifts in fire breaks in Interior Alaska \(U.S. National Park Service\) \(nps.gov\)](#) and [Uncharted Flames: NPS Alaska fire ecology team discovers evidence of an unmapped wildfire in Wrangell-St. Elias National Park and Preserve \(U.S. National Park Service\)](#).

Beyond traditional science communication and outreach to park staff, park partners, and the visiting public, the NPS Alaska fire ecology staff also committed significant time and effort to recruitment and employee development activities. For example, the fire ecology program hosted Shannon Courtney, a member of the Great Smoky Mountains Wildland Fire Module, for two weeks as a member of the field team. Shannon is pursuing a certificate program in Fire Science and received a personal Workforce Development Grant to fund her travel to Alaska. Program staff also played an important role in providing the Student Conservation Association’s All Woman Fire Crew a well-rounded fire management experience as they all had several opportunities to monitor plots and engage in work and learning centering on ecological topics.

D. Future Direction

The primary goals and direction for 2024 include developing a program of work that reflects the growing capacity of the NPS AK fire ecology program, as well as writing up technical reports or publications from past field work. Planning work includes assisting with revisions of Fire Management Plans and compliance for all field work. Field work planned for this year includes a revisit to plots in the Chakina-Steamboat Fire and installation of additional McCarthy Rd Allotment control plots—both in Wrangell-St. Elias National Park and Preserve— as well as continued monitoring of Denali frontcountry treatment areas, with a special focus on the encroaching spruce bark beetle infestation and potential changes in fuels.

Specifically, the proposed direction for the NPS Region 11 fire ecology program for 2024 is as follows:

Planning

- Fire Monitoring Plan revisions in FMPs
- Field compliance
- Continued project and tech transfer to new park-level fire ecologists

Projects and Data Entry

- Fire ecology field projects:
 - Denali frontcountry pre-and post-treatment monitoring – Monitor progress in fuels reduction, ground-truth LiDAR, track spruce bark beetle infestation, pile burn monitoring.
 - Denali – Investigate changes in fuel load and canopy conditions in an area impacted by spruce beetles five years ago in coordination with rare lichen survey

- Denali – peat coring for fire regime study
- Gates of the Arctic – fuels treatment monitoring, and tree coring for continued improvement of our understanding of fire return intervals
- Wrangell-St. Elias – Chakina-Steamboat Fire revisit to investigate revegetation response in unburned, once burned, and twice burned sites in an area known for long fire return intervals (150-200 yrs)
- Wrangell-St. Elias – Moose Lake, Crystal Creek (McCarthy Road) installation of pre-treatment monitoring control plots
- Scientists in Parks (SIP) projects:
 - Data management – Refine and further develop data management workflow for fuels treatment monitoring conducted by fuels technicians via a “Minimum Monitoring” Survey123 form and ArcPro project. Collate legacy data.
 - Data management – Organize and upload three years of terrestrial lidar scans (TLS) to interagency processing platform. Perform preliminary analyses on full dataset to better understand how to interpret TLS data.
 - Fire Ecology -- Combined two large tree ring datasets that included data collected over 30+ years and used this data to estimate stand establishment dates across the burnable portion of three parks. Data will be used in survival analysis to calculate fire cycles in three NPS units.
- Data Entry: 2024 field data
- Data Entry: Complete QC of all FFI databases, including FFI species lists

Reports/Outreach

- Outreach: Denali teacher program and Forest Disturbance Field Course
- Outreach: Success Stories/High Latitude Highlights/Website updates

Appendix A. Staffing and Accomplishments

In 2022, the Alaska fire program sought to add two new full-time permanent park-level fire ecologist positions to the existing organizational chart. These positions were approved in summer of 2022 and two candidates were selected in November of 2022. The candidates assumed their new positions by early February of 2023. Sarah Stehn was selected as the park-level fire ecologist for the Western Area Fire Management Program and is based at Denali National Park. Fleur Nicklen was selected as the Eastern Area Fire Management Program fire ecologist and is based at the Fairbanks Administrative Center. The new park-level fire ecologists have assumed responsibility for many of the park-level duties previously spearheaded by the Regional Fire Ecology Program.

Both Area fire ecology programs received funding for biological technicians. Eastern Area hired a single biological technician, and Western Area hired two (Table A-1). The biological technicians have proved hugely valuable to field season success. Having dedicated staff rather than largely relying on “borrowed” field assistance from the Area fire management programs dramatically improves program efficacy and productivity. Four biological technician positions will be filled by the Area fire ecology programs in 2024 and the hiring process commenced in November of 2023. Also of note, a fire effects lead position was funded for the Western Area fire ecology program. A candidate was selected and will commence work based out of Denali National Park in February of 2024. The intention of this position is to serve both area programs as needed and lead a field crew that can effectively operate in any park in the state.

Table A-1. Fire ecology staffing 2023

Ecologist and Monitors	Position	Appointment Length	Training and Development
Jennifer Barnes	Regional Fire Ecologist	PFT	S-520
Jennifer McMillan	Assistant Regional Fire Ecologist	PFT	READ training, Supervisory training
Fleur Nicklen	Fire Ecologist Eastern Area	PFT	Supervisory training Part I & II, MOCC, maintaining resource helicopter manager
Sarah Stehn	Fire Ecologist Western Area	PFT	ICS trainings, READ training, Supervisory training Part I & II, Aviation training, fuels treatment detail
Olivia Lawrence	Biological Technician Eastern Area	Temp- 11 pay periods	S-271, A-100, Fuels treatment trip, Lower 48 helicopter coverage assignment
Sarah Martin	Biological Technician Western Area	Temp- 12 pay periods	A-100, S-130, S-190, SAR training, Wilderness First Aid, Lower 48 fire assignment
Mariana Perez	Biological Technician Western Area	Temp- 13 pay periods	A-100, Wilderness First Aid, SAR training, Lower 48 helicopter coverage assignment

Regional Fire Ecologist Accomplishments/Focus Areas

The Interior 11 (Alaska) Regional Fire Ecologist facilitates planning, monitoring, research and outreach for the region and park programs. In 2023, the regional fire ecologist was actively involved with regional and national committees, provided direction for the fire ecology program, prepared

research proposals, prepared reports, and publications, presented results, analyzed data from current projects, reviewed portions of Fire Management Plans, participated on IMT fire assignments, and assisted on hiring panels (Table A-2).

Table A-2. Regional Fire Ecologist accomplishments and focus areas in 2023 (J. Barnes).

Category	Percent Time	Notes
Planning	15%	Fire Management Plan updates and reviews ATR for Denali Lake Core research proposal Compliance and planning for projects (KATM-BC) KLGO field visit and planning for fire management and fuels
Presentations/ Reports	15%	Presentations: NPS, Interagency Meetings, University Annual reports for Fire Ecology program and I&M network Publication preparation: Boyd et al. 2023 Fuels treatments Fire Success Stories and web articles Fire Ecology Workshop (Feb 2023)
NPS Meetings/ task groups	10%	AKRO and Park Fire Meetings Regional Fire Ecologist conference calls Strategic Plan – NPS Climate-Fire Work Group/Task Group Leader NRAC Fire Management Liaison BAER Regional Coordinator I&M Technical Committee meetings - ARCN
Interagency work	10%	AWFCG Fire Research, Development & Application Committee AWFCG Fire Modeling and Application Committee Alaska Fire Science Consortium (Board member) Interagency fire meetings – Fall Fire Review, Spring Ops, Fuels Workshop GA Editor for NPS Alaska
Wildfire Assignments	7%	Lost Horse Creek AK-FAS-311296 PSCC(t) 7 days IMT PSCCt rostering and training (10 days)
Prescribed fire projects (implementation)	0	
Non-fire fuels projects (implementation)	0	
Research	12%	Research Project Proposals: DENA – Lake Coring 4000 years fire regime – NRAC SCC FY24 DENA – Frontcountry fire regimes and beetles – NPS Reserve fund FY23 (Funded) Spruce Beetle, fire behavior and terrestrial LiDAR – USGS NRPP FY24 Research consultation on various projects
Data collection	5%	Katmai Brooks Camp Fuels Treatment
Data entry	2%	Data entry supervision and database assistance QC of data
Data analysis	10%	DENA and WRST – Terrestrial LiDAR Scan DENA, YUCH, WRST – Annual Report 2022
Supervision/Admin	10%	Supervision GS-11 Assistant Regional Fire Ecologist Paperwork and administrative (time, travel, email) Budget and position management Hiring panel NPS National Fire Science Program Lead
Training	3%	S-520; Instructor/prep: S-495
Travel out-of-park for plot or project work	2%	Field work and fire assignments in 2023.
Miscellaneous	1%	Acting Regional Fire Management Officer

Assistant Fire Ecologist Accomplishments/Focus Areas

The assistant regional fire ecologist is supervised by the regional fire ecologist. This position has traditionally provided support in the planning and implementation of park-level fire effects and fuels monitoring projects as well as assisting in planning, including park fire management plans, fire monitoring plans, administrative support as well as aviation and project-level compliance.

The primary workload in 2023 focused effort toward one field project, including the sampling design, methodology development, field logistics, data management, and analysis. Additionally, the assistant fire ecologist was the primary author of this year's NPS Annual Fire Ecology report and contributed to the interagency AWFCG Fire Research and Development Committee (Table A-3).

Table A-3. Assistant Regional Fire Ecologist accomplishments and focus areas in 2023 (J. McMillan).

Category	Percent Time	Notes
Planning	5%	Compliance & field work prep for the following projects: KATM: Brooks Camp Hazard Fuels Reduction Monitoring
Presentations/Reports	30%	Fire Ecology Annual Report NPS Fire Success Story
NPS Meetings/ task groups	12%	AKRO Fire Staff Meetings (weekly) AKRO Ranger Services Meetings (twice monthly) Interior Region 11 Fire Management Meetings (monthly) Regional Fire Ecologist Meetings (alternate) AKRO Fire Staff Meetings (semiannual) Miscellaneous Project Meetings
Interagency Work	8%	AWFCG Fire Research, Development & Application Committee Alaska Interagency Fall Fire Review
Wildfire Assignments	0	
Prescribed fire projects (implementation)	0	
Non-fire fuels projects (implementation)	0	
Research	3%	Development of NPS Fuels & Migratory Bird Project Proposal
Data Collection	10%	KATM: Brooks Camp Hazard Fuels Reduction Monitoring
Data Entry	13%	FFI Data Entry & QC
Data Analysis	10%	AKR Fire Ecology Annual Report Development of statistical code for future use in R
Supervision/Admin	11%	Standard administrative duties Biotechnician hiring
Training	8%	Resource Advisor (READ) training DOI Required Courses Mandatory safety and aviation courses
Travel out-of-park for plot or project work	2%	Field work in 2023.
Miscellaneous	1%	

Eastern Area Fire Ecologist Accomplishments/Focus Areas

The Eastern Area Fire Ecologist is duty stationed in Fairbanks, AK and serves Wrangell-St. Elias National Park and Preserve, Gates of the Arctic National Park and Preserve, and Yukon-Charley

Rivers National Preserve. They are supervised by the Eastern Area Fire Management Officer. This position was new in 2023, with the intention of serving as program lead and technical advisor in fire ecology for the Eastern Area Fire Management Program. Responsibilities included program development and implementation of a Fire Ecology monitoring program. Duties included hiring, training, and supervising employees, planning, implementing, and evaluating ecological effects monitoring projects for both fuel reduction treatments and wildfires, promoting and facilitating fire ecology related research in Alaska, and working collaboratively with the WAFM team, AKR team, I&M, and park resource managers.

Table A-4. Eastern Area Fire Ecologist accomplishments and focus areas in 2023 (F. Nicklen).

Category	Percent Time	Notes
Planning	15%	Compliance and prep for fuels and monitoring projects as well as research projects in WRST and YUCH
Presentations/Reports	10%	NPS Fire Ecology Workshop, Pre-season presentation to WRST interpretive staff, wrote two Fire Success Stories, Presented Soil Temperature and
NPS Meetings/ task groups	10%	NPS Fire Meetings, Weekly/daily EAFM meetings, I&M Technical Committee meetings, Alaska Fire Science Consortium meetings, Interagency fire meetings – Fall Fire Review, Spring Ops, Fuels Workshop
Interagency Work	1%	Collaborated on two proposals with university researchers
Wildfire Assignments	0%	
Prescribed fire projects (implementation)	0%	
Non-fire fuels projects (implementation)	1%	Contributed field technician to assist implementation, helped with prep work
Research	15%	Wrote two research proposals, continued Andrew Cr Burn soil temp monitoring, hired SIP to use tree rings to estimate fire return intervals
Data Collection	8%	DENA and WRST fuel break monitoring, YUCH-Biederman Fuel break post-monitoring, YUCH-Andrew Cr Burn soils monitoring.
Data Entry	7%	FFI entry/import QA/QC, QA/QC soil temp. data
Data Analysis	7%	Summaries stats of soil temp, active layer depth, soil organic mat depths, stand density for presentations and reports
Supervision/Admin	15%	Recruited and hired BioTech, 1 SIP intern, 1 perm Biotech, Supervised 12 PP GS-04 seasonal Biotech, managed budget, and standard administrative duties
Training	9%	NPS Fire Ecology Workshop, Local Fire Ecology training, Motorboat operator certification course (MOCC), supervisory training I and II, Aviation training related to helicopter manger
Travel out-of-park for plot or project work	2%	DENA frontcountry field work
Miscellaneous	0%	

Western Area Fire Ecologist Accomplishments/Focus Areas

The Western Area Fire Ecologist is duty stationed in Denali Park and serves Denali National Park and Preserve, Lake Clark National Park and Preserve, and the Western Arctic Parklands (Bering Land Bridge National Preserve, Cape Krusenstern National Park, Noatak National Preserve, Kobuk Valley National Park). They are supervised by the Western Area Fire Management Officer. This position was new in 2023, with the intention of serving as program lead and technical advisor in fire

ecology for the Western Area Fire Management Program. Responsibilities included program development and implementation, along with fire management professional and technical support functions, such as hiring, training, and supervising other employees in the collection, inventory, processing, and reporting of data, and providing data analysis and interpretation to fire and resource managers for adaptive fire management.

The primary workload in 2023 consisted of assisting with WAFM planning and compliance efforts, recruitment and hiring of five positions, and establishment of several research collaborations. Additional efforts were spent in completing one-time trainings related to occupying a new position (i.e., Supervision, Aviation, ICS, READ) and participating in meetings and workgroups to facilitate introduction of park staff to the broad suite of fire management practice tools (Table A-5).

Table A-5. Western Area Fire Ecologist accomplishments and focus areas in 2023 (S. Stehn).

Category	Percent Time	Notes
Planning	12%	FMPs - annual updates and reviews, DENA fuel treatment planning and compliance (5yr programmatic), DENA frontcountry wetlands survey, DENA spruce beetle summit, Compliance and planning for research projects
Presentations/Reports	13%	Presentations: NPS Fire Ecology Workshop, Assoc. of Fire Ecologists, Reports: Annual reports for Fire Ecology program and I&M network, Outreach: Fire Success Stories, NPS web pages and articles, High Latitude Highlights, AK Geo Workshop, DENA Resource Days Field Trip, Wesleyan College Group, SCA Guard School
NPS Meetings/ task groups	10%	DENA Resources Meetings (weekly), AKRO Fire Ecology Team Meetings (weekly), WAFM Fire Staff Meetings (bi-weekly), AKRO Fire Staff Spring Training
Interagency Work	1%	Interagency fire meetings – Fall Fire Review, Spring Ops, Fuels, AWFCG Fire/Invasive Species Committee (FISC)
Wildfire Assignments	0%	
Prescribed fire projects (implementation)	0%	
Non-fire fuels projects (implementation)	1%	Backcountry cabin visit with Fuels Team
Research	17%	Collaborative Proposals: Research Reserve Fund, Ongoing Collaborations: UAF lake coring; NAU burn pile monitoring; UNR snow depth sampling; UNC forest health monitoring.
Data Collection	12%	DENA: HQ-TX, FC-TX, FC-PILES, I&M, spruce beetle, YUCH: Biederman, KATM: Burn Pile Monitoring

Data Entry	8%	Minimum monitoring of fuels treatments protocol development, Supervising and tracking data entry, Formatting excel data for FFI import via R scripts
Data Analysis	3%	DENA-FC Burn pile stats for compliance update, DENA-HQ-TX summary, PostTreatmentYear1", DENA-HQ-TX summary, PostTreatmentYear1
Supervision/Admin		Supervision: 12 PP GS-04 BioTech, 13 PP GS-06 BioTech, Position management: Recruitment and hiring of 2 BioTechs, 2 SIP interns, 1 Perm BioTech, Budget management and expenditures, Paperwork and administrative (time, travel, email), Fire-related: N-4092, ICS-100, ICS-200, ICS-700, M3
Training	13%	Fire-related: N-4092, ICS-100, ICS-200, ICS-700, M3, Other: Supervisory Foundations (in-part), DOI required courses, Mandatory safety and aviation courses
Travel out-of-park for plot or project work	5%	Travel related to 2023 field work (YUCH, KATM)
Miscellaneous	3%	

Appendix B. History of Fire Effects Monitoring Plots

Estimates of the number of fire ecology and fuels inventory projects and plots established in Interior Region 11 (Alaska) parks since the mid-1980s are provided in Table B-1. All data listed has been entered into the FFI database with two notable exceptions; 1) data from ~2000-2003 Composite Burn Index (CBI) plots and 2) data from fire effects projects conducted prior to 2005. The data not yet entered in FFI should be transferred from their existing database formats to FFI; this is particularly true of the CBI plots, and this process was partially completed in 2021.

Table B-1. All fire effects plots established by the Alaska regional fire ecology program.

Park Unit	Monitoring Unit	Plot Type	Years Data Collected	Total Plots
LACL	2013 Currant Cr Fire	CBI & Cover	2014	43
LACL	2013 Currant Cr Fire	AKR Fire & Fuels Plots	2014-2015	10
LACL	2013 Kristin Cr Fire	CBI & Cover	2014	7
WRST	Carl Cr RX	AKR Carl Cr Plots	2010	29
WRST	2009 Chakina Fire	CBI & Cover	2009-2010	57
WRST	2009 Chakina/2016 Steamboat Fire/Reburn	CBI, AKR Fire & Fuels Plots	2010-2017	49
WRST	Chokosna Hazard Fuels Plots – TX	AKR Hazard Fuels Plots	2009-2010	13
WRST	WRST Headquarters TX	AKR Hazard Fuels Plots	2009-2021	19
WRST	Fire Effects – Paired Plots	AKR Paired Plots	2006	2
WRST	McCarthy University Subdivision TX	AKR Hazard Fuels Plots	2011-2023	27
WRST	McCarthy Road Allotments	AKR Hazard Fuels Plots	2023	13
YUCH	2004 Woodchopper/ Edwards Cr Fires	AKR Fire & Fuels Plots	2004-2018	8
YUCH	1999 Witch Fire	Fire Effects (Other)	2001	15
YUCH	Fire Effects – Paired Plots	AKR Paired Plots		5
YUCH	1999 Fires Landcover-CBI	CBI	2001	119
YUCH	1999 Fires Landcover-CBI	CBI, AKR Fire & Fuels Plots	2014	31
YUCH	2005 Backcountry Cabins – TX	AKR Hazard Fuels Plots	2005-2020	42

YUCH	2018 Andrew Creek Fire- Aerial Assessment	Inventory (Other)	2019	80
YUCH	2018 Andrew Cr Fire	CBI & CAKN Vegetation	2019	28
YUCH	Biederman Allotment/Clearcut	AKR Hazard Fuels Plots	2023	15
DENA	Headquarters – TX	AKR Hazard Fuels Plots	2003-21, 2023	28
DENA	FY21 Fuels TX	AKR Fire & Fuels Plots	2021, 2023	23
DENA	Frontcountry Fuels TX (FC-TX)	AKR Fire & Fuels Plots	2023	2
DENA	DENA-VDM	AKR Fire & Fuels Plots	2005-2011	43
DENA	2000-2001 Fires CBI	CBI	2002	84
DENA	2001 Landcover-CBI & Reburns	AKR Fire & Fuels Plots	2007, 2016	55
DENA	2009 CAKN Bear Cr Fire	CBI & Cover	2010	28
DENA	2013 CAKN Beaver Log Fire	CBI & Cover	2014	13
DENA	2013 CAKN Toklat River East Fire	CBI & Cover	2014	25
DENA	DENA-TLS Fuels Assessment	AKR Fire & Fuels Plots	2022	22
DENA	DENA-FCPILES	Other	2023	8
NOAT	2002 Fires – Cottonwood/Uyon	CBI & Cover	2003	40
NOAT	2010 Fires	CBI & Cover	2011	34
NOAT	2004 Uvgoon Fire	AKR Fire & Fuels Plots	2004-2013	6
NOAT	2012 Uvgoon/ Kungiakrok Fires	CBI & Cover	2013	22
NOAT	1977 Fires Racine Plots	Racine Plots	1982-2017	8
BELA	1977 Fire Racine Plots	Racine Plots	1978-2019	8
BELA	Fairhaven Ditch Cabins- TX	AKR Hazard Fuels Plots	2012	4
BELA	2002 Mile Post 85 Fire	CBI & Cover	2003	53
KATM	Brooks Camp	AKR Fire & Fuels Plots	2022	31
KATM	Brooks Camp	Pile Burn Monitoring	2023	102
Total				1251

LACL = Lake Clark National Park and Preserve, WRST = Wrangell St. Elias National Park and Preserve, YUCH = Yukon-Charley National Park and Preserve, DENA = Denali National Park and Preserve, NOAT = Noatak National Preserve, BELA = Bering Land Bridge National Preserve, KATM = Katmai National Park and Preserve

Appendix C. Reports, Publications, or Presentations Completed in 2023

Articles and Publications

Boyd, M., Walker, X., Barnes, J., Celis, G., Goetz, S., Johnstone, J., Link, N., Melvin, A., Saperstein, L., Schuur, E., and Mack, M. 2023. Decadal impacts of wildfire fuel reduction treatments on ecosystem characteristics and fire behavior in Alaskan boreal forests. *Forest Ecology and Management*. 546. <https://doi.org/10.1016/j.foreco.2023.121347>.

Presentations

Barnes, J.L. 2023. Fire research and management: Examples from the North. (Presentation). NPS Fire Ecology Workshop. NCTC West Virginia. February 2023.

Barnes, J.L. 2023. Thinning – Fuels Treatment Monitoring and Effects (Presentation). Alaska Interagency Fuels Workshop, Fairbanks, AK. March 2023.

Barnes, J.L. 2023. Spruce bark beetles, vegetation change and risk of fire in Alaska. (Presentation). Denali NPPR Spruce Bark Beetle Summit, April 2023.

Barnes, J.L. 2023. Fire regimes and fuels treatment. (Presentation). Denali Management Team Meeting. April 2023.

Barnes, J.L. 2023. Fire Ecology & Fuels Monitoring Program. (Presentation). NPS Spring Seasonal Training. Fairbanks, AK. April 2023.

Project Learning Tree. June 25-26, 2023.

Barnes, J.L., Stehn, S.E. and K. Mitchell. 2023. Denali Resource Days, 4-hour field trip on forest disturbance, fire ecology, and fire management. May 16, 2023.

Stehn, S. E., 2023. Alaska Geographic Field Course, 3-day field workshop on moss and lichen ecology in the Boreal Forest. June 2-4, 2023.

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