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Natural Resource Stewardship and Science

Alaska Region Fire Ecology Annual Report for 2014

Natural Resource Data Series NPS/AKRO/NRDS—2015/781

ON THIS PAGE
National Park Service fire staff in the field in Lake Clark National Park and Preserve, Alaska.
Photograph by: Yasunori Matsui, NPS Alaska Region

ON THE COVER
A view through burned black spruce trees to Lake Clark, during a fire effects and burn severity study of the 2013 Currant Creek fire in Lake Clark National Park and Preserve, AK.
Photograph by: J. Northway, NPS Alaska Region

Alaska Region Fire Ecology Annual Report for 2014

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All manuscripts in the series receive the appropriate level of peer review to ensure that the information is scientifically credible, technically accurate, appropriately written for the intended audience, and designed and published in a professional manner.

This report received informal peer review by subject-matter experts who were not directly involved in the collection, analysis, or reporting of the data. Data in this report were collected and analyzed using methods based on established, peer-reviewed protocols.

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Abstract

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. Each year an annual report is completed to provide an overview of activities of the fire ecology program. The report includes descriptions and preliminary results of monitoring or research projects implemented by the fire ecology program, provides an annual summary of the fire season in Alaska and within the Alaska park units, and highlights communications and other activities accomplished by the program during 2014.

Overview

Introduction

The National Park Service (NPS) Alaska Region Fire Ecology Program provides science-based information to guide fire and land management planning, decisions and practices to understand and maintain fire-adapted ecosystems in Alaska. This report provides an overview of the 2014 wildland fire season for the Alaska Region parks and provides preliminary results from monitoring, research and outreach activities that were completed in 2014 by the NPS Alaska fire ecology program.

Figure 1. In route to monitor a long term vegetation plot that burned in 2013 in Denali National Park & Preserve (NPS photo 2014).

In 2014, the Alaska NPS fire ecology program had an active field season conducting burn severity assessments in Lake Clark and Denali National Parks & Preserves (Fig. 1), re-measuring 15 year old fire plots in Yukon-Charley Rivers National Preserve, and continuing to collect seasonal fuel moisture samples. The regional fire ecologists were involved with preparing monitoring reports, monitoring protocols and research proposals, and participated in several agency and interagency committees. Communicating results and information about fire ecology continued to be a focus of the program.

2014 Fire Season

One of the wettest summers on record led to a slow fire season in Alaska both statewide and within the National Park lands. The 2014 fire season started out with an early, dry spring and two large fires that started prior to greenup contributed to a majority of acres burned statewide. In 2014, a total of 393 fires were reported that burned 233,530 acres in Alaska (AICC Situation Report Dec. 14, 2014, http://fire.ak.blm.gov/).

Figure 2. A natural tundra wildfire in Noatak National Preserve – the Noatak River fire on July 12, 2014. (NPS Photo/ Yasunori Matsui).

The fire season was relatively quiet on National Park Service lands in Alaska. Two wildfires started on NPS lands and burned a total of 752.2 acres, although a total of four wildfires occurred within three Alaska park unit boundaries (Table 1). Noatak National Preserve had the largest fire, which started from a lightning strike in July, and burned 750 acres (Figure 2).

Wrangell-St. Elias and Yukon-Charley Rivers both had fires within the park boundaries, but not on NPS lands. The Windfall Mountain fire, which is on Doyon lands within the administrative boundaries of Yukon-Charley Rivers, started in 2013 and has been burning in a shale oil deposit (Stromquist 2014). The fire has burned through the winter of 2013/14 and continued to burn during the summer of 2014.

The NPS fire management program in Alaska continued to conduct fuels reduction projects in Denali, Lake Clark, Wrangell-St. Elias and Yukon-Charley Rivers in 2014. Fuels reduction projects are implemented around infrastructure or values to be protected from fire to provide defensible space and mitigate potential wildfire hazards (McMillan and Barnes, 2013). When vegetation or trees are cut during these fuel reduction projects, the material removed for fire protection are often put into piles to be burned later. The fire management staff carried out prescribed fire pile burns in Denali and Wrangell-St. Elias during 2014, with a total of 10 acres burned to remove the debris from earlier fuels reduction projects (Table 2).

Table 1. Wildfires and prescribed fires in Alaska park units from 2014.

Park Unit	**Number of Wildfires[1]**	**Total Acres Burned[1]**	**Number of Wildfires started on NPS Lands[2]**	**Acres Burned NPS Lands[2]**	**Number of Prescribed Fire Units**	**Acres of Prescribed Fires**
Denali National Park & Preserve	-	-			2 (Admin Rd and Toklat)	9.0
Noatak National Preserve	2	752.2	2	752.2	-	-
Wrangell-St. Elias National Park & Preserve	1	0.1	0	0	1 (Kiagna Cabin)	1.0
Yukon-Charley Rivers National Preserve	1	6	0	0	-	-
Total for Region	***4***	***758.3***	***2***	***752.2***	***3***	***10.0***

[1] Includes total number of fires and acres of all fires 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 fires and acres burned on NPS managed lands.

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 wildfire effects on the landscape. Table 2 provides a list of the number of plots measured in 2014 and the total number of fire/fuels monitoring or inventory plots established in Alaska parks since 2003.

During 2014 the NPS Alaska fire ecology program assessed burn severity and one-year post-fire effects for some of the fires that occurred in 2013 in Lake Clark and Denali. In addition thirty fire effects plots were established in Yukon-Charley Rivers to inventory the fuel and vegetation changes 15 years post-fire. Brief descriptions of the burn severity and fire effects monitoring projects are provided below.

Assessing Burn Severity in Lake Clark

As fires burn under varying weather conditions across landscapes characterized by varying topography and fuel types, the fire behavior and effects can change. Within any given fire, some areas may be radically changed due to intense scorching or sustained burning of surface organic layers, while other areas remain untouched. This varying fire intensity results in a heterogeneous pattern or 'fire mosaic' of burn severity on the landscape. Burn severity is a measure of the ecological effects of the fire on the ground or landscape after a fire occurs (Keeley 2009; Allen and Sorbel 2008). Burn severity of a fire influences vegetation patterns, succession, carbon emissions, and many other ecological factors after a fire. National programs such as the Monitoring Trends in Burn Severity (MTBS) program and US Geological Survey (USGS) provide burn severity maps for large fires utilizing satellite imagery (http://www.mtbs.gov/) (Figure 3). To verify the ability of the remote sensed burn severity maps to accurately reflect burn severity, we periodically assess burn severity on the ground to calibrate the satellite-based burn severity maps with field data.

Although fires are not rare in Lake Clark National Park & Preserve, 2013 was a fairly active and visible fire season for the park. Two large fires burned during 2013 in the park: Kristin Creek (16,747 acres) and Currant Creek (1,868 acres). The Currant Creek fire was only 15 miles from Port Alsworth, a major community on Lake Clark. There had been no ground-based, post-fire monitoring in park since the early 1980s. The NPS fire program and Southwest Alaska Inventory & Monitoring network (SWAN) were interested in determining the effects and burn severity of these fires.

During the summer of 2014, forty-three plots were measured for burn severity, vegetation composition, and organic soil consumption at the 2013 Currant Creek fire and seven plots were measured at the 2013 Kristin Creek fire in Lake Clark. Ground based burn severity was assessed using Composite Burn Index (CBI) plots. The fire effects were assessed for multiple vegetation strata and variables (ground, herbaceous, shrub and tree layers if present). Severity was scored from 0 to 3 for each stratum, where 0 was unburned or unaffected by fire and 3 represents high severity. Vegetation and ground cover were estimated within the 30-m diameter circular plots and soils information was collected to assess organic soils consumption. The burn severity map and examples of different burn severities are shown in Figures 3 and 4.

Table 2. Fire effects, fuels treatment (TX) or prescribed fire (RX) plot workload (2014) and total monitoring plots Installed 2003-2013.

Park	Monitoring Unit	Type of Plot (FMH, photo point, other)	Pre-burn/TX 2014	1yr Post 2014	Post (2-20 years) 2014	Annual Total	Total Plots
Lake Clark	Currant Creek Fire 2013	CBI & Cover		43			43
	Kristin Creek Fire 2013	CBI & Cover		7			7
Wrangell-St. Elias	Carl Creek RX	AKR Carl Creek Plots					29
	Chakina Fire 2009	CBI & Cover					56
	Chakina Fire 2009	AKR Fire & Fuels Plots					9
	Chokosna Smith – Fuels Treatment	AKR Chokosna Hazard Fuels Plots					13
	Headquarters – Fuels Treatment	AKR Hazard Fuels Plots					19
	Fire Effects – Paired Plots	AKR Paired Plots					2
	McCarthy University Subdivision	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		30
Denali	Headquarters – Fuels Treatment Plots	AKR Hazard Fuels Plots					27
	VDM Highpower fire reburns	AKR Fire & Fuels Plots					10
	Landcover-CBI	AKR Fire & Fuels Plots					55
	BeaverLog Fire 2013	CBI & Cover		13			13
	Toklat River East Fire 2013	CBI & Cover		25			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
Bering Land Bridge	1977 Fire Racine Plots	Racine Plots					8
	Fairhaven Ditch Cabins - Fuels Treatment	AKR Hazard Fuels Plots					4
Total				**88**	**30**		**474**

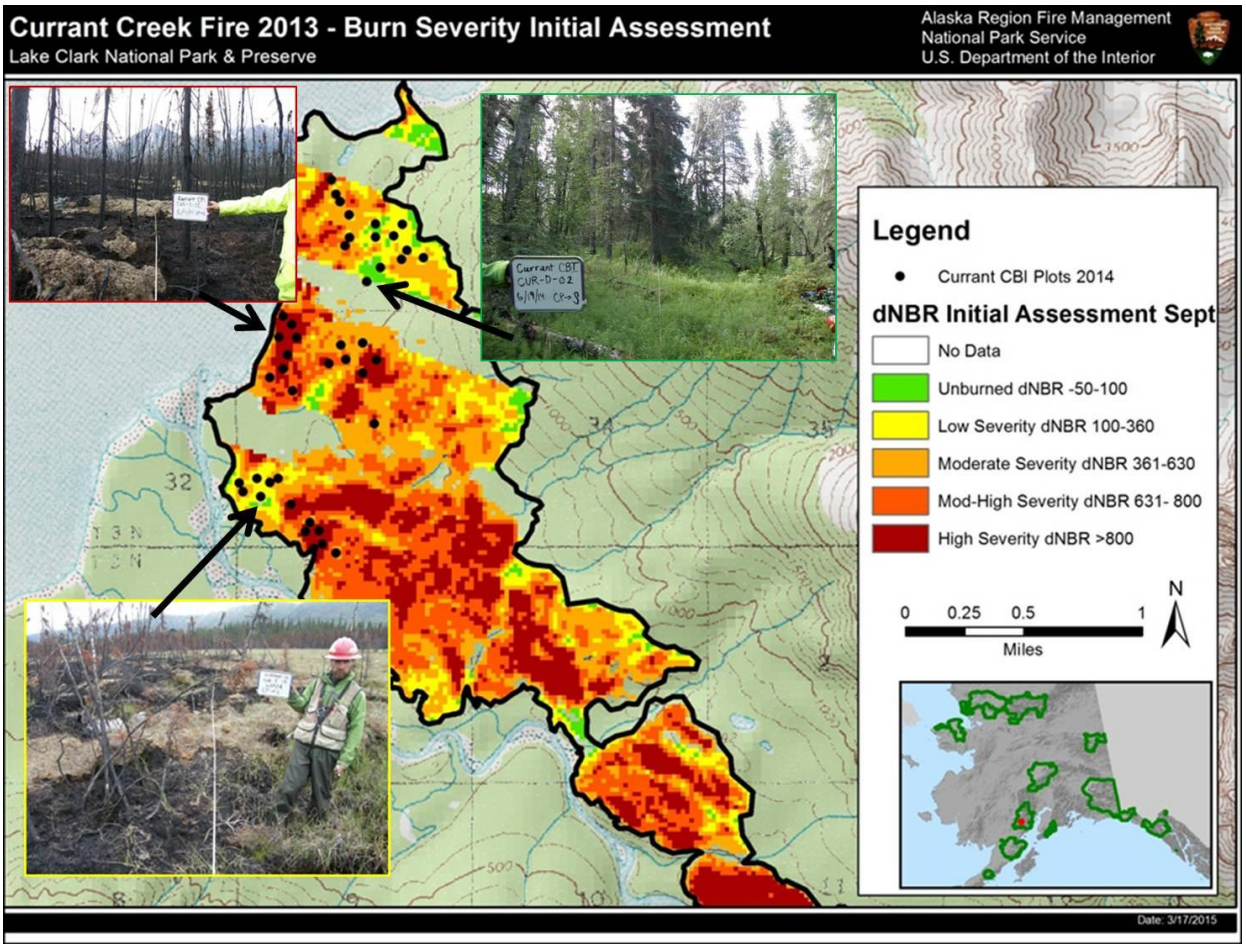

Figure 3. Satellite derived burn severity map of the 2013 Currant Creek fire in Lake Clark National Park & Preserve. Ground truth plots (black dots) were used to assess the scale of burn severity shown in the map. Photos show examples of burn severity detected on the ground that match the satellite derived burn severity map. Note that the map is a combination of two Initial Assessment maps (Sept and July). "No data" and banding in map are caused by Landsat 7 satellite issues.

Figure 4. Examples of different burn severities 1 year after the 2013 Currant Creek fire in Lake Clark National Park & Preserve. Left photo is low severity, middle moderate severity and right high severity based on CBI plots. (NPS Photos/AKR Fire Ecology).

Preliminary results of the ground truth burn severity assessment for the Currant Creek fire matched well with the September satellite scene initial assessment burn severity map (Figure 5, $r^2 = 0.79$). The Currant Creek fire area was primarily forested with black spruce (*Picea mariana*) and some white spruce (*P. glauca*) stands. The initial assessment burn severity map shows a mosaic of burn severities in the Currant Creek fire area (Figure 3). Based on the area that was mapped with the September post-fire imagery and calibration of the dNBR values, 47% of the area burned likely had moderate-high to high severity. Further analysis is needed to determine how common this higher burn severity is for fires that burn into August in Alaska. Based on the plot data it appears that many of the high severity areas as mapped by the remote sensing satellites did not have high duff or organic soil consumption due to the *Sphagnum* moss in the area (See the light brown pillows of moss shown in photos in Figures 3), although these sites did have high mortality to trees and other vegetation.

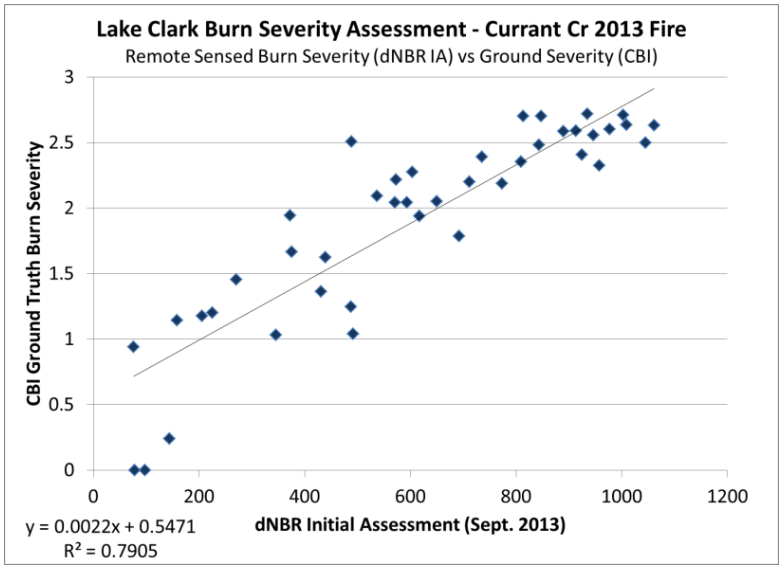

Figure 5. Comparison of remote sensed burn severity values (dNBR) to ground based burn severity measures (CBI) for the Currant Creek fire of 2013 in Lake Clark National Park & Preserve.

Interestingly, at the time of the plot measurements (late June 2014), there was relatively low herbaceous or shrub cover one-year post-fire at many of the sites that burned, except at the low severity plots (Figure 6). The low plant cover varied from the findings at the Denali plots, where many plants had re-sprouted and germinated by the time of sampling in August (compare plant cover in Figure 7). Contributing factors for the differences in plant cover among the two parks are uncertain. Possibly the low plant cover one-year post fire in Lake Clark resulted from the early dry spring prior to sampling; the rains began to fall the week of the field project. To investigate this hypothesis, plans are under development to revisit a subset of these plots to assess re-vegetation 2 years post-fire, in conjunction with the Southwest Alaska I&M Network.

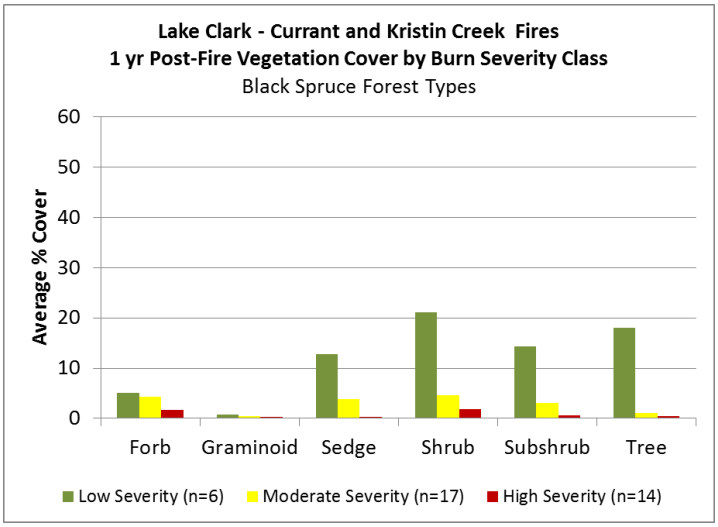

Figure 6. Comparison of average vegetation lifeform cover one-year post-fire black spruce sites by varying burn severity classes at the Lake Clark CBI plots that burned in 2013.

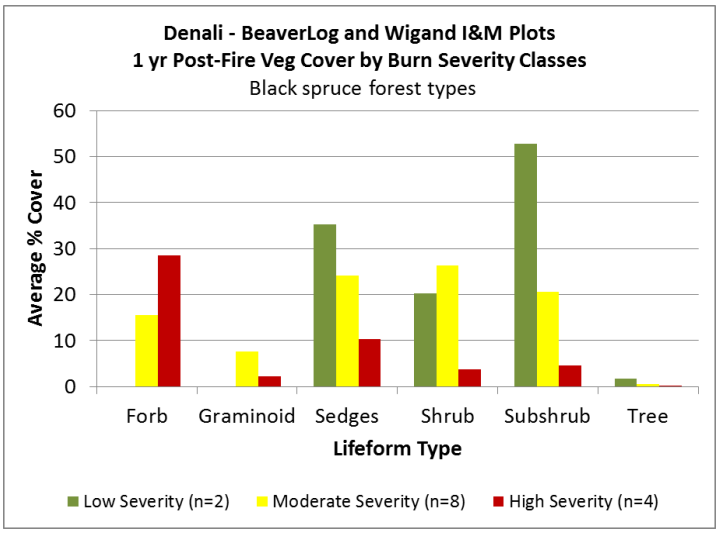

Figure 7. Comparison of average vegetation lifeform cover one-year post fire of black spruce sites by varying burn classes at the Denali CAKN I&M plots that burned in 2013.

Burn Severity at Long Term Vegetation Plots in Denali

During the summer of 2013, Denali had 14 fires, including several large fires with a total of 104,850 acres burned within the park boundary. Based on the fire perimeters, it appeared that several Central Alaska Network Inventory & Monitoring (CAKN) vegetation mini-grids (75 total plots) were burned by three 2013 fires in the park. As mentioned above, burn severity strongly influences the impacts of fire on vegetation succession, lichen/moss consumption, and active layer thaw. However burn severity is often difficult to assess several years after a fire. Since many of these plots were not going to be re-measured by the CAKN vegetation crew for another 5 to 10 years, the NPS Fire Program worked with CAKN to develop a plan to monitor these burned plots for severity and initial fire effects.

In 2014, the Denali fire crew and regional fire ecologists measured burn severity and one-year, post-fire effects at two of the burned mini-grids (38 plots). A diversity of burn severities and vegetation types were sampled, including: black and white spruce forests, paper birch forests and tussock-shrub tundra. Based on ocular cover estimates, the average vegetation cover one-year post-fire are shown in Figure 7 for the black spruce forest plots sampled. In general the vegetation cover reflected expected changes 1year after a fire for the burn severity classes. Sites such as the mesic feathermoss black spruce forest plot shown in Figure 8 resulted in the high forb (herbaceous plant) cover after a relatively high severity burn occurred. A majority of the understory plants were fireweed and horsetail at this site, but the pale green and pink flowered plant in the 2014 photo was *Cordyalis sempervirens*, which will only flower for a few years after a fire disturbance, and then the seeds will lie dormant in the soil until the next disturbance.

Figure 8. Comparison of 'pre-fire' photo of a black spruce plot with thick feather moss and horsetail understory (left) and one year post-fire after a crown fire occurred in this area (right). Note the dense herbaceous cover that has re-grown one year post-fire in Denali National Park & Preserve. Denali BeaverLog Plot 15 (NPS CAKN Photo 2010 and NPS Fire Photo 2014).

The primary intent of monitoring the Inventory & Monitoring (I&M) vegetation plots was to measure burn severity at the plot level. A secondary objective was to assess how well the remote sensed dNBR burn severity maps worked to determine burn severity at random plot locations (not established with the intent of sampling a range of burn severities as in the Lake Clark project). A comparison of the burn severity from the ground versus the burn severity dNBR from remote sensing showed a fairly good fit ($r^2 = 0.63$, see Table 3). This correlation suggests that the dNBR maps could be useful for assessing relative burn severity at the plot level.

Assessing these fires and plots provided an opportunity to improve our understanding of how fire changes vegetation, permafrost, soils and potential impacts of climate change. These data will provide information for the long-term monitoring of natural fires for Denali. The project is an excellent example of a cooperative effort between the NPS Fire Program and the CAKN Inventory and Monitoring Program.

Figure 9. Photo on the left shows a moderate-high burn severity plot from the 1999 Witch fire in Yukon-Charley Rivers National Preserve. Photo on the right shows the same plot 15 years after the fire. Spruce

and paper birch are returning and most of the burned trees have fallen over. (NPS Fire Photos 2001 and 2014).

Yukon-Charley Rivers 15 Years Post-Fire Effects and Fuels Assessment

In 2001 the NPS Alaska Eastern Area fire management crew conducted burn severity assessments on several 1999 fires that occurred in Yukon-Charley Rivers National Preserve (Allen and Sorbel, 2008). The goal of this current project was to assess the revegetation and fuel loads 15 years after the fire at these burn severity plots. This information will be used to inform successional models that can be used to update the Yukon-Charley River's landcover map for areas that have burned since the map was made (1999) and the satellite data sets that were used for the map (pre-1990). The intent of the project was to revisit a subset of the plots that had been measured for burn severity in 2001. Due to difficult access and limited helicopter landing sites only 30 of the original 119 plots were revisited.

However much can be gleaned from the data collected, and with additional plot data from the I&M program, updates to the map are expected in 2015. Measured plots varied in vegetation and severity classes. Figure 9 shows an example of moderate-high severity burn in a closed black spruce forest that has good regeneration of black spruce and paper birch among the down-fallen trees 15 years after the fire. Preliminary results suggest that higher grass cover is persisting in high severity plots in Yukon-Charley, even 15 years after the fire.

Table 3. A summary of the ecological objectives and results for 2014 projects are presented in this table.

Monitoring Unit	Management Objective	Monitoring Results	Objective Achieved?	Year Last Analysis Completed & Years included in analysis
LACL Currant Creek Burn Severity Assessment	Assess use of dNBR maps for burn severity in Lake Clark. Assess re-vegetation 1 year post-fire.	September dNBR Initial Assessment: *dNBR = 354.94(CBI) – 65.815* $r^2 = 0.7905$ *See Figure 6*	**Yes**	2014 (2014)
DENA I&M Veg Plots Burn Severity Assessment	Assess use of dNBR maps for mapping burn severity at a plot level. Assess re-vegetation 1 year post-fire.	August dNBR Initial Assessment: *dNBR = 244.91(CBI) + 10.289* $r^2 = 0.6332$ *See Figure 7*	**Yes**	2014 (2014)

Data Management

Data for all recent monitoring projects have been entered into FFI (FEAT/FIREMON Integrated) - a plot-level monitoring SQL 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 datastore IRMA in January 2015. The Alaska Eastern Area fire ecology data set is located here and includes data for YUCH and WRST: https://irma.nps.gov/App/Reference/Profile/2219410 and the Alaska Western Area fire ecology data set includes data for DENA, NOAT, BELA, and LACL: https://irma.nps.gov/App/Reference/Profile/2219412. The updated FFI databases reflect the recent data additions and QC to the AK NPS fire ecology databases (Table 4).

Table 4. Monitoring data entry and number of treatments or wildfires monitored in 2014.

Park/Project	% 2014 Data Entered	% 2014 Data Quality Checked	# Prescribed Fires Monitored	# Non-fire Fuels Treatments Monitored	# Wildfires Monitored	# BAER Treatments Monitored
Lake Clark CBI and Fire Plots	100%	90%	0	0	2	0
Denali CBI/I&M Plots	100%	90%	0	0	2	0
Yukon-Charley 1999 Fires – Landcover-CBI	100%	90%	0	0	3	0

Research & Technology

The 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 2014, three fire research proposals were submitted to NPS and other funding organizations. A tree ring study in Wrangell-St. Elias (WRST) was partially funded by NPS fire research funding in 2014 (see below for more information). The final CESU report for the role of tundra burning in carbon cycling study in Noatak National Preserve that was funded by the NPS Funds in 2011 was completed in May. A journal article on this study is being prepared.

Both fire ecologists participate in the interagency Fire Research, Development and Application Committee (FRDAC) for the Alaska Wildland Fire Coordinating Group (AWFCG) and are on the board for the Joint Fire Science Program (JFSP) Alaska Fire Science Consortium. In the fall of 2014, the regional fire ecologist became the chair of the Alaska AWFCG Fire Modeling and Analysis Committee for the next year. Both ecologists participated in interagency fire workshops and presented work related to fuel moisture research data collection in Alaska and within the parks.

Wrangell-St. Elias Fire History and Tree Ring Research

In 2011, a 36-acre fuels treatment project was conducted in WRST adjacent to the remote community of McCarthy, Alaska. The pre-thinning monitoring plots revealed significant evidence of a historic fire – very old burned stumps and snags. The fuels project happened to occur in an area that was presumably burned in a very large (estimated 380,000 acre) fire from 1915 (Lutz 1956). Large fires from the early 1900s were recorded in early government exploration documents and early fire history records from the Bureau of Land Management, yet the extent and actual fire perimeters are unknown.

During the implementation of the fuels treatment, the fire program collected 133 tree cross-sections from the trees that were cut during the fuels reduction project. The intent was to have these trees aged to determine an estimated time of the last fire. NPS Reserve Fire Research proposals were submitted in 2012 and 2013 to work with a dendrologist at the University of Idaho to complete the tree aging and link to climate records. A portion of funds became available in 2014 to count the tree rings from the cross-sections. This work was completed by the NPS Alaska assistant fire ecologist. Surprisingly, a majority of the trees were much younger than expected if the site burned in 1915. The average tree ring count was 56 years, with a majority of the trees having a count of less than 80 years (Figure 10). These findings have led to more questions in regards to the fire history in the area or successional patterns post-fire. A new research proposal was submitted to study the tree

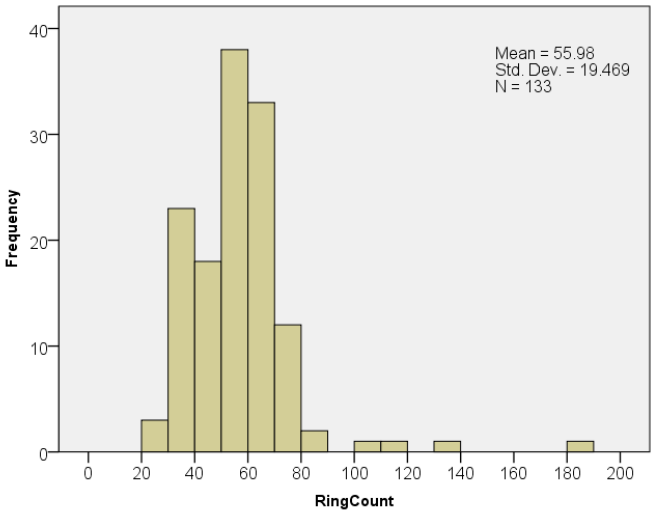

Figure 10. Histogram of ring count age in years of the 133 tree cross-sections collected at the McCarthy University Subdivision fuels project

ring radial-growth patterns to infer growth release and suppression at the site to potentially relate to climate and weather parameters that may lead to large fire growth in this region of Alaska.

Communicating Results

Communicating results of projects or research is an important aspect the fire ecology program to provide information and outreach to fire managers, park staff, and the public. Communication comes in many forms: presentations, web pages, reports; but also includes blogs, Facebook, and personal communication. All are important ways to communicate.

In 2014 a unique and innovative way to showcase a fire ecology project came through the use of the ESRI ArcGIS Story Maps. The Lake Clark National Park & Preserve fire ecology work was compiled into an interactive map with photos, descriptions of the field work, and effects of the fire and burn severity. The acting regional fire communication specialist spearheaded the project and we plan to use this avenue to displaying our fire ecology field work more often. Take a tour of the Currant Creek fire ecology study at: http://bit.ly/1jPgRgq

The cooperative ecosystem study units (CESU) final report for the Noatak study on the age of carbon burned during tundra fires was completed in 2014, a journal publication is being prepared. One fire story and other informal articles were written this year; including a short article on a fuels reduction project around 100 year old structures in Bering Land Bridge National Preserve was featured in the NPS RX Effects newsletter. Five presentations were prepared and presented this year by the regional fire ecologist, ranging from “New fires and old fires – fuel barriers or not?” to “CFFDRS and Duff Moisture”. See Appendix A for a list of reports, presentations, and other forms of communication completed in 2014.

Planning and Compliance

The fire ecology program participates in planning activities for the fire management and park land management programs. Planning work this year included preparing compliance for four field projects in 2014, writing the Arctic Network I&M Fire Monitoring protocols and reviewing the Gates of the Arctic Fire Management Plan. Table 5 has a list of parks with fire management plans (FMP) 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 5. Fire Management Plan - Fire Monitoring Plan Status as of 2014

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 2014?
Denali	Yes in RSS	Planned for 2015	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	0	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	2	0

Fire ecology accomplishments and areas of focus

The Alaska NPS Fire Ecology Program is comprised of 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. Over the past twelve years this has worked well since the NPS Alaska Western Area Fire Management (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.

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. Four field projects were implemented during the summer of 2014, which required significant time in preparing compliance/research permits, aviation safety plans and other documents. Significant time was allocated to preparing the Arctic Network Inventory & Monitoring (ARCN) fire monitoring protocols.

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. A majority of work this year focused on planning for field work, reviewing planning documents and reports, preparing portions of the ARCN fire monitoring protocol, implementing field projects, inputting data collected into the FFI database, and assisting with prescribed fire pile burns and other fuels projects for area programs.

Summary and 2015 Fire Ecology Program Direction

The planning, monitoring, research, outreach and collaboration of the fire ecology program throughout 2014 has provided scientific information to guide fire and land management planning for the National Park Service and other entities. The goal of the NPS fire ecology program continues to be to provide an understanding of fire adapted ecosystems and to provide tools and technology to safely manage fire in Alaska.

In 2015 the fire ecology program will continue to:

- Participate in *planning* activities for the fire management and land management programs and develop strategies to accommodate fire management issues as a result of climate change.
- Provide effective evaluation of Alaska NPS fire management program activities and fire on the landscape through *monitoring.*
- Coordinate *research* and facilitate the use of scientific data, modeling and technology to enhance the fire management program.
- Provide fire ecology *information and outreach* to fire managers, other park staff, and the public.
- *Collaborate* with other NPS programs, interagency partners, and other entities.

The major planning efforts for 2015 will be to complete the draft Arctic Network I&M fire protocols, update fire monitoring plans for Denali Fire Management Plan, develop an Alaska park specific fire risk and fuels planning model, and work on the NPS Alaska Region Climate Change advisory committee. Field work will focus on re-measuring fuel reduction plots in Wrangell-St. Elias, revisiting the Lake Clark Currant Creek fire with the Southwest Alaska I&M Network vegetation crew, and assisting on a burn severity assessment project on the Kenai (Funny River Fire) with the US Fish and Wildlife Service. Research funding for the Wrangell-St. Elias tree ring study was received; the purpose of this study will be to use tree ring data to compare past climate records and fire records to determine if climate or vegetation or both influence large fire events in this region. Outreach efforts include: completing monitoring reports for two fuels projects, publishing a journal article on the tundra fire results from Noatak and presenting results of studies to park units and others. The fire ecology program will continue to collaborate with NPS programs, interagency partners and other entities to improve the knowledge of fire on the landscape in Alaska.

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Appendix A. Reports, publications, and presentations completed in 2014 in conjunction with the Alaska Region Fire Ecology Program.

Barnes, J.L. and Weddle, L.L. Fuels reduction to protect 100 year old historic structures in Bering Land Bridge National Preserve, Alaska. RxEffects, NPS Fire Ecology Program. Vol 1, Issue 13, pg. 8.

Hu, F.S., Barnes, J.L. and Dash, C. 2014. The role of tundra burning in carbon cycling: Radiocarbon analysis of recent burns in the Noatak National Preserve, Alaska. CESU Final Report, May 5, 2014. 12 pp.

Barnes, J.L. and Ziel, R. 2014. New fires and old fires – fuel barriers or not? (Presentation). Alaska Fire Science Consortium – Interagency Spring FMO Meeting. Fairbanks, AK. April 2014.

Barnes, J.L. and Miller, E. 2014. 2012-2013 Fuel moisture campaign – what have we learned? (Presentation). Interagency Spring FMO Meeting. Fairbanks, AK. April 2014.

Barnes, J.L. 2014. Climate change? Shortened fire return intervals in Alaska boreal forests and tundra. (Presentation) Alaska Regional NPS 'Science for Lunch Series', Fairbanks, AK. April 2014.

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Fire Ecology Related Fire Stories & Other Communications:

After Fire a Different Forest… Lake Clark National Park and Preserve, Alaska. Cohesive Strategy-Maintain and Restore Resilient Landscapes Fire Story. December 2014. http://www.nps.gov/fire/wildland-fire/connect/fire-stories/2014-parks/lake-clark-national-park-and-preserve.cfm

Lake Clark interactive story map - Currant Creek Fire: Fire Ecology Study 1 year later. July 2014 http://bit.ly/1jPgRgq

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