



Northern Rockies Fire Science Network (NRFSN) Annual Report for Fiscal Year 2019

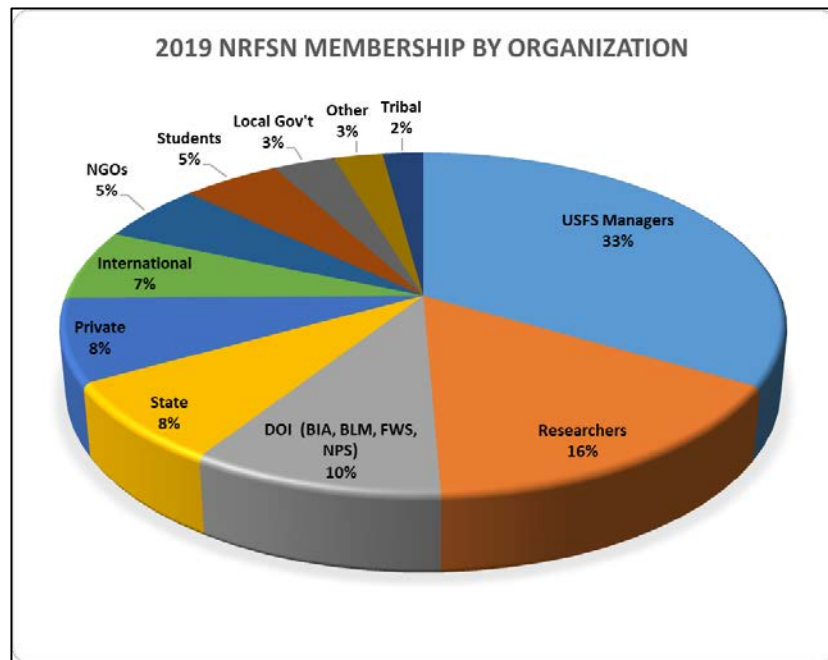


During FY19, the Northern Rockies Fire Science Network (NRFSN) continued to gain visibility and diversify our membership by emphasizing partnerships, personal briefings and consultations, and co-hosting and attending in-person events. In addition to direct engagement, we hosted webinars and produced and facilitated access to online resources, including written products and videos, the NRFSN searchable publication and webinar databases, new “hot topic” web pages, and past event webpages; and we engaged through Twitter. Activities and products predominantly focused on reburns and post-fire regeneration, fuel treatment, fire-adapted communities, traditional knowledge and fire, risk assessment and management, wilderness and long-duration fire, firefighter health and safety, and whitebark pine restoration.

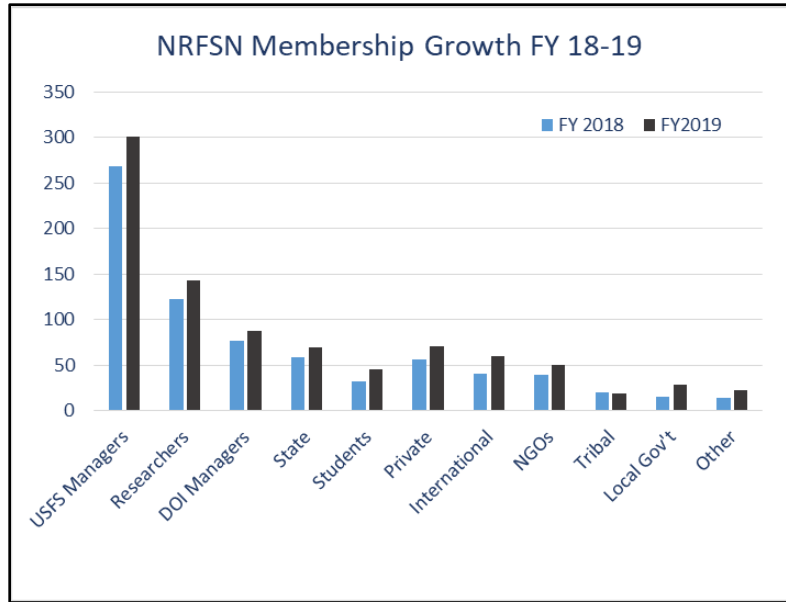
Participation by Organization, FY2019

NRFSN membership grew 21% from FY18 to FY19, to 902 members. This total excludes the 21 JFSP Fire Science Exchange Network members. Reflecting high federal, tribal, and state land ownership in the Northern Rockies, the NRFSN has a high proportion of federal, tribal, and state managers (56%) and researchers (16%). Current manager membership in the United States includes 301 USFS, 70 State, 37 BLM, 32 Tribal and BIA, 30 NPS, 26 local government, and 8 FWS managers. Research membership includes 78 University, 49 USFS, 8 NOAA and NWS, 6 USGS, 1 ARS, and 1 NRCS.

Ninety-three percent of NRFSN members are from the U.S., especially MT and ID, followed by WY, OR and WA. The 60 international members are mostly from Canada (93%, primarily from British Columbia and Alberta), with additional members from Europe, Australia, and Southeast Asia. International members are predominantly public land managers (55%) and researchers (27%) with the remaining 18% evenly split among students, private land managers and community members/citizens.



NRFSN membership grew in nearly all categories. In addition to continued growth by USFS managers, DOI managers, and researchers, notable increases in membership in FY19 included county land managers (90%), USGS scientists and staff (50%), international organizations and individuals (46%), private companies (62%), and university and college students (44%). These areas of growth demonstrate increasing awareness of NRFSN activities and products by diverse stakeholders engaged in fire and fuels management across the U.S. and Canadian Northern Rockies.



FY19 growth was predominantly from engagement at the Western Regional Cohesive Strategy meeting and field trip (Missoula, June 2019), Bob Marshall Wilderness workshop and field trip (Choteau, July 2019), Fire Behavior Conference (Albuquerque, April 2019), visitors to the NRFSN exhibit at the Northern Rockies Training Center (Missoula), and from personal briefings.

Participation by Activity, FY 2019

NRFSN activities in FY19 included workshops and field trips; presentations and exhibits; briefings and consultations; webinars; past event documentation through summaries, videos and links to related resources; searchable publication and webinar / video databases; hot topic web pages; briefs and syntheses; bimonthly e-newsletters; social media tweets; and videos; as well as support to the USDA Forest Service’s Washington Office (WO) by organizing a brown bag for WO staff to learn about the JFSP Fire Science Exchanges; and by serving as liaison between the WO and the Fire Science Exchange Network to collaborate on the National Fire Danger Rating System update rollout workshops.

Direct Engagement

Direct engagement is a critical part of NRFSN work because it facilitates members building relationships and exchanging knowledge, and because federal agency managers and scientists see these as useful but have limited opportunities for workshop, field trip and conference engagement unless it is nearby. Thus, NRFSN leadership and staff spent a substantial amount of time, energy, and resources in FY19 facilitating scientist-manager communication through workshops and field trips, delivering resources through exhibits, and conducting leadership and field briefings and consultations. We also engaged the public in fire science conversations stimulated by art developed by fire professionals.

Workshops and Field Trips. The NRFSN planned 3 workshops and 3 field trips in FY19 to address the following topics of high interest in the Northern Rockies: ecological effects of repeated fires, fuel treatment and collaboration, wilderness fire management, and ecology and restoration of whitebark pine. In addition, we concluded a *Conversations through the Smoke* traveling art show initiated in FY18.



Field trip participants visit an area of high severity fire on the Maple Fire, Yellowstone National Park.

Reburns and Post-fire Regeneration

In Northern Rockies ecosystems, recent occurrence of shorter-interval, high-severity fire in landscapes with historically long-interval fire regimes, has presented fire management challenges and questions about long-term ecological effects. To address this, In October 2018, NRFSN partnered with Yellowstone National Park’s fire managers and scientists at the Universities of Wisconsin and Washington to host a workshop and field trip to learn from the 2016 Maple Fire, which burned in the footprint of the 1988 North Fork Fire.

Forty people attended, representing four federal agencies, a tribal agency, several universities, and a city fire department. The two-day event fostered dialogue and relationship building among managers and scientists and provided opportunities to discuss the latest science on reburn characteristics, fire effects, fire behavior, and the effects of climate change on fire and vegetation dynamics.

National Park Service managers also shared information about national fire policy, local strategic plans, and a decision-support tool that informed their decision process while managing the Maple Fire. The field trip provided valuable opportunities to visit research sites and see firsthand the varied fire effects and limited tree regeneration following a short-interval reburn.

Fuel Treatment, Collaboration, and Fire-Adapted Communities

At the request of the Western Region National Cohesive Wildland Fire Strategy Committee, NRFSN worked with Committee Co-Chairs Joe Stuttler and Katie Lighthall, and local agency leadership, to organize a field tour showcasing success stories and lessons learned while addressing the National Cohesive Wildland Fire Management Strategy’s vision: to safely and effectively extinguish fire, when needed; use fire where allowable; manage our natural resources; and as a Nation, live with wildland fire.

The tour visited the Marshall Woods Restoration Project on the Lolo National Forest near Missoula to discuss community mitigation and education on private lands, fuel treatments on public lands adjacent to a complex human landscape, research support of fuel treatment planning, and the Wildfire Adapted Missoula Project. The group of 37 participants learned about collaborative efforts in and near Missoula County to address community wildfire preparedness; they then visited the Flathead Reservation of the Confederated Salish and Kootenai Tribes to learn more about shared incident response, the integration of science into fire operations, and a multi-jurisdictional fire and fuels management program that incorporates traditional knowledge, western science, and partnerships.



Field trip participants listen to an overview of the fire and fuels management program on the Flathead Reservation of the Confederated Salish and Kootenai Tribes.

Featured partners on this field tour included the USDA Forest Service, Bureau of Land Management, Confederated Salish and Kootenai Tribes, Montana Department of Natural Resources and Conservation, Missoula County, Lolo Restoration Committee, and the Blackfoot Challenge.

Wilderness Fire



A wide-ranging discussion of wilderness fire in the Bob Marshall.

This follow-up to the 2016 wilderness fire workshop and field trip, *Wilderness Fire Management: Harder Then or Now?* was requested by 2016 participants. In July 2019, the NRFSN partnered with the Rocky Mountain Ranger District, Lewis & Clark National Forest to host the *Wilderness Fire Management: Easier Now or Later?* workshop and field trip on the eastside of the Bob Marshall. The event brought together 40 fire, recreation, and wilderness managers, researchers, and students to share knowledge and lessons learned from wilderness fire management. These included future challenges related to changing climate and fire seasons; vegetation, soil, and water response to fire; resilience; risk management; recreation; and ideas for strengthening wilderness fire management.

Whitebark Pine Restoration

In September 2019, the NRFSN partnered with the Whitebark Pine Ecosystem Foundation, the Confederated Salish and Kootenai Tribes, and Salish Kootenai College to host the workshop - *The Far View from the Mountaintops: Meshing Past and Present Whitebark Pine Science, Management, and Cultural Significance*.

Workshop presentations featured research, restoration, the cultural value of whitebark pine, integration of traditional knowledge and western science, and the importance of making science delivery culturally and socially relevant. Field trip attendees hiked to a cone collection site on the Flathead Indian Reservation to hear about the Confederated Salish and Kootenai Tribes (CSKT) whitebark pine restoration and reforestation efforts, and to hear stories from CSKT Forestry and Cultural Preservation managers about their experiences working on whitebark pine restoration. Discussions focused on management approaches and philosophies, as well as the outlook for whitebark pine.

It was a great honor and rare opportunity for many of the attendees to visit the field site and pay their respects to “Ilawye”, meaning the “Great Great Grandparent”, a sacred and ancient whitebark pine snag bearing many fire scars and evidence of surviving for millennia.



Confederated Salish and Kootenai Tribal Department of Forestry Head and Salish Kootenai College field intern discuss whitebark pine restoration projects on the Flathead Indian Reservation.

One fire ecologist noted that, “*Standing next to such a resilient and ancient tree snag and her many descendants with such a knowledgeable and passionate group of people all united for the same cause, it was hard not to be hopeful for the future of whitebark pine.*”

Building Fire-Adapted Communities through Art

In FY19, the NRFSN co-hosted the final two *Conversations through the Smoke* traveling art shows. A partnership between the University of Idaho and NRFSN, the art shows sought to connect the creative voices of those the artists, who were also fire practitioners, with communities highly affected by recent fires and smoke in the Northern Rockies. Art from 15 fire managers, scientists, and firefighters was displayed in two communities in FY18, and then in Moscow and Salmon, Idaho in FY19.

The exhibit provided a backdrop for community discussions about fire science and management. The two FY19 shows engaged 177 people in one-on-one discussions about the future of large wildfires and smoke. Maps of past fires, smoke, and the wildland urban interface across the West were presented, inviting viewers to think about: *How can we adapt to a future with more large fires and more smoke? How can we have more fires burn under less extreme conditions in order to lessen the costs of fire relative to the benefits? How can communities become more fire-adapted and smoke-ready in fire-resilient landscapes?* The juried art pieces were especially valuable in sparking individual conversations about the personal experiences of visitors. As follow-up, we developed a web page featuring the artists and their work and allowing others to enjoy the artwork.



Conversations Through the Smoke art exhibit in Salmon, Idaho.

Presentations and Exhibits. In FY19, the NRFSN partnered with the Northern Rockies Training Center (NRTC) in Missoula to offer an onsite exhibit during training season. Trainings included RX410, RX301 and RX341 as well as other fire meetings. This exhibit reached a diverse group of managers and scientists throughout the season. In addition, NRFSN materials were distributed at the International Association of Wildland Fire (IAWF) Fire Behavior Conference (Albuquerque, NM) and Human Dimensions of Wildland Fire Conference (Asheville, NC), Society for Ecological Restoration Northwest Conference (Spokane, WA), the Montana Forest Collaboration Network meeting (Kalispell, MT), and the Wyoming Prescribed Fire Council meeting (Lander, WY).

With an increased effort to serve those addressing firefighter health and safety, NRFSN briefings were given at the USFS Region/Station/Area Safety Managers Meeting, and at a USFS Human Performance and Innovation & Organizational Learning RD&A's injury and accident meta-review focus group on fire management (Missoula, MT). Also serving those engaged in prescribed fire, the NRFSN made presentations and briefings at the McCall Burn Boss Workshop (McCall, ID), as well as fire behavior and long-term analysts engaged in NWCG's Advanced Fire Environment Learning Unit. Finally, we briefed a variety of partners at the 2019 Western Region Cohesive Wildland Fire Strategy meeting (Missoula, MT) and scientists at a science communication workshop (Missoula, MT). In addition, we developed and displayed a poster at the 5th Human Dimensions of Wildland Fire Conference (Asheville, NC) that used the NRFSN to highlight the process of developing a regional Fire Science Exchange.

Leadership Briefings and Consultations. In FY19, we continued to use opportunities for one-on-one briefings and consultations to increase awareness of the NRFSN, share products and services, and explore potential future collaboration and partnerships. We provided personal briefings to the following USDA Forest Service leaders: Acting Chief of Staff Fire and Aviation Management; Intermountain Regional Fire Director; Southern Regional Biological & Physical Resources Director; Forest Supervisor, Stanislaus National Forest; Northern Region Fire Operations Risk Manager; and Fire Management Officer, Bighorn National Forest. Other briefings included the Department Head of Forest, Rangeland and Fire Sciences, University of Idaho. Nationally, the NRFSN took the lead on organizing a brown bag for USDA Forest Service’s Washington Office (WO) staff to learn about the JFSP Fire Science Exchanges. Fifteen WO staff exchanged knowledge with 10 JFSPs and Fire Science Exchange representatives. This was followed by a consultation with the Assistant Director, FAM Landscapes and Partnerships.

Network of Fire Science Champions. In FY19, the NRFSN hosted more workshops and field trips than initially planned. As a result, we did not have the capacity to host Network of Fire Science Champions calls. We hope to continue these in the future in order to support a regional community of practice interested in wide-ranging discussions about fire and fuels science.

Webinars. Because there are already many webinar series that address fire and fuels-related topics, the NRFSN does not host a regular webinar series. Rather, we host webinars on key topics as requested by scientists and managers. In FY19, NRFSN webinars addressed several themes of importance to Northern Rockies fire managers, including an increased emphasis on firefighter health and safety. Other themes included climate effects on post-fire regeneration, ecological effects of mixed-severity fires, and post-disturbance management of pine beetle impacts. The following webinars served 427 participants: *Smoke exposure health effects and mitigations for wildland fire personnel: current research and recommendations* (Kathleen Navarro, USFS Pacific Southwest Region, Aviation and Fire Management, and Megan Martinez, Custer Gallatin National Forest), *Assessing wildland firefighter sleep and fatigue while on fire assignment* (Randy Brooks, University of Idaho), *Climatic controls on post-fire regeneration and growth of ponderosa pine and Douglas-fir* (Kimberley Davis, University of Montana), and *Unraveling the complexity of mixed-severity fire regimes: new insights from three Rocky Mountain ecosystems* (Cameron Naficy, University of British Columbia). With the Southern Rockies Fire Science Network, we also co-hosted *Management responses to mountain pine beetle infestations on national forestlands in the western U.S.* (Jesse Abrams, University of Montana; Heidi Huber-Stearns, University of Oregon; and Emily Jane Davis, Oregon State University).

Online Resources

In addition to the many in-person events we hosted or co-hosted in FY19, the NRFSN put substantial energy into making science accessible through online resources on the NRFSN website. This included past event documentation, searchable publication and webinar databases, subject matter expert reviewed resources on hot topics, and a bimonthly e-newsletter.

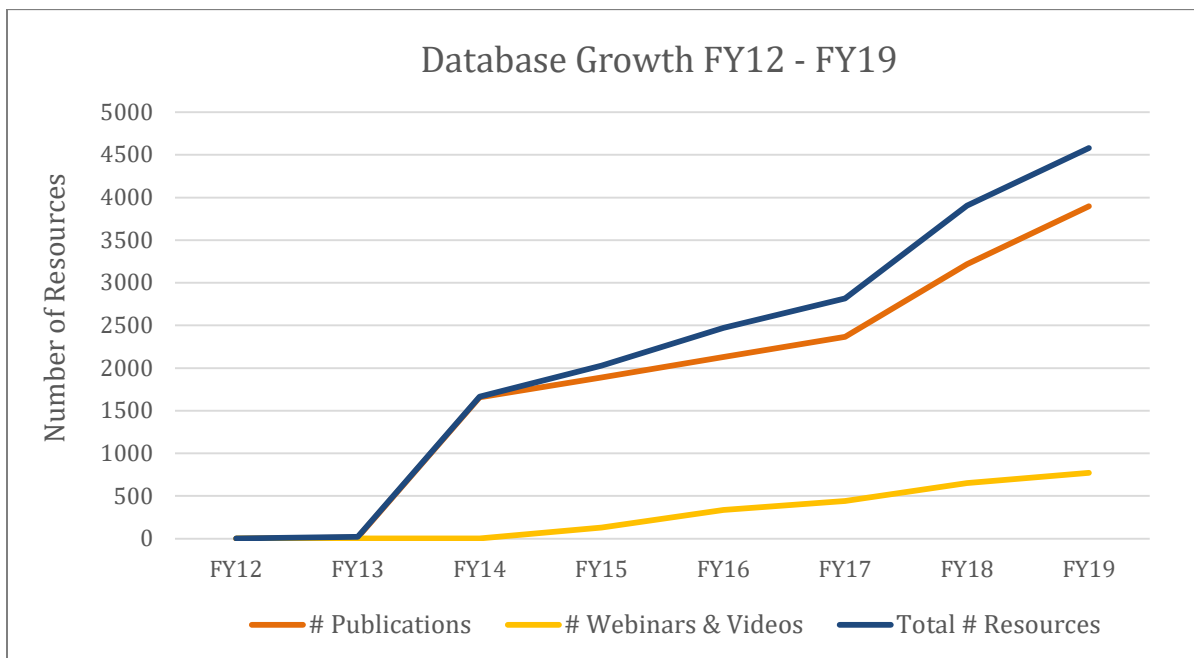
Past Event Documentation. In FY19, we developed past event web pages, which highlighted key messages and posted slideshows, video presentations, handouts, and other associated resources for the workshops and field trips the NRFSN hosted. Of note, we also developed a web page featuring the 15 artists and their work from the *Conversations through the Smoke* art shows. These materials offer learning opportunities for those who were not able to participate directly and allow participants to easily reference and revisit information presented during the event. Past event resources were posted for the following events:

- *Conversations through the Smoke* art shows
- *Long-Duration Fire and Re-Burn Effects in Yellowstone National Park* field trip

- *Working Across Boundaries to Implement the Cohesive Strategy in the Northern Rockies* field trip
- *Wilderness Fire Management: Easier Now or Later?* workshop and field trip
- *The Far View from the Mountaintops: Meshing Past and Present Whitebark Pine Science, Management, and Cultural Significance* workshop

Searchable Databases. The NRFSN hosts a searchable Webinar & Video Archive to help managers, scientists and others locate recorded webinars and videos on topics of interest. In FY19, we added 121 webinar and video recordings to this searchable archive; 59% (71) of the new webinars and videos addressed wildfire risk assessment and risk management. Many of these resources were also related to human factors of firefighter safety and to risk in the wildland-urban interface. Overall, we provided access to 773 webinar recordings and videos in 2019, which were searchable by topic and ecosystem. According to Google Analytics, there were 929 page views of the NRFSN Webinar & Video archive database in FY19.

Expanding the searchable NRFSN Research & Publications Database during FY19, we added 681 new publications, bringing the total to 3897 documents. In past annual reports this number reflected documents plus webinars and videos. However, this year, the total number of resources in the publication database and webinar archive are reported separately. Based on manager interest and high wildfire activity in the northern Rockies, in FY19 we added a post-fire management topic to the database. This includes resources on post-fire rehabilitation and salvage logging. According to Google Analytics, the publication database received 2150 page views in FY19.



Hot Topics Webpages. In FY19, we continued to develop “hot topic” web pages focused on key themes important for fire and fuels management in the Northern Rockies. These topic-focused web pages feature important resources (webinar recordings, videos, scientific articles, syntheses, and upcoming and past events) relevant to specific topics of interest. While the hot topics pull resources from our searchable databases, the hot topics feature a narrower list of resources that are recommended by subject-matter experts to ensure viewers can quickly find the most current and relevant resources on a given topic. The following new hot topic web pages were created and shared with users in FY19: 1) post-fire salvage logging, which included resources on the ecological and economic effects of salvage logging;

2) post-fire tree regeneration, which illuminated the climatic controls and ecological interactions that control tree regeneration after fire; and 3) whitebark pine restoration and management, which links to resources for restoring these valuable high-elevation pines. According to Google Analytics, there were 617 page views of our entire suite of Hot Topic webpages in FY19.

Briefs and Syntheses. In FY19, NRFSN briefs and syntheses addressed the following topics: mountain big sagebrush, traditional knowledge and fire, effects of repeat fires, and post-fire tree regeneration.

Based on manager requests for information about mountain big sagebrush and fire, the NRFSN collaborated with the Rocky Mountain Research Station’s Fire Effects Information System to produce the research brief - *Mountain Big Sagebrush - Fire Regimes*. This brief compares characteristics of historical and contemporary fire regimes in mountain big sagebrush communities. Fuels and fire regimes in many sagebrush ecosystems have changed since European-American settlement due to a combination of interrelated factors such as land management for livestock production, woodland expansion, nonnative plant invasions, and climate changes. The research brief highlights the important role of fire and contemporary stressors in the vegetation dynamics of these communities and informs management decisions regarding restoration of mountain big sagebrush.



To more widely share conclusions and policy implications from a recent NRFSN publication, *Returning Fire to the Land: Celebrating Traditional Knowledge and Fire*, we were invited to partner with the California Fire Science Consortium to develop a research brief - *Community Conversations: Applying Traditional Knowledge to Fire Management and Research*. In the original publication, authors, Frank Lake and others highlighted challenges and solutions in applying Traditional Knowledge (TK) and western knowledge (WK) to wildland fire and fuels management. The authors noted that while many tribes wish to use traditional knowledge and cultural burns to address wildland and fuel management issues, a variety of constraints prevent TK from being used. The research brief, authored by Hannah Lopez, Frank Lake, and Vita Wright, summarizes four important management implications: 1) both TK and WK are valuable resources when making decisions about wildland fire and fuel management; 2) tribal partnerships can be used to achieve multiple resource objectives; 3) to facilitate collaboration between TK and WK, focus on improved relationships between tribal and non-tribal land managers and researchers; and 4) communication should be culturally sensitive and respectful to traditions and the sensitivity of information shared.

Many large fires have burned since Camille Stevens-Rumann and others wrote the 2014 NRFSN science review, *The Effects of Previous Wildfires on Subsequent Wildfire Behavior and Post-Wildfire Recovery*. Scientists have found that repeated high severity wildfires in many ecosystems results in low tree regeneration. In contrast, other combinations of severity result in variable changes in tree regeneration. In addition, previous wildfires inhibit growth, severity, and extent of subsequent wildfire, but the length of time these areas serve as barriers or decreases in severity varies. While research supports the general trends demonstrated in the original science review, there are numerous additional resources and publications available. To help managers keep up with the pace of on-going research on this topic, authors Camille Stevens-Rumann, Susan Prichard, and Penelope Morgan updated this review in FY19.

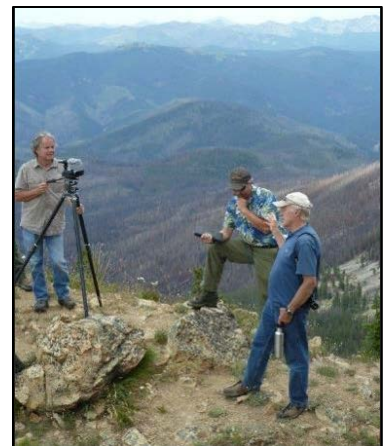
With a changing climate and more fire on the landscape, managers are asking about the effects of fire on long-term vegetation recovery. To address this, in FY19, the NRFSN partnered with authors Camille Stevens-Rumann, Penelope Morgan, Kimberley Davis, Kerry Kemp, and Jarod Blades to complete a new science review, *Post-fire Tree Regeneration (or Lack Thereof) Can Change Ecosystems*. The authors found

collectively that few tree seedlings have established 9-13 years after many large forest fires; fewer trees established far from living tree sources; and hot, dry climatic conditions in the years following fires resulted in lower tree regeneration. They make numerous management recommendations for actions that can be taken before, during, and after fires to increase the potential for tree regeneration.

Newsletters. The NRFSN usually produces 5 newsletters/year, distributed outside of fire season. In FY19, we produced 3 newsletters and five listserv announcements of upcoming events. We were unable to complete a planned January 2019 newsletter due to the government shutdown, and our September 2019 newsletter was moved to October based on the need to prioritize other work during a staffing shortage. NRFSN newsletters are resource-focused, including short articles about new scientific resources and new publications, upcoming events, and fire or fuels-related regional highlights.

Social Media. In FY19, the NRFSN sent 120 tweets and increased our number of followers by 202. This brought the NRFSN a total of 1686 followers. NRFSN tweets highlight current research and news relevant to fire science and management in the Northern Rockies. We also use Twitter to make followers aware of NRFSN events and other conferences, webinars, and opportunities that may be of interest, including those hosted by others.

Videos. Based on manager interest, we contracted with videographer William Munoz to film the presentations and breakout sessions at NRFSN's July 2019 wilderness fire workshop in Choteau, MT, and to produce videos of the talks. These videos are available through the NRFSN YouTube channel and are linked on the workshop's past event page. In FY19, we also initiated a contract with videographer Peri Sasnett to develop a video focused on lessons learned from wilderness fire management and science in the Northern Rockies. Using interview footage that we've collected from experienced fire managers and scientists, and input from subject matter experts, this video will target provide resources, guidance, and inspiration to line officers, especially those relatively new to managing wildland fire.



Interviewing retired District Ranger Dave Campbell about wilderness fire.

Highlights and Achievements, FY2019

An Established Resource in the Northern Rockies. In our seventh year, the NRFSN continued to grow its reach within the fire research and management communities in the region and beyond. There is now a high level of awareness about the Northern Rockies Fire Science Network by fire and fuels managers, and we are increasingly being invited to participate in a variety of events in the region. We continue to expand the audiences we serve beyond federal, state and tribal managers and scientists to include county land managers, private companies, and university and college students. Of note, international organizations and individual membership increased in FY19, so that the NRFSN is increasingly serving managers and scientists in both the U.S. and Canadian Northern Rockies.

Governance & Staffing. NRFSN leadership continues to leverage partnerships with the USDA Forest Service's Human Performance and Innovation & Organizational Learning RD&A, the Wildland Fire Management RD&A, RMRS Fire, Fuels, and Smoke Program, and Northern Region; University of Idaho, University of Montana, Montana State University, and Salish Kootenai College.

Representing the USFS, NPS, BLM, BIA, Montana DNRC, and UI Extension, the NRFSN Advisory Board provides input on strategic direction, partnership opportunities, and potential activities; networks with their respective communities about NRFSN activities and products; makes suggestions to improve the effectiveness of our activities and products; and provides feedback on program effectiveness.

Unfortunately, a joint meeting between the NRFSN advisory board and planning team, scheduled for

January 2019, was canceled due to the government shutdown. We were unable to find another time during FY19 where enough members were able to meet to reschedule. Our Advisory Board is very supportive and engaged, and we are looking forward to increased interaction with existing members in FY20, as well as the two newest members representing the BIA and BLM.

NRFSN staff work closely with the NRFSN Planning Team to design and implement NRFSN activities. There was one planning team member change in FY19. In June 2019, Penny Morgan, Co-Investigator from the University of Idaho, retired. To enable her to remain active with the NRFSN, Charles Goebel, Department Head and Professor for the UI Department of Forest Rangeland, and Fire Sciences, agreed to serve as the interim UI Co-Investigator. His research interests include wildland fire ecology and management, restoration ecology, and forest stand dynamics and ecology. He also brings previous FSEN experience, having served as the Great Lakes Fire Science Consortium Principal Investigator.

Since FY17, University of Montana Restoration Ecology Lab Research Coordinator Megan Keville and NPS Science Communication Specialist Linda Mutch have served together as NRFSN Co-Coordinators. In May 2019, Megan accepted a new position as the Society of Conservation Biology North America's Operations Director. From June-September 2019, Monique Wynecoop, Fire Ecologist on the Colville National Forest, detailed as NRFSN Co-Coordinator. She assisted with event planning and coordination, review and development of written products, and newsletter articles. Remaining in a shared position with the Rocky Mountain Research Station's Fire, Fuels, and Smoke Program, Pam Sikkink continued to serve as NRFSN's Fire and Fuels Science Information Specialist. In FY19, Pam primarily focused on managing and updating the NRFSN searchable publication and webinar databases, developing new hot topics, exhibit preparation and staffing, writing newsletter articles, and supporting NRFSN field trips.

FY19 Highlights

FY19 was another productive year for the NRFSN. We leveraged partnerships to host workshops and field trips with the Western Region Cohesive Wildland Fire Strategy Committee, Confederated Salish and Kootenai Tribes, Montana DNRC, BLM Western Montana District, Lolo National Forest's Missoula Ranger District, the Lewis and Clark National Forest's Rocky Mountain Ranger District, Yellowstone National Park, Salish Kootenai College, Whitebark Pine Ecosystem Foundation, and the Universities of Wisconsin and Washington. In addition, at the request of District Rangers from the Flathead and Lewis and Clark National Forests, we partnered with the Crown Managers Partnership to develop a fire forum; however, the forum was postponed until FY20 due to the government shutdown. These partnerships both recognize the value of the NRFSN in connecting scientists and managers, and they ensure that workshop and field trip agendas are relevant to the diverse participants served by NRFSN events.

We continued an emphasis on integrating tribal partners and traditional knowledge into NRFSN events and products. In FY19, the Confederated Salish and Kootenai Tribes were vital partners for two events – the cohesive strategy field trip and the whitebark pine workshop. They are also central to the Crown Managers Partnership Fire Forum, which has been pushed to FY20. While on Detail with the NRFSN, Monique Wynecoop developed and gave the thought-provoking presentation, *More than Trees: the importance of making our science delivery culturally and socially relevant* (Pablo, MT, Sept 2019). She also worked with the NRFSN to develop a traditional knowledge and fire ecology newsletter that will be launched in FY20. We look forward to continued work with Monique as fire ecologist and tribal liaison.



Concurrent with the Fire Science Exchange Network’s first meeting in Washington, DC, the NRFSN supported the USDA Forest Service’s Washington Office (WO) and the Fire Science Exchange Network by organizing a brown bag for WO staff to learn about the JFSP Fire Science Exchanges. Fifteen WO staff exchanged knowledge with 10 JFSP and Fire Science Exchange representatives. Following the brown bag, the NRFSN organized a consultation with the Assistant Director, USDA Forest Service, Fire and Aviation Management, Landscapes and Partnerships. This consultation led to the request and agreement by several fire science exchanges to collaborate on the National Fire Danger Rating System update rollout workshops. The NRFSN Principal Investigator served as liaison with the WO and the fire science exchanges for this collaboration. Regionally, the NRFSN partnered with the Northern Region to organize an interagency NFDRS update workshop, which will be implemented in FY20.

In FY19, NRFSN products and activities continued to promote dialogue and deliver science on critical fire and fuels issues in the Northern Rockies, including reburns and post-fire regeneration, fuel treatment, traditional knowledge and fire, risk assessment and management, wilderness and long-duration fire, and whitebark pine restoration. We supported fire-adapted communities through the cohesive strategy field trip and fire art shows. In addition, based on a manager request, we hosted two webinars on firefighter health and safety.

The *Conversations through the Smoke* art shows in Idaho were an innovative approach for engaging fire managers, scientists, and the public in conversations about fire. We used art to spark conversations in communities that will continue to experience large fires and smoke. NRFSN support and sponsorship was critical to making these events a reality.

Transition to FY20

During the coming year, the NRFSN will continue to expand our membership and facilitate knowledge exchange about a variety of scientific resources that support proactive, effective management before, during, and after fire. This will provide context for the NRFSN’s overarching goals of building science-manager communication networks; increasing scientist awareness of management challenges and research needs; and increasing manager awareness, understanding, and use of science.

In FY20, we will continue disseminating science around key themes that are important to fire and fuels managers in the Northern Rockies. Activities and products will address the following themes: resilience, fuel treatment, ecological effects of severe fire and repeat fire, wilderness and long-duration fire, risk management, fire and traditional knowledge, and public communication.

To offer additional opportunities for workforce development, we will collaborate with the USDA Forest Service’s Washington and Regional Offices to offer the interagency National Fire Danger Rating System

update workshop, a high-priority training for fire managers. We will also continue to host in-person events that provide valuable opportunities for engagement between managers and scientists.

We have several other workshops and field trips scheduled or planned, including co-hosting our first event in Canada - the Crown Forum 2020 in Cranbrook B.C. in collaboration with the Crown Managers Partnership. These annual forums, targeted for decision makers and specialists facilitate networking opportunities, build collaboration, and deepen understanding of common issues in the Crown of the Continent Ecosystem. In addition, we are coordinating two *Learning about Resilient Futures* workshops with PI Monica Turner that are part of a research project funded by the Joint Fire Science Program - *What makes for a resilient landscape? Climate, fire and forests in the Northern Rockies*. Finally, we will work with the Whitebark Pine Ecosystem Foundation and other partners on the High Five workshop and field trip, a 10-year conference on the ecology and restoration of high-elevation white pine ecosystems.

We will continue to strengthen relationships with tribal land managers in the Northern Rockies. In partnership with Kim Kelly of the BIA, Vernon Stearns of the Spokane Tribe, and Monique Wynecoop of the Colville National Forest, we will expand our outreach to tribal managers by conducting 1-2 focus groups to build relationships and understand the fire and fuels science needs of tribes in the region. We will also partner with Colville Forest Ecologist Monique Wynecoop to distribute a newsletter focused on fire ecology topics of interest to tribes. By fostering knowledge exchange among managers, researchers and tribal community members, we are actively building communication capacity at several levels of tribal involvement.

The NRFSN Advisory Board has identified three areas where they would like to see the NRFSN place additional emphasis: risk management, public communication/education, and policy. We will enhance our publications database in these topic areas, develop relevant hot topics, and develop research briefs that are relevant to agency leaders and other policy makers.

Also in FY20, we will continue to expand our searchable database and website to include topic-focused “hot topic” web pages, which will feature new and important resources (webinar recordings, videos, scientific articles, reviews, and briefs) that inform specific issues. Featured hot topics may include public perspectives of fire management, smoke and populations, fuel treatment effectiveness, and/or fire behavior prediction. In addition, we will be developing a video about managing long-duration fire for line officers and agency administrators.

In early FY20, NRFSN is transitioning to a new Coordinator, Signe Leirfallom. With Linda Mutch transitioning back to working full-time for the National Park Service, the NRFSN will return to the model of having a single Coordinator. For the interim period where Linda and Signe overlap, Linda will serve in a science communication role, focusing more effort on fire video coordination and written products, in addition to providing Signe orientation to Coordinator responsibilities.

We will continue to seek and use input from NRFSN members and potential members as we develop the NRFSN program of work. We look forward to another productive and stimulating year of fire science exchange!