



Photo credit: Klamath Lake Forest Health Partnership

NORTHWEST FIRE SCIENCE CONSORTIUM

*Plan of Work
FYs 2020-2021*

Northwest Fire Science Consortium is part of a national network of consortia established by the Joint Fire Science Program to accelerate the awareness, understanding, and adoption of wildland fire science information by federal, tribal, state, local, & private stakeholders in the PNW



JFSP Project Number: 11-S-3-8
Name of Exchange: Northwest Fire Science Consortium
Principal Investigator: Morgan Varner
Co-PI/Administrative Dir.: Janean Creighton
Coordinator: Carrie Berger

Key Accomplishments, challenges, lessons learned

During the past 3 years (2017 through 2019) the priority areas for the Northwest Fire Science Consortium (NWFSC) plan of work were informed through input from our advisory board and a straw poll of our list serve and social media followers. These priority areas were 1) Smoke in Washington and Oregon: air quality and cross-boundary issues with prescribed fire; 2) Post-fire management and restoration; 3) Landscape level planning: collaborative natural resource management and coupled human and natural ecosystems; and 4) Managing fuels and fuel treatments in a changing climate.

While this did provide the NWFSC with a more concrete pathway moving forward and helped inform our activities for the past 3 years, these priority areas are quite broad and do not allow for the identification of specific research needs at a local level. As the activities during the past 3 years were completed and issues of future funding arose, it became apparent that a more strategic approach was needed to increase the effectiveness of fire science delivery and use. Thus, during 2018 the NWFSC completed its second regional needs assessment, (the first was completed in 2011 as part of the initial JFSP planning grant). The information from this assessment titled “Regionally relevant wildland fire research needs in Washington and Oregon” in addition to the results of the National Evaluation in 2018 provided valuable information for the NWFSC to progress in a more strategic way into 2020 and 2021. The incorporation of the findings from our 2018 needs assessment into our plan of work for 2020 and 2021 is detailed in the *Future Directions* section.

Measurable outcomes for 2017, 2018, 2019 – (*Logic Model outcome referenced by number*)

JFSP National Survey

The 2018 JFSP National Survey indicated increased awareness of the NWFSC on the part of both users and producers of fire science research, with 80% of managers indicating knowledge of the NWFSC prior to taking the survey, and 100% of scientists indicating the same (See Logic model, outcome #4). Additionally, 100% of scientist respondents and 77% of manager respondents had visited the NWFSC website. Survey results indicate that, with regards to obtaining information from the web site specifically to use in their job, managers are using the on-line resources more than scientists (Table 1).

Table 1. Responses to question: During the last year, how often did you use information obtained from your Fire exchange’s website in your job?

	Scientist n=14	Manager n=34
Never	0	0
Rarely	5	9
Occasionally	4	21
Often	4	3
Very often	1	1

Nonetheless, the importance of the NWFSC to the professional work of all respondents is increasing, with 73% of managers (n = 44) indicating the NWFSC is moderately to extremely important, and 90% of scientists (n = 14) indicating the same (outcomes #1 & #2).

In addition, the JFSP survey results indicated an increasing number of managers and scientists in the northwest are working jointly on research and/or management projects (86% of scientists respondents, n=14; 55% of manager respondents, n=44). Since facilitation of collaboration between managers and researchers is a primary goal of the NWFSC, this is a sign that providing more opportunities for managers and scientists to interact is a growing component in the work of the NWFSC, and meets one of our medium terms outcomes (outcome #5)

Table 2. Likert scale of level of agreement with the statements (1=strongly disagree; 3=neutral; 5=strongly agree). Values are average of responses.

The Fire Exchange...	Managers	Scientists	Outcome measured
<i>... is needed to help coordinate sharing of fire science information in my region.</i>	4.3	4.5	#5
<i>...has helped improve the use and application of fire science information in my region.</i>	4.0	4.1	#9
<i>...has helped improve policy regarding fire management in my region.</i>	3.2	3.8	
<i>...has helped improve environmental conditions in my region.</i>	3.3	3.5	
<i>...has helped improve the safety of fire line officers in my region.</i>	3.2	3.3	
<i>...has helped improve the safety of the public in my region.</i>	3.3	3.6	
<i>...has helped improve communication among fire managers/practitioners and fire researchers/scientists in my region.</i>	3.7	4.5	#5
<i>...has helped me improve my awareness of applied research needs</i>	N/A	4.1	#3

Both manager and scientist respondents indicated that the NWFSC is helping to improve the use and application of fire science information, and is needed to coordinate the sharing of information and research results (outcome #9) (Table 2). Most notably, there is improved communication among managers and scientists in the region and the NWFSC is helping to facilitate this. However, these results indicate that with regards to the NWFSC impacts on policy, environmental conditions, and safety, there is little awareness and/or recognition of any efforts on the part of the NWFSC. It is the intention of the NWFSC to put additional efforts into these areas, as appropriate. Environmental conditions may be difficult to directly connect to NWFSC activities in the near term, but they are a long-term outcome.

The 2018 JFSP National Evaluation Survey included some NWFSC specific questions concerning the usefulness of the products provided by the Consortium. For manager respondents (n=43) the most useful to very useful products were: webinars and webinar recordings (both 81%), research briefs and website (both 80%), monthly newsletter (74%), publications library (72%), and Fire Facts (60%), JFSP project page (47%) and field tours (32%). The least useful products are Facebook (9%) and Twitter (9%). For scientists (n=14) results were similar with the most useful being research briefs (100%), webinars, website, and monthly newsletters (all 93%), webinar recordings and the JFSP project page (both 71%). As with managers, scientists found the least value from Facebook (0%) and Twitter (7%). Regardless, the NWFSC will continue to engage in outreach activities with both Facebook and Twitter, as these take relatively minimal person hours to maintain and may reach additional communities (general public and managers beyond the region).

The NWFSC received 17 requests for assistance on the development of workshops, field tours, and research briefs during the funding period. These included: a workshop on climate change assessment for Tribal lands in the Pacific Northwest (see Key Successes); organizing and facilitating the joint meeting of

the Washington and Oregon Prescribed Fire Councils, facilitating the Oregon State University Fire Summit (see Key Successes); and providing content and support for the development of a Fire Science Core Curriculum in collaboration with Oregon State University Forestry and Natural Resources Extension Program (outcome # 10).

Completed NWFSC activities FY 17 - 19¹

Activity (conducted, hosted, facilitated, or sponsored)	Number of activities/events during FY 17, 18, 19	Total participants reached
In person outreach		
Field tours	4	71
Workshops	13	1065
Conference/Symposia presentation	7	405
Informal and personal interactions about NWFSC	8	80

Requests for information, assistance, referrals	17	
Leadership briefings	2	25
Web based outreach		
Webinars	16	2,022 (attended + YouTube views; as of 2/19/19)
Videos	2	27,743 views (as of 2/19/19)
Electronic newsletter	24	1,049 subscribers
Facebook posts	246	756 followers
Tweets	3,912	2,288 followers
Printed materials		
Fire Science Core Curriculum	1	
NWFSC Needs Assessment	1	Journal article in progress
Research briefs	9	Over 200 copies distributed
Fire Facts	11	Over 400 copies distributed

Accomplishments

Some of the activities and deliverables summarized in the table above are detailed below.

NWFSC Needs Assessment: Regionally-Relevant Wildland Fire Research Needs in Washington and Oregon (in review)

[Fire Science Core Curriculum](#) (EM9172)

¹ Reporting from up through 2nd quarter FY 19

Research Briefs:

- [#10 - Post-fire logging: Examining long-term effects on understory vegetation](#)
- [#11 - Pathology of wildfire risk: A characterization of social and ecological dimensions](#)
- [#12 - Landscape-level prescriptions: A new foundation for restoration planning](#)
- [#13 - Contracted suppression resources: Private engine dispatch and sharing in the Northwest](#)
- [#14 - Engagement strategies: Helping facilitate development & implementation of adaptation options](#)
- [#15 - Conflict around suppression: Drivers and Legacies](#)
- [#16 - Rangeland Fire Protection Associations: Institutional and Social Dimensions of an Alternative Model of Wildfire Response](#)
- [#17 - Ecological Reference Conditions: Perspectives in Collaborative Restoration of Dry Forest Landscapes](#)
- [#18 - Burning for Butterflies: Identifying Weather and Fuel Conditions that Protect and Promote Butterfly Habitat](#)

Webinars: posted on the [NWFSC YouTube channel](#)

- 1) Smoke Photographic Guide
- 2) Communication under fire: Understanding capacity for effective communication during large-scale wildfires (*also a Research Brief*)
- 3) Creating fire adapted communities: An interactional approach
- 4) Understanding stakeholder perceptions of fire with mental modelling: A case study from Ashland, OR.
- 5) Making national spatial data work for your NW landscape (*in partnership with LANDFIRE*)
- 6) Rangeland fire protection associations in Oregon and Idaho(*JFSP # 14-2-01-29*)
- 7) Summary of 2016 Fire Season (*offered every year*)
- 8) Outlook for 2017 fire season in WA and OR (*offered every year*)
- 9) A climate change assessment of vegetation, fire, and ecosystem services for Tribal lands in the PNW (*also a workshop*)
- 10) Fire management of American Indian basket weaving plants in the Pacific Northwest (*Georgia Hart and Tony Marks-Block both recipients of a GRIN Award*)
- 11) Lessons from the Milli Fire
- 12) Fuel treatment effectiveness in the southern Blue Mountains of Oregon (*JFSP 14-1-01-2*)
- 13) Smoke tools and information for prescribed fire and wildfire - “Filled gaps in my tech knowledge” – Practitioner, Smoke Goose Consulting
- 14) Scaling up Collaborative Restoration: What can be learned from participatory landscape simulation modeling?
- 15) BehavePlus updates and changes (*in partnership with The Southwest Fire Science Consortium, Northern Rockies Fire Science Network, Southern Rockies Fire Science Network, California Fire Science Consortium, Great Basin Fire Science Exchange*)
- 16) An outlook for the 2018 fire season in Oregon and Washington (*offered every year*)

Videos:

FY17: “[Restoring western dry forests: Individuals, Clumps and Openings](#)”. The video was filmed during a workshop illustrating the ICO approach, based on how dry forest structure would be in the absence of widespread fire suppression. In addition, the NWFSC provided funding towards the development of an Android app used in the approach.

FY18: [Restoration in a fire forest: The benefits of burning](#). This video was filmed during a TREX training in Central Oregon and discusses how wildfire has historically played an important role in the health and structure of Oregon's dry forests.

Fire Facts:

In addition to distributing Fire Facts at our own NWFSC events, others are requesting NWFSC Fire Facts for distribution at their events. For example, Fire Facts were requested for Oregon Representative Pam Marsh's 'Smoke and Fire Summit' in southern Oregon this summer. The session addressed forest management, health impacts, economic consequences, and climate change. Over 400 people were in attendance at the Summit. The focus of the FY17 series was primarily around fire-prone communities: [What is A Fire Adapted Community?](#) [What is CWPP?](#) [What is WUI?](#) The focus of the FY18 series was around Fire Behavior and the components of the Fire Behavior triangle: [What is? Fire Behavior](#) [What is? Fuel](#) [What is? Topography](#) [What is? Weather](#)

Field Tours/Workshops/Symposia:

Washington Forest Collaboratives Summit (FY 17, 18)
 PNW Forest Collaboratives Workshop (FY 17, 18)
 Fire in the PNW Symposium (FY17)
 Burned Area learning Network Workshop (FY 17)
 Rural Voices for Conservation Coalition (FY17, 18, 19)
 Era of Mega Fires (hosted FY 17)
 Second Creek Post-fire Restoration Field Tour (FY 17)
 Mixed Severity Fire and mixed Conifer Forests Field Tour (FY 17)
 Oak Savanna restoration and the Role of Fire Field Tour (FY 17)
 Climate change assessment for Tribal lands in the PNW Workshop (FY 18)
 Oregon Forest health Conference (FY 18)
 Blues Coalition: Science, Management & Collaboration Workshop (FY 18)
 WA and OR Joint Prescribed Fire Meeting & Workshop (FY 18)
 Eagle creek/Columbia Gorge field Tour (FY 18)
 Post-fire Management Field Tour (FY 18)
 Forest Fuels Management Field Tour (FY 18)

Key Successes

Symposium: Fire in the Pacific Northwest – Past, Present & Future: Implications for ecology, operations, and restoration west of the Cascade Mountains

Following the advice of our advisory board, the NWFSC held a regional summit focused on fire regimes in forests and grasslands on the west side of the Cascade Crest in Washington and Oregon. The event brought 66 researchers, federal and state managers, NGO's, county and city government together to: learn, review and discuss the available science on Westside fire regimes and implication for forest, woodland and grassland management, community preparedness and, where appropriate, restoration needs and current activities, the changes that are occurring in Westside fire regimes and identify challenges and research gaps. (Outcomes #2, #3, #5 & #6) The NWFSC received funding from the Oregon Forest Resources Institute (OFRI) for the summit. [PowerPoint presentations can be viewed here.](#)

The research needs and questions that resulted were sent to JFSP for consideration:

1. In a highly fragmented landscape, how appropriate/useful are our current fuel and fire behavior models? What are the scenarios around fuel and fire behavior in highly fragmented and intermix/interface areas under extreme climate scenarios? Should we let fire do the work or not? Those kinds of process models need to be refined to have better certainty.
2. Fire risk in the dunes (beach grass, pines, etc)- newly prone to fire because of change in dominant vegetation; conifer fire can burn hotter and cause more damage than beach grass fires; How does fire danger differ along the coast (CA to WA)? What lessons can we learn up and down the coast to prevent fires?
3. Regarding restoration, what are the necessary conditions to make burning more efficient and effective/successful? In grasslands and prairie restorations, what are the appropriate burn conditions that promote/maintain populations vs conditions that are detrimental to the same populations?

“Many of the Q&A sessions highlighted common management issues and concerns and ultimately potential similar productive conversations on how to address.” - Symposium participant

“Very worthwhile discussion on an important topic. Information provided and discussions with participants very useful. Would like to see a similar event for Early Succession topics (fire and/or non-fire related).” - Symposium participant

Workshop: Climate change assessment for Tribal lands in the Pacific Northwest

This workshop focused on assessing potential climatic changes to vegetation, fire, and ecosystem services across tribal lands and sacred places throughout the Pacific Northwest. Through hands-on activities using research results and tools, participants used their expertise and knowledge to make clear links as to how these changes may impact important ecosystem services, such as traditional foods, hunting, timber production, non-timber forest resources, ranching quality, agricultural suitability, and cultural resources. Participants left the workshop with spatial data and relevant actionable adaptation strategies. (Outcomes #8 & #9)

Workshop evaluation results:

- 81% of respondents (n=16) said the information they learned will be useful in their work
- 100% indicated that they would recommend this workshop to others
- 87% indicated that the material that was presented was useful to very useful
- 80% said the level of specificity of the discussion was useful
- 93% indicated the overall delivery of material was useful to very useful
- 100% indicated the opportunity to engage with others was very useful
- 100% said the mix of people at the workshop was very useful
- 94% of respondents were very satisfied with the workshop

“I was looking for ideas about how forests are likely to change and how to incorporate that info into adaptation planning. I will incorporate what I learned. Many good insights and ideas.”
-Workshop participant

“Rapid vulnerability workshop process. Lots of good conversations and thinking about how we can apply it to our own work.”
-Workshop participant

Oregon State University Fire Summit

The NWFSC partnered with Oregon State University College of Forestry to hold a Fire Summit in which subject-area experts from across the Western United States gathered to discuss and present transparent, science-based forest management actions to key policy makers and elected officials that if implemented will help mitigate the risk and impacts of high-severity fire events in the West. The goal was to identify viable forest management practices that could help mitigate risks and impacts of high-severity fire events in the West. (Outcome #10). The full report of the OSU Fire Summit can be viewed [here](#).

Recommendations from panel discussions:

1. Expand strategic use of commercial thinning, prescribed forests and managed wildfire as forest management tools
2. Improve Coordination across jurisdictions and ownership boundaries
3. Develop and implement cross-boundary “pre-fire response” plans
4. Address inequities associated with liability for cross-boundary fires
5. Invest in data mapping and risk assessment to support cross-boundary management and suppression

TREX Training Opportunity Enhancement

During FY 18 the NWFSC was able to allocate \$5,000 towards scholarships for 16 individuals to participate in TREX training in southern and central Oregon.

“I was just awarded a scholarship to participate in the Central Oregon TREX, and I wanted to express my gratitude to all of you who made it possible. This will make it much easier for me to participate. I’ve been looking forward to the time that I could finally take this training. Thank you!”

-Bend TREX participant

Governance

The Northwest Fire Science Consortium is directed by a Principal Investigator with the Pacific Northwest Research Station and managed by an Administrative Director. The Management Committee (MC) provides leadership, and approval for activities and priorities. The MC is composed of individuals from federal agencies, state universities, extension, and private organizations. The MC is responsible for setting NWFSC direction and priorities and for making decisions about NWFSC activities and deliverables. Currently Consortium operations are based at seven lead institutions with professionals and supporting staff at each. The Principal Investigator is located at the USFS Pacific Northwest Research Station. The Administrative Director, a part-time Program Coordinator and one additional MC member are located at Oregon State University in Corvallis, OR. Two MC members are located at the University of Oregon in Eugene, OR. One MC member is located at the USFS Region 6 office in Portland, OR, one MC member is located at Sustainable Northwest in Portland, OR, one MC member is with The Nature Conservancy in Portland, OR, and the final MC member is with the Center for Natural Lands Management in Olympia, WA. Collectively, these seven institutions are directly responsible for implementing the science delivery programming. The Advisory Board (AB) provides higher level strategic direction, guidance and advice from the management and science communities. The AB develops recommendations for fire science information and technical assistance needs, science delivery opportunities, ideas for possible new research and objective evaluations of the NWFSC’s activities and progress toward meeting its goals.

During 2018, David Seesholtz (PI for the NWFSC since 2016) retired. He was replaced by Dr. Morgan Varner, Research Biological Scientist for the USFS PNW Research Station, Pacific Wildland Fire Sciences

Lab. Also during 2018, Advisory Board members Geoff Babb from BLM-Central Oregon Fire Management Service and Cyndi Sidles, US Fish and Wildlife representative retired. Geoff Babb has indicated that he will be replaced at the BLM, and will inform the NWFSC when this occurs and provide the name of the individual so they can be contacted. We are currently seeking a replacement for the USFWS position. Carrie Phillips (USGS) was replaced by Sue Phillips, representing the USGS Forest and Rangeland Ecosystem Science Center.

The NWFSC Advisory Board members are:

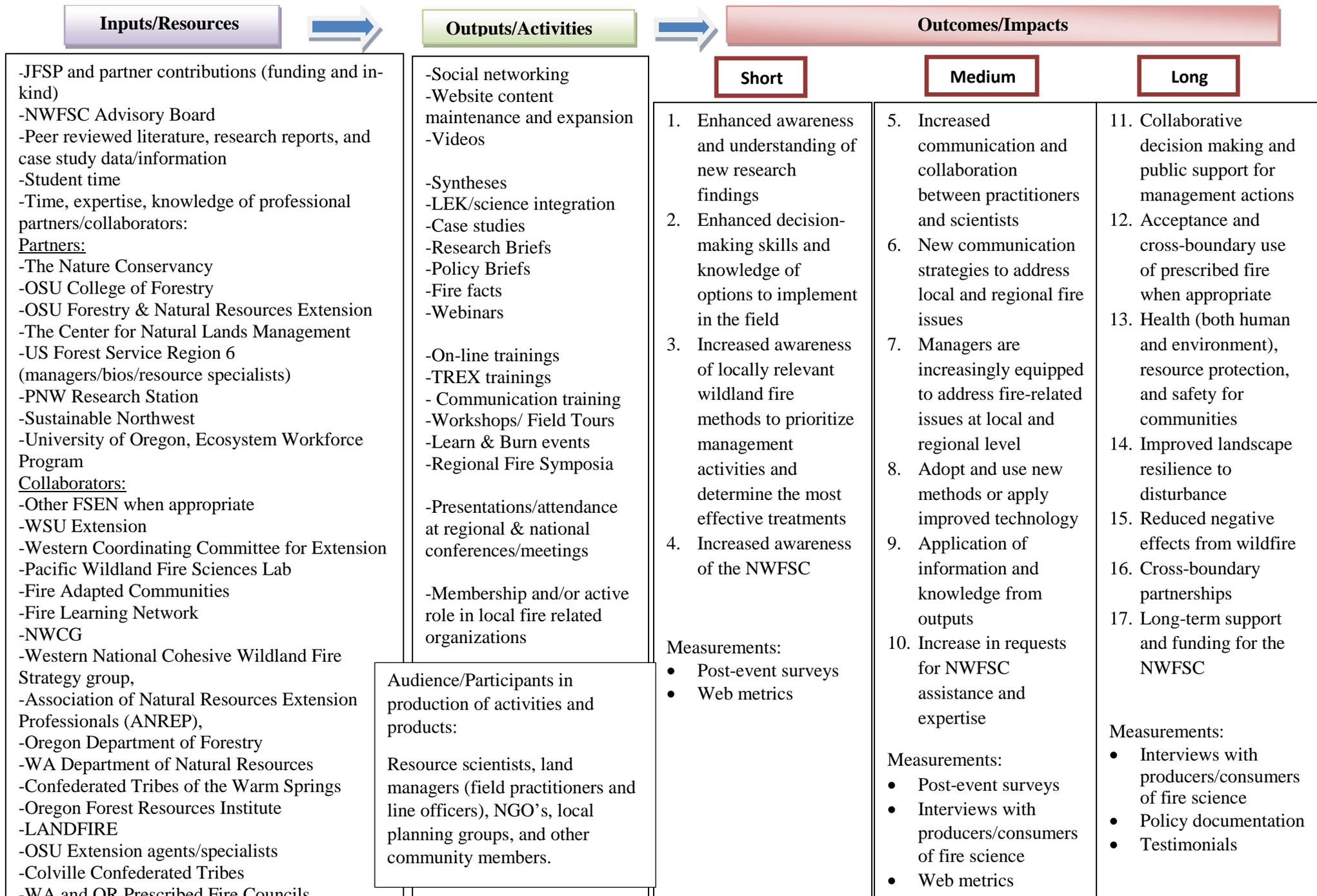
Craig Glazier	USFS Region 6
Ryan Haugo	The Nature Conservancy
Ellen Eberhardt	USFS PNW Research Station – Pacific Wildland Fire Sciences Lab
Sean Hopkins	Washington Department of Ecology
Dana Skelly	USFS CFLRP representative
Josh Clark	Washington Department of Natural Resources
Kim Kelly	Bureau of Indian Affairs
Karen Kopper	National Park Service
Sue Phillips	US Geological Survey
<i>Vacant</i>	BLM
<i>Vacant</i>	US Fish and Wildlife

Current activities to be completed in 3rd and 4th quarter of FY 19

Current activities and projects	Completion date
In person outreach	
EPA Smoke Management Forum	May 29-30, 2019
WA Prescribed Fire Council Conference	TBD
OR Prescribed Fire Council Meeting	TBD
Pacific Northwest Forest Collaboratives Workshop and field tour	April 11-12, 2019
Webinars	
Cross-boundary fire risk reduction: Let's fix the fire problem	February 26, 2019
Expect the Unexpected: Fire management challenges & opportunities in a changing climate	March 5, 2019
Wildfires and inland mountain forests: Is non-forest vital to forest resilience?	April 2, 2019
ONW Risk Assessment Update	April 24, 2019
Videos	
Fish & Fire	TBD
Fire science history & current policy	TBD
Media & fire science	TBD
Cascade head: exploring an historical burn	TBD
Printed materials	
Synthesis – social vulnerability and wildfire	April 2019
Synthesis – Social dimensions of smoke	August 2019
Research Brief – Four (4) in progress	June 2019
Fire Facts – Three (3) in progress	March 2019

Logic Model for NW Fire Science Consortium (FY 2020-FY 2021)

Situation: A 2018 Needs Assessment of wildland fire managers and agency stakeholders, and a broader audience of Consortium users identified the need to better understand local wildland fire research in order to prioritize management activities and determine the most effective treatments. The research topics most needed locally in Washington and Oregon are: communication and other social dimensions of wildland fire; climate change; fuel mitigation and prescribed fire; ecological health, resiliency, fire effects, and post-fire restoration; riparian areas.



Future Direction

One issue that consistently emerges in discussions and studies about the use of scientific research is the lack of local or regionally relevant information. This is often due to difficulties in applying research findings from areas with ecological or social contexts that differ from the Pacific Northwest. There is a clear need for a better understanding of local wildland fire research topics that are of the greatest value to fire science users in the Pacific Northwest. The objectives of the NWFSC needs assessment were to:

- 1) Characterize wildland fire science use among NWFSC constituents since a 2011 needs assessment conducted for this region.
- 2) Understand NWFSC constituents' perspectives about applying local and non-local research in their work.
- 3) Identify the wildland fire topics of which more locally-specific scientific research is most needed among fire science users in the NWFSC area.
- 4) Develop recommendations to help guide the NWFSC in its outreach efforts.

The future direction of the NWFSC is informed by the 2018 needs assessment.

Summary Results of Needs Assessment

The 2018 needs assessment consisted of 20 interviews with key wildland fire managers and stakeholders and a survey of 167 NWFSC users. One of the key findings from the original 2011 assessment was that although the needs for wildland fire science were diverse topically, they often centered on site-specific information that could better guide strategic planning, management decisions, and the resolution of ongoing debates in local contexts. In the 2018 research effort, initial interviews with stakeholders indicated that site-specific information needs were still very much apparent and had perhaps become even more pressing in recent years as the body of wildland fire research expanded, often without addressing management questions for users in their specific areas of work. Nearly all survey respondents (n = 167; 96 percent) said that research conducted in the same local area as their work was moderately or very important to their job. The other four percent said that local research was only slightly important (three percent) or unimportant (one percent) for their jobs.

The 2018 needs assessment identified five categories of wildland fire research most needed locally:

- 1) Communication and other social dimensions of wildland fire
- 2) Climate change on different aspects of ecological conditions and wildland fire
- 3) Fuels mitigation and prescribed fire
- 4) Ecological health, resiliency, fire effects, and post-fire restoration
- 5) Wildland fire in riparian areas

In addition, 25 specific topics within the five above categories were identified by survey participants as those most needed at a local level. An important consideration of moving forward is the consistency of the NWFSC areas of focus in order to align with the short, medium, and long-term impacts established in earlier Logic Models, and the ability to measure these impacts over time. In order to maintain consistency in measuring impacts, these five categories have been assigned to 3 overarching broad priority areas with specific topics taken from the needs assessment allocated to each (please note: many topics fit under multiple categories and are associated with more than one priority area). This maintains consistency in the Logic Model and measurable outcomes over time. These broad priority areas, the categories of wildland research, and their associated topics are detailed in the following tables.

PA 1. Landscape Level Planning

Communication and other social dimensions
Communicating with the public about fire impacts & fire risk
Public expectations about the fire season or fire regimes
Attitudes about wildfire among the local public
Public perceptions of wildfire risk
Climate change effects
Climate change effects on local fire regimes
Understanding how climate change may influence fire effects/impacts
Climate change effects on local wildland fire behavior
Climate change effects on local forest conditions
Ecological health, resiliency and fire effects
Fire effects related to landscape or ecological health
Long term studies about fire behavior and fire effects (more than 10 years after a fire)
Factors that affect landscape resiliency
Managing moist mixed-conifer forests in WA and OR
Wildland fire in riparian areas
The role of fire in affecting fish habitat
Understanding the role of fire in riparian areas
Post-fire restoration and management
Effectiveness of post-fire restoration strategies and techniques (e.g. to minimize erosion, improve regen, mitigate invasive species, and protect endangered species)

PA 2. Fuels and Fuel Treatments

Communication and other social dimensions
Public tolerance of smoke from prescribed burns/smoke from wildfire
Public attitudes about prescribed burning
Communicating with the public about fire impacts & fire risk
Public perceptions of wildfire risk
Climate change effects
Climate change effects on local fire regimes
Understanding how climate change may influence fire effects/impacts
Climate change effects on local wildland fire behavior
Climate change effects on local forest conditions
Fuels mitigation and prescribed fire
Research about burn windows for conducting prescribed fires
Effectiveness of fuels mitigation techniques (e.g., thinning) to reduce fuel loads or wildfire risk
Modelling fuel treatment effectiveness
Effectiveness of using prescribed fire to mitigate wildfire risk & restore natural conditions

PA 3. Smoke

Communication and other social dimensions
Public tolerance of smoke from prescribed burns
Public attitudes about prescribed burning
Public tolerance of smoke from wildfire
Communicating with the public about fire impacts

One theme that is consistent throughout the assessment is the need for more locally-based fire science. A key finding indicates that differences in ecological and climatic conditions between regions and social acceptance of non-local research are key barriers for using non-local information. Stated barriers to using non-local research related to differences in fire behavior, ecological conditions, and climatic conditions across different regions or ecosystems. Social considerations such as reaching consensus and aligning findings and decisions with local knowledge were also important challenges to using non-local research. Respondents mentioned that locally-specific research can improve credibility and reduce uncertainty about research application and management implications. This need is addressed in the Logic Model and included as measurable outcomes #3 and #7. The degree to which respondents valued non-local information was more varied, although all respondents felt that using research conducted in other areas had a least some degree of utility.

Another common theme centered on communication, especially with the local communities. Respondents recognize that engaging and communicating with the local public is an important aspect to consider and to include in the decision-making process. Across the consortium's region, respondents are interested in having more social science studies that assess local public perspectives on fire-related issues. They would also value more training opportunities to help them assess public perspectives on their own, consider how to effectively integrate public opinion and local knowledge into management decisions, and learn effective communication techniques. The NWFSC has incorporated this into the plan of work for 2020 and 2021 and is reflected in the Logic Model (Outcome #6).

The NWFSC acquired a wealth of information that is too large to fully report here. However, several recommendations that were developed from the findings to help the NWFSC better meet the needs of the fire science users in Washington and Oregon can be detailed:

1. Develop and share more examples or case studies of local wildland fire mitigation and management projects and research efforts
2. Enhance the capacity for researchers, managers, and other stakeholders to produce more applied research syntheses about local wildland fire topics
3. Consider a system to collect, organize, evaluate, disseminate, and use different types of unpublished data and experiential knowledge
4. Facilitate and distribute more localized and collaborative research on the most needed wildland fire topics identified here
5. Continue providing publications through multiple sources and modes.

The results of the 2018 needs assessment provide the NWFSC with information to keenly focus efforts for the next two years and put attention on the topics identified, whenever possible or appropriate (see Activity Table). There is easy integration with the National Cohesive Strategy, as issues of resilient landscapes, fire adapted communities, and safe and effective wildfire response have emerged as significant needs in the Northwest. In addition, changing climatic conditions and the effects on landscapes, and issues of the evolving risk in public and wildfire safety, (identified areas of concern in the Quadrennial Fire Review) are at the forefront of fire science user requests in the assessment.