

Fire science needs in the Pacific Northwest

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After a century of wildfire suppression, the costs and complexity of wildfire management are increasing. Population growth in fire-prone landscapes, climate change, and diverse land management objectives all contribute to a complex management environment. The number and types of managers and practitioners involved in wildfire management has also grown. Government agencies, land managers, air quality regulators, nonprofit organizations, community leaders, and others have a diversity of fire science and social science needs. To protect and restore fire-adapted communities and natural resources in the Pacific Northwest, a process for effective dissemination and accelerated user adoption of pertinent information, knowledge, tools, and expertise is necessary. An improved system to connect, engage, and exchange information between researchers and diverse groups affected by wild or prescribed fire could enhance exchange of existing fire science and technologies throughout the region, and encourage fire and land management stakeholders to evaluate and adopt relevant fire science.

Despite the many existing fire science delivery methods in the region, uncertainty exists as to whether managers and practitioners consistently use these resources, or if the growing, diverse set of current

fire science users can access them.¹ It is not clear if research is developed and disseminated in ways that are accessible and useful for diverse stakeholders and land managers. To build a consortium that can serve the diversity of fire science needs in the Pacific Northwest, we conducted an assessment of fire science users and their perspectives. This report reviews the findings of this assessment and its implications for the development of a “Northwest Fire Science Consortium.”

Approach

Members of the Northwest Fire Science Consortium planning team conducted in-person and telephone-based interviews with seventy-four individuals from Washington and Oregon between May 24 and July 11, 2011. Participating researchers interviewed representatives from federal and state land management agencies, county and municipal entities, nonprofit conservation, economic development, community forestry and collaborative organizations, Native American Tribes and tribal organizations, private contractors, and others (Table 1). We selected potential interviewees by starting with a list of key contacts that consortium project partners suggested, and then using “snowball sampling,” in which in-

interviewees were asked to suggest the names of other relevant contacts.

Table 1: Primary roles of individuals interviewed

Agency or interest	Number of interviewees
Federal land management agencies (USFS, BLM, NPS, USFWS, DoD)	27
State agencies (ODF, WDNR, and so forth)	12
Counties and municipalities (including local fire districts)	5
Tribal entities	2
Conservation NGOs	7
Community forestry NGOs and community-based collaborative entities	4
Private contractors, consultants, and timber interests	8
Landowners, small woodland owner NGOs, and active community members	5
Academia, extension, and rural development	4
Total	74

Interviews were designed to elicit information on four general topics:

- **Current use of fire science:** how and why are stakeholders using fire science to serve different purposes?
- **Content:** what kinds of fire science information, tools, and resources do fire science users currently utilize and desire?
- **Access:** how can useful, credible information, tools, and resources best be delivered or made accessible? In other words, how do fire science users prefer to receive or attain fire science information?

- **Collaborative and participatory research:** how has past research and monitoring engaged and served communities where fire science is important? What are the opportunities to build connections through future collaborative research and monitoring?

The interview instrument consisted of fifteen questions and associated subject prompts. Interviews were not limited to these questions, and there was flexibility to pursue issues of greatest concern and interest to the interviewee. Interviewers took notes during each interview and later synthesized these notes into a standardized summary document.

Two planning team members reviewed all interview summaries independently, and developed a set of key themes to analyze results. Themes represent concepts, concerns, needs, or ideas that are important either because they are common to several interviews or because they provide particular insights into the questions at the heart of the needs assessment. The themes presented here help to distill interview data into observations and conclusions that can inform decisions regarding the structure, strategies, and focus of a Northwest Fire Science Consortium.

Results

Current use of fire science

An overarching finding of the needs assessment is that the community of fire science users in the Pacific Northwest has quite diverse needs, interests, and concerns. The ecological and socioeconomic complexity of natural resource management in the Pacific Northwest creates this diversity of stakeholders. The region includes Washington and Oregon forests, rangelands, and grasslands on the east and west sides of the Cascade Crest. Many of these landscapes are significantly departed from historic conditions. This ecological complexity creates diverse management needs. Furthermore, since the development of the Northwest Forest Plan in 1994, public land management has shifted from a timber basis toward an ecosystem restoration focus, affecting forest management as well as the socioeconomic vitality of the region's communities. Collaborative groups and community-based organizations have worked toward building agreement around federal land management direction, and fostering economic

redevelopment through restoration, recreation, and other values. These groups have broadened and diversified the community of stakeholders who engage with fire science and changed how they view and interpret it.

Who uses fire science?

To understand these different types of fire science users, we propose the following broad preliminary categories (these may be refined after future work):

Direct fire science users: Those who regularly access in-depth primary and secondary fire science information in the form of peer-reviewed research, modeling tools, or technical training. This category includes:

- Agency land managers responsible for preparing legally defensible planning documents, e.g. for requisite environmental analysis processes
- Nongovernmental organization staff members, tribal resource managers, and private contractors responsible for planning and implementing projects based on the most up-to-date scientific information
- Fire management officials responsible for wildfire response and protection duties
- Extension and outreach specialists and community fire protection planners on whom other members of the local community rely for current fire science information

Indirect fire science users: Those who largely access secondary fire science information in the form of brief publications, outreach materials, personal communications, and user-friendly tools and resources. This category includes:

- Agency land managers and staff members from other organizations and entities who primarily rely on scientific experts within their organizations to supply them with up-to-date information
- State, county, and municipal managers whose duties are primarily defined by existing plans, policies, or programs (i.e., their duties are not subject

to change based on new information unless the plan, policy, or program itself changes; they operate within a limited decision-space)

- Members of collaborative groups, community-based organizations, and other entities whose roles may include community planning, conflict resolution, or fire awareness and outreach to a general audience (e.g. homeowners in the wildland-urban interface).

This diversity of fire science users means that there is also a diversity of purposes for interpreting and using fire science. In addition to its role in illuminating past ecosystem dynamics or projecting the outcomes of future land management, both direct and indirect fire science user interviewees saw science as an instrumental tool for achieving particular objectives. Interviewees acknowledged that science can be a form of political power, and that many users seek information that supports their perspectives on forest and fire management. Fire science therefore is a means of influencing what can and cannot be implemented on the landscape (particularly in the case of public lands). This also indicated that users may see scientific findings and recommendations as malleable to particular political purposes.

Users may regard fire science differently depending on its source. They may view work by interest groups (e.g. environmental and industry groups) and even some university researchers publishing in peer-reviewed journals with suspicion, especially if their research carried implications that were at odds with the interests or agendas of particular agencies and organizations. In other words, the determination of “good science” often has as much to do with whether its implications aligned with existing interests as it does with questions of scientific process and analytical rigor. Interviewees also reported that indirect users often lacked familiarity with the scientific process of research, and that increased knowledge of how science “works” and is applied in land management would be helpful.

However, although interviewees were broadly supportive of the role of fire science in helping to inform their decisions and activities, they did not consistently report deferring to science as a final arbiter of complex decisions. In part, this was the result

of the importance of social, economic, and political considerations in the decision-making process, which more or better scientific information cannot always help address.

Content

What kinds of information are different fire science users seeking?

- Direct fire science users draw most frequently on information that directly supports their roles within their respective organizations or communities. For example, government agency staff members responsible for working on environmental analysis documents are most interested in crafting legally defensible plans, so their information needs center on peer-reviewed science produced in universities and federal research stations. Fire managers make use of fire, fuel, and smoke models, and regularly visit websites that give updates on information about weather, preparedness, and fire activity.
- Indirect fire science users have a broader array of interests than direct users, but have less need for the details of specific research projects. They generally look for “take home” messages that help them understand or communicate about particular issues relevant to their local environments.

What research topics are of significant interest to fire science users?

- **Site-specific research:** Many interviewees expressed that “general” research findings (e.g. general forest ecology or fire history of the Northwest) or research from ecological settings different from their own, would not necessarily be valuable for their particular needs. They place a high value on site-specific information at the watershed and even subwatershed scale. This was particularly the case in the drier forests of southern Oregon and eastern Oregon and Washington, where there is a sense that research conducted in the wetter western Oregon and Washington forests often is not applicable.
- **Impacts of forest management prescriptions:** Several direct fire science users, largely representing land management agencies, private contractors, tribes, and other entities, are interested in specific information that could help them develop forest

management prescriptions. Such topics include outcomes of treatment prescriptions (e.g., fire hazard effects of different thinning prescriptions, effects of prescribed fire) and guidance on options for achieving objectives such as fuel reduction and ecological restoration.

- **Implications of climate change:** Numerous direct and indirect users expressed interest in research about implications of climate change for fire regimes in forest and grassland systems. Not all interviewees raised this issue, but those that did felt that this was a significant and growing concern.
- **Controversial topics:** Interviewees identified several management controversies that would benefit from further study or syntheses of existing research. These are typically site-specific issues where a lack of agreement about past reference conditions or current ecological dynamics makes moving forward with management activities difficult. There is continued interest in the fire hazard implications of salvage logging, the fire hazard implications of high levels of insect-related mortality in forests, fire ecology of riparian zones, prescribed fire effects on threatened and endangered species, and historical and current fire ecology of moist mixed-conifer stands in drier forest types (e.g., southern Oregon, eastern Oregon and Washington).
- **Site-specific fire histories:** Interviewees desired fire histories at the watershed and subwatershed scale, particularly in the mixed-conifer stands in drier parts of the Northwest. Many southern Oregon and eastern Oregon and Washington interviewees reported that there is much less consensus on proper management in moist mixed-conifer than in dry, ponderosa pine-dominated forests. Because of issues particular to western Washington, interviewees there have specific information needs for fire effects on rare invertebrate species.

How could fire science modeling tools be improved, and what additional models are desired?

Regular, active use of modeling tools is limited to a subset of direct fire science users—primarily those in public land management agencies whose roles center on wildfire response and protection or on de-

signing management prescriptions. In some cases, individuals with extensive experience and familiarity with models act as a community-wide resource for collaborative entities or other community-based groups. Of those who do use models regularly, several expressed the sense that the number of currently available modeling tools is overwhelming, and that many of these models do not interface well with one another. As a result, there is much interest in refinement, consolidation, and training in existing tools or work on interoperability between existing tools, rather than creation of additional tools.

Interviewees also identified additional topics for which modeling tools would be useful. These topics included:

- **Landscape-scale analysis:** Among both direct and indirect fire science users, there is a great deal of interest in being able to track, plan, and prioritize at a landscape scale—including planning and resource allocation that value landscape-scale perspectives for their potential to optimize the use of scarce resources (e.g., providing fuel reduction in the WUI). For collaborative and community-based groups, there is interest in being able to track and visualize activities across multiple ownerships and jurisdictions at a landscape scale.
- **Forest-based economic development:** Fire science users, particularly those associated with collaborative or community-based entities, desire models that link forest management and economic development objectives. Because economic feasibility is often a major barrier to achieving restoration and fuel reduction work, several interviewees expressed a need for information and tools that help with estimating costs and economic benefits, or that optimize the location of utilization plants (e.g. biomass or small-diameter mills).
- **Carbon accounting:** A smaller number of interviewees expressed interest in models that support carbon accounting, such as the carbon implications of biomass utilization versus pile-burning or thinning and prescribed burning versus wildfire. Such models may help inform debates over the ecological costs and benefits of different management and utilization options.

Access

Where and how do interviewees obtain fire science research?

- Interviewees receive fire science information from a wide variety of sources, and no one source was preeminent. Sources include: peer-reviewed research and syntheses from university scientists as well as federal research stations, publications by nongovernmental organizations (such as The Nature Conservancy), unpublished agency documents, personal communication with experts both inside and outside the interviewee's organization, social networks, informational websites, conferences and seminars, required and optional trainings, existing decision support models, and existing Community Wildfire Protection Plans and their associated committees.
- Those who use fire science for crafting legally defensible land management plans rely most heavily on peer-reviewed publications from university scientists and research stations. Agency line officers and other high-level agency and NGO managers rely frequently on experts within their agencies or organizations. Members of community-based organizations typically rely on technical experts within the community, such as university Extension Service employees, or other key contacts who stay abreast of current science.
- In general, interviewees consider peer-reviewed science to be the most credible source of information, followed closely by whitepapers and other publications put out by the federal research stations. Information provided by The Nature Conservancy is generally highly regarded. However, interviewees look suspiciously upon research coming from other trade or nonprofit organizations, particularly those that are perceived as having political agendas.

What access challenges do fire science users face?

- There was a sense from across the spectrum of interviewees that identifying, locating, and accessing information was a more substantial barrier than the presence or absence of information. In other

words, while interviewees identified several specific topics for which they believed more or better science was needed (see above), in general, they felt that information was accumulating faster than they could keep up with it.

- Access issues differed between those connected to academic and research institutions (including the U.S. Forest Service), and those lacking research library connections to access peer-reviewed research. Federal agency personnel and those associated with academic and research institutions are able to access most of this material, while nongovernmental organization staff members and members of collaborative groups are largely unable to access important information published in peer-reviewed journals. This acts as a major barrier to information transfer for a large proportion of the Pacific Northwest fire community. Some nonagency, nonacademic interviewees expressed a sense of disenfranchisement as a result of this current asymmetric pattern of access to information.
- Interviewees affiliated with land management agencies generally reported being prevented from using social media (e.g., Facebook, Twitter) due to institutional policies. Some felt that this restriction may limit their access to information rapidly shared via online social networks.

What formats for future delivery and dissemination of research products would be most useful?

- **Clearinghouse:** There is a great deal of interest for the consortium to act as a “clearinghouse” of existing fire science information (including links to other existing fire-related sites) and to package and deliver information in useful, accessible ways. Both direct and indirect fire science users expressed a great deal of interest in having access to a searchable, online library of relevant fire science information.
- **Digital resources:** Because of a perceived abundance of existing fire science information, many interviewees from across the Pacific Northwest fire community also expressed interest in receiving regular e-mail “digests” with briefs on new

information and links to full reports (several interviewees mentioned the Society of American Foresters’ “E-Forester” newsletter as a good model for this). This idea is especially attractive to people with limited time or ability to search for new information, including many direct fire science users working for the public land management agencies. These interviewees generally said that staying informed on new and relevant information is extremely important, but that the structure of their positions allowed very little time to do so. As a result, they would more likely utilize information that was packaged appropriately. There was a mixed response to the concept of online “webinars” for training and information transfer. Some interviewees are enthusiastic about the idea, particularly those experiencing reductions in travel budgets and anticipating future difficulties justifying travel. Others are less interested, preferring in-person meetings or direct communication with experts.

- **Syntheses:** In addition to their interest in digests of new information and tools, interviewees are very interested in synthesis publications, which interpret and package a great deal of information on a particular topic so that it has direct relevance to practitioners. For many within the agencies, syntheses are important for their ability to inform management planning with the best available scientific information. Many interviewees from outside the agencies view syntheses as a way of obtaining key information on particular topics for use in community planning, outreach, and education.
- **Field tours:** Interviewees who had participated in interactive science-based field tours (usually research scientists, agency managers, and a variety of community members) regard them as valuable venues for fire science learning. Interviewees appreciate the direct dialogue possible between scientists, managers, and others, and feel that these tours have the potential to help move diverse communities of citizens, managers, and others toward more common understandings of the role of fire in their landscape.

Collaborative and participatory research

- Despite the growing popularity of participatory and collaborative research between universities, agencies, communities, and other stakeholder groups over the past two decades, many interviewees are unfamiliar with these concepts. Several interviewees confuse collaborative and participatory research with collaboration more generally (e.g., collaborative decision-making).
- There are different views on the meaning and value of collaborative or participatory research. Members of collaborative and community-based organizations, tribes, and NGOs desire more of an active role in partnering with researchers and participating in research that could serve their communities or inform their land management planning, while government agencies are largely looking to enlist others in accomplishing needed internal tasks such as monitoring. There is a sense among some interviewees that research that originates and is conducted entirely within the community of academic or research station institutions often falls short of community needs, either because it does not incorporate community interests, or because a lack of transparency about process can lead to distrust of results.
- When asked about their interest in collaborative and participatory research, responses commonly began, “Yes, but . . .”. While many interviewees support the idea in concept, they feel they don’t have the time or flexibility to take part in such work. Some, particularly those in the agencies, are pessimistic about this kind of research “paying off” in the long run in terms of gains in efficiency.
- Even for those who expressed more optimism about collaborative or participatory research, many see it primarily as a way to recruit outside entities to do necessary but underfunded activities, such as postimplementation project monitoring. This fits with a larger theme echoed by many within the agencies that shrinking budgets are causing them to look for more efficient ways of performing their duties, including “outsourcing” some of their monitoring, outreach, education, and communication needs.

- Several interviewees from both within and outside the land management agencies desire opportunities for communicating with researchers to share ideas on potential projects and research questions and to identify ways to collaborate on future projects.

Summary of results

The findings of this assessment point to broad diversity within the Pacific Northwest fire community, but also show common themes in regional fire science use. These findings mirror the results of other existing fire science user needs assessments in the region (Appendix 1) and include the following:

- There is a large degree of diversity within the Pacific Northwest fire community’s information needs, institutional roles and barriers, and ability to access existing resources.
- Interviewees acknowledged that a great deal of important information already exists, and that they would greatly benefit from new ways to search, access, and be made aware of this information.
- Interviewees’ specific information needs were diverse, but often centered on site-specific information that would help in strategic planning, management project planning, and resolution of ongoing debates regarding specific practices.
- Interviewees who regularly used modeling tools commonly felt that the most pressing need is for refinement, consolidation, and interoperability between existing tools rather than the continued proliferation of new tools.
- Interviewees were broadly interested in products that synthesize existing science and in having primary research “packaged” and “delivered” to them on a regular basis.
- Although many individuals both within and outside the agencies desire more contact and collaboration with researchers, there are currently limited opportunities to do so.

Appendix 1: Comparison of results with prior needs assessments

The USFS Pacific Northwest Research Station and others have previously conducted several assessments that support the findings reported in this document.² In 2006, U.S. Forest Service researchers MacGregor, Seesholtz, and Barbour reported on science and research needs of a range of natural resource managers and specialists. These needs included:

- Increased access to research results through online centralized databases
- Periodic regional-level conferences and workshops as a mode of receiving science and research
- Aggregation of research papers and reports
- The development of “informal information networks” that allow for the selection of information relevant to a particular unit or region
- Advice and consultation on the application of landscape-scale research at the local level
- Increased capacity at the unit level to overcome any barriers to incorporating research into management activities

Another U.S. Forest Service assessment conducted in 2004 reported similar findings. This assessment was primarily intended to inform fire research, but also discussed processes for increasing the effectiveness of delivering fire science to end-users. Examples included information clearinghouses; direct communication networks in the form of workshops, field trips, and conferences; and the synthesis of existing information into forms that are easy to use and understand.

In 2010, the U.S. Forest Service Pacific Northwest Research Station sponsored a workshop intended to identify the gaps in fire science delivery to the end-user and assess the end-user needs. These identified needs included synthesizing of existing fire science information; recognizing that there are a variety of target audiences for this information that demand a variety of approaches; placing more emphasis on information exchange as opposed to knowledge transfer; and facilitating learning opportunities through trainings, workshops, and mentoring.

1 Fire, fuels, and air quality professionals and land managers currently have access to scientific information through a variety of outreach delivery systems, including the Agricultural Research Service, ecoshare.info, fire.org, [FRAMES Northwest Fire Portal \(frames.nbii.gov/northwest\)](http://frames.nbii.gov/northwest), [Northwest AIRQUEST](http://northwest.airquest.gov), [Northwest Interagency Coordination Center \(NWCC\)](http://northwestinteragencycoordinationcenter.gov), [USFS Pacific Wildland Fire Sciences Lab](http://usfs.gov/pnw-wildland-fire-science-lab), [USFS Missoula Fire Sciences Lab](http://usfs.gov/missoula-fire-science-lab), the [USGS Forest and Rangeland Ecosystem Science Center \(FRESC\)](http://usgs.gov/forest-and-rangeland-ecosystem-science-center), and the [Western Wildlands Environmental Threats Assessment Center \(WWETAC\)](http://westernwildlands.org).

2 These assessments are: *Science and research utilization by field managers*. Project report for PNW 06-JV-11261976-259. Donald G. MacGregor, David Seesholtz, and Jamie Barbour; 2006; *Bridging the worlds of fire managers and researchers: Lessons and opportunities from the wildland fire workshops*. Seth M. White. PNW-GTR-599. March 2004; *Meeting notes for the Joint Fire Science Consortium planning group*. January 27-28, 2010. Compiled by The Keystone Center.



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