

Summary of key partner research needs, the importance of chartering, and PNW's comparative advantages

Key partner research needs

The research needs of Pacific Northwest Research (PNW) Station stakeholders and partners vary widely (see appendix). However, there are some common themes that have emerged over multiple formal information-gathering efforts.

The research needs summarized below came from station sensing efforts over 10+ years, compiled and condensed from the following sources:

- the research road maps developed during 2016 program reviews
- a synthesis of multiple PNW station scoping efforts and third-party reports from 2009-2017 (including the US Endowment's 2017 [Blue Ribbon Report](#), and the Society of American Foresters report on forest sector R&D needs)
- a [2010 GAO report](#) titled Forest Service R&D: Improvements in Delivery of Research Results Can Help Ensure That Benefits of Research Are Realized
- a spreadsheet of science needs gleaned from the NWFP science synthesis
- and a summary of partner engagements by the station management team and others.

Recurring themes in past partner information requests. Over the last decade we have repeatedly heard the following from partners and stakeholders:

- **Overall, social and economic sciences are underinvested in.** Social science research has been consistently identified as the most pressing information need. This is critical to integrate across all research areas. More social science is specifically needed in urban areas and in rural, natural-resource dependent communities. External stakeholder: "From a research perspective, sustaining human communities ought to be where you start, and then work backward. In the past, PNW has done the opposite." To our partners and stakeholders, social and economic questions should drive the ecological research, not vice versa.
- **Climate change research should be a major priority.** This topic affects all management topics and every environment, human and natural. Many of the problems that natural resource professionals will face in the coming 10 to 20 years will be tougher because of the complications of climate change.

More science is needed to improve understanding of the interactions between climate conditions, forest conditions, and other influences. Also mentioned again and again is the need to be able to project future conditions more accurately and precisely, both at regional levels and at finer spatial scales, such as counties (650 to 1,000 square miles).

- **Fire** continues to be a priority research need in Oregon and Washington. More investment is needed in understanding and monitoring the effectiveness of fire as a silvicultural tool and its influence at the landscape level. More and better knowledge is needed about the benefits of creating landscapes that are fire-adapted.

Information needs include social and economic research, because sustaining fire-adapted ecosystems requires building more public support for using fire as a forest management tool.

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Creating more public support requires several kinds of knowledge. Social science research is needed to understand community values, interests, and perceptions related to forests and wildfires. Both resource managers and the public need to understand better what kind of forest might exist in the future—with fire being sensibly reintroduced, or not.

- **More integration across disciplines is needed.** Hydrology, wildlife and fisheries science, range science, forest science—we need to be moving beyond individual stories from these separate fields to tell integrated stories that encompass all these sciences. We often hear our partners asking for research that will help them address tricky public land management problems with a triple-bottom-line approach.
- **More synthesis of existing science is needed.** Stakeholders want more synthesis of existing research. This includes integrating Indigenous knowledge into research. Clear statements are needed about the state of science in key fields, including both what is now known with some confidence and what science gaps remain that stymie decision-making for resource managers and the public.
- **Communication efforts should not be an afterthought.** Better planning is needed to foster communication and deliver research findings faster and in formats that can be used, which might mean moving away from traditional research products and adopting new delivery channels and technologies. Much of the time partners don't actually need new research, they need better translation, interpretation, and packaging of existing research. There are about 30,000 different scientific journals, with close to 2 million articles published each year. Better attention to communication and science delivery can help narrow down the task of making this massive store of existing knowledge more accessible.
- **Other common information needs** from partners over the years have focused around: conflicting pressures on the resource base, recreation (economic impacts, increasing demand, changing demographics), water supply and future water availability, risks of invasive species infestations and other forest health issues, smoke and air quality, forestland conversion, landscape-scale approaches, and the need to create a more positive public image for forests in general and the Forest Service as an agency.

For a list of more specific research questions that have consistently come up in partner sensing, see the appendix.

The importance of chartering

Without a strategic vision (or charter), we are more likely to take action only to address immediate problems—putting us in a cycle of crisis management. Of all the compelling reasons to recharter, one of the most critical is the speed with which forces in the environment are changing (climate change, a global pandemic, large-scale social and economic upheaval). As Yogi Berra said, “If you don't know where you're going, you'll wind up somewhere else.”

Progress in resolving problems like climate change, loss of forest land to development, or wildfire risk depends on a flow of new scientific knowledge. New approaches, new tools, and evolving policies require continuous additions to our knowledge of basic ecology, biology, and social sciences, and the application of that knowledge to practical purposes. This is why our partners in the National Forest

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System side of the agency are required to use the “best available scientific information” to inform forest planning.

Therefore, it’s important to be visionary in planning for the future direction of station research because our continued relevance to our partners depends on our ability to anticipate their future needs so that they can continue to make informed decisions. This requires a deep understanding of the state of current knowledge, a clear sense of what questions science *could* answer, and a willingness to look beyond solving the problems of the day towards the types of problems that transcend time.

Visionary leaders are able to “see” the future because they care about it. Tech companies, working together in the 1990s, recognized the power of digital networks and began developing life-changing electronic devices to reflect these new, previously unthinkable possibilities rather than trying to continue the traditional method of doing business.

But being visionary is about more than trying to make the future better and more efficient, however. It also gives us the breathing room to take action before problems reach crisis level. Strategic planning such as chartering provides us the opportunity to adapt day-to-day decisions to follow a larger vision, creates a direction for our work, and maximizes options for being nimble in addressing emerging land management problems.

In 2010, the GAO issued a report identifying areas of FS R&D operation that need attention, namely: improving science delivery, being more responsive to stakeholders, and better connecting work across stations. Overall, R&D needs to become adept at using a variety of science delivery methods and find ways to include users more efficiently in this process. With this in mind, being visionary means also thinking big about the entire process of research, including encouraging coproduction of research, thinking more strategically about science delivery, expanding our coordination of specific lines of work with other research stations, incorporating uniquely valuable resources like experimental forests, and coordinating more closely with WWETAC and the NW Climate Hub.

The competitive advantages of PNW and FS R&D over universities

- **Forest Inventory and Analysis.** FIA forest inventory data is foundational to many other fields of science. The fact that FIA has an annual users’ group meeting and works with stakeholders to create the information people need is very powerful.
- **Experimental Forests and Rangelands.** Strengths include their ability to show outcomes of management actions, their appeal to multiple learning styles, and their long-term commitment to science dissemination. Few other research institutions have comparable opportunities to capture the long-term variability in forest and range ecosystems given the 12 experimental forests, a volcanic national monument, 98 research natural areas, and more than 25 larger scales studies across our region.
- **Social science connected to natural resources.** As a research institution with social science and economics research already in the same organization as ecosystem research, FS R&D is thought to have a comparative advantage over research institutions with internal institutional barriers.
- **Urban forest research.** Increased urbanization is making the livability and sustainability of cities in the region a critical concern. FS R&D’s research helps local governments and citizens understand the multiple values that healthy stands of trees create in urbanized settings. Urban

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forest research creates an awareness of the FS as a whole, helps us connect to 82% of the population living in cities, and establishes the FS as a thought leader and conservation champion.

- **Landscape-scale research.** PNW is known for big-picture, “all-lands” science. The groundbreaking science that informed the Northwest Forest Plan was the start of other ambitious research projects that address connectivity and interactions across large watersheds and landscapes. Keeping pace with advancing geographic information systems, remote sensing, and ever-growing computing power has enabled PNW research to inform an expanding vision of all-lands conservation. Partners agree that the agency’s brand is very strong and influential when R&D mission area leaders and scientists do large-scale regional assessments and report on forest conditions.
- **Long-term studies.** With almost a century of research behind us, PNW is uniquely positioned to conduct long-term studies compared to most other research institutions. Partners have emphasized both ecological studies at specific locations (e.g., LTERs, watershed studies, and silvicultural research) and broader regional and national scale studies that track ecological and socio-economic changes over time (e.g., RPA assessments). The ability to work with many types of landowners contributes to the strength of long-term studies.

APPENDIX

Specific research needs heard consistently from stakeholders:

Climate change

- How can we get more information on carbon offset programs, markets, policy?
- What policies and land management practices result in forest carbon accumulation?
- What are the probable impacts of climate change on: natural resources, wildfire, water availability, vegetation, disturbance regimes (insects, disease), aquatic habitats, NTFPs?
- What policies and land management practices result in forest carbon accumulation?
- What are the relationships between drought and other disturbances?
- How will changes in CO₂, water availability, and temperature affect tree growth and mortality?

Ownership patterns and land use change

- How can we integrate across boundaries to address large-scale issues?
- What are the economic and environmental impacts of forest land conversion?
- How can we better predict future land use choices and development patterns encroaching on forests?

Recreation

- How will changing demographics, interests, social media, and technology impact recreation?
- What do people value in landscapes?
- What is the economic impact of public land recreation?
- What are the health effects of outdoor recreation?

Fire, fuels

- How do we prioritize areas with highest likelihood of wildfire so we can target treatment more effectively?
- How do we assess fuel treatment effectiveness?
- How does policy affect transference of risk to private landowners?
- What is the long-term message needed to change behavior so that people feel ready for fire season?
- What can we expect from novel post-fire ecosystems?
- How can we make sense of the many confusing fire models out there?
- What are the trade-offs between prescribed burns and wildfire?
- How do fuel treatments affect carbon mitigation at multiple scales?
- How can we manage westside OR/WA fire?
- What are the community (social, economic) impacts of smoke?

Urban nature, engagement

- Where can we get accurate, comprehensive information about the economic value of trails and green spaces in cities?
- How can we engage diverse groups of people, including youth, with natural resources?
- What are the health and well-being effects of exposure to green spaces?

Biodiversity

- West side forests are losing early-seral stages, what does this mean for forest managers?
- What is the function of early-seral forests?
- What are the effects of fire suppression on forest biodiversity?
- How well do mechanical methods and Rx fire create diverse habitats?
- Is use of surrogate species (e.g. indicators, sentinels, flagships, umbrellas, keystones) effective in achieving conservation goals?
- How do we characterize demography, persistence, viability, dispersal, and habitat connectivity for more species than the usual high-profile species?

Ecosystem services

- How can we identify, quantify, and value non-market goods and services to support the development of ecosystem markets?
- How feasible are nontraditional forest product markets, including carbon credits, public water supply, forested buffer zones, and renewable energy options?
- What programs could be effective at easing development pressure?

Watersheds

- How does active management affect aquatic life?
- What are the links between land use and water quality, quantity, and timing of availability? What are the implications of absence of disturbance in riparian and aquatic systems?
- What are the effects of thinning on stream temperature over time?
- What are the economic consequences of water challenges?

Forest management

- What are the interacting effects of drought, insects, disease, climate change and fire on forests?
- How can we predict, prevent, or manage sudden oak death?
- What are the trade-offs between coarse and fine filter approaches to conservation?
- How does habitat quality of early seral differ from burned versus managed forest?
- Can we get more applied land management work (versus modeling)?
- How can we evaluate trade-offs with the no-action alternative (e.g., roadless rule, treating for invasives)?
- What are the different levels of social acceptability of forest management practices?
- What are appropriate forms and levels of support to bolster long-term public engagement?
- How does trust at different organizational scales affect public support of active forest management strategies?

Rural economies

- What are the economic and social values of subsistence resources?
- How can we invest in rural economies?
- What is the sustainability of ecocultural resources for tribal use?
- How do we promote a shift from timber to tourism or other new economic models for communities?
- Who is harvesting NTFPs and what are their motivations?

Listed species

- What are best rangeland management practices for stream restoration and recovery of rare or threatened species?

- What are the forest structure and configuration characteristics that facilitate juvenile spotted owl dispersal?
- What are the short- and long-term effects of silvicultural treatments and wildfire on spotted owl occupancy, forest dynamics, and prey?
- Is there marbled murrelet recruitment from Alaska/British Columbia?
- What is the response of murrelets to silvicultural activities designed to accelerate expression of mature forest conditions?

Family forests

- How can we provide incentives to keep working forests working?