2016 Ecology Program Yearbook:
Applying Science to Serve the National Forests

USDA Forest Service, Pacific Northwest Region

Cover photo: Pacific Northwest Region ecologists appreciating the beauty of the Hells Canyon landscape from the Buckhorn Overlook in eastern Oregon. Photo courtesy of Ellen Morris Bishop, Nature's Light Photographics, Joseph, Oregon.

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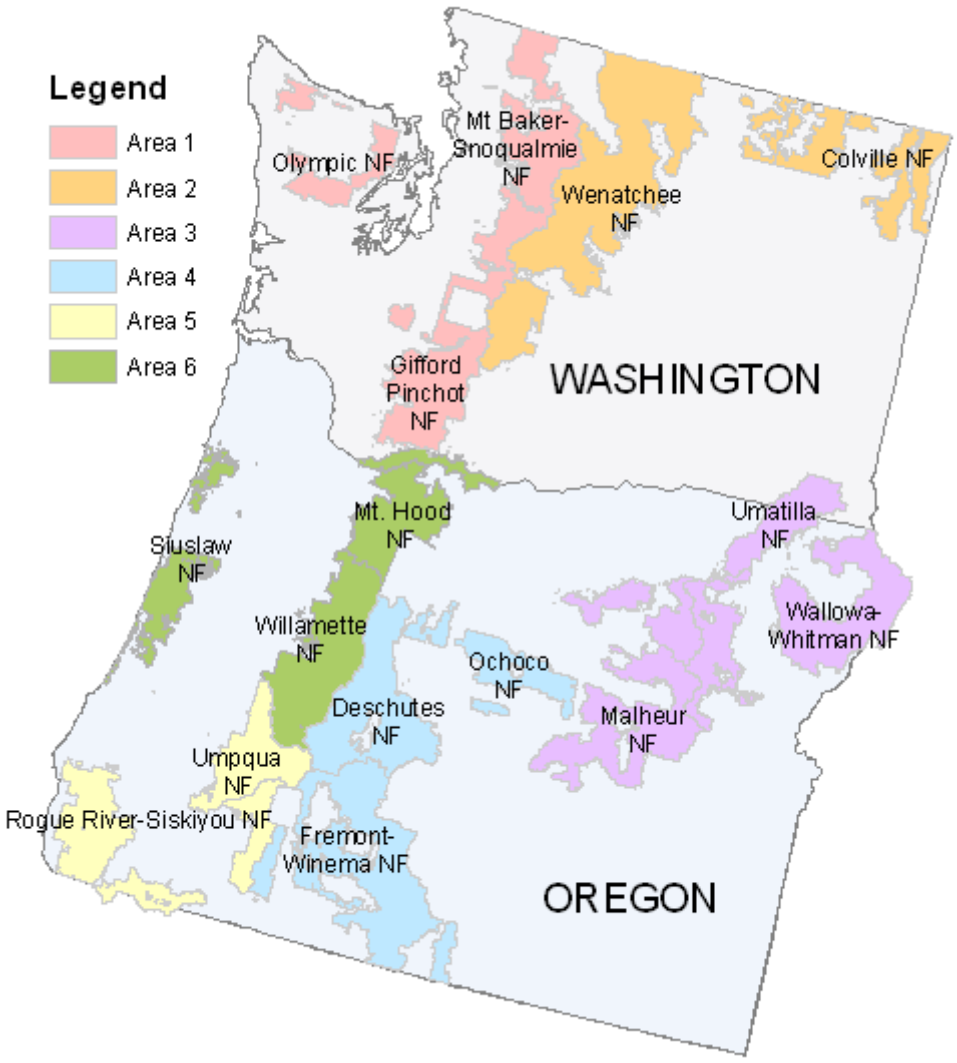
Region 6 Ecology Areas



The Ecology Program in the Pacific Northwest Region is organized into six areas comprised of two to three National Forests. Ecologists' annual program of work is drawn up jointly with the Forest natural resource staff officers in that area.

Ecology Program Mission Statement

The Ecology Program is a network of ecologists applying science to serve the National Forests in the Region through core services of landscape assessment, technology transfer, monitoring, mentoring, products (maps, publications, and databases), ecosystem services, support to planning, and science-management partnerships. The ecologists work as equal partners with other disciplines on an area basis to serve multi-forest needs and provide a landscape perspective. Ecologists are based on National Forests and are hence accountable to Forest leadership.

Ecology Program in the Pacific Northwest Region

The Regional Ecology Program today has a terrestrial emphasis and is organized by areas. Six areas cover the Region, as shown on page 2. Ecologists in these areas carry out a program of work crafted according to the National Forests' needs. Those ecologists covered by the program's Pacific Northwest regional commitment are indicated in the table below. The Ecology Program is well-integrated with other disciplines. One of our ecologist positions is also a half-time botanist and two others are half-time with the Forest Health Protection program. Other ecologists receive funding from fire, wildlife, and other disciplines.

Ecologists serving the six ecology areas:

Area	Area Name	Ecologists
1	**Western Washington**	Jessica Hudec, Kevin James (with Botany), Susan Piper (contact)
2	**Eastern Washington**	James Dickinson, Monique Wynecoop (with Fire)
3	**Northeast Oregon**	Sabine Mellmann-Brown, Michael Jennings (with Forest Health), Upekala Wijayratne, Vacant (vice Gunnar Carnwath)
4	**Central Oregon**	Gregg Riegel, Elizabeth Johnson, Claire Addis, Mike Simpson (with Forest Health), Vacant (range ecologist)
5	**Southwest Oregon**	Bill Kuhn, Pat Hochhalter, Amy Nathanson
6	**Northwest Oregon**	Jane Kertis, Steve Acker, Doug Glavich, Vacant (vice Wes Wong)

The program is built on a social contract between National Forest leadership, ecologists on the ground, and the Regional Office. The program of work is crafted annually with Forest Leadership Team and Staff Officer guidance. A high degree of accountability of performance is characteristic of the program.

Funding is anchored by a Regional Office Program Delivery commitment covering about 60 percent of the cost of each Area's ecology program. The remainder is made up of partnerships (such as Forest Health, Botany, BLM) and Forest contributions. **The Regional commitment has been a decision of Forest Supervisors collectively as an investment in the multi-Forest landscape perspective, continuity, and the many other services the ecologists provide.**

At the Regional Office, Tom DeMeo serves as the Regional Ecologist, and Nikola Smith as the Regional Ecosystem Services Specialist. Two student interns from De La Salle North High School, Guillermo Gamino-Barron and Alex Lopez-Tomas, work on data management on a part time basis.

Core Services (the "Eight Pillars")

Landscape assessment

The ability to analyze, interpret and integrate the composition, structure, and function of ecosystems at multiple scales is an important capability that ecologists provide at project, landscape, and regional scales. The following examples demonstrate the landscape assessment advances we have made across the Pacific Northwest Region in 2016.

In the Eastern Washington Area two major landscape assessments were accomplished with the support of the Area Ecologist. The first landscape assessment utilized local, regional, and national data sources to successfully analyze and prioritize the 255 subwatersheds of the Okanogan Wenatchee National Forest. This product was used by the Forest Leadership Team to schedule a 5-year plan of work for forest resiliency planning. The second effort was in leading the assessment of a 35,000-acre landscape for both terrestrial and aquatic restoration needs. The resulting report provides ecological context for restoration activities in a late successional reserve that includes spotted owl habitat, as well as endangered spring chinook, bull trout, and steelhead. The district IDT will use this to guide their NEPA planning in FY17.

Ecologists in the Northwest Oregon Area provided results from the dead wood analytical tool DecAID to supply updated information on snag and down wood amounts and their spatial distributions. These broad scale watershed level data will be used to assess wildlife habitat health (e.g., abundance of large snags), and determine potential treatments for landscape projects. In FY16 Ecologists developed updated deadwood information at the National Forest scale, incorporating recent large scale wildfire information. We also worked with planning, wildlife and silviculture staff on the Siuslaw National Forest to develop an outline for a comprehensive white paper on dead wood to streamline future deadwood NEPA analyses. We participated on the Regional team preparing a new version of DecAID website, drafting text for some updated sections, and reviewing the work of others on the team for other sections.

Northwest Oregon ecology also worked with the Oregon Dunes Restoration Collaborative to develop a comprehensive landscape strategy for assessing and prioritizing restoration opportunities. The strategy will guide short and long term activities for the Siuslaw National Forest and the Collaborative to be most effective in their goal to restore the unique dunes ecosystem.

Technology transfer

The Ecology Program performs technology transfer in a variety of formats, from trainings, workshops and conferences, to syntheses and informal discussions. The examples below outline the work we accomplished in 2016.

Western Washington Ecology Program hosted a training session on plant associations in the Olympic National Forest. This training was the first for the Olympic NF since the 1990s. Botany, silviculture, timber, wildlife, and planning staff spent a day in the field [re]familiarizing themselves with the Guide to Forested Plant Associations of the Olympic National Forest (Henderson et al., 1989)[1], identifying indicator plant species, recognizing influential biophysical elements, and discussing the effects of forest management, natural disturbances, and environmental factors on plant associations. Participants discussed using plant associations for predicting special forest product habitat potential and productivity, selecting appropriate sites to develop forage and/or increase botanical species diversity, determining best placement of skips and gaps during harvest layout, and identifying seed zones under potential future climate scenarios. Plant association trainings were also held on the Rogue River-Siskiyou, Willamette, and

[1] Henderson, J.A., D.H. Peter, R.D. Lesher, D.C. Shaw. 1989. *Forested plant associations of the Olympic National Forest*. USDA Forest Service Technical Paper R6 ECOL 001-88, Portland, OR, 502 pp.

Ochoco National Forests in 2016. Similar trainings are planned at several locations throughout Region 6 in 2017, including a second training on the Olympic in Spring 2017 that will focus on riparian issues.

Western Washington Ecology Program also completed a forest patch analysis for the Mt. Baker-Snoqualmie and Olympic National Forests. The objective of this work was to help inform Forest Leadership discussion about integrated restoration on the west side of the Washington Cascade Mountains. Restoration on "west side" forests has tended to be focused on promoting forest structure and the recovery of listed terrestrial and aquatic species. This initial forest-wide patch analysis utilized the dataset and methods as described in the 20-year monitoring report for the *Status and Trends of Late-Successional and Old-Growth Forests* (Davis et al., 2015)[2]. The results of this analysis were forest-wide maps displaying the arrangement of forest structure defined at both 80- and 200-year old thresholds. The spatial pattern of older-forest structure served as a starting point to discuss landscape variability in forest successional pathways, past management activity, disturbance regimes and climate change at multiple spatial scales for both terrestrial and aquatic systems.

Technology transfer accomplishments in the Eastern Washington Ecology Area occurred in collaboration with the Pacific Northwest Research Station and the University of Washington. The most substantial technology transfer effort involved the Confederated Tribes of the Warm Springs (CTWS). The recent closure of the tribal lumber mill and increasing vulnerability of key resources to wildfires, insects, and disease has the tribes' natural resource staff considering a new management approach. To help answer questions about managing resources for the future, our workgroup has initiated the compilation of data to describe historical conditions and ecological capacity of CTWS Reservation lands. Furthermore, using the methods developed in the Interior Columbia Basin Assessment and pioneered in the Okanogan Wenatchee National Forest Restoration Strategy, we are teaching the CTWS a process to assess how current ecosystem conditions can be managed to develop more resilient conditions and sustainable uses of tribal resources.

NE Oregon Ecologists measuring riparian vegetation and shading of the stream.

Monitoring

Monitoring is a critical component of the planning process and an important part of keeping faith with the public we serve. Put simply, ecological monitoring answers questions like "Did this treatment work?" Often neglected, particularly in a downsizing era, monitoring is more important than ever, especially with respect to the increasing importance of adaptive management. Monitoring can assist with finding new levels of agreement and building trust when proposing controversial management applications or dealing with scientific uncertainty. Ecologists can focus on monitoring as a core responsibility, rather than "other duties as assigned." We are well equipped to design

[2] Davis, R.J., J.L. Ohmann, R.E. Kennedy, W.B. Cohen, M.J. Gregory, Z. Yang, H.M. Roberts, A.N. Gray, T.A. Spies. 2015. Northwest Forest Plan–the first 20 years (1994-2013): status and trends of late-successional and old-growth forests. Gen. Tech. Rep. PNW-GTR-911. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 112 p.

statistically sound monitoring studies and pilot new methods that will provide insight and guidance for decision makers.

Important recent monitoring activities include:

Grizzly Ridge game exclosure in Hells Canyon Natural Recreation Area.

- To support thinning of riparian corridors on the Malheur National Forest, Northeast Oregon ecologists worked closely with district hydrologists, silviculturists and fisheries biologists to identify treatment and control areas and establish 6 monitoring reaches in the treatment area. Pre-treatment measurements were finished just days before the removal of dense grand fire overstory. Project goals include releasing riparian shrubs and creating a more diverse pattern of seral communities within the watershed. Monitoring treatment effects was part of the Record of Decision and was funded by the monitoring budget for the Malheur Collaborative Forest Landscape Restoration Plan (CFLRP).
- Northeast Oregon proposed and received support for a 2017 trial of unmanned aircraft systems (UAS) to monitor riparian areas of Forest Service grazing allotments containing salmon bearing streams. As budgets and workforce are decreasing we are exploring novel technologies and analytical methods to improve management of sensitive habitats.
- Both Central and Northeast Oregon completed the sixth and final year of White Headed Woodpecker (*Picoides albolarvatus*, a Management Indicator Species/Sensitive Species) population and habitat monitoring. These baseline trend data support regional habitat occupancy modelling and are delivered to local wildlife specialists for use in NEPA documents. This is a momentous achievement that required several years of extensive field work with large travel distances and multiple crew members.
- Western Washington and Northwest Oregon Ecology Areas are inventorying fringe species and special habitats including chinquapin, oak savannahs and woodlands, whitebark pine, meadows, balds, and wetlands, in order to better support their management.
- Central and Northeast Oregon Ecology monitored effectiveness of livestock grazing on upland range and riparian vegetation. Discerning grazing effects from hydrologic flux and annual variation in precipitation is key to understanding management induced change. NE Oregon, in collaboration with range managers of multiple districts, is maintaining several three-way exclosures that were established as early as the 1930s. Fenced treatments include a game exclosure and a livestock only exclosure which are paired with an open control. Ecologists have been remeasuring vegetation of these sites in an approximate 10 year cycle. For this last measurement cycle they collected data on biological soil crust to understand the impact of ungulates on this resource.
- Central Oregon Riparian Ecological Type Scorecard monitoring is supporting the Fremont-Winema NF with litigation efforts in four lawsuits. This repeated interval monitoring program is also being utilized in the Ochoco NF Big Summit Wild Horse Territory. Data currently being collected is adding to a long-term (approximately 20 year) database with multiple site visits, allowing condition comparisons through time and supporting adaptive management efforts.

Mentoring

Ecologists are particularly valuable in mentoring fellow employees, since we tend to stay in place longer than many from other disciplines. In June, Tom DeMeo provided an overview of common ecological types for a group of summer interns working on GIS story maps for Leah Rathbun, Regional Biometrician, in order to familiarize them with the material they would be working with. He is also helping the new Regional Soil Scientist, Cara Farr, transition into her job in the areas of ecological unit inventory and integrating with the Ecology Program. We also help mentor existing employees. NE Oregon Ecologists have sent their biological technicians "back to school" for advanced degrees in natural resource management after working with them for one or two summers. Mentoring is one of those things "you don't know what you've got 'til it's gone."

Products (Maps, Publications, Databases)

A core service of the program is the development of more locally relevant high resolution products to support project planning efforts. In 2016 Pat Hochhalter of the Southwest Oregon Ecology Area achieved a major accomplishment in a cleaning and reorganizing of the regional ecology plot dataset, an immensely valuable resource containing more than 28,000 formally recorded field plots. These were originally used to develop the plant association guides in the region although today they are used for a wide array of applications, notably our current revision of the potential vegetation map for the region.

This year a more complete and improved forest structural restoration map was developed, based on Haugo et al. (2015)[3] but now including the entire west side, and using more current datasets and methods. (A sample of the maps from this document are shown in the Partnerships section of this document.) This effort continues our collaboration (since 2011) with The Nature Conservancy on restoration mapping/natural range of variation assessment.

Other recent publications and reports of the Ecology Program include:

Western Washington

Halofsky, J.E., D.L. Peterson, J.J. Ho, J. Hudec. In preparation. Climate change vulnerability and adaptation in southwestern Washington. PNW-GTR-xxx. Portland, OR: USDA, Forest Service, Pacific Northwest Research Station. xxx p.

Hudec, J. 2016. Mixed conifer forests of the Gifford Pinchot. Unpublished white paper.

Hudec, J. 2016. Multi-agency land management and emergency response: Cougar Creek Fire. Presentation at Columbia River Gorge Science Conference hosted by Yakama Nation Fisheries.

James, K. 2016. Landscape restoration framework. Presentation to MBS Forest Leadership Team and Regional Office staff.

Eastern Washington

Manastash-Taneum Resilient Landscapes Project: Landscape Evaluations and Prescriptions

Lower Chiwawa Big Meadow Restoration Project: Landscape Evaluations and Prescriptions

[3] Haugo, R., C. Zanger, T. DeMeo, C. Ringo, A. Shlisky, K. Blankenship, M. Simpson, K. Mellen-McLean, J. Kertis, and M. Stern. 2015. A new approach to evaluate forest structure restoration needs across Oregon and Washington, USA. Forest Ecology and Management 335:37–50.

Eastern Washington (continued)

Okanogan Wenatchee National Forest Strategic Prioritization

Northeast Oregon

Carnwath, G.C. and C.R. Nelson. 2016. The effect of competition on responses to drought and interannual climate variability of a dominant conifer tree of western North America. Journal of Ecology: 1421-1431.

Dwire, K.A., S. Mellmann-Brown and J.T. Gurrieri. 2017 (in review). Potential effects of climate change on riparian areas, wetlands and groundwater-dependent ecosystems in the Blue Mountains, Oregon, USA. Submitted to Climate Services.

Jennings, M.D., and G.M. Harris. 2016. Climate change and ecosystem composition across large landscapes. Landscape Ecology: 1-13.

Kerns, B.K., D.C. Powell, S. Mellmann-Brown, G. Carnwath, J. Kim. 2017 (in review). Effects of climate change on vegetation in the Blue Mountains, Oregon, USA. Submitted to Climate Services.

Central Oregon

Dwire, K.A., K.E. Meyer, G**.** Riegel, and T. Burton. 2016. Riparian fuel treatments in the western USA: Challenges and considerations. Gen. Tech. Rep. RMRS-GTR-352. Ft. Collins, CO: U.S.D.A, Forest Service, Rocky Mountain Research Station. 156 p.

Hessburg, P.F., T.A. Spies, D.A. Perry, C.N. Skinner, A.H. Taylor, P.M. Brown, S.L. Stephens, A.J. Larson, D.J. Churchill, N.A. Povak, P.H. Singleton, B. McComb, W. J. Zielinski, B.M. Collins, R.B. Salter, J. J. Keane, J.F. Franklin, and G. Riegel. 2016. Tamm Review: Management of mixed-severity fire regime forests in Oregon, Washington, and Northern California. Forest Ecology and Management 366: 221–250.

Johnson, E.J and G.M. Riegel. 2016 Report: Effects of Fuel Treatment Alternatives on Bitterbrush Population Dynamics and Understory Composition along the Eastern Slopes of the Cascade Range of Oregon and California. Unpub. Rpt.

Johnson, E.J., G.M. Riegel, and S.C. Lovtang. 2016. Understory response to varying fire return intervals in an old-growth ponderosa pine forest. Poster Presentation, Northwest Scientific Assc. 87th Annual Meeting, Oregon State Univ. Cascade Campus, Bend, OR.

Riparian Scorecard Monitoring plot reports for the Fremont-Winema and Ochoco NFs.

Northwest Oregon

Acker, S.A., J. Kertis, and R.J. Pabst. 2017. Tree regeneration, understory development, and biomass dynamics following wildfire in a mountain hemlock (*Tsuga mertensiana*) forest. Forest Ecology and Management 384: 72–82. http://dx.doi.org/10.1016/j.foreco.2016.09.047

Rochefort, R.M., M.M. Bivin, L. Conquest, S.A. Acker, and L. Kurth. 2016. Exotic plant inventories in Mount Rainier, North Cascades, and Olympic National Parks. Natural Resource Report NPS/NCCN/NRR—2016/1279. National Park Service, Fort Collins, Colorado.

Spies, T, P. Hessburg, C. Skinner, K. Puettmann, M. Reilly, R.J. Davis, J. Kertis, J. Long. 2016 (in review). Old growth, disturbance, forest succession and management in the area of the Northwest Forest Plan. In: Synthesis of Science to Inform Land Management within the Northwest Forest Plan Area: PNWGTR

Regional Office

Deal, R., L. Fong, and E. Phelps, tech. eds. 2017. Integrating ecosystem services into national Forest Service policy and operations. Gen. Tech. Rep. PNW-GTR-943. Portland, OR: USDA For. Serv., Pac. Northwest Res. Sta., 87 pp.

DeMeo, T., R. Haugo., C. Ringo, J. Kertis, S. Acker, M. Simpson, and M. Stern. In review. Refining our understanding of forest structural restoration needs in the Pacific Northwest, USA, 31 pp.

Ecosystem Services

The Region 6 Ecosystem Services Program is based in the Ecology Program and jointly funded with State and Private Forestry, the Region 6 Climate Change Program, and the PNW Research Station. Examples of work related to each deputy area are provided below.

Applying Ecosystem Services to Support Landscape Scale Planning in the Rogue Basin: Supporting interdisciplinary teams to integrate ecosystem services into NEPA processes, including "pre-NEPA" assessments, development of Purpose and Need statements and design of management actions needed to support interdisciplinary goals. Projects include oak and habitat restoration on the Gold Beach Ranger District (Shasta Agness Project) and cross-jurisdictional restoration in the Applegate Adaptive Management Area, in partnership with the Medford District BLM and private landowners. Designed and implemented workshops to highlight connections between landscape conditions, goods and services provided by planning areas, and management needed to sustain functions that meet ecological, economic and social goals.

Support for Resource Planning and Monitoring: This was a collaboration among the regional social scientist to address socio-economic components of Northwest Forest Plan monitoring, as well as social and economic sustainability under the 2012 Planning Rule. It was completed with help from the Washington Office Ecosystem Management Coordination staff in developing technical bulletins on integrating ecosystem services into tradeoff analysis during forest plan revisions.

Climate Change Vulnerability Assessments: Led the ecosystem services team for two vulnerability assessments (South Central Oregon and Southwest Washington Adaptation Partnerships). Presented at forest-level workshops and completed assessment chapters.

Watershed Investment Partnerships: Member of the McKenzie Collaborative convened by Eugene Water and Electric Board and the Willamette National Forest to address management of the McKenzie watershed, which provides Eugene's drinking water. The collaborative is taking an All Lands approach to sustain function on public and private lands in the McKenzie. Worked to develop the Pure Water Partners project, a voluntary incentive program for private landowners to promote protection and restoration of high quality riparian areas. The collaborative is also developing stewardship contracting opportunities on the Willamette National Forest to sustain the resilience of the McKenzie headwaters and generate retained receipts for the Pure Water Partners fund. Completed pilot phase and are applying lessons learned to implementation in 2017.

National Ecosystem Services Strategy Team: Member of a core team established by the Associate Deputy Chiefs to develop cohesive national strategy, policy and implementation plans for ecosystem services

programs across Forest Service deputy areas. Co-author of a GTR identifying opportunities and needs for integrating ecosystem services into USFS programs and operations (in press at the PNW Research Station, expected release by January, 2017).

Support to Planning

Through the other "pillars" of monitoring and landscape assessment, ecologists play a significant role in supporting National Forest planning teams. For example, at the Regional Office, Tom DeMeo assisted with the reorganization of the Colville and Okanogan-Wenatchee Forest Plans, in cooperation with analyst Max Wahlberg and others. He is also working with the Eastside Screens issue, serving on a team exploring options for its revision. Nikola Smith has worked to integrate ecosystem services into the Northwest Plan revision process as well as landscape planning for the Rogue Basin.

Other support from the Ecology Program includes:

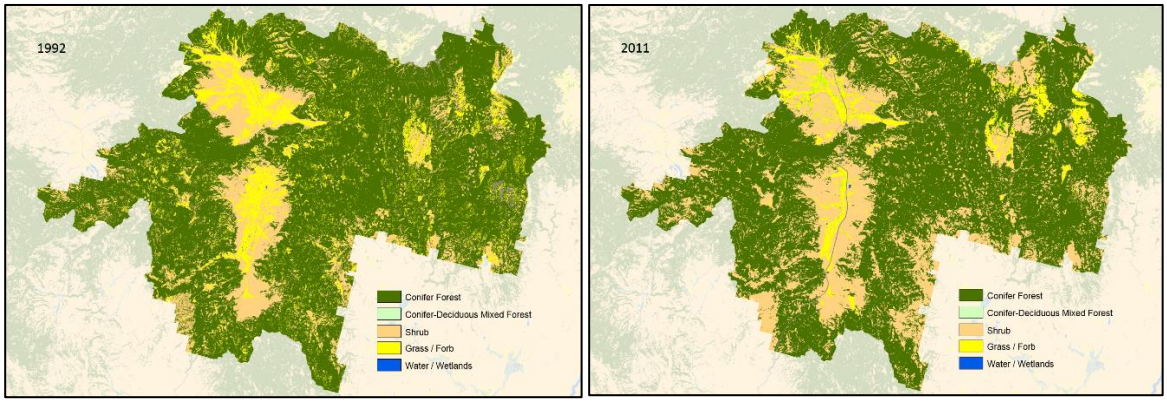
- The Western Washington Area Ecology group assisted planners through landscape assessments that inform broad-scale restoration strategies. Late-successional reserve and early seral habitat management are of particular interest. They also reviewed monitoring program for three Region 6 projects as part of a Washington Office Collaborative Forest Landscape Restoration Program (CFLRP) Review Team and contributed to Forest Plan Monitoring Transition to the 2012 planning rule on the MBS and GP.
- The Northeast Oregon Ecology Area developed a technical proposal, secured funding, and completed a tool for mapping and quantifying the landscape patterns of any area of interest. The Landscape Pattern Tool allows for detailed measurement of landscape changes over time using remotely sensed and field plot data. A follow-on proposal is currently underway to make the Landscape Pattern Tool widely accessible to nontechnical users in collaboratives as well as users worldwide through Google App Engine. In addition, NE Oregon ecologists continued to support the ongoing Blue Mountain Forest Plan revision by writing the landscape pattern section and providing analysis on the range of variability of early seral forest habitat (post high severity fire).
- Northeast Oregon Area Ecology worked to obtain 2014 Farm Bill Categorical Exclusion Areas status for 3 National Forests. These ecologists performed spatial analyses, drafted the CE application document, and shepherded the application through each NF and to the RO for signature by Chief Tidwell.
- The Central Oregon Area Ecology team participated in discussions and data analysis for the Deschutes and Lakeview Collaborative Forest Landscape Restoration Programs and Ochoco Forest Restoration Collaborative.
- Central Oregon Ecologists developed forest vegetation data layers derived from LiDAR remote sensing data. The data layers are currently being utilized by specialists on the Deschutes, Fremont-Winema, and Ochoco National Forests for analysis of departure from reference conditions in landscape assessments, initial stand diagnosis and prioritization in project planning, and to map areas where Category B Survey and Manage surveys are required by the Northwest Forest Plan.
- Southwest Oregon Area Ecology works with local collaborative groups on landscape restoration projects through participation on project IDTs, such as Stella, Shasta-Agness, Kimball Thin, Elk, Skillem, Quartz, North Layng, Calapooya Divide, and Calf-Copeland.

Partnerships

Collaborative Forest Landscape Restoration Program (CFLRP) Support

An important feature of FY16 Budget and Program Direction for R6 Ecology was providing support for the CFLRPs. Our Area Ecologists are uniquely suited to support the science and information needs of this national program.

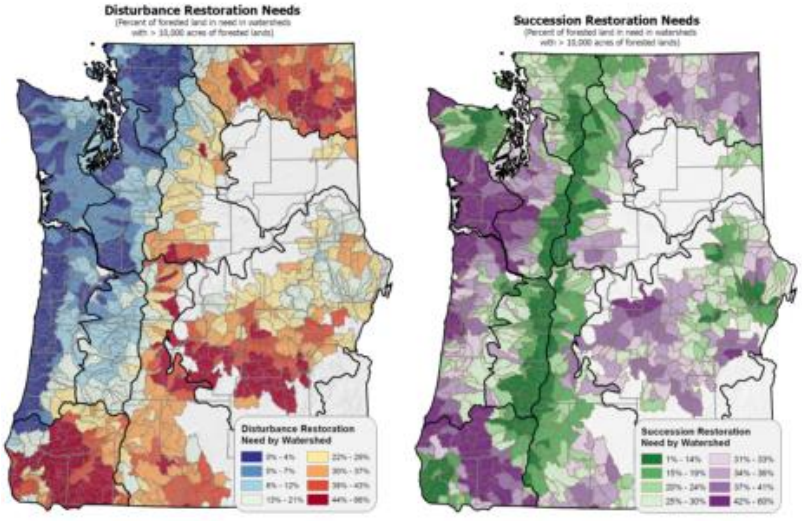
The Blue Mountains Ecology Area provided support to the **Southern Blues CFLRP**. A key accomplishment in FY16 was the development of a tool for collaborative measuring, monitoring, and gauging changes in landscape patterns.



Southern Blues landscape patterns of 1992 and 2011 show large reductions in grasslands and significant expansion of forests and shrublands. But exactly where and in what way have the patterns, and therefore the habitats, of this landscape changed? How can those changes be measured from one time period to another? How can collaborators tell if their efforts are achieving their desired landscape patterns? This activity developed an app that can be used by non-technical citizens to answer these questions for their area of interest.

The Nature Conservancy

The Ecology Program continues to maintain a strong partnership with **The Nature Conservancy**. Their organization offers complimentary capabilities for getting important Regional work done, such as collaborating with the Joint Fire Science Program's Fire Learning Network, CFLRP monitoring, and assessing our landscapes to determine forest structural restoration needs for the Region. This work has shaped the eastside restoration effort and will likely be a key component of Westside restoration planning as well.



Stakeholder/Collaborative Support

Strong relationships with stakeholders will be key to the success of R6 in the future, as financial resources become more scarce and management challenges more complex.

The Western Washington and Northwest Oregon Ecology groups worked with the **Pinchot Partners** collaborative group to develop a literature review on the ecology and management of big huckleberry, a geodatabase of past and ongoing huckleberry enhancement projects on Mt. Baker-Snoqualmie, Gifford Pinchot, Mt. Hood, and Willamette National Forests, and a huckleberry restoration strategy for the Gifford Pinchot National Forest. This project was funded by a grant received from the **Weyerhaeuser Family Foundation.** Additional funds were procured for 2017 to validate habitat suitability work completed by the **Cowlitz Tribe** and to begin a long term monitoring program with the help of **Cascade Forest Conservancy**.

The Northwest Oregon Ecology Group has been working with the **Oregon Dunes Restoration Collaborative** to develop a strategy for restoring dunes ecosystems. They have also been working with the **South Willamette Forest Collaborative** on restoring mixed conifer forest landscapes.

Partnerships with other Science Providers

Meadow restoration with University of Washington.

The R6 Ecology Program supports a Science Liaison, Cheryl Friesen, part time to help promote strong relationships between the NFS Ecologists and **scientists with universities, state, other federal agencies, and non-profit organizations**. Through these relationships, we will be able to assemble human and financial resources to compound our accomplishments. In FY16, we made deliberate efforts to identify shared interests with the **PNW Research Station** by participating in their Program Reviews. The Reviews have led to several fruitful collaborations, including a forum to share skills related to restoration modeling held in Portland. We also had several PNW scientists talk at the yearly Ecology Program meeting, highlighting information knowns (and unknowns) related to riparian management. We also have on-going relationships with **Oregon State University, University of Oregon, Washington State University, and University of Washington**.

Region 6 Ecology

Region 6 ecologists at the Buckhorn Overlook in the Hells Canyon National Recreation Area.

Front row (left to right): Pat Hochhalter, Jessica Hudec, Jane Kertis, Amy Nathanson, Upekala Wijayratne, Sabine Mellmann-Brown, Kathleen Ward (Natural Resources Staff Officer, Colville NF), Michael Jennings

Back row: Nikola Smith, Shawn Mork (Range Management Specialist, Wallowa-Whitman NF), Kevin James, Mike Simpson, Claire Addis, Cheryl Friesen (Science Liaison), Elizabeth Johnson, James Dickinson, Steve Acker, Tom DeMeo, Jerry Hustafa (Botanist, Wallowa-Whitman NF), Gregg Riegel

Photo courtesy of Ellen Morris Bishop, Nature's Light Photographics, Joseph, Oregon.

Western Washington Ecology Program (Area 1)

Gifford Pinchot, Mount Baker-Snoqualmie, and Olympic National Forests

Program Priorities

- Acquisition and compilation of legacy ecology plot data for a variety of potential uses including fine-scale landscape patch delineation and LiDAR validation.
- Support to planning through landscape assessments that inform broad-scale restoration strategies. Late-successional reserve and early seral habitat management are of particular interest.
- Habitat suitability analyses, literature syntheses, and management strategies for special forest products including huckleberry, salal, and beargrass.
- Inventory and management of fringe species and special habitats including chinquapin, oak savannahs and woodlands, whitebark pine, meadows, balds, and wetlands.
- Information transfer through plant association trainings, climate change education, presentations, and white papers on special topics of interest.

Area 1 Ecology Program Team

Jessica Hudec

Kevin James

Susan Piper

Accomplishments

- Collaborated internally and externally with forest Program Managers, PNW Research Stations, and Wenatchee Forestry Sciences Lab on landscape assessment and decision support systems.
- Conducted forest structure patch analysis for MBS and OLY to help guide Forest Leadership discussion of landscape scale restoration and resiliency.
- Drafted subwatershed-scale integrated analysis for determining restoration prioritization as part of the forest-wide MBS Restoration Strategy.
- Hosted first plant association training on the OLY since the 1990s. Resource specialists reviewed indicator plants and guidebooks while discussing management issues including timber harvest, forage creation, and climate change.

Ecologist Kevin James helps a timber employee work through the plant association guide at a training in the Wynoochee Watershed on the Olympic National Forest in July 2016.

- Partnered with Conservation Northwest to conduct a down-scaled climate change analysis of MBS roads systems for two travel management EAs.
- Led GP South Zone interdisciplinary team and South Gifford Pinchot Collaborative Group through landscape assessment and treatment prioritization process for a vegetation management project.

Continued from previous page

- Worked with Pinchot Partners collaborative group to begin a huckleberry management strategy for the GP, write a huckleberry ecology and management literature review, and compile a huckleberry treatment geodatabase for Western Washington and Northwest Oregon.
- Developed a monitoring plan with Cascade Forest Conservancy and Cowlitz tribe to assess huckleberry restoration effectiveness and inform management.
- Reviewed monitoring program for three Region 6 projects as part of a Washington Office Collaborative Forest Landscape Restoration Program (CFLRP) Review Team and contributed to Forest Plan Monitoring Transition to the 2012 planning rule on the MBS and GP.

*Pine siskin (*Spinus pinus*) feeds on a thriving* Agastache *plant one year after the 2015 Cougar Creek Fire. Observed August 2016.*

- Served as Climate Change Coordinators on the GP and MBS and facilitated completion of the Climate Change Scorecard.
- Presented a webinar on climate change concepts and results of Southwest Washington climate change vulnerability assessment to interested Forest Service personnel, partners, and the public.
- Co-led Southwest Washington climate change adaptation workshop with PNW Research Station and University of Washington. Shared vulnerability assessment results and discussed adaptation options with resource specialists from Forest Service, WA-DNR, WDFW, and Yakama Nation; local collaborative group members; and the public.
- Acquired legacy ecology monitoring data for MBS and OLY for archival purposes.

Products, Papers, & Publications

Halofsky, J.E.; D.L Peterson, J.J. Ho, J. Hudec. In preparation. Climate change vulnerability and adaptation in southwestern Washington. PNW-GTR-xxx. Portland, OR: USDA, Forest Service, Pacific Northwest Research Station. xxx p.

Hudec, J. 2016. Mixed conifer forests of the Gifford Pinchot. Unpublished white paper.

Hudec, J. 2016. Multi-agency land management and emergency response: Cougar Creek Fire. Presentation at Columbia River Gorge Science Conference hosted by Yakama Nation Fisheries.

James, K. 2016. Landscape restoration framework. Presentation to MBS Forest Leadership Team and Regional Office staff.

Responding to Future Needs

Landscape Assessment- Continue to evaluate landscapes at multiple scales to help prioritize restoration needs and inform management of late successional reserves, early seral forests, and special forest products.

Monitoring- Continue database development to store and disseminate legacy ecology plot data for multiple applications. Participate in post-fire, special forest product, and climate change monitoring efforts.

Tech Transfer- Offer additional plant association trainings across the area and encourage the use of plant associations and other Ecology core products in management.

Climate Change- Complete publication of Southwest Washington Climate Change Vulnerability Assessment. Use vulnerability assessment results for all forests in adaptation planning.

Collaboration- Continue working with research stations on landscape evaluation and climate change projects. Offer ecological context to management discussions with planning teams and collaborative groups.

Eastern Washington Ecology Program (Area 2)

Okanogan Wenatchee and Colville National Forests

Program Priorities

The Eastern Washington Area of the Region 6 Ecology Program position was successfully filled in March of this fiscal year. This position has been vacant for nearly 3 years and was previously only a partial appointment for a botany and range program lead. The OWF and COL forests agreed that a full time landscape ecologist was needed and selected a candidate to be stationed in Wenatchee. The incumbent has successfully integrated into both forests and is continuing to forge relationships and projects with both forests.

The priorities for 2016:

1. Establish relationships across both National Forests.
2. Establish the role of landscape ecology within the Easter Washington Area.
3. Develop projects to demonstrate the role of landscape ecology in disturbance prone ecosystems.
4. Identify opportunities to support ongoing management projects.
5. Create research and management partnerships to address new issues.

Area 2 Ecology Program Team

James Dickinson, Landscape Ecologist

Monique Wynecoop, Fire Ecologist

Accomplishments

Landscape ecology is focused on the study of processes interacting at multiple spatial scales. Working with the OWF to explore the importance of these considerations, a strategic analysis and prioritization was conducted across 255 subwatersheds providing the context for the relative importance of individual planning efforts across the seven districts. The strategic analysis used the Ecosystem Management Decision Support software to simultaneously consider social, economic, ecologic restoration (aquatic and terrestrial habitats) needs, disturbance (fire, hydrologic, and insect and disease vulnerabilities), and restoration feasibility. This strategic view of the OWF then can be used to schedule implement individual landscape evaluations for use in environmental analyses.

The Area Ecologist led the analysis effort for one such project area on the Wenatchee River Ranger District which has resulted in a new approach to planning on the district. This report provides the landscape context for restoration work. Both aquatic and terrestrial ecosystem restoration activities can now be addressed to create functional conditions at both the restoration site and across the landscape, helping to create the resilience needed in these landscapes.

Considerable support was provided to develop an aquatics analysis that is relevant at both the landscape and the reach scale assessments for restoration activity. The Area Ecologist provided analytical support and logical development of this analysis method in order to support the integration of terrestrial and aquatic ecosystems which is needed in forest restoration projects. Further effort is being conducted to continue to refine this to be more relevant and more integrated for future projects on the OWF.

The OWF is an anomaly compared to the other Northwest Forest Plan forests because the OWF has a considerable amount of wildland fire on an annual basis and has had a considerable amount of late successional forest and spotted owl

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habitat degraded as a result. James Dickinson has worked closely with the wildlife program to work through an update to the Late Successional Reserve Assessment. This is in the final stages and will provide a crosswalk between the NWFP, the USFW Northern Spotted Owl Recovery Plan, and the OWF Restoration strategy in lieu of a revision to the OWF Forest Plan.

Developing new science and new methods is a critical need in the Eastern Washington Area. The Area Ecologist has been collaborating with the PNW-Wenatchee, University of Washington, and Forest Health Protection on several projects. A Joint Fire Science Program funded project is ongoing to test whether the historical mosaic of fire footprints, now absent due to fire suppression, would have more directly retarded the footprint of contemporary large fires (e.g. the Tripod fire). Furthermore, this project is seeking to learn from managers whether these historical mosaics (presumably with lower fire risk of large fires) would allow for more tolerance to letting wildfires burn and continue the hypothesized pattern of self-regulation.

An ongoing collaboration with FHP is identifying the mechanisms of decay in fire killed stands of the Carlton Complex. Interestingly, this project is identifying both the opportunities to understand the lost economics of salvage as well as the role of decay in snags, fuels, and gap formation. The latter opportunity is being explored for outyear funding and data collection. Working with FHP has also resulted in a project to identify the survivorship of apparently dead (100% scorched) trees that have actually produced green foliage after the 2015 fires. This study has the potential to provide insight into the formation, role, and longevity of legacy trees in landscape scale fires. These 2015 fires are also being studied to understand the role and development of patches in landscapes that are prone to fire.

These collaborations are critical for the Area Ecology program to integrate and develop larger impacts and understandings of our landscapes, but the information is only useful if it can be shared. Some technology transfer has already been happening in the EW Area. The use of the Interior Columbia Basin science, as implemented by the OWF has been introduced with both the Warm Springs Indian Reservation (located in north central OR) and the Blackfoot-Swan Lake Restoration Project in Region 1. James has been actively supporting transfer of lessons learned, techniques, and tools to make these collaborators successful. The Area Ecologist has been working with FHP, to test the utility of the ForeWarn remote sensing product out of the Eastern Forest Threat Assessment Center for near real-time identification of insect outbreak movement. Finally, EW Area had the opportunity to host the Joint Fire Sciences advisory committee to share local fire ecology and management issues. This 2 day field and office visit allowed the opportunity to advance the issues that could be addressed in future JFSP research funding to expand our understanding of the area.

Products, Papers, Publications

Manastash-Taneum Resilient Landscapes Project: Landscape Evaluations and Prescriptions

Lower Chiwawa Big Meadow Restoration Project: Landscape Evaluations and Prescriptions

Okanogan Wenatchee National Forest Strategic Prioritization

Responding to Future Needs

Restoring the resilience on our federal lands is a national priority. Increasing scale and pace is irrelevant if the restoration actions do not create resilience to disturbances. Resilience exists at different scales and so too do the requirements for management actions at each scale. A variety of disturbances, ecosystems, habitats, and social environments creates opportunity to learn and adapt.

The Eastern Washington Area is well positioned geographically to explore these relationships and identify the role(s) that active management can play in restoration.

The Eastern Washington Area is working with the Western Washington Area to identify and address common issues and approaches to restoring resilience on the National Forests of Washington. A common framework across Washington will strengthen regional efforts, and ensure local management is backed with the best science and policy.

Northeast Oregon Ecology Program (Area 3)

Malheur, Umatilla and Wallowa-Whitman National Forests

Program Priorities

The NE Oregon Ecology Team meets annually with all natural resource staff officers and other natural resource specialists to discuss program priorities, response to assistance requests from forest units and the annual program of work.

In 2016, we adjusted our workload mid-year after Gunnar Carnwath moved to a fulltime Forest Plan Revision position in Montana. We continued long-term vegetation and habitat monitoring, provided field visit support to specialists and managed ecology legacy data. In addition, we worked on the following program priorities:

- Support the Forest Plan Revision Team with analysis products and expert knowledge as requested by our Forest Supervisors.
- Support Collaborative Forest Landscape Restoration (CFLR) on the Malheur National Forest with monitoring and tool development
- Provide assistance to Interdisciplinary Teams for Allotment Management Plan Revisions.
- Support riparian management efforts by providing expert knowledge to forest collaboratives and initiating a literature review and white paper on selected riparian management questions.

Area 3 Ecology Program Team

Sabine Mellmann-Brown, PhD

Michael Jennings, PhD

Upekala Wijayratne, PhD

Vice Carnwath - vacant

Accomplishments

- Supported the Blue Mountains Forest Plan Revision with Natural Range of Variation analysis of early seral forest habitat (after high severity fire) to guide salvage timber sales. Wrote section on landscape pattern and collaborated on riparian and rangeland desired condition sections.
- Worked with 3 National Forests to identify and justify 2014 Farm Bill Categorical Exclusion Areas: performed spatial analyses, drafted the Categorical Exclusion document, and shepherded the application to the Regional Office.
- Secured funding and organized training on implementing ICO (Individuals, clumps and openings) prescriptions. Silviculturists, wildlife biologists and marking crews used newly developed app to map and analyze tree patterning while marking stands.
- Developed a technical proposal, secured funding, and completed a quantitative tool for collaborative monitoring and management of landscape patterns. The Landscape Pattern Tool can be applied in any area of interest and allows for detailed measurement of landscape changes over time using remotely sensed and field plot data.
- Organized one-day session on riparian management as part of the annual regional Ecology Program meeting.

Region 6 Ecologists analyzing the Hells Canyon landscape

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- Collaborated with Blue Mountain Ranger District (Malheur NF) on meadow and riparian restoration. Accomplished pre-treatment monitoring of riparian areas in East Fork Big Creek Creek to address NEPA requirements (funded by CFLRP monitoring budget).
- Assisted Malheur NF interdisciplinary team with analysis of existing vegetation and potential forage production. Wrote sections of specialist report for Allotment Management Plan revision.
- Remeasured vegetation plots in legacy rangeland exclosures to understand reference conditions and the effects of livestock on biological soil crust.
- Accomplished 6th and final year of data collection for white headed woodpecker (Management Indicator Species). Data support regional habitat occupancy modelling and are delivered to local wildlife specialists for use in NEPA documents.
- Particpated in research on the efficency of a pheromone in repelling mountain pine beetle from whitebark pine.
- Initiated literature review and synthesis regarding management of riparian corridors to assist with collaborative process and consultation. Modeling the relationship between forest stand structure and snowpack duration under climate change.
- Served as Climate Change Coordinator on the Wallowa-Whitman NF.
- Continued to provide clients with *Walter Climate Diagrams* for particular areas of interest. Diagrams show month-by-month current and expected future changes in seasonal climate.
- Continued to provide technical assistance, vegetation data and geospatial analytical products to natural resources specialists, leadership teams and collaboratives on all three forests.

Products, Papers, Publications

Carnwath, G.C. and C.R. Nelson. 2016. The effect of competition on responses to drought and interannual climate variability of a dominant conifer tree of western North America. Journal of Ecology: 1421-1431.

Dwire, K.A., S. Mellmann-Brown and J.T. Gurrieri. 2017 – in review. Potential effects of climate change on riparian areas, wetlands and groundwater-dependent ecosystems in the Blue Mountains, Oregon, USA. Submitted to Climate Services.

Jennings, M.D., and G.M. Harris. 2016. Climate change and ecosystem composition across large landscapes. Landscape Ecology: 1-13.

Kerns, B.K. D.C. Powell, S. Mellmann-Brown, G. Carnwath, J. Kim. 2017 – in review. Effects of climate change on vegetation in the Blue Mountains, Oregon, USA. Submitted to Climate Services.

Mellmann-Brown, S., U.C. Wijayratne and J.H. Rausch. 2016. Monitoring the effects of riparian restoration treatments. Presentation, Society for Ecological Restoration Regional Conference: Monitoring ecological restoration – Measuring change and seeing results. April 4-8, 2016, Portland, OR.

Responding to Future Needs

Riparian management continues to be a major challenge for all three forests. It remains our long-term vision to develop spatial explicit future desired conditions within riparian valley bottoms and describe appropriate management actions.

In the more immediate future we intend to

- Advance riparian management consensus by providing a science review to assist with project planning and testing the efficiency and cost of using unmanned aviation systems to monitor riparian livestock use
- Develop a process to evaluate existing ecological conditions of riparian corridors
- Finalize analysis and report on effects of ungulates on biological soil crust in semi-arid grasslands
- Continue to develop tools for technical and non-technical users and explore the use of novel data collection procedures and technologies.

Central and South Central Oregon Ecology Program (Area 4)

Deschutes, Fremont-Winema, and Ochoco National Forests
Crooked River National Grasslands

Program Priorities

The Central and South Central Area Ecology Team met priorities for 2016 which included several long-term projects:

- Climate Change Vulnerability Assessments for the Deschutes and Ochoco, and Fremont-Winema NFs.
- Provide riparian and meadow ecological expertise, conduct monitoring of ecological status attributes for Rangeland Allotment Management Plan renewal NEPA process. Produce analyzed data and interpretation for livestock grazing lawsuit defense.
- Develop understory and fuel profile development models for Central Oregon ponderosa pine forests to assist restoration and fuel treatment planning through our Alternative Fuel Treatment and the Repeated Fire Return Interval Administrative Studies.
- Provide program support to Region, Forest, and Ranger Districts as requested.
- Training and Mentoring.

Area 4 Ecology Program Team

Gregg Riegel, PhD
Elizabeth Johnson
Mike Simpson
Claire Addis
Sara Lovtang

Cooperators

Steve Gibson
Ben Goodin
Christina Veverka
Joe Washington

Accomplishments

- Completed 6th and final year of White Headed Woodpecker (Management Indicator Species/Sensitive Species) population and habitat monitoring. Data supports regional habitat occupancy modelling and are delivered to local wildlife specialists for use in NEPA documents.
- Re-measured riparian effectiveness monitoring plots on the Fremont-Winema and Ochoco NFs.
- Re-measured Alternative Fuels Treatments study plots. This long term study began in 2001 and covers the Deschutes, Fremont-Winema and Modoc NFs. Treatments include prescribed fire, prescribed mowing, thinning followed by prescribed fire, and untreated control.
- Used LiDAR remote sensing data to analyze laminated root rot pockets and bark beetle risk to large legacy ponderosa pines within the Walton Lake Forest Health & Safety Project, Ochoco NF.
- Continued work on Region-wide Potential Natural Vegetation (PNV) mapping. Utilized the 1984-2012 GNN Time Series datasets to improve existing draft versions of PNV.
- Landscape Assessment for the East Hills project on the Fremont-Winema NF.

Photo: Field review of draft Ecological Site Descriptions, CRNG

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- Partnered with Western Wildlands Environmental Threat Assessment Center (WWETAC) to complete database of characteristics of terrestrial invasive plants for "risk assessment"
- Participated in discussions and data analysis for the Deschutes and Lakeview Collaborative Forest Landscape Restoration Programs and Ochoco Forest Restoration Collaborative.
- Data Management: 1) Continued work on vegetation datasets for Forest Plan revision; 2) catalogued and processed Fremont-Winema NF legacy riparian monitoring data and GIS files.
- District Ecologist 120 Day Detail, Elizabeth. Johnson, Sisters RD.
- Cooperator Joe Washington, Fremont-Winema Botany and Invasive Plant Manager:
    - Hosted a conference to discuss whitebark pine (WBP) strategies for assessing current stand conditions to recognize and prioritize potential restoration treatments.
    - Secured Interagency Special Status/Sensitive Species Program (ISSSSP) funding for:
        - NEPA for proposed treatments in stands of WPB/lodgepole pine that are heavily affected by mountain pine beetle.
        - Monitoring WBP response to Accelerated Landscape Restoration treatments.
- Cadre Instructor: Implementing Indicators of Rangeland Health. Reno, NV; Billings, MT.
- Cadre Instructors: Rx 310 Fire Effects Flora and Weeds modules, PNW Training Center.
- Faculty Instructor: Fire Ecology and Effects, Central Oregon Community College, Spring 2016.
- Meeting Program Chair and Host: *Living on the Edge of Change: Exploring the Dimensions of Restoring Fire Resilient Landscapes, Culture, & Economies on the Cascade Range's Eastside*. Northwest Scientific Assc. 87TH Annual Meeting.
- Mentoring Fremont-Winema NF South Zone Silviculturist.
- Riparian Ecological Type and Scorecard Interagency Training, Lakeview, August 3-4.

PRODUCTS, PAPERS, PUBLICATIONS

Dwire, K.A., K.E. Meyer, G. Riegel, and T. Burton. 2016. Riparian fuel treatments in the western USA: Challenges and considerations. Gen. Tech. Rep. RMRS-GTR-352. Ft. Collins, CO: U.S.D.A, Forest Service, Rocky Mountain Research Station. 156 p.

Hessburg, P.F., T.A. Spies, D.A. Perry, C.N. Skinner, A.H. Taylor, P.M. Brown, S.L. Stephens, A.J. Larson, D.J. Churchill, N.A. Povak, P.H. Singleton, B. McComb, W. J. Zielinski, B.M. Collins, R.B. Salter, J. J. Keane, J.F. Franklin, and G. Riegel. 2016. Tamm Review: Management of mixed-severity fire regime forests in Oregon, Washington, and Northern California. Forest Ecology and Management 366: 221–250.

Johnson, E.J and G.M. Riegel. 2016 Report: Effects of Fuel Treatment Alternatives on Bitterbrush Population Dynamics and Understory Composition along the Eastern Slopes of the Cascade Range of Oregon and California. Unpub. Rpt.

Johnson, E.J., G.M. Riegel, and S.C. Lovtang. 2016. Understory response to varying fire return intervals in an old-growth ponderosa pine forest. Poster Presentation, Northwest Scientific Assc. 87th Annual Meeting, Oregon State Univ. Cascade Campus, Bend, OR.

Riparian Scorecard Monitoring plot reports for the Fremont-Winema and Ochoco NFs.

Responding to Future Needs

Long-term fire effects monitoring and administrative studies examining the effects of various fuels treatments and historic return intervals.

Effectiveness monitoring of livestock grazing on rangeland and riparian vegetation. Discerning grazing effects from hydrologic flux is key to understanding management induced change.

Assistance with developing management strategies to address invasive annual grass concerns.

Assistance with Ecological Site Descriptions for the Crooked River National Grassland (CRNG).

ID Team member and analyst support for the Ochoco NF Big Summit Wild Horse EIS and Management Plan.

Support Districts on project-level NEPA.

Southwest Oregon Ecology Program (Area 5)

Rogue River-Siskiyou and Umpqua National Forests

Program Priorities

The Southwest Oregon Ecology Program is integrated with the Rogue River-Siskiyou and Umpqua NFs, as well as local collaboratives, to provide landscape-level and historic/future perspectives on current and future projects. Contributions include short, medium, and long-term data collection projects, as well as vegetation mapping projects and assistance with education and acquisition of newer technology, such as LiDAR.

- Continue to work with local collaborative groups on landscape restoration projects through participation on project IDTs, such as Stella, Shasta-Agness, Kimball Thin, Elk, Skillem, Quartz, North Layng, Calapooya Divide, and Calf-Copeland.
- DecAID downwood and snag analysis for the Rogue River-Siskiyou NF.
- Climate Change Vulnerability Assessments for both the Rogue River-Siskiyou and Umpqua NFs – start the process in FY17, before the start of Forest Plan revision for both forests.
- Assist with the new Region Six Potential Natural Vegetation (PNV) map.
- Continue data stewardship for ecology legacy data, including the Fred Hall legacy photos and the Ecology Program permanent plot database.

Area 5 Ecology Program Team

Bill Kuhn (starts January 2017)

Patricia Hochhalter

Amy Nathanson

Accomplishments

- Continued to help develop the purpose and need for the Calf-Copeland restoration project on the Umpqua National Forest. This project will have multiple restoration objectives including sugar and ponderosa pine resilience, and ecosystem resilience for fire disturbance in northern spotted owl habitat. The Umpqua is working with a local collaborative, Umpqua Forestry Coalition (UFC), which represents a broad range of views from environmentalists, timber industry advocates, and members of the public. South Umpqua Rural Community Partnership (SURCP), another local collaborative group, is also participating in project discussions. Most of this year's work has involved participating in field trips and community discussion.
- Served as the climate change coordinators for the Rogue River-Siskiyou and Umpqua NFs. Responsible for Elements 1-9 of the Climate Change Scorecard. Also responsible for completing the scorecard for the Boise NF in Region 4 during a detail assignment. Wrote the Climate Change section for all NEPA documents for the Umpqua NF, and responded to Climate Change comments. Continued working with specialists and leadership from both forests, as well as Regional Climate Change Coordinator Becky Gravenmier and scientists from PNW Research to lay the groundwork for a Climate Change Vulnerability Assessment for the Umpqua and Rogue River-Siskiyou NFs.
- Klamath Siskiyou Management/Climate Change modeling with Region 5 – Assist with others from the Klamath-Siskiyou region to assess and improve the multiple alternative scenarios for future forest management, with the hope to have refined the management actions in the scenarios and ensure the scenarios are meaningful to managers in the area.

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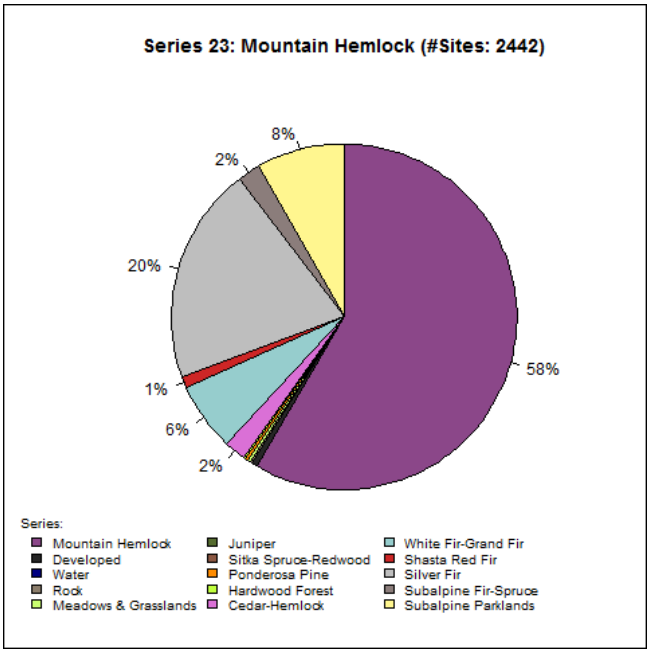

Example of PNV map accuracy assessment for the mountain hemlock series. Fifty-eight percent of the ecology plots with a series call of mountain hemlock were mapped as mountain hemlock.

- Assisted in acquiring additional LiDAR data for the Umpqua and Rogue River-Siskiyou NFs. Worked with Regional Biometrician to write a grant to fund vegetation plots in the 2015 LiDAR flight areas, to provide additional vegetation metrics. A companion grant request was also submitted for the Willamette NF. Grants were part of the Federal Forest Health (FFH) Program in the Oregon Department of Forestry (ODF) and all were fully funded. Additionally, in 2016, worked with the RO and other forest specialists to acquire LiDAR for the entire Cottage Grove RD, as well as significant parts of the Tiller and North Umpqua RDs.
- Conducted Range Allotment field reviews and monitoring, along with the Range Program Coordinator, along with specialists from Region 5, for the allotments along the Siskiyou Crest. On the IDT for the Applegate Management Plan and allotment monitoring.
- RAP Camp – Resources and People Camp; assisted with the ecology, silviculture, and forest management session for approximately 60 high school aged students. Also worked with the Kids in the Woods program for 30 middle school students from Ruch M.S.
- Continued working with a team of ecologists on the potential natural vegetation mapping project, to create a seamless map of potential vegetation across Region 6. Primary tasks included verifying the series calls using the ecology plot data, an independent data set of approximately 28,000 plots.
- Assisted the Landfire BpS review process for both NW Oregon and SWO models.
- Data management of the Fred Hall legacy data photographs, mostly eastside, organization and photo sequencing.
- Detailed for three months as the Forest Ecologist on the Boise NF in Region 4. Duties included coordinating the effort to write the 2004-2015 Forest Cumulative Monitoring Report, and conducting data analysis for some of the vegetation sections of this document. Served as a member of the Forest IDT, responsible for organizing and facilitating meetings. Served on the BAER team for the 2016 Pioneer Fire, where duties included assisting botanists in determining forest impacts on rare plants, and assisting the team in utilizing Avenza to get spatial data and photographs from tablets and smartphones into ArcGIS geodatabases. Investigated utilizing ArcGIS Online as a tool to share data on proposed BAER treatments. Conducted GIS analyses to help prioritize locations for post-fire restoration efforts. Experiences in this detail have helped improve communication between specialists, and promoted tech transfer for data collection and analysis.

Responding to Future Needs

The SW Oregon Ecology Group will continue to work with staff officers and forest/district specialists to determine data and project needs.

We envision our plan of work as a mixture of direct assistance to the units, technology transfer to forest units and long-term projects. Projects will likely continue to address restoration issues at the landscape scale, as well as in the context of climate change.

Northwest Oregon Ecology Program (Area 6)

Siuslaw, Willamette, Mt. Hood National Forests; Columbia River Gorge NSA

Program Priorities

The Northwest Oregon Ecology Program meets yearly with its working group (natural resource specialists from Forests and BLM units) to discuss ecological issues and develop potential program of work ideas. Ideas are vetted, proposal are written and work is prioritized with the steering committee of Forest Natural Resource staff, Regional Ecologist and BLM representatives.

Program priorities for 2016 included:

- Continuing long-term, landscape projects
- Continuing to facilitate climate change information exchange
- Provide technology transfer
- Assist Forests with high priority issues
- Assist with the completion of the new R6 Potential Natural Vegetation (PNV) map.

Area 6 Ecology Program Team

Jane Kertis

Dr. Steve Acker

Doug Glavich

Accomplishments

Long-term, landscape projects:

- Special habitat mapping/classification: Performed classification of recently collected non-forest data (largely from Coast Range). Completed draft plant community description document. Completed editing special habitat map for Salem BLM area.
- Historical Range of Variability: Adjusted and tested disturbance effects from models, performed initial model runs for pilot west Cascades area. Developed mockups for products to be used in landscape planning.
- Deadwood analysis: Completed and rolled out reports analyzing current and reference conditions of snags and down wood for Mount Hood, Siuslaw, and Willamette NFs. Developed outline and fleshed out sections for comprehensive white paper on dead wood with SIU planning, wildlife and silviculture staff. Participated on Regional team to prepare DecAID website
- Riparian vegetation management tools: Developed conceptual model for riparian classification, refined version for High Cascades ecoregion working with aquatics staff from Willamette and Mount Hood NFs. Worked with DRM on initial GIS analysis of vegetation adjacent to stream network in reference areas (Wilderness and roadless).
- Post-fire vegetation and CWD trajectories: Completed manuscript on tree regeneration and biomass dynamics following Charlton Fire (see Publications). Completed 20 year post-fire measurements of tree regeneration, live trees, snags, down wood, fine fuels, and understory vegetation.
- Climate Change: Completed climate change scorecard for Siuslaw. Completed initial draft NW Oregon Vulnerability Assessment for review. Attended various climate change events (webinars, presentations) and distributed information. Began working with researchers to develop information for upcoming Coast Vulnerability Assessment.

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- Technology Transfer: Partnered with Willamette NF botanists to put on Plant Association Training. 40 participants from five NFs, NW Oregon BLM, and NRCS attended.
- Regional potential vegetation map: Worked with a team to clean and analyze ecology plot data used in Plant Association Guides for validation of the initial version of the series map, as well as developing GIS methods for map validation.

Forest Issues:

- Helped facilitate development of Oregon Dunes Restoration Strategy and formation of the Oregon Dunes Restoration Collaborative. Helped write draft strategy document. Shared information with other practitioners at national conference. Continue to participate in Collaborative activities.
- Partnered with Jessica Hudec, Western Washington Ecology to produce huckleberry annotated bibliography and treatment history geodatabase on the Gifford Pinchot, Mt Hood, and Willamette NFs. Worked with Forest silviculturists, botanists, and other resource staff, and visited Forest offices to gather pertinent information.
- Worked with McKenzie River District Fuels personnel and Regional Biometrician to develop design for monitoring fuels and vegetation for Prescribed Fire in Wilderness project on Willamette National Forest. Established 12 plots and collected pre-burn data in partnership with District, OSU, and Regional Ecology.
- Partnered with Middle Fork District, Willamette National Forest and South Willamette Forest Collaborative to plan series of field trips to Rigdon Landscape Restoration area and begin landscape planning assessment.
- Sampled *Viola adunca* populations across known Oregon silverspot butterfly meadows on the Siuslaw NF to estimate site numbers and determine larvae food source availability.
- Worked with Natural Resources Conservation Service to strategize options for developing Ecological Site Descriptions for Willamette NF vegetation types. Assessed initial plant association and soil type relationships, field checked draft mapping unit distribution.

Products, Papers, Publications

Presentations:

2016 Annual Meeting of the Oregon Chapter American Fisheries Society: "Development of analytical tools for classification and assessment of riparian ecosystems in northwest Oregon"

Northwest Scientific Association 2016 Meeting: "Biomass dynamics and tree regeneration following wildfire in a mountain hemlock (*Tsuga mertensiana*) forest"

North American Pacific Dune Restoration Retreat 2016: "Dunes restoration on the Siuslaw National Forest, Oregon"

Publications:

Acker, S.A., J. Kertis, and R.J. Pabst. 2017. Tree regeneration, understory development, and biomass dynamics following wildfire in a mountain hemlock (*Tsuga mertensiana*) forest. Forest Ecology and Management 384: 72–82. http://dx.doi.org/10.1016/j.foreco.2016.09.047

Rochefort, R. M., M. M. Bivin, L. Conquest, S. A. Acker, and L. Kurth. 2016. Exotic plant inventories in Mount Rainier, North Cascades, and Olympic National Parks. Natural Resource Report NPS/NCCN/NRR—2016/1279. National Park Service, Fort Collins, Colorado.

Spies, T, P. Hessburg, C. Skinner, K. Puettmann, M. Reilly, R.J. Davis, J. Kertis, J. Long. 2016 (in review). Old growth, disturbance, forest succession and management in the area of the Northwest Forest Plan. In: Synthesis of Science to Inform Land Management within the Northwest Forest Plan Area: PNWGTR

Responding to Future Needs

The NW Oregon Ecology group will continue to engage with our working group and steering committee to ensure we deliver timely and relevant products. We will continue to make progress on long term landscape projects such as special habitats, HRV, riparian tools and dead wood analysis. We will assist in Regional products and tools. We will promote applied ecological principles while consulting, partnering and serving our Area and Region.