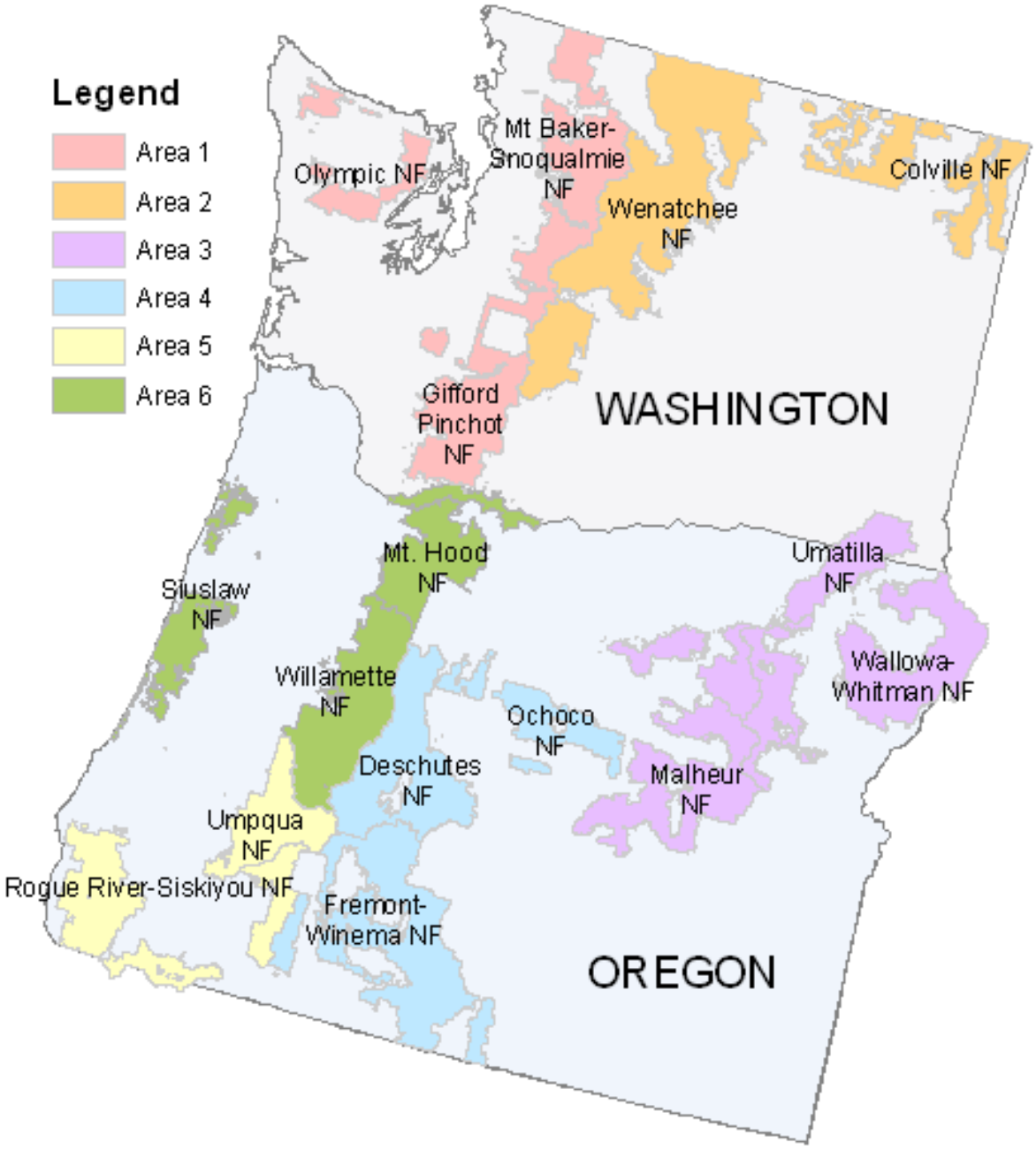
USDA Forest Service
Pacific Northwest Region
Ecology Program 2022 Annual Report
Applying Science to Serve the National Forests

The cover photo frames the extreme far southeast edge of Central Oregon Area Ecology Program's landscape. The view is looking across Oregon-Nevada border SW to the Warner Mountains. The high ridgeline to the left is the Mt. Bidwell area on the Modoc NF (CA), and to the far right, the Bald Hills area on the Fremont-Winema NF (OR). In the foreground is bare ground with erosional water flow patterns and scatted pedestaled perennial grasses amongst the sea of low sagebrush (*Artemisia arbuscula*), fractured basalt with buckwheat (*Eriogonum sp*.) in bloom and scatted western juniper (*Juniperus occidentalis*). The bright green area in middle-right of the photo is a riparian wetland on Horse Creek.

A close-up of the Horse Creek site in the cover photo (referenced above), shows Bruce Slice (BLM Range Specialist) reading a nested frequency plot frame in a *Carex simulata* Ecological Type as Jimmy Leal (Lakeview BLM Field Office Fish Biologist), records data that will be used to assess livestock grazing and climate change effects. The BLM Lakeview District began a partnership with the Central Oregon Area Ecology Program in 2000 to establish riparian ecological type scorecard monitoring plots throughout the District in concert with the Ecology Program's monitoring program on the Fremont-Winema. This plot (FSBLM 114) was established in 2001 and was remeasured on June 29, 2022, when this photo was taken. Jimmy Leal became the Fremont-Winema Natural Resources Staff Officer in August 2022. Photo credit Gregg Riegel.

Contents

Pacific Northwest Region 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 the following core services: landscape assessment, technology transfer, monitoring, mentoring, products (maps, publications, and databases), support to planning, and partnerships. Many of these services support climate change adaptation. The Area 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 into 6 areas. They cover the Region as shown on page 1. Area Ecologists carry out a program of work crafted to each National Forests' needs. The Regional Ecologist, based at the Regional Office in Portland, ensures issues at the regional scale are incorporated into the program.

Ecologists serving the six areas:

Area	Area Name	Ecologists
1	**Western Washington**	Jessica Hudec, Kevin James (with Botany), Vacant (vice Crider)
2	**Eastern Washington**	Kerry Kemp, Monique Wynecoop
3	**Blue Mountains**	Amarina Wuenschel, Christal Johnson, Cameron Naficy (with FHP), Vacant (vice Poage)
4	**Central Oregon**	Gregg Riegel, Cristina Mckernan, Max Wahlberg (with FHP), Associate Range Ecologist (vacant)
5	**Southwest Oregon**	Bill Kuhn, Pat Hochhalter, Devin McMahon
6	**Northwest Oregon**	Upekala Wijayratne, Doug Glavich, Bobette Jones, Cheryl Friesen
RO	**Regional Office**	Tom DeMeo, Skye Greenler (Presidential Management Fellow)

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.

In FY22, at the direction of the Regional Investment Board, the Regional Ecology Program Steering Committee (SC) was formed to exchange information, promote integration, and provide advice and direction to the Program. The SC is led by the Natural Resources Director, and includes the Directors of Resource Planning and Monitoring, Fire and Aviation, and State, Private, and Tribal Forestry, as well as the Assistant Director for Vegetation Management and Ecology. Also included are two Forest Supervisors from the Eastside and two from the Westside, on a rotating basis. (Currently these are the Forest Supervisors for the Wallowa-Whitman, Okanogan-Wenatchee, Olympic, and Siuslaw National Forests.) Finally, the SC includes a representative from the Pacific Northwest Research Station and the Regional Tribal Liaison. The SC met twice during 2022 and plans on meeting at least twice yearly, in the spring and in the fall.

As of FY20, ecologists are fully funded at the regional level, with funding held in a central Regional Office account and drawn on by the Area programs. Ecologists do not count toward Forest-level head count caps. **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.**

Core Services

Climate Change Adaptation

Climate change is among the most pressing, if not the most pressing issue facing the planet, and indeed the National Forest System as well. Ecologists are working closely with the Regional Coordinator, Thomas Timberlake, on applying the information developed in recent years for the vulnerability assessments developed for each National Forest. Many of the Forest climate change coordinators are ecologists from our program. We were pleased to see Thomas join us for our annual meeting of ecologists in Bend in October.

Ecologists, notably Max Wahlberg in Central Oregon, also provide analytical support to climate assessment and modeling. For example, Max serves on the co-production team supporting The Nature Conservancy's Climate Analog Mapping project. Additionally, through our partnership agreement with the University of Washington, we are researching ways to adapt our ecological departure metrics to future landscapes affected by climate change.

Support to Planning (including Postfire Restoration)

Ecologists support the Forest Service planning process at many levels. At the Forest and Area levels, we develop products and analyses, such as the mid-scale vegetation mapping for the Morgan Nesbit project in the Blue Mountains. For the Umatilla NF, ecologists compiled documentation of all treatments as a tool for planning for the year.

At the Forest Planning level, ecologists from Southwest Oregon worked with their counterparts from four National Forests in Northern California on a pre-planning assessment for the Klamath Region. This included use of the new potential vegetation map and our standard departure-mapping approach. Ecologists will also support the Blue Mountains Plan revision effort as it revives.

Southwest Oregon ecologists also are contributing to the Snowy Butte planning effort and the Rogue Basin CFLRP.

Landscape Assessment

Ecology is on the forefront of landscape assessment for post-fire restoration. Recently, Director Dan Shively asked us to develop an integrated landscape planning strategy for the Region's five focal landscapes (Central Washington, Central Oregon, Mt. Hood, Northeast Washington Colville, and Klamath River Basin).

The ecological departure map (Haugo et al. 2015, DeMeo et al. 2018) has become a standard Regional product available for planning terrestrial restoration treatments. This has become updated on an annual basis through our cooperative agreement with Brian Harvey and his staff at the University of Washington. This assessment is also the Region's approach to the ecological departure and wildlife habitat questions of the CFLRP Common Monitoring strategy.

Each iteration of the map is kept dynamic by close attention to updated data layers and methods. The recent move to annually update the Region's gradient nearest neighbor (GNN) layer will facilitate this. Through our partnership with the University of Washington, we are identifying ways the departure map can reflect climate change effects such as drought and moisture deficits during the growing season.

At the Area/Forest level, we are working with the post-fire restoration planning effort for fire-affected landscapes on the Fremont-Winema National Forest. To support this, Max Wahlberg completed a departure analysis for the Bootleg fire footprint.

Amarina Wuenschel, Blue Mountains Area ecologist, is serving as a post-fire research liaison with the Pacific Northwest (PNW) and Pacific Southwest Research Stations. Ecologists are participating in the Westside Fire effort led by the PNW Station.

Kevin James of the Western Washington Ecology Area has been working with the Mt. Baker-Snoqualmie National Forest (MBS) and the Tulalip Tribe on landscape assessment for the Snohomish Basin. MBS is an official partner in this "fire and flood" project along with the Washington DNR, King County and Snohomish County.

We continue to be involved in the landscape work Washington DNR incorporates into its Forest Health strategy. We are working with the Nature Conservancy, the University of Washington, and University of Montana on developing a strategy for assessing and managing future landscapes affected by climate change.

Doug Glavich in the Northwest Oregon Ecology area has been leading the Region in special habitat monitoring. He produced draft maps in Google Earth Engine – 2.5 million acres on the west slope Cascades, covering the Willamette and Mt Hood NFs, 82.3 thousand acres in the Coast Range on the Siuslaw NF and BLM, and 1.4 million acres in the SW Oregon Cascades, covering the Umpqua and RRS NFs. He also field checked maps and collected field data to make map corrections.

In cooperation with hydrology staff, the Blue Mountains Ecology Area, District and Forest staff on the Wallowa-Whitman National Forest, and the Pacific Northwest Research Station, we are providing the terrestrial landscape component for the Meadow Creek Project. Under the leadership of Regional Hydrologist Brian Staab, this project is taking an innovative approach combining the efforts of both the Northern Blues Collaborative Forest Landscape Restoration Project (CFLRP), and the Meadow Creek Collaborative Aquatic Landscape Restoration Project (CALRP). Research and monitoring are also integrated into the effort from the beginning. Thus, we seek to coordinate and integrate both terrestrial and aquatic restoration on the same landscape.

Technology and Training

Technology transfer through trainings, webinars, information exchange, and general "trouble shooting" is a hallmark of the Ecology Program. Ecology Areas, such as the Blue Mountains, NW Oregon, and Southwest Oregon, continue to hold plant association trainings. These describe plant associations at the local scale and are an invaluable way to orient new silviculturists, wildlife biologists, botanists, and other specialists. This training not only describes the ecosystems but also emphasizes the management implications of treatments applied to the ecosystems.

Eastern Washington ecologist Monique Wynecoop is leading the program's efforts to incorporate traditional knowledge into planning, adding a crucial source of Best Available Scientific Information and increasing opportunities for Indigenous land management. Readership has boomed for the Traditional Knowledge and Fire newsletter Monique launched in 2020, as awareness of the importance of Traditional Knowledge increases within the Forest Service. Other ecology areas are also building relationships through which Tribes can share and enact their knowledge, including with the Confederated Tribes of the Umatilla Indian Reservation.

Gregg Riegel in Central Oregon is the Forest Service representative on the interagency training cadre for Interpreting Indicators of Rangeland Health, as well as serving on national teams to develop and refine range monitoring criteria.

Bobette Jones and Upekala Wijayratne served on two silviculture certification panels, offering an ecological perspective to the proceedings.

Ecologists also honed their virtual presentation dialogue skills for multiple groups, including the National Advanced Silviculture Program, collaborative groups, and university speaker series.

Cheryl Friesen continues to function as our science liaison. She interacts with Regional program managers and the ecologist cadre to ensure the best available science is finding its way into the hands of our field practitioners. Though the pandemic paused a 15-year long string of successful symposiums and workshops, the gap was filled in 2022 with participation in the Governor's Fire Task Force. She also coordinated finalization of the synthesis "Fuel treatment impacts on landscape-scale wildfire behavior in moist, westside Pacific NW Forests: A summary of relevant literature" with Professor Matt Powers from OSU and Emeritus FS Ecologist Jane Kertis.

Monitoring

Monitoring is an important pillar of the Ecology Program, and ecologists support monitoring in many important ways. Notable among this is our role in collaborative forest landscape restoration projects (CFLRP), both within the Region and nationally as well. We were instrumental in developing the Common Monitoring Strategy (CMS), developed in lessons learned from the first 10 years of CFLRP projects. This is now being implemented in CFLRP projects across the Region, with the significant involvement on ecologists on the Areas. The Northern Blues project was the first to implement the CMS, and we continue to work closely with them to address and fine-tune implementation. The Eastern Washington Ecology Area is also heavily involved in supporting monitoring for CFLRP projects on the Colville and the Okanogan-Wenatchee NFs; Kerry Kemp has been providing exceptional leadership. Bill Kuhn and his team support the CFLRP on the Rogue River-Siskiyou NF, and Max Wahlberg the work on the Deschutes CFLRP. Throughout the seven CFLRPs in the Region, ecologists will be playing a significant role in their monitoring, in collaboration with research and other partners.

The Southwest Oregon Ecology Area has been providing significant monitoring support for the Calf-Copeland project (sugar pine), the Shasta-Agness project (pre-treatment vegetation monitoring). And the Ashland Forest Resiliency Project.

The ecology program continues to support the range program in the Region as a close partner. Gregg Riegel and Cristina McKernan continue to do a significant amount of range-related monitoring, including monitoring of vegetation using the multiple indicator monitoring (MIM) protocol, the riparian scorecard, maintaining long-term riparian monitoring sites, fen vegetation analysis, and other applications.

Moreover, in November we were pleased to welcome Skye Greenler to the Ecology Program. Skye is a Presidential Management Fellow (PMF), with primary duties focused on monitoring support to the CFLRPs as we implement the CMS. Skye has already contributed significantly to implementing monitoring questions related to fire risk, ecological departure, and invasives.

Products (Maps, Presentations, Publications, Databases)

Documentation to support the new Potential Vegetation Map, including map unit descriptions, an accuracy assessment, and a "how to" guide, were produced in 2022. Currently work is proceeding on a General Technical Report (GTR), with submittal of a draft expected in Spring 2023.

Ecologists have commented on efforts to inventory and describe the Region's late seral/old-growth resources in response to the administration's initiative on this. We are in support of the assessment being done by Marin Palmer and Ray Davis. Additionally, ecologists support the Forests on this issue on an ongoing basis. For example, Max Wahlberg in Central Oregon is providing a large tree analysis for the Green Ridge project area.

The following is a list of area-specific reports, publications, and presentations by Area Ecologists:

Western Washington

Presentations

- Lead author on Northwest Forest Plan concurrence review in support of North Fork Stillaguamish Landscape Analysis Project EA.
- Prepared and presented brief to the Forest Supervisor on adaptive management area land use allocations and proposed restoration actions.
- Presented MBS Restoration Strategy and future direction to the Darrington Collaborative.
- Presented ideas for moving from age-based to structure-based management and local vs. landscape-scale desired conditions to Forest Supervisors in the Western Washington Restoration and Coordination Zone.
- Presented "Good Fire, Bad Fire: The Philosophy of Fire Management" to the South Gifford Pinchot Collaborative group.
- Reilly, M.J., Kerns, B.K., Kim, J.B., Acker, S.A., Hudec, J.L., Kearns, H., Willhite, E., Kertis, J., Halofsky, J.E. 2022. Chapter 5: Climate Change Effects on Vegetation and Disturbance. *Climate Change Vulnerability and Adaptation in the Columbia River Gorge, Mount Hood National Forest, and Willamette National Forest.* Edited by Halofsky, J.E., Peterson, D.L., and Gravenmier, R.A. PNW-GTR-1001. Portland, OR. USDA, Forest Service.

Eastern Washington

Presentations

- Hankins, D. & Wynecoop, M. 2022. Guest Speaker. San Jose State University. "Building Connections: Tools and case studies for promoting and maintaining fire adapted communities and ecosystems"
- Wynecoop, M. Guest speaker. Univ. of Idaho Wildland Fire Management Course. Feb 15, 17, 2022.
- Wynecoop, M. Guest speaker. "Ethical considerations in actionable science". Univ. of Washington graduate seminar course. March 2, 2022.
- Kemp, K., Gaines, B., Woodrow, A. & Youkey, D. "Revision of the Late Successional Reserve Assessments (LSRAs) for the Okanogan-Wenatchee National Forests: Why Here, Why Now?" Presentation to the LSRA Oversight Committee. May 27, 2022.
- Wynne, M. & Wynecoop, M. Invited speaker. "Traditional Management, Resilient People and Plant Relationships". Environmental Justice Speaker Series, WA DNR. June 7, 2022.
- Wynecoop, M. 2022. Invited Speaker. NRFSN & All Nations Health Fire Educational Workshop, July 27, 2022.
- Wynecoop, M. Guest Speaker. "Indigenous Perspectives on Fire Management." UW Seminar for the College of Environment. Dec 8, 2021.
- Wynecoop, M. "Tribal Experiences in Collaborative Fire Management in the Northwest." Co-Presenter for NW CASC Webinar. Oct 21, 2021
- Wynecoop, M. Guest speaker. "Communicating TK & Western Science". Salish Kootenai College Technical Writing Class. Oct. 20, 2021.

Publications/Products

- Davis, K.T., Rozance, M.A., Wynecoop, M.D., Swensen, K.B. et al. in review. Collaboratively managing post-fire vegetation transitions across cultural landscapes. Frontiers in Ecology & the Environment.

- Davis, K.T., Robles, M.D., Kemp, K.B., Higuera, P.E. et al. in review. Reduced fire severity offers near-term buffer to climate-driven declines in conifer resilience across the western United States. PNAS.
- Jacobs, L.A. et al. in review. Indigenous Voices: Critical Reflections on Traditional Ecological Knowledge. OSU Press.
- Wynecoop, M. 2022. NRFSN TK & Fire in the Northern Rockies & Pacific NW Newsletter, July 2022 Issue. https://www.nrfirescience.org/hot-topics/fire-traditional-knowledge

Blue Mountains

Publications/Products

- Johnson, CJ. 2022. Climate Change and Paleoecology of the Pacific Northwest. White Paper Report.
- Wuenschel, A & Saager, K. 2022. Recommendations for the Umatilla National Forest and the Confederated Tribes of the Umatilla Indian Reservation (CTUIR) for riparian species to plant in the Meacham Creek restoration project across tribal and USFS lands. White Paper Report.
- Johnson, CJ. 2022. Grazing Impacts on Vegetation of Logan Valley Fen. White Paper Report.
- Johnson, CJ. 2021. Bull Thistle Presence and Persistence in the Blue Mountains. White Paper Report.
- Shive, K.L., A. Wuenschel, L.J. Hardlund, S. Morris, M.D. Meyer, and S. Hood. 2022. Ancient trees and modern wildfires: declining resilience to wildfire in the highly fire-adapted giant sequoia. Forest Ecology and Management.
- Johnson, CJ. 2022. Historical Fire Regimes on the Whitman RD. White Paper Report.
- Wuenschel, A. 2022. Ridgetop Grassland Recovery of Ridgetop Grasslands after the 2021 Lick Creek Fire. White Paper Report.

Central Oregon

Products

- Ecological Status of Long-Term Riparian Monitoring Sites, FRE-WIN NF and Lakeview BLM (Riegel, McKernan, Braisted)
- Fen Vegetation Analysis, FRE-WIN NF (McKernan)
- Riparian Vegetation Characterization Summary, FRE-WIN and Lakeview BLM (McKernan)
- Ecological Departure Analysis for the Bootleg Fire Footprint and Associated Landscape (Wahlberg)
- Green Ridge Project Area Large Tree Analysis, DES NF (Wahlberg)

Presentations

- Fen Presentations to 1) FRE-WIN Zone All Employee Meeting, 2) Antelope Allotment ID Team. (McKernan)
- Fen Field Trips Antelope Allotment, for Forest Specialists, Chemult RD. (McKernan)
- National Cadre Instructor: Rx 310 Introduction to Fire Effects (Riegel)

Southwest Oregon

Products

- Simpson, Kertis, Acker, and Hochhalter. 2022. Guide to Understanding and Using the Potential Natural Vegetation (PNV) Map Layer

Northwest Oregon

Publications

- Pugh, B.E., Colley, M., Dugdale, S.J., Edwards, P., Flitcroft, R., Holz, A., Johnson, M.J., Mariani, M., Means-Brous, M., Meyer, K., Moffett, K.B., Renan, L., Scrodt, F., Thorne, C., Valman, S., Wijayratne, U., Field, R. 2022. A possible role for river restoration enhancing biodiversity through interaction with wildfire. Global Ecology and Biogeography. 31: 1990 - 2004.

Presentations

- Northwest Oregon Coast Range Vegetation: Biophysical Drivers, Climax Forest Types & Linked Structure, Historical Disturbance & Pattern." US Fish & Wildlife Service – Intro to the Siuslaw NF meeting, October 2022 (Glavich).
- Incorporating Climate Trends and Process into Forest Management – Highlights from the climate change and adaptation in the CRSRG, MHNF, and WNF" Willamette NF Forest Leadership Meeting, February 2022; Middle Fork and Mt. Hood ID teams Winter 2022 (Jones, Wijayratne, and Glavich).

Partnerships

The Ecology Program has many partners, and we see these efforts as essential to not only completing work but building support for Forest Service objectives. We have so many partnerships at so many levels, there is a risk of leaving someone out in any description of them.

Nonetheless, here are a few: Our ongoing partnership with The Nature Conservancy in landscape assessment and fire ecology; supporting Washington Department of Natural Resources (DNR) in implementing and monitoring their 20-Year Forest Health Strategy; university agreements and informal partnerships with the University of Washington, Oregon State University, and the University of Montana; coordination with the Regional Office Biometrics Unit and Ray Davis' monitoring of Northwest Plan implementation; co-production work with the Pacific Northwest Research station on fire ecology, invasives, climate change, and many other applications; and partnerships with all the CFLRP projects (and in turn their partners).

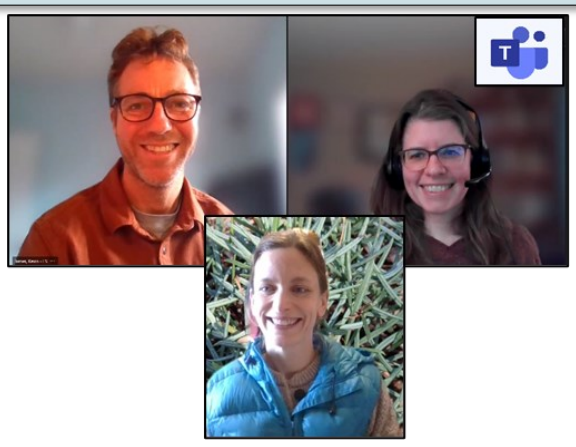
Doug Glavich leads a plant association training in a late seral western hemlock stand on the Siuslaw National Forest with assistants Bobette Jones and Pek Wijayratne. Photo credit: Bobette Jones.

Western Washington Ecology Program (Area 1)

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

Program Priorities

In FY2022, Western Washington Natural Resource Staff Officers, Ecologists, and the Regional Ecologist agreed that the focus for the Western Washington Ecology Program would be support to planning, monitoring, climate change, and collaboration and partnerships. Ecologists' work continues to be integral to all levels of project planning and forest management, including the development of broad-scale landscape management strategies and mid-level resource management plans, supporting specific project implementation, and carrying out various types of monitoring. Furthermore, Western Washington Ecologists provide consistent representation between the Forest Service and other state, federal, and non-governmental resource management agencies, research institutions, tribes, collaboratives, and other partners that is not tied to one specific resource area.



Western Washington Area Ecology Program Team

Kimberly Crider

Jessica Hudec

Kevin James

Accomplishments

Planning

- Provided broad-scale ecology information for pre-NEPA project proposals.
- Applied fire refugia (Oregon State University), Old Forest Assessment (USFS), and large/dense sustainability (WA-DNR) models to local landscapes to help identify treatment types and locations.
- Contributed ecological context for purpose and need and climate change reports for Environmental Analyses (EAs).
- Assisted WA-DNR with eastside forest health strategy implementation by applying outputs from landscape evaluations and dual benefit analyses to project planning.
- Served as interim interdisciplinary team leader for large ecologically-focused project with multiple partners.
- Synthesized relevant literature on managing for forest health and resiliency and mitigating fire risk in priority planning areas.
- Led several field trips to proposed vegetation management planning areas with IDTs, collaborative groups, USFWS, WA-DNR, tribes, and other partners.

In 2022, Ecologists led several field trips, including this South Gifford Pinchot Collaborative field trip to the Little White Salmon planning area, a priority watershed in Washington DNR's 20-year Forest Health Strategic Plan.

Monitoring

- Partnered with USFWS and WA-DNR on implementing project-level acoustic recording unit surveys for northern spotted owls. This effort was in support of two landscape restoration projects on the north zone of the Mt. Baker-Snoqualmie NF.
- Identified initial set of subalpine and alpine ecology plots to investigate conifer encroachment in response to climate change. Plots were last monitored in the 1980's and 1990's.
- Updated early seral management monitoring plan.

Climate Change

- Served as Climate Change Coordinators, participated in regional climate change calls, shared information on updated National and Regional direction.
- Incorporated climate change into landscape level planning and into project level NEPA as indicated by Regional direction.
- Used information from vulnerability assessments to strengthen NEPA project proposals and analyses.
- Provided technical guidance to resource specialists for updated analysis addendums to the 2014 NCAAP vulnerability assessment.

Collaboration and Partnerships

- Worked with researchers on post-fire monitoring, climate change and climate refugia, fire history and fire refugia, vegetation and habitat modeling, etc.
- Supported Line Officers by working with local tribes and collaborative groups.
- Continued work with Stillaguamish Tribal Youth to implement huckleberry restoration and ecological knowledge exchange (4th year).
- Worked with Forest Leadership and Collaborative to determine the ecological and policy decision space associated with proposed landscape restoration actions in an adaptive management area land use allocation.
- Provided information on common needs, tools, and data sources for Western Washington Restoration and Coordination Zone

Stillaguamish Tribal Youth and Area Ecologist restoring huckleberry fields.

Products, Papers and Publications

Lead author on Northwest Forest Plan concurrence review in support of North Fork Stillaguamish Landscape Analysis Project EA.

Prepared and presented brief to the Forest Supervisor on adaptive management area land use allocations and proposed restoration actions.

Presented MBS Restoration Strategy and future direction to the Darrington Collaborative.

Presented ideas for moving from age-based to structure -based management and local vs. landscape-scale desired conditions to Forest Supervisors in the Western Washington Restoration and Coordination Zone.

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Responding to Future Needs

Support to planning, monitoring, climate change, and collaboration and partnerships will continue to be priorities for the Western Washington Ecology Program in 2023. Western Washington Ecologists will also continue to offer science communication and tech transfer to forest specialists, collaboratives, and others and provide consistent representation between the Forest Service and partners. In doing so, we will foster connection among people and between people and places. Notable partnerships include work with WA-DNR in priority watersheds on both the eastside and westside of the Cascades, with Level 1 wildlife consultation teams for work regarding northern spotted owls, with research and collaborative groups on a variety of ongoing projects across the area, and work supporting the Western Washington Restoration and Coordination Zone.

Eastern Washington Ecology Program (Area 2)

Okanogan-Wenatchee and Colville National Forests

Program Priorities

The Eastern Washington Ecology program specializes in forest and fire ecology, monitoring and traditional ecological knowledge (TEK). Our FY22 annual program priorities were developed in cooperation with natural resource staff officers on both forests, and included:

- Supporting collaborative and forest monitoring
- Climate science and coordination
- Translating science for management
- Support tribal engagement in forest restoration
- Working with partners to develop landscape assessments in support of forest-level project planning
- Research partnerships to developed applied science

Area 2 Ecology Program Team

Kerry Kemp, Area Ecologist

Monique Wynecoop, Fire Ecologist

Cooperators: Aja Woodrow (USFS), Chuck Hersey (DNR), Derek Churchill (DNR), Kim Kelly (BIA), Melodi Wynne (STN), Bill Gaines (Washington Conservation Science Institute), Vita Wright (PNWRS)

Accomplishments

Supporting collaborative and forest monitoring

- Coordinating development of monitoring plans for the North Central WA and NEW Forest Vision 2020 CFLRPs.
- Developed crosswalk of monitoring questions and indicators for CFLRP, WA DNR 20-Year Strategy, NWFP, and transitional forest plan monitoring for the OWNF.
- Identified opportunities for remeasurement and analysis of NEW Forest Vision 2020 fuels monitoring data to evaluate fuel treatment effectiveness.
- Participated in the Regional Interagency Monitoring Workshop Planning Group and the WA DNR Forest Health Advisory Monitoring Committee.

Climate science and coordination

- Serve as forest climate change coordinator for OWNF. Help forest staff access climate change resources.

Translating science for management

- Compiled and edited the Northern Rockies Fire Science Network (NRFSN) Traditional Knowledge (TK) and Fire newsletter.

Participating in a cultural burn on Karuk ancestral lands during the Indigenous Woman's TREX © Monique Wynecoop

Emerging lupine seedlings post-fire at the Spokane Tribal Network Food Sovereignty Garden in early 2022. Monique Wynecoop helped plan and implement a woman-led cultural burn at the garden in 2021. © Monique Wynecoop

- Reviewed the OWNF Forest Restoration Strategy (FRS) and provided recommendations to FLT and the North Central WA Forest Health Collaborative (NCWFHC) for key considerations in the application of FRS to future project planning.

Support tribal engagement in forest restoration

- Participated in Indigenous Women's TREX (Prescribed Fire Training Exchange) in Northern CA.
- Site visits and post-burn monitoring at the Spokane Tribal Network (STN) Food Sovereignty Garden.
- Co-produced and filmed video with NRFSN & the STN on cultural burning, local fire ecology, and food sovereignty.

Landscape assessments in support of project planning

- Leading a team of internal and external specialists to update the OWNF Late Successional Reserve Assessments.
- Reanalyzed Lidar data across the CNF to update the CNF forest structure layer.
- Collaborated on the development of landscape evaluations for upcoming projects on the OWNF with WA DNR.

Research Partnerships

- PNW Research Station, PSW Research Station, Univ. of Montana, NW CASC, OSU, Univ. of British Columbia

Products, Papers and Publications

Publications:

Davis, K.T., Rozance, M.A., Wynecoop, M.D., Swensen, K.B. et al. *in review.* Collaboratively managing post-fire vegetation transitions across cultural landscapes. Frontiers in Ecology & the Environment.

Davis, K.T., Robles, M.D., Kemp, K.B., Higuera, P.E. et al. *in review.* Reduced fire severity offers near-term buffer to climate -driven declines in conifer resilience across the western United States. PNAS.

Jacobs, L.A. et al. *in review.* Indigenous Voices: Critical Reflections on Traditional Ecological Knowledge. OSU Press.

Wynecoop, M. 2022. NRFSN TK & Fire in the Northern Rockies & Pacific NW Newsletter, July 2022 Issue. https://www.nrfirescience.org/hot-topics/fire-traditional-knowledge

Presentations:

Hankins, D. & Wynecoop, M. 2022. Guest Speaker. San Jose State University. "Building Connections: Tools and case studies for promoting and maintaining fire adapted communities and ecosystems"

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Wynecoop, M. Guest speaker. "Ethical considerations in actionable science". Univ. of Washington graduate seminar course. March 2, 2022.

Kemp, K., Gaines, B., Woodrow, A. & Youkey, D. "Revision of the Late Successional Reserve Assessments (LSRAs) for the Okanogan-Wenatchee National Forests: Why Here, Why Now?" Presentation to the LSRA Oversight Committee. May 27, 2022.

Wynne, M. & Wynecoop, M. Invited speaker. "Traditional Management, Resilient People and Plant Relationships". Environmental Justice Speaker Series, WA DNR. June 7, 2022.

Wynecoop, M. 2022. Invited Speaker. NRFSN & All Nations Health Fire Educational Workshop, July 27, 2022.

Wynecoop, M. Guest Speaker. "Indigenous Perspectives on Fire Management." UW Seminar for the College of Environment. Dec 8, 2021.

Wynecoop, M. "Tribal Experiences in Collaborative Fire Management in the Northwest." Co-Presenter for NW CASC Webinar. Oct 21, 2021

Wynecoop, M. Guest speaker. "Communicating TK & Western Science". Salish Kootenai College Technical Writing Class. Oct. 20, 2021.

Responding to Future Needs

Fostering collaboration and strengthening partnerships with local Tribes, NGOs, state and federal regulatory agencies through monitoring, shared learning, science transfer, and cross-boundary landscape analysis will continue to be a focus of the E. WA Ecology Program in 2023. By partnering with the NRFSN, NCWFHC, local universities, and WA DNR Forest Health Resiliency Division, we are able to broaden our impact and encourage innovative management approaches.

Blue Mountains Ecology Program (Area 3)

Malheur, Umatilla, Wallowa-Whitman National Forests

Program Priorities

In early 2022, the Blue Mountains Ecology Team met with all natural resource staff officers within our area to develop a program of work. Themes of our discussion included:

- Developing knowledge and monitoring of riparian forest thinning treatments
- Support of CFLRP projects on the three forests
- Whitebark pine: synthesize knowledge, provide modelling support
- Forest and grassland ecological monitoring support

Northern Blues Collaborative Field Tour. Umatilla NF. June 2022.

Area 3 Ecology Program Team

Amarina Wuenschel, Area Ecologist

Cameron Naficy, PhD, Landscape Ecologist (FHP/Ecology Programs)

Christy Johnson, PhD, Ecologist

Accomplishments

Ecological Monitoring

- Collaboratively developed protocols and sampling design for the Northern Blues CFLRP. Most recently we developed the riparian thinning protocol. Our intentions is to use this for riparian forest thinning monitoring across the region, and perhaps supplementing the work the CFLRP is doing and using it on the Malheur as well. Trained NBFC monitoring crews.
- Completing the Northern Blues CFLRP monitoring plan.
- Monitored post-fire effects on the Umatilla NF in the Lick Creek Fire footprint ridgetop grasslands.
- Developing a study plan for assessing differences in implementation and public perception of two HFRA projects on the Malheur NF in partnership with James Johnston, OSU. Received funding from the Southern Blues CFLRP and entered it into an agreement.

Collaboratives

- Highly engaged as members of the Northern Blues CFLRP monitoring team and have attended weekly calls. Attended Harney County Restoration Collaborative and Blue Mountain Forest Partner meetings.
- Compiled all the planned FS treatments for the Umatilla and organize all treatment files so 2022 field season planning could commence.

Trainings

- Plant association training on the Wallowa Whitman and Malheur National Forests.
- Coordinated 2 groundwater dependent ecosystem trainings on the Malheur and Umatilla for August.

Blue Mountains Vista. Wallowa-Whitman National Forest

Technical Assistance

- Multiple field visits and meetings to discuss riparian habitat conservation areas (RHCA) historical conditions and dynamics, treatments, potential data needs or guidelines.
- Assisting Dave Powell on an effort to revise stand density indices used in silvicultural prescriptions based on climate change factors.
- Development of ecohydrological models and compilation of stream gauge data in Blue Mountains .
- Core team technical lead and reviewer for mid-scale vegetation mapping for Morgan Nesbit Project.

Miscellaneous

- Contributed to a successful grant application for Enterprise crews to assist with groundwater dependent ecosystem surveys.
- Worked closely with Regional and Washington-Office staff to create a mechanism for the NFS to use Cooperative Ecosystem Studies Unit agreements (which cap overhead and provide a mechanism to acquire external support).
- Engaged with fire refugia modeling in partnership with Oregon State University.
- Served as WWNF Climate Change Coordinator.
- Initiated planning for a remeasurement of the Mountain Invasion Research Network in collaboration with U of Oregon and Starkey Experimental Forest.
- Attended a prescribed burn conducted by the Confederated Tribes of the Umatilla Indian Reservation.

Products, Papers and Publications

- Johnson, CJ. 2022. Climate Change and Paleoecology of the Pacific Northwest. White Paper Report.
- Wuenschel, A & Saager, K. 2022. Recommendations for the Umatilla National Forest and the Confederated Tribes of the Umatilla Indian Reservation (CTUIR) for riparian species to plant in the Meacham Creek restoration project across tribal and USFS lands. White Paper Report.
- Johnson, CJ. 2022. Grazing Impacts on Vegetation of Logan Valley Fen. White Paper Report.
- Johnson, CJ. 2021. Bull Thistle Presence and Persistence in the Blue Mountains. White Paper Report.
- Shive, K.L., A. Wuenschel, L.J. Hardlund, S. Morris, M.D. Meyer, and S. Hood. 2022. Ancient trees and modern wildfires: declining resilience to wildfire in the highly fire-adapted giant sequoia. Forest Ecology and Management.
- Johnson, CJ. 2022. Historical Fire Regimes on the Whitman RD. White Paper Report.
- Wuenschel, A. 2022. Ridgetop Grassland Recovery of Ridgetop Grasslands after the 2021

Responding to Future Needs

USFS and CTUIR tribal staff planning restoration at Meacham Creek.

Recently within the Blue Mountains Area, we have experienced another large wildfire (> 100,000 ac), whitebark pine has been federally listed as a threatened species, the Biden Administration has emphasized the importance of old-growth forest management, more projects are being planned within riparian habitat corridors, and climate change is ongoing. We anticipate that all of these themes will be a major focus of our program of work in FY2023 and beyond.

Central Oregon Ecology Program (Area 4)

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

Program Priorities

- The Central Oregon Area Ecology Team specializes in addressing a wide range of eastside forest, upland range, and wetland and riparian ecological management issues. We are currently focused on: 1) drought and livestock grazing interactions, 2) forest stand and landscape vegetation analyses and monitoring and, 3) upland range inventory and monitoring.
- Provide riparian, meadow, and fen ecological expertise, conduct monitoring of ecological status attributes for Rangeland Allotment Management Plan renewal NEPA process.
- Implement understory and fuel profile models for ponderosa pine forests to assist restoration and fuel treatment through our Alternative Fuel Treatment and Repeated fire Return Interval Administrative Studies.
- Provide Landscape Assessment-Departure Analysis support for vegetation of Central OR National Forests & Grassland.
- Define and establish Ecological Site Descriptions (ESD) for the Crooked River National Grassland.
- Provide support for invasive weed management and monitoring.
- Provide program support to Region, Forest, and Ranger Districts.

Area 4 Ecology Program Team

Gregg Riegel, Cristina McKernan, Max Wahlberg, Bec Braisted, Wendy Brewer, and Kelly Smith.

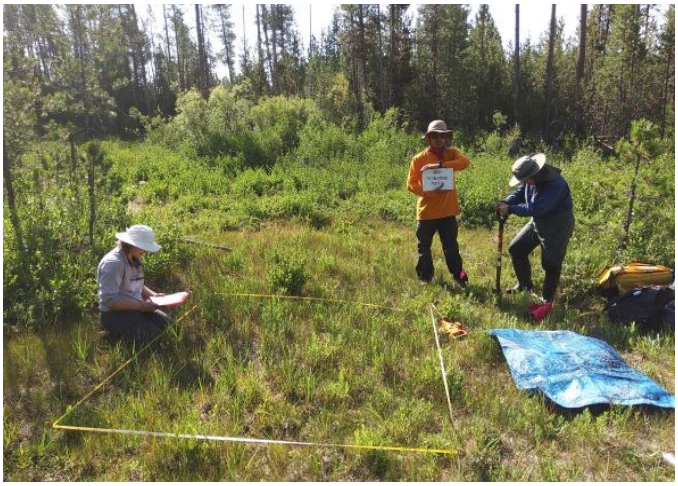
Cooperators: Kristen McBride, Kevin Keown, Tom DeMeo, Robert Garcia, Steve Gibson, Ben Goodin, Jim David, Jacob Young, Erin Rentz, Sandra Klepadlo Girdner, Tia Adams, Christina Veverka, Beth Johnson, Marlo Fisher, Jimmy Leal (BLM), Les Boothe (BLM), and Chris Gebauer (NRCS), Becky Kerns (PNW), Kyla Zaret (OR Inst. of Natural Resources, INR), David Cooper (Colorado State Univ., and Dave Weixelman (retired USFS).

Accomplishments

- Riparian Monitoring vegetation using Multiple Indicator Monitoring (MIM) protocol on Rail, Potlid, Bear, and Cougar Creek on Ochoco NF, and 2) Completed Riparian Scorecard measurements on Horse Creek, Lakeview BLM District. Both projects evaluate long-term livestock grazing effects on vegetation and soils.
- Ecological Site Description (ESD)- Measured vegetation attributes and updated the database for the Crooked River National Grassland.
- Bootleg Post Fire Landscape Assessment – analyzed ecological departure and associated interpretation for the Bootleg Fire and surrounding landscape .
- Fen Inventory, Assessment, and Monitoring in the Chemult Pasture, Fremont-Winema National Forest. Measured vegetation, soil, and hydrologic characteristics to identify functioning condition and establish long term monitoring sites.
- Whitebark Pine Monitoring – in collaboration with FHP resampled long-term whitebark pine plots across the Deschutes and Fremont-Winema NFs.

Max Wahlberg and Gregg Riegel clip herbaceous plants and sort by species to determine annual production on a newly established ESD plot on the CRNG. Annual production is used in defining ESD site productivity and can be used in calculating carbon budgets. 6/6/22. Photo credit Bec Braisted.

Administrative Studies



The Fremont-Winema NF committed to monitor fens for livestock impacts and implement adaptive management practices if fen conditions deteriorate. Our approach is to conduct an ecological inventory and assessment of fen conditions and establish a monitoring protocol to develop criteria that will trigger the need for adaptive management. Fens in our project area range in condition from "low" to "high" functioning based on the inventory and assessment. In 2023 we will establish long-term monitoring plots to identify impacts to fen function and use inventory and assessment data to predict wetland (fen) types across the landscape. This project is partially supported by OWEB funding (received 2022) and collaboration with OR Inst. of Natural Resources (INR), and Colorado State University (CSU). Photo credit Julianne Baranowski .

Gregg Riegel observes the understory in the Repeated Fire Interval study conducted from 1997-2017, that measured vegetation response to prescribed fire at 5,10, and 20 year burn intervals, in old growth ponderosa pine within the Metolius RNA (Sisters RD, DNF). Becky Kerns (PNW) and Riegel collaborated in obtaining 10 year Wildfire Crisis Strategy funds for statistical analyses and publishing in Y23. 6/23/22. Photo credit Max Wahl-

Products:

- Ecological Status of Long Term Riparian Monitoring Sites, FRE-WIN NF and Lakeview BLM (Riegel, McKernan, Braisted)
- Fen Vegetation Analysis, FRE-WIN NF (McKernan)
- Riparian Vegetation Characterization Summary, FRE-WIN and Lakeview BLM (McKernan)
- Ecological Departure Analysis for the Bootleg Fire Footprint and Associated Landscape (Wahlberg)
- Green Ridge Project Area Large Tree Analysis, DES NF (Wahlberg)

Presentations:

- Fen Presentations to 1) FRE-WIN Zone All Employee Meeting, 2) Antelope Allotment ID Team. (McKernan)
- Fen Field Trips Antelope Allotment, for Forest Specialists, Chemult RD. (McKernan)
- National Cadre Instructor: Rx 310 Introduction to Fire Effects (Riegel).

Engagement & Technology Transfer:

- Interagency Cadre Instructor: Interpreting Indicators Rangeland Health (Riegel).
- Fire and Weeds Working Group PNW, R6, OSU, Great Basin Fire Science Exchange (Riegel).
- Region 6 Range Representative, National Range Futuring, and 2) Inter-Regional Rangelands Assessment, Inventory, and Monitoring Team (Riegel)
- OSU Courtesy Graduate Faculty. (Riegel).
- Riparian and Wetland Restoration to National Carbon Partnership Program Working Group (McKernan)
- Ongoing engagement with collaborative efforts Deschutes CFRP and Central Oregon Shared Stewardship Alliance (Wahlberg).
- Technical assistance to the national QWRA – HVRA Ecological Services Working Group (Wahlberg)
- Analytical support to and ongoing coordination with the Central Oregon Forest Health and Protection Service Center (Wahlberg).
- Partner on the TNC Oregon Climate Analog Mapping Co -Production Team (Wahlberg)

Responding to Future Needs

Climate mediated shifts coupled with rapid population growth create novel conditions in the National Forests of Central Oregon. Our program is focused to help develop and implement meaningful climate adaptation strategies. This includes identifying areas that serve as climate refugia into the future and restoration practices that enhance and support critical ecological processes.

Southwest Oregon Ecology Program (Area 5)

Umpqua & Rogue River-Siskiyou National Forests

Program Priorities

- Support climate-adaptive pre– and post-fire restoration
- Plan and execute baseline, implementation, and effectiveness monitoring for vegetation and fuels treatments
- Develop and implement post-wildfire vegetation monitoring to understand trajectories and inform potential post-fire management
- Develop a post-fire restoration framework for southwest Oregon as part of a Regional framework
- Collaborate with Forest specialists, academic and federal researchers, and other local, state, and federal agency specialists to identify restoration and monitoring priorities, write proposals, and bring resources to address needs
- Help both the Rogue River-Siskiyou and Umpqua National Forests to establish restoration goals and targets that incorporate rapidly changing climate and disturbance regimes

Area 5 Ecology Program Team

Bill Kuhn

Pat Hochhalter

Devin McMahon

Incense cedar germinant

Accomplishments

Planning

- Assisted with Rogue Basin CFLRP Work Plan development
- Supported Snowy Butte Planning Area restoration prioritization with spatial data and EEMS modeling
- Led the new Umpqua Resilient Landscapes interdisciplinary working group to identify and connect future project areas

Monitoring

- Completed pre-treatment monitoring of sugar pine health and regeneration in the Calf-Copeland project
- Assisted in launching pre-treatment vegetation and fuels monitoring within the Shasta-Agness Landscape Restoration Program units
- Monitored post-fire vegetation and conifer regeneration within the Chetco Bar fire footprint
- Assisted with legacy tree monitoring in the Ashland Forest Resiliency project

Data

- Contributed to finalizing the regional Potential Natural Vegetation map and user guide, and documenting the process in an upcoming general technical report
- Entered General Lands Office survey records into a database to support restoration goals for Snowy Butte project area

Accomplishments (cont'd)

Collaboration

- Assisted Rogue Forest Partners (RFP) collaborative in developing all-lands monitoring plans, protocols, and databases
- Assisted RFP in the development of vegetation series-based tree species climate adaptability guides to inform climate adaptive restoration (work in progress)
- Assisted Southern Oregon Climate Smart collaborative in developing a local climate adaption guide with locally relevant case studies (work in progress)
- Facilitated a national group of analysts documenting best practices for state and transition modeling in Forest Plan revision
- Responded to data requests from multiple resource areas across both forests and the Region
- Put on two Plant Association trainings for the Umpqua National Forest
- Participated in insect and disease training with Southwest Oregon Forest Health Protection, and shared Phoenix Youth Corps field crew to find Douglas-fir borer
- Participated in field trips with forest specialists and leadership, Oregon State University Cooperative Extension, Forest Service researchers, and other area ecologists

Knobcone pine is having a postfire renaissance

Products, Papers and Publications

Simpson, Kertis, Acker, and Hochhalter. 2022. Guide to Understanding and Using the Potential Natural Vegetation (PNV) Map Layer.

Newly opened canopy around legacy sugar and ponderosa pines in the Calf Copeland project

Shrubby tanoak and ceanothus regeneration following the fires in 2002 and 2017. Thank you, Mason and technicians!

Responding to Future Needs

For 2023, SW OR ecologists are:

Continuing to lead long-term planning efforts

Collecting models, literature, and local data on postfire regeneration to inform planting needs

Working with FHP on Healthy Forest Restoration Act insect risk designation for both Forests

Working on developing a post-fire restoration framework

Northwest Oregon Ecology Program (Area 6)

Mt. Hood, Willamette, and Siuslaw National Forests

Columbia River Gorge National Scenic Area

Program Priorities

The Northwest Oregon Ecology Program meets yearly with its working group to discuss ecological issues and develop potential program of work ideas. Ideas are vetted, proposals are written, and work is prioritized with the steering committee of Forest/CRGNSA Natural Resource staff, Regional Ecologist, and BLM representatives.

Program priorities for 2022 included:

- Continuing long-term, landscape projects:
  - ◊ Special habitat mapping and classification
  - ◊ Deadwood analysis
  - ◊ Incorporating climate change and adaptation strategies into planning
  - ◊ Post-fire vegetation and deadwood trajectories
  - ◊ Tools for riparian vegetation management
  - ◊ PODS for planning
- Providing technology transfer
- Assisting Forests with high priority issues:
  - ◊ Landscape analyses
  - ◊ Meadow management support
  - ◊ Meadow ESA recovery species support
  - ◊ Post fire restoration and monitoring

Area 6 Ecology Program Team

Doug Glavich

Bobette Jones

Pek Wijayratne

Cheryl Friesen

Accomplishments

Long-term projects:

- Special habitat mapping/classification: Produced draft maps in Google Earth Engine – 2.5 million acres on the west slope Cascades, covering the Willamette and Mt Hood NFs, 82.3 thousand acres in the Coast Range on the Siuslaw NF and BLM, and 1.4 million acres in the SW Oregon Cascades, covering the Umpqua and RRS NFs. Field checked maps and collected field data to make map corrections.
- Created an POD+ outline for the Willamette NF to help forest ID teams and leadership integrate ecological and PODs elements into planning.
- Climate Change information exchange: Continued support for the Coast Range Climate Change Vulnerability Assessment (CCVA) – provided vegetation data for final maps. Rolled out the CCVA for the CRSG, MHNF, and WNF.

Technology transfer:

- Plant Association Training–trainings completed for Coast Range on Siuslaw NF and Cascades west slope on Willamette NF.

Forest high priority issues:

- NEPA support: Wrote *changed condition* section for the Elkhorn Wild and Scenic River Project following the 2020 Beachie Creek Wildfire.
- Continued support for project meadow management on Siuslaw NF.
- Continued support for Oregon Silverspot Butterfly habitat needs and participation in the interagency and multi-partner working group.
- Huckleberry restoration and management: Field and data analysis support.

Forest high priority issues (continued):

- Rigdon RNA Knobcone pine monitoring: Field and data analysis support.
- Developed a long-term photo-point implementation monitoring strategy with the Willamette NF to evaluate danger tree selection criteria and future fuel and forest recovery dynamics. Collected baseline photos using Field Maps.
- Completed report for the Echo Mountain Fire first year post fire vegetation response.

Collaboration:

- Writing State and Transitions Models (STM) best practices document with regional analysists working group to provide consistency and improve information transfer for NRV.model development used for plan revision.
- Attend the H.J. Andrews Experimental forest monthly meetings. Continue to exchange information and develop products relevant to management.
- Developing relationships and providing tech transfer with forest collaboratives.
- Participating in a PODS+ working group to collaboratively identify priority management areas to integrate fire planning and risk reduction into a landscape framework. The NR program managers, lead by fuels are developing an approach to incorporate this framework into the 3+1 program of work.
- Provided input to NSF grant to continue research in Bunchgrass Meadows (WIL) and other west Cascades meadow systems with University of Oregon.

Bobette taking a photo point for the danger tree implementation monitoring project.

University of Oregon researchers, Willamette staff and NWO Ecology group field at Bunchgrass Meadows on the Willamette NF.

Climate Change:

- Served as climate change representatives/coordinators for forests and assisted in completing reporting for the Climate Action Tracker.
- Help planners utilize CCVA results and information in the NEPA Climate Framework.

Products, Papers and Publications

Publications:

Pugh, B.E., Colley, M., Dugdale, S.J., Edwards, P., Flitcroft, R., Holz, A., Johnson, M.J., Mariani, M., Means-Brous, M., Meyer, K., Moffett, K.B., Renan, L., Scrodt, F., Thorne, C., Valman, S., Wijayratne, U., Field, R. 2022. A possible role for river restoration enhancing biodiversity through interaction with wildfire. Global Ecology and Biogeography. 31: 1990 - 2004.

Presentations:

Northwest Oregon Coast Range Vegetation: Biophysical Drivers, Climax Forest Types & Linked Structure, Historical Disturbance & Pattern." US Fish & Wildlife Service – Intro to the Siuslaw NF meeting, October 2022 (Glavich).

Incorporating Climate Trends and Process into Forest Management – Highlights from the climate change and adaptation in the CRSRG, MHNF, and WNF" Willamette NF Forest Leadership Meeting, February 2022; Middle Fork and Mt. Hood ID teams Winter 2022 (Jones, Wijayratne, and Glavich).

Responding to Future Needs

The NW Oregon Ecology group will continue to engage with our working group and steering committee to ensure we deliver relevant products in support of forest priorities. An emerging focus for our Area is addressing landscape resiliency to wildfire and climate change. With the new fire recovery teams in place at the RO and forest levels, we anticipate assisting with post-fire recovery efforts.