NORTHWEST OREGON ECOLOGY GROUP NEWSLETTER

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April 2015

The Northwest Oregon Ecology Group is an association of ecologists with a wide range of interests from the Mt. Hood, Siuslaw and Willamette National Forests, the Columbia River Gorge National Scenic Area, and the Eugene and Salem Bureau of Land Management Districts. The group works from local to regional scales to provide tools, assessments, and analyses for ecological issues for planning, managing and monitoring forest ecosystems in Northwest Oregon. Through their own efforts, and affiliation with ecologists with Oregon State University, University of Oregon, Oregon Department of Fish and Wildlife, University of Washington, and private consultants, they have developed products most resource managers use every day.

Modeling Historical Range of Variability

Jane Kertis, NW Oregon Ecology Group
Allison Reger, Willamette NF Analyst
Lisa Helmig, Willamette NF Silviculturist

Landscape modeling tools are now available to develop baseline data on the types and range of historical landscape conditions. The amount and distribution of structural stages - such as complex, high quality early seral or multi-layered late seral - in space and time can give us some insight into the conditions plants and animals have adapted to in our landscapes. We are using a spatial state and transition model (ST-SIM) to describe broad compositional and structural stages of forested lands in NW Oregon (adapted from the ILAP project). We have modified models to reflect historical disturbance regimes, gathered pertinent spatial layers, and adjusted fire behavior inputs for an eight million acre area encompassing portions of the Willamette and Mt. Hood National Forests, and the Salem/Eugene BLM. We will be running models numerous times and compiling model outputs to describe the amount and spatial pattern of seral stages across the NW Oregon forested landscape. Initial results are forthcoming, and we hope to have a report outlining results by the end of the fiscal year.

Seasonal Effects of Prescribed Fire on the Herbaceous Understory at Mutton Meadow, Middle Fork RD, Willamette National Forest

Jennifer Lippert, Willamette National Forest Botanist and Jane Kertis, NW Oregon Ecology Group

During planning for the Jim's Creek Savannah Restoration Project, several questions emerged regarding prescribed burning in meadows within the mixed conifer-dominated landscape. Specifically, we wondered whether prescribed burns would differ in affecting native and non-native species and whether season of burn would have significant differences.

Mutton meadow is a dry California fescue/California oatgrass/ Roemer's fescue community type, with seepy areas that feature camas, monkeyflower and wild onion. Oregon white oak is found on the site as well as old scattered Ponderosa pine and incense cedar, and young Douglas- fir. Non-natives such as selfheal, oxeye daisy, dogtail grass and tall fescue are also present in low numbers due to years of sheep grazing in the meadow.

To answer our questions we established the study. The meadow was sectioned into three strips, parallel with the slope. Three transects were then laid perpendicular to the slope, with equal sections within each strip. The top portion of the meadow was burned in fall 2005, the middle was burned in February 2007 and the bottom was the control. Presence and cover of selected herbaceous vegetation data was taken in transects for 2 years pre-treatment and 2 years post-treatment.

We found 38 herbaceous species on the site: 28 native and 8 exotics. No new exotic species were found after burning. Overall, burning produced little change in distribution (presence) or cover in the majority of species. Two species increased in distribution (varileaf collomia, Pacific sanicle), and one species exhibited increased cover (straightbeaked buttercup) due to burning. Both Spanish clover and California oatgrass increased significantly in both presence and cover. Only one species had significantly lower cover 3 years post-fire — straightbeaked buttercup. The only species whose presence was reduced was the invasive St. Johnswort. Most species did not show a change in presence or cover in response to season of burn.

Significant differences were found for fall burns only. Rough aster, bighead clover, phlox and varieleaf collomia, responded with significant increases in cover after fall burns. Sticky cinquefoil increased in presence. This project highlighted the potential role of fire in meadow management. Native flora is not adversely affected by prescribed burns and respond most positively to fall burns. However, the majority of species tolerate spring burns, so if there are logistical issues with fall burns, spring could be substituted. Because of the variability in fire effects, replicating this experiment in more meadows will yield more meaningful results.

A trait based approach to understanding meadow species abundance over a conifer encroachment gradient

Jessica Celis, MS Student, School of Forestry, Oregon State University

Meadows in the Oregon Cascades occupy a small fraction of an otherwise forested landscape. Nevertheless, they contribute disproportionately to the plant, insect, and wildlife diversity of the region. In portions the western Cascades, conifer encroachment has reduced meadow extent by as much as 50% since the mid-1940s. Various factors have contributed to meadow contraction: cessation of sheep grazing, changes in climate (snow pack and length of the growing season), suppression of fire, and strong positive interactions among established and newly establishing trees. As trees establish and canopies close, meadow forbs and grasses are gradually replaced by forest understory plants. Yet, they do so at very different rates: some disappear in one or two decades; others can persist for more than a century. My Master's research explores whether this variation in survival can be explained by differences in trait plasticity (i.e., the ability of plants to adjust resource-acquiring structures to adapt to changes in their environments).

One of the largest meadows at the Bunchgrass Ridge study site (photo by Jessica Celis)

During summer 2014, I measured the morphological traits of 13 meadow species that vary in their sensitivities to encroachment (i.e., increased shading). I expressed this sensitivity using a quantitative index expressing the rate of decline in cover with declining light. For each species, I sampled the above- and below-ground traits of 15-17 individuals distributed across a wide range of light levels in conifer-invaded meadows at Bunchgrass Ridge (Willamette National Forest – see website for more information: http://depts.washington.edu/bgridge/). I chose traits that are known to respond to changes in light - the most limiting resource for these species. These include specific leaf area (SLA; leaf area divided by leaf dry mass) and ratio of above- to below-ground mass (A/B ratio). In shaded environments, plants tend to develop larger, thinner leaves to enhance light capture, resulting in greater SLA. Plants should also adjust allocation of biomass to structures that acquire the most limiting resource (here, light rather than soil water or nutrients). As such, I predicted that sensitivity to encroachment (reduced light) would vary inversely with species ability to adjust SLA and A/B ratio.

The author excavating one of the study species, *Erigeron aliceae* (photo by Chris Parson).

Although some species showed plastic responses to light for SLA and A/B ratio, others showed little or no change in these traits. Although SLA increased in the shade for all species - consistent with expectation - species with greater plasticity in this trait were not less sensitive to light. Rather, change in leaf area (not the ratio of leaf area to mass) was a stronger predictor of sensitivity: leaf area increased in the shade for less sensitive species, but declined for more sensitive species. For the latter, leaf area may become too small to support survival in the shade.

Few species showed significant adjustment of A/B ratio, thus plasticity in biomass allocation explained little of the variation in sensitivity to encroachment. Interestingly, two species considered least sensitive to encroachment - *Iris chrysophylla* (Iridaceae) and *Achillea millefolium* (Asteraceae) - showed contrasting responses to increasing shade. Iris allocated more to shoots/leaves (consistent with expectation) but *Achillea* allocated more to root systems. Allocation to leaves in *Achillea* may hinge on the production of reproductive shoots, which are not formed in shade. Thus, morphological or developmental constraints may limit the ability of some species to respond adaptively to changes in light.

My results suggest that differences in morphological plasticity explain little of the variation in species' sensitivity to encroachment. Physiological plasticity (e.g., the ability to adjust photosynthetic systems) may be more important. It is also likely that survival hinges on the abilities of species to respond to other, tree-induced changes in the environment, including those below ground.

Northwest Oregon Climate Change Vulnerability Assessment and Adaptation Strategy Development

Jane Kertis and Wes Wong, NW Oregon Ecology Group; Cheryl Friesen, Willamette NF Science Liaison; Salem and Eugene BLM; and Conservation Biology Institute

Identifying and assessing vulnerable resources is a key step towards understanding climate change effects and managing for future ecosystem resilience. As part of the climate change scorecard, each National Forest is expected to develop vulnerability assessments and help craft adaptation strategies to address these effects. BLM has completed several broad scale climate assessments (Rapid Ecological Assessments) across the nation. In FY14 we partnered with Conservation Biology Institute (CBI) to begin the process. We surveyed natural resource specialists on the Siuslaw NF, Willamette NF and Mt. Hood NF to determine the potential suite of vulnerable resources. We then selected a subset of resources to investigate to pilot through the Adaptation for Conservation Targets (ACT) framework (Cross et al. 2012). Workshop participants selected 3 vulnerable resources to explore: late successional forests in the western hemlock zone; municipal water supply; and cold, headwater stream habitats for the torrent salamander. Participants developed conceptual models that described the climatic, ecological, and socioeconomic influences on the resource, and how these drivers may be directly and indirectly affected by future climate change. Adaptation actions were developed to mitigate climate change effects and create a more resilient system in the future. For instance, predicted increased summer temperatures and decreased spring and summer precipitation will combine to increase the probability and severity of summer/fall drought. To continue to maintain and grow late successional forest across NW Oregon, we have an objective to maintain stand densities consistent with optimum vigor and stand health. Adaptation actions for reaching that objective include targeted thinning to reduce stand densities and prescribed burning. The projected outcome would be a reduction in competition for water, tree growth maintenance, reduced tree mortality, and an increase in resilience. A report outlining the process and results will be available at the end of FY15. Future assessments targeting additional high priority vulnerable resources are being discussed.

Cascade Torrent Salamander

Consequences of limited light availability on flower production of meadow communities in the Pacific Northwest USA

Jessica Celis, MS Student, School of Forestry, Oregon State University

This part of my Master's research addresses the relationships between reduction in light availability during encroachment and flower production in meadow species.

As trees establish and canopies close, meadow forbs and grasses are gradually replaced by forest understory plants. This has consequences not only for the community of meadow plants, but for the pollinator networks that rely on the nectar and pollen provided by these species. From previous research we know that some meadow species can survive encroachment for decades, although abundance can be greatly reduced. However, we know very little about the effects on flower production. During summer 2014, I quantified flower production in meadow species across a wide gradient of conifer encroachment (open meadow to closed forest) in two forest-meadow complexes on the Willamette National Forest: Bunchgrass Ridge (BG) and Frissel Meadows (H.J. Andrews Experimental Forest on the Willamette NF). Sites were visited 2-3 times over the growing season to capture maximum flower production among species of differing phenology. At 475 locations representing open to closed-canopy conditions I used quadrats to estimate the density of flowers (number of flowers/one percent cover) of each meadow species. Above each quadrat I also took a hemispherical photograph from which I estimated light availability as a proxy for encroachment. For each species, and for the full community of species, I then developed models of maximum flower production (adjusted for species' cover) as a function of total transmitted light (%).

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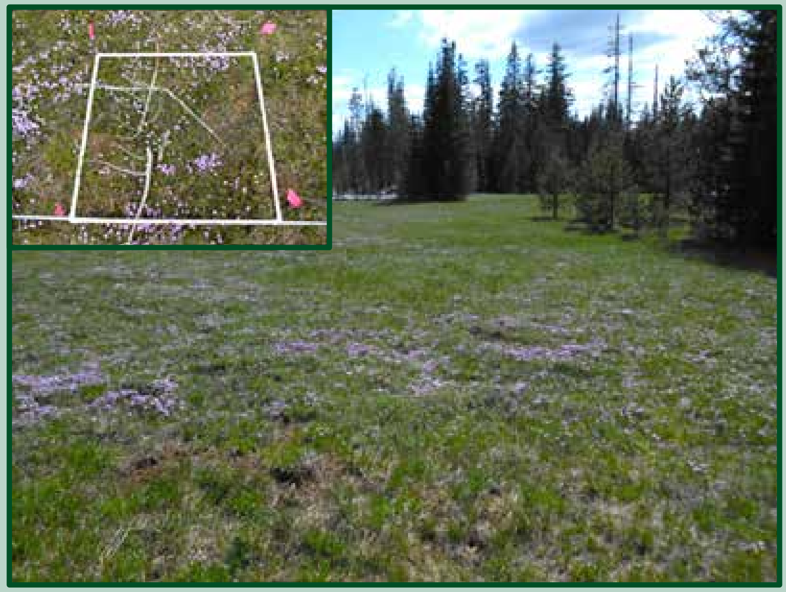

Phlox diffusa in peak bloom at Bunchgrass Ridge (inset photo is a sampling quadrat).

Eriophyllum lanatum (yellow) and *Cerastium arvense* (white) color Frissell Meadow (insert photo is a sampling quadrat).

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At both sites, flower production declined exponentially with decreasing light. With a 10% reduction in light there was a 21% and 36% decrease in flowering density at HJA and BG (see figure). These relationships are consistent with a large body of research that examines the effects of shading on flower and seed production. Here, encroachment dramatically reduces not only the abundance of species, but their ability to flower. The large reduction in flowering, even with a small reduction in light, has important implications for seed production and the diverse communities of pollinators that rely on these species for nectar and pollen resources. Removing trees early in the encroachment process may be critical to sustaining these meadow-based pollinator networks.

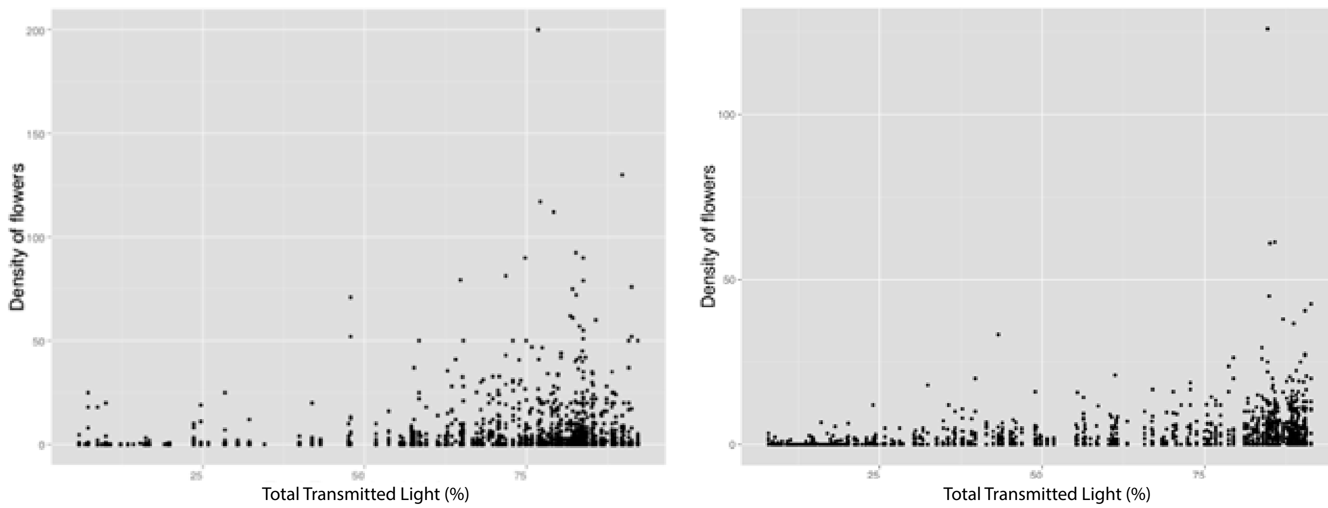
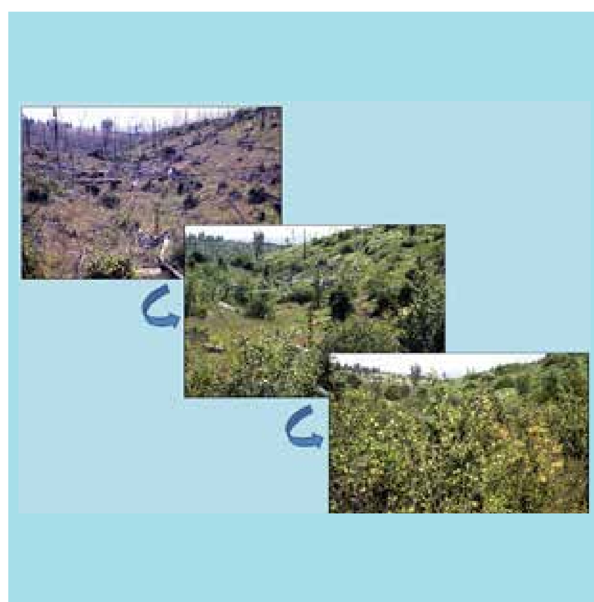


Figure 1: Change in total flowering density across the light gradient at HJA (left) and BG (right).

Rocky Fire Photo Monitoring: Synthesis & Interpretation

Wes Wong, NW Oregon Ecology Group

The Mt. Hood NF is creating a digital "story board" and report to synthesize key ecosystem changes and lessons learned from ecological succession pathways following the 1972 Rocky Fire. Four decades of monitoring photos within the burn were located, indexed, and scanned. These digital images are now being assembled into an interactive pictorial version of a state-and-transition model. We are currently completing model development based on vegetation type (plant association group), treatment history, and site monitoring notes. Several Barlow RD resource specialists provided positive initial feedback about using these products, which will become available online by the fall. The visual sequence of vegetation changes, and the qualitative synthesis and interpretation report can help inform planning efforts underway for integrated resources management at v Hood NF and on similar landscapes elsewhere. The visualization tool will be rolled out to the Eastside ID team members soon.



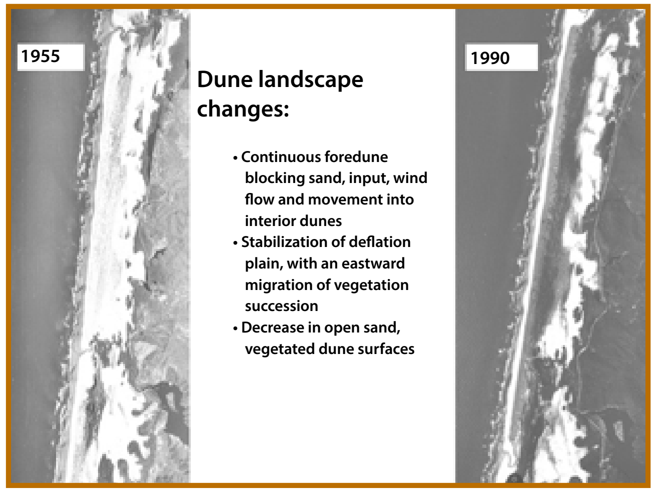
Dunes Restoration Strategy Development

Jane Kertis, NW Oregon Ecology Group; Donni Vogel, Oregon Dunes Natural Resource Area; and the Dunes Restoration Strategy Collaborative

The Oregon dunes ecosystem is a dynamic landscape. Plants, animals, and humans rely on this for habitat and recreation. Invasive species (most notably European beachgrass) have stablized this system and altered natural processes and patterns. A passionate group of Forest Service and external partners have formed a collaborative to strategize on restoring the dunes ecosystem. We want our strategy to be a realistic, flexible approach to restoring this unique landscape. We are outlining the "dunes story," starting with the questions: what makes these dunes unique? And why are they disappearing?

Our collaborative efforts should lead to ideas for accomplishing 3 restoration goals:

- Preserve/maintain the best functioning components (e.g. dune systems, plant and animal habitat, globally significant plant communities, recreation activities);
- Restore site specific conditions and processes (e.g. open sand, snowy plover habitat, pink/yellow sand verbena habitat); and

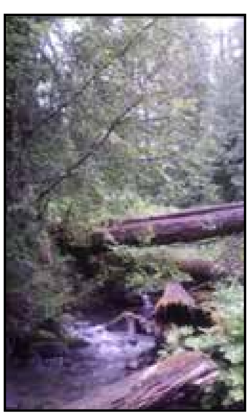


- Restore landscape processes and pattern (e.g. sand movement, sand deposition, resultant pattern of dune formations, native plant communities).

We hope to have a draft strategy developed by the end of the fiscal year.

Tools for Riparian Vegetation Management

Steve Acker and Jane Kertis, NW Oregon Ecology Group; Johan Hogervorst, Willamette NF Hydrologist; and Kate Meyer, McKenzie River Ranger District Fisheries Biologist

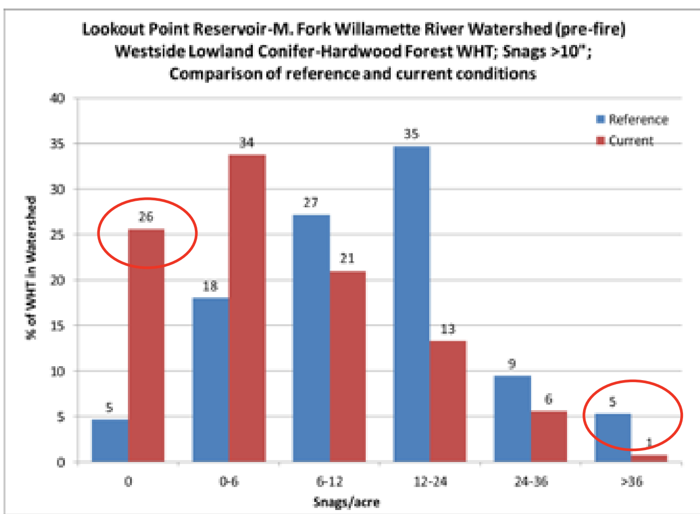


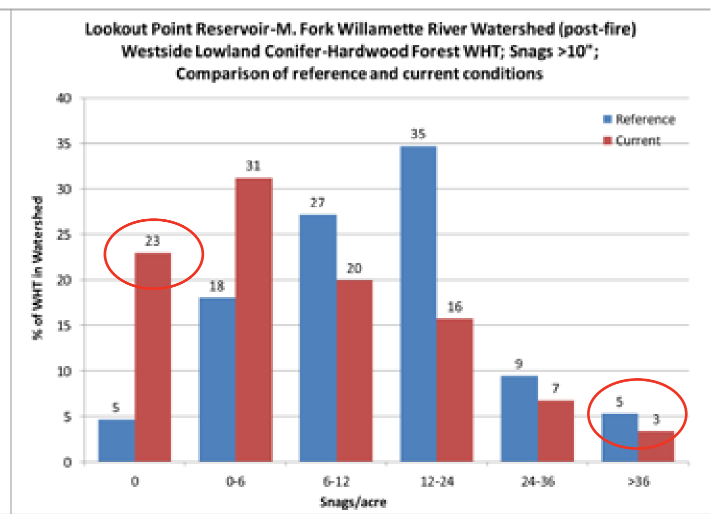
Management of riparian areas in forested landscapes has been an area of active development in policy and science in recent decades. Questions remain concerning how best to balance restoration of riparian and aquatic ecosystems and other goals of land management. To address these questions, we are working to describe the physical and biological capacity and variability of riparian ecosystems in northwest Oregon in a way that will provide the context for assessment of both historical and current conditions. The analysis will be based on geological and geomorphic setting, potential vegetation, and predominant disturbance processes, with the goal of representing the potential of different segments of the riparian area to deliver shade, bank stability, large wood, and leaf litter to stream channels. Reference and current conditions will be assessed by some combination of imagery, ground measurements, and state-and-transition simulation modeling. By identifying both reference and current conditions by watershed, the results will indicate where restoration treatments may be of most value. Our plans are to pilot the method in FY 15/16 on a western cascades watershed (the "Flat Country" planning area on the McKenzie River Ranger District/ Willamette NF), and we will be identifying an additional pilot area in the Coast Range on the Siuslaw NF.

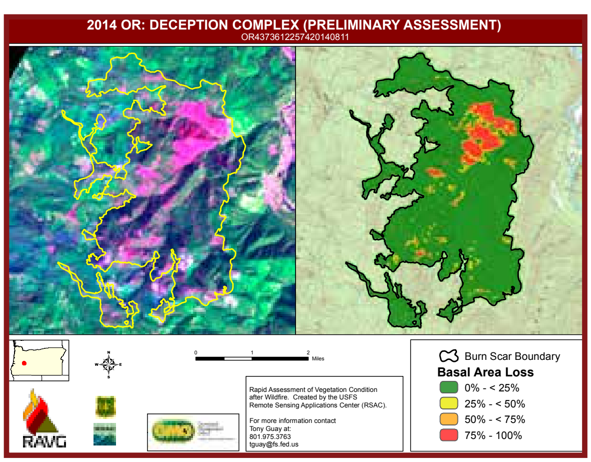
Deadwood Assessments of Northwest Oregon Forests

Steve Acker and Jane Kertis, NW Oregon Ecology Group

Ecologists have been working with wildlife biologists in NW Oregon to supply information on snag and down wood amounts and distribution, to be used to assess wildlife habitat health, and determine potential treatments. These broad scale, watershed level data can be used to prioritize areas where large snags are limiting, and indicate where managing for high structure early seral habitats could result in a more balanced seral distribution. In FY14 /FY15 ecologists consulted with wildlife biologists on all the National Forests in northwest Oregon to understand their needs and use of information from the dead wood analytical tool DecAID. We have begun developing updated watershed scale deadwood information using the latest version of DecAID (incorporating 2012 GNN data). There have been 3 large-scale (≥1000 acres) disturbances since the date of the new GNN layer that added snags to the landscape. Using the RAVG (Rapid Assessment of Vegetation Condition after Wildfire) dataset managed by USFS, we are updating current deadwood distribution for the watersheds containing the Government Flats and 36 Pit Fires (Mt. Hood NF) and the Deception Complex Fire (Willamette NF). To support planning on the Middle Fork Ranger District, we selected the 5th-field watershed containing the Deception Complex Fire as the initial location for delivery of deadwood information (see figure below). The analysis indicated some subtle changes in the 40,000+ acre watershed, including a slight decrease in the area without snags and an increase in the area with high density of snags (>36/acre). We expect to have updated watershed scale snag and down wood information available to wildlife biologists by the end of the fiscal year.







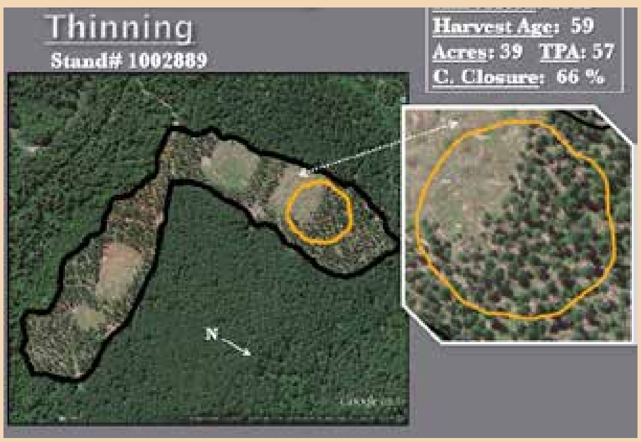
Central Cascades Adaptive Management Partnership on the Web!

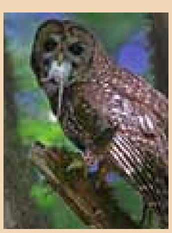
Cheryl Friesen, Science Liaison, Willamette NF

CCAMP has been actively bridging science and management interests for over 10 years. Much of our work is documented within the Ecoshare Website, graciously supported by Tom DeMeo and the Regional Ecology Program. (http://ecoshare.info/projects/central-cascade-adaptive-management-partnership/)

Visual Silvicultural Prescription Library: A tool to help communicate forest harvest.

This handy powerpoint presentation consists of existing silviculture prescriptions implemented on the Willamette National Forest, Oregon. Planar imagery was taken from Google Earth, 2013 data. Photo points/street views were obtained in the field using a digital camera. A companion document describes each prescription in more detail. We hope to continue to grow this collection over time. It can be downloaded from the following website in June 2015:
http://ecoshare.info/projects/central-cascade-adaptive-management-partnership/synthesis-papers-tools/





Posted Webinar:

Critical Habitat for the Northern Spotted Owl: Managing PNW Landscapes for a Threatened Species. May 8, 2014

This workshop provides background on the northern spotted owl, sheds light on the purposes of recovery plans and critical habitat as expressed in the Endangered Species Act, describes the modelling exercise that determined the current spotted owl critical habitat, discusses integrating recovery with the NWFP, and provides several examples of landscape-level planning efforts in CHU's that have occurred or are underway in the range of the northern spotted owl. http://ecoshare.info/projects/central-cascade-adaptive-management-partnership/workshops/critical-habitat-for-the-northern-spotted-owl/

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The Northwest Oregon Ecology Group relies on a variety of professionals throughout the area to support their activities. The following ecologists and biologists also contribute to the program.

Brett Blundon, District Fisheries Biologist,
Eugene BLM.
Specialities: Stream Ecology.

John Christy, Ecologist,
Oregon Natural Heritage Information Center.
Specialties: Wetland ecology and mosses.

Corbin Murphy, Wildlife Biologist,
Cascades Resource Area, Salem District BLM

Tom O'Neil, Ecologist,
Northwest Habitat Institute.
Specialties: Oak restoration, wildlife habitat,
and biodiversity data management.

Allison Reger, Analyst,
Willamette National Forest.
Specialties: VDDT modeling, and landscape analysis.

Program Design: Alan Work, Mountain Hawk LLC, Graphic Design and Interpretive Services, www.mountainhawk.org