Federal agencies, state government, collaborative groups, and businesses have been attempting to increase the pace and scale of restoration in fire-adapted forests of eastern Oregon. Our goals were to analyze how forest collaboratives and Forest Service managers can successfully plan and manage at landscape scales; and, to determine how scientific research, participatory simulation modeling, and innovations in collaborative participation may facilitate this. This research contained four components: 1) participatory landscape simulation with collaborative groups in eastern Oregon using the Envision computer model, 2) adaptive learning and synthesis about the role of science in collaborative landscape planning, 3) a west-wide survey how of 205 federal managers conceive of landscapes and scientific tools, and 4) a case study of collaborative engagement in landscape planning in Wallowa County, and 4). Results include multiple findings about how different forest restoration strategies at the landscape scale affect future forest outcomes in central and southern-central Oregon, and the process challenges of aligning stakeholder interaction and model results. We also found that a majority of managers across the West see a need to manage for landscape scales and use computer models but not at the expense of other tools, and that social acceptance of treating riparian areas within forested landscapes was affected by trust in the Forest Service to implement treatments and the temporal scale of proposed activities. We prioritized stakeholder engagement and access to knowledge through 12 interactive workshops to develop and apply research results, and a series of technical briefs.
Final Report Narrative (3 pages maximum)

OVERVIEW
Federal agencies, state government, collaborative groups, and businesses have been attempting to increase the pace and scale of restoration in fire-adapted forests of eastern Oregon. However, achieving landscape-scale outcomes has been challenging: forest collaboratives have typically focused on identifying agreement at smaller scales, and agency planning and management across ownerships is growing but limited. Scientists have begun to develop landscape tools to address these problems and inform accomplishment of accelerated restoration. Our goals were to analyze how forest collaboratives and Forest Service managers can successfully plan and manage at landscape scales; and, to determine how scientific research, participatory simulation modeling, and innovations in collaborative participation may facilitate this. This research built on the prior work of the Forests, People, Fire project. It concerned three IWFL themes: Resilient Ecosystems, Healthy People and Communities, and Competitive and Innovative Products. Our project contained four components: 1) participatory landscape simulation with collaborative groups in eastern Oregon using the Envision computer model, 2) adaptive learning and synthesis about the role of science in collaborative landscape planning, 3) a west-wide survey how of 205 federal managers conceive of landscapes and scientific tools, and 4) a case study of collaborative engagement in landscape planning in Wallowa County, and 4). Outputs to date include seven technical extension papers, nine scientific or managerial presentations, 12 stakeholder workshops/webinars, one website, one master’s thesis, one submitted manuscript, three draft manuscripts, two infographics, and one GIS story map.

RESULTS
Describe any new knowledge gained: Results include, first, findings about how different forest restoration strategies at the landscape scale would affect future forest outcomes using participatory scenario modeling in central and southern-central Oregon. These suggest that forest management can modify fire behavior at stand and patch levels and sometimes (cumulatively) at landscape levels. However, in all cases, stopping forest restoration activities led to increased area and severity of wildfire. Although wildfire will not intersect most fuel treatments, treatments can increase the resilience of forests and landscapes to fire, drought, and some insects and disease, allowing some fires to burn less severely. Scenarios that incorporated more prescribed fire and the use of managed natural ignitions had the greatest ability to modify fire area and severity. Large landscapes (e.g. millions of acres) can absorb many fires and much management activity without large changes in overall conditions and fire behavior. Even a doubling or tripling of the rate of restoration and fuel treatments may have only a small effect on the occurrence of a high-severity fire and exposure of human values to high-severity fire over a 50-year period. But the fact that large landscapes are difficult to change with restoration and wildfire also means that they can accommodate many values and disturbances. Given the limited effect of fuel treatments in modifying fire behavior across whole landscapes, though, it is more effective to concentrate restoration treatments spatially to control behavior of fire around high value parts of a landscape where fire effects may be least desired (e.g. WUI and habitat species that use dense older forests). Our modeling work demonstrates that clustering fuel treatment along existing barriers to fire (e.g. roads) or high value areas reduces severe fire area more effectively than doubling treatment area with no targeted spatial pattern. It also shows that the probability of high-severity fire in small old-growth areas can be reduced if they are embedded in landscapes that have been the focus of treatment that restore resilience. We also found that under current harvesting levels, average stand diameter increases over time. The implication of this is that increasingly large shares of ponderosa pine stems will be over 21 inches and unavailable for harvest under current Forest Service practices in eastern Oregon. Second, our process evaluation of our scenario engagement with collaborative groups and our own adaptive learning revealed that aligning stakeholder
interaction and model results was challenging given the time required to run the model, results were of interest but at a coarser scale of insight than collaborative dialogue had typically focused, and that different collaborative groups may have varied preferences for how to incorporate and value model results depending on the formality or informality of their own organizational cultures. Third, our survey of agency managers found that a majority shared a common view of the concept of landscapes, emphasized conditions at the landscape scale, felt that scientific knowledge should have more weight when public consensus is low, and felt that computer models were important but should not supersede other information. A clear understanding of model operation and assumptions was key to achieving comfort with use of computer models. Finally, our case study of stakeholder engagement in Wallowa County found that social acceptance of treating riparian areas within forested landscapes was affected by trust in the Forest Service to implement treatments and the temporal scale of proposed activities. Stakeholders often described tradeoffs between the provision of a single ecosystem service at different time periods, where maintaining or enhancing immediate conditions conflicted with maintaining or enhancing long-term conditions or vice versa.

**Description of planned outcomes and deliverables versus actual:** As planned, this work generated new knowledge about the potential future outcomes of accelerated restoration scenarios, and helped inform current collaborative dialogue in central Oregon. However, we expanded our project to increase our breadth of impact beyond this region by adding new methods, locations of study, and means of outreach. This included a Q-sort-based case study of a pioneering landscape management project in Wallowa County, a west-wide survey of manager perspectives, and a series of technical briefs to share results and insights to practitioner audiences. Deliverables are listed in full in the “Other Supporting Materials” section. We also leveraged $50,000 of funds from the PNW research station given their interest and partnership in this work; these funds were used in place of IWFL funds and resulted in cost savings to the College.

**Incorporation of IWFL themes:** Our research examined how to create more fire-resilient landscapes that support the production of ecosystem services including forest products, wildlife, and functioning riparian systems. These values were inherently integrated in the modeling scenarios we developed. In particular, some scenarios posed direct questions about the future impacts of no action, current actions, and increased treatment actions. Results helped illustrate how accelerated restoration may affect the future availability of different sized stems for timber harvest and associated economic benefit from processing materials; and how use of more intensive harvesting regimes on federal lands changed product flow and future stand conditions. One key finding is that at the landscape scale, highly divergent management strategies (e.g., increased timber production vs. wildlife habitat preservation) can arrive at generally similar landscape conditions and outputs decades into the future. This is because 1) large landscapes have the varying forest conditions and the capacity to produce a range of ecosystem services and 2) they are dynamic—trees are continuously growing and dying and wildfire is a constant. We also fostered new understanding of how collaborative groups can engage scientific tools to consider landscape-scale management approaches and implications; collaboratives are a key part of healthy social dialogue about forest management in many western communities.

**Description of partnerships with organizations external to the College of Forestry:** This project engaged the Deschutes Collaborative Forest Project (DCFP) and the Lakeview Stewardship Group (LSG) in landscape simulation exercises through interactive workshops and application of results (component #1). We also engaged Wallowa Resources and the Wallowa-Whitman Forest Collaborative in the design and implementation of the case study (component #4). Each collaborative group contains multiple participants from the US Forest Service, local community/county government, the forest industry, NGOs, and others. We estimate that we engaged with over 40 unique individuals through these partnerships.
OSU researchers also worked closely with two scientists from the PNW Research Station and leveraged $50,000 of funding through this partnership.

**IMPACTS**

**Short term and long term impacts on management/policy and the benefit/impact to Oregon and IWFL stakeholders:** Our results have many implications that can help enhance and focus the collaborative restoration of fire-adapted landscapes. Prominent among these are that the trajectories of large landscapes are hard to change, and that managers and stakeholders should focus on entire landscapes and long-term timeframes so as to not over-estimate the effects of certain management actions or differences between alternative plans. They should also consider how large landscapes can provide for a range of human and ecological values, and absorb many disturbances; if there is social willingness to accept temporal, spatial, and resource tradeoffs. This suggests a need for collaborative dialogue to “scale up” and away from its common focus at the level of stands and prescriptions. Our findings that also indicate that how and where we manage forests matters more than how much we do so, because tools such as managed natural fire, prescribed fire, and mechanical thinning applied in strategic locations with a targeted spatial pattern are more likely to result in reduced fire severity.

**Outreach:** Outreach was not an end-stage activity, but was rather the central focus of this project. We consistently engaged the DCFP and LSG throughout in scenario development and potential application of findings in 12 workshops and webinars. All project personnel had established relationships in these communities and did not need to rely solely on Extension for outreach. FNR Extension personnel engaged were EJ Davis, Nicole Strong, and Daniel Leavell. Davis assisted with design of stakeholder workshops, and Strong and Leavell participated in all activities with the DCFP and LSG in their respective areas. Strong led a scenario development subgroup for the DCFP. Davis developed a technical extension brief series designed for practitioner audiences, and requested detailed written peer review from both agents; Strong provided this. The briefs and findings were then shared through social media posts by the College of Forestry and the Northwest Fire Science Consortium. We held a webinar with the NWFSC attended by myriad managers and practitioners across the Northwest. Keith Olsen was creating a web map interface for ongoing stakeholder engagement with scenario results, but left OSU before this task could be completed. We also engaged with the PNW Research Station to complete additional infographics and a GIS storymap through their established science outreach channels.

**Current and planned publications:** Publications are listed in full in the “Other Supporting Materials” section. We have published seven technical briefs, two infographics, and one GIS storymap; have submitted one scientific manuscript that is under review; and have three manuscripts in draft form.

**Graduate student involvement:** We initially engaged one Master’s student to conduct research on landscape-scale management on an east-side national forest, then added a second to conduct the case study of stakeholder social acceptance in Wallowa County. The former is working for Lake County Resources Initiative reviewing the biophysical monitoring data collected on the Fremont-Winema National Forest to organize it and make it available for researcher use. The latter completed a thesis, presented research results and informed collaborative dialogue with the Wallowa-Whitman Forest Collaborative Group, and is currently working on a manuscript.
Other Supporting Materials  (2 pages maximum)

TECHNICAL BRIEFS


PRESENTATIONS


Merschel, A.G. 2017. Go Big or Go Home? Tools and Processes for Scaling up Collaborative Landscape Restoration. Invited oral presentation to Oregon Department of Forestry (All staff meeting). February 2017. Salem, OR.


STAKEHOLDER WORKSHOPS or WEBINARS
With Deschutes Collaborative Forest Project, six workshops were held on: 4/14/16, 8/3/16, 10/26/16, 2/24/17, 6/22/17, and 11/14/17.

With the Lakeview Stewardship Group, five workshops or webinars were held on: 5/19/16, 6/22/16, 8/24/17, 12/4/17, and 8/22/18.

With Wallowa-Whitman Forest Collaborative Group, one workshop was held on 8/22/2018.

MANUSCRIPTS AND THESES


