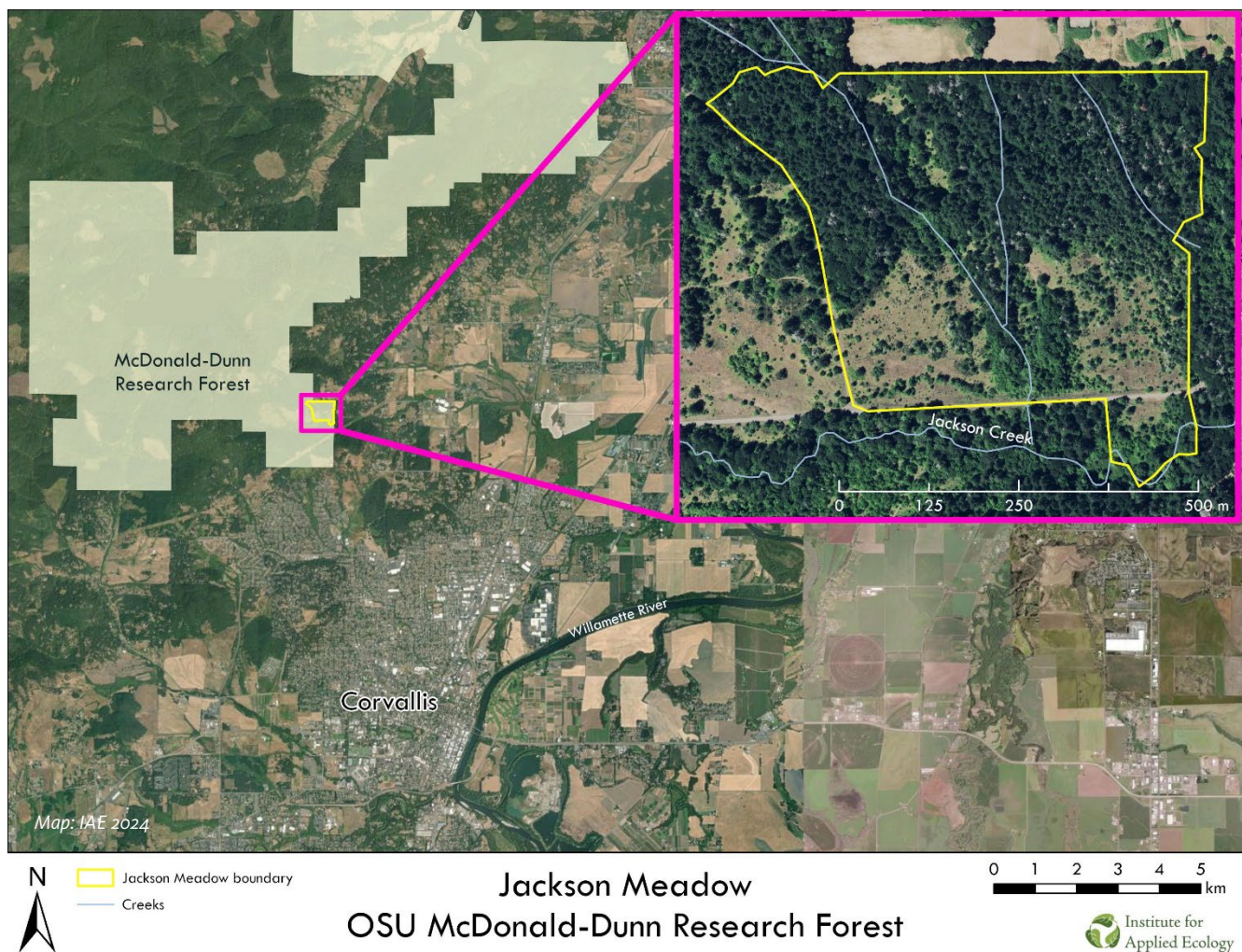


Jackson Meadow Restoration Information

Note: The information in this document has been adapted from the Restoration and Management Plan for Jackson Meadow, created by the Institute for Applied Ecology.

1. LOCATION

Jackson Meadow is a 27-acre site located in the Oregon State University (OSU) McDonald-Dunn Research Forest just north of Corvallis, Oregon (Figure 1). The site can be characterized by two distinct topographical landforms: an upland area composed of a mixed forest, and a bench with remnant prairie habitat (both xeric and mesic) being encroached by woody vegetation. There are three riparian corridors that drain south through the site toward Jackson Creek.



Location of Jackson Meadow in the Oregon State University McDonald-Dunn Research Forest north of Corvallis, Oregon.

Prior to European settlement, Jackson Meadow was likely a mix of oak woodland, savanna, and prairie habitat, typical of much of the Willamette Valley and surrounding foothills at the time. These ecosystems were maintained for thousands of years by the Indigenous Kalapuya people. The Kalapuya deliberately used fire to reduce non-oak woody vegetation and maintain open habitat composed of native bunchgrasses and forbs, which provided food and other important resources (Boyd 1999). In the absence of frequent disturbance, these ecosystems naturally transition toward conifer-dominated forests. Following Euro-American settlement, fire suppression, land conversion, and the establishment of non-native species have contributed to the loss and modification of native oak-prairie habitat. Today, these landscapes are critically imperiled, with <10% of original habitat remaining (Noss et al. 1995).

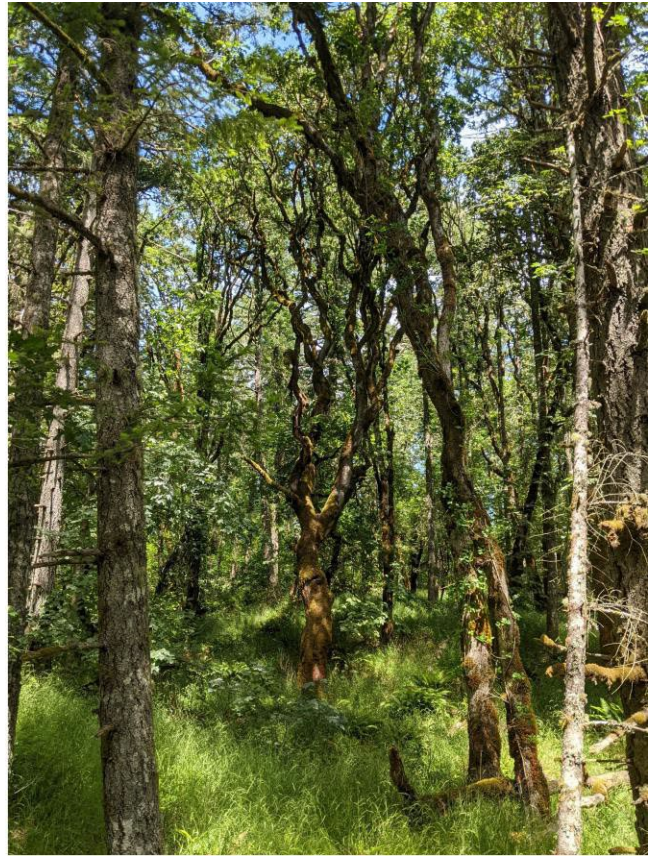
In 2021, OSU's College of Forestry began partnering with the Institute for Applied Ecology (IAE) to develop and implement an oak-prairie restoration project for Jackson Meadow. The 67-year-old Douglas-fir stand in the upland was scheduled to be harvested in 2022 to release 419 Oregon white oak trees for wildlife and aesthetics and reduce fuel loads along the forest boundaries. This created an opportunity to conduct a full-scale restoration of the site, including the remnant meadows in the bench adjacent to the harvested upland. IAE developed a restoration proposal that also included a research component to monitor changes in site condition over the project's duration and contribute to a regional network restoration experiment.

2. PURPOSE AND OBJECTIVES

The restoration project at Jackson Meadow has the following objectives:

1. Release stand-grown oaks from competition with Douglas-fir and transition the upland area from a closed-canopy forest to oak savanna-woodland.
2. Decrease woody encroachment in the remnant prairie meadows.
3. Reduce the abundance of non-native species.
4. Increase the abundance and diversity of native species.
5. Monitor site changes over time and adapt practices based on data and observations.

In summer 2022, OSU completed the oak-release timber harvest at Jackson Meadow. A post-harvest cleanup process began in early 2023 and will be followed by several years of [chemical fallow treatments](#) before introducing native plant materials.



(Left) Meadow area in the bench dominated by non-native grasses, such as common velvetgrass (*Holcus lanatus*) and false brome (*Brachypodium sylvaticum*), experiencing woody encroachment from common hawthorn (*Crataegus monogyna*). (Right) Forested area in the upland with a unique growth-form bigleaf maple (*Acer macrophyllum*) being crowded by Douglas-fir (*Pseudotsuga menziesii*). The understory is dense with false brome. *Credit: Photos taken in July 2022 by Institute for Applied Ecology*

3. **POST-HARVEST ASSESSMENT**

OSU completed logging operations at the site between September – October 2022 and removed thousands of trees (mostly conifers) while retaining more than 1,000 others, including oaks and other hardwoods, wildlife snags, riparian trees, and large diameter Douglas-fir. IAE visited the site post-harvest to assess on-the-ground conditions, map habitat types, and determine appropriate management units for restoration. Many mature overtopped oaks were released from conifer competition, as were other native hardwoods such as bigleaf maple and Pacific madrone (*Arbutus menziesii*). Logging operations caused considerable ground disturbance in some areas and resulted in a substantial amount of stumps and woody debris across the site. Some of this debris was gathered into burn piles, most of which have been burned as of February 2023. In April 2023, IAE observed a handful of retained trees across the site that appear to have fallen on their own over the course of the winter, likely due to windstorms.



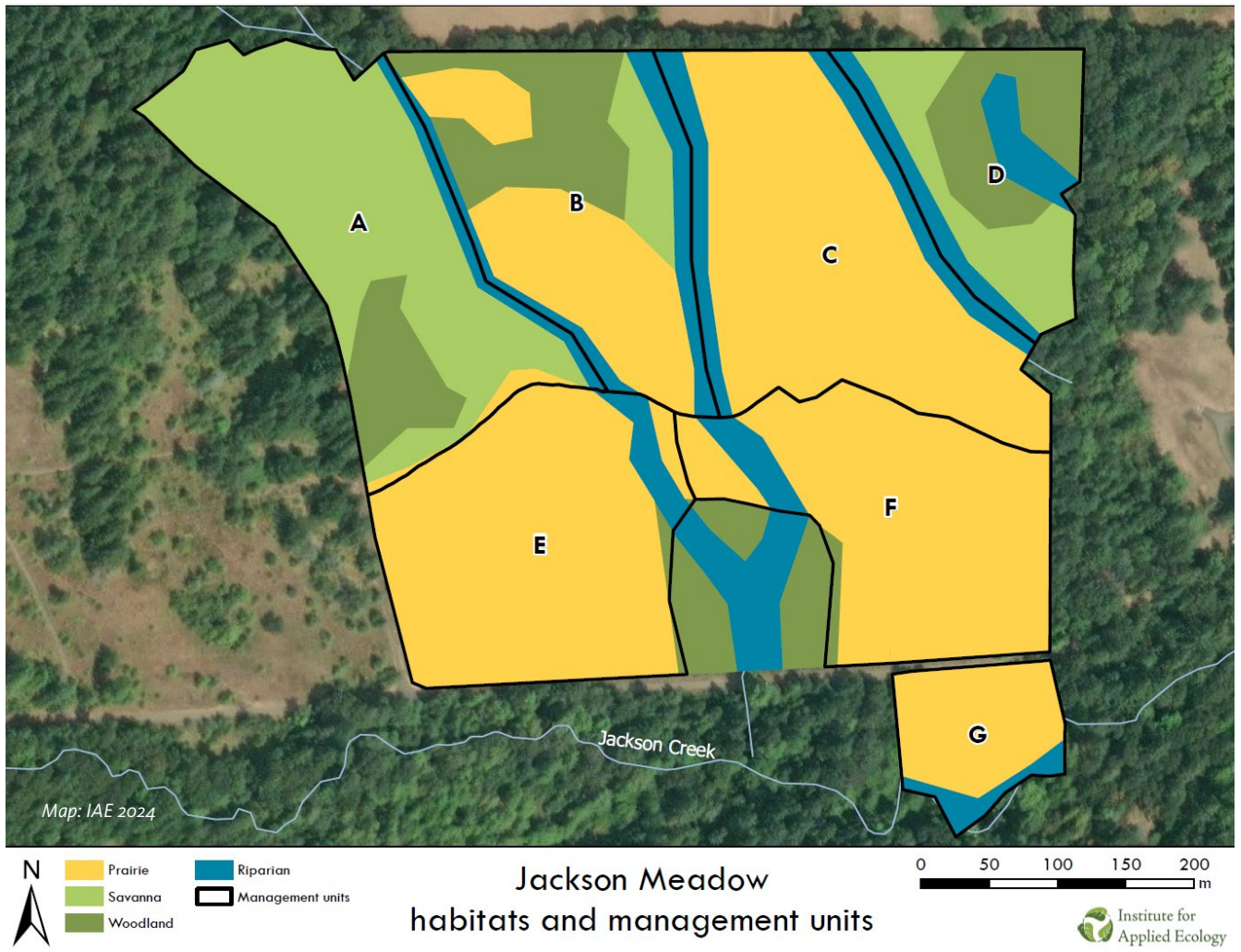
A relatively dense stand in the southwest corner of the site with mature Oregon white oaks (*Quercus garryana*; foreground) and Pacific madrone (*Arbutus menziesii*; background center) after being released from conifer competition. *Credit: Photos taken in February 2023 by Institute for Applied Ecology*



Tree stumps and woody debris litter the site following timber harvest operations. *Credit: Photos taken in February 2023 by Institute for Applied Ecology*

Habitat types and management units

The site can be divided into seven management units. The upland region is composed of units A (6 acres), B (5 acres), C (6 acres), and D (3 acres), while the bench is composed of units E (5 acres), F (4.5 acres), and G (1.5 acres).



Map of post-harvest habitat types and proposed management units. Boundaries are approximate and do not exactly match true conditions on the ground. Letters indicate management units.



Example photos for six of the seven management units. (A) a large madrone (*Arbutus menziesii*) amid an Oregon white oak (*Quercus garryana*) stand in unit A; (B) looking north up unit B from the dirt spur; (C) a thin Oregon white oak that was retained amid

widespread tree harvest in unit C; (D) a seep emerging from the ground in unit D; (E) looking northeast across the meadow in unit E; (F) looking north across the meadow in unit F. Unit G not shown. *Credit: Photos taken in February 2023 by Institute for Applied Ecology.*

4. **RESTORATION STRATEGY**

It is important to recognize that restoration is a dynamic process, with each site responding to actions differently, depending on factors such as soils, topography, and past land use. Thus, a key element of the Jackson Meadow restoration strategy will be the use of adaptive management practices. Management units, treatment timing, and techniques may deviate from the original plan based on annual monitoring data and observations. All management decisions will receive final approval by OSU.

Proposed activities

Reduce woody encroachment in the meadows

Much of the woody vegetation in bench management units E and F were removed or destroyed during timber harvest operations. After harvest, IAE began removing the remaining hawthorn, rose (*Rosa sp.*), and other woody species from these units using chainsaws and hand mowers.

Burn debris piles

Following timber harvest, there were approximately 78 slash piles of substantial size (at least 10-m in diameter) across the site. These piles can act as a source of weeds, as plants growing under the cover of woody material may be less exposed to herbicide treatments. Therefore, burning these piles in a timely manner will be critical before progressing to further restoration activities.

Mastication and mowing

Even with the larger debris being gathered into burn piles, there is still a lot of material on the ground which is not conducive for typical prairie restoration practices. This is a larger problem in the upland area but will still be a challenge in the bench meadow units because of all the small trees and shrubs that were destroyed when equipment drove through. Additionally, the meadows contain abundant grass thatch from previous growing seasons that could impede herbicide applications. Before any widespread chemical treatments occur, it is imperative for a mastication machine to mulch the entire project area. This will help expose bare soil, flush out weeds, and make the ground easier to navigate during herbicide application, mowing, and seeding.

Chemical fallow

Typical restoration of degraded prairie-oak habitat includes several years of continuous

herbicide applications to kill all ground vegetation and create bare soil conditions in which to plant (known as a chemical fallow treatment). Maintaining fallow for several years is the best opportunity to reduce the weed seed bank at the site. Chemical prescriptions depend upon the primary weeds and vegetation present.

Revegetation

Once the site has been fallow for three years, IAE will sow a mixture of native grass and forb seed purchased from local native seed producers. Given the variety of habitats across the site (Figure 8), there will be at least three seed mixes developed: an upland prairie mix, a woodland/savanna mix, and a wet prairie/riparian mix.

To complement seeding, planting plugs, bulbs, and bareroots is a useful way to increase diversity across the site, particularly after the first year of seeding when one can assess which species, functional groups, or phenology may be lacking from the community.

We recommend assessing conditions after the first year of seeding to determine which native perennial species should be supplemented with these types of plant materials.

Spot sprays

In between broadcast herbicide applications and once native seed is on the ground, spot spray treatments should be conducted to deal with problematic weed outbreaks. IAE plans to visit the site regularly to monitor weed problems and respond rapidly. By targeting specific species, or a suite of species (e.g., perennial grasses), we can tailor chemical prescriptions to be most appropriate for a given situation.

5. MONITORING

Monitoring is an important component of the restoration plan for Jackson Meadow. IAE will use observations and data from monitoring efforts to adjust restoration plan treatments, prescriptions, and timing to achieve the most desirable outcomes. Each June between 2023-2026, IAE will continue to collect vegetation cover data. These data will be analyzed annually to track the change in conditions through time and determine whether additional actions should be taken. Additionally, IAE will make site visits at least once per season to locate and map invasive species, track their phenology to determine when to act, assess the efficacy of restoration treatments, and evaluate native species establishment (after seed is sown).

6. MAINTENANCE

Prairie-oak ecosystems are characterized by early successional habitat and have historically required regular disturbance to prevent conifer encroachment. Moreover, the widespread distribution of invasive species in our region today adds a layer of complexity to the management of these ecosystems. As a result, once the restoration phase is complete, regular maintenance will be necessary to achieve the long-term

sustainability of prairie-oak habitat at Jackson Meadow (Table 4).

RestoreNet experiment

Across a regional network, experimental studies provide great insight regarding how unique site factors affect restoration treatments and how implementation techniques affect restoration results. RestoreNet is a regional, collaborative, experimental network open to all restoration practitioners and hosted by IAE. The RestoreNet experimental design was developed collaboratively by practitioners and researchers to be robust, relevant to ecological theory, and able to address real-world restoration questions. Each RestoreNet site is a replicate of the experiment that addresses critical questions and restoration challenges unique to each site, while contributing to a regional network to apply information learned across broader scales. RestoreNet aims to improve restoration outcomes by 1) increasing knowledge of the factors that affect native plant establishment and, ultimately, restoration outcomes; 2) reducing restoration costs; 3) addressing questions important to ecological theory, including topics related to species life history traits and plant communities; and 4) engaging practitioners in the research process to improve research questions and dissemination of useful results.

During the Jackson Meadow project planning phase, IAE and OSU agreed that the project could serve as a valuable addition to the greater RestoreNet study. As a result, IAE will implement two RestoreNet sites during the restoration process at Jackson Meadow.

7. Citation:

All information in this document has been adapted or sourced from the Institute for Applied Ecology's Restoration and Management Plan for Jackson Meadow.

Reed, P., Mitchell, J.C., Esterson, A.T., and Harris, S. 2023. Restoration and management plan for Jackson Meadow in the OSU McDonald-Dunn Research Forest. Institute for Applied Ecology, Corvallis, Oregon