2025 McDonald-Dunn

Forest Plan

Oregon State University

COLLEGE OF FORESTRY

LAND ACKNOWLEDGEMENT

The forested landscapes that now constitute the McDonald and Dunn Research Forests are located on the traditional homelands of a diversity of Indigenous Peoples who were forcibly removed from their lands and often relocated to reservations. We navigate, and are part of, systems that marginalize people, and we take thoughtful action to decolonize our practices and ensure a diverse, inclusive and equitable environment for work and study that honors Sovereignty Rights. We respect the contributions of Indigenous communities and center our work around the Seventh Generation Principle, and incorporate multiple ways of knowing and cultural humility into our understanding and stewardship of natural resources. The College of Forestry is committed to taking people and the institutions with whom we work beyond the land acknowledgement to find ways to support and empower Native Americans and their communities. We honor and respect Tribal Sovereignty and Self Determination Rights as we work to partner with, support, and build capacity within Tribal Nations in Oregon and beyond.

Oregon State University
College of Forestry

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Executive Summary

The McDonald and Dunn Forests occupy approximately 11,500 acres north and west of Corvallis. These two tracts, often referred to collectively as the McDonald-Dunn Forest due to adjacency, are the two largest of the ten research and demonstration forests managed by Oregon State University's College of Forestry.

As property owned by Oregon State University, the intent of these forests is to provide opportunities for learning through research, teaching, and outreach, while demonstrating a variety of active forest management approaches. The forests are stewarded to continuously create and maintain conditions that foster possibilities for learning about all aspects of sustainable forestry, forest products, natural resource management, and the human dimensions associated with forests. Ownership by Oregon State University allows several distinct advantages, including (1) enabling long-term studies of complex forest dynamics, which are essential for understanding the slow processes associated with forest management, and (2) allowing the testing of innovative management approaches not in use on other public or private lands. In addition to their educational role, the forests receive extensive visitation from recreationists who use the space for a variety of activities including hiking, running, biking, horse riding, dog walking, and hunting (with the latter occurring on the Dunn Forest only).

The College of Forestry accommodates researchers, students, instructors, and recreationists by employing a team of research forest staff with diverse expertise and using revenue generated through timber harvest to maintain the forest. All aspects of the McDonald-Dunn Forest are interconnected and rely on active forest management (Figure 1). Active management creates conditions that support a wide range of scientific and educational opportunities: it enables inquiry through research and student investigation through class assignments, provides real-world demonstrations for forest owners and managers, allows students to gain skills and experience planning and implementing forest management operations, and enables community learning through participatory science. Simultaneously, the revenue generated from timber harvests funds forest staff salaries and enables hiring of external entities with essential specialized expertise; is used to maintain roads, trails, facilities, and signage; facilitates acquisition of seeds and seedlings for reforestation and restoration; finances labor associated with preparing sites for planting; supports surveys for species of interest; enables invasive species control and wildfire risk reduction activities; funds research equipment and supplies; supports recreational activities; and supports volunteer management, interpretation and outreach, monitoring to enable adaptive management, and much more.

Figure 1. *Active forest management underpins all aspects of the McDonald-Dunn Forest.*

Providing high quality opportunities for research, teaching, and outreach, while also providing quality recreational opportunities, requires broad consideration of tradeoffs. For this reason, the 2025 forest plan was developed with extensive input from many individuals over the course of three years. Iterative forest modeling was a cornerstone of the forest plan development process, enabling an assessment of tradeoffs among various management options by anticipating future forest characteristics likely to arise because of land allocation decisions. These predictions of future conditions under different land allocation scenarios enabled community and university discussion and input in evaluating tradeoffs when making decisions.

The aim of this plan is to strategically chart the course of the McDonald-Dunn Forest so that it (1) aligns with the vision, mission, and goals of the OSU Research and Demonstration Forest network; (2) reflects the diversity of ideas brought forth by college, university, and community members during the plan development process in a meaningful way; and (3) provides a flexible framework that guides the decisions that will be made by research forest staff such that research and teaching needs are fulfilled, best practices are demonstrated, and the forests are able to adapt to changing conditions and human values over time. Although operational implementation decisions are made according to the professional judgement of the research forest staff, ultimate responsibility for high-level research forest decision-making lies with the dean of the College of Forestry and a new *Research Forest Technical Advisory Committee* that emerged as a recommendation during the plan development process.

Plan Development Process

This plan is built around the vision, mission, and goals underpinning all research and demonstration forests managed by the College of Forestry. The vision, mission, and goals were developed during 2021, at the direction of the dean of the College of Forestry, by a group of faculty members representing a broad range of disciplinary expertise. Germane to the vision, mission, and goals is the premise that the research and demonstration forests serve as a model for actively and sustainably managed forest systems.

To ensure incorporation of diverse perspectives and overcome perceived shortcomings of previous forest management plans that were developed nearly entirely by academics, two committees worked concurrently to prepare this plan at the direction of the dean of the College of Forestry from early 2022 to early 2025: a *Faculty Planning Committee* (comprised of employees of OSU), and a *Stakeholder Advisory Committee* (comprised of individuals external to OSU). Additional input was provided through meetings with the Tribal Councils of the Confederated Tribes of Siletz Indians and Confederated Tribes of Grand Ronde, through two Community Listening Sessions, two Community Input Sessions, two Academic User Input Sessions, a survey of academic use of the forests, and a webform that solicited public input continuously throughout the planning process. Input was received from faculty, staff, students, alumni, recreational users, neighbors, and interested members of the community. A wide range of opinions and ideas were expressed regarding various aspects of the forest and the policies guiding management. The input was summarized, considered carefully, and used by the two planning committees in developing the resulting document. A more thorough discussion of the process used to develop the plan is included in Chapter 1, and on the research forest website.

New Management Paradigms

This new plan supersedes the previous forest plan for the McDonald-Dunn Forest adopted in 2005, which superseded the plan developed in 1993. The 2025 Forest Plan builds off the approach taken in the 2005 Forest Plan by reimagining the four landscape-scale **themes** that previously guided land allocation across the forest with five **management strategies.** The themes of the 2005 Forest Plan ("Short rotation wood production with high return on investment," "High quality, growth maximizing timber production," "Visually sensitive, even-aged forest," and "Structurally diverse forest") have been replaced by these newly defined management strategies: "even-aged, short rotation," "even-aged, long rotation," "multi-aged, multi-species," "late-successional forest," and "ecosystems of concern". The intent of incorporating management strategies rather than adopting outcome-based management area designations or some other approach is to ensure there are a wide variety of silvicultural systems in place so that at any point in time, students, staff, and faculty can find replicates of specific silvicultural systems at various stages of development to use in research, teaching, or for hosting Extension demonstrations.

Each of these five new management strategies is expected to model sustainable forestry while emphasizing a different suite of forest values, uses, products, and services. The ***even-aged, short rotation*** management strategy will enable learning about methods that could yield high wood production with a reduced land footprint, obtain quicker financial returns, and reduce investment risks to help industrial and other private landowners remain financially-competitive in forest products markets. As the primary approach to industrial land management, it is essential as a research comparator to alternative practices. This strategy will simultaneously routinely create habitat for species dependent upon early seral forest conditions and enable rapid transition to new timber species and/or new genetic sources of existing species in response to changing climatic conditions. The ***even-aged, long rotation*** management strategy will provide learning opportunities about the production of larger, high-quality wood managed across longer rotations. This will provide opportunities to practice intermediate stand treatments, enhance carbon sequestration, and provide habitat for species along the continuum of forest ages, from early seral to older forests conditions. Management that emphasizes longer rotations is a strategy of interest for some Tribal communities, many family forest owners, and public forest managers in the Pacific Northwest. The ***multi-aged, multi-species*** management strategy will enable exploration of a variety of approaches to create complex forest communities and structures with multiple age classes and species, which is a pressing research need as climatic conditions and social pressures shift over time. The ***late-successional*** forest management strategy will encompass existing reserves established through the 2005 Forest Plan as well as additional new acreage, providing opportunities to learn about the benefits and risks associated with maintaining older forests with limited intervention and how to effectively steward forests to enhance older forest characteristics. The ***ecosystems of concern*** management strategy will entail experiential learning about restoration and maintenance of three ecosystems of particular interest in the region: native oak savanna/woodlands, prairies/meadows, and riparian/aquatic systems.

This suite encompasses varying intensities of forest management, enabling research and monitoring of the ecological, economic, and social benefits and costs associated with each. This sets the stage for learning about a variety of pressing issues such as wildfire risk, competition among trees under changing climatic conditions, carbon within forests and harvested wood product pools, identification of operational efficiencies, and the economics of forest management, while educating students who are the professional forestry workforce of tomorrow.

To inform decisions regarding the amount of acreage to allocate to each of the five management strategies across the forest, an external consultant modeled 15 scenarios reflecting varying acreage allocations. This information was used to allow evaluation of tradeoffs among the anticipated forest conditions and revenue generation resulting from differences in acreage allocations among the management strategies. The final land allocation selected reflects a "middle ground" in the sense that it is not possible to simultaneously maximize all values the forests could provide. The forest must generate income to maintain infrastructure and function, which means a net positive cash flow over time. For this reason, analyses factored into account the expenses associated with the required personnel, infrastructure, operations, outreach and communication, and all other anticipated financial needs associated with forest management and maintenance. Ultimately, the plan calls for a reduction in total harvest volume relative to the past, with current calculations indicating a sustainable harvest level of approximately 4.3 MMBF/year, down from the 6.0MMBF/year established by the 2005 Plan.

The use of management strategies across the forest does not preclude the implementation of innovative silvicultural practices aimed at advancing learning through research and demonstration. Research forest staff welcome requests from faculty, staff, and students for testing novel management approaches at any time and there is flexibility in the plan to afford such amendments.

Plan Outline

The plan is organized into 4 chapters. Chapter 1 establishes the foundation for the plan by describing the plan's intent; delineating the process used to craft the vision, mission, and goals of all the research and demonstration forests managed by the College of Forestry; detailing the processes used to create this plan; and recounting prior forest planning efforts. This material sets the stage for Chapter 2, which provides a thorough site description including information on the location, biophysical conditions, historical ownership and land use, cultural resources, zoning and regulations, timber harvest and natural disturbance history, recreation history, infrastructure, and current forest conditions. Chapter 3 details all aspects of the intentions of the new plan by describing how Indigenous perspectives will be incorporated into stewardship of the forest; the central premise of providing ample opportunities for learning through research, teaching, and outreach; the foundational concept of economic sustainability; definitions of each of the new forest management strategies; explanation of the multitude of approaches incorporated to ensure biodiversity is sustained; recognition of numerous threats to forest health and recommended approaches for management where appropriate; considerations of various aspects of visitor management and neighbor relations; and descriptions of approaches that will be used to enhance community engagement and partnerships. Lastly, Chapter 4 outlines how the plan will be implemented by describing roles, monitoring and data archiving expectations, and specifications for reporting that will allow for adaptive management as new information is learned, and conditions change over time.

This new plan was developed with the aspiration that it would provide guidance such that the McDonald-Dunn Forest would realize heretofore untapped potential for learning through research, teaching, and outreach while showcasing ecological, economic, and social sustainability. The intent is to enable the forest to serve as a living laboratory that expands knowledge, promotes the sharing of outcomes, and influences decision making in land management practices across the full spectrum of forest ownership types — from small private woodlands to industrial forests.

Acknowledgements

This plan, and the foundational content within, was developed, reviewed, and revised by many individuals, committees, and groups. The College of Forestry would like to acknowledge their many contributions to the development of this plan.

We especially acknowledge and thank the members of the *Faculty Planning Committee* and *Stakeholder Advisory Committee*, as well as the many members of the community who attended listening sessions and input sessions, contributed public comments, and directly reached out to us to provide their thoughts and suggestions.

Faculty Planning Committee (FPC)[1]

- John Bailey – *FERM, College of Forestry*
- Kevin Bladon – *FES, College of Forestry*
- Mindy Crandall – *FERM, College of Forestry*
- Cristina Eisenberg – *former Associate Dean of Inclusive Excellence and Director Tribal of Initiatives, College of Forestry*
- Tiffany Garcia – *FWCS, College of Agricultural Sciences*
- Mark Kerstens – *FERM, College of Forestry*
- Dave Lewis – *AE, College of Agricultural Sciences*
- Ian Munanura – *FES, College of Forestry*
- Laurie Schimleck – *WSE, College of Forestry*

Stakeholder Advisory Committee (SAC)

- Jennifer Beathe – *Starker Forests*
- Dave Ehlers – *Benton Small Woodlands Association*
- Jim Fairchild – *Audubon Society of Corvallis* [stepped away from the SAC in September 2024]*
- Trey Jackson – *Forest Recreation Advisory Committee, Team Dirt*
- Michael Karnosh – *Confederated Tribes of Grand Ronde*
- Elise Kelley – *Oregon Department of Fish and Wildlife*
- Mike Kennedy – *Confederated Tribes of Siletz Indians [retired in August 2024]*
- Jessica McDonald – *Greenbelt Land Trust*
- Jesse Ott – *Benton County Natural Areas and Parks*
- Angela Sondenaa – *Confederated Tribes of Siletz Indians [joined in September 2024]*
- Kaola Swanson – *Conservation Fund*
- John Taylor – *Forest neighbor*
- Leo Williamson – *Oregon Department of Forestry*
- Faye Yoshihara – *Forest neighbor*

Ex-officio

- Jenna Baker – *Recreation and Engagement Program Manager, Research Forests*
- Brent Klumph – *Associate Director of Operations, Research Forests*
- Carli Morgan – *Inventory, GIS, and Reforestation Manager, Research Forests*

Stakeholder Engagement Facilitators

- Turner Odell – *Senior Project Manager, Oregon Consensus, Portland State University*
- Jennah Stillman – *Project Associate, Oregon Consensus, Portland State University*

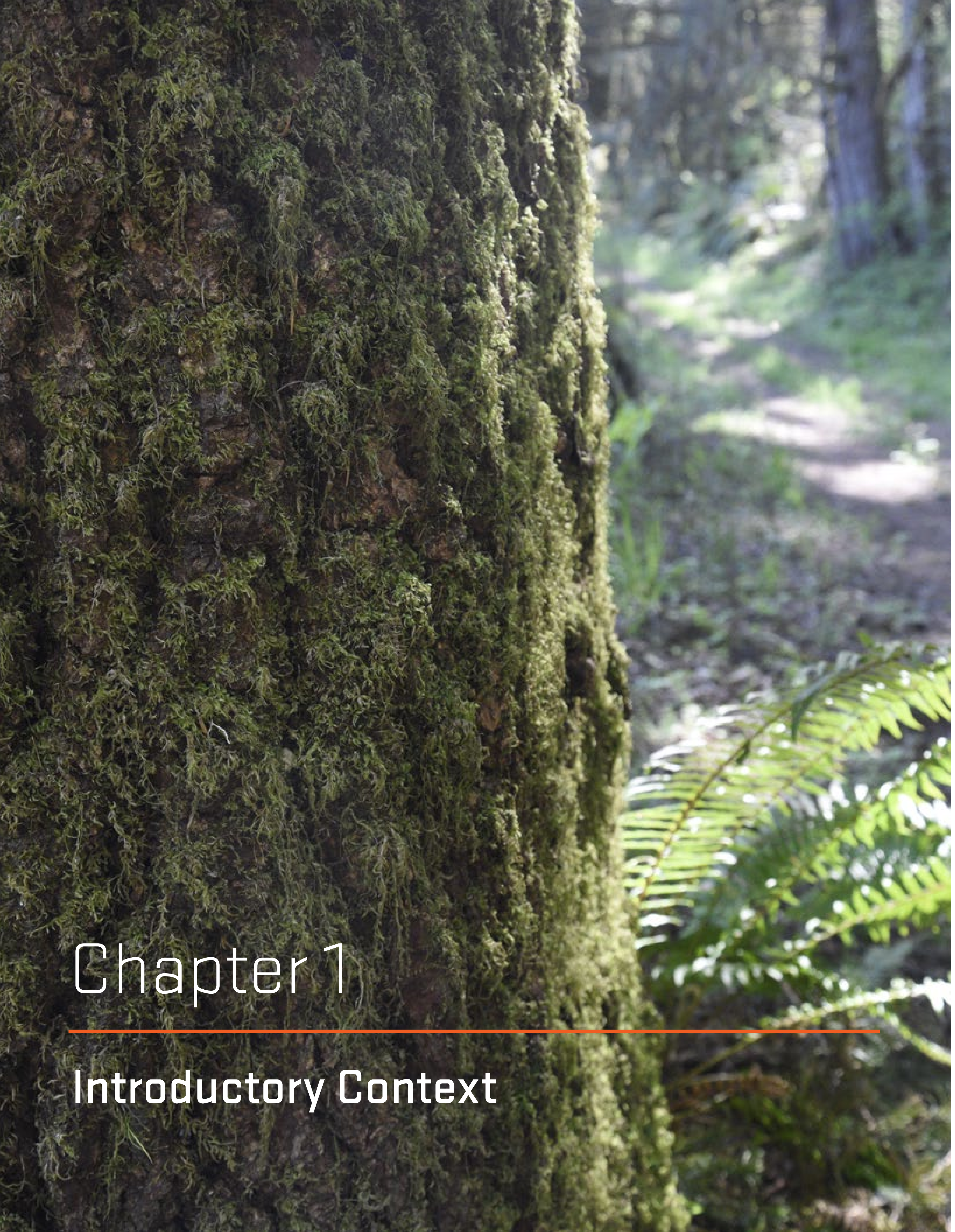
[1] *AE = Dept. of Applied Economics; FERM = Dept. of Forest Engineering, Resources and Management; FES = Dept. of Forest Ecosystems and Society; FWCS = Dept. of Fisheries, Wildlife, and Conservation Sciences; WSE = Dept. of Wood Science and Engineering*

Additional Contributors

- Jeff Behan – *Institute for Natural Resources*
- Matt Betts – *FES, College of Forestry*
- Ray Brunner – *Institute for Natural Resources*
- Meg Krawchuk – *FES, College of Forestry*
- Graham Frank – *FES, College of Forestry*
- Sean Gordon – *Institute for Natural Resources*
- Joan Hagar – *U.S. Geological Survey*
- Scott Harris – *Institute for Applied Ecology*
- Greg Latta – *L & C Carbon*
- Kevin Lee – *Marketing and Communications, College of Forestry*
- Zhaofeng Lin – *Grant County Soil and Water Conservation District*
- Jordon Lindsey – *Grant County Soil and Water Conservation District*
- Julia Lont – *Marketing and Communications, College of Forestry*
- Katie Moriarty – *National Council for Air and Stream Improvement*
- Jason Piasecki – *National Council for Air and Stream Improvement*
- Jim Rivers – *FERM, College of Forestry*
- Jacob Rose – *Institute for Natural Resources*
- Thomas Stokely – *The Nature Conservancy*
- Jimmy Taylor – *National Wildlife Research Center*
- Ann Van Zee – *Marketing and Communications, College of Forestry*
- Karl Walters – *KR Walters Consulting Services*
- Dana Warren – *FES, College of Forestry*
- Rachel Zitomer – *FES, College of Forestry*

Forest Plan Development Chair and Co-Chair

- Holly Ober – *Associate Dean of Outreach and Extension, College of Forestry*
- Stephen Fitzgerald – *former Director, Research Forests*



Chapter 1

Introductory Context

The ultimate purpose of the Research and Demonstration Forests managed by the College of Forestry is to serve as a model for an actively and sustainably managed forest system by providing outdoor laboratories that offer a wide variety of learning opportunities. Since 1924, the college has stewarded forestlands that enable students to develop and apply their skills, afford researchers venues to gain new knowledge through scientific investigations, and allow community members to acquire new understanding through outreach and demonstrations.

This first chapter of the 2025 Forest Plan explains the intent of the plan, which is essentially to ensure the McDonald-Dunn Forest continues to provide learning opportunities in the short and long term, given current and anticipated future conditions. This chapter also outlines the process used to develop the vision, mission, and goals of the research and demonstration forests, recounts the processes used to create this plan, and chronicles prior forest planning efforts.

1.1 Intent of the 2025 McDonald-Dunn Forest Plan

The lands that now comprise the McDonald-Dunn Forest have gradually come under OSU ownership over the span of nearly a century (1926-2025). Throughout this period, the forest has been managed according to guiding principles that have evolved as scholarly and societal priorities changed. The first document outlining forest management intentions, written in 1931, varies greatly from this one, yet some concepts remain unchanged. Two enduring fundamentals are that: (1) The forests provide opportunities for learning; (2) Timber harvest is used to meet numerous objectives including providing teaching/research/skill building opportunities, promoting forest health, providing a variety of habitat conditions for wildlife, and generating revenue to support the continued existence of the network of research and demonstration forests.

In contrast, some concepts are either entirely new to the 2025 Forest Plan or have much greater emphasis.

- This plan provides a heightened acknowledgement that these forests were the traditional homelands of the Kalapuyan people. As part of the plan development process, conversations were initiated to strengthen relationships between the Confederated Tribes of Grand Ronde and the College of Forestry, and between the Confederated Tribes of Siletz Indians and the College; and to discuss co-stewardship according to the terms of the Tribes. As a result, there is an emphasis on ecocultural restoration and partnerships to foster co-learning.
- A foundational premise is the recognition that management of these forests requires the evaluation of tradeoffs among diverse values. The McDonald-Dunn Forest provides opportunities for research, teaching, and outreach, while also providing social and cultural benefits to a variety of users including the College of Forestry, OSU, community members, and the plants and wildlife that call the forest home. Balancing the expectations of all individuals at once is a challenge that is inherently prone to tension. The intensive modeling effort embedded in the 2022-2025 planning process was undertaken to project likely future forest conditions under different land allocation scenarios so that internal and external input could be considered when making acreage allocation decisions. The plan reflects efforts to accommodate multiple perspectives and values in decision-making.
- Resilience, a forest's long-term ability to adapt to a range of stresses, is increasingly recognized as an essential characteristic for which to aspire when stewarding forests due to changing climatic conditions. This desire to promote resilience is apparent throughout the new plan, evidenced by (1) the metrics used to assess tradeoffs among land allocations (e.g., wildfire resistance, forest carbon, and resilience as it relates to forest composition and forest density), (2) inclusion of a sub-section on climate change as a threat to forest health and sustainability, (3) flexibility built into the management strategies so that reforestation efforts could include planting seedlings from different

locations or even species other than Douglas-fir if new knowledge suggests this is an appropriate approach, (4) the increased acreage allocated to stands with multiple ages and species–-a strategy anticipated to be more resilient than traditional single-aged or single-species approaches, and (5) the increased attention to wildfire preparedness.

- It was recognized from the initiation of the planning process that this plan must be developed to allow for adaptation and accountability. Thus, the plan was crafted to incorporate flexibility that would allow for adjustments over time in response to unforeseen opportunities, constraints, and disturbances as well as availability of new information. Widespread recognition of the challenges that changing climatic conditions may have in dictating future options in sustainable management of forests requires a degree of flexibility unrecognized in previous plans but woven throughout this one. Also, recognition of the need for more transparency and accountability led to the incorporation of monitoring expectations, crafted to align with each of the research forest goals, with the anticipation that these will serve as the cornerstone of adaptive management over time once the plan is implemented.

It is important to note that given the complexity of managing visitor use on a multiple-use forest, a separate McDonald-Dunn Forest visitor use management planning process will be undertaken after this forest management plan is formally adopted. This new visitor use management plan (VUMP) will describe the vision and mission of the forests recreation and engagement program, detail policies and practices related to access, trail development, recreation research and monitoring, communication, education and interpretation, volunteers, and other visitor programming on the McDonald-Dunn Forest. Work on this VUMP is anticipated to begin in early 2026.

The intent of the current plan is to weave together the diversity of ideas brought forth throughout the plan development process 2022-2025 in a meaningful way that reflects a variety of voices and values. We have strived to create a framework that will guide the decisions made by research forest staff while providing flexibility during implementation such that research and teaching needs are fulfilled, forestry best practices are demonstrated, and the forests can adapt to changing conditions and human values. We begin by describing the premise for the new plan, which is the vision, mission, and goals, as defined by faculty at the request of the College of Forestry dean during 2021.

1.2 Processes Used to Define the Research Forests Vision, Mission, and Goals (2021)

Shortly after Dr. Tom DeLuca became dean of the College of Forestry in 2020, he issued a memorandum that charged a group of faculty members to serve on a body named the *Research Forest Advisory Committee.* This group of individuals with diverse disciplinary expertise was tasked with creating draft vision, mission, and goal statements that could encompass all the research and demonstration forests, as well as developing recommendations for a process that could be used to create a new management plan for the McDonald-Dunn Forest.

The dean's memorandum specified that the research forests be managed in such a way that they serve as an attestation of the college's mission ("to explore, evaluate, communicate and catalyze new possibilities in forestry and advance sustainable solutions to challenges facing society"), showcase the college's diverse values, and function as a model of sustainable multiple-value forest management. This committee was asked to craft the vision, mission, and goals such that they would serve as a foundation for future individualized management plans for each research and demonstration forest, ensuring that the forests provide opportunities that further the college's teaching, research, and outreach mandates.

The resulting vision, mission, and goal statements developed by this committee set the foundation for the two plan development committees that were subsequently established. These statements remain unchanged from their original form, as crafted in 2021, and were not altered by later committees.

OSU Research & Demonstration Forest Vision, Mission, and Goals

Vision:

The OSU Research and Demonstration Forests aspire to be globally recognized as a model for an actively and sustainably managed forest system that supports the college's desire to advance forestry through scientific inquiry, education, and the application of new knowledge to inform best practices of forest management.

Mission:

- To create opportunities for education, research, and outreach to address the economic, social, and environmental values of current and future generations of Oregonians and beyond.
- To demonstrate how an actively and sustainably managed forest fosters economic prosperity, biodiversity conservation, and resilience amidst disturbances and global change.
- To support social and cultural values of forests, enhancing the wellbeing of local communities, Tribal communities, and society.

Goals:

- **Learning, Discovery, Engagement** — Provide students, teachers, researchers and the general public diverse opportunities for learning, discovery, and engagement related to forest ecosystems and management for multiple resource values.
- **Stewardship** — Demonstrate sound forest stewardship principles that address the challenge of balancing the need for productive forests, diverse plant and wildlife communities, healthy aquatic ecosystems, carbon storage potential, recreation opportunities, and other resource values.
- **Research** — Provide long- and short-term opportunities for student and faculty research, citizen science, and the sharing of research findings.
- **Resilient Forests** — Promote resilience to the effects of a changing climate, invasive species, insect pests, pathogens, wildfire, urban encroachment, and other disturbances.
- **Working Demonstration Forest** — Demonstrate contemporary and innovative aspects of an active and sustainably managed forest, based on the best available science and technology.
- **Recreation** — Provide safe, diverse, and inclusive recreation opportunities that build forest connections and contribute to community well-being.
- **Community Connections** — Establish, maintain, and enhance relationships and communication with forest neighbors, the broader community, and all those connected with the research forests.
- **Financial Sustainability** — Provide revenue that sustains research forest operations and supports the College of Forestry's education, research, and outreach mission now and in the future.
- **Accountability** — Demonstrate a commitment to transparent governance of OSU's research forest properties focused on achieving the stated vision, mission, and goals.
- **Continuous Improvement** — Demonstrate a commitment to continuous improvement in the management and stewardship of the research forests based on adaptive management principles.

1.3 Processes Used to Develop the 2025 Forest Plan (2022-2025)

The 2025 Forest Plan was developed over a period of approximately three years, beginning in spring 2022 and concluding in fall 2025 (Appendix A). The planning process was segmented into three phases (Figure 2).

The planning process was initiated in early 2022, through the establishment of a contract between the College of Forestry and an external entity, Oregon Consensus (OC). This entity is a program of the National Policy Consensus Center at the Hatfield School of Government at Portland State University, established by state statute as the State of Oregon's program for public policy conflict resolution and collaborative governance. OC provides mediation and other collaborative services to public bodies and stakeholders who are seeking new approaches to challenging public issues. They were contracted to facilitate interactions between the College of Forestry and stakeholders during the plan development process.

OC initiated the gathering of input by conducting assessment interviews with key stakeholders. The aim was to gain an understanding of the breadth and depth of interests relevant to management of the McDonald-Dunn Forest. OC contacted 11 individuals with diverse backgrounds and perspectives via phone in March 2022. Each telephone interview session consisted of a series of standardized questions about the interviewee's (1) observations and concerns about current and past forest management;

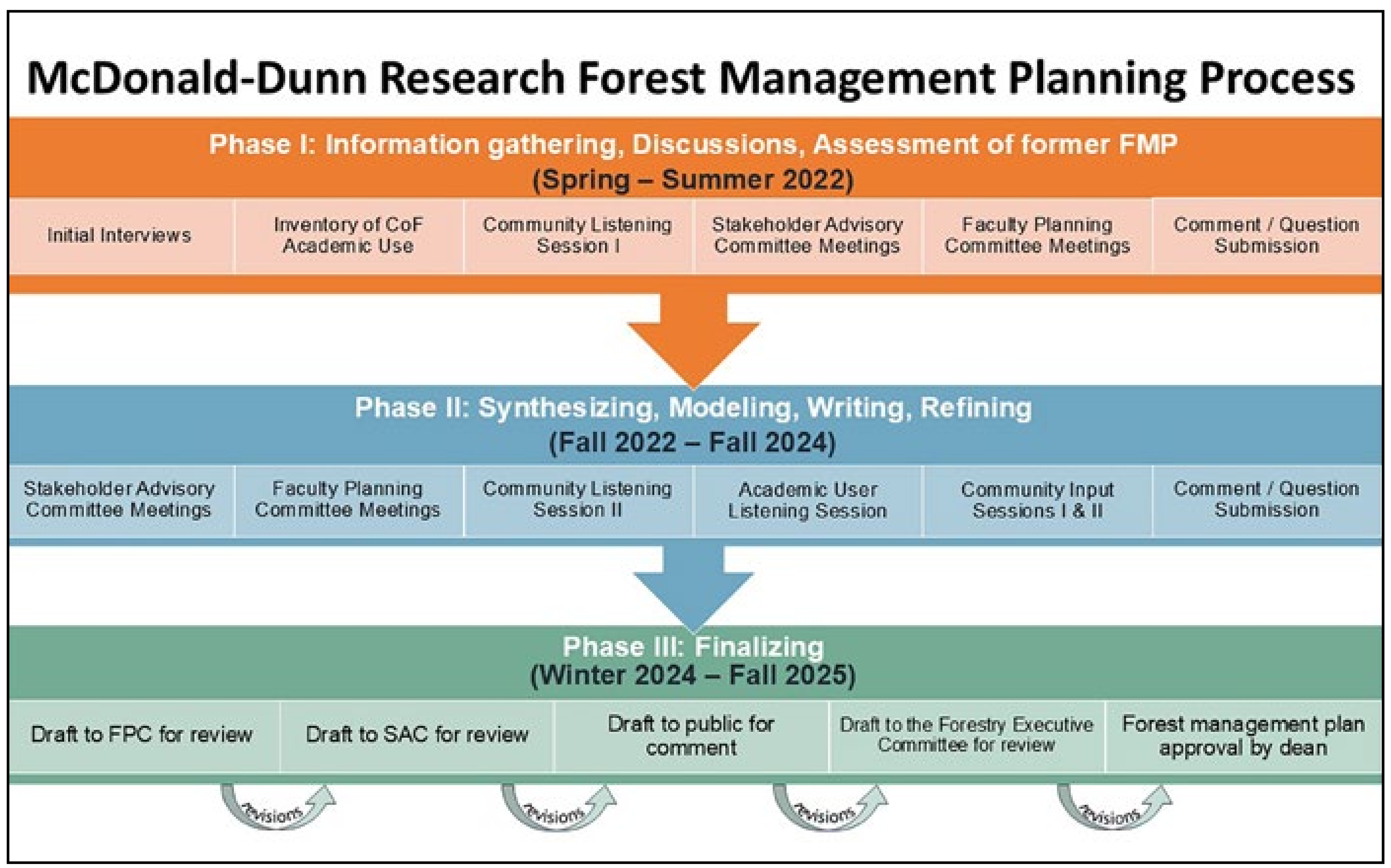


Figure 2. *Overview of the process used to develop the 2025 McDonald-Dunn Forest Plan.*

(2) suggestions and aspirations for future forest management; and (3) observations and suggestions for the process to be used to develop the new forest management plan. Reponses were distilled into five key themes:

- The McDonald-Dunn Forest is highly valued as a community asset.
- The forest provides multiple values, including recreation, wildlife, carbon, timber, research, education, and others.
- Accountability to a forest management plan has been missing and trust in forest management has diminished due to past management actions and inaction.
- A new forest management plan, developed with stakeholder and public input, could provide an opportunity for the College of Forestry to demonstrate a new approach to forest management with greater transparency and accountability.
- There is an opportunity to center research, education, and demonstration in new paradigms for the forest's management.

Using this insight as a springboard, the college issued invitations to potential members of two committees: an internal *Faculty Planning Committee* (FPC) and an external *Stakeholder Advisory Committee* (SAC). The invitees to each group were selected to provide representation from a broad spectrum of interests and expertise, and also to reflect concerns and aspirations that surfaced during the assessment interviews. The SAC had 13 members while the FPC had 10 members plus 3 individuals functioning in an ex officio capacity. Names and affiliations of committee members appear on page 12 of this document.

The roles of the two groups overlapped to some extent. Both were asked to provide input and recommendations on the development of the plan; to work in coordination with the other committee; to work collaboratively and constructively throughout the process; to collectively engage a broad array of voices and perspectives; to participate in meetings and email discussions between meetings; to become familiar with the 2005 Forest Plan and the vision, mission, and goals defined for the research forests in 2021; to assist in the development of management scenarios that would evaluate trade-offs among educational, ecological, social, and economic values; and to provide input on the implementation approach and communication strategies that would ensure long-term engagement and accountability. It was made clear that the SAC would not be a decision-making body but rather an entity responsible for advising, providing input and recommendations on the development of the plan, and reviewing information contributed by the broader public for consideration and integration into the plan. In addition to the requests previously described for both committees, the FPC was also tasked with providing technical input for the plan. Research forest staff were involved in the planning process as technical resources and writers in an ex-officio capacity.

The SAC and FPC began work at a joint meeting in June 2022. The SAC had four solo meetings during 2022 (in August, September, and December), four during 2023 (in January, March, and April), and four during 2024 (in February, June, September, and October). The FPC had six solo meetings during 2022, 13 during 2023, and eight during 2024 (generally biweekly across this timespan, with a break during summers, and then reduced during the later stages). Members of both committees were also invited on two joint forest tours in February and March of 2023 and a final concluding gathering in May 2025. All meetings were open to the public to watch online in real time, and recordings were posted online so they could be viewed later.

Several measures were undertaken to broaden the scope of input beyond these two committees and included efforts to learn from the academic community and the broader community external to the university.

Voices internal to the university

- An online survey was distributed in June 2022 to all faculty and graduate students in the College of Forestry, as well as to deans of other colleges across OSU with a request that they disseminate further. The intent was to gain a better understanding of how faculty and students have been using the McDonald-Dunn Forest for academic purposes.
- Two open forums were held in March 2023. These were intended to gather information on forest use for research, teaching, and outreach, as well as learn about barriers to use of the forest for academic purposes.

Voices external to the university

- Two Community Listening Sessions (CLS) were held in 2022, in August and November. Three questions were asked during the first CLS, to solicit input on steps that should be taken to ensure the research forest provides learning opportunities, provides opportunities to explore how sustainable management can balance multiple objectives, and provides opportunities for recreation and community connections. Three different questions were posed during the second CLS, to solicit ideas on what people value about the forests, what could be done to increase the ability of the forests to provide learning opportunities, and what should be prioritized to ensure sound forest management taking into account changing conditions.

- Two online means of communication were created in August 2022 and remained available throughout the entire planning process, until early 2025. One was a comment submission portal and the other a question submission portal.

Efforts pivoted in Fall 2022 from information gathering and assessment of the former plan to synthesis of current ideas and development of an outline of elements desired for the new plan. Central to this, the SAC and FPC each created a synthesis document that reflected their thoughts on priority components to be included in the new plan. These documents reflected suggestions for the plan development process as well as content for the new plan. These concepts were melded into a single document titled "Overarching Principles Guiding the New Forest Management Plan" (Appendix B). This document served as the basis of the formulation of the initial outline for the 2025 Forest Plan and was returned to repeatedly throughout the plan writing process.

Throughout the latter part of 2023 and into fall of 2024, two contractors conducted analyses that enabled the assessment of tradeoffs associated with different land allocation scenarios across the McDonald-Dunn Forest. One contractor developed growth and yield models to describe anticipated changes in tree and stand composition and volume over time. The other developed a series of models that predicted changes in a variety of forest characteristics of interest defined by the FPC and SAC. This process is described in more detail in section 3.4.2. The results of these projections were discussed during two Community Input Sessions held during June and October 2024, to facilitate broad input on potential land use allocation decisions.

Phase III of the plan development process occurred from late 2024 to fall 2025 as the draft plan was revised according to input from the FPC and SAC. Following this, a 30-day comment period was provided for the community to provide input. Following incorporation of edits, the draft plan was reviewed by the Forestry Executive Committee (a group of faculty, staff, students, and administrators from the College of Forestry), refined based on input received, and finally approved by the dean in late 2025.

1.4 Overview of Recent History of the McDonald-Dunn Forest (past 30 years)

The 2025 Forest Plan is the latest in a series of plans developed over time to guide management of the McDonald-Dunn Forest. Prior plans were implemented in 1993 and 2005. Before the development of the 1993 plan, overall management of the forest came under the purview of the forest manager and forest director with little additional input. Typically, the forest manager would establish work priorities each year that were reviewed and approved by the director (College of Forestry 1993). This approach enabled staff to address issues and devise management strategies in the short term and worked within the paradigm that existed at that time.

1.4.1 The 1993 Forest Plan

In 1992, College of Forestry Dean George Brown tasked a group of 16 faculty from the College of Forestry and College of Agricultural Sciences to be part of a *Forest Planning Team* that would develop a plan for the McDonald-Dunn Forest. This team began by considering public input that was gathered through community meetings and written communications during 1991-1992.

The 1993 plan established nine goals. Operationally, the forest was stratified into three geographic zones: north (approximately 4,000 acres in the Dunn Forest), central (approximately 2,300 acres bounded to the north by the Dunn Forest and to the south by Sulphur Springs Road), and south (approximately 3,300 acres south of Sulphur Springs Road including the headwaters of Soap Creek). Each zone was envisioned as having different forest characteristics, with the north emphasizing younger, structurally uniform stands; the central emphasizing two-aged stands; and the south emphasizing structurally complex forests.

This plan was in effect from 1994 to 2004, although it was not implemented exactly as originally designed. The original plan estimated that the forest could sustain an average harvest of 4.4 million board feet/year (MMBF), based on the land allocations and management direction in the plan. However, shortly after plan implementation, two unanticipated events influenced the harvest schedule. In spring 1995, a federally threatened species, northern spotted owl (*Strix occidentalis caurina*), was observed

nesting in the Oak Creek drainage in the south zone. As a result, many of the forest stands that had been selected by the scheduling model for uneven-aged harvests in the vicinity were no longer available for harvest. Also, in 1995, a new Memorandum of Understanding was developed between the College of Forestry and the College of Agricultural Sciences, transferring management responsibilities and revenues for the forested land on the agricultural farms to Agricultural Sciences. Once the sustainable harvest level was recalculated without these lands, it was reduced from 4.4 to 4.1 MMBF. This harvest level was maintained 1995-2005.

1.4.2 The 2005 Forest Plan

In the spring of 2003, 10 faculty from the College of Forestry plus one representative from forest industry were appointed by College of Forestry Dean Hal Salwasser to the *Interdisciplinary Planning Team* and tasked with updating the management plan for the McDonald-Dunn Forest. This team was charged with creating a plan that focused on desired outcomes, leaving operational implementation up to the professional judgment of the research forest staff. The committee was informed that the success of the plan was to be measured according to predetermined indicators that were each tied to one of the nine newly defined forest goals. They were also told that a primary interest was to use the McDonald-Dunn Forest to test management strategies that would be of primary interest to private forest owners. Lastly, they were instructed to create a plan that would engage College of Forestry faculty in a more active role than was the case with the previous plan.

The ensuing process used to develop the 2005 Forest Plan engaged several hundred individuals (faculty, staff, students, alumni, extended education clients, recreational users, and neighbors) in meetings and online surveys, as well as consultation with the Confederated Tribes of Grand Ronde. Creation of the plan included six steps: (1) collecting existing information, (2) setting forest plan goals, objectives, and indicators, (3) testing several possible management scenarios, (4) identifying needs, issues and concerns of faculty, students and other interest groups, (5) drafting and reviewing the plan, and (6) final plan adoption and implementation.

The 2005 Forest Plan retained the three geographic zones developed as part of the 1993 plan (north, central, and south). It further refined expectations within each zone by delineating four landscape-scale *themes*. Theme 1 (short rotation wood production with high return on investment) was assigned to stands within the north and south zones; theme 2 (high quality, growth maximizing timber production) occurred in all three zones; theme 3 (visually sensitive, even-aged forest) was assigned to stands within the central zone; and theme 4 (structurally diverse forest) was assigned to stands in the south zone. This plan called for an average timber harvest level of 6.0 MMBF/year for the first decade, increasing to 8.0 MMBF/year over time.

The stated purpose of the 2005 Forest Plan was to provide a management framework for research forest staff by allocating the land base of the forest to a variety of management approaches. It was expected that specific prescriptions and project plans would be guided broadly by the silvicultural framework and implemented by the forest staff as they carried out the plan. Overall responsibility for research forest planning and decision-making was the purview of the dean of the College of Forestry and the Forestry Executive Committee.

1.4.3 Suspension and Resumption of the 2005 Forest Plan

The 2005 Forest Plan was in effect for only a short period. The economic downturn commonly referred to as the *Great Recession* began in 2008. Economic challenges were exacerbated by high expenses associated with implementing theme 4 (structurally diverse forest), costs associated with monitoring, and the reduction of research forest staff from 10 individuals to four. Despite the intention of the plan to ensure the forests' financial sustainability in a variety of economic conditions, it ultimately lacked adequate flexibility to accommodate the unprecedented drop in timber prices resulting from the housing crisis that accompanied the recession. It quickly became clear that a contingency plan must be adopted to ensure the long-term viability of the forests, and the plan was officially suspended in 2009.

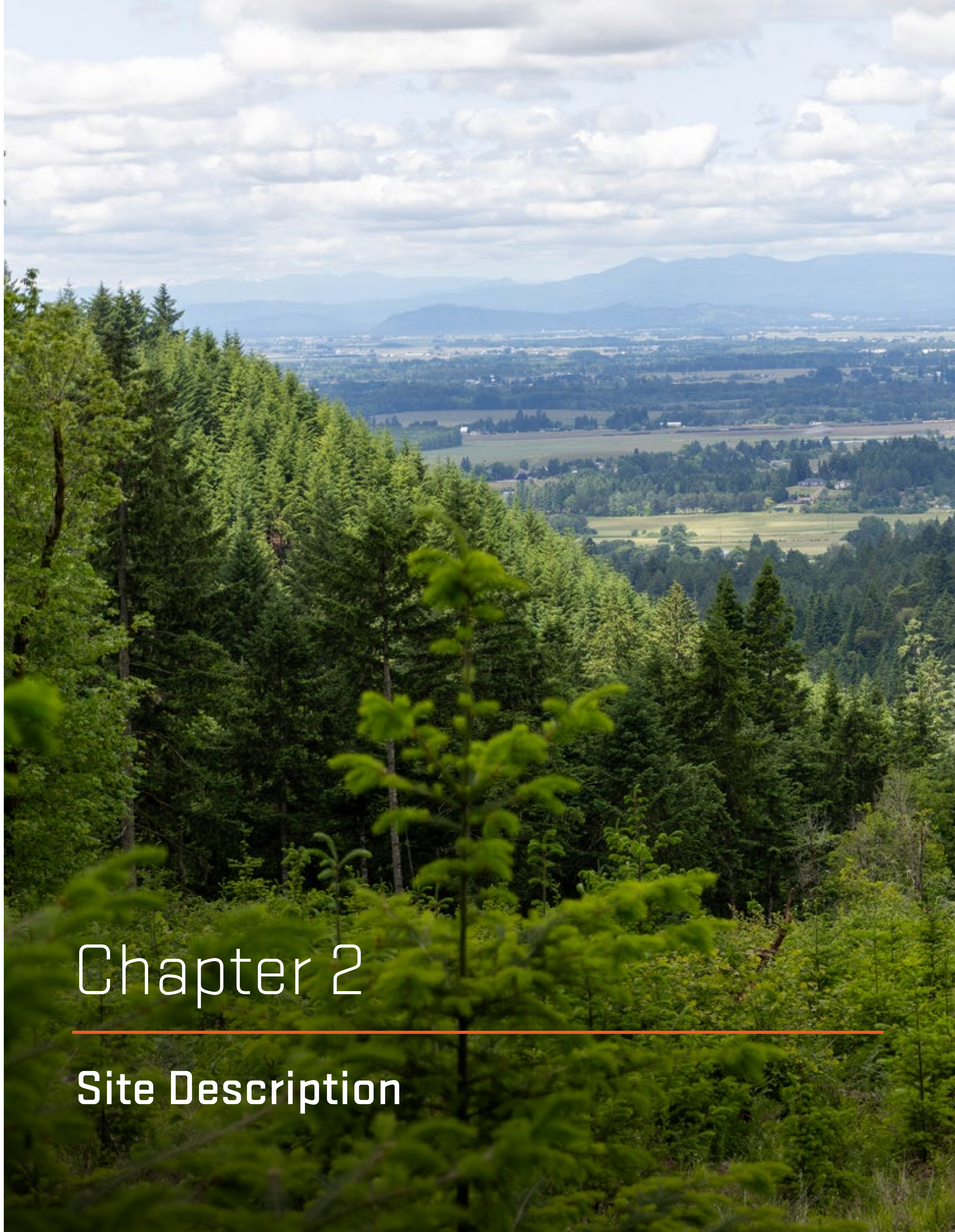
After the 2005 Forest Plan's suspension, the McDonald-Dunn Research Forest staff managed the forest based on annual plans of work developed by the forest director and approved by the dean and Forestry Executive Committee, as had been the paradigm prior to the 1993 Forest Plan. In 2019, significant concern was expressed by the community when a stand containing old trees was harvested, eroding trust in the College of Forestry's management. In response to public request that the 2005 Forest Plan be reinstated, the interim dean of the College of Forestry, Anthony Davis, reinstituted the 2005 Forest Plan in 2019 and mandated that it be followed until a new plan was developed and implemented.

Meanwhile, an inventory of the McDonald-Dunn Forest was conducted 2019–2022, making new data available upon which to base the modeling that could underly development of a new plan.

In 2020, the new dean of the College of Forestry, Tom DeLuca, set the stage for the development of a new plan by convening a *Forest Planning Advisory Committee*, tasked with the development of vision, mission, and goals (as described previously, in section 1.2). This served as the foundation for the efforts then assumed by the *Stakeholder Advisory Committee* and *Faculty Planning Committee* throughout 2022–2025 as development of the 2025 Forest Plan commenced (Table 1).

Table 1. *Recent history of management planning and implementation on the McDonald-Dunn Forest.*

Date	Activity
Pre 1993	Annual forest management plans-of-work were developed by the forest manager, approved by the forest director, and then implemented by the forest manager and research forest staff
1992–1993	The first official forest management plan was created and then implemented
2003–2005	The second official forest management plan was created and then implemented
2009	The 2005 Forest Plan was suspended by the College of Forestry dean due to the economic downturn
2009–2019	The forest was managed according to annual plans of work created by the forest director and approved by the dean and Forestry Executive Committee
2019	The *No Vacancy* Harvest controversy precipitated the interim dean's reinstatement of the 2005 Forest Plan, with the mandate that it be followed until a new plan was developed and implemented
2019–2022	An inventory of the forest was conducted
2020–2021	The new permanent dean charged a team of faculty to develop vision, mission, and goals that would serve as an umbrella for all the research and demonstration forests managed by the College of Forestry
2022–2025	A new forest management plan was developed
2025	The 2025 Forest Plan was approved, and implementation began shortly thereafter



Chapter 2

Site Description

The McDonald-Dunn Forest is by far the largest of the forest tracts managed by the College of Forestry. As such, the physical and ecological attributes are varied. This chapter provides a thorough description of the site. This includes information on the location of the forest, surrounding land ownership, the ecoregion, geology, soils, topography, climate, hydrography, vegetation, historical ownership and land uses, cultural resources, zoning and regulations, timber harvest and natural disturbance history, recreation history, current infrastructure, and current forest conditions.

2.1 Location of the McDonald-Dunn Forest

The McDonald-Dunn Forest covers approximately 11,500 acres on the western edge of the Willamette Valley and the eastern foothills of the Coast Range (Figure 3). The forest is in Benton County, west of U.S. Highway 99W and northwest of Corvallis, between 44.6 – 44.73° N latitude and 123.22 – 123.35° W longitude. The forest is surrounded on all sides by private residential, agricultural, and industrial forest lands (Figure 4).

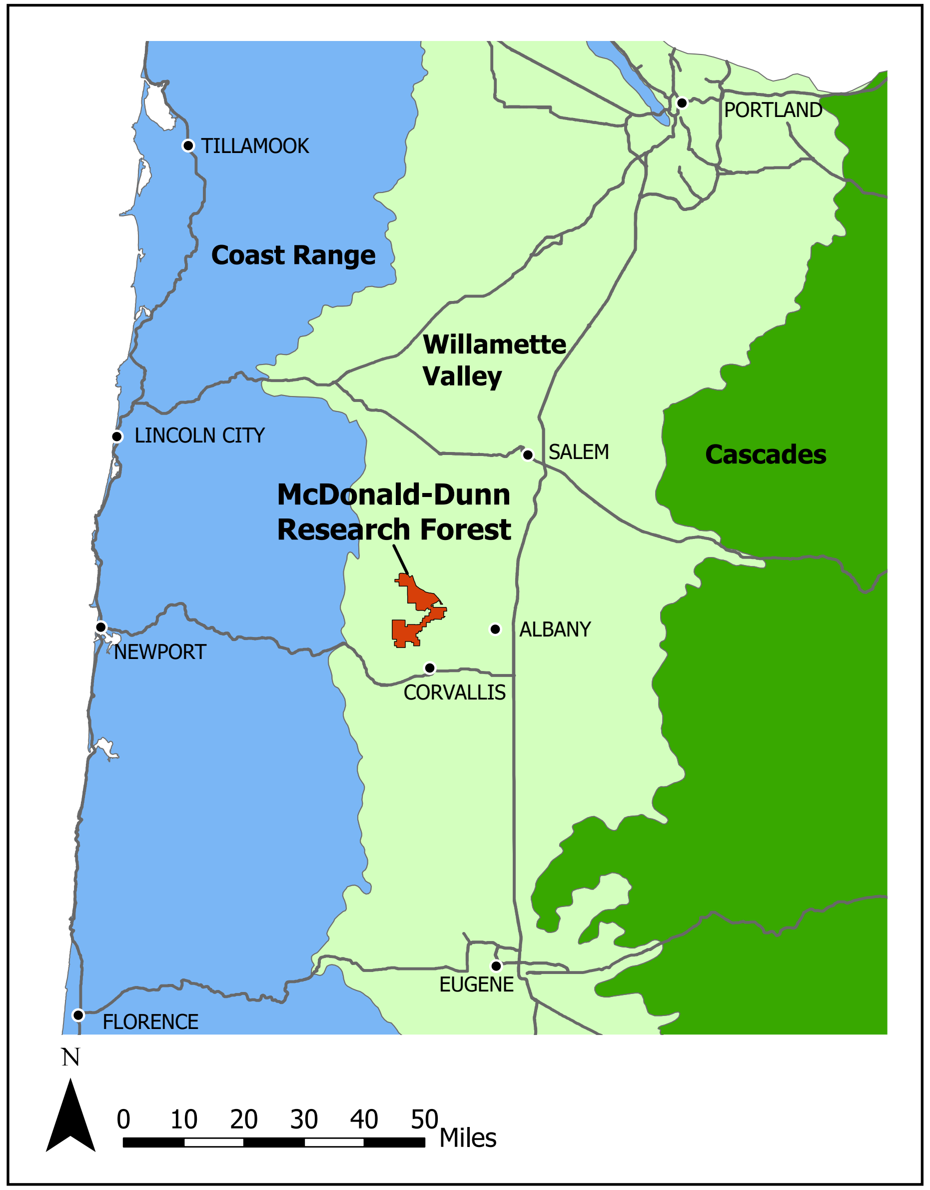


Figure 3. *Location of the McDonald-Dunn Forest in Western Oregon, relative to the Coast Range, Willamette Valley, and Cascades ecoregions.*

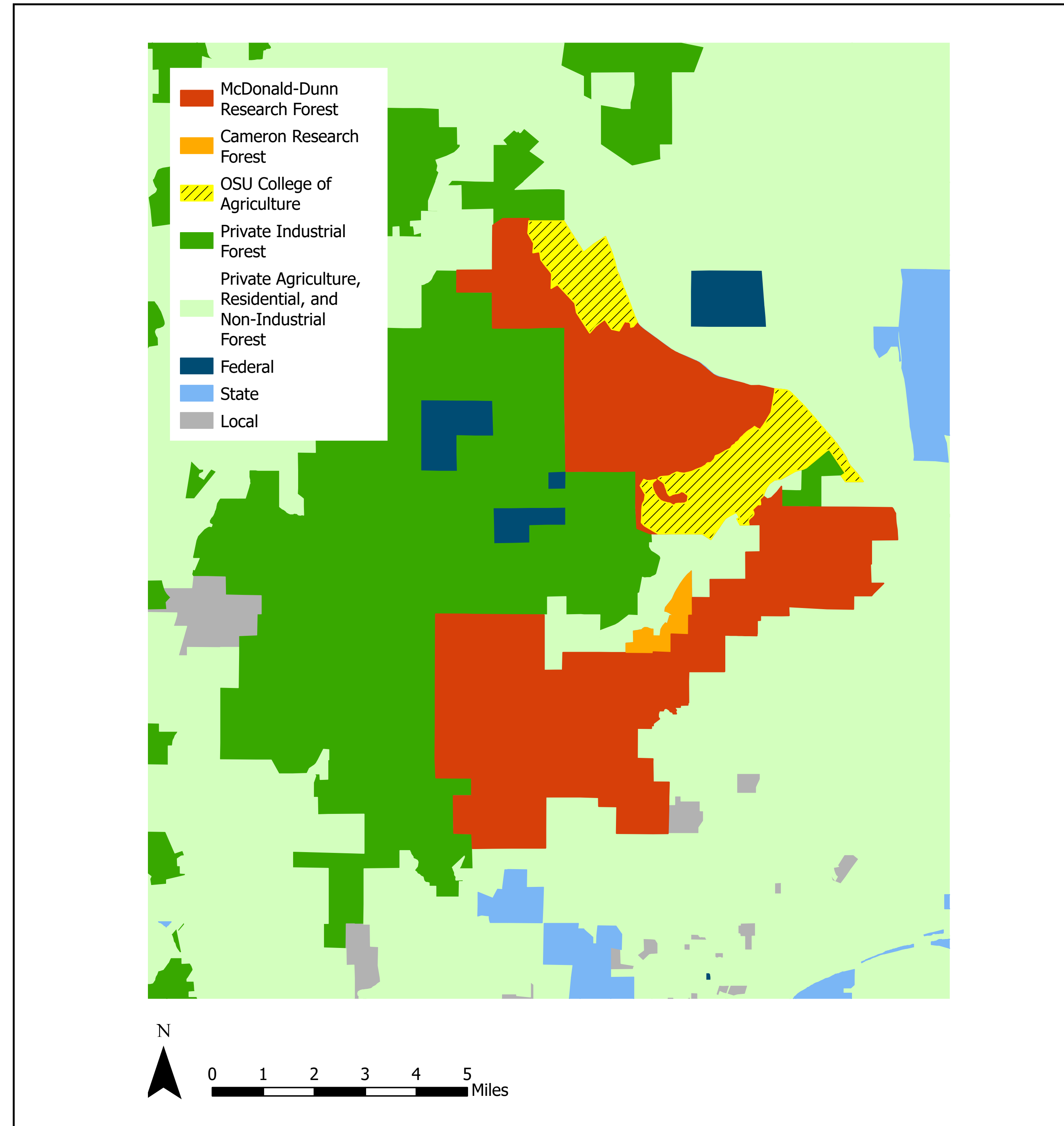


Figure 4. *Land ownership in the vicinity of the McDonald-Dunn Forest. Areas shown with yellow hatching are managed by the OSU College of Agricultural Sciences and are therefore not included in the 11,500 acres covered by this plan.*

2.2 Biophysical Conditions

2.2.1 Ecoregion

The forest is located in the *Valley Foothills* level 4 ecoregion, a transition area between the broader Oregon Coast Range to the Willamette Valley ecoregions (Thorson et al. 2003). To the west, the Coast Range is a mountain range extending north-south, with peaks ranging from 1,000 to over 4,000 feet at Mary's Peak (located 12 miles southwest of the McDonald-Dunn Forest). The mountains capture rainfall moving inland from the Pacific Ocean, creating a mild, mesic climate, with average daily temperatures ranging from 35 to 65°F and annual rainfall ranging from 60 to 120 inches. To the east, the Willamette Valley ecoregion parallels the Coast Range in a north-south orientation, ranging from 20 to 40 miles wide east to west. It is an alluvial plain with the Willamette River as its central feature, located approximately 3 to 5 miles east of the forest. The valley also has a mild Mediterranean climate with wet winters and dry summers, but overall precipitation is lower than the Coast Range (35 to 80 inches) due to the rain shadow effect of those mountains. Mean annual rainfall in Corvallis is 42.7 inches (U.S. Climate Data 2025).

2.2.2 Geology

The Coast Range began as a series of underwater volcanos and seamounts, which were uplifted during collision with the North American continent approximately 34 million years ago. This origin led to geologies combining sedimentary rocks and basaltic lavas (Bishop 2003). Both the northern and southern sections of the forest are dominated by Siletz Volcanics, a type of pillow lava formed when underwater eruptions rapidly cooling into tube-shaped formations (DOGAMI 2020). Limited sediment-dominated geologies occur along the eastern border of the Coast Range, which were influenced to a greater extent by Willamette Valley processes, including inundation during the Missoula Floods which occurred 15,000 to 13,000 years ago.

2.2.3 Soils

Soils on the McDonald-Dunn Forest are dominated by interspersed areas of Jory (39%) and Price (40%) series, particularly in the more upland areas (Figure 5). Both are derived from volcanic (igneous) basalts and are typically deep (>60 inches) and well-drained but with

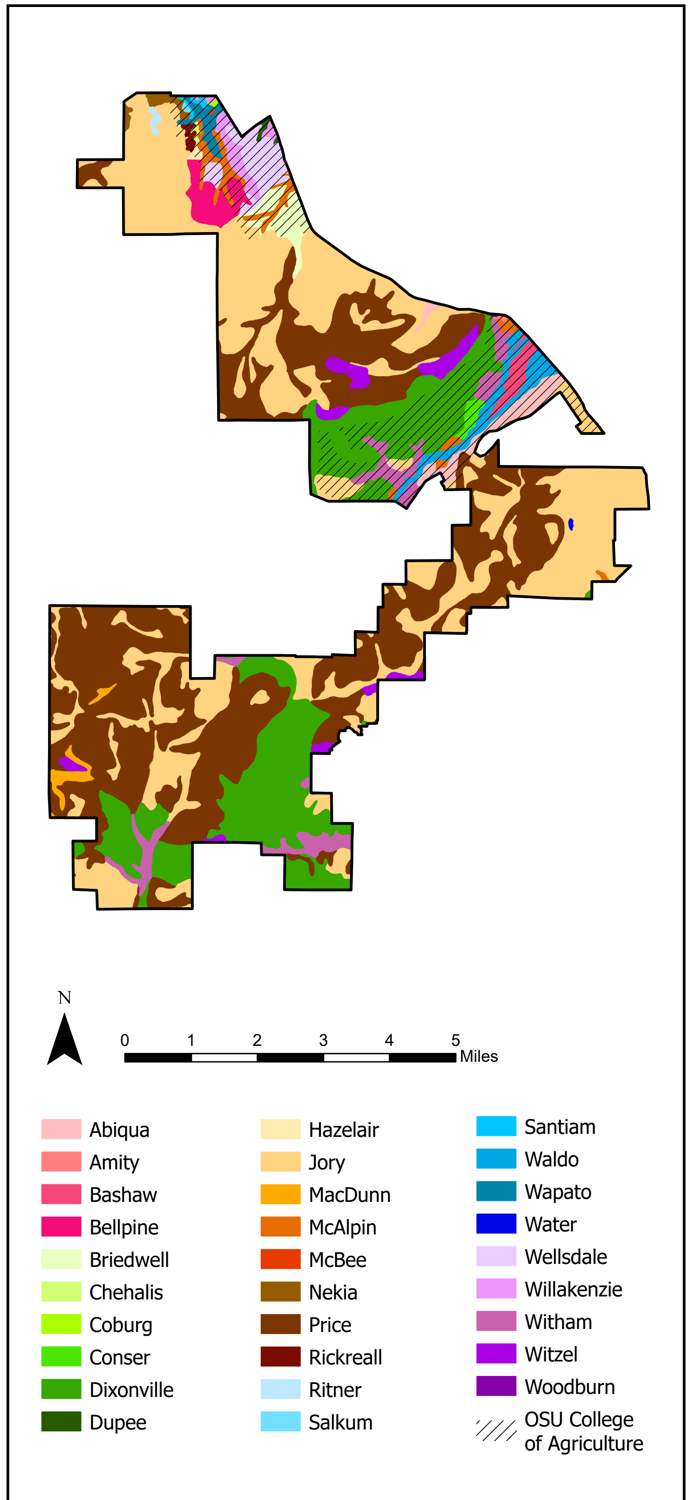


Figure 5. *Soil series in the McDonald-Dunn Forest.*

moderately slow permeability due to high clay content (30–60%). These soils can be productive for forests, as well as for agricultural crops. Price soils, subgroup Typic Haploxerepts, tend to occur on steeper slopes, whereas Jory soils, subgroup Xeric Palehumults, are unique to the Willamette Valley and margins. Soil from the Dixonville series, subgroup Pachic Ultic Argixerolls, comprise a sizable portion of the forest as well. These soils also originate from basalts but are generally shallower (20–40 inches), are found in lower elevation areas on the southern half of the forest, and are savannah and prairie soils (Soil Survey Staff 2024).

2.2.4 Topography

Elevation in the McDonald-Dunn Forest ranges from 250 to 2,100 feet, with the highest points in the southwestern region (Figures 6 a, c). The underlying basalt geology is resistant to erosion, leading to landforms with steep slopes and high relief (Shively 1989). Slopes in this area often range from 30 to 60%, with only a few small areas exceeding the 60% threshold that triggers extra landslide risk precautions in the Oregon Forest Practice Rules. A study of landslide activity along the western margin of the forest found that debris flows and avalanches are the most common landslide types, occurring most frequently below significant breaks in slope and bedrock hollows (Shively 1989). The northeast and eastern boundary of the forest generally have lower elevations and lesser slopes (<10%; Figures 6 b, d).

2.2.5 Climate

Reports from the closest weather station (located 2.5 miles, or 4.0 km, from Peavy Arboretum in the McDonald Forest) indicate that over the past 10 years, average monthly minimum and maximum temperatures were 34 and 47°F respectively in winter, and 53 and 86°F in summer. Average monthly precipitation ranged from a maximum of 7.1 inches in winter (December) to a minimum of 0.1 inches in late summer (August).

A recent climate change assessment for the Oregon Coast region conducted by the Oregon Coast Adaptation Partnership determined that the region has experienced a mean annual temperature increase of up to 2.7°F (1.5 °C) since 1895 (Halofsky et al. 2024). Based on an 11-year moving average, temperatures increased 0.7°F (0.4°C) from 1910 to 1945, dipped in the mid-1940s and mid-1970s, and then rose again by 1.8°F (1.0 °C) from the late 1970s through 2019. Temperature trends varied by season, with the most warming for inland locations observed in summer minimum temperatures—an increase of 3.2°F (1.8°C). This assessment did not find any significant long-term trend in precipitation since 1895 but did note that annual averages during the past 20 years (1999 to 2019) were 5–10% below the 20th century average, with trends less pronounced in inland than coastal areas. Reduced precipitation was most pronounced in the summer season (79% of normal 20th century amounts). This summer reduction in precipitation is pertinent to future forest management planning because increases in wildfires have been associated with reduced summer precipitation across the western US (Holden et al. 2018).

Projections of future climate for the Oregon Coast predict temperatures warming 3.6–7.0°F (2.0-3.9 °C) by 2100. Warming to this degree would mean that the highest elevation locations in the Coast Range would experience temperatures comparable to current temperatures in the Willamette Valley, and lower elevations, such as Corvallis, would experience temperatures similar to those currently experienced in Sacramento, California. Higher air temperatures could gradually cause changes in the distribution and abundance of plant species, with drought-tolerant species likely increasing in dominance (Halofsky et al. 2024). Also, increasing vapor pressure deficits (drier atmospheric conditions) could create greater moisture stress for existing vegetation and drier dead fuel conditions during each fire season.

2.2.6 Hydrography

Streams on the McDonald-Dunn Forest flow into three major drainage basins (HUC10): the Marys River to the southwest, the Muddy Creek-Willamette River to the southeast, and the Luckiamute River to the north (Figure 7). The largest creeks contributing to these drainages are Oak Creek, Jackson-Frasier Creeks, and Soap and Berry Creeks, respectively.

There are approximately 100 miles of mapped streams in the forest, and overall drainage density is 4.7 mi/mi^2. Small streams (as classified by the Oregon Department of Forestry, generally average annual flow <2 ft^3/sec or drainage area <200 acres) make up 96% of the total, with the remaining 4% classified as medium-sized (2 to 10 ft^3/sec). Soap Creek becomes a large class stream (>10 ft^3/sec) but only after it leaves the forest and flows through land managed by the College of Agricultural Sciences. Most of

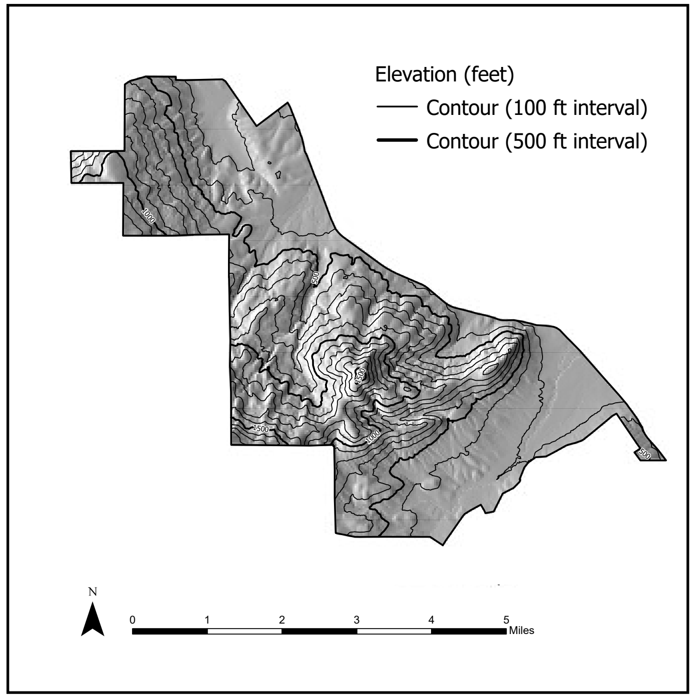


Figure 6a. *Topography of the McDonald-Dunn Forest: Dunn Forest elevation.*

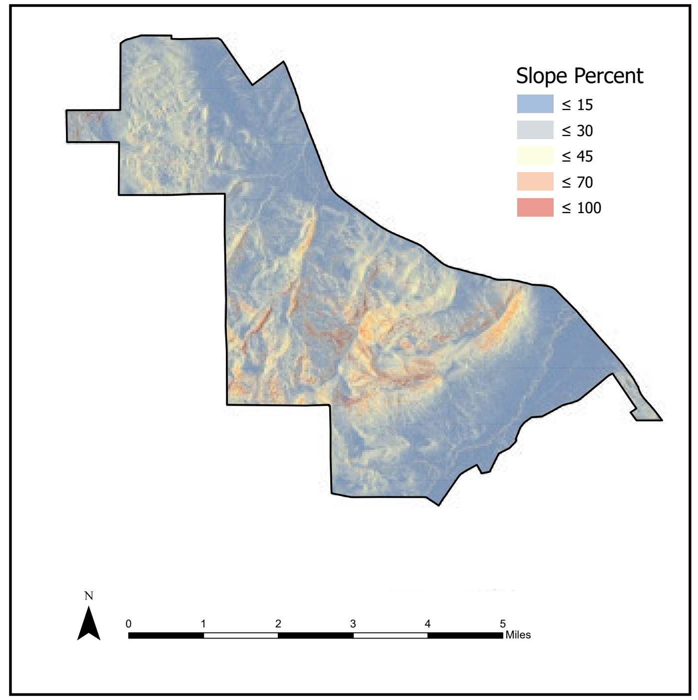


Figure 6b. *Topography of the McDonald-Dunn Forest: Dunn Forest percent slope.*

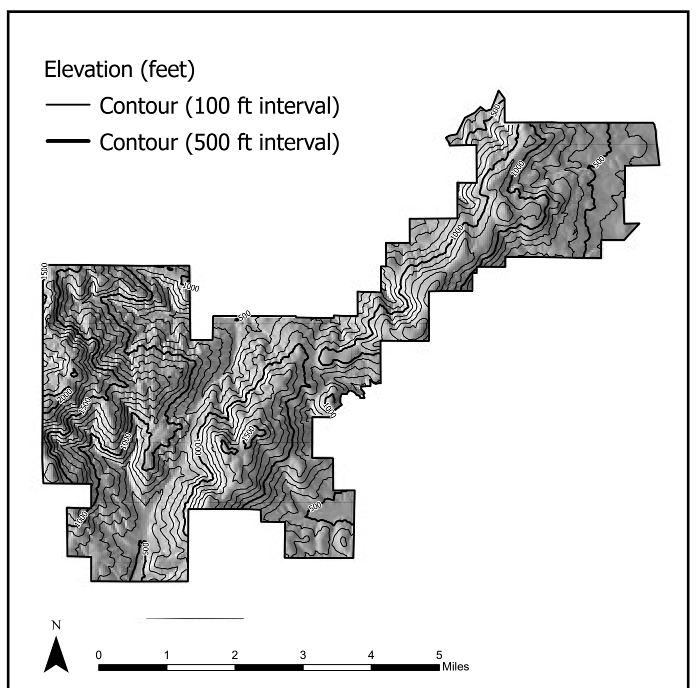


Figure 6c. *Topography of the McDonald-Dunn Forest: McDonald Forest elevation.*

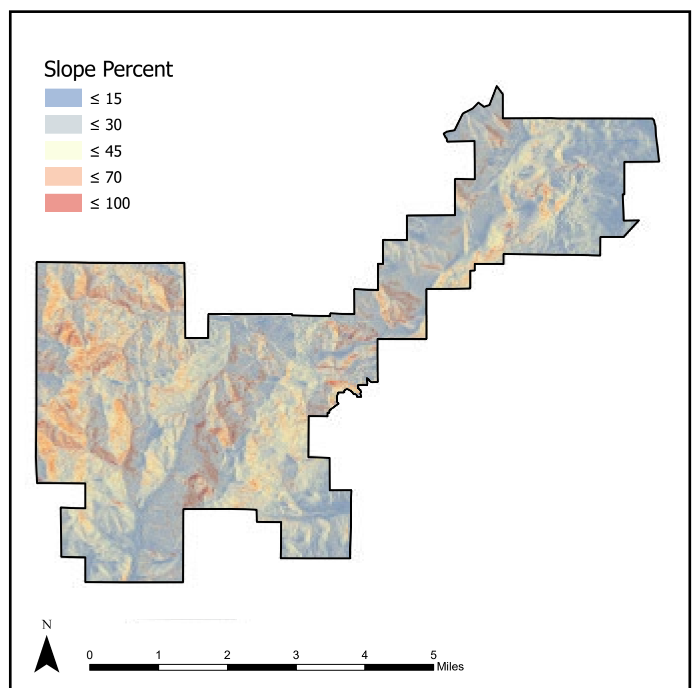


Figure 6b. *Topography of the McDonald-Dunn Forest: Dunn Forest percent slope.*

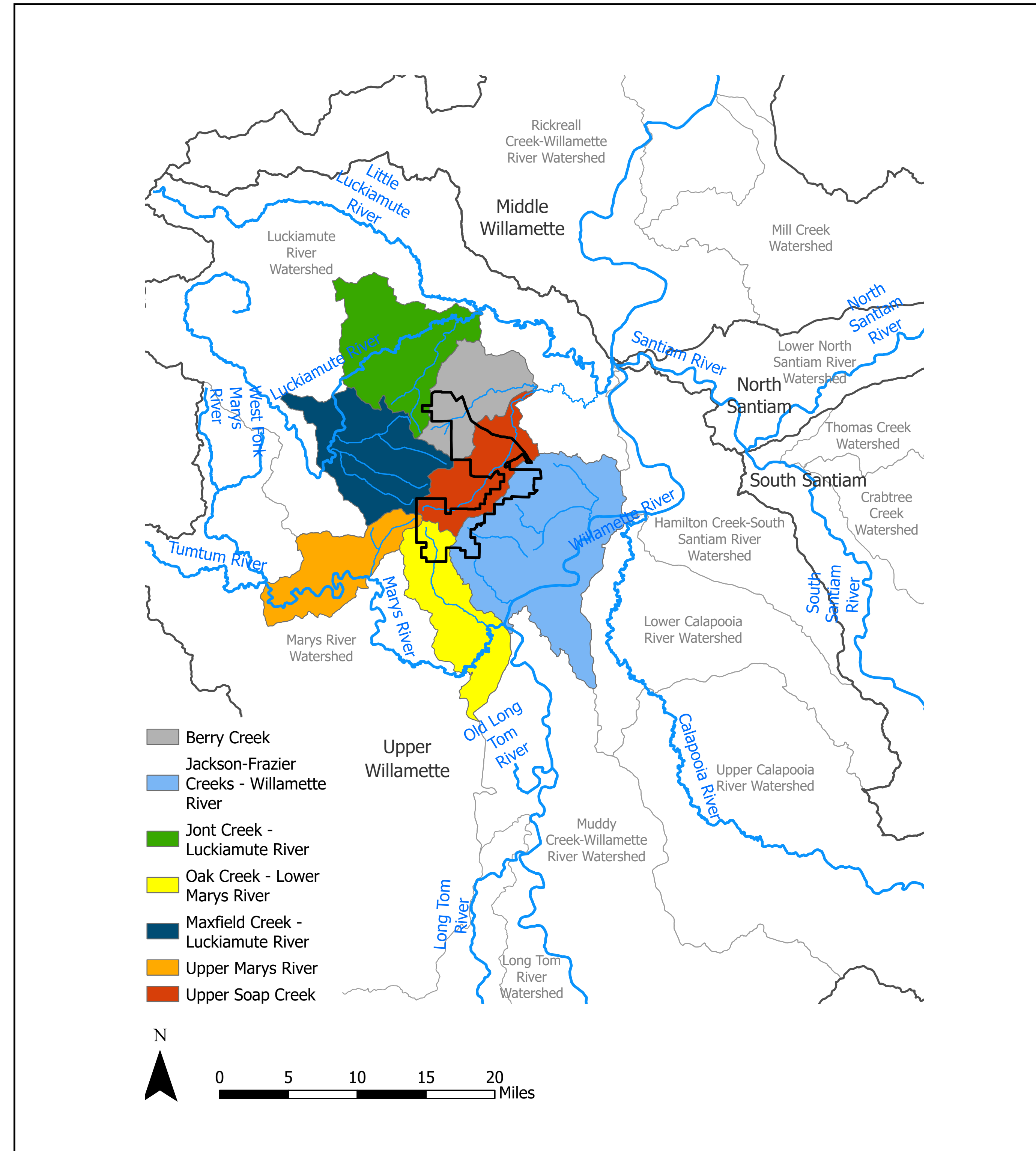


Figure 7. *Boundaries of watersheds within and surrounding the McDonald-Dunn Forest (outlined in black).*

the medium class streams (85%) are classified as perennial, while the majority of small streams (85%) are intermittent or seasonal (Figure 8 a). Several of the mainstem streams are considered fish bearing (14%), and lower portions of Soap and Oak Creeks are also considered *potential* habitat for salmon, steelhead, and bull trout, although only cutthroat trout are currently present (Figure 8 b).

Two streams in the Soap Creek watershed are on the Oregon Department of Environmental Quality's 303(d) list of impaired waters in Oregon. Soap Creek is listed for exceeding dissolved oxygen standards and South Fork Berry Creek is listed for exceeding summer temperature standards.

Groundwater contributions to the streams draining the forest are variable due to the stratified nature of the Siletz River Volcanic (SRV) geology, where basaltic pillow lavas are interbedded with less permeable tuffaceous marine sediments (Ochoa et al. 2022). Streams at higher elevations in the system are generally considered losing streams as they contribute to groundwater, whereas streams in the lower reaches of the system are gaining streams that are supplemented by groundwater discharge. This dynamic is boosted by a transition to lower permeability geologies in the valley and a geologic fault line (the Corvallis Fault) that lies just southeast of the forest and creates a flow barrier.

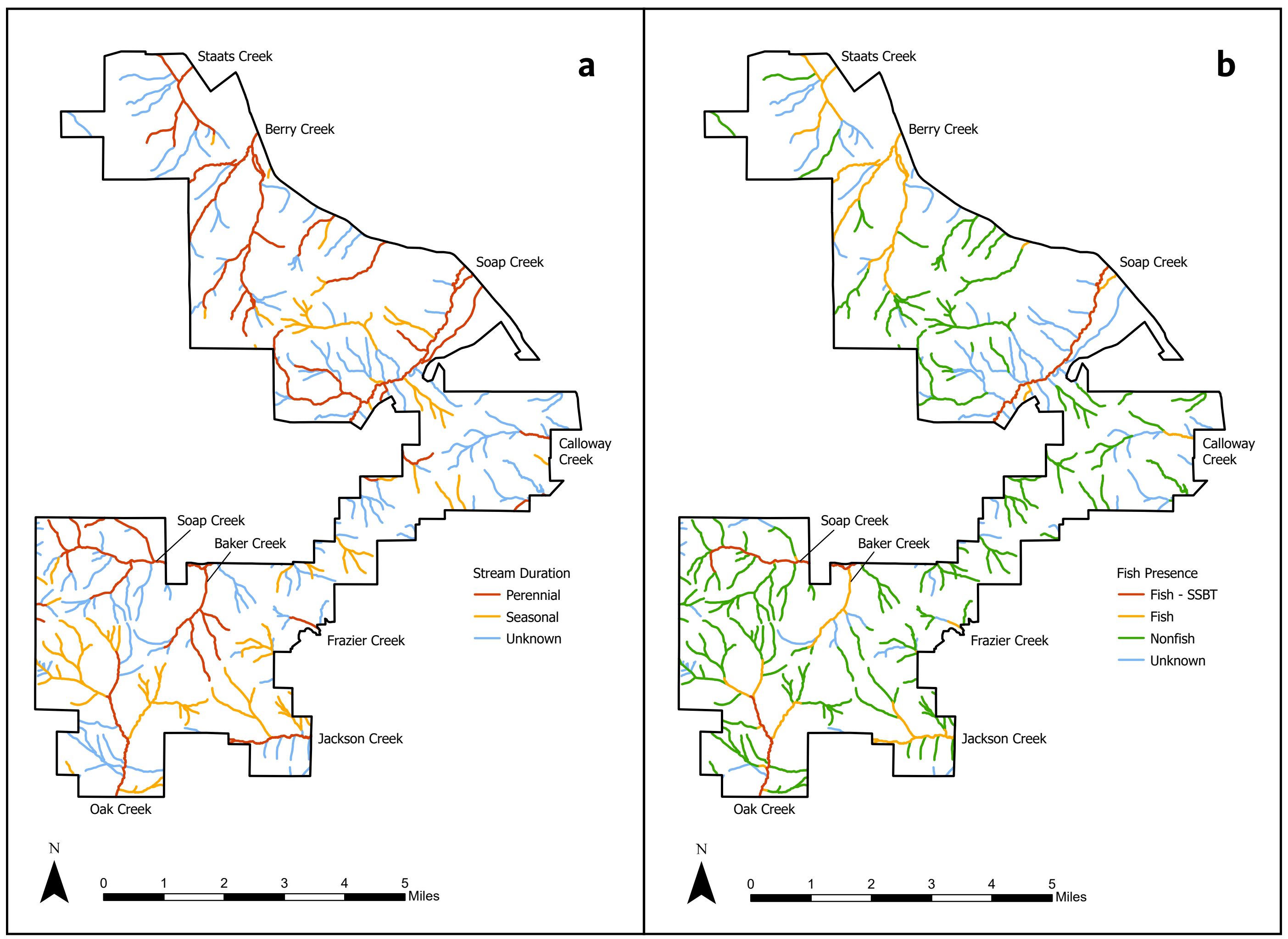


Figure 8 a, b. *Stream classification in the McDonald-Dunn Forest: (a) seasonality and (b) potential fish presence.*

2.2.7 Vegetation

Broadly speaking, Oregon contains moist forests west of the Cascades Mountain Range and dry forests east of the Cascades. Within the moist forests of western Oregon, there is a precipitation gradient from very wet with over 200 inches of precipitation per year (coastal fog belt and crest of the Coast Range) to less than 30 inches per year to the east (Schaefer et al. 2008). The Douglas-fir (*Pseudotsuga menziesii*) forests in the foothills surrounding the Willamette Valley—including the McDonald-Dunn Forest—are on the drier end of this precipitation gradient.

Natural and human disturbance have shaped these forests for millennia, with fire being the predominant disturbance agent. Within forests west of the Cascades there are fire regimes within fire regimes. For example, there are areas where fire is frequent (<50 years) intermixed with other areas where the fire return interval is long (>150 years) (Johnston et al. 2023). Fires were frequent in the region of the McDonald-Dunn Forest (Drake 2025) as well as along and within the Willamette Valley and adjacent lower river valleys, with most ignited by Native Americans (Boyd 2021; Lewis 2023). These fires created and maintained wet and dry prairie ecosystems, oak savannas and mixed oak/Douglas-fir woodlands, with regular surface fires reducing woody plant encroachment (into prairies) and maintaining conifer tree density and surface fuels at much lower levels than what we see today (due to thin bark when conifer trees are young). Indigenous stewardship using cultural burning increased productivity of culturally important resources, such as acorns, berries, and camas, that were important food resources for the Kalapuya people who lived in the Willamette Valley (Boyd 2021; Lewis 2023).

Following the arrival of Euro-American explorers in the mid-1800s, surviving Native Americans were forcibly removed to reservations and were no longer allowed to practice cultural burning across most of the Willamette Valley and surrounding landscape (Lewis 2023). Frequent fire diminished and, as such, Douglas-fir stands grew denser and invaded new areas suitable for Douglas-fir establishment and growth that were historically oak savanna woodlands (Johannessen et al. 1971).

Estimates of vegetation in the Willamette Valley and foothills have been reconstructed from General Land Office surveys in the early years of European colonization (Christy and Alverson 2011). These maps (Figure 9 a) estimate conifer forests covered ~35% of the McDonald-Dunn Forest footprint, mostly at higher elevations in the western regions. Sparse woodlands of Douglas-fir, white oak (*Quercus garryana*), and bigleaf maple (*Acer macrophyllum*) were estimated to comprise ~20% of the area adjacent to the upland forests. Oak savannas were found in lower elevations and were estimated to be the most prevalent cover type (~40%), and small sections of dry prairie (~5%) were also present. As Euro-American colonization expanded and Native American burning practices were eliminated, forest cover expanded greatly in extent, particularly in the valley foothills (Sprague and Hansen 1946). This is quite different than the current dominance of closed-canopy conifer forests (Figure 9 b).

Six understory plant associations have been identified in mature, upland forested areas of the McDonald-Dunn Forest (Figure 10), primarily determined by moisture gradients, elevation, direction and angle of slope, and soil (Hubbard 1991; Leavell 1991). Moister locations with shrub dominated understories include (1) western hemlock/vine maple-salal (*T. heterophylla/Acer circinatum-Gaultheria shallon*), (2) grand fir/vine maple-salal (*A. grandis/A. circinatum-G. shallon*), and (3) grand fir/trailing blackberry-poison oak (*A. grandis/Rubus ursinus- Toxicodendron diversilobum*). Drier sites with forb understories are (4) grand fir/sword fern (*A. grandis/Polystichum munitum*), and (5) grand fir/Hooker's fairybells-western meadowrue (*A. grandis/Prosartes hookeri-Thalictrum occidentale*). False brome (*Brachypodium sylvaticum*), an invasive exotic grass, dominates the (6) grand fir/false-brome type, which has been spreading and increasing in dominance throughout much of the forest.

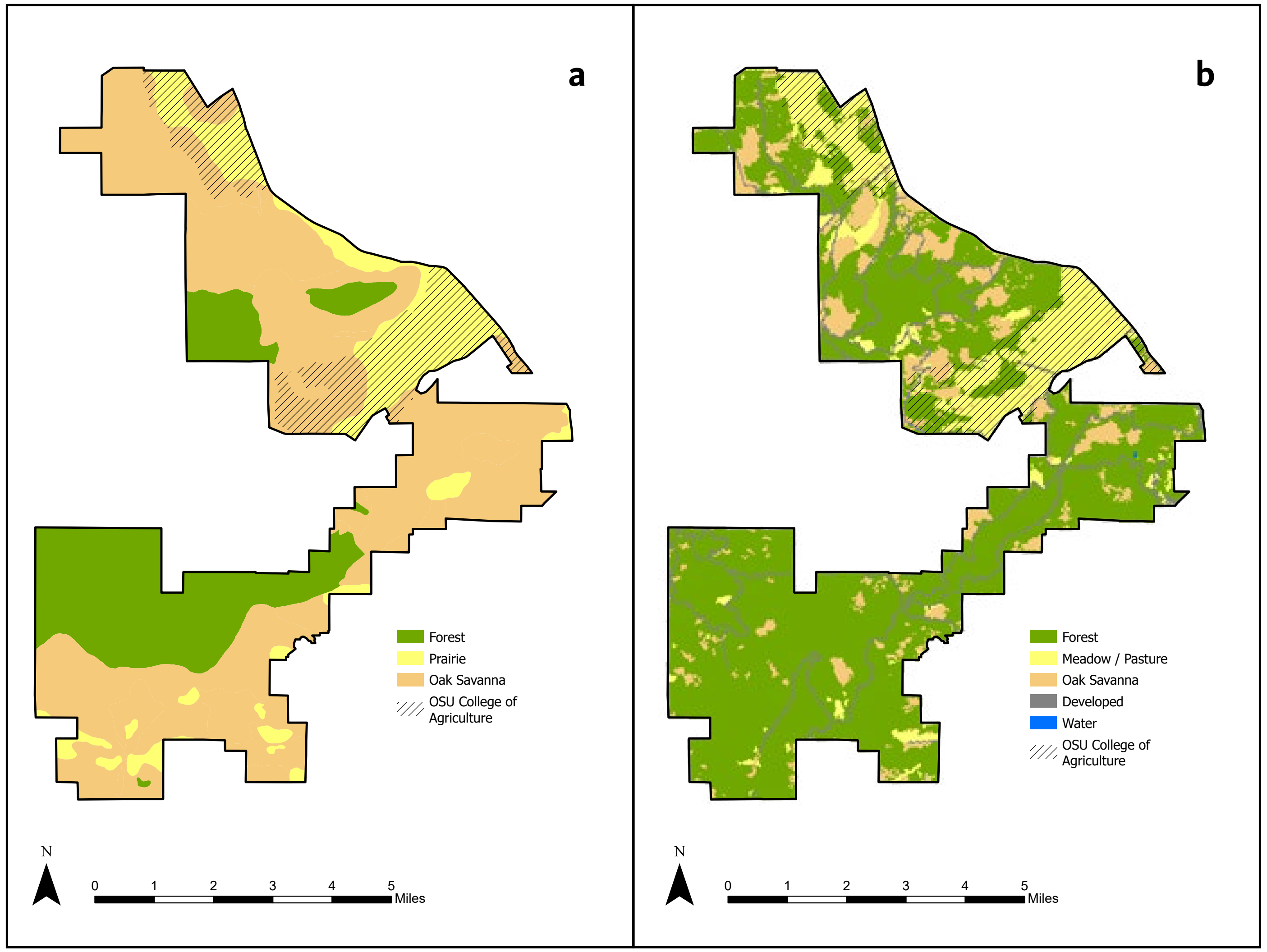


Figure 9 a, b. *Vegetation in the McDonald-Dunn Forest in (a) 1800 and (b) 2023. Source: Oregon GIS Framework Program.*

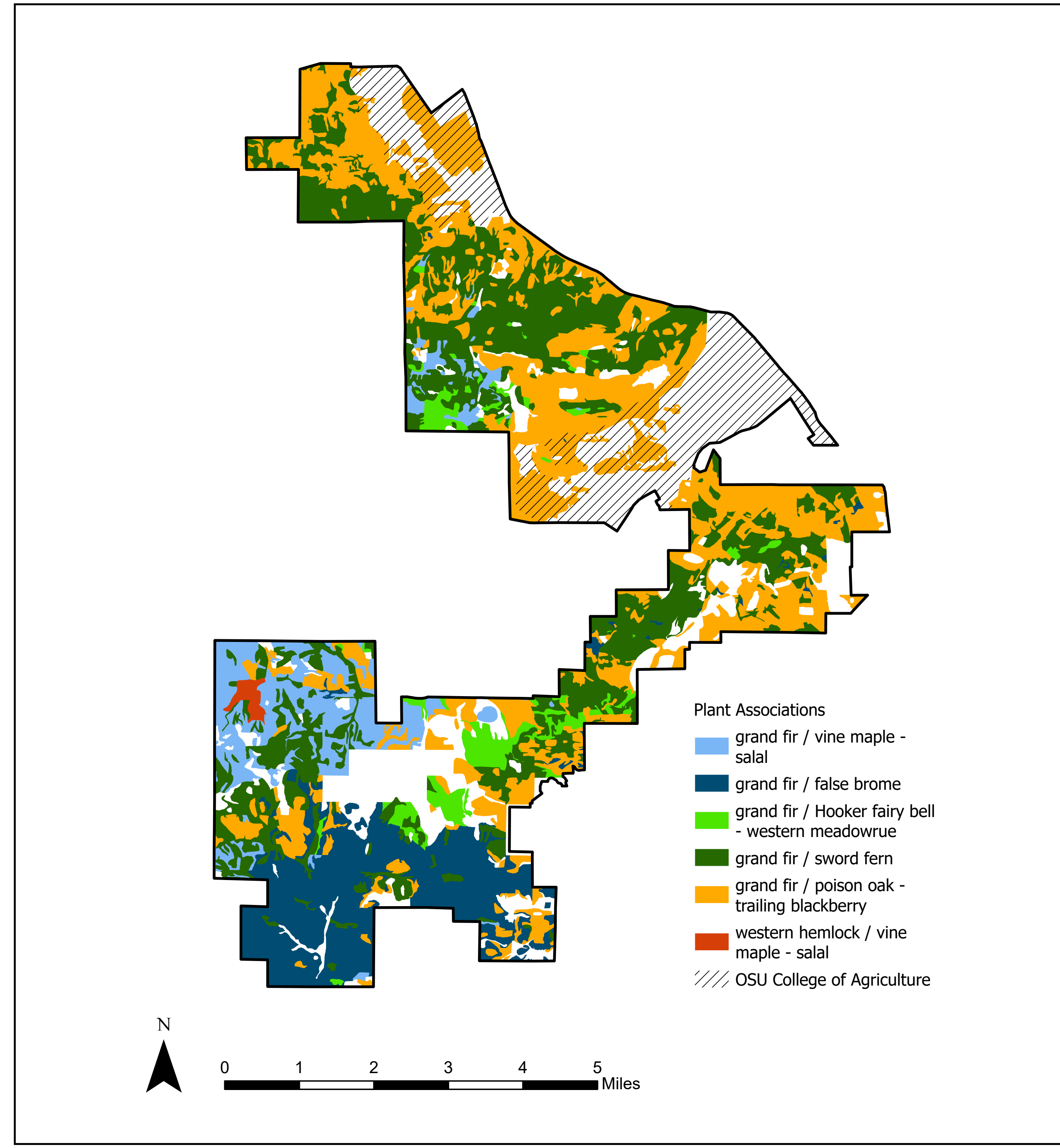


Figure 10. *Distribution of plant associations in the McDonald-Dunn Forest. Data are from the 2005 Forest Plan and forest inventories prior to the writing of that plan.*

Three ecosystem types occurring in the McDonald-Dunn Forest have long been recognized as deserving of special management consideration, as evidenced by their prominence in prior forest plans (College of Forestry 1993, 2005): oak savannas, prairies/meadows, and aquatic/riparian systems. Each is described below.

Oak Savanna

Savannas are open, fire-maintained ecosystems with scattered open-grown trees (trees grown in open conditions with limited competition from other nearby trees) and an understory dominated by perennial grasses and forbs. Willamette Valley oak savannas formed a network of open, oak-dominated woodlands across the lowlands and up the foothills and lower southern slopes of the Coast Range and Cascade mountains (Franklin and Dyrness 1973). The composition of the herb layer in savannas prior to Euro-American settlement is unknown but may have been similar to upland prairie based on overlap in species found in remnants (Christy and Alverson 2011). Shrubs were likely historically excluded by frequent low-intensity surface fire—Indigenous cultural burning—but species like hazelnut, Saskatoon serviceberry (*Amelanchier alnifolia*), poison oak, common snowberry (*Symphoricarpos albus*), and trailing blackberry are a prominent component of remnant savanna, woodlands, and successional treed prairies today (Franklin and Dyrness 1973; Buechling et al. 2008; Reid 2014). Succession in the Willamette Valley region in the absence of fire tends to favor increased shrub dominance in the understory, increased tree density, and increased conifer presence, with the end result being conversion to a conifer forest (Johannessen et al. 1971).

Savannas covered over 18% of the Willamette Valley between 1851 and 1910, with treed woodlands covering another 14% (Christy and Alverson 2011). Almost all savanna-like stands present today were prairie in 1851. Most pre-settlement savannas have, in the absence of fire, now succeeded into woodland or closed forest. Exotic invasive species are common in oak savannas today, including Himalayan blackberry (*Rubus armeniacus*), eglantine rose (*Rosa eglanteria*), velvet grass (*Holcus lanatus*), and false brome. Co-occurrence of prairies and oak savannas as well as shared understory floristics have facilitated combined restoration and conservation efforts of these ecosystems (e.g., Legacy Oaks and Prairie Task Force 2008; Clinton et al. 2020). Restoration of savanna habitats and species primarily involves mechanical release of legacy trees from shading, control of exotic invasive

shrubs and grasses, and restoration of native species (Halsey et al. 2004; Legacy Oaks and Prairie Task Force 2008; Appendix E).

Oregon white oak is the most common tree within oak savannas, but Douglas-fir and big leaf maple can also be prominent. Oregon white oak is a long-lived (up to 500 years) shade-intolerant tree, with larger individuals having thick bark that promotes fire resistance. Some of the larger Oregon white oak in the Willamette Valley today predate Euro-American settlement and often show a characteristic 'open-grown' or 'wolf' architecture (Gildehaus et al. 2015). Remnant Oregon white oak, poison oak and blue wildrye (*Elymus glacus*) savannas have a prominent shrub layer and grass-dominated herbaceous layer with Roemer's fescue (*Festuca idahoensis ssp. roemeri*) and California oatgrass (*Danthonia californica*), sometimes with native forbs like bedstraws (*Galium spp.*) and mountain sweet cicely (*Osmorhiza berteroi*) (Kagan 1997).

Prairies

In contrast to the coniferous forests that dominate surrounding hills and mountains, Willamette Valley prairies are open ecosystems primarily dominated by perennial graminoids and forbs that support a diverse flora and fauna distinct from the surrounding conifer forests (Franklin and Dyrness 1973). Over the course of Euro-American settlement in the 19th and 20th centuries, more than 99% of the prairies in the Willamette Valley were lost. The fertile soils and lack of trees made them particularly desirable for development, agriculture, and grazing. This near total elimination of prairie

habitats led many prairie-dependent species to become rare, including the federally endangered Willamette daisy (*Erigeron decumbens*) (U.S. Fish and Wildlife Service 2010; Oregon Natural Heritage Information Center 2023). The few prairies that remain today are unlikely to reflect a representative sample of historic variation but instead tend to be small patches and on less arable land. The composition of these prairie remnants is also likely significantly altered by historic and ongoing grazing, conifer and shrub encroachment given decreased fire frequency, invasion by exotic species, and fragmentation.

Prairies have been a focus of restoration and conservation efforts throughout the Willamette Valley in recent times (US Fish and Wildlife Service 2017; Clinton et al. 2020), with notable successes in the delisting of three formerly endangered perennial forbs endemic to PNW prairies: golden paintbrush (*Castilleja levisecta*), Bradshaw's lomatium (*Lomatium bradshawii*), and Nelson's sidalcea (*Sidalcea nelsoniana*) (Oregon Natural Heritage Information Center 2023). Restoration actions include removal of encroaching trees and exotic invasive species to release existing native prairie species, replanting and seeding of native prairie species, and the re-introduction of prescribed fire and cultural burning (Halpern et al. 2019; Brambila et al. 2023; Appendix E).

Upland dry prairies made up 21% of the Willamette Valley between 1851 and 1910, based on estimates from the General Land Office (Christy and Alverson 2011), occurring in an extensive mosaic of varying patch sizes with wet prairies and riparian forests. These dry prairies occurred on well-drained soils in a variety of upland settings, along gradients of both soil depth and seasonal soil moisture. Trees that otherwise occur within the Willamette Valley were largely excluded by frequent anthropogenic burning, but harsh edaphic conditions and summer drought also likely inhibited tree growth on some sites.

All extant prairies in the Willamette Valley have some non-native plants and many are dominated by exotic invasives. Today, scattered remnants of high-quality native upland prairie contain various combinations of perennial bunchgrasses that may also have historically been the primary species present: Roemer's fescue, Sandberg bluegrass (*Poa secunda*), prairie junegrass (*Koeleria macrantha*), Lemmon's needlegrass (*Achnatherum lemmonii*), wheatgrass (*Elymus trachycaulus*), and California oatgrass (*Danthonia californica*) (Franklin and Dyrness 1973).

A diversity of native perennial forbs also occurs in high quality upland prairie remnants and were likely a significant component of historic prairies. Remnant California oatgrass (*Danthonia californica*) prairies have frequent crown brodiaea (*Brodiaea coronaria*), woodland strawberry (*Fragaria vesca*), bracken fern (*Pteridium aquilinum*), and western buttercup (*Ranunculus occidentalis*) (Reid and Schindel 1994). Remnant Roemer's fescue prairies are forb-rich, with abundant broad petal strawberry (*Fragaria virginiana*) and frequent deltoid balsamroot (*Balsamorhiza deltoidei*), Nuttall's larkspur (*Delphinium nuttallii*), rose checkermallow (*Sidalcea asprella ssp. virgata*), Hall's Aster (*Symphyotrichum hallii*), Lupines (*Lupinus sp.*), western buttercup (*Ranunculus occidentalis*), western yarrow (*Achillea millefolium*), Oregon sunshine (*Eriophyllum lanatum*), and common lomatium (*Lomatium utriculatum*) (Reid and Kagan 1994).

The modern composition of vegetation remnants suggests significant overlap in the composition of grasses and forbs between upland prairies and sunny openings in oak savanna, and prairies may have hosted widely scattered oak (*Q. garryana*, *Q. kelloggii*), ponderosa pine (*Pinus ponderosa*), and Douglas-fir (Christy and Alverson 2011).

Wet prairies represented 10% of the Willamette Valley between 1851 and 1910 (Christy and Alverson 2011). These are nutrient-rich wetlands and wet meadows that are seasonally moist or flooded. These sites are often depressional, collecting water running over the landscape and are poorly drained, underlain by clay soils or thin soils over rock. Most wet prairies have now been drained, farmed, grazed, or overrun by exotic species (Christy 2017).

Wet prairies are dominated primarily by Camas (*Camassia quamash*) and graminoids, especially tufted hairgrass (*Deschampsia cespitosa*), dense sedge (*Carex densa*), and lateral sedge (*Carex unilateralis*), and to a lesser degree by forbs (e.g., Nuttall's quillwort (*Isoetes nuttallii*)) or shrubs (e.g., *Rosa nutkana*) (Chapell 2014). Upland trees like oak species and Douglas-fir were excluded from wet prairies by flooding and by periodic fires when the lush herbaceous vegetation dried out. Camas prairies are forb-dominated, with frequent bog saxifrage (*Micranthes oregana*), western buttercup, and fool's onion (*Triteleia hyacinthina*) (Christy 2017).

Riparian and Aquatic Systems

Riparian systems are the dynamic interface between dry land and flowing water. The vegetative composition and structure of riparian zones is a function of disturbance history, climate, the available species pool, elevation, stream gradient, floodplain width and topography, and disturbance events such as flooding. Riparian forests often have disturbance to both vegetation and stream channels from flooding, with surface water swelling to cover streamside vegetation for some time during flood events.

The soils, plants and detritus found in riparian zones help buffer inputs to water bodies and assist with nutrient cycling. Healthy riparian vegetation and structure protect stream banks from erosion, maintain favorable water temperature for fish and invertebrates through shading, provide large wood that creates important in-stream habitat, filter runoff, and provide nutrients to support terrestrial and aquatic life. Riparian vegetation creates meanders in streams and rivers and increases habitat complexity in valley bottoms. Channelization, filling, vegetation removal and development can restrict the natural ability of streams to meander over time, in turn limiting habitat quality, and impacting floodplain function, water cleansing, and sediment deposition.

Riparian forests in Western Oregon are characteristically dominated by deciduous trees and shrubs, such as big-leaf maple, alders, black cottonwood (*Populus trichocarpa*), dogwood (*Cornus spp.*), willows (*Salix spp.*), Oregon white ash (*Fraxinus latifolia*), and salmonberry (*Rubus spectabilis*). Lush ferns, graminoids, and forbs can dominate the understory (Christy 2017).

Aquatic stream ecosystems are found in areas where freshwater accumulates and flows over the land surface for extended periods. They are dynamic systems composed of various biotic (living) and abiotic (nonliving) components that interact with each other. The biotic elements include submerged vegetation, the upper portions of which may float at the surface, and algae. A large variety of invertebrate and vertebrate animals use both aquatic beds and emergent wetlands during at least part of their life cycles. In the Coast Range and Willamette Valley native aquatic bed dominants include the submerged coontail (*Ceratophyllum demersum*) and the floating common duckweed (*Lemna minor*) and yellow pond lily (*Nuphar polysepala*). Across Oregon, many aquatic bed habitats have been lost to biological invasions, eutrophication, river channelization, siltation, and filling for agriculture or urban development (Christy 2017).

Freshwater riparian and aquatic systems provide essential habitat to many at-risk species, including important spawning and rearing habitat for salmonids, breeding habitat for amphibians, and habitat for freshwater mussels and other invertebrates. Western Oregon's abundant winter rain and melting snow flow through soils and occasionally overland collecting sediment and nutrients before recharging aquifers and draining to rivers, streams, lakes and wetlands.

Forested riparian areas are often managed to promote specific functional and structural characteristics known to enhance water quality and support native terrestrial and aquatic species. In particular, riparian areas influence streamflow regulation and flood mitigation, stream water temperature, erosion and sedimentation, nutrient transport, large wood recruitment, habitat provision, and regulation of terrestrial microclimate. Large woody material in streams and riparian areas provides habitats for many species (Wondzell and Bisson 2003; Olson and Weaver 2007). Most

woody material in streams come from within 15 to 30m (~50-100ft) of the channel (Welty et al. 2002; Burton et al. 2016), but occasional large inputs can also originate from hundreds of feet away via landslides and debris torrents (Miller and Burnett 2008). Increased humidity, higher soil moisture and lower air temperatures in riparian areas provide habitat conditions for plants and animals that differ from the uplands, with the extent of these differences varying by stream size and topographic position (Naiman et al. 2000). Stream temperatures influence many physical and biological processes, and in the Northwest higher summer temperatures can have negative impacts on cold water fish species, such as salmon and trout (McCullough et al. 2009). Forest harvesting can increase stream temperatures, mainly through reduction in shading (Groom et al. 2011b; Warren et al. 2016). Forest roads and harvesting can also increase the amount of sediment reaching streams, with negative effects on the viability of fish eggs as well as other aquatic organisms (Kemp et al. 2011). Recent research investigating adherence to and exceedance of older Oregon and California Forest Practice Rules suggest that the newly updated Oregon Forest Practice Act (OFPA) rules should limit changes in stream temperature (Groom et al. 2011a; Bladon et al. 2016; Groom et al. 2018; Miralha et al. 2024) and suspended sediment (Arismendi et al. 2017; Hatten et al. 2018) resulting from harvest relative to older rules. The OFPA water protection rules adopted in 2022 have not been in place long enough to elegantly study ecological ramifications, but adherence to these rules as a foundational guideline in the McDonald-Dunn Forest positions the forest well to rigorously investigate effectiveness of the new rules.

Projected changes in the quantity and timing of water flow into Western Oregon's streams in response to climate change are of conservation concern. Shifts towards wetter winters with more precipitation falling as rain and with more extreme flooding events are predicted over the next few decades (Oregon Climate Change Research Institute 2023). Well-functioning riparian forests may be able to trap sediments and attenuate some of these floodwaters. Streams and freshwater ponds can store, slow down and slowly release needed water during the dry summer months. In contrast to the projected wetter winters, summers are predicted to be drier and warmer than present, with subsequent increased drought and water stress, which could lead to changes in species composition over time (Oregon Climate Change Research Institute 2023; section 2.2.5).

2.3 History of Ownership and Land Use

2.3.1 Ownership and Land Use Prior to 1920

Before chronicling the known history of the land that is now part of the McDonald-Dunn Forest, it is important to note that the College of Forestry is part of Oregon State University, a land-grant institution established through the Morrill Acts of 1862 and 1890. These two acts granted federally controlled land to states to support the creation of institutions of higher education. Lands were stolen from Indigenous Peoples through genocide and forcible removal to reservations and then were sold to raise funds to establish and endow land-grant colleges. This was an outcome of the Doctrine of Discovery, a policy used for centuries to justify colonial conquest of lands that belonged to Indigenous Peoples. *Settler colonialism*, the act of settler societies stealing the land of an Indigenous population and erasing its culture—using power and authority to develop or exploit the colonized to benefit the colonizers—involves modernizing and/or destroying Indigenous communities by force, including genocide. Settler colonialism culminated in the passing of the 1862 and 1890 Morrill Acts, which caused extensive destruction of Indigenous societies nationwide. With this as a backdrop, details of historical land ownership and land use are further described below.

Archaeological evidence suggests a human presence in the Willamette Valley during the Paleo-Indian period (12,000 to 8,000 BC) and a stable human population by the Early Archaic period (8,000-6,000 BC) (Toepel 1985; Hylton 1998). The area now called the McDonald-Dunn Forest is located within the traditional homelands of the Luckiamute and Marys River band of Kalapuya. Their purposeful and regular cultural burning to achieve desired cultural objectives produced a landscape that favored subsistence plant and animal species. Regular burning maintained the area in fairly open conditions that favored oaks, pine, grass and prairie vegetation (Boyd 2021).

Early Euro-American explorers arrived in the Willamette Valley in 1812 and found an open landscape dominated by prairies and oak savanna. Wide hardwood-dominated riparian galleries up to two miles across were associated with the Willamette River, and smaller riparian areas along its tributaries characterized the valley. Foothills along the valley margin contained scattered stands of Douglas-fir with open prairies intermixed with abundant oak savannas. Within these foothills Douglas-fir was confined to riparian areas, moist ravines, and northerly slopes where fire was less frequent.

Epidemics in the late 1700's and the 1830's decimated Native American Tribes in the Willamette Valley (Mackey 2004; Davis 2023). White settlers arrived at a time when much of the land in the Valley was unoccupied because so many Indigenous peoples had succumbed to diseases they had previously not encountered. As land was claimed by repeated waves of white settlers, the few Kalapuya survivors were forced to abandon land they had lived on for thousands of years and become part of what is now known as the Confederated Tribes of Grand Ronde and the Confederated Tribes of Siletz Indians. The McDonald-Dunn Forest is part of the collective lands taken from these Tribes in 1855.

Most of the area that was to become the McDonald-Dunn Forest was then homesteaded by white settlers. These settlers engaged primarily in wheat cultivation and animal husbandry, with land uses diversifying over time to include orchards as well as logging.

2.3.2 Ownership and Land Use 1920-Present

The area now referred to as the McDonald-Dunn Research Forest was acquired by OSU gradually over the course of many decades. The first parcel was acquired in 1924, when the Board of Regents of what was then called *Oregon State Agricultural College* (now *Oregon State University*) appropriated funds to purchase 80 acres of land for the School of Forestry. This first purchase included Peavy Arboretum, envisioned by Dean George Peavy as a living laboratory and outdoor classroom for students, located near campus. Following this, a series of donations from a wealthy benefactor, Mary McDonald (Figure 11 a), made possible the purchase of over 6,000 acres that collectively created the first school forest (Jackson 1980). Numerous parcels were acquired through gifts and purchases from 1925 to 1962, through the land and money donated by Mary McDonald. Dean George Peavy (Figure 11 b) and Professor T. J. Starker (Figure 11 c) used the donations provided by Mary McDonald to purchase parcels that added to the existing acreage, slowly expanding the McDonald Forest over time (Figure 12). Many of the parcels obtained during this period contain the deed language "For the use and benefit of the School of Forestry."

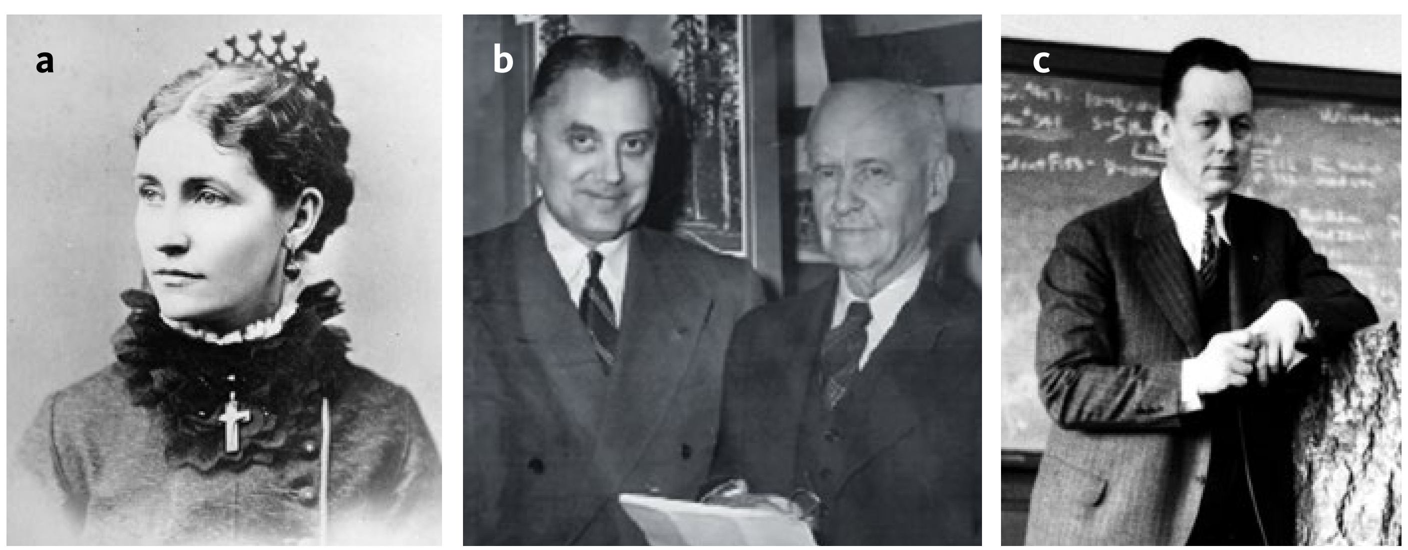


Figure 11 a, b, c. *Individuals collectively responsible for acquiring much of the land that now comprises the McDonald-Dunn Forest include (a) benefactor Mary McDonald, (b) Deans Paul Dunn and George Peavy, and (c) Professor T. J. Starker.*

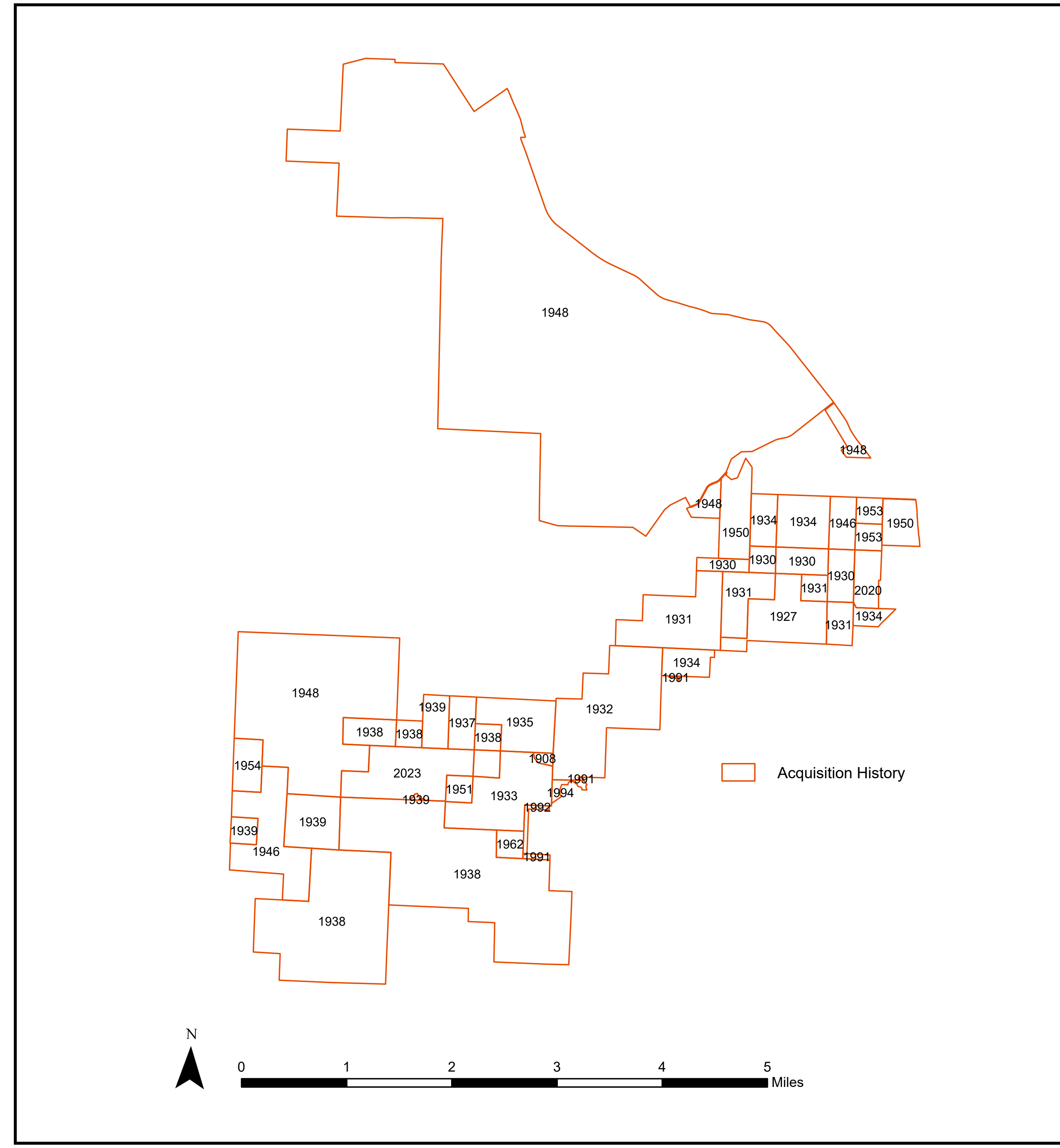


Figure 12. *Dates of acquisition of each portion of what is today called the McDonald-Dunn Forest.*

In addition, Dean Paul Dunn acquired another 6,200 acres of agricultural and forested land previously used for military training. This land had been acquired through condemnation proceedings to establish Camp Adair Military Reservation during World War II and did not revert to the original owners at the end of the war and was transferred to the university in 1948. An agreement was made such that all forested lands part of this acquisition would be used to facilitate learning by the School of Forestry and all agricultural lands by the School of Agriculture (Jackson 1980). Statute ORS 352.113 defines ownership of lands by a public university (see text box below).

Several recent acquisitions have further altered the acreage of the McDonald-Dunn Forest. In 2020, the College of Forestry purchased 82 acres of forestland adjacent to the research forest office in Peavy Arboretum. This was the site of the previous State Forest Nursery. The college had leased the land for several decades prior to this purchase. In addition, the Baker Tract, a 317-acre inholding in the McDonald Forest that was previously owned and managed by Starker Forests, was acquired by the university through a land exchange in September 2023. The intent of this land trade was to straighten property boundaries and consolidate each entity's ownership, enabling improved management of each entity's respective properties. As part of the land exchange, Starker Forests received approximately 170 acres of the Dunn Forest. The Dunn Forest decreased by 168.5 acres and the McDonald Forest grew by 317.

The title to McDonald-Dunn Forest, and all other research and demonstration forests managed by the College of Forestry, is held by the State of Oregon acting by and through the OSU Board of Trustees. ORS 352.113 gives the university custody and control of all real property. This means that the ultimate authority and responsibility for decisions on the use and management of university resources reside with the Board of Trustees either directly, or as delegated to university staff, as in the case of the research forests.

Forest Ownership

Title to real property, like the McDonald-Dunn Forest, is not held by the public or even the State itself but rather is required to be held by the State of Oregon acting by and through the OSU Board of Trustees as stated in ORS 352.113:

"352.113 Real and personal property held by public universities; legal title; custody; sale and transfer. (1) Legal title to all real property acquired by a public university listed in ORS 352.002 must be taken and held in the name of the State of Oregon, acting by and through the governing board of the public university. Legal title to all real property conveyed to a public university is considered to be conveyed to and vested in the State of Oregon, acting by and through the governing board. Authorized conveyances of all real property, other than university lands, acquired by or vested in the State of Oregon for the use or benefit of the university must be executed in the name of the State of Oregon, acting by and through the governing board, by the chairperson of the governing board." Further, by law that real property is not to be held for general use by the public or even for general use by the State of Oregon. Rather, that real property is under the custody and control of OSU's Trustees to be used for "university purposes".

"(2) The governing board has custody and control of and shall care for all real property used for university purposes. Management, maintenance, encumbrance, disposal and preservation of all real property used for university purposes, whether the real property is acquired before or after the establishment of a governing board, is the responsibility of the governing board. Unless the governing board has granted prior consent, real property taken and held under this section may only be encumbered by the State of Oregon in accordance with state law and in a manner that would not impair the financial condition of the university or the rights of the holders of any obligations of the university issued or incurred under any master indenture or other financing agreement."

The OSU Research and Demonstration Forests are not funded or managed as "public lands" by the University. By design, these forests are self-funded through sustainable harvests, with no funding provided by the College of Forestry, Oregon State University, the State of Oregon, or taxpayers. The text box on the previous page provides additional details describing the expectation of this land to be used for university purposes.

2.4 Protection of Cultural Resources

As set forth in section 2.3, the College of Forestry is part of Oregon State University, a land-grant institution established through the Morrill Acts of 1862 and 1890. The main campus of Oregon State University and the McDonald-Dunn Forest are located on the traditional lands of the Mary's River, or Ampinefu, Band of the Kalapuya who lived there for millennia. These Indigenous Peoples were forcibly removed to reservations in Western Oregon, and today their living descendants are part of the Confederated Tribes of Grand Ronde and the Confederated Tribes of Siletz Indians.

Recognizing this theft of land from Indigenous Peoples and erasure of their culture through force and genocide, the College of Forestry now strives to go beyond simple land acknowledgements by accepting the damage done to the Kalapuya and other Indigenous Peoples by initiating healing through the establishment of respectful relationships with their descendants that fully acknowledge and honor the sovereignty provided to Tribal Nations by the Tribal Self Governance Act of 1994.

For decades, all management of Native American sites and management activities near artifacts that exist on the McDonald-Dunn Forest has been coordinated with the Confederated Tribes of Grand Ronde, the Confederated Tribes of Siletz Indians, and the Confederated Tribes of Warm Springs, in accordance with five state laws, a county ordinance, and a federal law that provide guidance on the management of cultural resources (Appendix C).

In 2003, an MOA (Memorandum of Agreement) between the Confederated Tribes of Grand Ronde and the College of Forestry was created to document a shared understanding of cultural resource management activities in the forest. The 2003 MOA between Confederated Tribes of Grand Ronde and the college outlined a number of expectations, including engagement between Tribal cultural resources staff and research forest staff in setting goals and objectives surrounding cultural resources; development of strategies for Tribal cultural resources staff to use cultural resource activities on research forests as learning, training, and interpretation opportunities for Tribal members; and cooperative development of protocols for cultural resources protection and interpretation. In addition, this MOA called for annual meetings between Tribal representatives and college representatives to discuss improvements to cultural resources stewardship. Although the MOA was established for a 4-year period (2003-2007), several tenets of the 2003 MOA regarding cultural resources have been closely followed to date, such as regular surveying for and protection of cultural resources.

As part of the development of the 2025 Forest Plan, conversations were initiated between Tribal Councils and the College of Forestry in 2023 to explore opportunities to create MOUs (Memorandum of Understanding) between the college and Confederated Tribes of Siletz Indians and between the college and Confederated Tribes of Grand Ronde. The intent of these documents will be to affirm a commitment to protect Tribal treaty rights, and to establish standards by which the college and each Tribe will act. Additional details are in section 3.1.

A Memorandum of Agreement is a contract between two parties, with a specific timeline and deliverables, whereas a Memorandum of Understanding is an agreement between two or more parties. Unlike a contract, however, an MOU need not contain legally enforceable promises. While the parties to a contract must intend to create a legally binding agreement, the parties to an MOU may intend otherwise. An MOU with a Tribal Nation is typically intended by parties with shared interests to affirm their intentions to support Reserved Treaty Rights (USFS 2023).

2.5 Land Use Zoning and Regulations

2.5.1 Land Use Zoning

Land use in Oregon is governed by the 1973 Oregon Comprehensive Land Use Planning Program, which is overseen by the Department of Land Conservation and Development (DLCD 2024). The system was created with the intention of preserving vast areas of land for farm and forest production, to protect habitat, to conserve natural resources, and to protect air and water, while also allowing development of land for homes and businesses.

This statewide land use planning system contains 19 goals. Goal 4 pertains to forest lands, defining them and requiring counties to inventory them and adopt policies and ordinances that will "conserve forest lands for forest uses." Accordingly, most of the McDonald-Dunn Forest is zoned as *Forest Conservation*. The purpose of this zoning classification is to limit development, preserve forests as forests, reduce or prevent further fragmentation of forests, and to maintain their economic and environmental integrity. Specifically, the purpose of Goal 4 is:

> *"To conserve forest lands by maintaining the forest land base and to protect the state's forest economy by making possible economically efficient forest practices that assure the continuous growing and harvesting of forest tree species as the leading use on forest land consistent with sound management of soil, air, water, and fish and wildlife resources and to provide for recreational opportunities and agriculture."*

Other uses within a forest conservation zone are considered 'conditional', meaning that some activities may be allowed, but only under certain predetermined conditions. Both Goal 4 and Benton County Chapter 60 specify outdoor recreation opportunities as important and protected resources within Forest Conservation Zones, and recreation is fully embraced by research forest staff. However, the development of infrastructure (e.g., parking, toilets) to support these recreation opportunities is considered a conditional use which is potentially inconsistent with the overarching land classification (forest conservation) but deemed beneficial or necessary in specific situations or locales.

2.5.2 Regulations

The **Clean Water Act** (CWA) of 1972 sets federal standards for water quality and pollution control, and mandates that states develop more specific guidance. In Oregon, the **Oregon Forest Practices** Act (OFPA) sets standards on non-federal forestlands for commercial activities involving the establishment, management, and harvesting of trees. These state laws aim to fulfill the goals of the CWA by outlining forest practices intended to protect water quality. The Board of Forestry has primary responsibility to interpret the OFPA and set rules for forest practices, while the Oregon Department of Forestry (ODF) is responsible for administering and enforcing the OFPA and the forest practice rules. ODF works with landowners and operators to help them comply with the requirements of the OFPA. The Oregon Legislature first passed the OFPA in 1971. The act and the administrative rules implementing it have changed many times in the 50 years since. Two Senate Bills (1501 and 1502) were passed during the 2022 Legislative Session, making substantial changes to the Forest Practices Act. In particular, the Private Forest Accord resulted in changes for the protection for streams, new design standards for roads, and greater retention of trees on steep slopes (Oregon Department of Forestry 2022). These new rules will influence future management on the McDonald-Dunn Forest.

The **Endangered Species Act** of 1973 was created with the intent to conserve species listed as endangered or threatened. *Endangered species* are those in danger of extinction throughout all or a significant portion of their range, whereas *Threatened species* are those likely to become endangered within the foreseeable future. The State of Oregon and the federal government maintain separate lists of threatened and endangered species. The Fish and Wildlife Commission through ODFW maintains the list of threatened and endangered native wildlife species in Oregon, whereas plant listings are handled through the Oregon Department of Agriculture, invertebrate listings are handled through the U.S. Fish and Wildlife Service and the Oregon Biodiversity Information Center.

Federal and state laws prohibit the taking (defined as harassing, hunting, shooting, capturing, trapping, killing, collecting, wounding, harming, or pursuing), transportation, possession, sale, offering for sale, import, or export of threatened and endangered animals or plants without special permits. All known sites with statutorily protected species of threatened and endangered plants or animals, and species that are candidates for such listing must be managed to protect these species. To provide protection to threatened and endangered species, their locations are not identified on published maps or described in this plan. Section 3.5 and Appendix I provide information on imperiled species found on or near the forest.

2.6 Disturbance History

2.6.1 Harvest History

The land allocations and management direction specified in the 1993 McDonald-Dunn Forest Plan estimated that the forests could sustain an average harvest of 4.4 MMBF/ year. Accordingly, the harvest schedule in the 1993 Forest Plan recommended an annual harvest of 4.4 MMBF/ year in the first decade rising to between 6 and 7 MMBF/ year in the long term. As mentioned in section 1.4.1, this level of harvest was never realized because the harvest schedule was modified shortly after plan implementation due to the presence of nesting northern spotted owls, a federally threatened species, and a new Memorandum of Understanding developed between the College of Forestry and College of Agricultural Sciences that transferred management responsibilities and revenues for the forested land on the agricultural farms to the College of Agricultural Sciences. The recalculated harvest level of 4.1 MMBF/year was maintained 1995-2005, although harvest varied considerably from one year to the next (College of Forestry 2005).

The 2005 Forest Plan called for an average timber harvest level of 6.0 MMBF/year for the first decade, rising to 8.0 MMBF/year over time, as mentioned in section 1.4.2. It was anticipated that most regeneration harvest would emerge from stands 50-70 years old and that the average age of trees on the forest would change from 55 years in 2005 to 56 years in 2015, and to 58 years in 2105. Harvest and growth were projected to remain approximately equal for a few decades and then growth was predicted to begin exceeding harvest and inventory was expected to begin to increase. Approximately 8% of the growth was anticipated to come from reserve stands over the first few decades, with this decreasing to 5% of growth in the long term (College of Forestry 2005).

As described in section 1.4.3, the 2005 Forest Plan was suspended in 2009, the forest was managed according to annual plans of work for the next 10 years, and then the 2005 Forest Plan was reinstated in 2019. In contrast to the timber harvest volume predicted in the 2005 Forest Plan, the actual timber volume harvested 2006-2024 was lower. This is because shortly after the implementation of the 2005 Forest Plan, the economy experienced a downturn and log prices decreased such that harvesting between 2008 to 2010 was temporarily halted. During that time, only a small amount of timber was harvested on the McDonald-Dunn Forest to maintain learning and training opportunities for the Student Logging Training Program. From 2006 to 2024, the average annual harvest has been approximately 3.9 MMBF, which is well below the calculated 6.0 MMBF sustainable harvest level (Figure 13). Since harvest operations returned to full swing in 2013 following the economic downturn, average annual harvests have been 5.2 MMBF. [Note that the high volume of timber harvested in 2015 was a result of salvage harvesting damaged trees from the 2014 ice and windstorm event.]

Net revenue (total revenue minus expenses) averaged $550,826 annually since 2006 (Figure 14), or $872,654 since harvest operations returned to planned levels in 2013 following the economic downturn. To ensure economic sustainability, a portion of income from more profitable years is held in financial reserves to help compensate for negative cash flows during less profitable years.

2.6.2 Natural Disturbance History

The forest has periodically experienced damage from ice, snow, and wind, which gave rise to small salvage harvests the year after they occurred. The largest salvage harvest in recent years occurred after the aforementioned 2014 ice and windstorm. Also, in 2015-2016, the forest experienced a "hot drought" that resulted in an increase in tree mortality and triggered an outbreak of flatheaded fir borer (*Phaenops drummondi*). Some of the timber in the affected areas was salvaged, while many affected trees were retained to provide snags for wildlife habitat enrichment. Due to anticipated changes to climatic conditions such as warmer temperatures (see section 2.2.5), the McDonald-Dunn Forest is projected to experience increased tree mortality and insect and disease activity in the future.

Wildfires have sporadically occurred on and adjacent to the McDonald-Dunn Forest, with two recent examples occurring in 2015 and 2016. In 2015, the human-caused Timber Hill wildfire ignited at Chip Ross Park in the northern portion of Corvallis, very close to the forest boundary. Wind direction prevented that fire from spreading uphill into the forest. In 2016, a small human-caused wildfire occurred within the McDonald-Dunn Forest, burning approximately 4 acres. Forecasted reductions in summer precipitation and relative humidity could exacerbate future wildfire risk (see section 2.2.5).

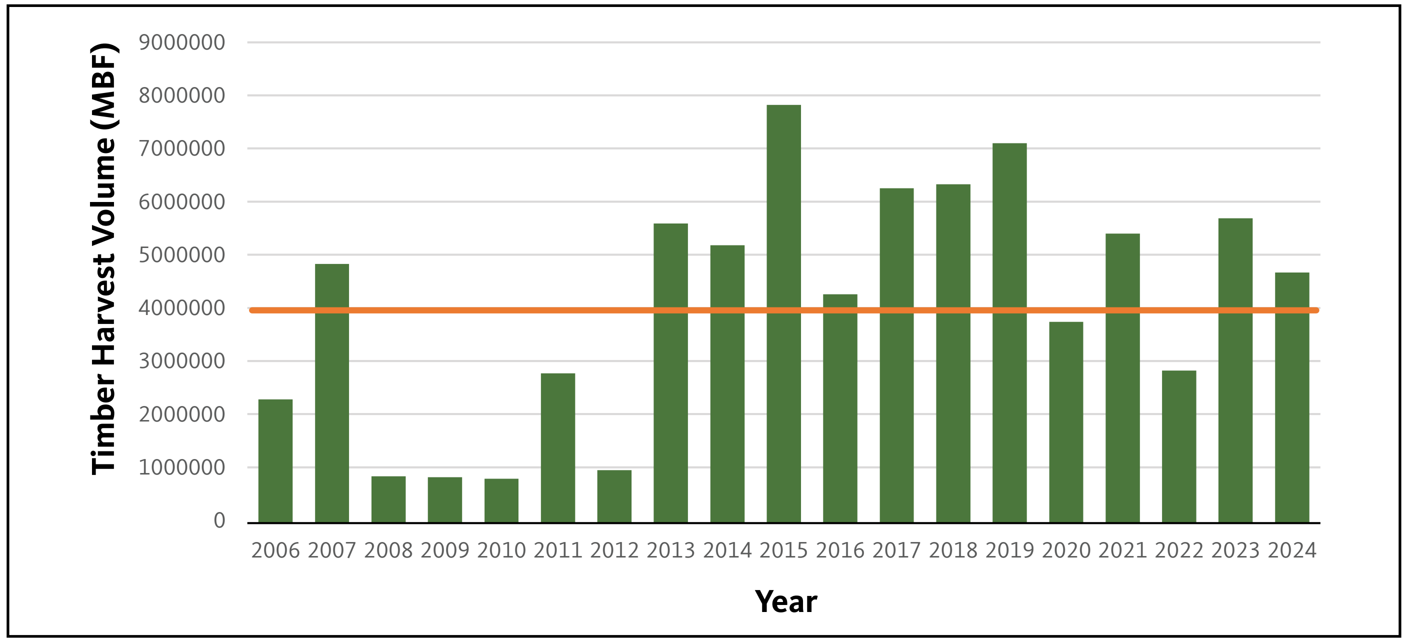


Figure 13. *Annual harvest volume from the McDonald-Dunn Forest 2006-2024, with the average across this period shown by the orange line.*

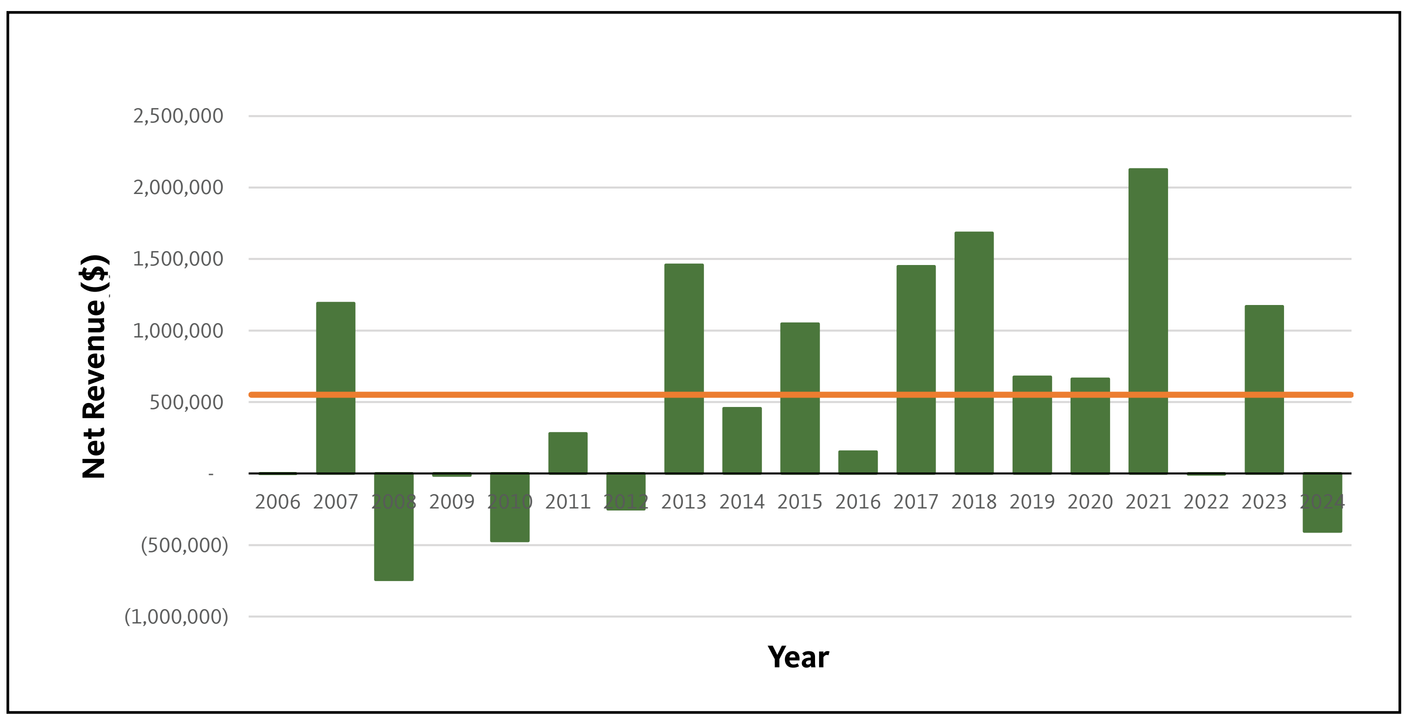


Figure 14. *Annual net revenue generated from the McDonald-Dunn Forest 2006-2024, with the average across this period shown by the orange line.*

2.7 Visitor Use

2.7.1 Historical Visitor Use

As described in section 2.3.1, the area now called the McDonald-Dunn Forest was historically stewarded by members of the Luckiamute and Marys River band of Kalapuya. Epidemics caused by early Euro-American explorers decimated Native American Tribes in the Willamette Valley altering the capacity to manage lands at the scale prior to first contact. Survivors were forcibly removed from their homelands in the mid-1800s, and the area was then homesteaded by white settlers.

Written records indicate that lands now encompassed within the McDonald-Dunn Forest have been visited by European settlers for recreational hiking, picnicking, horse-riding, hunting, bicycling, birdwatching and related activities for over a century. There are historical accounts of people traveling to Sulphur Springs by horse and wagon as early as the 1890s.

When the first McDonald Forest tracts were acquired by Oregon State University in the late 1920s and early 1930s, routes to access the forest began to increase. Much of the recreation in the forest had been for informal day use prior to this, and was not systematically recorded. A Civilian Conservation Corps (CCC) camp was active at Peavy Arboretum from 1933 until 1942, during which time CCC workers "constructed roads and trails throughout the arboretum and McDonald Forest" (Landis ND).

Rising recreation use on the forest was tolerated but not necessarily embraced during the post-war era. McDonald-Dunn Forest managers prioritized uses on the forests in 1959 in this order: (1) learning and instruction, (2) research and demonstration, (3) commercial harvesting, and (4) recreation. Conflict between certain types of recreation and college instruction and research was evident in the form of vandalism to research plots, despite installation of gates to limit access (Davies et al. 1997). Damage to research plots, attributable to recreationists or others, and whether intentional or accidental, has been a persistent factor contributing to the complexity of managing forests for multiple uses.

The late 1960s and early 1970s were a period of broadscale societal shifts in interest and views regarding human interactions with the natural world, and related nationwide growth and change in nature-based recreation. In the McDonald-Dunn Forest, these converging trends manifested in rising numbers of visitors accessing more forest areas (Jackson 1980). Evidence of the School of Forestry recognizing the importance of recreation was evident through the hiring of faculty to teach recreation courses in the late 1940s (Dunn et al. 1990). In 1973, the School embraced the discipline even more fully when the Department of Resource Recreation Management was transferred into the School from the OSU Division of Health and Physical Education. Anecdotal information from this period suggests that the forest was receiving growing public use for recreation (Meier 1974).

Recreation visitation to the McDonald-Dunn Forest continued to increase and diversify through the 1980s and into the 1990s, fueled in part by the emergence of mountain biking as a sport, its popularity among students and Corvallis residents, and ready access to a variety of appealing routes in the forest. Access was enabled by an expanding network of all-weather roads, which grew from 50 miles in 1956 to over 110 miles by 1996 (Jackson 1980). Corvallis grew rapidly during this period, with associated conversion of previously forested land for housing developments along the city's northwestern boundary. Removal of this buffer of private timberland between the city and McDonald-Dunn Forest was followed by an influx of residents living in nearby areas and increased emphasis on scenic and recreational values of the remaining adjacent forestland (Balfour 1996). Estimated annual recreation visits to the forests rose from 7,500 in 1980 to 33,000 in 1989 (Finley 1990), 50,000 in 1990 (McComb et al. 1994), and to 65,000 in 1994 (Wing 1998).

In 1993, with the need for comprehensive planning increasingly apparent, College of Forestry faculty produced the first long-range Forest Plan (College of Forestry 1993). The plan recognized that pressures were mounting on the forest to serve the growing Corvallis community's recreational needs and most recreation on the forest was trail-based. Feedback from foot-based, mountain bike, and equestrian user groups, along with coordination with a Trails Advisory Committee (formed in 1991), clearly indicated the need for more proactive planning and management of the forest trail network, including addressing an estimated 18 miles of unofficial "multi-use" trails, additional connector and access routes, and improved trailhead infrastructure. In response, the plan initiated a 3-year pilot program focused on education and outreach regarding trail use etiquette and the use of volunteers and research forest staff to improve the proposed McDonald-Dunn Forest trail network. The 1993 Forest Plan lists a "recreation forester" in the research forest staff structure, signifying growing recognition of the importance of visitor management.

The second Forest Plan (College of Forestry 2005) included an estimate of at least 150,000 annual visits to the forest. The plan noted that recreational pressures were expected to continue increasing and recommended estimating the number of recreational use visits per year by major category of use as a Performance and Sustainability Indicator. The 2005 Forest Plan refers to a “recreation program” and “recreation manager”, further highlighting recognition of the importance of visitor management on the Forest.

The first systematic survey of recreation visitors to the forest was conducted from 2008 to 2009. Recreation visits for this one-year period were conservatively estimated to number 105,000, with many frequent (36% at least twice weekly) and longtime visitors (46% for 10 or more years). The forest was identified as being important to many residents for recreation, and as playing a pivotal role in the local community. Growth in visitation to the forest appeared to be roughly tracking overall population growth in Corvallis (Needham and Rosenberger 2011).

In 2017, McDonald-Dunn Forest visitors were again comprehensively surveyed, both onsite as in 2008-2009, and also using a mailed household survey of Corvallis residents regarding their activities and current perceptions of recreation-related issues on the forest (Kooistra and Munanura 2018). Recreation activity was estimated to have increased to over 155,000 annual visits. This estimate did not include the Dunn Forest and was described as conservative. Perhaps the most notable finding from the 2017 survey was that growth in visitation to the McDonald-Dunn Forest was increasing faster than population growth in Corvallis (Figure 15).

The COVID-19 pandemic and restrictions on indoor activities caused participation in outdoor recreation in dispersed, undeveloped outdoor settings to spike drastically. Visitation in the McDonald-Dunn Forest rose rapidly during 2019 and 2020, in line with national trends such as visitation to less developed national forest areas, which increased some 25% (USDA Forest Service 2021). As the pandemic waned, growth in nature-based recreation

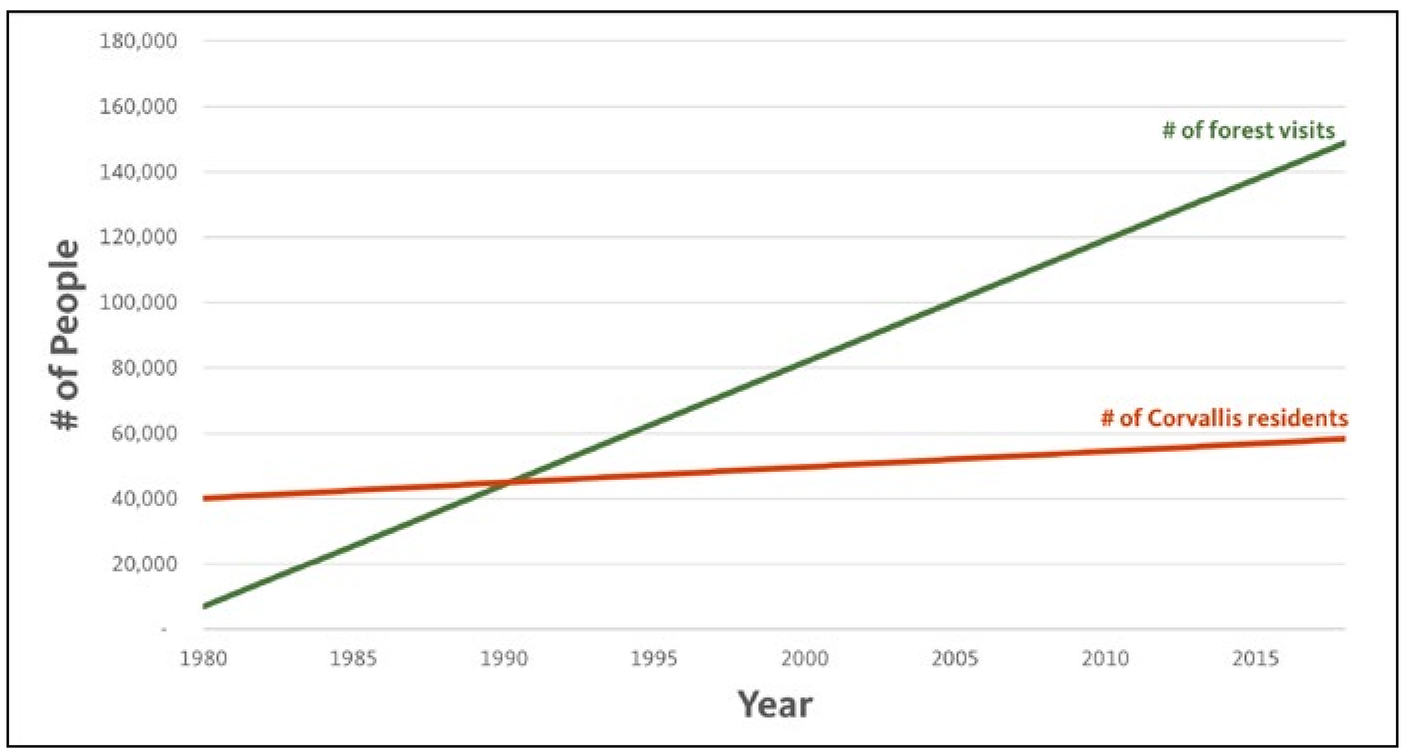


Figure 15. *Trends in the estimated number of annual visits to the McDonald-Dunn Forest relative to the population of Corvallis 1980-2018. Sources: Finley 1990, McComb et al. 1994, Wing 1998, Needham and Rosenberger 2011, Kooistra and Munanura 2018, World Population Review 2024.*

appears to have trended back roughly to prior rates (Perren et al. 2023), but precise data on McDonald-Dunn Forest visitation rates in recent years was not available at the time of the publication of this plan.

2.7.2 Current Visitor Use

On an average day, several hundred people currently visit the McDonald-Dunn Forest for recreation, learning, exercise, personal renewal and other purposes. Kooistra and Munanura (2018) found that recreational use of the forest had increased by 47% in the previous eight years. Based on that trend, an estimate of about 200,000 annual visits in 2025 is plausible. Visitors are mostly day hikers, runners and dog walkers, with significant numbers of mountain and gravel bikers, and a smaller but substantial number of equestrians. Parking at popular access points is often at capacity, especially on weekends. Based on recent trends, visitation to the McDonald-Dunn Forest is predicted to continue expanding.

This demand presents challenges yet also offers opportunities to provide high-quality visitor experiences that are consistent with the McDonald-Dunn Forest overarching mission and goals. Allowing public forest access provides abundant opportunities to enhance individual well-being and community livability. Moreover, the forests’ open-air setting offers an immersive platform to provide educational opportunities about forests and forest management, which directly meets one of the primary goals of the research forests.

Greater recognition of the importance of nature-based activity in everyday life has been accompanied by a shift from a “recreation as leisure” focus to more of a “recreation as human connection” approach to management. This perspective better reflects the ways in which people use and value forests today and can serve as a framework for integrating complementary aspects of recreation and educational forest visitation under a common management umbrella.

2.8 Infrastructure

The road system in the McDonald-Dunn Forest consists of 110 miles of gated single-lane gravel and native-surfaced roads (Figure 16 a, b). This includes 113 steam crossings, 4 bridges, and 17 locked gates. Road access by motorized vehicles is restricted to use for teaching, research, demonstration, commercial log hauling, administrative traffic, and fire control. Although shared by many users, **vehicles always have the right-of-way**. The roads are maintained, repaired, closed, or vacated according to regularly updated road management objectives for each road segment.

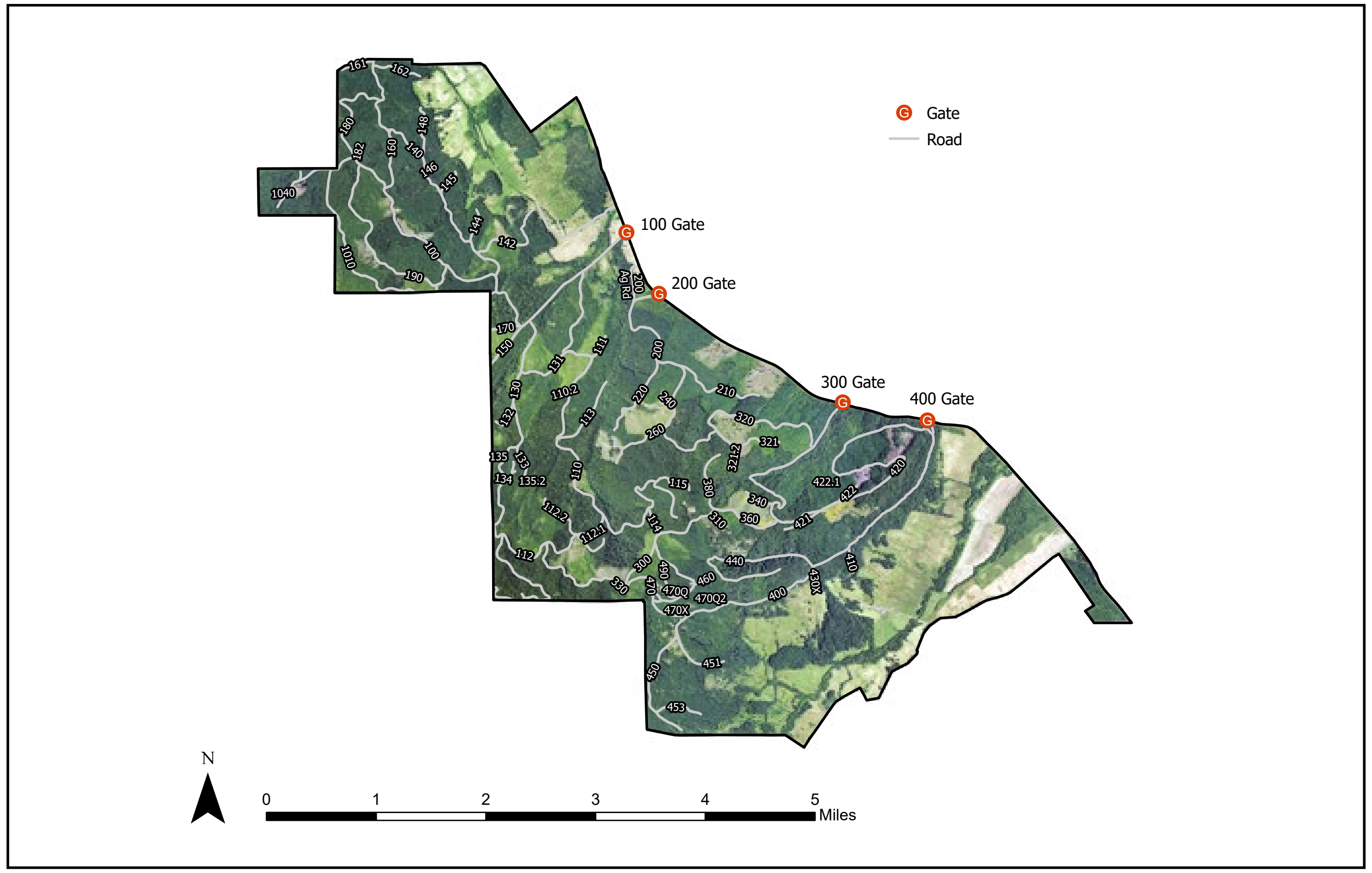


Figure 16 a. *Location of transportation infrastructure, including roads and gates, within the Dunn Forest.*

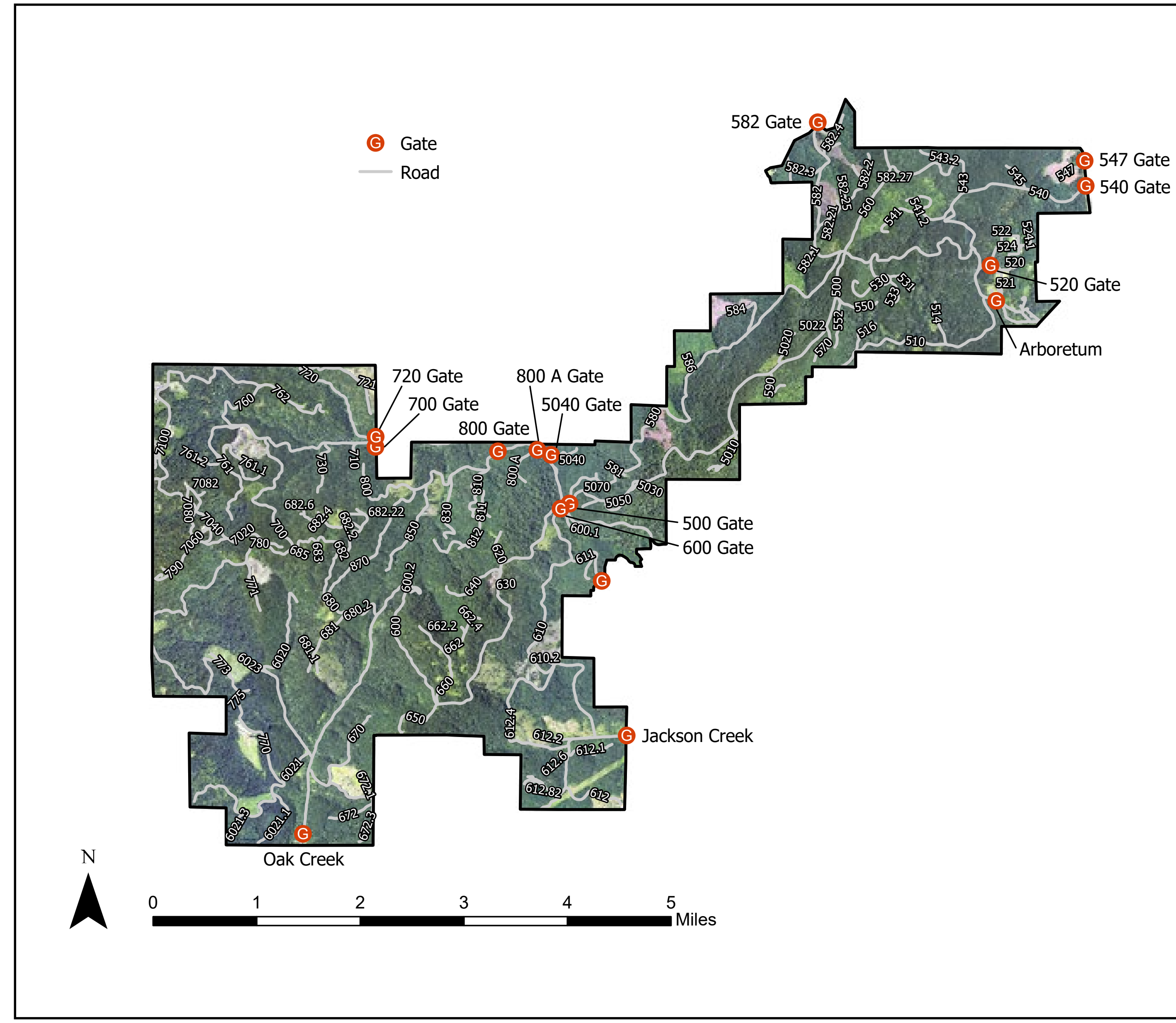


Figure 16 b. *Location of transportation infrastructure, including roads and gates, within the McDonald Forest.*

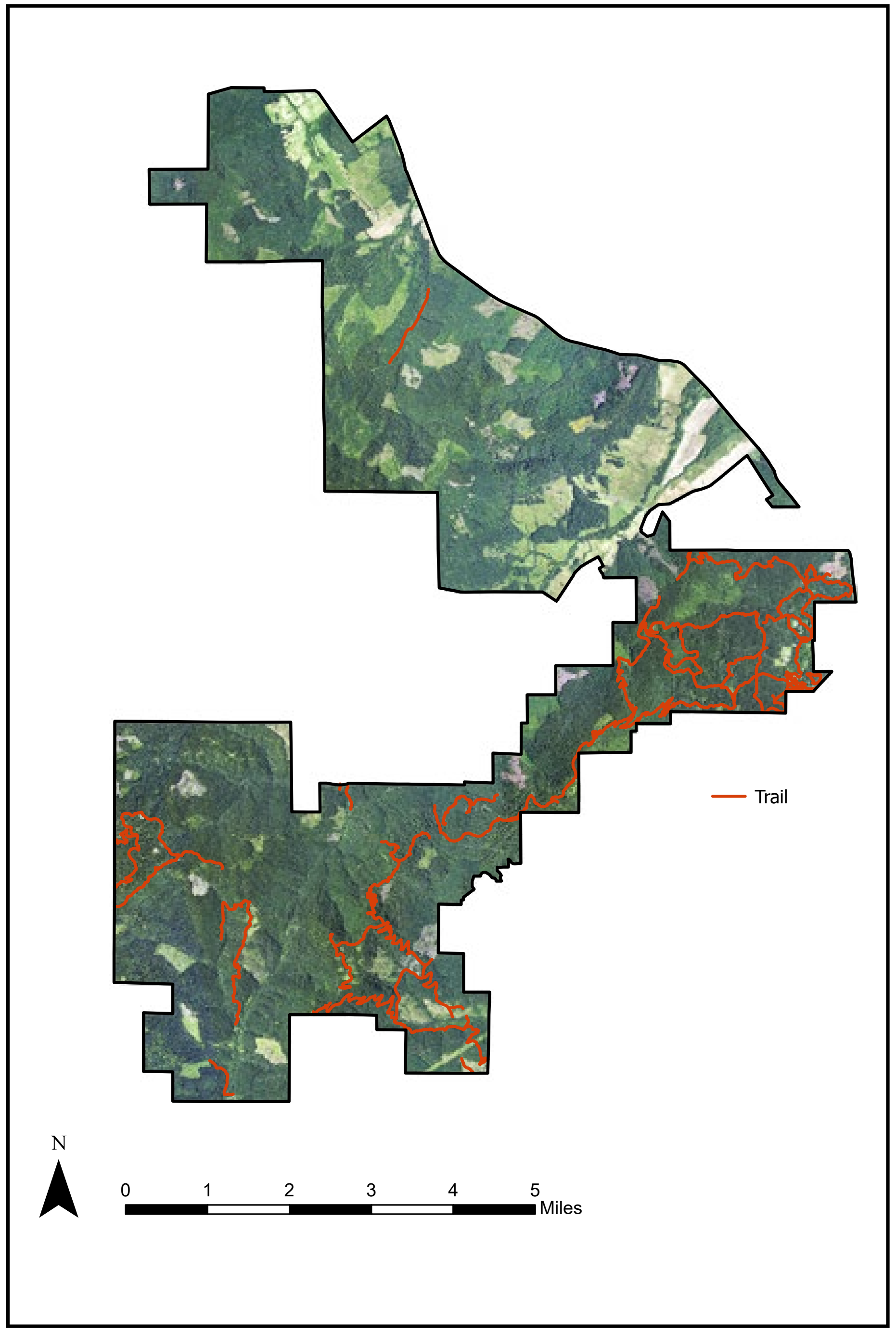


Figure 17. *Location of trails for non-motorized use within the McDonald-Dunn Forest.*

The McDonald-Dunn Forest also contains 35 miles of authorized trails (Figure 17). Mixed use trails are designed to support foot traffic, mountain biking, and horseback riding. Motorized vehicles are not allowed on forest trails. This includes cars, trucks, motorcycles, e-bikes, hover boards, Segways, etc. However, motorized wheelchairs are permitted.

Most of the permanent structures on the McDonald-Dunn Forest are located in Peavy Arboretum and near the Oak Creek trailhead area (Figure 18 a, b). At this time there are no permanent structures in the Dunn Forest.

Two structures are available for public use. Peavy Lodge, which has indoor space for a maximum capacity of 70 people, is available to rent for events such as meetings, retreats, weddings, and other gatherings. The Firefighter Memorial Shelter is available on a first-come, first-served basis, and can accommodate up to 50 people. This building is dedicated to all who work to protect our forest resources and to commemorate Oregon firefighters who died fighting the South Canyon Fire in Colorado in 1994.

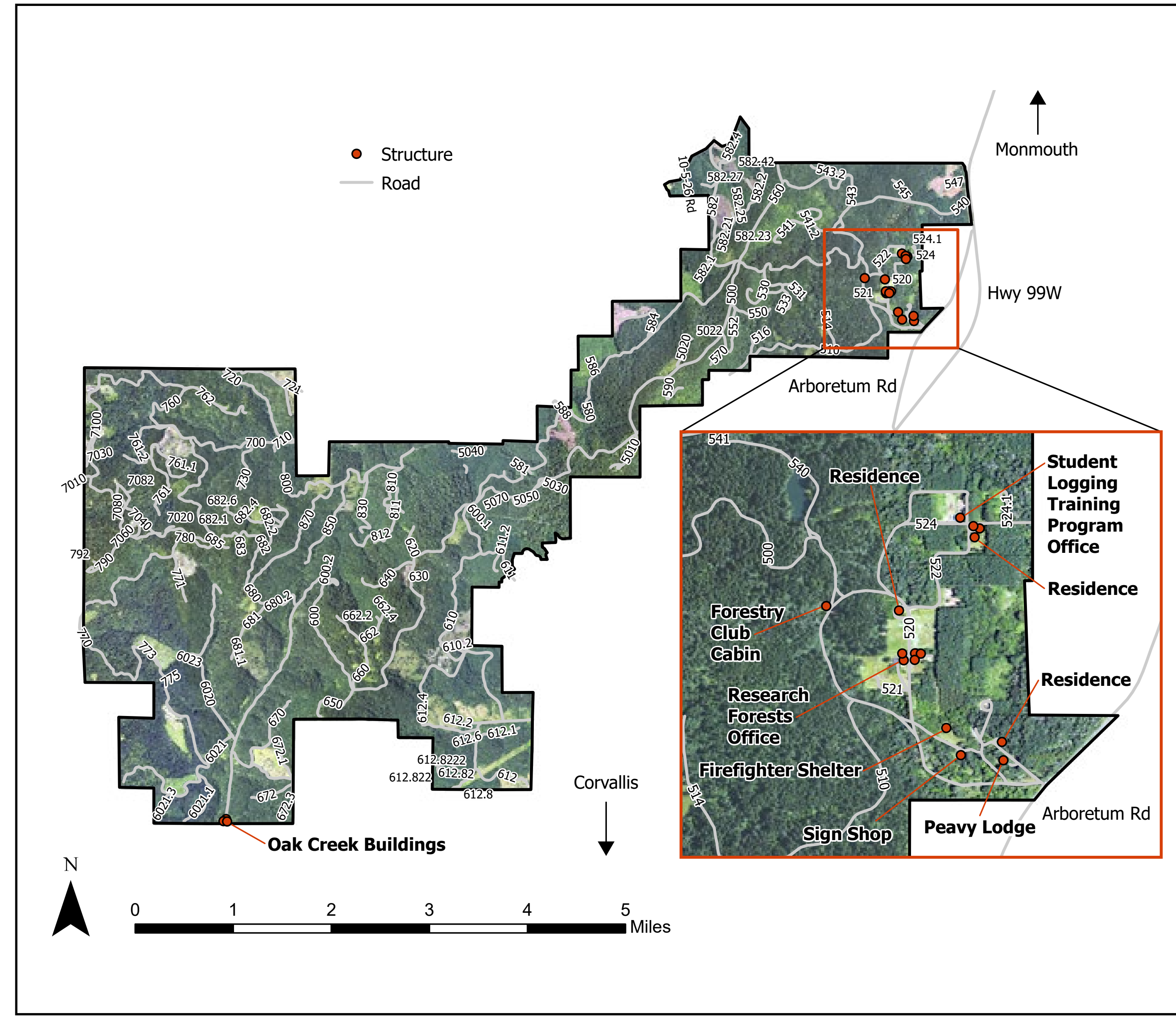


Figure 18 a. *Location of structures within the McDonald Forest.*

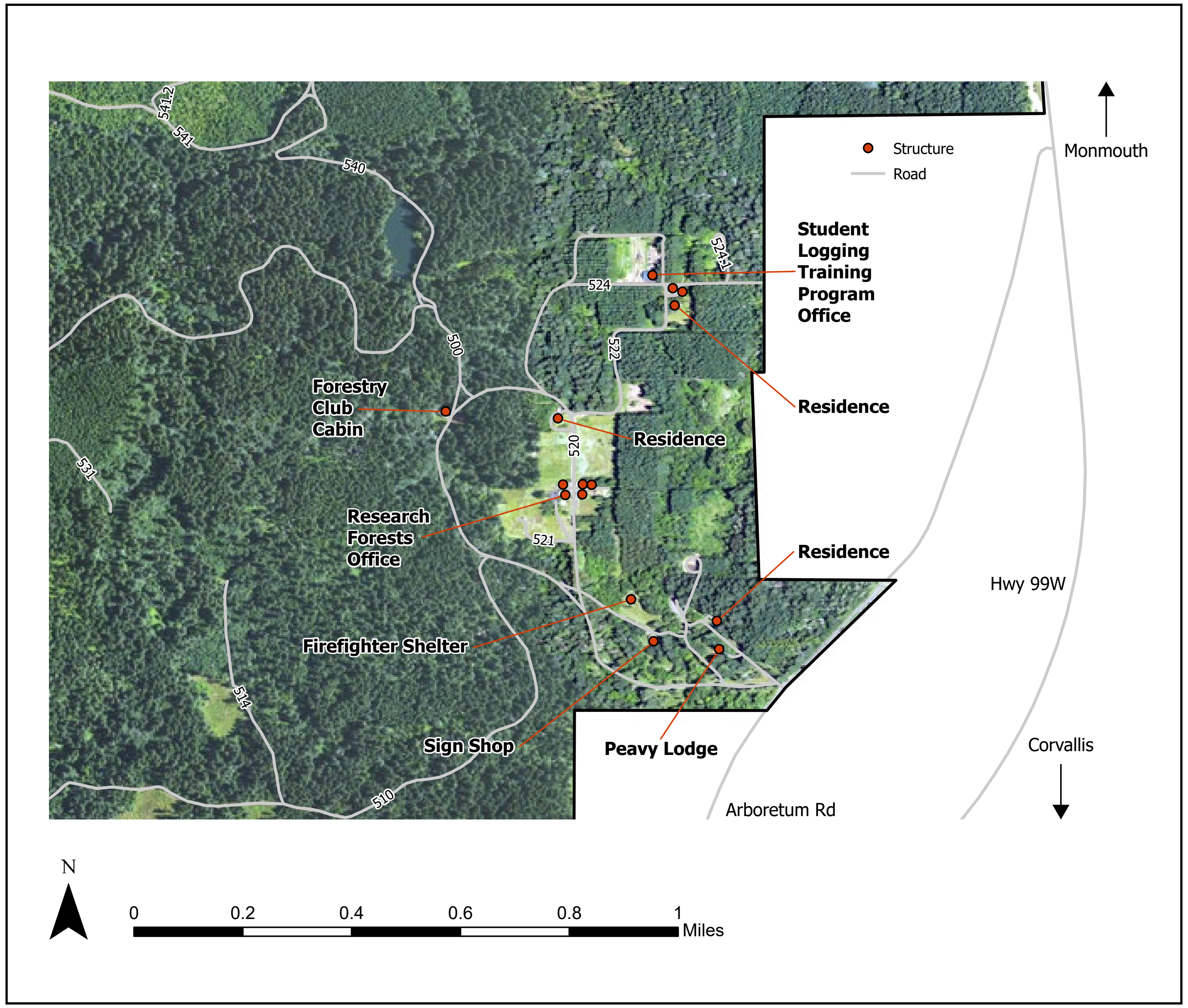


Figure 18 b. *Location of structures: close-up of Peavy Arboretum area.*

2.9 Current Forest Conditions

As mentioned in section 2.2.7, the current coniferous overstory consists predominantly of Douglas-fir with a small grand fir component. Although Douglas-fir and bigleaf maple are the dominant trees in recent times, the presence of naturally reproducing grand fir throughout the forest suggests that most of the vegetation across the forest is in the grand fir series, with the exception of one minor drainage near Soap Creek where western hemlock and western redcedar occur (see Figure 10).

Potential timber productivity of the forest is medium to good, with most of the area between high site III (where Douglas-fir will grow about 110 feet tall in 50 years) and low site II (height of Douglas-fir reaching 125 feet in 50 years) under natural conditions (King 1966; OAR 150-303-424). Actual productivity varies from the King estimates of potential, depending on species composition, stocking, genetics, and cultural practices.

Overstory stand age varies widely, with an average across the forest of 67 years in 2022 (Figure 19). Most of the stands that are currently less than 80 years old are second- or third-growth Douglas-fir forests. Many of the 80- to 120-year-old stands near the southern border of the forest are primary forest, originating through natural seeding in the absence of fire (i.e., suppression of wildfire and lack of cultural burning). All stands over 120 years of age are also primary forest. The current spatial distribution of stands according to age across the forest is shown in Figure 20.

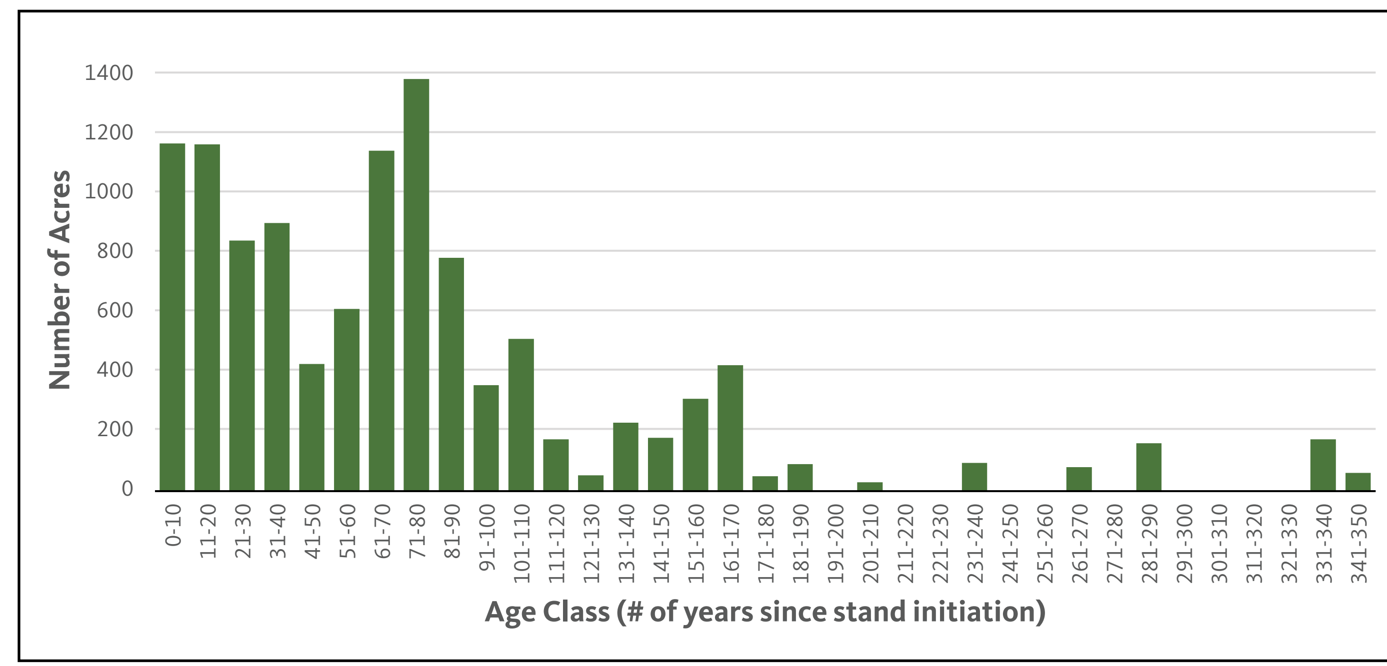


Figure 19. *Number of acres of Douglas-fir according to age class distribution in the McDonald-Dunn Forest as of 2022.*

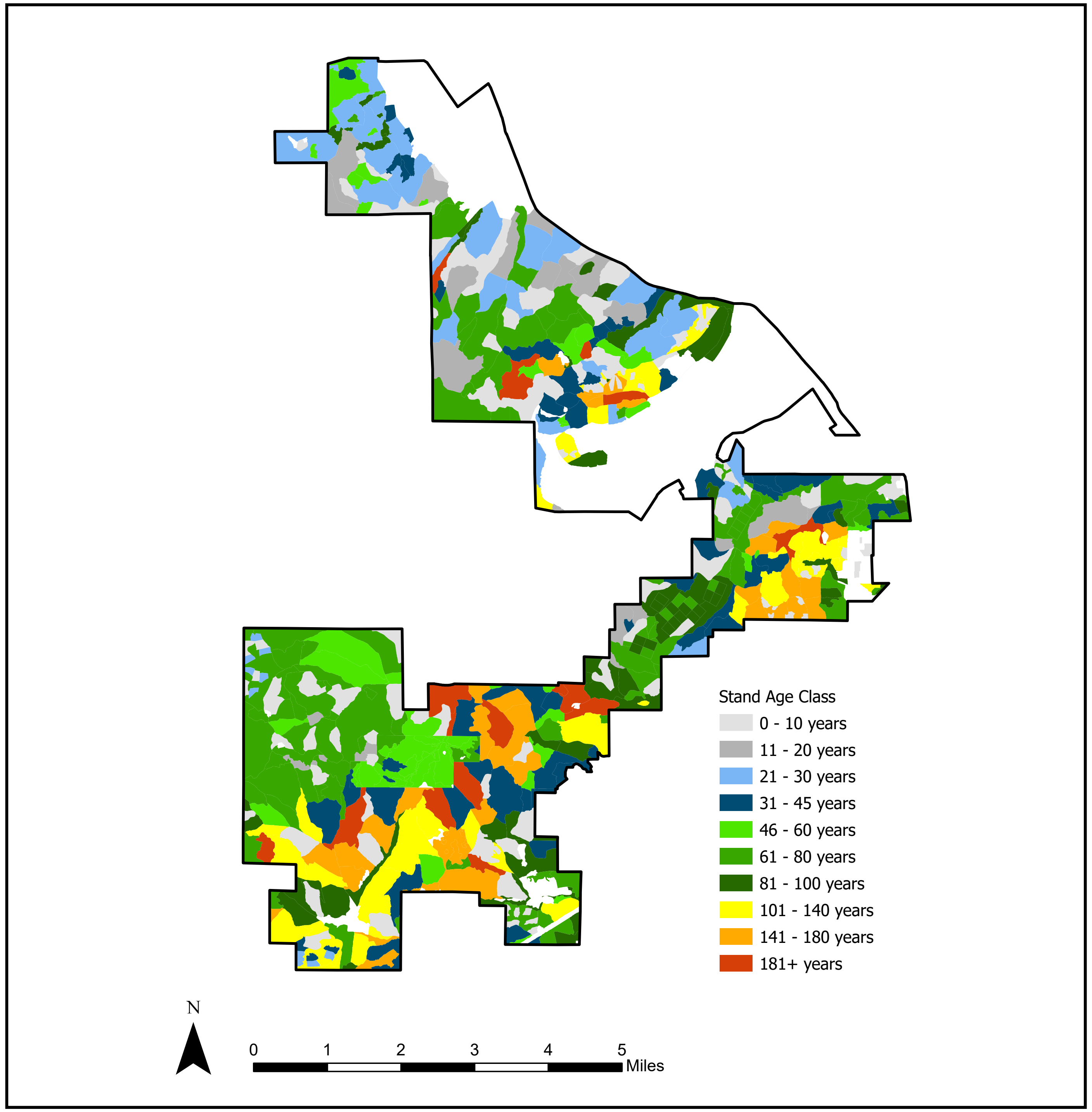
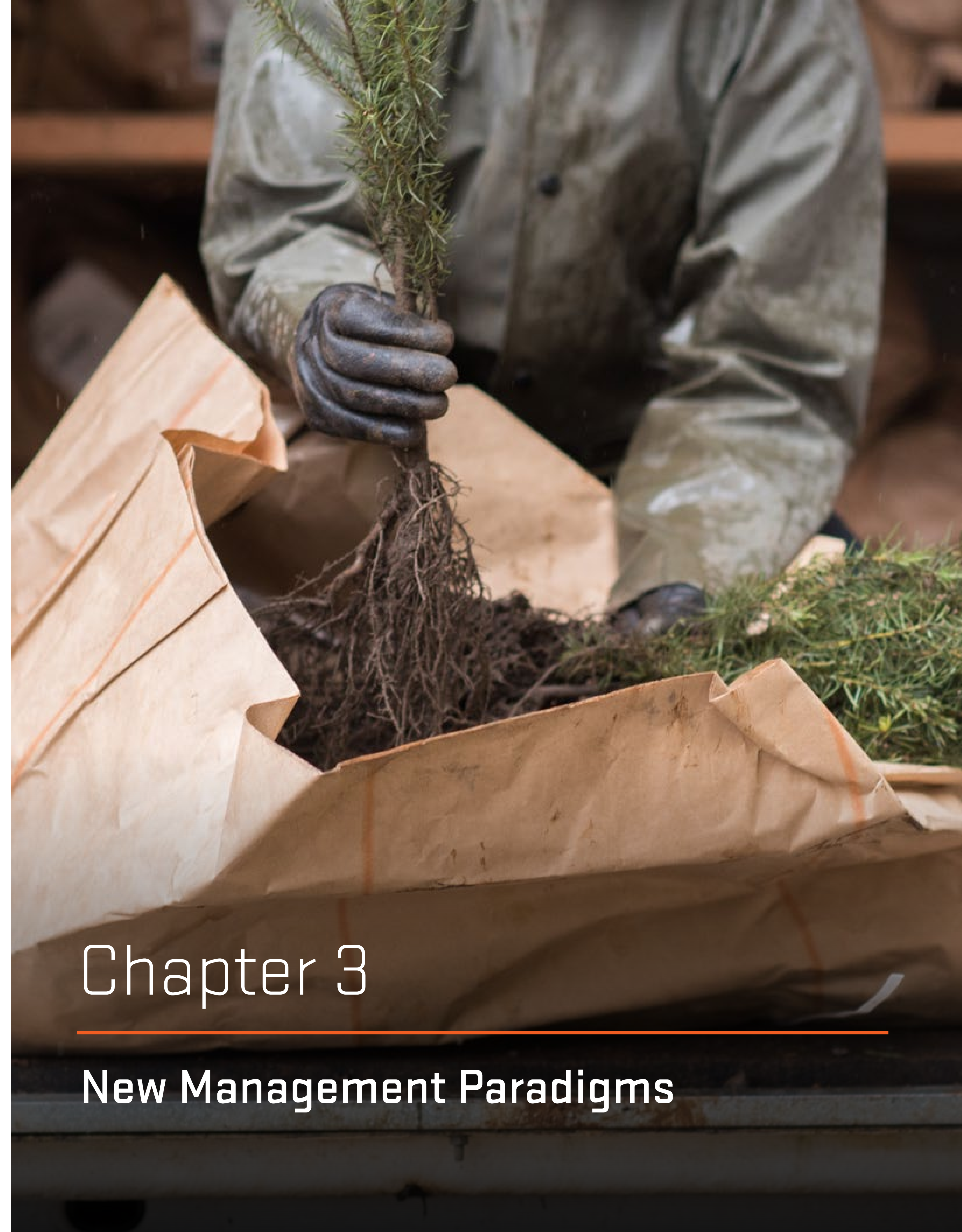


Figure 20. *Spatial distribution of Douglas-fir stands according to age class distribution in the McDonald-Dunn Forest as of 2024.*



Chapter 3

New Management Paradigms

The aim of this plan is to chart the course of the McDonald-Dunn Forest so that it is well aligned with the vision, mission, and goals of the OSU Research and Demonstration Forest network, and also reflects the heterogeneity of ideas brought forth by college, university, and community members during the plan development process in 2022-2025. This chapter describes these intentions as envisioned during the plan development process. It begins with an overview of how Indigenous perspectives will be incorporated into stewardship of the forest; explains the central premise of providing varied opportunities over time and space for learning through research, teaching, and outreach; highlights the fundamental expectation of economic sustainability; presents definitions of each of the new forest management strategies that will be overlaid across the forest; explains the approaches incorporated to ensure biodiversity is sustained; highlights the growing need to explore strategies to promote climate resilience to ensure adaptation to changing conditions and anticipated threats to forest health; delineates expectations for visitor management and neighbor relations; and describes approaches that will be used to enhance community engagement and partnerships. Material is written so as to provide a framework that guides the decisions made by research forest staff while providing flexibility so that the forest can adapt to changing conditions and human values over time.

3.1 Tribal Engagement and Incorporation of Native American Perspectives

The College of Forestry is firmly committed to honoring Tribal ancestral relationships that have persisted since time immemorial. In the early to mid-1800s, Euro-American settlers displaced the Kalpuyan Peoples who lived on and used what are today called the McDonald-Dunn Forest for their sustenance. Prior to that, European diseases introduced to North America in the 1400s-1500s by Spanish explorers had spread across the continent and killed up to 90% of the previously existing population of places like Oregon. When Euro-American settlers arrived in Oregon in the 1830s, more Indigenous Peoples died through additional introduction of diseases and genocide (Boyd 1999). Survivors were forcibly removed to reservations.

In recent years, partnerships in natural resource research and adaptive management have been growing between Indigenous Peoples and universities, to help heal the damage done to Indigenous Peoples and reinstate the traditional relationships and cultural stewardship that had been in place for millennia. **Decolonization** refers to an intentional reversal of the erasure of Indigenous languages, culture, beliefs, and resource stewardship practices; pernicious institutional structures; deep ecological degradation; and intergenerational human trauma created by settler colonialism. Because we live in a world where all systems are based on settler-colonial practices such as capitalism, decolonization requires systems-based institutional changes. New partnerships are now bringing together multiple ways of knowing to co-develop solutions to urgent natural resource problems and help create a more sustainable future (Eisenberg et al. 2024).

3.1.1 Indigenous Knowledge

Indigenous Knowledge (IK, which encompasses Traditional Ecological Knowledge and Indigenous Ecological Knowledge) refers to knowledge and practices passed from generation to generation informed by cultural memories, sensitivity to change, and values that include reciprocity (defined as taking with the moral responsibility of giving back in equal measure). IK observations are qualitative and quantitative and illustrate that objectivity/subjectivity is a false dichotomy in knowledge generation. IK observations are long-term, often made by persons who hunt, fish, and gather for subsistence and often passed down through generations over millennia. Most importantly, IK is inseparable from a culture's spiritual and social fabric, offering irreplaceable ecocultural knowledge that can be thousands of years old, spanning many generations. Moral values, such as kinship with nature and reciprocity, which can help restore ecosystems, are intertwined in IK systems. IK land-care practices include cultural burning and adjusting timber harvest to create more sustainable communities of culturally significant traditional plants that provide wildlife habitat, and in turn, food, medicines, and products for humans.

Scientific Knowledge (SK, also known as Western science) is an inquiry system shaped by Aristotelian logic and hypothesis testing. In contrast to IK, key attributes of SK are singularity of truth (monism) and objectivity. SK is characterized by synchronic (short-term) studies that strive to be value-free (unbiased, amoral) and ideally use systematic, replicated experimentation conducted in isolation, accurate measurements, and empirical tests, which lead to predictive, generalizable statistical models that have credibility and legitimacy.

One of the cornerstones of settler colonialism is the singularity of truth—there is one truth to righteously be imposed on the world. SK expresses this belief in many ways. Decolonization involves the inclusion, respect, and honoring of multiple ways of knowing. IK and SK represent two very different worldviews that, when braided together, can help develop the solutions needed to create holistic socio-ecological systems more resilient to global change. SK has gaps in its effectiveness in informing our understanding of how the world works because of its basic principles; IK can fill those gaps, because it is the original knowledge, developed over millennia of adaptive stewardship of the natural world by humans. Embracing multiple ways of knowing that provide fuller, more holistic, and richer knowledge is necessary to help guide policy and management for a sustainable future.

3.1.2 Policies for Co-stewardship

Despite recent efforts, there remains widespread lack of institutional and academic professional understanding about how to partner ethically with Indigenous Peoples. The College of Forestry strives to be an inclusive, diverse, and caring community of interdisciplinary, multi-cultural scholars who respect and value Tribal partnerships, Indigenous ways of knowing, and relationships with Indigenous Peoples. Accordingly, in 2023, the college created the *Principles and Best Practices for Working with Indigenous Knowledge and Partnering with Tribal Nations and Indigenous Peoples: Volume I: Principles.*

These principles provide an effective, proactive, and mutually supportive process built on prioritizing deepening intercultural relationships and helping them flourish in a reciprocal manner. These principles provide critically important direction for the college when building trusting and sustained relationships with Tribal Nations. They will be applied to all research, ecocultural restoration, and co-stewardship programs between the Confederated Tribes of Grand Ronde and Confederated Tribes of Siletz Indians and the College of Forestry in the McDonald-Dunn Forest.

Co-stewardship of the forest by the College of Forestry and each of the Indigenous Tribes of Oregon whose homeland this was will be guided by MOUs currently under development. This will involve protecting and enhancing Tribal ecocultural sites on the forest, engagement in early stages of planning on the formulation of goals and objectives for stewarding ecocultural resources, and annual discussions of operations including previous year accomplishments and coming year plans. Annual reports, discussed during annual meetings,

Guidelines for Co-stewardship and Ecocultural Restoration

To engage respectfully with Tribal Nations in co-stewardship and ecocultural restoration of the McDonald-Dunn Forest, the following principles apply:

1. Acknowledge the historical context of past injustice: genocide, ethnocide, and ecocide.
2. Practice early and sustained engagement with Tribal Nations and/or Tribal knowledge holders.
3. Earn and maintain trusting relationships by being transparent, open about ideas and agendas, and honest at all times, in all forms of communication.
4. Respect different processes and worldviews.
5. Recognize, respond to, and adapt to challenges with cultural humility.
6. Consider supporting co-stewardship structures.
7. Pursue co-production of knowledge. Knowledge co-production is a research framework based on equity and the inclusion of multiple knowledge systems.
8. As needed, provide funding to Tribal Nations and Indigenous Peoples for involvement at each step of partnership and knowledge co-creation.
9. Share decision-making processes with partnering Tribes and Indigenous Peoples. Be honest and transparent about any limitations regarding the ability to share such.

Details on these principles can be found on the OSU College of Forestry Indigenous Natural Resource Office website.

will describe efforts associated with cultural burning and ecocultural restoration (described further in Table 7). In co-stewardship partnerships with Tribal Nations, the college will acknowledge and support Tribal data sovereignty. Any guidance and direction provided to the college by Tribal partners that involves sharing their Indigenous Knowledge will be protected via MOUs and data sharing agreements, in keeping with best practices for partnering with Tribal Nations.

3.1.3 Culturally Significant Species and Cultural Ceremonies

In recognition of the Indigenous Peoples who lived on and used what is today called the McDonald-Dunn Forest for their sustenance, a commitment has been made with the onset of the 2025 Forest Plan to nurture culturally significant species across the forest. New MOUs will establish clear policies around access for Tribal members to tend and gather culturally significant non-timber plants for personal and community use.

New MOUs will also clearly outline the ability to use the forest for sweat lodge ceremonies. Historical documents indicate efforts nearly 50 years ago to allow use of the research forest for spiritual purposes. A sweat lodge was built in 1976 in the Dunn Forest for use by Indigenous Peoples in a location that offered seclusion (Jackson 1980). A request for permission to build a new sweat lodge in the forest was received in 2023 and formally accommodated in 2024. Use of this sweat lodge is ongoing and demonstrates progress in decolonizing the relationship between the college and Tribal partners on whose ancestral lands the McDonald-Dunn Forest is located.

3.2 Fostering Learning Opportunities

This plan was developed with the intention of providing a framework that will continuously create conditions favorable to a wide variety of learning opportunities. Five new management strategies were developed with the expectation that each would create possibilities for research, teaching, and outreach across disciplines for many years to come (section 3.4.1). It is anticipated that they will collectively provide considerable options for comparative inquiries, experimental investigations, training in new skills, and demonstration opportunities. The new management strategies were written to guide future decisions that will be made by research forest staff, while providing flexibility so that research and teaching needs would be fulfilled, best practices demonstrated, and to ensure the forests' ability to adapt to changing conditions and shifting human values. In addition, the new management strategies were developed with the understanding that the McDonald-Dunn Forest is a place to demonstrate treatments not typically practiced in the Pacific Northwest but that may become more common in the future.

Recognizing that the McDonald-Dunn Forest could offer far more opportunities for learning to the community than has been the case in the past, section 3.8 provides additional ideas on outreach through volunteering and community partnerships, interpretation and education, communication, and community science. The emphasis in section 3.2 is on learning opportunities for those associated with universities.

3.2.1 Protocols for Initiating and Reporting on Research, Teaching, and Outreach

It is essential that research forest staff understand how the forest is being used for research, teaching, and outreach so that they ensure management activities are aligned with learning objectives, know who to contact if problems or concerns arise, can report accurately on how the forest is supporting learning opportunities, and can protect natural resources while ensuring public safety and equitable access for all users.

Individuals interested in initiating research on the forest must submit an online form to obtain permission. The research forest director will review each proposal within 10 business days of receipt and schedule a follow-up conversation with the lead investigator. This will provide opportunities to clarify expectations from the research forest regarding data management, discuss costs associated with management activities dictated by the research, review timing and safety protocols, and make connections with other research forest staff. Once research projects on the forest are completed, it is the responsibility of the lead researcher to report metadata and to provide updates to the research forest director on any publications resulting from their work. Links to publications emanating from the research forest are shared in the online searchable database to showcase the scientific discovery and learning occurring on the forest.

A new system will be implemented in 2026 for tracking use of the forest for educational uses other than research (e.g., university classes, Extension or outreach events, field trips for K-12 classes). As has been the case previously, certain activities will require application for a special use permit, such as when an event is not consistent with research forest guidelines (e.g., takes place after sunset, requires vehicle access) or when the scope of the event is such that it could interfere with other visitor use (section 3.8.3).

3.2.2 Locations Associated with Long-term Research

Long-term research projects are defined as those that have already or are anticipated to endure longer than ten years. Nine such projects existed on the McDonald-Dunn Forest prior to the writing of this plan, and two begin in 2025 and 2026 (Table 2, Figure 21). Collectively, they cover nearly 10% of forest acreage as of 2025. This acreage could increase in the future to accommodate the wildfire preparedness study and other newly envisioned long-term research projects.

Table 2. *Long-term research projects on the McDonald-Dunn Forest.*

Start Date	Project Title	Project Description	Example Publications	Size
1925	Pole Wood Preservation Study	Investigates treatments intended to increase utility pole resistance to decay and response to wildfire	Utility Pole Research Cooperative Annual Reports 1981-2021	6 acres
1989	College of Forestry Integrated Research Project (CFIRP)	Examines responses of vegetation, wildlife, economics, and humans to several silvicultural alternatives through replicated experimentation	Chambers et al. 1999; Barry et al. 2017; Huff and Bailey 2009	875 acres
1989	Stand Density Management Cooperative Douglas-fir Spacing Study	Part of a regionally replicated research project that examines various aspects of intensive stand management	Maguire et al. 1991	52 acres
1989	Urban Fringe Study	Investigates the interests and concerns of research forest neighbors regarding forest management activities in the wildland-urban interface	Shelby et al. 2004	75 acres
1990	Uneven-aged Management Studies: Forest Peak, 6021 Stand, and West Fork	Examines multiple facets of uneven-aged management, including economics	Alarid 1993; Emmingham 1998	136 acres
1993	Mature Forest Study (Stand Density Regulation & Understory Regeneration Study)	Investigates efforts to convert single-aged forest stands into a two-aged forest stand structure	Cole and Newton 2009; Elfstrom and Powers 2023	145 acres
2011	Purple Martin Study	Investigates purple martin use of artificial and natural nest sites in regeneration harvests	Sherman and Hagar 2021	N/A
2021	Jackson Meadow Restoration Study	Examines effects of restoration efforts over time, including whether ground disturbing activities affect restoration results, how long the site should be held in chemical fallow, and the seeding rate of native vegetation	Metzler 2024	27 acres
2023	Assisted Migration Study	Investigates survival of Douglas-fir seedlings that have been sourced from warmer and drier climates south of the Willamette Valley	None yet available	6 acres
2025	Variable Tree Retention Study	A replicated experiment that examines the longevity of trees retained in harvest units at varying densities, spacings, species, and tree sizes	None yet available	68 acres
2026	Wildfire Preparedness Study	Anticipated to begin in 2026, this project will compare the efficacy of several fuel reduction methodologies on the margins of the forest, prioritizing areas with high housing densities and high wildfire risk (e.g., low fuel moisture due to south-facing aspect).	None yet available	Design is under development; size will expand over time

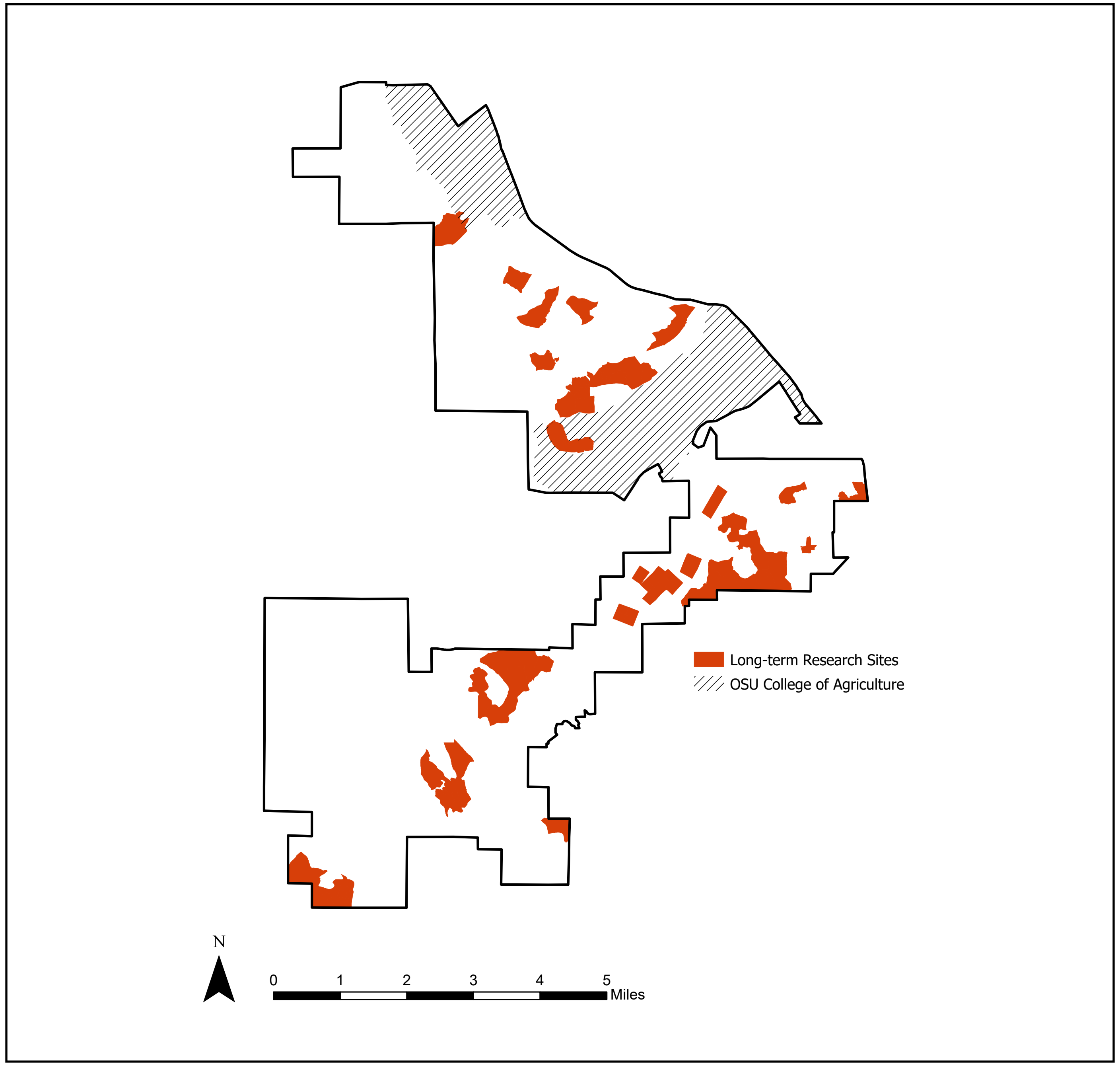


Figure 21. *Location of long-term research projects on the McDonald-Dunn Forest.*

Formal research plans for long-term research projects must be approved by the research forest director. Newly proposed long-term research projects must be clear about the intent, land area used, methods, restrictions on other land uses within the research site, budget, and duration of the project. The Principal Investigator named in the research plan is expected to provide input on management treatments, funding to implement the treatments if outside the normal scope of work of research forest staff, funding to cover other costs including data collection and study site maintenance, and a commitment to report metadata and provide updates on publications resulting from the project.

3.2.3 Locations Associated with Teaching and Outreach

Some areas in the forest are visited extensively by university classes and may require special management attention to retain their educational value. These areas may contain special features in close proximity to roads that illustrate historical or ecological structural characteristics and processes. They may not require special effort to maintain but may require restricted management operations. Such areas should be brought to the attention of the research forest director. Teaching area plans filed with the director must be clear about the intent, land area used, methods, restrictions on other land uses on the teaching site, and duration of use. These areas will be managed in accordance with their intended teaching purposes.

Some other areas of the forest play a unique role for university students. For example, Peavy Arboretum provides an essential location for OSU's Forestry Club activities. The club competes in Conclave, an annual logging sports competition among students from colleges across the western US. The George W. Brown Logging Sports Arena in Peavy Arboretum served as the site for the competition when OSU hosted the event in 2012 and 2023. In contrast to these established grounds, some student activities occur in locations that shift over time. For example, the Student Logging Training Program is a long-standing entity that provides opportunities for students to gain hands-on experience in logging operations. These harvest operations take place in different locations each year, selected in coordination with research forest staff.

A great deal of outreach occurs in the easily-accessible Peavy Arboretum. This is the location of the Forest Discovery Trail, an interpretation program designed to help students understand the long-term nature of forest management (see section 3.8.3). This is also the location of Peavy Lodge and the Firefighter Memorial Shelter, which can be used by educational groups (section 2.8; Figure 18).

3.3 Ensuring Economic Sustainability

Sustainability is a cornerstone of this plan. The concept of sustainability specifies that decisions and actions taken in the short term should not compromise livability for future generations. When considered in the context of forestry, sustainability entails managing natural resources such that they persist in a healthy state over the long-term. Sustainability is often described through the lens of three pillars: environmental, social, and economic (Figure 22).

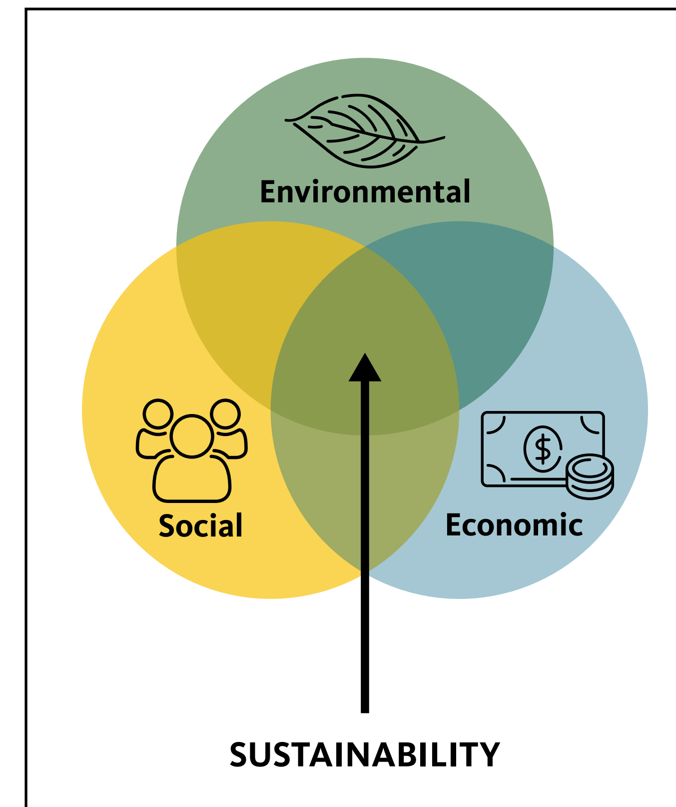


Figure 22. *Sustainability, a cornerstone of the research forest vision, mission, and goals, necessitates consideration of environmental, social, and economic conditions now and into the future.*

Sustainability is a key element of the vision for the OSU Research and Demonstration Forests. It is also embedded in the three missions and is a component of several of the goals (section 1.2). The McDonald-Dunn Forest is uniquely suited for investigating the intersection of ecological, social, and financial pressures that affect forest landowners, given the forest's size, intense recreational use, and intention of providing learning opportunities about five different forest management strategies that may be of interest to landowners.

The environmental component of sustainability is woven throughout the entire forest plan, and called out expressly in sections 3.4, 3.5, and 3.6. The social component of sustainability is also interwoven across many sections of the plan, and brought to the forefront in sections 3.1, 3.7 and 3.8. In this section, we describe how and why economic sustainability is a core tenet of all aspects of planning for the research forests.

3.3.1 Sustained Revenue Generation

The ten OSU Research and Demonstration Forests managed by the College of Forestry do not receive funding from the state of Oregon, tax payers, Oregon State University, or the College of Forestry (section 2.3.2). Rather, the expectation is that these ten forests as a collective group be financially self-sustaining. Substantial expenses are associated with maintaining these forests in a manner that enables them to provide opportunities for research, teaching, and outreach, while also allowing for many to be used recreationally by the surrounding community, all while not compromising environmental conditions in the short- and long-term. Expenses include salaries for 6.5 research forest employees (full time equivalencies as of 2025, down from 10 in 2005), maintenance of roads and facilities, acquisition of seeds and seedlings to enable reforestation and restoration, labor associated with preparing sites for planting and protecting plants from browsing, surveys for species of interest, wildfire risk reduction activities such as mastication, research equipment and supplies, volunteer management, harvest operations, interpretation and outreach, monitoring to enable adaptive management, and much more.

Section 3.4.2 of the plan describes the culmination of the careful thought put into balancing divergent needs and interests. Recognizing that the 2005 Forest Plan was suspended shortly after implementation—largely due to unanticipated financial constraints—the current plan was developed with a keen eye toward ensuring the forest could generate adequate revenue to support ongoing forest management, including research, teaching, and outreach associated with the forest, while not causing degradation of forest health or other natural resources over time and while meeting the foundational expectation of providing learning opportunities over the long-term.

Revenue from the research forests has historically been raised almost entirely through the production and sale of traditional wood products. Because the production of large quantities of any one forest product type (e.g., poles vs lumber vs pulpwood) at any point in time could result in economic instability due to market volatility, meticulous attention was given during the planning process to the ages at which stands would be harvested as well as the acreage to be harvested any given year, as these factors dictate the volume and type of forest products created and sold.

When calculating expenses during the planning process, the personnel required to maintain the research forests as well as associated infrastructure and the needed outreach and communication efforts were considered. Additional details on staffing needs and plan implementation are described in sections 4.1 - 4.3.

3.3.2 Additional Potential Sources of Revenue

A core principle of economic sustainability is maintaining flexibility to withstand unanticipated changes such as market fluctuations or regulatory shifts. Diversifying the revenue stream that supports the research forests is of considerable interest in this regard, but economic analyses to investigate consistent, viable, and feasible options to support the forest was beyond the scope of what could be done as part of the 2025 Forest Plan development process. Additional investigation and analysis are recommended as the subject of future student or faculty research project(s), with the intent to act upon the most promising avenue(s) identified. Also, it is recommended that a *development team* be established and charged to meet regularly to assess the feasibility and suitability of new and emerging revenue options, ensuring alignment with the vision, mission, and goals of the forest.

Revenue generation is a core element of the sustainability trifecta dictated by the research forest vision and mission. Because diversification of forest values has led to a call for a more heterogeneous collection of management strategies that in turn will decrease harvest volume, there may be a need to investigate additional options to add to the funding portfolio over time. As part of the adaptive nature of this plan, potential supplemental revenue sources will be pursued when appropriate (Table 3).

Table 3. *Potential supplemental sources of financial support for the McDonald-Dunn Forest in the future.*

Potential source of supplemental financial support	Situations under which to consider
Charitable foundations	Submit proposals to request support for specific time-bound efforts (e.g., individual restoration projects)
	Submit proposals to fund internship/training programs
Donations	Establish a process for soliciting donations for recreation, specific projects, or for the forest more broadly
	Build a "Friends of the Forest" program
Environmental finance	Consider selling carbon credits for verified additionality
	Consider establishment of a forest bond
	Consider payments charged for ecosystem services
Fees for use	Charge researchers a flat fee for use of the forest so that a portion of operational expenses of the forest is covered
	Charge researchers an hourly rate for staff support time
	Charge for recreational visitation, including hunting leases
Grants	Submit proposals to support specific time-bound efforts (e.g., individual restoration projects, interpretive projects, trail projects)
	Submit proposals to fund internship/training programs
Reduced cost labor	Identify options to offset costs of student labor (e.g., university programs such as work-study or college programs such as mentored employment)
Volunteer labor	Establish a trail ambassador program to complement the existing trail building program

3.4 Forest Management Strategies

3.4.1 The Five 'Management Strategies'

To achieve the mission and goals for the research forest, including the continuous creation of conditions favorable to a wide variety of learning opportunities, land will be allocated to five different **Management Strategies**. Each of these management strategies represents a different set of management objectives typical of forestland owners and managers in Oregon and beyond, with most incorporating some aspects of ecological forestry (e.g., sustaining biological legacies, maintaining structural and biological complexity/diversity, emulating natural disturbances). Guidelines were developed for each to provide opportunities for research, teaching, and demonstration tailored to the interests of different clientele groups. These management strategies were developed during the planning process with a degree of specificity that will allow research forest staff to make site-specific management decisions. Collectively, when applied across the landscape of the McDonald-Dunn Forest, they will provide a mosaic of conditions to support learning opportunities and biodiversity (Figures 23, 24, 25).

Brief Descriptions of Management Strategies

Even-aged, Short Rotation Management Strategy

Even-aged plantations of Douglas-fir (or other climatic-appropriate species and genetic stock) will be established and managed to be financially-competitive by producing high yields of wood products valuable for domestic mills. Rotation length will be 35-50 years. Clearcut harvests will not exceed 80 acres (with limited exceptions due to large-scale disturbances), and ~5% cover of hardwood trees and/or resprouts will be purposely left free to grow in the understory throughout the rotation. Regular harvests associated with this management strategy will enable research and demonstration of climate adaptability using the introduction of alternative genetics of Douglas-fir or other species, provide early seral habitat conditions favored by some plant and wildlife species, create wood products for typical markets, provide dependable financial returns, and potentially reduce wildfire spread by repeatedly interrupting continuous fuel loads across the landscape upon harvest.

Even-aged, Long Rotation Management Strategy

Even-aged forests of Douglas-fir (or other climatic-appropriate species and genetic stock) will be established and managed to provide older forest conditions and produce larger, high-quality wood for domestic mills. Rotation length will typically be 60–90 years, with 3% of stands managed to 120 years. Clearcut harvests will not exceed 40 acres (with limited exceptions due to large-scale disturbances), and ~10% cover of hardwood trees and/or resprouts will be purposely left free to grow in the understory throughout the rotation. This management strategy will create learning opportunities about managing and financing rotation lengths longer than is typical in the region, provide training opportunities on repeated thinning and underburning, ensure retention of legacy elements at stand initiation to provide habitat conditions for some plant and wildlife species throughout a longer period of time, create high-quality wood products for niche markets, provide dependable financial returns, and provide older forest conditions that are not common across much of the surrounding region.

Multi-aged, Multi-species Management Strategy

Multi-aged, mixed-species forests of primarily Douglas-fir will be established and managed using shelterwood-with-residuals, group-selection, and variable retention regeneration harvests to create heterogeneity in opening size, regularly regenerate new age classes of trees, and maintain structural diversity to promote a variety of values. Multiple tree species will be encouraged. Harvests will not exceed 40 acres. This management strategy will demonstrate complex approaches for small-scale forest operations, create learning opportunities about managing with complex silvicultural techniques, and enable investigations of operational costs and harvest costs associated with non-typical silvicultural approaches. Multi-aged stands with varying degrees of within-stand complexity will promote landscape-scale biodiversity and provide a broader suite of habitat conditions for wildlife and plants. Continuous tree cover will provide visual aesthetics, and multi-age and multi-species stands will provide conditions that are not common across much of the surrounding region.

Late-successional Forest Management Strategy

This management strategy will be applied to areas allocated to "reserves" according to the 2005 Forest Plan, plus additional acreage. Forest succession and developmental processes following natural disturbances will proceed with limited human intervention in the areas formerly called reserves. These former reserve areas will be stewarded as needed to maintain older-forest structural and compositional diversity and to provide for public safety, (e.g., hazard tree removal, fuels management) and invasive species control. Younger stands newly added to this strategy may need more active operations in the near term (e.g., variable retention harvests) to promote the development of older forest conditions. This management strategy will create learning opportunities about long-term management considerations associated with risks from invasive species, climate change, and climate-induced disturbances as trees age and tree densities increase, and will provide learning opportunities about the importance of old forests and benefits associated with their active stewardship. It will sustain older forest conditions that promote habitat for some plant and wildlife species, and will provide aesthetic conditions preferred by some forest visitors. Older stands will provide conditions that are not common across much of the surrounding region.

Ecosystems of Concern Management Strategy

Restoration and maintenance activities will be undertaken in native oak savanna/woodlands, prairies/meadows, and riparian/aquatic systems. Two strategies will be employed:

- retain and conserve the most at-risk and highest value components of each ecosystem type and
- use intensive efforts where needed to improve and restore broader ecological and/or cultural functions at specific sites.

This management strategy will enable research, teaching, and demonstration on aspects of ecosystem restoration and monitoring for these three systems deserving of special management consideration in the region. It will provide learning opportunities about restoration principles, the ecology of native plants, production of first foods, and invasive species reduction, as well as demonstrations of potential applications of Indigenous Knowledge. It will enhance area biodiversity by improving the health of these three distinct ecosystem types and also reduce wildfire spread across the landscape.

These five management strategies represent approaches currently in use to varying degrees by private, Tribal, state, federal and land trust forest landowners and managers across the Pacific Northwest. Deploying them across the McDonald-Dunn Forest will afford diverse opportunities for research, teaching, and demonstration. Their implementation over space and time will ensure a wide distribution of seral stages and stand structural conditions across the landscape while providing demonstrations and training opportunities in the implementation of various forest practices used in actively managed forests and producing revenue to support the forest. Each management strategy will be implemented using best current silvicultural practices consistent with the need to meet desired future conditions. Within the context of each management strategy, there is flexibility to make site-specific silvicultural decisions so long as those decisions are consistent with the intent of the strategy.

Each of the management strategies was thoughtfully developed to provide contrasting conditions that will enable learning through research and monitoring. Features such as initial stocking density, early vegetation control measures, and intermediate treatments were purposely defined differently for each to enable scientific comparisons among the conditions created. A detailed description of the intent of each management strategy is provided below, and this material appears in table form in Appendix D. Each description attempts to articulate the vision for each strategy, along with details on implementation.

Even-aged, Short Rotation Management Strategy

Guiding Principles: Manage in a way that creates learning and research opportunities about short-rotation forestry and early seral conditions, enabling rapid transition to alternative genetic seed sources or species.

Stand Establishment: Employ intensive site preparation following industry standards (pile burning, prescribed fire, mechanical treatments and herbicide treatments) for ease of planting and early stand establishment. Planted seedlings will be from the best genetically selected material available for timber production but will also consider genetic seed sources adapted to a changing climate. Planting densities will be sufficient to meet the Oregon Forest Practices Act and will be selected with the intent to avoid the need for precommercial thinning (PCT), but PCT would be allowed if warranted because of excessive natural regeneration. Spacing will be relatively uniform. Competing vegetation will be managed to minimize mortality and growth loss of tree seedlings for the first 1–5 years until trees are free-to-grow, after which competing vegetation will be allowed to grow. A minor component (minimum of ~5% cover) of hardwood trees and/or resprouts will be identified and purposely left free to grow in the understory/overstory until final rotation age.

Intermediate Treatments: Thinning and other intermediate stand treatments will only be done if justifiable economically or if needed to respond to an unplanned disturbance event to maintain the health of each stand. Approximately 5% cover of hardwoods will be retained during thinning treatments to provide habitat diversity.

Stand Age: Rotation lengths will be regulated primarily by age that maximizes net revenue production. Rotation ages will be 35-50 years.

Legacy Elements: Retention of leave trees in harvest units >25 acres will follow the Oregon Forest Practices Act (OFPA) minimum requirements of two trees per acre (sized 11” and larger). Trees within riparian areas adjacent to even-aged, short-rotation units and outside of areas designated as ecosystems of concern can count towards the two trees per acre minimum. The exception to this, as noted above, is that 5% coverage of hardwood will be retained within the harvest unit as well as other legacy/character trees (Appendix H).

Even-aged, Long Rotation Management Strategy

Guiding Principles: Manage in a way that creates learning and research opportunities about long-rotation forestry and retention of legacy elements throughout the life of each stand, informed by both Indigenous knowledge and Western science.

Stand Establishment: Employ adequate site preparation to plant and establish a stocked young stand (e.g., use a combination of pile burning, broadcast burning, mechanical treatments, and herbicide treatments). Planted seedlings will be from the best genetically selected material available for timber production but will also consider genetic seed sources adapted to a changing climate with an eye to such longer rotations (i.e., a lengthier time span for surviving and growing). Initial stocking rates will be appropriate for the site conditions with enough established trees to accommodate multiple commercial thinning harvests within the rotation, with the intent to avoid PCT but allowing it if warranted. Spacing can be variable and appropriate to the site. Competing vegetation will be managed to increase seedling survival and growth until planted trees are free-to-grow (typically six years or less), and then competing vegetation will be left free to grow. A modest component (minimum of ~10% cover) of hardwood trees and/or resprouts will be identified and intentionally left free to grow in the understory/overstory until final rotation age to enhance diversity.

Intermediate Treatments: The first commercial thinning will occur as dictated by stand conditions, likely around 28–34 years of age. Additional commercial thinning entries will be done until final harvest using a variety of thinning approaches. The last thinning will occur no later than 10–15 years before final harvest. Approximately 10% cover of hardwoods will be retained during thinning treatments to provide habitat diversity.

Stand Age: Rotations typically will be 60–90 years, with a small percentage (3% of the entire forest acreage) managed to 120 years to represent a variety of common and uncommon rotation lengths and provide a diversity of conditions across a landscape scale.

Legacy Elements: Procedures will exceed OFPA regulations (i.e., retain additional legacy trees, green trees, snags, and coarse woody debris). Details will be dictated by stand-specific characteristics and treatment objectives.

Multi-aged, Multi-species Management Strategy

Guiding Principles: Manage in a way that creates learning and research opportunities about managing multi-aged and/or multi-species stands through creation of small openings and variable harvest practices that have low levels of stand disturbance, informed by both Indigenous Knowledge and Western science.

Stand Establishment: A combination of pile burning, broadcast burning, and herbicide treatments will be used for site preparation in the understory and/or small openings. Seedlings will be planted as needed to augment natural regeneration of conifers from seed and hardwoods from both sprouts and seed, with an eye to species richness and genetic variability.

- Shelterwood with residuals will maintain an appropriate overstory density to allow understory trees sufficient resources to grow. Overstory trees may be spaced uniformly or variably, dictated by site, stand, and windthrow risk conditions.
- Group-selection harvests will contain small (1.5–4.0 acre) openings with scattered legacy trees retained in openings.
- Variable retention regeneration harvests will retain individual trees, clumps of thinned and unthinned trees, and/or no-touch areas that are dictated by site, stand, and windthrow risk conditions.

Intermediate Treatments:

- Shelterwood-with-residuals: understory trees may be commercially thinned when needed (likely 35–50 years of age) depending on the overstory density. If overstory trees die, replacement trees may be assigned from the understory cohort to maintain the two-tiered canopy structure over time.
- Group-selection: Periodic thinning in the openings and matrix between openings will be used to increase vertical and horizontal structure, maintain health, and provide interim revenue.
- Variable retention regeneration harvests: Periodic thinning will be used to increase vertical and horizontal structure, maintain health, and provide interim revenue.

Stand Age:

- Shelterwood-with-residuals: Overstory trees will age progressively until natural mortality; harvest of most understory trees will be 60–70 years. Therefore, the age of the oldest trees harvested from these stands will be 60–120 years, regulated primarily by the complexity of habitat desired for each stand.
- Group-selection: Re-entry harvest will occur every 15–30 years to create 3-4 age classes across each stand with the oldest trees being 120 years. Minimum proximity of group selection openings to previous harvest entries will be >200 feet.
- Variable retention harvest: Re-entry may occur for precommercial or commercial thinning to maintain appropriate stand densities, favor the release of various trees species, and enhance forest structure and growth rates. Subsequent variable retention harvest may occur between 60-120 years to further diversify the stand.

Legacy Elements: This management system maintains abundant living and dead structure constantly within each stand with the intention of creating and sustaining diverse forest conditions, including some trees >120 years of age.

Late-successional Forest Management Strategy

As a result of cultural burning by the Kalapuya people, most of the original conifer forest on the McDonald-Dunn Forest was confined to north-facing slopes, and small, shaded valleys, ravines and riparian areas where fire was less frequent and/or intense. Following the arrival of Euro-American explorers, cultural burning waned and Douglas-fir stands grew denser and invaded new areas suitable for the species (Drake 2025). Old forests were more open and large trees on the McDonald-Dunn Forest—primarily Douglas-fir—were more scattered and often clumped (Juday 1976) compared to old-growth forests found within the wetter portions of the Coast Range. Drake (2025) estimated that large Douglas-fir occurred at an average density of only 13 trees per acre. These old trees possess large branches that extend to the lower bole, indicating that they developed in open conditions. A fire history study on the McDonald-Dunn Forest documented multiple fire scars within these large old trees, chronicling frequent—often near-annual—cultural burning prior to 1850 (Drake 2025).

Since the removal of frequent surface fire following Euro-American settlement (after 1850), tree density has increased in the older forests designated in the 2005 Forest Plan as old forest reserves, given the natural seeding of Douglas-fir and grand fir into what was once more open conditions. Thus, the current structure of these areas of the McDonald-Dunn Forest demonstrates the effects of fire exclusion and the reduction in disturbance for the last 170 years (Drake 2025). In other words, these stands now possess a novel forest structure and record fuel accumulations.

This densification of the areas designated in the 2005 Forest Plan as reserves influences forest dynamics and tree physiological status (tree vigor and health). Given changing climatic conditions on the McDonald-Dunn Forest (as evidenced by significant increases in tree mortality), reduction in stand density (i.e., some removal of smaller trees) and reduction of surface fuel loading within these stands could help maintain the vigor of large old trees as well as return the tree density and fuel levels to more typical historic levels described above, conferring greater resilience of large trees in the event of a fire. Thus, purposeful stewardship to reduce stand density, control invasive species, remove trees for safety reasons (near roads, trails, parking areas, and structures), and re-introduce low-intensity fire disturbances using prescribed and Indigenous fire practices may be needed.

Younger stands that are newly allocated to this management strategy may require thinning to promote development of large-tree character and structure and buffer them from climate change (Bailey and Tappeiner 1998). Overall, the main purpose of this stewardship is to restore or enhance long-term forest health. Such treatments would likely be done at a cost; it is unlikely they would generate revenue, but rather would be an ecological investment. Such treatments would serve the objective of restoring and maintaining older forest conditions, and would provide an important opportunity for conducting research in older forest stands.

Guiding Principles: Manage in a way that ensures learning and research opportunities about the creation and maintenance of historical late-seral forest conditions, informed by both Indigenous Knowledge and Western science.

Stand Establishment: Typically, stands will regenerate continuously on their own from small amounts of natural seeding. Active conifer and hardwood regeneration efforts may occur in areas subjected to large-scale disturbances (e.g., windstorms, ice storms, or wildfires), or when adding acres to the late-successional forest strategy. Invasive vegetation will be managed with judicious use of herbicides and alternative measures when necessary to ensure establishment and growth of tree seedlings and culturally significant species.

Intermediate Treatments: All areas may receive intermediate treatment under limited circumstances:

- Treatment of invasive species
- Removal of individual trees due to safety concerns
- Cultural and prescribed burning at small spatial scales to emulate historical processes and for research purposes.
- Areas newly added to the late-successional forest strategy may need intermediate treatment, such as irregular thinning or creation of gaps to promote characteristics of historical late-seral forest conditions typical of the region and in light of climate change. Girdling or tree blasting may be used to mimic natural tree mortality, with the intention of creating snags and eventually large coarse woody debris for wildlife.

Stand Age: The age of the oldest trees in these stands will continue to increase over time adding to the age-class diversity across the forest.

Legacy Elements: There will be no stand-scale harvest, so there is no need to designate legacy elements for this management strategy.

Ecosystems of Concern Management Strategy

Recognizing that there are limits to the time and funding available for restoration efforts, a two-step approach is recommended when allocating effort to oak and prairie restoration. The first approach focuses attention on conserving the highest quality of the remaining legacies of oak savannas and prairies, and the second puts more intensive effort into restoring remnants of lower quality. Conserving open-grown oak trees and fragments of native prairie communities is the most pressing priority, as they are rapidly being lost to natural processes and invasive species and once gone, will be very difficult to recreate. The second priority will require more intensive efforts to improve important ecological functions and processes in more degraded remnants of these habitats. This strategic approach should maximize future ecological, cultural, and educational benefits and opportunities.

In contrast, activities with riparian areas will be more constrained because these areas are explicitly protected under the Oregon Forest Practices Act (OFPA) to ensure that forest management activities do not impair water quality and to ensure that adequate vegetation is retained to provide in-stream and adjacent habitat and structure. All routine management activities in riparian areas will meet or exceed OFPA requirements, and will be augmented by research and monitoring devised to develop better understanding of the efficacy of stream and river corridor restoration efforts.

Guiding Principles: Manage in a way that creates learning and research opportunities about a range of restoration opportunities and intensities to improve and maintain the health and resiliency of selected ecosystems, informed by both Indigenous Knowledge and Western science.

Stand Establishment:

- Oak savanna/woodlands: in areas designated to receive intensive restoration treatment, oaks may be purposefully established through seed or seedlings at appropriate densities along with other native and culturally significant vegetation that historically occurred in these ecosystems. Site preparation may include prescribed fire and cultural burning or judicious herbicide use if required.
- Prairies: may require site preparation with cultural burning and prescribed fire and/or judicious herbicide use and seeding of other appropriate native herbaceous vegetation.
- Riparian systems: in areas designated to receive small-scale restoration treatment, limited harvests will occur with site preparation and planting at appropriate densities along with other native vegetation that historically occurred in these ecosystems. There may be judicious use of appropriate herbicides to control invasive species.

Intermediate Treatments:

- Oak savanna/woodlands: treatments could include prescribed fire and cultural burning, control of invasive plants, and/or precommercial thinning to remove young invading conifers.
- Prairies: treatments could include repeat cultural and prescribed burning and control of invasive plants and invading conifers.
- Riparian systems: treatments could include additional structural thinning, repeat prescribed burning, and control of invasive plants.
- Aquatic systems: in-stream and pond treatments could include removal of invasive species, including invasive aquatic plants, and placement of large wood.

Stand Age:

- Oak savanna/woodlands: the age of the oldest trees will tend to increase over time with no intentional harvest.
- Riparian systems: tree age will increase for long-lived conifers. For alders and other short-lived species, tree age may decrease as they senesce and die.

Legacy Elements:

- Oak savanna/woodlands: old conifers with an open-grown character dating to pre-settlement will be retained.
- Prairies: NA
- Aquatic/riparian systems: large old trees and big logs will be retained or enhanced both in-stream and in riparian zones.

More detailed recommendations for conservation and restoration of oak and prairie habitats can be found in Appendix E and recommendations for riparian and aquatic habitats can be found in Appendix F. Interest in restoration ecology is growing among practitioners and students; devoting land to experimentation of oak, prairie, and riparian restoration provides especially valuable opportunities for learning through innovative research, teaching, and demonstration.

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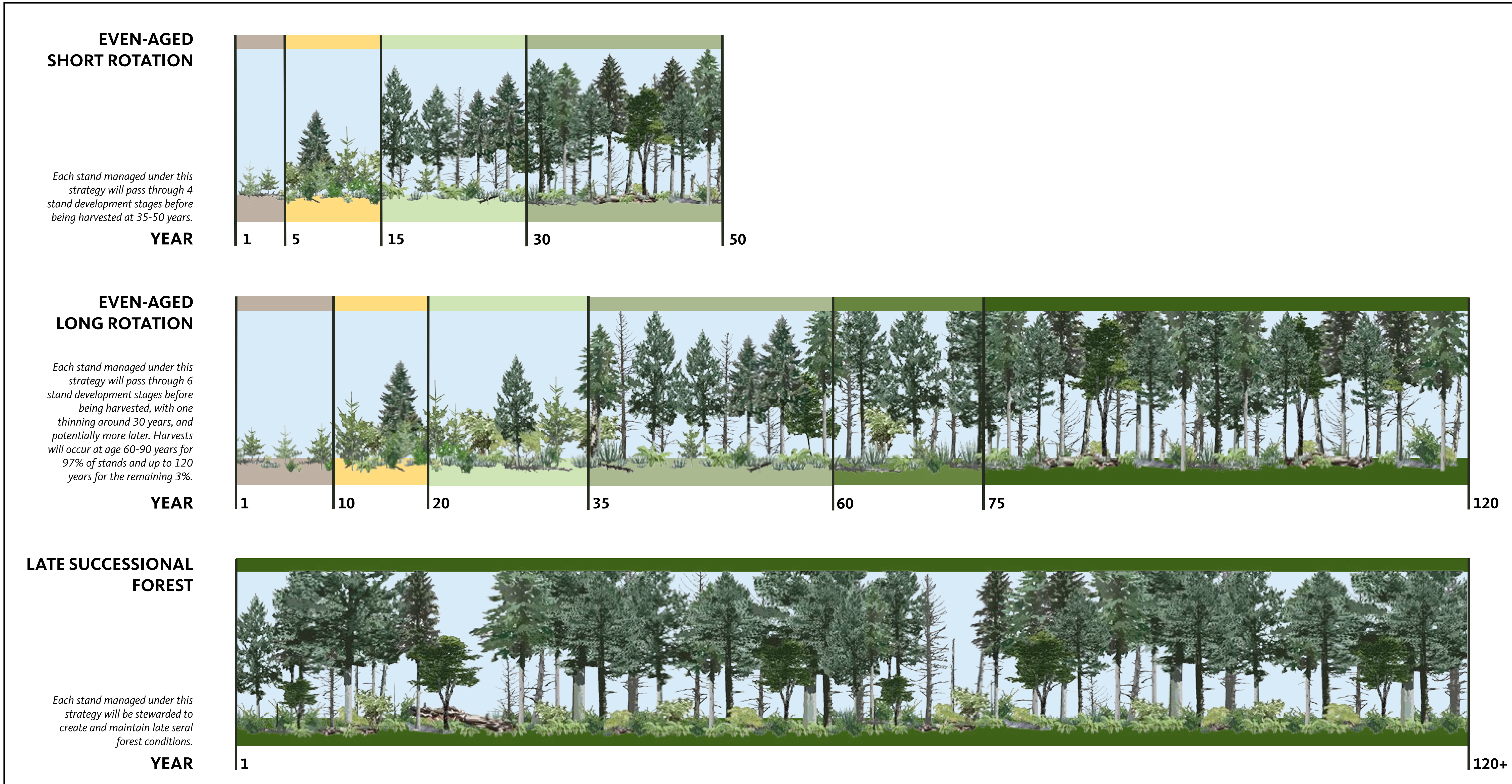


Figure 23. *Conditions typical of Even-Aged Short Rotation, Even-Aged Long Rotation, and Late Successional Forest management strategies.*

SHELTERWOOD WITH RESIDUALS

Each stand managed under this strategy will be stewarded to create and maintain a two-storied canopy. The density of the overstory trees will be managed to allow understory trees to grow. Final harvest of the understory will occur at age 60-120. Original overstory trees will remain and some understory trees may be selected to remain as replacement for overstory trees that die.

YEAR

GROUP SELECTION

Each stand managed under this strategy will be stewarded to create heterogeneity by creating small openings that regenerate new age classes of trees. Final harvest will occur at age 60-120 years.

YEAR

VARIABLE RETENTION

Each stand managed under this strategy will be stewarded to create heterogeneity through retention of individual trees, clumps of trees, and no touch areas. Periodic thinning will maintain appropriate stand densities, and enhance forest structure, composition, and growth rates. Variable retention harvest may occur at age 60-120 years.

YEAR

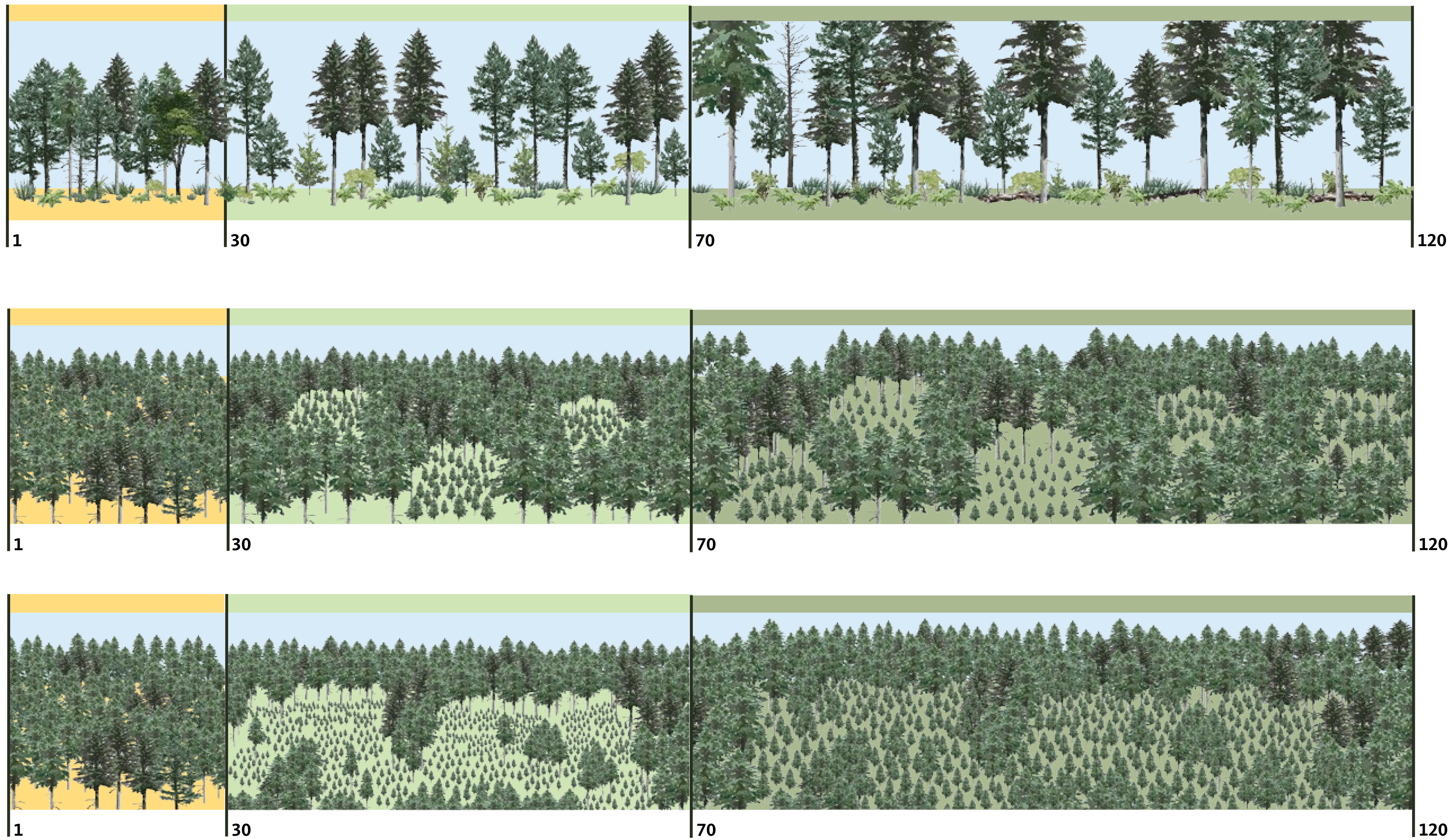


Figure 24. *Conditions typical of each of the three silvicultural approaches within the Multi-Aged, Multi-Species management strategy.*

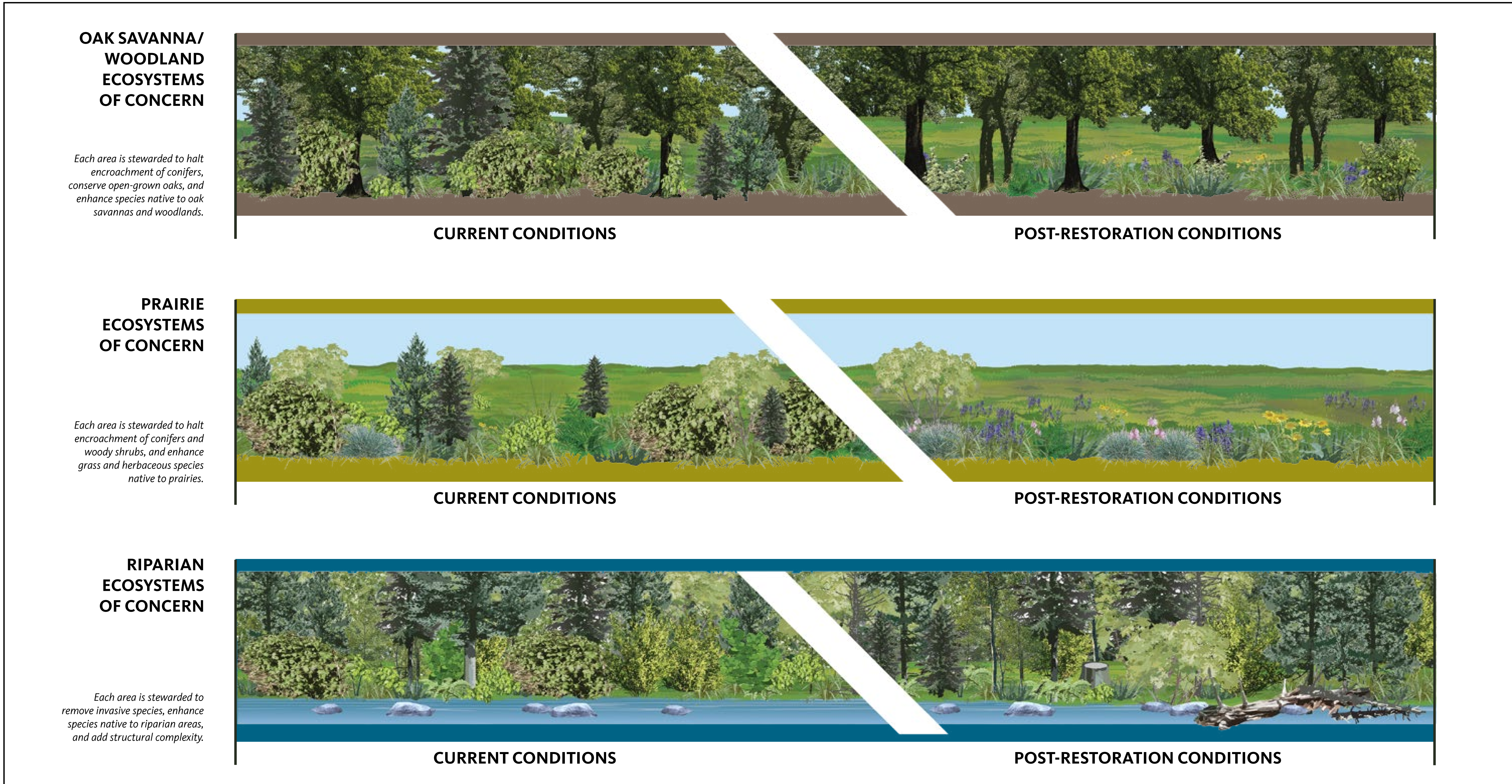


Figure 25. *Conditions typical of each of the three Ecosystems of Concern management strategies before and after restoration.*

3.4.2 Acreage Allocations for each Management Strategy

A foundational premise of this plan is the recognition that management of the McDonald-Dunn Forest requires weighing tradeoffs among diverse values. The forest is intended to provide opportunities for research, teaching, and outreach while also providing social and cultural benefits for a variety of users. In addition, the forest aims to meet these values while also being ecologically and economically sustainable (section 3.3). Meeting all these expectations simultaneously is a challenge bound to result in tensions. For this reason, an external consultant was hired to develop a model to assist in understanding the anticipated effects of the amount of land allocated to each of the five management strategies.

Effects of forest planning decisions were modeled with Woodstock (Remsoft Corporation 2021), a linear programming software package widely used in forest planning efforts. The forest conditions at the time of the most recent detailed forest inventory (conducted from 2014 through 2022) were used as the starting point in the modeling, with prices and costs from recent years (Table G1 in Appendix G). Input received from the early Community Listening Sessions were used by the *Faculty Planning Committee* and *Stakeholder Advisory Committee* to develop a list of eight forest characteristics valued by forest users (Table 4). The modeling enabled an assessment of tradeoffs among different land allocation scenarios. Details on the calculation of these metrics for the modeling appear in Appendix G.

In the first round of modeling, the software was programmed to estimate these forest characteristics at 5-year time steps over 125 years for 5 scenarios. One scenario (A) reflected a continuation of current acreage allocations to the new management strategy most closely aligned to the previously assigned theme from the 2005 Plan, and four others (B, C, D, and E) reflected

Table 4. *Eight metrics developed to enable evaluation of tradeoffs across land allocation scenarios.*

Forest Value	Intention of the Measurement
Biodiversity	Habitat suitability of focal taxa (bees, early successional birds, late successional birds, red tree voles, ungulates, amphibians)
Forest carbon	Amount of above- and below-ground carbon
Forest products	Revenue derived from forest products harvested
Recreation acceptability	Perceptions of recreationists of aesthetic acceptability of forest conditions for their preferred recreational activity
Resilience - density	Resilience as related to tree density, intended to reflect susceptibility to stressors such as drought and insects
Resilience - composition	Resilience as related to the degree of dominance of Douglas-fir relative to other tree species
Revenue - net	Total net revenue derived from forest products less that used for all management expenses
Wildfire resistance	Degree of resistance to wildfire

substantial acreages of just one or two forest management strategies and small amounts of all others (10-15%) (Table G2 in Appendix G). The intention of this first round of modeling was to investigate the implications of having a forest with vast acreage of just one of the management strategies, while ensuring there was a meaningful amount of land in each of the remaining management strategies (i.e., minimum of 10%). After this initial round of modeling was completed, edits were made to inputs to improve accuracy, and the model was re-run.

In the next round of modeling, the software was programmed similarly, but 7 new scenarios reflecting different acreage allocations were investigated. Because a benchmarking exercise that determined which novel scenarios would maximize each of the 8 forest values suggested that large acreages of two of the management strategies, *multi-aged, multi-species* and *even-aged, long rotation* led to higher scores on each of the eight metrics of interest, members of the *Faculty Planning Committee* and *Stakeholder Advisory Committee* developed these 7 new scenarios such that they reflected large acreages of one or both of these management strategies (Table G3 in Appendix G).

Subsequently, taking into account feedback received from the *Stakeholder Advisory Committee* and the community after seeing the model results (Table G4 in Appendix G), the *Faculty Planning Committee* developed a final slate of three scenarios to submit to the dean of the College of Forestry as recommendations for final consideration (Table G5 in Appendix G). Ultimately, the following approximate acreage allocation to management strategies was selected:

- 10% *even-aged, short rotation*
- 30% *even-aged, long rotation (i.e., 27% managed as long and 3% as extra-long)*
- 23% *multi-aged, multi-species*
- 10% *late-successional forest*
- 10% *ecosystems of concern*
- 17% non-forest and long-term learning (e.g., long-term research, roads, rights-of-way, etc.)

This represents substantial change relative to forest management according to the 2005 Forest Plan:

- a **reduction** in acreage allocated to even aged, short rotation management (from 25% of forest acreage devoted to theme 1 to 10% acreage devoted to even-aged, short rotation)
- **increases** in acreage allocated to even-aged, long rotation (from 27% devoted to theme 2 to 30% to even-aged, long rotation); multi-aged, multi-species (from 20% devoted to themes 3 and 4 to 23% to multi-aged, multi-species); late-successional forest (from 4% old growth reserves to 10% late-successional forest); and ecosystems of concern (from 6% to 10%)
- **no change** in non-forest/long-term learning (static at 17%)

Additional details on the modeling process appear in Appendix G. It is important to note that acreage devoted to long-term learning could increase in the future to accommodate the wildfire preparedness study (see Table 2) and other newly envisioned long-term research projects. The addition of acreage to research would necessitate slight adjustment to the acreage allocations described above.

3.4.3 Timber Harvest Schedule and Anticipated Future Forest Conditions

A 10-year harvest scheduling analysis was produced for the McDonald-Dunn Forest as part of the modeling process described in section 3.4.2. Recall that the harvest schedule in the 1993 forest plan originally called for an annual harvest of **4.4 MMBF/year** but was reduced to **4.1 MMBF/year** shortly after implementation for several reasons. In contrast, the 2005 Forest Plan predicted a much higher annual harvest of **6.0 MMBF/year.** Actual harvest levels varied considerably from year to year 2006-2024 (Figure 13).

Analyses conducted as part of the 2025 Forest Plan indicate a sustainable harvest level of approximately **4.3 MMBF/year**. Timber harvest any specific year may be above or below that level, due to changing market conditions or other factors, but the goal is to stay within 10% of the projected sustainable harvest level each year.

The change in projected harvest from 4.1 MMBF/year in the 1993 plan to 6.0 MMBF/year in the 2005 Forest Plan to 4.3 MMBF/year in the current plan is due to differences in modeled forest growth projections based on the acreage devoted to the four prior management themes described in the 2005 Forest Plan relative to the five management strategies described in the 2025 Forest Plan. Also, the boundaries of the forest changed in September 2023 due to a land exchange with Starker Forests that resulted in a reduction in the size of the Dunn Forest by 168.5 acres and an increase in the McDonald Forest of 317 acres (section 2.3.2).

Average age of the forest has gradually increased in recent times. It was 55 years in 2005 (College of Forestry 2005) and 67 years in 2024. Under this plan, average age is projected to increase slightly from 67 years by about 5 years in a decade, barring any major natural catastrophes (e.g., ice storms, wind, wildfire) and will continue to increase if this plan continues to be followed beyond that (Figure 26 a, b, c, d).

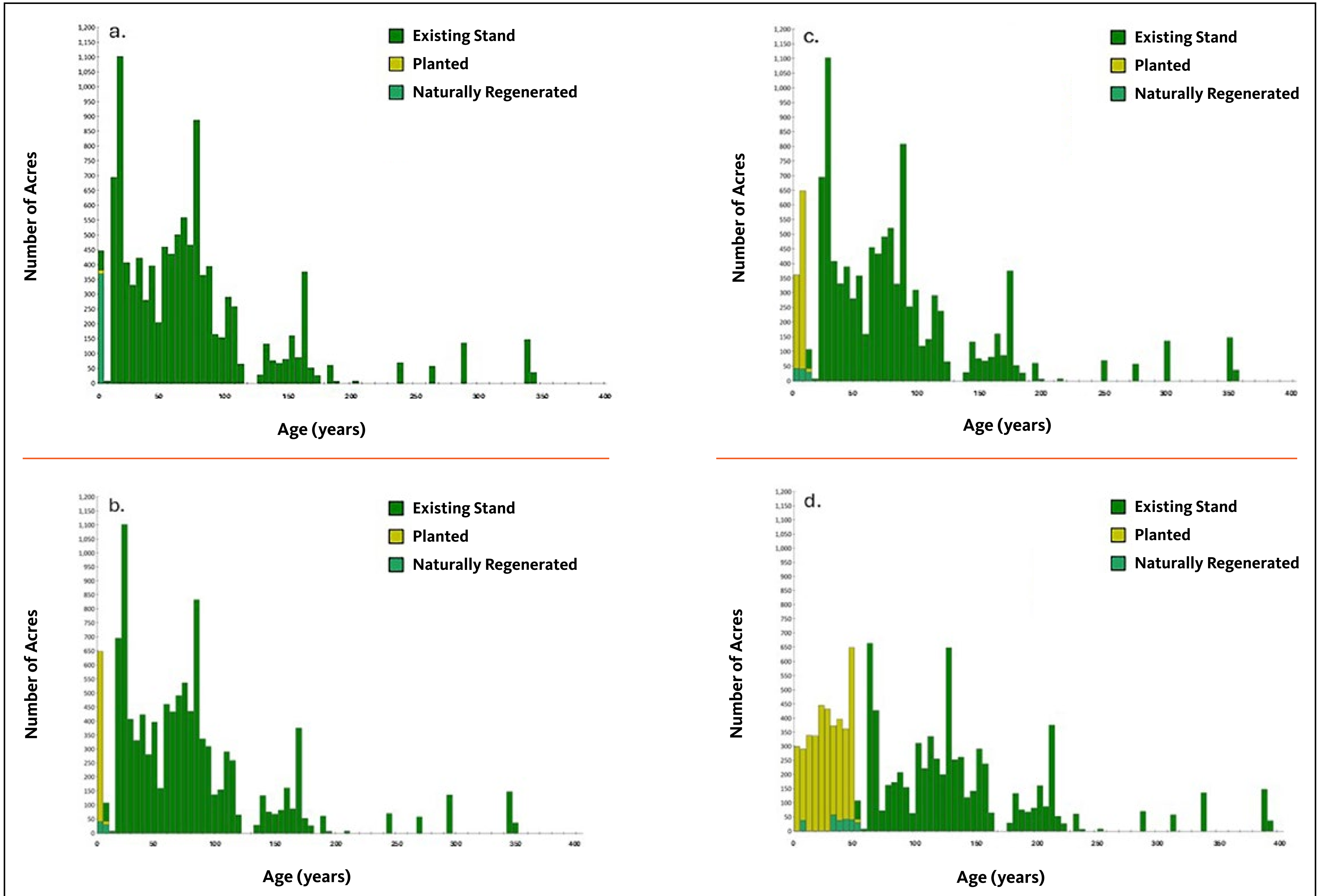


Figure 26 a, b, c, d.
Projected age class distribution over time: (a) current, (b) 5 years from now, (c) 10 years from now, and (d) 50 years from now.

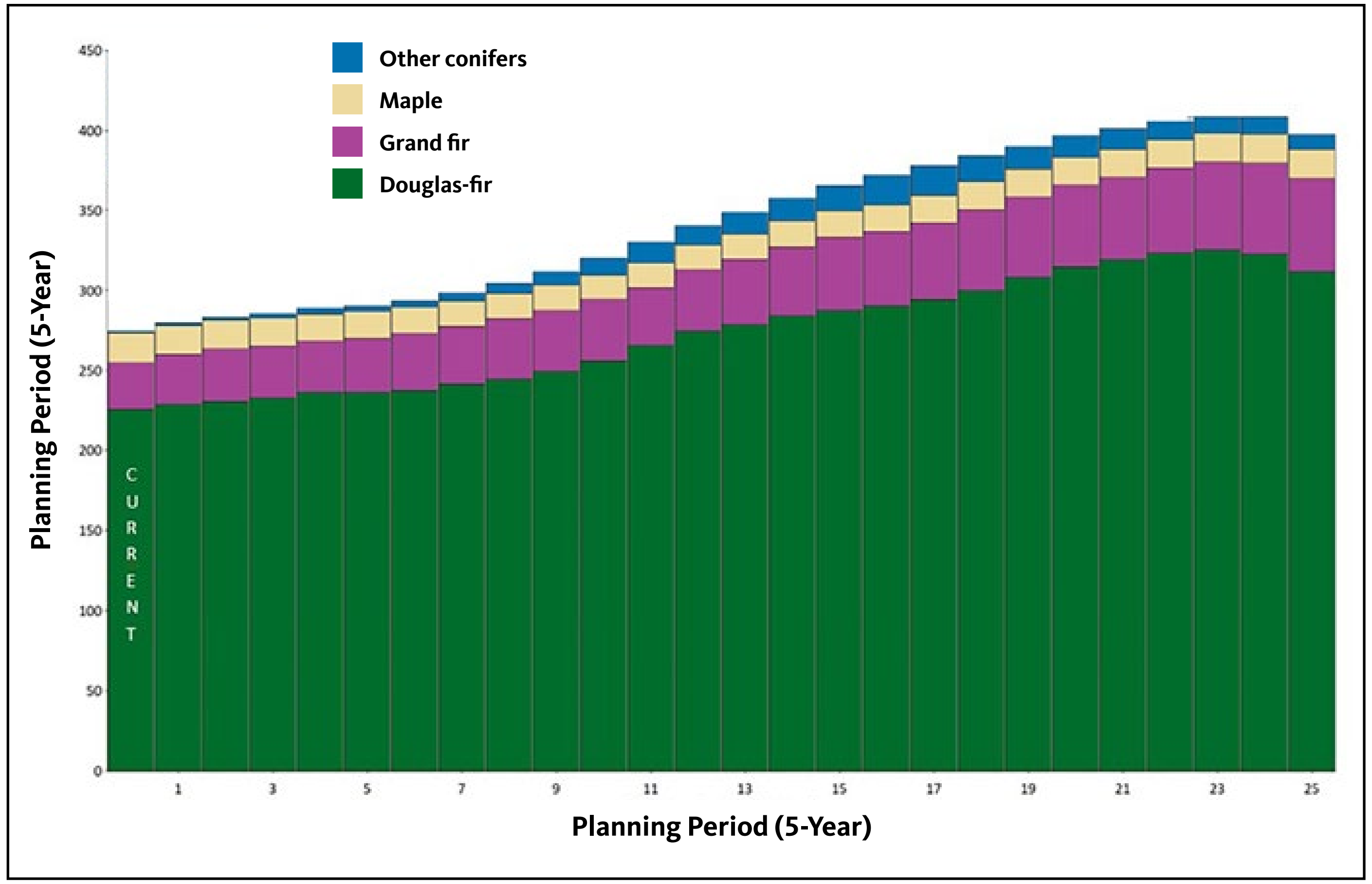


Figure 27. *Projection of forest inventory over time, in 5-year periods.*

Forest inventory is projected to increase gradually over time from current conditions (Figure 27).

The anticipated spatial distribution of stands according to management strategy across the forest is shown in Figure 28. Stands were allocated to even-aged, short rotation (EASR), even-aged, long rotation (EALR), and multi-aged, multi-species (MAMS) in a manner that will result in the creation of blocks of each of these management strategies over time. These blocks were intentionally spread spatially across the McDonald-Dunn Forest so that they would encompass a range of slopes, aspects, elevations, and soils. The intent is to ensure a variety of conditions for learning through research and demonstration while creating blocks of substantial size for wildlife species that require large areas to acquire the resources needed.

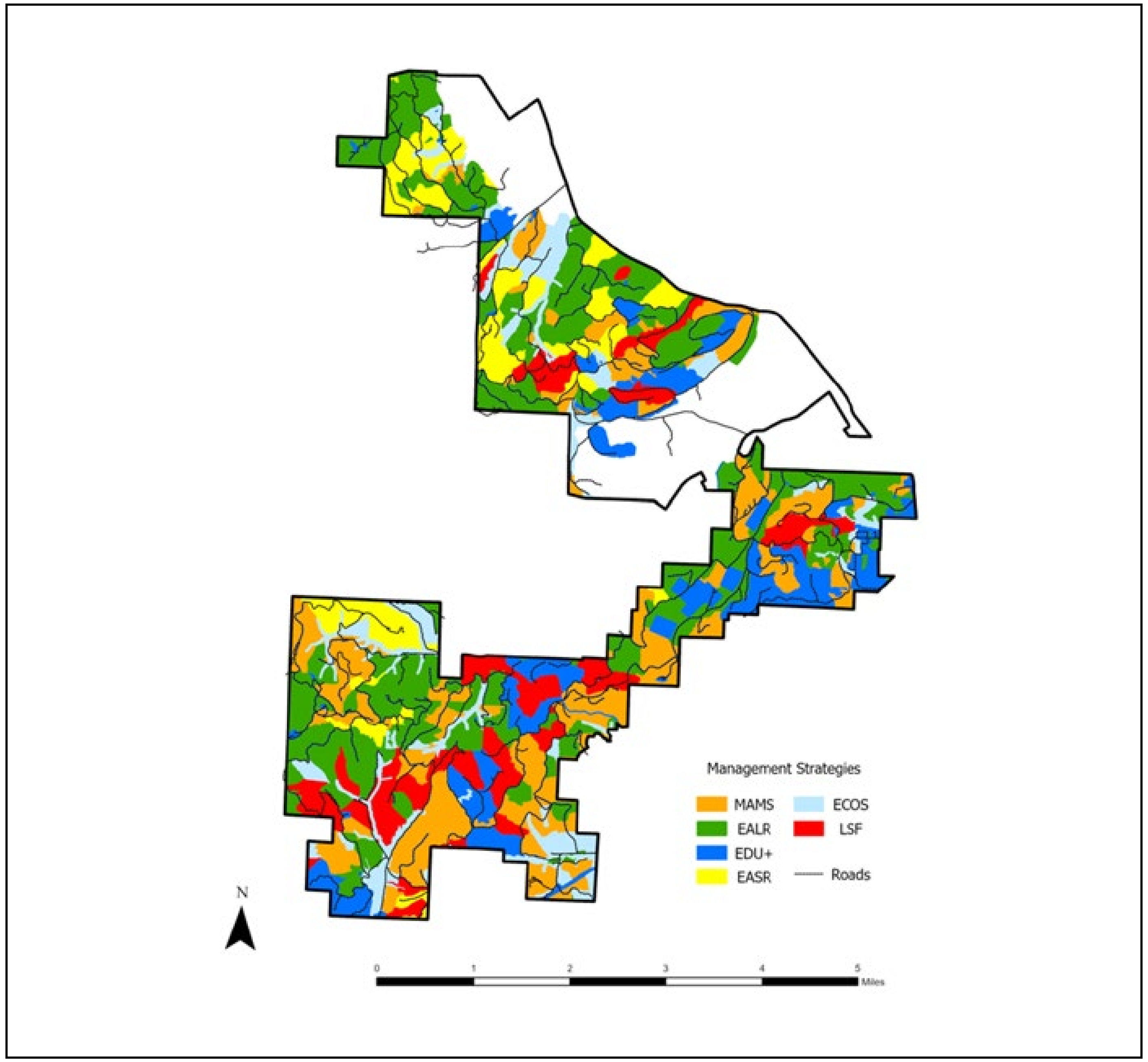


Figure 28. *Allocation of forest stands to each of the five management strategies in the McDonald-Dunn Forest. Abbreviations are as follows: MAMS – multi-aged, multi-species; EALR – even-aged, long rotation; EDU+ - long-term learning and non-forest; EASR – even-aged, short rotation; ECOS – ecosystems of concern; LSF – late-successional forest.*

Input received from the community during the plan development process 2022-2025 indicated strong interest in expanding the acreage of older forest. The 2005 Forest Plan specified 350 acres or 3.8% of the McDonald-Dunn Forest as "old growth reserves", intended to demonstrate stand and community development with limited management while conserving elements of biological diversity associated with old forests (College of Forestry 2005). The 2025 Forest Plan designates an additional 810 acres to late-successional forest, for a total of 1,160 acres in this management strategy dedicated to ensuring older forest characteristics (Figure 29).

A series of criteria were used to select stands to allocate to the late-successional forest management strategy. These included the following: existing "old growth reserves" designated through the 2005 Forest Plan, plus new areas comprised of stands 160 years or older in 2024, stands with significant canopy coverage of older trees, stands adjacent to areas previously designated as reserves with old trees that could lead to the creation of larger blocks of older forest habitat, and stands with old trees that could provide linkages between areas previously designated as reserves to create improved continuity of older forest conditions across the forest.

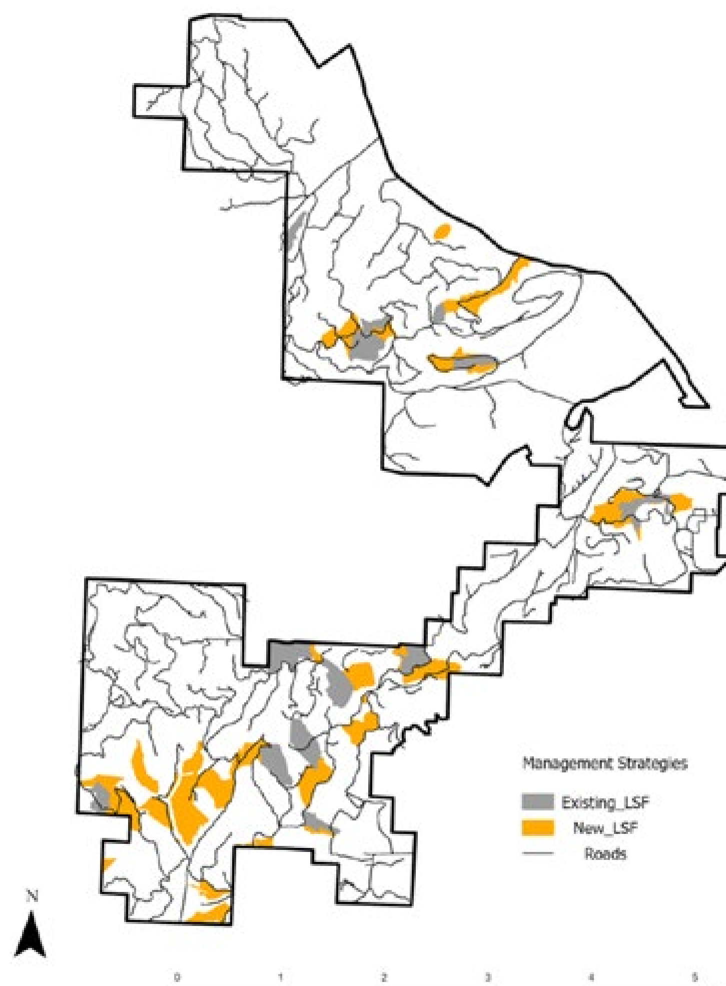


Figure 29. *Location of stands allocated to the late-successional forest (LSF) management strategy, showing the former reserves as well as newly added acreage across the McDonald-Dunn Forest.*

3.5 Maintaining Biodiversity

Biodiversity, the variety of life (biological diversity) across different scales (Wilson 1988), contributes to forest resilience over time, underpinning a whole host of natural ecosystem processes. Managing to meet the habitat requirements of every species known or suspected to occur in the McDonald-Dunn Forest would be unrealistic and infeasible. Furthermore, such an approach is not possible, because an accurate inventory of all species from all kingdoms is lacking, as is a robust understanding of the habitat needs of every species known to occur in the region. A more feasible option to promote and conserve biodiversity involves combining a top-down approach (coarse filter) and bottom-up approach (fine filter), and that is what this plan calls for.

Biodiversity can generally be characterized at 4 scales: (1) genetic diversity, (2) species diversity, (3) community diversity, and (4) landscape diversity (Noss and Cooperrider 1994). These scales are interconnected, because each is influenced by spatially and temporally varied events that transcend across multiple scales (Betts and Forbes 2005). Informed management that combines the coarse and fine filter approaches can integrate diversity at these four scales to maintain and even enhance biodiversity across the McDonald-Dunn Forest landscape.

Top-down (coarse filter) approaches typically use the natural **historical range of variability** (HRV) in disturbance regimes and forest conditions to guide management actions at a coarse scale. The coarse filter approach operates on the premise that native species have adapted to local disturbance regimes. Limitations to this approach include concerns that past conditions may not be an appropriate surrogate for future forest conditions with changing climate, and that over a century of anthropogenic land cover change experienced in and around the McDonald-Dunn Forest may have already pushed it beyond historic conditions and transcended into novel conditions. However, a management approach based around HRV can serve as a baseline for disturbance regimes, land-cover types, and forest age classes upon which to base harvest activities and forest management more broadly. The five management strategies the new plan calls for across the McDonald-Dunn Forest (section 3.4, Appendix D), were designed with the intent of creating a broad spectrum of disturbance regimes across the forest, ranging from frequent (even-aged, short rotation) to infrequent (late-successional forest), to ensure the continued presence of forest conditions suitable for a variety of organisms across space and time.

Conversely, bottom-up (fine filter) approaches utilize the habitat requirements of sensitive and/or indicator species. **Habitat** is the natural environment that contains all the physical and biotic factors an organism needs to survive and reproduce. The presence of species that have a relatively narrow range of adaptability to the environmental conditions in their system (i.e., strict habitat requirements) can provide information about the environmental conditions of a system (Katz 1926). Managing to ensure the persistence of **indicator species** and sensitive species by prioritizing their habitat requirements defines a baseline of fine scale management goals. This baseline thereby provides the lower bounds of the acceptable range of variability on the landscape.

Other species can benefit from this sort of management if their needs fall within the habitat requirements of the indicator species, particularly if the indicator species are also **keystone species** (organisms whose activities provide benefit and necessary habitat requirements to other species in an ecosystem) (Simberloff 1998), or **cultural keystone species** (organisms that shape the cultural identity of people, through salient roles in diet, medicine, and spiritual practices) (Garibaldi and Turner 2004).

Pairing a multi-faceted fine-scale indicator species approach with the coarse-scale natural template approach can provide a management system that is feasible and operational in working forests (Duflot et al. 2021). Section 3.5.1 further explores the coarse filter approach, and then sections 3.5.2 and 3.5.3 and Appendices E and F describe attention that will be paid to particular species, stand-level elements, and ecosystem types across the forest as part of a fine filter approach. Lastly, section 3.5.4 and Table 6 describe the monitoring that will be undertaken to enable the adaptive stewardship aspect of this new plan.

3.5.1 Coarse Filter Approach – Ensuring Structural and Compositional Diversity

Intensively managed, even-aged forest plantations generally reduce the temporal availability of both complex early and late seral forest stages. Reducing either early seral and late seral conditions on the landscape would have negative impacts on species dependent upon early and late seral habitat features. This plan simultaneously ensures economic sustainability while prescribing actions at the landscape scale of the McDonald-Dunn Forest to ensure habitat availability for species dependent upon both complex early and late seral forest characteristics.

- One of the five new management strategies, ecosystems of concern, will involve restoration of oak savanna and prairie/meadow ecosystems, which will increase the amount of early seral and open grassland/woodland habitat available across the research forest. Detailed guidelines for the conservation and restoration of native oak and prairie habitats and the management of aquatic and riparian areas appear in Appendices E and F.

- Stands in the even-aged, short rotation management strategy will incorporate moderate hardwood retention and maintenance throughout the life of each stand. Stands in the even-aged, long rotation management strategy will maintain double the hardwood retention of the short rotation stands. Thus, complex early seral conditions should be improved both in vegetative diversity and longevity in the stands managed on longer rotations.
- Late-seral forest stages will be maintained on the landscape through the even-aged, long rotation and late-successional forest management strategies. The late-successional forest areas will experience light management as needed to maintain older-forest structural and compositional diversity and to provide for public safety, (e.g., hazard tree removal, fuels management, tree planting after major disturbances like wildfire or wind, and invasive species control), providing refugia and habitat structure for late-seral dependent species. Stands newly added to this management strategy may need thinning or variable retention harvests to promote older-forest structural and compositional diversity early on.
- Species that have adapted to small-scale gap disturbance and multi-layered canopies will benefit from the multi-aged, multi-species management strategy.

In concert, the five management strategies will operate to provide the coarse filter approach to sustaining biodiversity while stand-scale guidelines will provide specific harvest considerations. In addition, maintenance of uncommon hardwood cover types such as oak, ash swales, and madrone (*Arbutus menziesii*) stands, and less common conifer cover types, such as redcedar and hemlock, will be prioritized to sustain biodiversity. Lastly, consideration of conditions at the landscape scale is also important, as many organisms survive by utilizing resources beyond the scale of single stands (Betts and Forbes 2005). Landscape level management recommendations pertain to the amount, type, age, size, shape, and proximity of different forest stands that are available to species (Hansen et al. 1991). These considerations were taken into account when individual forest stands were allocated to forest management strategies (section 3.4.3).

3.5.2 Fine Filter Approach – Managing Species of Concern and their Habitats

The 2025 Forest Plan development process used species groups of conservation interest known to use the McDonald-Dunn Forest in the fine-filter approach to ensuring biodiversity is sustained. Habitat quality indices were assembled based on the scientific literature and expert opinion from individuals with in-depth knowledge of wildlife habitat requirements in the Pacific Northwest (Appendix G). These indices reflected expected variation in habitat quality for these taxa across each of the five management strategies.

The species groups included during the plan development process were early seral birds, late seral birds, an arboreal small mammal (red tree vole, *Arborimus longicaudus*), amphibians, ungulates, and pollinators (i.e., bees). Birds were broken into two groups, given detailed knowledge of their habitat needs in managed forests. Early seral associated bird species for the purposes of the management plan were identified as aerial insectivores (e.g., Purple Martin, *Progne subis*) and leaf gleaners (e.g., MacGillivray's Warbler, *Geothlypis tolmiei*; Orange-crowned Warbler, *Vermivora celata*; and Wilson's Warbler, *Cardellina pusilla*). Late-seral associated bird species included woodpeckers (e.g., Pileated, *Dryocopus pileatus*; and Hairy, *Leuconotopicus villosus*, which are both also keystone species), canopy-nesting species (e.g., Hermit Warbler, *Setophaga occidentalis*; Golden-crowned Kinglet, *Regulus satrapa*; Brown Creeper, *Certhia americana*; and Chestnut-backed Chickadee, *Poecile rufescens*). The amphibian species considered included Western redback salamander (*Plethodon vehiculum*), Ensatina (*Ensatina eschscholtzii*), Rough-skinned newt (*Taricha granulosa*), Dunn's salamander (*Plethodon dunnii*), Coastal Giant salamander (*Decamptodon tenebrosis*), Clouded salamander (*Aneides ferreus*), Northwestern salamander (*Ambystoma gracile*), Long toed salamander (*Ambystoma macrodactylum*), Southern torrent salamander (*Rhyacotriton variegatus*), Pacific tree frog (*Pseudacris regilla*), Red-legged frog (*Rana aurora*), and Tailed frog (*Ascaphus truei*). Ungulates included Black-tailed deer (*Odocoileus hemionus columbianus*) and elk (*Cervus canadensis roosevelti*). These taxa were considered both as a composite unit as well as individually, when decisions were made regarding the allocation of acreage to each management strategy across the forest (section 3.4.2).

Beyond this planning exercise, to increase understanding of species of concern that currently use or could use the

McDonald-Dunn Forest, the Oregon Biodiversity Information Center (ORBIC) conducted a data system search for rare threatened, and endangered plant, animal, and fungi records for the McDonald-Dunn Forest and a one-mile radius around the perimeter as part of the plan development process. A total of 33 unique species were represented, including 4 species of fungi, 8 vascular plants, 13 invertebrate animals, and 8 vertebrate animals. Of these 33 species, only 25 have been reported during the past 50 years (e.g., after 1973) and only 13 have been reported during the past 25 years (e.g., after 1999) (Appendix I).

Northern Spotted Owls, a species listed as federally threatened in 1990, are known to have used the forest in the past but are not currently present. They were first reported in the southern portion of the forest in 1970 (Forsman 1976). Surveys were undertaken at the time of the species listing and occurred annually thereafter 1990-2008 and 2014-2024. Surveys during 1990-1999 were conducted by ODFW, research forest staff and students, and Oregon Cooperative Fish and Wildlife Research Unit. During 2000-2009 and 2014-2024, surveys were conducted by contractors. During 2009-2014, surveys were not contracted out, but the one known nest site used 2004-2008 was monitored by contractors. Since monitoring began in 1990, successful Northern Spotted Owl nest attempts were reported in 8 years: 1996, 1998, 2001, 2004, 2005, 2006, 2007, and 2008. These nests occurred in different regions in the forest over this 12-year period. Barred Owls (*Strix varia*), a species native to the Eastern US that has expanded west into the geographic range of the Northern Spotted Owl, were first reported during owl surveys in 1998. They have been reported 20 of the past 24 years (i.e., 1998, 2000-2008, 2010, 2013, 2015-2024). Northern Spotted Owls and Barred Owls sometimes interbreed: such hybrid owls, called *Sparred Owls*, were detected in 2017-2019. No known nest attempts of Northern Spotted Owls have occurred in the forest since 2008, and no Sparred Owl nest attempts have ever been reported in the forest. For these reasons, no specific management actions for these species are currently in place. However, surveys for owls will continue to be conducted annually on the McDonald-Dunn Forest.

Any sites used by statutorily protected species of threatened or endangered status, and species that are candidates for such listing, will be managed to protect these species, as was the case with the 1993 and 2005 McDonald-Dunn Plans (section 2.5.2). The location of these species is not made public, in an effort to reduce disturbance and allow protection of their habitats.

3.5.3 Management of Stand-Scale Elements

Applying the coarse filter approach by implementing the five management strategies should ensure species' habitat variability at the landscape scale to promote biodiversity across the McDonald-Dunn Forest. The guidelines developed to describe expectations for stand-level management decisions in each management strategy across the lifetime of each stand (i.e., stand establishment, intermediate treatments, stand age, and legacy elements; detailed in section 3.4 and Appendix D) also set expectations for the management of elements known to influence biodiversity at the within-stand scale. These include considerations at the time of harvest pertaining to retention or creation of hardwood/broadleaf trees, snags, course woody debris, and individual conifer tree retention. Each of these elements is covered in more detail here.

Large hardwoods are important habitat features for invertebrates, birds, and cavity nesting or roosting small mammals like flying squirrels and bats. Their fruits and seeds are food for frugivores and granivores. In addition, young hardwoods provide palatable food for many invertebrates, such as Lepidoptera, which are important prey for leaf gleaning insectivorous birds. The unique branching patterns of hardwoods—not typically seen in conifers except in old growth or damaged trees—provides varied forest structure which acts as growing substrate for mosses and epiphytic plants, and provides habitat for breeding birds, mammals, and salamanders. Hardwoods are also more likely to form natural cavities than conifers, which provide essential roosting and breeding sites for many cavity nesting species.

Bird abundance in intensively managed Douglas-fir stands in the Pacific Northwest is strongly associated with hardwood cover at local and landscape scales, especially for foliage-gleaning species (Ellis and Betts 2011). Stand-level abundance of bird communities has been shown to improve significantly above a threshold of stand-level broadleaved hardwood canopy cover of 6% (Ellis and Betts 2011). The guidelines below are intended to serve as an aid for research forest staff in identifying retention trees and/or shrubs to meet broadleaved hardwood retention goals (i.e., 5% and 10% canopy cover within EASR and EALR harvest units, respectively), to be used in a hierarchical fashion.

Retaining individual old conifer trees, clusters of old trees, and trees with unique characteristics can do much to provide structural and compositional habitat elements to support biodiversity. **Character/legacy trees** are unusual or

Guidelines for Retention of Hardwood Trees and Shrubs

- When possible, identify established overstory broadleaved hardwood trees for retention. These could include the following species:
  - Bigleaf maple, red alder (*Alnus rubra*), Oregon white oak, and Pacific madrone; black cottonwood and Oregon ash where applicable.
  - If multiple species are represented, use site-level characteristics to make retention decisions. For example, on moister sites, retaining maple, alder, and/or ash may be more appropriate. Oak and madrone are less widespread and may be more challenging to recruit, so retaining well-established trees of these species where they occur may be more appropriate in those situations, particularly on drier sites.
  - When possible, or when needed to reach the respective thresholds, retain multiple species to increase stand-level biodiversity.
- If the trees identified through the above guidelines need to be removed due to operational constraints (i.e., blocking skid trails or cable yarding paths) or safety issues, or established overstory trees are not in sufficient quantity to meet management thresholds, use further guidelines (below) to identify additional broadleaved hardwoods to meet the 5-10% thresholds.
- When applicable (e.g., such as to meet the 10% threshold in EALR) selecting a combination of overstory hardwoods and mid/understory hardwoods may provide more ecological benefit than leaving all overstory hardwoods of the same species. However, prioritize leaving the largest specimens, as these take the longest to recruit to the stand.
- Following the above, identify and select midstory trees for retention as needed. Note that these still provide critical resources for complex early seral dependent wildlife. These can include vine maple, Pacific dogwood (*Cornus nuttallii*), bitter cherry (*Prunus emarginata*), chokecherry (*Prunus virginiana*; less common), or cascara buckthorn (*Frangula purshiana*).
- When sufficient overstory and mid-story trees are not present in the stand to reach the 5-10% thresholds, identify and select broadleaved shrubs for retention. Although these will not count towards OFPA retention requirements, these provide critical resources for complex early seral dependent wildlife. These can include:
  - Beaked hazel (*Corylus cornuta var. californica*), evergreen huckleberry (*Vaccinium ovatum*), red huckleberry (*Vaccinium parvifolium*), western rhododendron (*Rhododendron macrophyllum*), or salal (*Gaultheria shallon*). Note that salal provides important food and pollinator resources, but in open/disturbed sites grows in a more prostrate form and will likely not provide complex structure.
  - Where applicable, salmonberry (*Rubus spectabilis*) and thimbleberry (*Rubus parviflorus*) could be used. However, these species are fast growing colonizers of disturbed sites and some of the slower recruiting species listed above should be prioritized first.
  - Oregon grape (*Mahonia aquifolium*), snowberry (*Symphoricarpos albus*), and/or oceanspray (*Holodiscus discolor*) may also be used to meet retention thresholds. However, these species provide less ecological benefits than the understory shrubs listed above, and therefore should receive lower priority for retention.
- Where applicable and as needed, bigleaf maple stump resprouts from “mature” trees can be used to meet management goals. Consider that initial canopy cover will be low (i.e., 6-10 feet diameter) within the first few years following cutting, but crowns typically expand rapidly by 5-10+ years. When identifying canopy cover thresholds, managers may assign 10-foot diameter circles towards the total hardwood cover tally per cut maple stump (≥11” diameter) allowed to resprout, when applicable.
- When stands reach rotation age, restart the decision process. Over the life of the stand, trees and shrubs will grow to larger sizes and/or experience mortality, and the specimens used to meet management goals during the previous harvest may no longer be applicable. However, during intermediate treatments (i.e., thinning) retain the specimens and minimum respective cover thresholds identified for retention during the initial harvest design.

unique in structure or are rare in the context of the current or anticipated future stand conditions. They are generally larger, older trees of any species, sometimes established in pre-Euro-American times, and are important ecological components of forest stands and landscapes (Franklin et al. 1981; Franklin et al. 2002). Guidelines for the selection of tree characteristics to prioritize when selecting individual trees for retention appear in Appendix H.

Standing dead trees, or snags, also provide critical habitat features for many wildlife species across taxonomic groups–including birds, mammals, amphibians, and invertebrates–by providing breeding, roosting, cover, and foraging sites. They are therefore important for maintaining biodiversity in forested ecosystems (Harmon et al. 1986; Newton 1994; Rose et al. 2001; Bunnell 2013; Seibold et al. 2016). Larger snags (>25” DBH) may stand for decades, if not centuries, and provide more cavities and ecosystem benefits than smaller snags (McFee and Stone 1966; Cline et al. 1980; Adams and Storm 2011). In addition to storing carbon, once snags fall and become downed wood, they provide nutrients for soil development, prevent erosion, store water, act as seedbeds and continue to provide critical habitat for wildlife species as they decompose (Franklin et al. 1981; Harmon et al. 1986; Rose et al. 2001). Large, downed wood naturally takes longer to decompose, and provides more ecosystem benefits than small-diameter woody debris left on site after harvest operations (i.e., logging slash).

3.5.4 Monitoring to Assess Changes in Biodiversity Over Time

It is considered best practice for monitoring to be incorporated into an adaptable management framework (Lindenmayer et al. 2000), and for monitoring to include multiple taxa and elements rather than just one (Tälle et al. 2023). Monitoring associated with the coarse filter approach will involve an assessment of trends over time in the distribution of tree species, size, and structural forest characteristics, as well as average age of the entire forest. Monitoring associated with the fine filter approach will involve an assessment of trends over time through two complimentary approaches: (1) surveys conducted by consultants for taxa of interest (owls annually, fish — specifically cutthroat trout — every 5 years, and open woodland/prairie plant species every 5 years), and (2) surveys of birds, herpetofauna, and fungi annually through participatory science (Table 6). Monitoring associated with stand-specific elements will involve an assessment of trends over time in two metrics: (1) distribution and quantity of legacy/character trees, and (2) distribution and quantity of standing dead wood in clearcut stands immediately post-harvest.

Guidelines for Management of Dead Wood (Standing and Fallen)

- Identify snags to be retained during harvest. The Oregon Forest Practices Act mandates a minimum of two trees (either two snags or two green trees) >11” DBH per acre be retained in regeneration harvests >25 acres. Because large snags (>25” DBH) provide greater ecological benefits than smaller snags and are often limited in managed forests, consideration should be given to retaining or creating these whenever possible.
- Consider including snags adjacent to or within retention tree clumps to reduce the likelihood of blowdown and to maintain worker safety.
- Retention of existing snags should be prioritized over creating new ones as created snags may have less wildlife utility than natural snags (Barry et al. 2018).
- When no snags can safely or operationally be retained or there simply are none available, consider creating snags to meet wildlife habitat objectives. High girdling is less cost effective than low girdling but can create taller snags that remain standing for longer periods (Friesen 2019). Although more expensive, snag creation via topping may also be suitable for creating snags that stand for over 25 years (Barry et al. 2017). Snag creation via slash-pile burning at the base of a live tree of interest can also be an effective snag creation technique and may provide additional opportunities for research and learning.
- Meet or exceed Oregon Forest Practice Act standards for retention of downed wood during harvest. Give priority to leaving downed logs >25” in diameter when possible.

3.6 Threats to Forest Health

The ability of forests to adapt to a range of stressors is increasingly recognized as an essential characteristic to aspire to when stewarding forests in the Anthropocene. This desire to promote resilience must take into account a variety of threats including changing climatic conditions, wildfire, invasive species, insect pests, and pathogens. This section addresses the growing pressures imposed by these new realities.

3.6.1 Climate Change

Two complementary forest management approaches on the McDonald-Dunn Forest are relevant to addressing concerns arising from changing climatic conditions:

1. Mitigation, in which the forests themselves and resultant forest products are used to sequester carbon, forest biomass is used to provide renewable energy, and greenhouse gas emissions are avoided through complementary product substitution (wood for carbon intensive fossil fuel consumer goods) and resilient forest composition and structure; and
2. Adaptation, which involves positioning forests and their associated benefits (above) to become more resistant and resilient to uncertain future disturbances that become more likely in the face of changing climate conditions.

Mitigation: Forests sequester carbon as a function of site productivity and the potential size of various carbon storage pools (i.e., soil, charcoal, litter, downed wood, standing dead wood, live stems, branches, and foliage). Sequestration capacity depends on site productivity, stand density, tree species and sizes, tree and stand vigor and longevity, soil disturbance, tree mortality, wildfires, insects, and diseases (Dye et al. 2024b). Forest management that regulates composition and structure prudently over time and space while balancing tree retention and removal can simultaneously store carbon in both intact forests and renewable carbon-smart products (e.g., lumber, engineered wood composites, paper, and byproduct energy) with its associated socioeconomic benefits. Every instance of substitution of wood for more carbon-intensive materials (particularly steel, concrete and aluminum) in the built environment reduces net carbon emissions to the atmosphere. Above all, enhancing the role of forests in reducing greenhouse gas emissions through sequestration requires keeping forests as forests.

Traditional silvicultural treatments that are focused on wood, water, wildlife, and aesthetic values are fully amenable to enhancing carbon storage and reducing emissions from forest management (Tappeiner et al. 2015; Carlisle et al. 2023). Choices regarding even-aged or uneven-aged management regimes, species composition, slash disposal following harvests, site preparation, timing and intensity of intermediate harvests, fertilization, and rotation length/entry cycles can all be modified to increase carbon storage and reduce long-term carbon emissions. In particular, improving the ecological resistance and resilience of our fire-adapted ecosystems enhances long-term sequestration through avoided loss to stand-replacing wildfire (Finkral and Evans 2008). Prudent forest management and wood utilization sustain high levels of carbon stored in large landscapes over long time periods. Recent research in the McDonald-Dunn Forest indicates that site productivity was the primary determinant in above-ground carbon dynamics, such that the optimal rotation age and thinning treatment combinations differs between site classes. Regardless, one or multiple thinning treatments over the course of the lifecycle of each stand resulted in greatest above-ground live carbon, with specifics dependent upon rotation length (Carlisle et al. 2023).

The choice of management strategy from this plan's five options affects the net carbon sequestration of each stand to some extent. The *late-successional forest* and *ecosystems of concern* management strategies provide a baseline near-term carbon sequestration rate for lightly-managed lands that provide a comparison for the more intensively-managed portions of the forest. The *even-aged, short-rotation* strategy provides long-term carbon sequestration that is linked to storage in forest products, especially as a net gain over substitute non-forest products (e.g., concrete), rather than in landscape storage pools. By extending timber rotations, the *even-aged, long-rotation* strategy has potential for greater net carbon sequestration relative to the short-rotation regime, which will be a key comparator. By having a more diverse array of structural characteristics, the *multi-aged, multi-species* strategy enables carbon sequestration in both forest products and in landscape storage pools. A key feature of the even-aged, long rotation management strategy is the potential for greater net carbon sequestration in comparison to even-aged, short-rotation strategy. The implementation of the five new management strategies will provide abundant opportunities to investigate true differences in carbon sequestration among stands managed according to different guidelines.

It is important to keep in mind the small magnitude of carbon storage in forests as a climate mitigation solution relative to current emissions. While forest management decisions may help temporarily draw down atmospheric carbon, the scale of carbon storage that can be achieved through such decisions is dwarfed by current fossil fuel emissions (DeLuca 2025).

Adaptation: On-going climate change can generate incentives for forest management adaptation through at least two channels – by differentially altering productivity of different tree species, and by differentially changing risks of stand damage. Given the importance of Douglas-fir trees in the current landscape composition and as the primary source of harvest revenue, a key concern is the potential for a warmer and drier climate to reduce Douglas-fir productivity (Restaino et al. 2016), and for extreme heat events to increase die-back risks for Douglas-fir (Still et al. 2023). The McDonald-Dunn Forest has recently begun to experience challenges associated with establishing Douglas-fir seedlings in some areas and die-back of mature Douglas-fir trees in others. These climate change concerns can generate long-term economic incentives to select species other than Douglas-fir (Hashida and Lewis 2019) or Douglas-fir seed sources from locations that better match anticipated future climatic conditions (St. Clair et al. 2020).

This plan approaches adaptation through a system of extensive on-going monitoring that will be aimed at identifying early signs of damage and productivity losses to Douglas-fir and other tree species. In the event of such damage and productivity losses, the plan encourages strategic use of seed source selection tools that have been developed at OSU and can be used to plant genetic stock that is better adapted to changing climatic conditions. The plan also encourages flexibility with respect to altering the composition and density of planted tree species in the three strategies with significant harvest. An example of this flexibility is replacing Douglas-fir with other species (e.g., ponderosa pine and incense-cedar) if climate conditions warrant. A key consideration is that planting decisions can be more frequently adapted in the *even-aged, short rotation* management strategy than in the other strategies that have longer rotation lengths or planning horizons. Active adaptation is not expected in the *late-successional forest* management strategy, although prescribed burning and light touch thinning may be needed to reduce density to bolster the resilience to changing climatic conditions. These *late-successional forest* stands can serve as a baseline comparison against the more heavily-managed portions of the forest where adaptation will take place.

Across the entire forest, resistance and resilience can be enhanced through prudent proactive management when current conditions are outside a range of desired conditions (Millar and Stephenson 2015; Tappeiner et al. 2015). For example, many areas within the McDonald-Dunn Forest would benefit from fuel reduction treatment (mechanical and prescribed fire) in advance of dry climatic patterns and wildfire. This need is consistent with millions of acres of dense, fire-excluded dry forest types of the American West (Prichard et al. 2021). Such treatments would allow for the progressive adjustment of forest conditions: fuel loading and arrangement, stand composition (species and genetic diversity), and vertical/horizontal stand structure. Treatments are largely consistent with professional forestry standards for the region but can be more quickly implemented in anticipation of emerging, rapid climatic shifts.

Techniques with greater potential risk include actively assisting species/genetic material migration to facilitate transitions to new locations/conditions faster than would happen naturally (Williams and Dumroese 2013; St. Clair et al. 2022). Assisted migration has the potential to expand the available genetic diversity for future conditions, encouraging better-adapted species mixtures and gene stocks, and providing new locations for genetic material (i.e., future climate refugia). These practices are rooted in traditional reforestation and afforestation practices (e.g., seed zones and transfer guidelines) but will require a commitment to new research, education and outreach as implementation moves forward (St. Clair et al. 2020). This fundamental mission of the research forests is driven by many scientific, policy and ethical concerns about risk of expediting the movement of some plant materials.

The McDonald-Dunn Forest—managed with climate change in mind—can play a role in mitigation through carbon sequestration in the woods and in the wood-based products derived there. The principles outlined in the five management strategies, along with the plan's purposeful flexibility put the forest on a progressive path. The plan's adaptive flexibility will allow research forest staff to customize reforestation and restoration prescriptions based on knowledge gained through adaptive learning (e.g., to seed source, species, planting density). To further promote resilience across the forest in concert with climate adaptability, it will also be essential to consider growing threats from wildfire.

3.6.2 Wildfire

The increased extent and intensity of wildfires now threatening the Willamette Valley are driven by longer fire seasons combined with increases in forest fuel loading and human ignitions. Since 1980, the western US has been affected by a rapidly warming climate characterized by reduced snowpack, earlier onset of spring and later persistence of summer into autumn with higher temperatures, and hotter droughts coinciding with more frequent periods of extreme fire weather (Moritz et al. 2018). Increased temperatures have direct impacts on fire behavior through living and dead fuel moisture and accelerated combustion of these fuels during wildfires (Wang et al. 2023). Increased temperatures also have indirect impacts through changes in the vegetation composition.

Simultaneous with warming, decades of aggressive wildfire suppression activities as well as the elimination of Indigenous People's cultural burning, coupled with more recent changes/reductions in active forest management have increased the volume and connectivity of fuels at the landscape scale (Pritchard et al. 2021). The McDonald-Dunn Forest is no exception to this pattern (Drake 2025). Widespread increases in the land area that is forested, increased fuel loading in much of that area, and increased vertical and horizontal fuel continuity in many forest types have increased the likelihood of large wildfires and higher burn severities. This occurs through the mechanism of increased likelihood of crown-fire initiation and spread. Such areas are potentially at greater risk of losing ecosystem services or converting to non-forest when they eventually burn.

A recent fire risk analysis conducted for the McDonald-Dunn Forest concluded that the long-term annual burn probability (the average likelihood of a specific location experiencing a wildfire in any given year, calculated over a long period of time) on the forest is quite low, at <1% (Scruggs 2024). Areas with the highest burn probability occur outside the forest boundary. Mapping of predicted flame length indicates there is great spatial variability in the predicted wildfire behavior across the forest. Areas predicted to have 25-foot flame lengths are generally small in area and discontinuous and concentrated in areas with higher fuel loads and steeper slopes, such as portions of Oak and Baker Creek drainages and areas north of Lewisburg Saddle.

The Suppression Difficulty Index (SDI), a measure of how difficult it is to access and suppress wildfires, shows large sections of land categorized as the lowest SDI in the mid and northern portions of the Dunn Forest (Scruggs 2024). Areas with the highest SDI include some areas of Oak and Baker Creeks and areas north of Lewisburg Saddle. Because SDI accounts for topography, fuels, and accessibility, the areas with higher SDI represent areas with steeper slopes, denser vegetation, and less road access.

Drive times for suppression resources to reach various areas of the forest is an important consideration when fire ignites. Areas reachable within 5 minutes are near the Soap Creek Area around the Adair Rural Fire District Station 1402, the developed part of the city to the East of the McDonald Forest around the Corvallis Rural Fire Protection District Station on NW Lewisburg Ave, and the residential and developed areas east of Chip Ross Park. Nearly all areas of the forest are reachable within 15-20 minutes, except the southwestern portion of the forest in Oak Creek. The areas predicted to experience the highest wildfire hazard based on modeled flame length, SDI, and drive time are concentrated in the southwestern portion of the McDonald Forest surrounding west Oak Creek, Baker Creek, west Lewisburg Saddle, and some of Dimple Hill and areas near Chip Ross Park.

Restoring resilient forests, and thereby reducing wildfire risk across the forest, requires use of numerous tools associated with active forest management, including timber sales, mechanical and chemical fuels treatments, and cultural burning/prescribed burning/managed wildfires (Bailey 2024). Managed wildfire as a management tool has limitations due to the proximity to housing and the presence of long-term research sites. Fuels treatment projects (including controlled burning) can reduce unwanted fire effects in the near term but need to be implemented at the spatial scales necessary to substantively improve landscape conditions. Fuels can be managed more aggressively during both site preparation and later stand management (i.e., around larger trees) to minimize risks, particularly near the wildland-urban interface. Substantial investment in mechanical treatments is needed to reduce fuels before simply reintroducing fire through prescribed burning (USFS 2018), and preferably years before any wildfire ignitions. Many fire-adapted forests have such high 'fire deficits' that returning fire prior to mechanical treatment or at too large of a scale could have damaging ecological effects, along with unacceptable consequences for local communities. A new long-term research project expected to begin in 2026 will be aimed at fuel reduction and community protection (Table 2). It will compare the efficacy of several fuel reduction methodologies on the margins of the forest, prioritizing

areas with high housing densities and high wildfire risk (e.g., low fuel moisture due to south-facing aspect).

The *even-aged, short rotation* and *even-aged, long rotation* management strategies will employ multiple wildfire mitigation strategies focused on harvest techniques and subsequent site preparation that markedly reduce surface loading within units and thereby interrupt wildfire flow across and among units as treatments advance. However, the plantation feature of these management strategies inherently opens a window of vulnerability while trees have smaller diameters with thinner bark, crowns occupy space closer to the ground, and surface fuels re-accumulate on site; fire avoidance/suppression will be required during these times in the rotation. Also, the portions of the forest under the *multi-aged, multi-species* management strategy will require regular maintenance of surface and ladder fuels with mechanical treatments and prescribed fire. The *late-successional forest* portions of the forest can be managed for fire risk by a similar cultural or prescribed burning approach and by isolating these areas from nearby hazardous conditions (e.g., fuel treatments in adjacent units and/or fire breaks). Historically, cultural burning across the forest and within these late-successional forests was nearly an annual occurrence, maintaining a very open stand structure dominated by large Douglas-fir (Drake 2025), which creates more fire-resilient conditions. Finally, restoration and maintenance of oak savannas, prairies, and oak woodlands will consistently reduce fire risk through fuel reductions and continuous canopy disruption in the sections of the forest designated for management as *ecosystems of concern*.

If a wildfire were to occur on the McDonald-Dunn Forest, ODF, with assistance from other local fire agencies, would be called upon to initiate immediate and full suppression. The guidelines to the right describe the actions that would be taken once the wildfire was fully extinguished.

Guidelines for Post-Wildfire Assessments

Following a wildfire on the McDonald-Dunn Forest, staff would immediately restrict access to affected areas and initiate a series of assessments to evaluate the implications.

- Public access to wildfire-impacted areas—such as roads, trails, and parking lots—would be temporarily closed to reduce safety risks. A hazard tree assessment would follow to identify and mitigate potential dangers. The duration of closure could be lengthy, as safety improvements are identified and implemented.
- A fire impact investigation would be conducted to evaluate fire intensity, assess tree mortality, and examine effects on riparian zones and stream habitats. The findings would guide decisions on the feasibility and prioritization of timber salvage operations, selection of appropriate logging systems, and identification of habitat restoration needs for species of concern.
- Staff would determine whether any ongoing research projects were impacted or destroyed and assess opportunities to initiate new studies on wildfire effects or salvage operations.
- Staff would assess whether any known cultural resources were impacted.
- A preliminary estimate of short-term post-fire costs would be developed, including expenses for repairing infrastructure such as roads and trails, as well as reforestation and vegetation restoration in subsequent years.
- An economic assessment would be performed to analyze the fire's impact on the sustainable harvest level. This would involve recalculating harvest projections using updated forest inventory data.

3.6.3 Invasive Species

Invasive plants have been a subject of focus in both prior McDonald-Dunn Forest Plans (College of Forestry 1993, 2005). In 2006, a forest-wide vegetation survey noted the presence of over 100 species of non-native plants (Invasive Plant Species Management Plan 2007). The forest is susceptible to invasive plant introduction and propagation from many different sources including neighboring properties, timber harvest activity, road systems and maintenance, recreation, wildlife, and vehicles. Given current distributions and continuing sources of new exotic plants, it is not feasible to eradicate all invasive plants in the forest, especially ubiquitous species such as false brome (*Brachypodium sylvaticum*).

A list of invasive plant species that could occur in the forest was compiled by the Institute for Natural Resources in January 2024 using three data sources: iMapInvasives (an online GIS-based tool for invasive species reporting and data management), EDDMaps (an online mapping system for documenting invasive species distribution), and iNaturalist (an online crowdsourced species identification system and organism occurrence recording tool). Plant species included on this list were those on the jurisdictional invasive species list within iMap for Benton County, Polk County, or the McDonald-Dunn Forest. This included 215 species, 59 of which were recorded in McDonald-Dunn Forest (Appendix J). The rationale for including not only species that have been reported in the forest but also those within the two counties where the forest is located is to increase awareness of species that could move or be transported locally and become problematic in the near future.

Due to the constrained staffing and resources available to address invasive species on the McDonald-Dunn Forest, current invasive plant species mitigation is limited to the following activities:

Prevention

- To reduce the introduction of non-native plant seed, logging and construction equipment are washed and inspected prior to entering the McDonald-Dunn Forest for contract work. The following equipment is exempt: rock trucks, log trucks, and contractor vehicles that do not leave roads or treated roadsides.
- Forest roads and roadsides are treated with herbicide on an as-needed basis to limit the propagation of invasive plants, generally every 1-2 years.

Monitoring

- Research forest staff, volunteers, and visitors conduct informal invasive species monitoring while on-site for other purposes, and findings are mapped.

Treatment and Restoration

- Herbicide is used to control vegetation in newly reforested areas, typically for three years following each timber harvest.
- As funding and scheduling allows, herbicide treatment of select invasive species populations are conducted in conjunction with regular reforestation activities to minimize cost and increase efficiency.
- Restoration efforts prescribed as part of the *ecosystems of concern* management strategy (Appendices D, E, and F) will necessitate careful and repeated treatment of invasive species.

On average, yearly herbicide use under the 2005 Forest Plan involved application on approximately 4% of the McDonald-Dunn Forest. A similar amount is expected under the 2025 Forest Plan. Timing and location of herbicide use will vary from year to year to meet different management objectives. Herbicide will be applied using approved chemicals, following all state and federal pesticide laws, and using trained and licensed pesticide applicators. The specific herbicides used in each application will be determined based on the vegetation to be controlled and the site conditions at time of use. Roadside treatments will occur through broadcast treatment via spray truck. Other prevention and restoration treatments will involve broadcast or spot treatments via ATV or backpack, or hack-and-squirt. Aerial application is unlikely, but possible if warranted by extreme circumstances such as an invasive insect pest outbreak.

Research to explore alternatives to herbicide and to investigate economic costs to such alternatives is a priority for investigation in the McDonald-Dunn Forest. It's unlikely herbicide use can be eliminated entirely because of the aggressive nature of the invasive plants already present on-site. Given the pervasive extent and adverse effects of invasive plant species on the McDonald-Dunn Forest, two actions are recommended.

- Expanded workforce: It is recommended that an additional staff member be hired with responsibilities for invasive species control. This could substantially boost capacity to control invasive species beyond what has been possible in recent years. In addition, volunteer work parties will be considered as an opportunity to provide a rapid response to halt the spread of newly detected invasive species.
- An updated invasive species management plan: If additional staffing can be accommodated, the prior plan should be updated and implemented. As a precursor, this will require an updated vegetation survey. The new invasive species management plan should incorporate Indigenous perspectives, outline a plan for invasive species mapping and monitoring, prioritize populations of invasive species for treatment, assess tradeoffs among treatment options, consider integrated pest management as well as common control techniques, propose mandatory prevention strategies, and provide recommendations for funding and resources to implement the plan.

A list of invasive animal species was compiled by the Institute for Natural Resources using similar methodology as that used to develop the invasive plant species list. This animal list included 39 species, 8 of which were reported in McDonald-Dunn Forest (Appendix K). The species reported in the Forest included 3 fish, 3 insect, 1 mollusk, and 1 amphibian species. None of these 8 species are prohibited according to Oregon Department of Fish and Wildlife (OAR 635-056-0050), and only 1 (*Lithobates catesbeianus*, American bullfrog) is controlled (OAR 635-056-0070). None of these species are currently managed in the Forest, and no control activities are anticipated at this time.

Climate change may act as a 'threat multiplier', exacerbating the spread of invasive species by creating conditions that favor their establishment and proliferation. Higher air temperatures and reduced summer precipitation could gradually cause changes in the distribution and abundance of invasive plant species, with drought-tolerant species increasing in dominance. Inventorying, monitoring, and strategic planning will be needed to effectively address the growing threat invasive species pose to the McDonald-Dunn Forest.

3.6.4 Insects and Pathogens

Historically, there has not been a significant amount of damage from insects and pathogens on the McDonald-Dunn Forest. However, recent climatic patterns have increased stress on overstory trees on many sites across the forest and elevated concerns over long-term sustainability of forest cover. Most sites have shifted historically from woodland/savanna conditions with mixed Oregon white oak and scattered Douglas-fir trees to closed-canopy forests of Douglas-fir. Emerging patterns of drought stress and accompanying bark beetles/wood borers are combining to cause significant tree mortality, especially on sites which are more vulnerable to drought and heat (e.g., south slopes, gravely soils, and ridgetops).

Insects

Bark beetles and wood borers have emerged as major disturbance agents in Douglas-fir and grand fir within and around the Willamette Valley. In grand fir, the major bark beetle is the fir engraver (*Scolytus ventralis*), which occurs across diameter classes and tree sizes. Fir engraver impacts are strongly linked to effects of drought on tree vigor. Douglas-fir has a complex of wood borer(s) and bark beetles including:

- The flatheaded fir borer (*Phaenops drummondi*), a wood boring beetle typically thought of as a secondary disturbance agent, now appears to be a primary mortality agent in low elevation, drought stressed Douglas-fir. It has been documented on many sites on the McDonald-Dunn Forest.
- The Douglas-fir beetle (*Dendroctonus pseudotsugae*), generally thought to be the most important mortality agent of Douglas-fir, is likely present throughout the McDonald-Dunn Forest. It is associated with drought, root rot centers, and major wind-throw events.
- Several other bark beetles of Douglas-fir are present. Each beetle has a different niche of phloem thickness and stem size (e.g., the Douglas-fir pole beetle, *Pseudohylesinus nebulosus*, and the Douglas-fir engraver, *Scolytus unispinosus*).

A single large tree could host multiple insects. For example, the flatheaded fir borer could occupy the butt log, Douglas-fir beetle the mid and lower upper bole, the Douglas-fir pole beetle the upper bole, and the Douglas-fir engraver beetle on large branches and tops.

Major defoliation events have thus far been rare in the more mature conifer forests of the McDonald-Dunn Forest. However, two defoliators may flare up in even-aged stands: the silver spotted tiger moth (*Lophocampa argentata*), a tent caterpillar that causes very localized and patchy defoliation, and Neodiprion sawflies (*Neodiprion* spp.) that can consume older foliage in spring.

The only significant invasive insect to date in the forest is the balsam woolly adelgid (*Adelges piceae*), whose major host is grand fir. At one time, the demise of grand fir was predicted due to the balsam woolly adelgid, but it appears grand fir is persisting quite well. Balsam woolly adelgid infestation creates a distinctive appearance in the upper crown of tall trees in that tops are flattened (no distinct leader), gnarly, and multi-stemmed, which is a common sight across much of the Willamette Valley.

Two new insect invaders of hardwoods have emerged in the region as of late. The emerald ash borer (*Agrilus planipennis*) and the Mediterranean oak borer (*Xyleborus monographus*) have recently established in the northern Willamette Valley, and both are expected in the McDonald-Dunn Forest within the next few years.

- The emerald ash borer (EAB) is a flat-headed wood boring beetle in the Buprestidae family which kills ash (*Fraxinus*) trees regardless of size or vigor. Based on observations in eastern North America where the insect has been present for nearly 25 years, heavy mortality (~90%+) of all Oregon ash (*F. latifolia*) is expected. This could have significant impacts on the ecology of riparian forests of the McDonald-Dunn Forest. Currently, there are genetic trials ongoing in hopes of finding resistance to EAB, as well as parasitoid wasp releases by Oregon Department of Agriculture, which may prove fruitful. However, experience with EAB in eastern North America suggests that stopping the spread of EAB in Oregon is improbable.
- The Mediterranean oak borer (MOB) is an ambrosia beetle closely related to bark beetles and weevils (Family: *Curculionidae*). Ambrosia beetles bore into wood but do not consume it. Rather, they inoculate the wood with an ambrosia fungi and feed on that fungus. They vector these fungi in specialized anatomical organs called mycangia. It is generally thought that MOB-caused tree mortality is a function of a combination of the physical damage from the beetle, and more importantly the plant pathogenic fungi that are vectored by the beetles. Currently, MOB is associated with mortality of Oregon white oak in Oregon, but in California it appears to mostly impact Valley oak (*Q. lobata*) and blue oak (*Q. douglasii*). A key question that researchers are investigating is whether tree vigor is important in susceptibility to MOB-caused mortality. Currently it appears MOB is closely associated with trees that have low vigor, such as poor growing space and compacted soils in urban situations, or root diseases. Large, older oak trees seem most susceptible, perhaps due to root disease, drought, and other issues associated with old age. On the McDonald- Dunn Forest, it is hard to predict what will happen to the Oregon white oak trees. It may be that MOB becomes chronic in older trees, causing decline and mortality, while it may not impact young vigorous trees. At this point in time, there is little management action that could be taken, as researchers work to find some way to control the insect.

Pathogens

Pathogen impacts have historically been minor and vary according to changes in soils, aspect, slope position, and past management. Root diseases are an issue in very localized sites where host trees have persisted for many generations:

- Laminated root rot (*Coniferiporia sulphurascens*) is present on the forest but rare.
- On sites where Douglas-fir has recently established, Schweinitzii root and butt rot (*Phaeolus schweinitzii*) is the primary root disease due to its ability to spread by spores; Schweinitzii root and butt rot typically does not kill trees outright.
- Incidence and decay by heart rots (especially conk rot of Douglas-fir; *Porodaedalia pini*) increase with tree age.
- Ice damage and other factors that cause broken tops provide entrance courts for the rosey top rot fungus (*Fomitopsis canjanderi*).
- Droughty sites where Douglas-fir is marginal may have increased the incidence of canker diseases in young plantations.
- Young plantations of Douglas-fir on droughty sites may experience increased incidence of canker diseases.
- Western oak mistletoe (*Phoradendron villosum*) may occur on Oregon white oak, but is not considered a substantial concern outside of situations where trees are very heavily infected (100+ plants in a crown).
- Western oak mistletoe fruits in winter and is a major food resource for western bluebirds.

Guidelines for Managing to Promote Forest Health

Management considerations vary across objectives for specific forest stands, but several common approaches could broadly benefit tree vigor, bolster stress resistance, and increase long-term stand resilience in the face of climate change with increased temperatures and drought.

- Restoration treatments that create low-density, clumped, mixed-species and multi-aged stands with and without the re-introduction of prescribed burning and cultural burning could become more important in the future as the ability to grow pure conifer stands is reduced and management of fuels becomes more of an imperative.
- Density management, including planting at lower densities and regular thinning of existing stands, may benefit tree vigor in *even-aged, short rotation* and *even-aged, long rotation* stands.
- In areas of root rot, promote resistant tree species at appropriate densities.
- Species that are more tolerant to drought can be selected for during thinning treatments. This may mean reducing/removing grand fir and other shade-tolerant species on dry sites, as they are more vulnerable to high temperatures and drought. This would not preclude retention of large standing dead grand fir as snags or leaving large green grand fir to eventually die and become snags.
- *Even-aged, short rotation* management could be a more conservative approach to maintaining timber values in the face of changing climatic conditions than *even-aged, long rotation*.
- Stands with conditions increasingly marginal for growing Douglas-fir may better serve broad forest goals if managed to promote other species (e.g., ponderosa pine, incense cedar, Oregon white oak, Pacific madrone).

3.7 Human Dimensions

Trail running, mountain biking, bird watching, hiking clubs, field trips at Peavy Arboretum, and other organized activities have occurred in the forest for decades. Field trips for students and learners of all ages, which blur the line between education and recreation, occur on a regular basis. These multiple modes of exposure to the McDonald-Dunn Forest enable community members to become increasingly aware of how the forest is managed and can heighten sensitivity to how management decisions impact their access to, and enjoyment of, these natural areas (Kil et al. 2012).

These myriad human dimensions of forest management reflect the complex ways that people affect and are affected by the environments they are nested in. The development of community place meanings and attachments through regular interactions with the McDonald-Dunn Forest further underscores the importance of considering human values in all aspects of forest planning. Indeed, high quality, readily accessible visitor opportunities in the McDonald-Dunn Forest are central to Corvallis' community identity and "fabric of life".

3.7.1 Visitor Use

The McDonald-Dunn Forest offers 35 miles of trail and 114 miles of road for year-round public access and visitation. Managing this year-round public access and providing it at no cost to the community requires maintenance of trails and recreational facilities, and involves conducting research to inform visitor plans and policies, organizing educational events and interpretive programming, coordinating volunteer opportunities, and delivering public information about forest management activities. As explained in section 2.7, public visitation has grown and diversified substantially in recent decades and is expected to continue to do so. This section outlines the benefits and challenges of managing public use on the McDonald-Dunn Forest and provides guidelines for a visitor use management framework.

Visitors to the McDonald-Dunn Forest can derive a wide variety of potential benefits, as the virtues associated with spending time outdoors are seemingly limitless. Access to natural areas can improve physical and mental health, foster social connections, and enhance environmental awareness. It can also boost local economies and improve overall quality of life by offering spaces for relaxation, gatherings, fitness, and personal growth. Located a short drive from the Oregon State University campus, the McDonald-Dunn Forest is an asset promoted when recruiting students, faculty, and staff to Corvallis.

Specific to the McDonald-Dunn, year-round, free public access offers numerous opportunities to integrate recreation and forest learning—and in many cases, recreation and environmental learning occur simultaneously. For instance, students and instructors gain enjoyable, healthful benefits from their time spent in the forest on field trips or while conducting research. Similarly, repeated recreational visits over time can result in learning through interpretive signage or observing how forests change under varying silvicultural treatments along trails by witnessing shifts in stand structure, growth, and species diversity. This directly addresses several of the research forest missions and goals by enhancing learning and discovery, while also providing recreation and community connections (section 1.2).

In addition to the learning opportunities, nature-based activities provide an array of interconnected physical and mental health benefits. Research repeatedly suggests that time spent in nature is a social determinant of human health. Moreover, safe and inclusive access to natural areas contributes to healthy, active communities and lifestyles (Wolf et al. 2020). Research on the types and levels of visitor use and motivations of visitors to the McDonald-Dunn Forest strongly indicate that the free, year-round access to the forest provides substantial health benefits to residents of Corvallis and surrounding areas (Kooistra and Munanura 2018).

Although the proximity of the McDonald-Dunn Forest to the community is a key ingredient to the use of the forest by recreationists, students, researchers, and educators, this proximity can also create challenges. Thoughtful and proactive management is needed to minimize potential undesirable environmental, social, and managerial impacts that could accompany high levels of visitation.

Visitor Management

Environmental Impacts: Without proper management, visitation to any natural area can engender undesirable ecological impacts. For instance, seasonal closures may be needed for certain sections of trails during rainy weather to prevent erosion and overall trail degradation. Winter storms regularly cause windthrow of substantial numbers of trees across trails and roads, which need to be removed to allow safe passage. Unauthorized trails are a particularly challenging dilemma, as they can result in loss of vegetation cover, erosion, impacts to water quality, displacement of sensitive wildlife species, and impacts to cultural resources and research projects. Managers can minimize these potential negative impacts by naturalizing unauthorized trails where feasible, building trails and roads to meet sustainable standards, and leveraging education and messaging to help positively influence compliance on trails.

Social Impacts: Visitor interactions in mixed-use trail and road systems can sometimes result in dissatisfaction and conflict. For example, conflict can occur when mountain bikers encounter slower-moving hikers or equestrians; between dog owners who leash versus unleash their dog; or between a timber harvest contractor and a recreational user. Strategies for mitigating conflicts include educating and encouraging visitors to use proper trail etiquette, establishing effective and creative signage and messaging systems, partnerships with community user groups, and, if resources allow, segmenting different use types onto separate trails.

Managerial Impacts: With continued growth in visitation, crowding and parking congestion is an ongoing issue at McDonald-Dunn Forest trailheads. When parking lots are at capacity, visitors may park illegally or be displaced from that location (i.e., they could forego their outing, try a different location, or return at a different time). Managers must find strategies that maximize visitor safety and compliance at parking lots while minimizing visitor dissatisfaction or undesirable displacement. These strategies can include providing information about high use times and parking capacity so people can increase their chances of finding an empty parking spot (e.g., live web-cam at Oak Creek parking area); installing bike racks at popular locations to encourage alternative transportation to the forest; and ensuring that parking lots are clearly signed and monitored to minimize illegal or unsafe parking. Also essential is to ensure that visitors understand road and trail etiquette, such as vehicles having the right of way on roads, so that conflicts are minimized.

Emergent technologies: There are significant management challenges associated with changing outdoor recreation technologies and emergent visitor uses. Electric-powered devices such as e-bikes, hoverboards and e-unicycles are among the new types of recreational uses on forest trails, although they are prohibited in the McDonald-Dunn Forest. These technologies and vehicles are increasingly impacting how visitor use is managed in non-motorized nature-based environments, and their potential for social and environmental impacts continues to be explored and studied.

Vandalism: Vandalism, defined as any action involving deliberate destruction of or damage to public or private property without owner permission, occurs periodically on the McDonald-Dunn Forest. Examples of vandalism include dumping of trash, building of unauthorized structures, and intentional or unintentional damage to research or teaching efforts (e.g., efforts to “clean up” flags or flagging used to mark data collection locations). Managers closely monitor instances of vandalism and other illegal actions to understand the magnitude of the problem, detect trends, and identify appropriate management responses. Vandalism or unintentional damage to research sites can be mitigated by educating visitors about ongoing scientific studies and the importance of leaving the sites undisturbed.

Guidelines for Visitor Use

In 2016, faculty and staff from the College of Forestry and the research forests met and reviewed recommendations from a McDonald-Dunn Recreation Collaborative effort. Through this work, the working group developed a mission and vision for the Recreation and Engagement Program.

The mission of the program is to support and promote an integrated community made up of residents, schools, organizations, the College of Forestry, and OSU by offering a high-quality local recreation destination and interactive opportunities to learn about forests. The vision of the program is to offer a variety of enjoyable opportunities for a diverse set of forest visitors to participate in close-to-home recreation and learning activities in a forested environment; a place where people feel comfortable engaging in outdoor activities as individuals or with their neighbors and friends and come away learning something new about forests.

The following guidelines for recreation in the McDonald-Dunn Forest were informed by the vision for the recreational use of the forest outlined in the 2016 Recreation Program Goals and Objectives. These guidelines seek to strategically strengthen the recreational and learning experiences for the community while minimizing potential adverse social, managerial, and ecological impacts that can be associated with public use of forest lands.

Guidelines for Visitor Use

Guideline 1: The McDonald-Dunn Forest is, and will continue to be, an integral part of the community.

- The McDonald-Dunn Forest will be an interactive setting for the community to learn about forest resources, ecology, management, research, societal benefits, and the College of Forestry mission (see interpretation section 3.8.3).
- Research forest staff will deliver accessible, transparent, and inclusive communications about forest management, recreation, and research through a variety of mediums and outlets, including online and printed materials (e.g., website and social media), in-person events, and on-site interpretive programming (see communication strategies section 3.8.4).
- The research forest will seek out and maintain positive partnerships with community organizations, Tribal governments, businesses, and agencies to promote community engagement and input (see community partnerships section 3.8.2).
- The Recreation and Engagement program will provide inclusive volunteer opportunities for forest stewardship and public involvement.(see volunteering section 3.8.1).

Guideline 2: The McDonald-Dunn Forest will offer diverse welcoming, high-quality, safe, and sustainable recreational opportunities consistent with the College of Forestry and research forest goals and themes.

- To the extent possible, trail design and management will focus on providing safe and sustainable visitor use that protects natural and cultural resources and is consistent with the research forests' mission, goals, and themes. If a trail cannot be maintained with these considerations, the research forest will explore changing the use designation, rerouting, or closing the trail.
- The research forest will strategically plan to protect and enhance current visitor use experiences and offer new experience opportunities in an environmentally, economically, socially, culturally, and managerially sustainable manner.
- The research forest will develop a comprehensive plan for the development and maintenance of a trail system that is designed for the protection of forest resources, diverse visitor experiences and enjoyment, and sustainable monitoring and maintenance.
- The research forest will continually strive to provide opportunities for visitor use by groups traditionally underserved or underrepresented in outdoor recreation.
- The research forest will continue to make improvements to better enable people with physical disabilities, including those who may require mobility devices such as wheelchairs, to safely access and make informed decisions about using the McDonald Forest.
- The research forest will partner with a diverse set of organizations and community members to improve the quality, accessibility, and distribution of materials for visitor services, including signs, maps, and brochures.
- The Dunn Forest will be managed for a more remote visitor experience, with hunting access and minimal trail infrastructure.
- The Dunn Forest hunting program will be maintained in a way that does not impact the safety of recreationists and adjacent landowners and is sustainable for natural, cultural, and social resources, including game populations.
- The research forest will develop a special uses plan that provides opportunities for organizations and community members to host events without compromising the needs of other visitors and the neighboring landowners.

Guideline 3: The Recreation and Engagement Program will commit to an adaptive management approach that relies on evidence-based decision-making, including routine monitoring of visitor use experiences, equity in the access to visitor opportunities and benefits, and continual assessments of potential adverse environmental impacts of visitor use.

- The research forest will develop a comprehensive visitor use management plan (VUMP) that identifies desired conditions, policies, and goals for all recreation and engagement program aspects.
- The VUMP will include a strategy for developing a monitoring system that effectively assesses existing conditions of visitor use and impacts (e.g., systematic surveys, community focus groups, visitor counts, resource impact mapping, etc.). This monitoring system will advance scientific understanding of visitation in the research forest and help management adjust visitor use policies as part of an iterative learning process.

Following the initiation of the 2025 McDonald-Dunn Forest Plan, a separate McDonald-Dunn Forest visitor use management planning (VUMP) process will commence. The new VUMP will expand on these guidelines and provide a more detailed outline of policies and practices related to trail development, improving access, recreation research and monitoring, hunting, education and interpretation, volunteers, and other visitor programming on the research forests.

As described in section 3.1.3, Tribal access for usual and accustomed cultural practices, such as hunting, gathering, and ceremony will be encouraged. Arrangements will be clearly described in new MOUs codeveloped with the Confederated Tribes of Grand Ronde and Confederated Tribes of Siletz Indians.

3.7.2 Wildland-Urban Interface

Significant portions of the McDonald-Dunn Forest are in the wildland-urban interface (WUI), the area where housing and wildland vegetation intermingle or are adjacent to each other (Radeloff et al. 2005). As the fastest-growing land use type in the US (Radeloff et al. 2018), the amount of WUI in Benton County and across Oregon has expanded rapidly since 1990, reflecting the growing desire of residents to live near natural amenities. Currently, there are approximately 5,300 tax parcels with one or more structures located within 2,500 feet of the research forests boundary (Figure 30). The presence of homes adjacent to the forest can create conflicts and tensions about forest management activities adjacent to homes along property boundaries. Addressing issues of mutual interest between neighbors and the forest is increasingly critical.

Figure 30. *Location of residential structures within 2500 feet of the boundaries of the McDonald-Dunn Forest.*

Intrusion

Intrusion into the forest from the WUI expands two management issues: potential encroachment of non-native plants onto forest property and the creation of unauthorized trails from adjacent private lands into the forest.

Invasive plants are a persistent threat to the research forests (section 3.6.3), requiring time and funding to control. As ornamental plants planted in yards move into natural areas, they can create a variety of disruptions. The impacts of nonnative plants on forests can include competition that leads to reductions in the diversity and extent of native species, changes in habitat conditions for wildlife, and ultimately degradation of native ecosystem function (Pimentel et al. 2005). Chemical vegetation treatments (e.g., herbicides) and mechanical methods are often needed to control invasive species when they move across boundaries from neighboring properties into the forest, increasing forest operating costs. The use of herbicides to control invasive plants is negatively viewed by some members of the public, resulting in the need for engagement with forest neighbors to collaborate on solutions (Potter et al. 2024).

The proliferation of unauthorized trails built to provide access from private properties into the forest (i.e., to facilitate convenient access by forest neighbors) is another concern. Such trails can have environmental impacts, as they are typically not built to standards, and are often placed in locations unsuitable for foot traffic. Such trails can lead to soil compaction, erosion, and tree wounds to stems and roots. Their existence can result in damage to sensitive resources, disturbance to wildlife, interference with forest operations, and the inadvertent introduction of invasive species onto the forest which require funding to control. Education and communication with neighbors will seek to succinctly and convincingly explain the legal rationale for requesting avoidance of the creation/maintenance of any trails not officially authorized by research forest staff (Winter 2006; Marion and Reid 2007).

Wildfire Risk

Although the WUI accounts for a small portion of the land area, it is a key source of wildfire ignitions (Mietkiewicz et al. 2020). The high density of private homes and other structures within close proximity to the boundaries of the McDonald-Dunn Forest (Figure 30), makes the forest vulnerable to human-caused fires. The 2015 Timberhill Wildfire, which ignited at Chip Ross Park, burned city property and directly threatened the McDonald-Dunn Forest immediately upslope. A shift in the wind direction prevented it from spreading into the forest, where it would have had the potential to develop into a major wildfire conflagration not only damaging the research forest, but also additional homes and human infrastructure adjacent to the forest. As mentioned in section 3.6.2, a recent fire risk analysis indicates higher burn probabilities immediately outside rather than inside the McDonald-Dunn Forest (Scruggs 2024).

Protecting infrastructure, property and human lives in the WUI requires working closely with individuals and communities to proactively prepare for wildfires (ERI 2013). As addressed in section 2.2.5, projections of future climate for the region predict warmer temperatures and decreased summer precipitation, which are conditions associated with increased risk of wildfires (Holden et al. 2018; Halofsky et al. 2024). More specifically, the Oregon Coast Range is predicted to experience larger wildfires in July and more frequent smaller fires in May, June, and August (Dye et al. 2024a).

Community Wildfire Protection Plans can play an important role in identifying high-risk areas, fuel treatment priorities, adequate local fire suppression capacity, structures and landscaping design and maintenance in a manner that is ignition resistant, safe evacuation routes (sometimes through reseach forests), and provide educational information to the local public (FireWise 2009). Whenever possible, research forest staff will work with adjacent landowners (both residential and industrial) and other public agencies (e.g., Oregon Department of Forestry) to facilitate efforts to improve wildfire preparedness and recovery ability.

As the size and intensity of wildland fires have increased, so has the exposure and associated impacts to vulnerable populations adversely impacted by wildland fire smoke and evacuations. Accordingly, the public health impacts of wildland fire smoke are taking on greater importance and merit the attention of all who have responsibility for land and air quality management decisions and wildland fire policy, who protect the health of the public and at-risk populations, and the stakeholders who are impacted by wildland fire policy. Wildfires are also associated with many other health and wellbeing costs including those associated with premature mortality (Johnston et al. 2012; Rappold et al. 2014), health care utilization, lost productivity, impacts on the quality of life (Jones 2017), compromised river and drinking water quality (Bladon et al. 2014; Hohner et al. 2016), and damage to critical infrastructure.

Communities benefit from proactive fuels management activities in both the forest and the WUI and in ways well beyond reductions in risk to life and property (Bailey 2024). Targeted fuels management treatments also can improve forest conditions and resilience to other disturbances (i.e., protect cultural plants, scenery, watersheds and habitat) while providing renewable consumer products with associated by-products (e.g., physical materials and co-generated energy) and providing multiple opportunities for businesses, workforces and communities. However, it should be recognized that not all areas within the forest or along the forest boundary can be treated to reduce fuels due to presence of research projects and other land allocations. As noted previously, a new long-term research project focused on fuel reduction and community protection will assess the efficacy of various fuel reduction methodologies along forest boundaries, with an emphasis on areas that have high housing densities and elevated wildfire risk. As the area of land in WUI continues to expand over time, issues related to interactions with adjacent landowners will likely continue to increase and warrant new specific plans for partnering and communicating.

3.8 Enhancing Community Engagement

Integrating community engagement into McDonald-Dunn Forest management is critical to ensuring that policies, programs, and decisions reflect the values and needs of the community who rely on the research forest for recreational use, while also providing opportunities for research, teaching, forest product creation, and learning. Community engagement also fosters a culture of co-stewardship, providing forest users with a sense of ownership and responsibility, which in turn can lead to more embraced and accepted policies and programs. Community engagement also strengthens the impact of educational opportunities and programming goals, thereby expanding opportunities for the public to gain an understanding of, and appreciation for, forest ecosystems and natural resource management.

The following sections outline the strategies and tactics pertaining to volunteering, partnership development, interpretation and education, and communicating with the public about the McDonald-Dunn Forest.

3.8.1 Volunteering

Maintaining an active volunteer program allows research forest staff to leverage limited resources to accomplish large amounts of work on the ground. Volunteers have the benefit of experiencing improved physical and mental wellness, being able to engage with like-minded individuals, and developing forest management knowledge. Over time, those who work in the forest develop a sense of stewardship and attachment to the areas they help to maintain.

In 2023 alone, the OSU Research and Demonstration Forests hosted 5,100 hours of volunteer labor. These volunteers helped with Peavy Arboretum upkeep, built and maintained trails, kept trails free from fallen trees and debris, removed invasive species, and assisted in community outreach events. A 'core' group of 8 to 10 volunteers work weekly, providing routine maintenance of forest trails. Many additional drop-in volunteer work parties are scheduled each year, giving local community organizations and individual members of the public an opportunity to protect and enhance the trails they love. The use of volunteer work parties will be expanded in the future to add more capacity in needed areas, such as halting the spread of newly detected invasive species on the forest (section 3.6.3).

The McDonald-Dunn Forest volunteer program objectives include:

- Maintain the safety of volunteers (the highest priority)
- Provide clear, consistent expectations for volunteers and staff
- Be economically efficient
- Create enjoyable and valuable opportunities for volunteers
- Build positive relationships between research forests, College of Forestry, and the community

Participatory science (sometimes called "community science" or "citizen science") is a way of conducting research that centers community members in collecting data. Through participatory science, community members collaborate with researchers to conduct scientific research and leverage local knowledge. Participatory science involves using specific protocols and tools to gather data and collect observations in a standardized way. This approach to science provides anyone with an interest in a topic the opportunity to contribute data to further scientific understanding of particular issues. By engaging community members, researchers can collect a larger amount of data, and often span larger geographic areas in a shorter amount of time. The approach also provides a good opportunity for participants to learn more about topics of interest to them, and contribute to broader understanding of natural resource issues.

The use of participatory science on the McDonald-Dunn Forest to date has been scant. Some pilot efforts employing this approach will begin in 2025 and 2026, as this dovetails with the priorities mentioned throughout this section of the 2025 Forest Plan regarding the desire to increase community understanding of the many learning opportunities provided by the research forests. The intent of the participatory science that will be initiated first will be to aid in monitoring trends in biodiversity over time, notably with birds, herpetofauna, and fungi, as described in section 4.2.

3.8.2 Community Partnerships

The McDonald-Dunn Forest relies on a diverse range of community partnerships to advance and meet goals for community engagement, recreation, research, and forest stewardship. The research forests will continue to value and maintain existing partnerships and continue to seek out mutually beneficial partnerships and collaborations with Tribal governments, public agencies, user groups, and community members. As mentioned in section 3.1, Tribal partnerships will involve co-stewardship of ecocultural resources and identification of opportunities to foster co-learning, through activities such as cultural burning and ecocultural restoration.

The following specific examples exemplify the spirit of the guidelines developed to support the goal of stewarding community partnerships in the McDonald-Dunn Forest.

Guideline 1: Support partnerships that involve local schools and environmental education groups.

- *Example 1:* **Get Outdoors Day** - OSU research forest staff partner with OSU Extension, Oregon Department of Fish and Wildlife, Benton County Health Department, and Corvallis and Albany (Linn County) school districts to lead the annual Get Outdoors Day event in Peavy Arboretum. During this event, the forest is enriched with bilingual (Spanish-English) activities, families, and dozens of local natural resource agencies and organizations – all coming together with the goal of encouraging families to get outside, enjoy their community, and hopefully try something new (e.g., catching a fish in Cronemiller Lake for the first time). The McDonald-Dunn Forest partners with Dial-a-Bus and Title 1 schools in Linn and Benton County to offer free transportation to the event. The free transportation ensures that every family has a chance to take part in the fun.
- *Example 2:* **Natural Resource Educator Working Group** - The research forest is an active member of a natural resource educator working group. The group consists of natural resource education professionals in the Willamette Valley and meets quarterly to discuss topics related to teaching, removing barriers to education, opportunities for collaboration, volunteer and staffing needs, and program development.

Guideline 2: Partner with volunteer groups, McDonald-Dunn Forest user groups, non-profit organizations, and recreation clubs to educate the public about responsible forest use and stewardship.

- *Example 3:* **Team Dirt** - The OSU research forests partner with the Corvallis chapter of Team Dirt, a Chapter of the International Mountain Bike Association (IMBA). Team Dirt is a nonprofit, volunteer organization that works in partnership with the forest and other local agencies to build and maintain trails throughout the Willamette Valley. The organization is dedicated to the stewardship of sustainable, multiple-use, and purpose-built trails, to preserve access for mountain bikers through advocacy and education, and to promote responsible trail use. Team Dirt works closely with McDonald-Dunn Forest staff to design, build, and maintain sustainable, primary-use and multi-use trails that better meet the needs of the mountain bike community.
- *Example 4:* **Forest Recreation Advisory Council** (FRAC) - The OSU Research Forests Recreation Advisory Council (FRAC) assists the research forest staff in realizing the goal of providing safe, quality recreation opportunities that are compatible with OSU Research Forests vision, mission, and goals. Council membership is designed to facilitate coordination and cooperation among community recreation users and research forest staff. FRAC membership consists of representatives from a variety of recreation user-groups and other community members as specific needs for input arise. The FRAC meets at least quarterly to address the ways the research forests can provide high quality nature-based recreation for local users in a socially, managerially, and ecologically sustainable manner; minimize conflicts among recreation users, between recreation users and adjacent landowners, and between recreation users and forest management, teaching, research and demonstration operations; and reduce environmental impacts of recreation use. In addition, FRAC members act as liaisons within their respective user communities to share information regarding what is happening on the McDonald-Dunn Forest.

Guideline 3: Sustain and develop partnerships with local public land managers to improve connectivity and common messaging for local trails in the community.

- *Example 5:* **Interagency Trail Uses Group** - The OSU Research Forests is a member of an Interagency Trail Uses Group in partnership with the City of Corvallis Parks and Recreation, Benton County Parks and Natural Areas, Greenbelt Land Trust, and Crestmont Land Trust. The group meets quarterly to address common trail use issues, coordinate and communicate trail planning efforts, and establish complementary strategies and policies to address recreational issues and needs in the community.

Guideline 4: Provide opportunities for community groups and organizations to host events without compromising the needs of other visitors, neighboring landowners, or other research forest management activities.

- *Example 6:* **Large events** - Several large running races occur every year on the McDonald-Dunn Forest (e.g., McDonald Forest 50k, Condor 25k, and McDonald 5k/15k). Because of their large size and potential to disrupt other forest activities, organizers must apply for a special use permit.

3.8.3 Interpretation and Education

The OSU Research and Demonstration Forests aim to provide students, teachers, researchers, and the community with diverse opportunities for learning, discovery, and engagement. Research forest staff will continue to develop a variety of interpretive products that help to establish the forest as an interactive setting for the community to learn about forest resources, ecology, management, research, societal benefits, and the College of Forestry mission. These products include but are not limited to maps, physical handouts, on-site signage, newsletters, in-person tours and events, social media, and website content.

As part of the McDonald-Dunn Forest Visitor Use Management Plan (VUMP), research forest staff will develop a formal interpretive program plan that aims to improve community understanding of, and appreciation for, the McDonald-Dunn Forest and the rationale for the management that occurs therein. The intent of developing the interpretive plan is to (1) increase transparency about the mission and goals of the research forests; (2) provide opportunities to engage youth and other non-traditional forest visitors; (3) encourage visitors to take positive actions to minimize impacts and comply with forest rules; and (4) improve relationships with community members by providing relevant information about recreation etiquette, forest management, and forest history.

Anticipated outcomes of the interpretive planning process include the research forests having a unique and community supported identity, future interpretive projects having messages delivered effectively through a variety of mediums, and having clearly defined avenues for developing additional interpretive programs and projects. The interpretive plan is expected to enhance collaboration with existing and potential new audiences to bolster support for the research forests, help identify interpretive themes and story lines that tie messaging back to the goals of the research forests, and improve/expand the Forest Discovery Program.

The **William Ferrell Forest Discovery Trail Interpretation Program** is designed to be an interdisciplinary interpretive trail that enhances knowledge and enthusiasm for forests and science, as well as demonstrate the way forests have been used by humans in Oregon. The Forest Discovery program invites students to explore the McDonald-Dunn Forest and take a closer look at the plants and animals that live in this forest ecosystem. Students also discover how this forest has transitioned from an oak savanna to a young Douglas-fir dominated forest over the last 200 years. Materials are available both online and along the trail and are designed to help learners easily explore the Forest Discovery Trail. Educators have the option of choosing which materials best meet the needs and learning objectives of their students. Five topics and themes were selected to teach students about forest disturbance, forest succession and forest science.

The research forest staff will improve and expand the Forest Discovery Program by exploring opportunities to install permanent and interactive interpretive stops along the trail, coordinating with educators and youth groups to attract more youth to the trail, providing train-the-trainer events to increase the number of individuals able to use the learning opportunities available, and hosting other events and outreach opportunities for educators and learners of all ages.

3.8.4 Communication Strategies

Effective communication is critical for the McDonald-Dunn Forest to achieve many of the goals described in section 1.2 (e.g., learning, discovery, engagement; recreation; community connections; and accountability). Research forest staff have in the past communicated with the OSU community, current and potential forest visitors, forest neighbors, and the media through a range of methods and strategies including printed materials, onsite interpretation, online resources, partnerships and sponsored events, and other forms of outreach. The 2025 Forest Plan calls for enhanced documentation of research projects and outcomes, as well as other educational uses of the forest (see sections 3.2.1, 4.2). The new plan also calls for broadening communication efforts within and outside the academic community to foster greater collaboration and enhanced understanding of forest use.

Historically, proactive external communications regarding research and demonstration activities on the forests have been limited by staffing and resource constraints, with outreach primarily targeting recreational forest users. Harvest-related communications have been limited to safety announcements and public notices regarding closures, with limited communications regarding short- and long-term research projects or ecological objectives of harvests. On-site forest signage is aging and reflects multiple iterations of OSU branding and messaging, with opportunities for additional interpretation regarding the mission, vision, and goals of the forests.

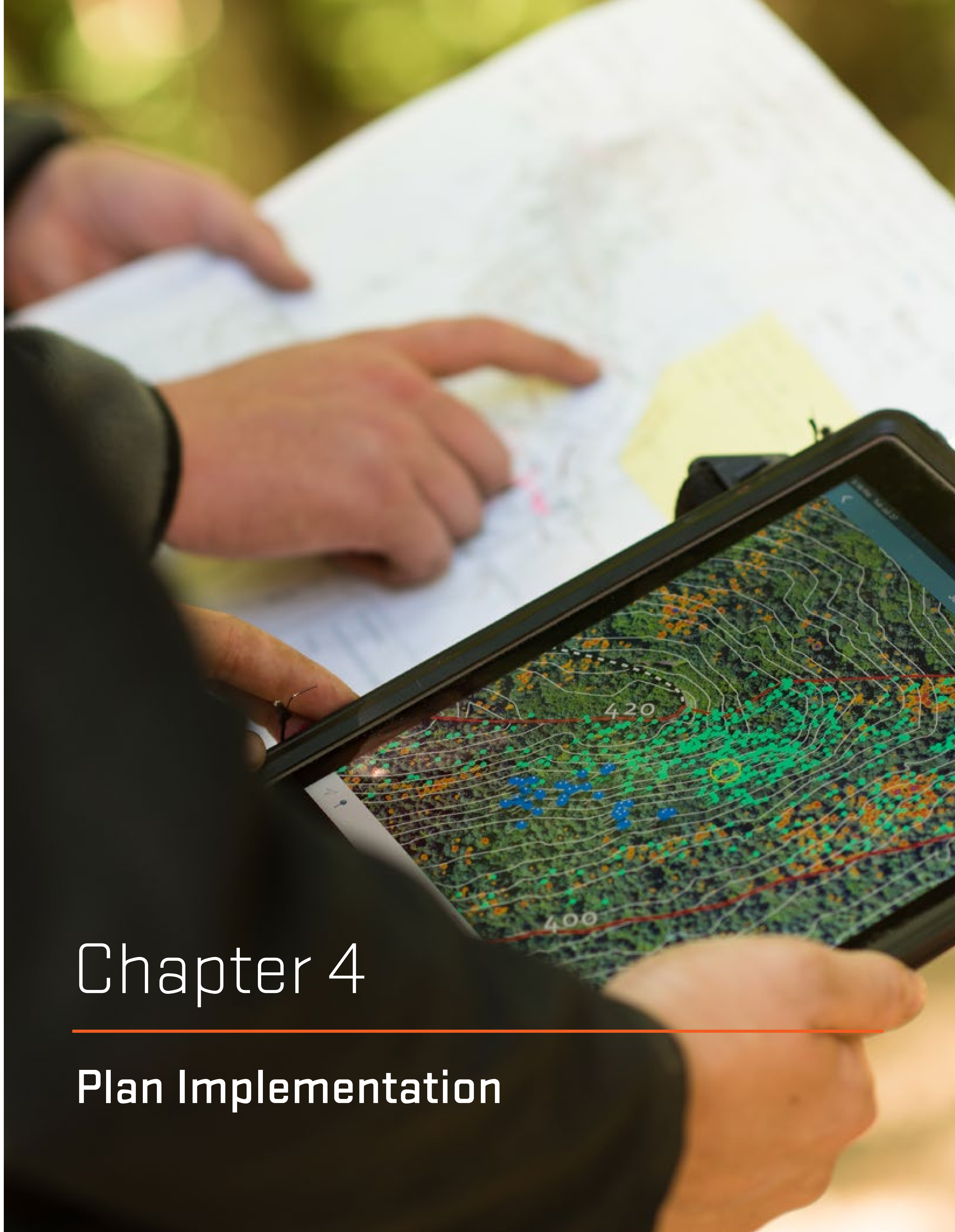
Feedback obtained through the development of the 2025 Forest Plan suggest several priorities are warranted for future proactive communications, in addition to the notifications of management operations mentioned above. The new priorities will include:

- Increase understanding of the mission, vision, and goals of the research forests.
- Educate on the history of the Indigenous Peoples who lived on and stewarded the land that is today called the McDonald-Dunn Forest.
- Improve storytelling and communication about what is learned from and the objectives of various management activities and harvest types.
- Describe the ecosystems existing across the landscape of the McDonald-Dunn Forest and how they have changed over time, including the role of *late-successional forest* and oak savanna restoration.
- Highlight ongoing research and educational uses of the forests.
- Overhaul signage and interpretation to improve accessibility and awareness of forest management objectives.

To achieve this, several strategies will be employed.

- ***Strategy 1:*** Implement a proactive storytelling approach that educates about research taking place on the forest and the ecological objectives associated with various management activities.
- ***Strategy 2:*** Increase opportunities for community engagement that showcase the ongoing research and demonstration activities on the forest.
- ***Strategy 3:*** Engage local media, elected officials, leaders from across campus, and others, to provide context for the ecological, economic and social impacts of forest management activities on the McDonald-Dunn Forest.
- ***Strategy 4:*** Invest in new signage at key areas – specifically Peavy Arboretum – to better describe the history of the Kalapuya people on this land, the mission and goals of the forest, as well as the role active management has played in creating the forest conditions the community has come to love.
- ***Strategy 5:*** Following the implementation of the new plan in 2025 and the 100th anniversary of the McDonald Forest in 2026, honor our history and look to the future through a series of events and celebrations that highlight what's been learned, showcase thought leadership, and educate the community on the role of the forests.

Communicating information can be challenging because visitors to the forest get their information from a variety of sources and are often not actively seeking it. Messaging for forest visitors is developed on an ongoing basis in response to salient management issues and needs, and to convey important information regarding forest management planning and actions. In recognition that addressing many potential issues of concern on the forest hinges upon careful communication strategies, a formal communications plan will be developed as a parallel effort in coordination with the forthcoming McDonald-Dunn Forest Visitor Use Management Plan (VUMP).



Chapter 4

Plan Implementation

This fourth and final chapter specifies how the intentions described in previous chapters will be implemented. This includes an explanation of roles and expectations of various individuals and entities. It also includes a description of expectations for monitoring change over time in various metrics that can show whether the plan is functioning as intended. By specifying reporting expectations tied to the forests mission and goals (section 1.2), this monitoring will allow for adaptive management as new information is learned and conditions change over time.

4.1 Roles

As the designated managers of the forests, the OSU research forest staff will implement the 2025 Forest Plan to meet the goals and objectives described according to the guidelines stated herein. The research forest director, in conjunction with all other research forest staff, will be responsible for day-to-day decisions and operations. Ultimate responsibility for management of the McDonald-Dunn Forest will lie with the OSU College of Forestry dean, with advisement by a new entity, the *Research Forest Technical Advisory Committee.*

Research forest staff are expected to determine precisely how to implement harvest operations to meet forest goals, including short- and long-term financial needs, within the context of the management strategies assigned through the modeling process. Operational plans will be guided by the silvicultural framework (outlined in section 3.4.1). Exceptions to the management strategy designations can be recommended by research forest staff for consideration by the dean and *Research Forest Technical Advisory Committee*. A summary of exemptions from the plan, as described herein, made during any given year will be provided to the dean and *Research Forest Technical Advisory Committee* as part of the annual report on plan implementation and performance, and documented in a way that is publicly available.

The dean and *Research Forest Technical Advisory Committee* may appoint additional committees and task forces as needed, such as a *Forest Recreation Advisory Council* or an *Invasive Species Management Advisory Committee*, on an ongoing or ad hoc basis to assist in the analysis of management issues, to provide technical advice, and/or to collect input from forest users. It is also recommended that a *development team* is established and directed to meet annually to discuss the financial viability of the forest and to determine the suitability of various revenue generating options that align with the research forest vision, mission, and goals. Potential members of this team could be the College of Forestry dean, associate dean of outreach, associate dean of research, chief administrative officer, director of development, department head, research forest director, and an external partner.

At the time of the initiation of the writing of this plan, the research forest staff consisted of seven positions reflecting 6.5FTE (full-time equivalent positions). This includes a research forest director at 0.5FTE, and six positions at 1.0FTE: associate director of operations, inventory/GIS/reforestation manager, forest engineer, business manager, recreation and engagement manager, and recreation field coordinator. This is a reduction from an all-time high of 10 full-time staff positions shortly before implementation of the 2005 Forest Plan but up from a low of four staff shortly after the 2005 Forest Plan was suspended in 2009. Discussions with research forest staff in late 2023 surfaced priorities for additional positions to allow much needed attention to be given to invasive species management, reforestation, forest inventory, and youth outreach. To address these needs, priorities for additional positions, as budgets allow, will be a *Reforestation and Vegetation Manager* and an *Education and Outreach Coordinator.* As of Fall 2024, a creative approach was identified to add a half-time position focused on outreach and education, with salary at no cost to the forest. This position joined the staff in summer 2025. It is likely that a manager position focused on reforestation and vegetation management will be added in 2026. Options will be pursued to add more capacity to the team in the future, as funding allows.

Additional support will continue to be provided to the research forest through numerous positions within the College of Forestry. Support is provided by units such as business services, human resources, marketing and communications, as well as from the dean and associate deans.

4.2 Monitoring and Reporting

Regular monitoring once the 2025 Forest Plan is implemented will provide insight as to how well the McDonald-Dunn Forest is meeting the mission and goals prescribed for the OSU Research and Demonstration Forests (section 1.2). To support adaptive management,

objectives and associated indicators were crafted to align with the 10 goals. Repeated measurements of the metrics assigned to each indicator at regular time intervals will enable an assessment of trends over time to evaluate forest performance according to each mission. In essence, these trends will reveal whether adjustments are needed—enabling timely and informed course corrections through adaptive management.

To derive a monitoring plan, the 10 research forest goals were categorized according to the three missions, and then objectives and indicators were developed accordingly.

1. The first mission is "to create opportunities for education, research, and outreach to address the economic, social, and environmental values of current and future generations of Oregonians and beyond." Four objectives were crafted, each with 2-3 indicators that will be measured and reported over time (Table 5).
    - Provide a diverse array of high-quality outdoor learning opportunities for students from the College of Forestry, OSU, and other institutions of higher education.
    - Provide opportunities to conduct innovative research on emerging issues.
    - Provide a diversity of high-quality outdoor learning opportunities for a variety of audiences including natural resource professionals, neighbors, youth, recreational users, civic groups, and others.
    - Provide strategic and effective communication about the research forests.
2. The second mission is "to demonstrate how an actively and sustainably managed forest fosters economic prosperity, biodiversity conservation, and resilience amidst disturbances and global change." Six objectives were crafted, each with 1-5 indicators that will be measured and reported over time (Table 6).
    - Demonstrate examples of a variety of strategies and practices for managed forests in the region.
    - Demonstrate carbon accounting.
    - Demonstrate stewardship by meeting or exceeding all laws, except where research requires deviation from laws and rules, and exemption is obtained from appropriate regulatory agencies.
    - Demonstrate conservation by sustaining and restoring native species, their habitats, and ecosystem diversity.
    - Demonstrate long-term resistance and resilience to climate change and associated perturbations.
    - Ensure financial sustainability.
3. The third mission is "to support social and cultural values of forests, enhancing the wellbeing of local communities, Tribal communities, and society". Five objectives were crafted, each with 1-4 indicators that will be measured over time (Table 7).
    - Provide nature-based recreation desired by local users that minimizes negative impacts while aligning with forest goals.
    - Minimize conflicts between recreation users and others.
    - Engage the community with the research forest.
    - Protect Indigenous and non-indigenous cultural resources during forest management activities.
    - Develop and honor relationships and support partnerships between the college and the Tribal Nations of Oregon based on trust and mutual respect.
4. Lastly, two goals call for accountability and continuous improvement. One objective with three indicators were crafted to address these (Table 8).
    - Use the monitoring plan to adapt management direction and ensure transparency.

The periodicity of reporting each indictor, anticipated metrics, and responsible parties have been further outlined to guide research forest staff monitoring and reporting efforts (Tables 5-8).

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Table 5. *Monitoring expectations for the mission of providing education, research and outreach.*

1st Mission: Education, Research, and Outreach

Objectives	Indicators	Measurement	How often to report?	Who is responsible?	Current Goal(s)
1. Provide a diverse array of high-quality outdoor learning opportunities for students from CoF, OSU, and other institutions of higher education.	A. Amount of use of research forest by college students, faulty, and staff for research.	Summary of usage.	Annually	Research forest director	1, 3
	B. Amount of use of research forest by college classes for teaching.	Summary of usage.	Annually	Research forest director	1
	C. Type and number of requests for research forest staff to provide tours of forest operations for college classes.	Summary of requests received by research forest staff to provide class tours.	Annually	Research forest director	1
2. Provide opportunities to conduct innovative research on emerging issues.	A. Number of researchers' requests for establishment of new research and demonstration projects.	Summary of requests.	Annually	Research forest director	1, 3
	B. Number of new publications and number of citations of publications describing research done on research forests in academic and trade publications.	Summary of publications and citations compiled each year and archived in research database.	Annually	Associate dean of outreach	1, 3
	C. Proportion of active research sites on research forests that are disturbed or vandalized.	Research disturbance report and summary of protection measures.	Annually	Research forest director	1, 3
3. Provide a diversity of high-quality outdoor learning opportunities for a variety of audiences including natural resource professionals, neighbors, youth, recreational users, civic groups, and others.	A. Number of requests for public tours, including K-12 school groups.	Summary of requests.	Annually	Recreation manager	1, 7
	B. Number of research forest operations, research and demonstration plots featured in outreach events and tours conducted by OSU and others.	Summary of tours and events.	Annually	Research forest director & instructors	1, 3, 7
4. Provide strategic and effective communication about the research forest.	A. Amount of website, social media, and newsletter engagement.	Summary of digital and social media analytics.	Annually	Recreation manager	1, 7
	B. Uptake of hard copy materials.	Report on number of copies printed.	Annually	Recreation manager	1, 7

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Table 6a. *Monitoring expectations for the mission of demonstrating conservation, economic sustainability, and resilience.*

2nd Mission:
Demonstrate Conservation, Economic Sustainability, and Resilience

Objectives	Indicators	Measurement	How often to report?	Who is responsible?	Current Goal(s)
5. Demonstrate examples of a variety of strategies and practices for managed forests in the region.	A. Representative examples of management and restoration practices implemented for each of the 5 management strategies.	Summarize # of acres in each management strategy and each *ecosystem of concern*, along with a comparison of this acreage relative to acreage goals (allocation).	Annually	Research forest director & associate director of operations	2, 5, 9
	B. Degree to which harvest activity meets decadal harvest scheduling targets across all management strategies.	Summarize harvest type acres and volume by management strategy relative to the plan.	Annually	Associate director of operations	2, 5, 9
6. Demonstrate carbon accounting.	A. Estimates of above ground carbon stores for each of the 5 management strategies.	Estimate above ground carbon for each management strategy, using multiple approaches when feasible.	Every 5 years	Inventory manager & hired consultant	2, 5
7. Demonstrate stewardship by meeting or exceeding all laws, except where research requires deviation from laws and rules, and exemption is obtained from appropriate regulatory agencies.	A. Success in operational practices meeting or exceeding OFPA regulations including where research projects dictate testing an alternative approach.	Report of operations documenting # of acres where OFPA has been met, exceeded, or deviated from (to facilitate teaching, research, or demonstration).	Annually	Research forest director & associate director of operations	2, 5
	B. Research forest participation in statewide conservation initiatives.	Summary of the initiatives participated in.	Annually	Research forest director & associate director of operations	2, 5

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Table 6b. *Monitoring expectations for the mission of demonstrating conservation, economic sustainability, and resilience.*

2nd Mission:
Demonstrate Conservation, Economic Sustainability, and Resilience

Objectives	Indicators	Measurement	How often to report?	Who is responsible?	Current Goal(s)
8. Demonstrate conservation by sustaining and restoring native species, their habitats, and ecosystem diversity.	A. Occurrence of species of interest.	Status update for owls.	Annually	Research forest director & hired technical specialists	2, 5
		Status update for fish (SSBT).	Every 5 years		
		Status update for rare butterfly species.	Annually		
		Status update for open woodland/prairie plant species.	Every 5 years		
	B. Occurrence of indicator species.	Survey for birds using participatory science.	Annually	Associate dean of outreach, research forest director, & recreation manager	2, 5
		Survey for herpetofauna using participatory science.			
		Survey for fungi using participatory science.			
	C. Distribution of tree species, size, and structural forest characteristics.	Report on inventory measurements at a level sufficient to maintain stand-level descriptions.	3-5 years	Inventory manager	2, 5
	D. Distribution and quantity of legacy structures/character trees and standing dead wood in clearcut stands pre-harvest.	Report on # of leave tree per harvest unit.	Annually	Inventory manager & associate director of operations	2, 5
		Report inventory of snags.	Every 10 years		
	E. Invasive species status and mitigation activities.	Report new locations of invasive species and # of acres treated for invasive species control.	Annually	Reforestation manager	2, 5

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Table 6c. *Monitoring expectations for the mission of demonstrating conservation, economic sustainability, and resilience.*

2nd Mission:
Demonstrate Conservation, Economic Sustainability, and Resilience

Objectives	Indicators	Measurement	How often to report?	Who is responsible?	Current Goal(s)
9. Demonstrate long-term resistance and resilience to climate change and associated perturbations.	A. Use multiple knowledge systems to track forest resistance and resilience to changing climate.	Pair metrics from modeling effort in concert with Indigenous Knowledge.	Every 5 years	Research forest director	2, 4, 5
	B. Track changes in forest composition.	Report changes in species presence, coverage of plant associations, levels of tree mortality, and percentage of seedlings planted of each species.	Every 5 years	Research forest director & inventory manager	2, 4, 5
10. Ensure financial sustainability.	A. Compare all revenue relative to all costs.	Report all funds generated and expended.	Annually	Business manager	2, 5, 8, 9
	B. Financial reserve account status.	Report amount of funds in fiscal reserves to ensure continued forest operations during lean years.	Annually	Business manager	2, 5, 8, 9
	C. Diversity of sources of financial support for the forests.	Summary of grants, donations, in-kind support, and other supplemental funding.	Annually	All research forest staff	2, 5, 8, 9

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Table 7a. *Monitoring expectations for the mission of providing social support and cultural values.*

3rd Mission: Support Social and Cultural Values of Forests

Objectives	Indicators	Measurement	How often to report?	Who is responsible?	Current Goal(s)
11. Provide nature-based recreation desired by local users that minimizes negative impacts while aligning with forest goals.	A. Estimated number of recreation visits within major categories of use.	Summary of surveys.	Every 5 years	Recreation manager & student	6, 7
	B. Satisfaction of visitors with recreation opportunities.	Summary of surveys.	Every 5 years	Recreation manager & student	6, 7
	C. Authorized and unauthorized trails.	Report # of miles of each trail type.	Every 5 years	Recreation manager or field coordinator	6, 7
12. Minimize conflicts between recreation users and others.	A. Number, type, and location of conflicts.	Compile summary.	Annually	Recreation manager	6, 7
13. Engage the community with the research forest.	A. Communication with the community.	Report # of subscribers to the newsletter, website traffic, and social media engagement.	Annually	Recreation manager	6, 7
	B. Knowledge gained by research forest visitors from informational kiosks.	Summary of visitor survey.	Every 5 years	Recreation manager, professor, & student	1, 7
	C. Understanding by neighbors of research forest management policies.	Summary of surveys.	Every 5 years	Recreation manager & student	7
	D. Volunteer efforts on the research forests.	Report on # of volunteer hours and value of time invested.	Annually	Volunteer coordinator	6, 7

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Table 7b. *Monitoring expectations for the mission of providing social support and cultural values.*

3rd Mission: Support Social and Cultural Values of Forests

Objectives	Indicators	Measurement	How often to report?	Who is responsible?	Current Goal(s)
14. Protect Indigenous and non-indigenous cultural resources during forest management activities.	A. Continue to identify and protect cultural resources prior to ground-disturbing activities.	Report on protection measures for cultural resources before disturbance.	Annually	Associate director of operations	5, 7
15. Develop and honor relationships and support partnerships between the college and federally recognized Kalapuyan Tribes based on trust and mutual respect.	A. Development of adaptive co-stewardship partnerships with Kalapuyan Tribes in earliest stages of revisions to research forest management plans that include formulation of co-stewardship goals and objectives for ecocultural resources.	Status update, including progress on fulfillment of MOU goals.	Annually	Research forest director & dean with Tribes	2, 7
	B. Development of Memoranda of Understanding (MOU) with Kalapuyan Tribes that cover partnership activities in protecting and enhancing Tribal ecocultural sites on research forests. Specific goals to be specified in the MOU.	Status update, including progress on fulfillment of MOU goals.	Annually	Research forest director & dean with Tribes	2, 7
	C. Co-implementation of the MOU with Kalapuyan Tribes and modification as necessary, with adjustments made as requested by Tribal partners, in keeping with adaptive co-stewardship practices.	Status update, including progress on fulfillment of MOU goals.	Annually	Research forest director & dean with Tribes	2, 7
	D. Discussion of annual operations—previous year accomplishments and coming year plans— and ideas to improve ecocultural resource stewardship with the research forest staff and the appropriate Tribal staff.	Arrange meeting to report on activities such as cultural burning and ecocultural restoration.	Annually	Research forest director & dean with Tribes	6, 7

Table 8. *Monitoring expectations for the goals of ensuring accountability and continuous improvement.*

Spanning All Missions: Underpinnings of Accountability and Continuous Improvement

Objectives	Indicators	Measurement	How often to report?	Who is responsible?	Current Goal(s)
16. Use the monitoring plan to adapt management direction and ensure transparency.	A. Form a *Research Forest Technical Advisory Committee* comprised of OSU faculty and staff to advise the dean on decisions regarding plan exceptions and amendments.	Meet at least annually, and as often as needed in addition to advise the dean on plan exceptions and amendments.	Annually	Dean	2, 5, 8, 9, 10
	B. Form a *Development Team* to assess the forest's financial viability and evaluate potential revenue-generating options that align with the research forest vision, mission, and goals.	Provide recommendations to the dean.	Annually	Dean	2, 5, 8, 9, 10
	C. Develop a new projection of current and future forest conditions using the model developed during 2024.	Report whether projections made in 2024 remain accurate, and if not, provide fresh updates.	Every 5-10 years	Inventory manager and external consultant	2, 5, 8, 9, 10
	D. Convene a team external to the College of Forestry with relevant expertise to provide an external review.	Evaluate whether the forest plan and associated monitoring efforts are functioning well.	Every 10 years	Dean	2, 5, 8, 9, 10

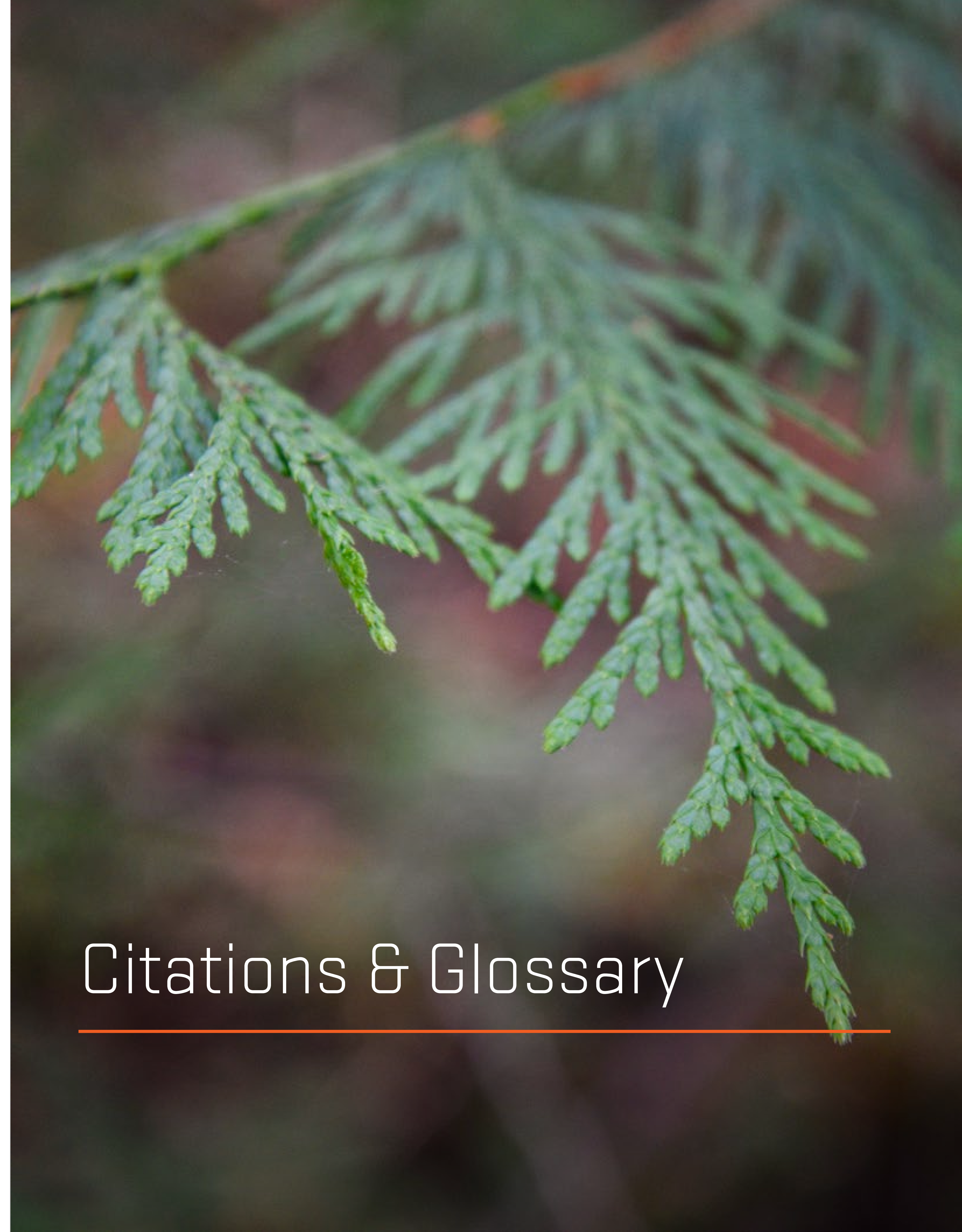
4.3 Adaptive Management to Enable Continuous Improvement

It is recognized that the forest plan is likely to change over time in response to unanticipated factors. The plan was purposefully developed with an adaptive management framework to allow for such changes. It is anticipated that performance under the plan will be summarized annually by the research forest staff for the dean and the *Research Forest Technical Advisory Committee*, using the indicators described, as well as new technological approaches if suitable options become available. The annual report will include performance during the evaluation period, problems encountered, exceptions to the guidelines, and a plan for the upcoming year that identifies adaptive management actions. This summary will be made publicly available.

One final monitoring objective calls for use of the monitoring plan to adapt management direction and ensure transparency (Table 5). This will be accomplished through four steps:

- The *Research Forest Technical Advisory Committee* will meet as often as needed to advise the dean on decisions regarding plan exceptions and amendments.
- A *Development Team* will meet annually to assess the forest's financial viability and evaluate potential revenue-generating options that align with the research forest vision, mission, and goals.
- Every 5-10 years following plan implementation, a new projection of current and future forest conditions will be developed using the model developed during 2024, and a report will be created to describe whether projections made in 2024 remain accurate. If past projections are no longer accurate, develop a new model to project future conditions.
- Every 10 years, a team of individuals external to the College of Forestry with relevant expertise—a collection of specialists from agencies, industry, organizations, and other universities—will conduct an external review of research forest performance during the prior decade.

Adaptive management will only be possible if monitoring, recordkeeping, and inventory efforts are properly funded. Successful implementation of this plan hinges on research forest budgeting accounting for the time and effort needed to collect the data that will show when adaptive management is needed.



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Glossary

Climate Adaptation – An approach that positions forests and their associated benefits to become more resistant and resilient to uncertain future conditions.

Climate Mitigation – Approaches whereby forests and resultant forest products are used to mitigate climate change, such as through carbon sequestration, forest biomass used to provide renewable energy, and where greenhouse gas emissions are avoided through complementary product substitution.

Cultural Burning – The Indigenous practice of intentionally lighting small, controlled fires to achieve desired cultural goals, such as promoting the health of vegetation and wildlife that provide food, clothing, and ceremonial items.

Cultural Keystone Species – A species that is central to a culture's identity and is reflected in their language, traditions, diet, and other cultural practices.

Decolonization – Reversing the erasure of Indigenous languages, culture, beliefs, and resource stewardship practices; pernicious institutional structures; deep ecological degradation; and intergenerational human trauma created by settler colonialism.

Ecocultural Restoration – A holistic restoration approach that incorporates Indigenous Knowledge with Western Science/Scientific Knowledge.

Forestry Executive Committee – A group of faculty, staff, students, and administrators from the College of Forestry that provides the dean with diverse perspectives on the administration and management of the college. It is comprised of 25 individuals.

Invasive Species – A non-native organism that can cause harm to the environment, economy, or human health.

Habitat – the natural environment, including physical and biotic factors, where an organism lives and has the resources it needs to survive and reproduce. Habitat is species specific.

Harvest Scheduling – the application of a computer model to determine the schedule of harvesting of forest stands to achieve specified targets.

Historical Range of Variability (HRV) – The natural range of ecosystem conditions and natural disturbances to which species have adapted in a given system.

Indicator Species – Species that have a relatively narrow range of adaptability to the environmental conditions in their system, and therefore their presence often provides information about the environmental conditions of a system.

Indigenous Knowledge – A body of observations, oral and written knowledge, innovations, technologies, practices, and beliefs developed by Indigenous Peoples through interaction and experience with the environment. It encompasses Traditional Ecological Knowledge and Indigenous Ecological Knowledge.

Keystone Species – Species whose activities provide benefit and necessary habitat requirements to other species in a given system.

Legacy tree – Individual trees purposefully selected to be retained during harvest operations to provide important ecological benefits to subsequent stands.

Morrill Acts of 1862 and 1890 – Acts that granted federally controlled lands to states to support the creation of institutes of higher learning referred to as **land-grant institutions.**

Open grown – Grown in open conditions with limited competition from other nearby trees, which often results in trees with full crowns and large limbs growing further down the main trunk of the tree relative to trees grown under more dense forest conditions.

Oregon Forest Practices Act – An act that sets standards for all commercial activities involving the establishment, management, or harvesting of trees on Oregon's non-federal forestlands, first passed in 1971 and updated many times since.

Participatory Science – similar to Community Science or Citizen Science, this is an approach to conducting research that pairs community members in collaboration with researchers to collect data and leverage local knowledge.

Prescribed Burning – the intentional, controlled application of fire under specified weather conditions to achieve specific management objectives, such as restoring health to ecosystems that depend on fire.

Reciprocity – Taking with the moral responsibility of giving back in equal measure.

Research Forest Advisory Committee – A group of faculty members convened by Dean Tom DeLuca in 2021 to create the vision, mission, and goals of the research and demonstration forests managed by the College of Forestry.

Research Forest Technical Advisory Committee – A new entity recommended by the *Faculty Planning Committee* to advise the dean on decisions regarding plan exceptions and amendments. This entity would prevent the need for individuals on the Forestry Executive Committee without forest management expertise from making decisions on these matters.

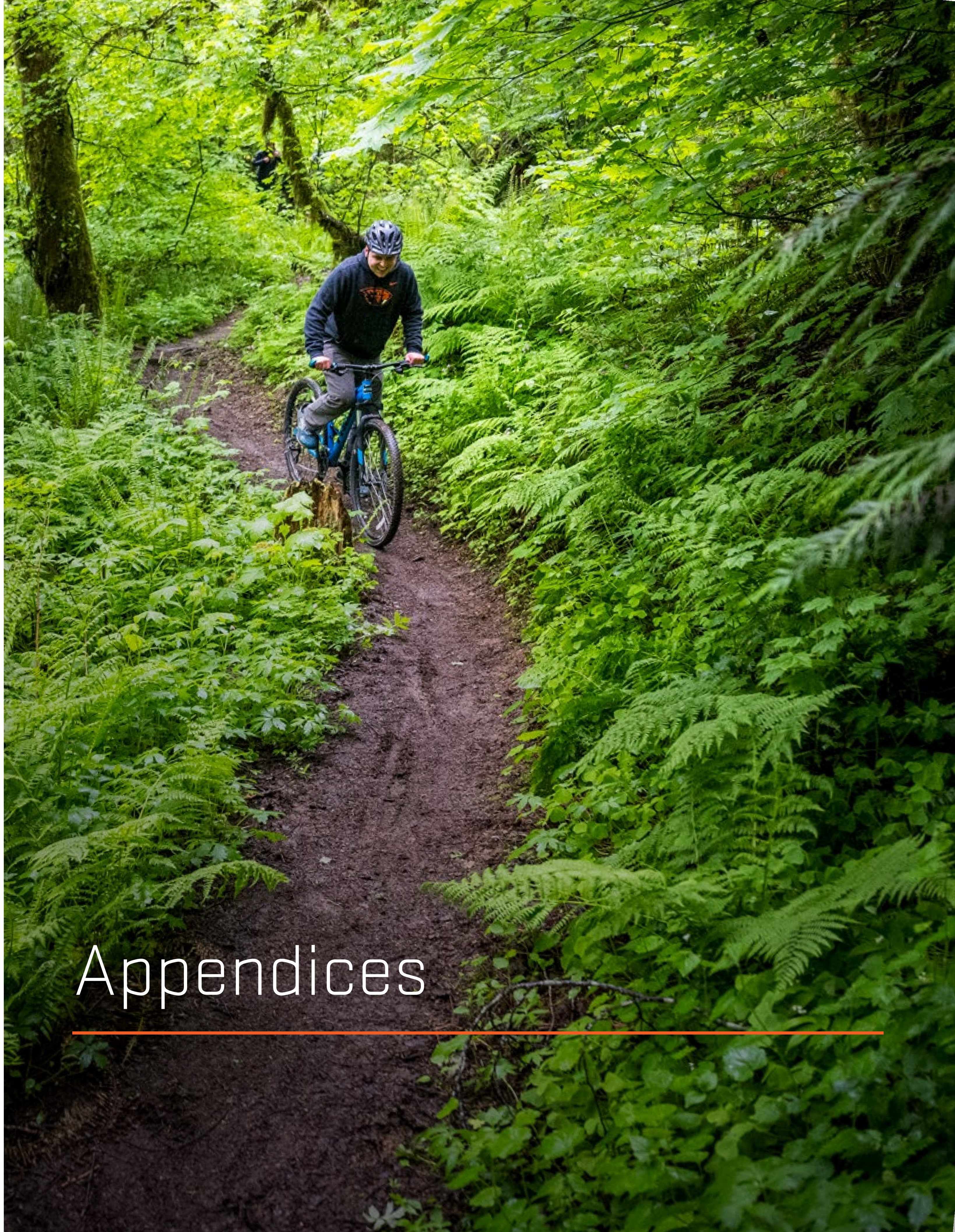
Settler Colonialism – The act of a settler society stealing the land of an Indigenous population and erasing its culture, using power and authority to develop or exploit the colonized to benefit the colonizers, involving modernizing and/or destroying colonies by force, including genocide.

Tribal Sovereignty – The right of Indigenous Peoples to Self-Governance and Self-Determination.

Visitor Use – The term 'visitor use' may be used instead of 'recreation' throughout this plan when describing the full range of public access to the forest. The term 'recreation' encompasses sanctioned activities in the McDonald-Dunn such as running, hiking, mountain biking, dog walking, nature viewing and birding, horseback riding, and hunting. Yet there are many other ways in which the public engages with the forest that may not fit within the recreation definition umbrella; these activities may include school field trips, educational trainings, research projects, interpretive tours, and public events. The term 'visitor use' is used to fully capture this broad range of public engagement on the McDonald-Dunn, including recreation.

Western Science/Scientific Knowledge – An inquiry system shaped by Aristotelian logic, and hypothesis testing, characterized by studies that strive to be value-free (unbiased, amoral) and ideally use systematic, replicated experimentation conducted in isolation, accurate measurements, and empirical tests, which lead to predictive, generalizable statistical models that have credibility and legitimacy.

Wildland-urban interface (WUI) – This is the area where structures and other human development intermingle with wildland vegetation and/or where housing is in the vicinity of a natural area.



Appendices

Appendix A. Timeline of Process used to Develop the 2025 Forest Plan

Stakeholder Advisory Committee (SAC): This committee engaged a broad and diverse array of voices and perspectives in the planning process. The primary role of the SAC was to provide recommendations regarding the balance of forest uses, values and management practices and help to ensure that broader stakeholder and public input was understood and reflected. SAC members were requested to share concerns and aspirations regarding the management of the forests to contribute to community expectations being understood by College of Forestry leaders and reflected in the alternative scenarios developed and evaluated during the management planning process. The SAC was not a decision-making body; they worked in tandem with the FPC to inform the development of a new management plan that was ultimately reviewed and approved by the College of Forestry Executive Committee and dean.

- May 20, 2025, SAC and FPC Joint Final Meeting
- Oct. 24, 2024, SAC Meeting
- Sept 25, 2024, SAC Meeting
- June 3, 2024, SAC Meeting
- Jan. 30, 2024, SAC Meeting
- Apr. 13, 2023, SAC Meeting
- Mar. 27, 2023, SAC and FPC Joint Field Tour
- Mar. 1, 2023, SAC Meeting
- Feb. 25, 2023, SAC and FPC Joint Field Tour
- Jan. 18, 2023, SAC Meeting
- Dec. 13, 2022, SAC Meeting
- Dec. 5, 2022, SAC Meeting
- Sept. 20, 2022, SAC Meeting
- Aug 30, 2022, SAC Meeting
- June 14, 2022, SAC and FPC Joint Kickoff Meeting

Faculty Planning Committee (FPC): This committee provided technical input related to the forest management plan. Members helped develop the new draft plan, independently assess modeled management scenarios, reviewed various portions of the draft plan, helped contribute to public input being evaluated and considered in the forest management planning process, and provided input on the implementation approach and communication strategies for long-term engagement and accountability.

- May 20, 2025, SAC and FPC Joint Final Meeting
- Nov. 19, 2024, FPC Meeting
- Nov. 4, 2024, FPC Meeting
- Oct. 18, 2024, FPC Meeting
- Oct. 3, 2024, FPC Meeting
- Sept 16, 2024, FPC Meeting
- May 30, 2024, FPC Meeting
- Feb. 22, 2024, FPC Meeting
- Jan. 25, 2024, FPC Meeting
- Dec. 12, 2023, FPC meeting
- Nov. 28, 2023, FPC meeting
- Nov. 14, 2023, FPC meeting
- Oct. 31, 2023, FPC meeting
- Oct. 17, 2023, FPC meeting
- June 12, 2023, FPC Meeting
- May 1, 2023, FPC Meeting
- Apr. 17, 2023, FPC Meeting
- Mar. 27, 2023, SAC and FPC Joint Field Tour
- Mar. 20, 2023, FPC Meeting
- Mar. 6, 2023, FPC Meeting
- Feb. 25, 2023, SAC and FPC Joint Field Tour
- Feb. 20, 2023, FPC Meeting
- Feb. 6, 2023, FPC Meeting
- Jan. 23, 2023, FPC Meeting
- Dec. 20, 2022, FPC Meeting
- Dec. 6, 2022, FPC Meeting
- Nov. 22, 2022, FPC Meeting
- Oct. 25, 2022, FPC Meeting
- Oct. 11, 2022, FPC Meeting
- Sept. 16, 2022, FPC Meeting
- June 14, 2022, SAC and FPC Joint Kickoff Meeting

Community Input and Community Listening Sessions

- Oct. 28, 2024, Community Input Session
- June 5, 2024, Community Input Session
- Mar. 21 & 22, 2023, Academic User Listening Sessions (open forums)
- Nov. 7, 2022, Community Listening Session
- Aug. 31, 2022, Community Listening Session

Appendix B: Overarching Principles Guiding the 2025 Forest Plan

Each principle described below reflects the Vision/Mission/Goals identified for the OSU Research and Demonstration Forests plus input received during the development of the McDonald-Dunn Forest Plan from the *Stakeholder Advisory Committee* (SAC), *Faculty planning Committee* (FPC), or the general public between June 2022 and January 2023. Each principle is written so as to provide overarching suggestions for the management of the McDonald-Dunn Forest in the context of the three missions of the OSU Research and Demonstration Forests.

Foundational Premises

- **Operate as an actively managed forest that advances the forestry profession by informing best practices in all aspects of forest management.** The McDonald-Dunn Research Forest (hereafter "forest") is a working forest that provides opportunities for research, teaching, and outreach while providing social and cultural benefits to a variety of users including the College of Forestry, Oregon State University, and the surrounding community.
- **Serve as a demonstration forest that provides diverse research and learning opportunities for students and the public, while being open for public use.** The forest will provide learning opportunities on all aspects of active forest management, demonstrating principles associated with sustainably managing forests for multiple values. The forest will also provide a wide variety of use values to the public.
- **Be adaptive and accountable.** Feasible monitoring expectations will be built into the management plan to enable adaptive management. The plan will incorporate enough flexibility to allow for adjustments over time in response to unforeseen opportunities, constraints, and disturbances as well as new information produced on the research forests and elsewhere.

Create Learning Opportunities

- **Provide opportunities to conduct innovative research on emerging issues.** The forest will be managed so as to create opportunities to conduct research on the role that managed forests can play in the production of and trade-off between a wide variety of ecosystem services, from the genetic to the ecosystem to the social scale.
- **Utilize creative approaches to monitor trends over time.** Inventory and monitoring efforts will seek to incorporate opportunities to pair traditional inventory and monitoring approaches with emerging technology to ensure accuracy and cost-efficiency, while also creating opportunities for research and education.
- **Foster public awareness and understanding of sustainable forest management.** Interpretation of management and research actions, coupled with outreach on the forest, will seek to promote broader understanding and awareness of the role of actively managed forests to produce and support resilient ecosystems, forest products, and healthy communities.
- **Demonstrate elements of Traditional Ecological Knowledge in management, research, outreach, and educational efforts on the forest.** Through partnerships with local Tribal Governments, the forest will integrate and highlight Traditional Ecological Knowledge.
- **Expand communications about the research forests.** Forest staff will improve documentation of past and present management actions, research projects and outcomes, and planned activities. They will also broaden communication efforts within and outside the academic community in order to foster collaborative and inclusive teaching, research, and outreach.

Illustrate Economic Sustainability

- **Be financially self-sustaining.** The plan will incorporate means to generate revenue to support ongoing forest management, including research, teaching, and outreach associated with the forest. Additional funding will be sought for special projects and opportunities.
- **Account for staffing needs.** The personnel required to maintain the research forests as well as associated infrastructure, outreach and communication efforts, must be accurately incorporated when estimating long-term revenue generation needs.
- **Be nimble.** The management plan must incorporate a degree of flexibility that allows it to withstand unanticipated changes such as climate change and associated disturbances, market fluctuations, and modifications to regulations.
- **Ensure environmental sustainability when planning timber harvest long-term.** Harvest activities must not

cause degradation in forest health and sustainability over time and must be consistent with the need to provide research and learning opportunities.

Exhibit Environmental Sustainability

- **Protect and enhance at-risk species and their habitats.** Research and monitoring will be undertaken to improve knowledge on the status of biodiversity, including at-risk species and the ecological communities upon which they depend. Management activities will be adjusted according to new knowledge and adaptive silvicultural practices.
- **Restore ecological communities in poor health.** Active restoration efforts will take place in ecological communities in need of management. This will include oak woodlands, prairies and meadows, and aquatic ecosystems.
- **Ensure forest structural and compositional diversity.** Management of the forest will, on the whole, foster variability in forest stand conditions ranging in age from early seral to late-successional forest, and varying in structure from simple to complex in order to provide habitat/ecosystems for a variety of species while also providing a variety of learning opportunities. Ecological patterns and processes, as well as research opportunities, will be considered when planning the spatial arrangement of stand conditions.
- **Actively manage threats to ecological integrity.** Threats such as climate change and invasive species will be actively managed and mitigated as appropriate. Expenses associated with management and mitigation of these threats will be incorporated into budget planning.

Nurture Social Sustainability and Cultural Values

- **Ensure public access to the forests.** The forest will remain accessible to the public for a variety of uses from multiple established entry points, but not all places at all times (e.g., safety restrictions, or research or management activities).
- **Foster community connections.** The College of Forestry will seek to nurture social sustainability by creating jobs, forest products, and opportunities for engagement with the forest-user community through such avenues as community science, research, and monitoring efforts.
- **Enhance connections with cultural resources.** Efforts will be made to communicate and engage with individuals who have connections to cultural resources to provide opportunities for involvement in the survey, research, and management of these resources.

Foster Recreation Opportunities

- **Promote research guided recreation use that minimizes impacts to ecosystems, management, and research.** Public use of the forest will be supported and managed for recreation opportunities consistent with the management plans (forest management plan and visitor use plan). The aim will be to ensure public safety without compromising ongoing management activities and research.
- **Support high quality and diverse recreational experiences.** The forest will seek to provide a range of user experiences within the context of an actively managed forest. Research-guided recreational planning will be inclusive of and balance different types of recreational users; it will seek to enhance experience integrity throughout the forest and minimize potential conflict between users.
- **Conduct research and outreach on sustainable recreational use.** The forest will support research on recreation with the goal of advancing scientific knowledge and informing policies and solutions to recreation management challenges.

[developed December 2022 – January 2023]

Appendix C. Cultural Resource Protection Protocol

Archaeological sites are acknowledged to be a finite, irreplaceable and nonrenewable cultural resource, and are an intrinsic part of the cultural heritage of the people of Oregon and Oregon State University. As such, archeological sites and their contents located on Oregon State University Research Forests are under the stewardship of the people of Oregon to be protected and managed in perpetuity by the state as a public trust.

The State of Oregon shall preserve and protect the cultural heritage of this state embodied in objects and sites that are of archaeological significance, according to ORS 358.910 Policy

Purpose

The Oregon State University Research Forests lie in the ancestral homelands of the Kalapuya. These forests contain valuable archeological and culturally significant plant population sites that are critical to the cultural heritage of Oregon and its residents. The College of Forestry recognizes the historic and cultural significance of these resources and are committed to their protection and preservation, in keeping with Tribal Sovereignty Rights and Treaty Reserved rights.

While the archaeological history in Oregon is extensive, the written history spans only the last two centuries. Prior to that time, the only historic records are archaeological. If this early history is to be understood and appreciated, sites must be identified and protected.

The archaeological record also contains more recent records, those within the written history of Oregon. Historical records by their nature seldom contain the full breadth of information needed to recover specifics of a time or place. Details are often only available from the archaeological record for specifics. The history of Oregon is contained in both the unwritten as well as the written archaeological records.

The importance of these resources is reflected in the protection afforded them in state and federal laws:

- The National Historic Preservation Act of 1966, as amended
- The National Environmental Protection Act of 1969
- The Archeological and Historic Protection Act of 1974
- The Archeological Resources Protection Act of 1979
- The Native American Graves Protection and Repatriation Act
- ORS 97.740 et seq. Indian Graves and Protected Objects
- ORS 358.905 et seq. Archaeological Objects and Sites
- ORS 390.235 et. seq. Archaeological Sites and Historical Materials

These laws provide the foundation for our commitment for management of archeological resources on the research forests.

Definitions

An **Archaeological Object** is (1) at least 75 years old, (2) part of the physical record of an Indigenous or other culture found in the state or waters of the state, and (3) material remains of past human life or activity that are of archaeological significance including, but not limited to, monuments, symbols, tools, facilities, technological by-products and dietary by-products. ORS 358.905 (a)

An **Archaeological Site** means a geographic locality in Oregon, including but not limited to submerged and submersible lands and the bed of the sea within the state's jurisdiction, that contains archaeological objects and the contextual associations of the archaeological objects with each other or biotic or geological remains or deposits. ORS 358.905 (c) (A)

Burial means any natural or prepared physical location whether originally below, on or above the surface of the earth, into which, as a part of a death rite or death ceremony of a culture, human remains were deposited. ORS 358.905 (e)

A **Culturally Significant Plant** refers to a plant species that holds deep cultural, spiritual, economic, and/or social importance to a specific community or group. These plants are often used for food, medicine, ceremonies, or crafting material.

Funerary Objects mean any artifacts or objects that, as part of a death rite or ceremony of a culture, are reasonably believed to have been placed with individual human remains either at the time of death or later. ORS 358.905 (f)

Ground Disturbing Activity is a disturbance to the soil such that an archaeological object could be damaged or the contextual integrity of an archaeological site compromised.

Human Remains means the physical remains of a human body, including, but not limited to, bones, teeth, hair, ashes or mummified or otherwise preserved soft tissues of an individual. ORS 358.905 (g)

Object of Cultural Patrimony means an object having ongoing historical, traditional or cultural importance central to the native Indian group or culture itself, rather than property owned by an individual native Indian, and which, therefore, cannot be alienated, appropriated or conveyed by an individual regardless of whether or not the individual is a member of the Indian tribe. The object shall have been considered inalienable by the native Indian group at the time the object was separated from such group but does not mean unassociated arrowheads, baskets or stone tools or portions of arrowheads, baskets or stone tools. Paraphrased from ORS 358.905 (h)

Qualified Archaeologist means a person who has a post-graduate degree in archaeology, anthropology, history, classics or other germane disciple with a specialization in archaeology, or documented equivalence of such a degree, twelve weeks of supervised experience in basic archaeological field research, including both survey and excavation and four weeks of laboratory analysis or curating, and has designed and executed an archaeological study, as evidenced by a Master of Arts or Master of Science theses, or report equivalent in scope and quality, dealing with archaeological field research. ORS 390.235 (b)

Sacred Object means an archaeological object or other object that is demonstrably revered by any ethic group, religious group or Indian Tribe as holy, is used in connection with the religious or spiritual service or worship of a deity or spirit power or was or is needed by traditional native Indian religious leaders for the practice of traditional native Indian religion. ORS 359.905 (k)

A **Site of Archaeological Significance** is an archaeological site on or eligible for inclusion on the National Register of Historic Places as determined in writing by the State Historic Preservation Officer or determined significant in writing by an Indian Tribe. ORS 358.905 (b)

Background

This protocol is established to ensure, within the limits of practical sampling designs, that sites of potential archaeological significance are identified and protected until surveyed to determine archaeological significance.

Implementation

The research forests will collaborate with the Oregon Tribes and the State Historic Preservation Office (SHPO) to survey identified areas of the research forests prior to ground-disturbing activities. With these surveys completed, a report will be generated, submitted to the SHPO and consultation with the Tribes will be sought if culturally significant objects are found.

The SHPO maintains a comprehensive statewide inventory of known cultural resource sites. SHPO is also a source of information and education on cultural resources management and can provide technical advice for conducting surveys and recording site information.

The research forests will work with the Tribes in a spirit consistent with Executive Order -96-30 and all faculty will be directed to contact the research forest associate director of operations prior to engaging in ground-disturbing activities.

Policy

The intent of cultural resource management on the OSU Research Forests is to become a model of cultural resource management that others will emulate. Through an active cultural resource program spanning almost 20 years on the research forests, the entire McDonald-Dunn Forest has been surveyed and areas of significance have been identified and are protected.

The research forests associate director of operations, in consultation with the research forest director, is responsible for the management of cultural resources on the research forests.

A ground survey conducted by a qualified archaeologist is required prior to any ground disturbing activities. The research forests will contract with a qualified archaeologist to conduct field surveys prior to ground disturbing activities but that does not relieve all field crews of their responsibility to be mindful and watchful for archaeological sites. A qualified archaeologist will use a predictive map as a guide to identify areas with a high probability of encountering a cultural resource. For ground disturbing activities within areas identified as having a high probability of containing archaeological objects or sites, the intensity of the survey will increase while in areas with a lower probability, the intensity of the surveys will decrease.

When an archaeological object is found on the forest, the research forest policy is to leave the object in place until the possibility of a contextual association can be determined. This policy pertains to pre-disturbance activities, objects found during ground disturbing activities or after the conclusion of ground disturbing activities.

Findings of any archaeological object or suspected culturally significant plant should be reported to the associate director of operations. No excavation or alteration of sites with archaeological objects is permitted (ORS 358.920) unless by a qualified archaeologist after obtaining a permit through the SHPO (ORS 390.235).

Appropriate language will be included in contracts to require contractors engaged in ground disturbing activities to stop ground disturbing activities if newly discovered cultural artifacts are located, and report their findings to the contracting officer representative immediately.

It is the responsibility of research forest staff, temporary employees and contractors to be mindful of discovering archaeological objects or sites, to respect and protect the possible integrity of the site and to immediately report findings.

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Appendix D. Guidelines for the Implementation of each 'Management Strategy'

Table D.1, 2. *Guiding principles (1) and overview (2) for each new 'Management Strategy'*

	Even-aged, short rotation	Even-aged, long rotation	Multi-aged, multi-species	Late-successional forest	Ecosystems of concern
Guiding principles	Manage in a way that creates learning and research opportunities about short-rotation forestry and early seral conditions, enabling rapid transition to alternative genetic seed sources or species.	Manage in a way that creates learning and research opportunities about long-rotation forestry and retention of legacy elements throughout the life of each stand, informed by both Indigenous Knowledge and Western science.	Manage in a way that creates learning and research opportunities about managing multi-aged and/or multi-species stands through creation of small openings and low levels of disturbance, informed by both Indigenous Knowledge and Western science.	Manage in a way that ensures learning and research opportunities about the creation and maintenance of late-seral forest conditions, informed by both Indigenous Knowledge and Western science.	Manage in a way that creates learning and research opportunities about a range of restoration opportunities and intensities to improve and maintain the health and resiliency of selected ecosystems, informed by both Indigenous Knowledge and Western science.
Overview	Even-aged plantations of Douglas-fir (or other climatic-appropriate species and genetic stock) will be established and managed to be financially competitive by producing high yields of wood products valuable for domestic mills. Clearcut harvests will not exceed 80 acres (with limited exceptions due to large-scale disturbances).	Even-aged forests of Douglas-fir (or other climatic-appropriate species and genetic stock) will be established and managed to provide older forest conditions and produce high-quality wood for domestic mills. Clearcut harvests will not exceed 40 acres (with limited exceptions due to large-scale disturbances).	Multi-aged, mixed-species forests of primarily Douglas-fir will be established and managed using **shelterwood-with-residuals, group-selection,** and **variable retention** regeneration harvests to create heterogeneity in openings, regenerate new age classes of trees, and maintain structural diversity for a variety of values. Multiple native tree species will be encouraged. Cumulative acres of regenerative openings generally will not exceed 40 acres in total.	Existing mature stands will be managed using only a light touch when needed to maintain historical older-forest structural and compositional diversity, manage invasive species and fuel loads, and provide for public safety. Forest succession and developmental processes following natural disturbances will proceed with little human intervention. Younger stands newly added to this management strategy may need more active operations to promote the development of older forest conditions.	Restoration and maintenance activities will be undertaken in **native oak savanna/woodlands, prairies,** and **riparian/aquatic systems.** Two strategies will be employed: • retain and conserve the most at-risk and highest value components of ecological and cultural diversity, and • use intensive efforts where needed to improve and restore broader ecological and/or cultural functions at specific sites.

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Table D.3. *Guidelines for stand establishment phase for each new 'Management Strategy'.*

	Even-aged, short rotation	Even-aged, long rotation	Multi-aged, multi-species	Late-successional forest	Ecosystems of concern
Stand establishment	Employs intensive site preparation following industry standards (prescribed fire and vegetation control) for ease of planting and early stand establishment. Planted seedlings will be from the best genetically selected material available for timber production but will also consider genetic seed sources adapted to a changing climate. Planting densities will be sufficient to meet the Oregon Forest Practices Act (OFPA) and will be selected with the intent to avoid the need for precommercial thinning (PCT), but PCT would be allowed if warranted. Spacing will be approximately uniform. Competing vegetation will be managed to increase seedling survival and tree growth until trees are free-to-grow (typically 6 years or less), and then competing vegetation will be allowed to grow. A minor component (minimum of ~5% cover) of hardwood trees and/or resprouts will be identified and purposely left free to grow in the understory throughout the rotation.	Employs adequate site preparation to plant and establish a stocked young stand. Planted seedlings will be from the best genetically selected material available for timber production but will also consider genetic seed sources adapted to a changing climate with an eye to longer rotations. Initial stocking rates will be appropriate for the site conditions with enough established trees to accommodate multiple commercial thinning harvests within the rotation, with the intent to avoid PCT but allowing it if warranted. Spacing can be variable and appropriate to the site. Competing vegetation will be managed to increase seedling survival and growth until trees are free-to-grow (typically 6 years or less), and then competing vegetation will be free to grow. A modest component (minimum of ~10% cover) of hardwood trees and/or resprouts will be identified and purposely left free to grow in the understory throughout the rotation.	A combination of pile burning, broadcast burning, and limited herbicide treatments will be used for site preparation in understory and/or small openings. Seedlings will be planted to augment natural regeneration of conifers from seed and hardwoods from both sprouts and seed, with an eye to species richness and genetic variability. **Shelterwood with residuals** will maintain an appropriate overstory density to allow understory trees to grow. Overstory trees may be spaced uniformly or variably, dictated by site, stand, and windthrow risk conditions. **Group-selection** harvests will contain small (1.5-4.0 acre) openings. **Variable retention** regeneration harvests will retain individual trees, clumps of thinned and unthinned trees, and/or no-touch areas that are dictated by site, stand, and windthrow risk conditions.	Typically, stands will regenerate continuously on their own from natural seeding. Active conifer and hardwood regeneration efforts may occur in areas subjected to large-scale disturbances (e.g., windstorms, ice storms, or wildfires), or when younger stands are added to this management strategy. Invasive vegetation will be managed with judicious use of herbicides and alternative measures when necessary to ensure establishment and growth of tree seedlings and culturally significant species.	**Oak savanna/woodlands** – in areas designated to receive intensive restoration treatment, oaks may be purposefully established through seed or seedlings at appropriate densities along with other native and culturally significant vegetation that historically occurred in these ecosystems. Site preparation with prescribed fire and/or judicious herbicide use may be required. **Prairies** – may require site preparation with prescribed fire and/or judicious herbicide use and seeding of other appropriate native herbaceous vegetation. **Riparian systems** - in areas designated to receive small-scale restoration treatment, limited harvests will occur with site preparation and planting at appropriate densities along with other native vegetation that historically occurred in these ecosystems. There may be judicious use of herbicides as needed.

Table D.4. *Guidelines for intermediate treatments for each new 'Management Strategy'.*

	Even-aged, short rotation	Even-aged, long rotation	Multi-aged, multi-species	Late-successional forest	Ecosystems of concern
Intermediate stand treatments	Thinning and other intermediate stand treatments will only be done if justifiable economically or if needed to respond to an unplanned disturbance event to maintain the health of the stand. ~5% cover of hardwoods will be retained during thinning treatments to provide habitat diversity.	The first commercial thinning will occur as dictated by stand conditions, likely around 28-34 years of age. Additional commercial thinning entries will be done until final harvest using a variety of thinning approaches. The last thinning will occur no later than 10-15 years before final harvest. ~10% cover of hardwoods will be retained during thinning treatments to provide habitat diversity.	**Shelterwood-with-residuals** - understory trees may be commercially thinned when needed (likely 35-50 years of age) depending on the overstory density. If overstory trees die, replacement trees may be assigned from the understory cohort to maintain the two-storied canopy structure over time. **Group-selection** – Periodic thinning will be used to increase vertical and horizontal structure, maintain health, and provide interim revenue. **Variable retention** regeneration harvests – Periodic thinning will be used to increase vertical and horizontal structure, maintain health, and provide interim revenue.	Existing mature stands may receive intermediate treatment under limited circumstances: • Treatment of invasive species • Removal of individual trees due to safety concerns • Prescribed or cultural burning to emulate historical processes and for research purposes. Younger stands newly added to this management strategy may need intermediate treatment under certain circumstances: • Irregular thinning or creation of gaps to promote characteristics of historical late-seral forest conditions typical of the region and considering climate change. • Snags and logs for wildlife may be created through girdling or blasting.	**Oak savanna/woodlands** - treatments could include prescribed burning, control of invasive plants, and/or precommercial thinning to remove young invading conifers. **Prairies** – treatments could include repeat prescribed burning and control of invasive plants and invading conifers. **Riparian systems** – treatments could include additional structural thinning, repeat prescribed burning, and control of invasive plants. **Aquatic systems** – In-stream and pond treatments could include removal of invasive species, including invasive aquatic plants, and placement of in-stream logs.

Table D.5, 6. *Guidelines for stand age (5) and legacy element retention (6) for each new 'Management Strategy'.*

	Even-aged, short rotation	Even-aged, long rotation	Multi-aged, multi-species	Late-successional forest	Ecosystems of concern
Stand age	Rotation lengths will be regulated primarily by age that maximizes net revenue production. Rotations will be 35-50 years.	Rotations typically will be 60-90 years, with 3% of the total forest acreage managed to 120 years to represent a variety of common and uncommon rotation lengths and provide a diversity of conditions across a landscape scale.	**Shelterwood-with-residuals** - Final harvest of understory trees will be 60-70 years. The age of the oldest trees harvested from these stands will be 60-120 years, regulated primarily by the complexity of habitat desired for each stand. **Group-selection** - Re-entry harvest will occur every 15-30 years to create 3-4 age classes. Minimum proximity of group selection openings to previous harvest entries will be >200 feet. **Variable retention** harvest – Re-entry may occur for precommercial or commercial thinning to maintain appropriate stand densities, favor the release of various trees species, and enhance forest structure and growth rates. Subsequent variable retention harvest may occur between 60-120 years to further diversify the stand.	NA. The age of the oldest trees in these stands will continue to increase over time, adding to the age-class diversity across the forest.	NA. The age of the oldest trees in oak ecosystems will tend to increase over time. For riparian ecosystems, tree age will increase for long-lived conifers but for alders and other short-lived, shade-tolerant species, tree age may decrease as they achieve senescence and die.
Legacy elements	Procedures will follow OFPA regulations (i.e., retain wildlife trees and coarse woody debris in harvest units >25 acres).	Procedures will exceed OFPA regulations (i.e., retain additional legacy trees, green trees, snags, and coarse woody debris).	This management system maintains abundant living and dead structure constantly within each stand in an effort to create and sustain diverse forest conditions.	No legacy elements are designated because there will be no stand-scale harvests.	**Oak savanna/woodlands** – old conifers with an open-grown character dating to pre-settlement will be retained. **Prairies** – NA **Aquatic/riparian systems** - large old trees and big logs will be retained or enhanced both in-stream and in riparian zones.

Appendix E. Recommendations for the Stewardship of Native Oak and Prairie Habitats

Numerous remnants of oak savanna, oak woodland, and prairies are located throughout the McDonald-Dunn Forest today. These legacies of earlier climatic conditions and land use practices provide important ecological functions and ecocultural values. Part of our collective heritage, they form a historical link to the past. Active management to maintain and restore these resources relates to many of the ten goals articulated in the vision, mission, and goals developed for the research forests in 2021 (see section 1.2). Additionally, active management is essential to fulfilling the educational mission of the research forests as it provides important opportunities for research, teaching, and demonstration. Partnering with Tribal Nations to co-steward restoration activities will be critical for incorporating Indigenous Knowledge in designing and carrying out restoration treatments. Much can be accomplished by incorporating Indigenous Knowledge with Western Science for a more holistic restoration approach, called ecocultural restoration.

Efforts to restore oak and prairie habitats within the Willamette Valley have been accelerating in recent years in response to increased recognition of the long and steady decline of these ecosystems and their cultural and ecological importance. Continued management action will be needed over time to maintain these habitats and the biodiversity they support. However, these efforts are severely hampered by the lack of scientific information and practical experience in restoration and conservation. Too often, restoration projects do not include the monitoring needed to provide vital information on the impacts or effectiveness of restoration practices. Without this, lessons learned from previous efforts cannot effectively inform or direct future actions. By designating the restoration of oak and prairie habitats as a priority in the 2025 Forest Plan, it is anticipated that the McDonald-Dunn Forest will serve as a flagship location for the development and dissemination of new knowledge needed for effective adaptive stewardship of these important habitats.

Background

As described in section 2.2.7, the Willamette Valley, including the area now called McDonald-Dunn Forest, has for thousands of years been home to the Kalapuya who have stewarded this land since time immemorial. Forest and grassland communities here co-evolved with Indigenous stewardship practices, such as cultural burning, informed by Indigenous Knowledge. A combination of climatic forces and Indigenous stewardship of this landscape—primarily through fire—produced a landscape dominated by large areas of prairies and oak savannas. These landscape conditions were very important to the Kalapuya and provided many resources supporting their culture. These resources included First Foods such as camas bulbs and acorns, on which they depended for sustenance. The Willamette Valley region was a cultural landscape, shaped by the frequent burning of prairies and savannas by local Kalapuya.

The lower elevations of the McDonald-Dunn Forest area were grassy with some scattered oaks when European-American settlers first arrived in the Willamette Valley (see section 2.2.7). Traditional stewardship of oak savannas and prairies with fire stopped after the forcible removal of Tribal Peoples to reservations following settlement. Without the regular use of fire, natural succession proceeded unchecked, and the prairies and savannas began to convert to forests of conifers and/or hardwoods such as Douglas-fir (*Pseudotsuga menziesii*) and bigleaf maple (*Acer macrophyllum*) or Oregon ash (*Fraxinus latifolia*). Consequently, many formerly common species of wildlife, insects, and plants dependent on oak and prairie habitats became rare. Moreover, the increase in invasive species began to pose increasing risk to these habitats, and will be the most difficult challenge to overcome in future restoration activities.

The few remaining areas of native oak savannas, oak woodlands, and prairies in the McDonald-Dunn Forest are part of a larger network of habitat patches. Maintaining and restoring remnant prairie and savanna communities and ecological structure while also improving their connectivity across the larger landscape has become a focus for many county, state, and federal agencies, as well as Tribal Nations. Research forest staff will collaborate with entities such as Benton County, State of Oregon, US Fish and Wildlife Service, Confederated Tribes of Grand Ronde and Confederated Tribes of Siletz Indians to coordinate on restoration efforts and subsequent educational opportunities.

Recommendations for Oak and Prairie Restoration in McDonald-Dunn Forest

Recognizing that there are limits to the time and funding available for restoration efforts, a triage approach is recommended when allocating effort. This entails first focusing attention on conserving the highest quality of

the remaining structural and compositional legacies of oak savannas and prairies, and secondarily putting more intensive effort into restoring remnants of lower quality. Conserving open-grown oak trees and fragments of native prairie communities is the most pressing priority, as they are rapidly being lost to natural processes and invasive species. Once gone, they will be very difficult to recreate. The second priority will require more intensive efforts to improve important ecological functions and processes in more degraded remnants of these habitats. This strategic approach should maximize future ecological, cultural, and educational benefits and opportunities.

Strategy 1. Retain and conserve high quality legacies

Conserve the highest quality of the remaining structural and compositional legacies of oak and prairie ecosystem types.

- Conserve open-grown oaks (savanna legacies) in danger of being lost to competition from conifers.
- Preserve high-quality "biological hot-spots" within larger remnant prairie areas, before they are lost to competing invasive species.
- Retain some stand-grown oaks.
- Include costs associated with oak and prairie restoration in the research forest annual budget.

Strategy 2. Improve degraded remnants

Employ more intensive efforts to restore lower quality oak savanna and prairie areas that need improvement.

- Interrupt the process of succession to conifers in designated savanna and prairie areas.
- Restore ecological functions of at-risk low-quality remnant savanna and prairie areas by controlling invasive species and augmenting native species.
- Manage and replace savanna structure trees over the long-term.

Priority 1. Retain and Conserve High Quality Legacies

The first two recommended tactics within this priority emphasize conservation of two important legacies that require quick action: open-grown oaks and high-quality native prairie remnants ("biological hot-spots"). The third involves conserving some stand-grown oaks (oak woodlands) and other hardwoods to sustain the ecological services they provide. Lastly, the fourth ensures adequate support for the work to be done.

Conserve Open-grown Oaks

Old, formerly open-grown oak trees are components of an earlier landscape that would be extremely slow and difficult to recreate. Conserving these legacies of historical savannas is a high priority that deserves urgent action. Many legacy oaks in the McDonald-Dunn Forest have already died and most of the remaining savanna trees may soon be lost to overtopping conifers if not released by removing small patches of competing conifers around each legacy oak.

Oregon white oak (*Quercus garryana*) can be found in many locations across the McDonald-Dunn Forest, such as in or around the edges of remnant prairie areas or embedded within the conifer-dominated forest. Some of these older oak trees were alive when the Kalapuya people still burned oak savannas in the early 1800s. The presence of open-grown oaks reflects the history of the relationship of Native Peoples to this landscape. Oaks provide many cultural resources for Native Americans. Animals associated with oaks, such as the Acorn Woodpecker (*Melanerpes formicivorus*), have cultural uses and significance, as do acorns themselves.

Oak trees and larger oak habitat patches provide a number of important ecological functions, which can help enhance biodiversity in larger forest ecosystems. Structurally, oaks (alive or dead) sustain biodiversity and nutrient flow. They are an important source of cavities for primary and secondary cavity nesting birds (e.g., Pileated Woodpecker (*Dryocopus pileatus*), Acorn Woodpecker, Western Bluebird (*Sialia mexicana*)) and small mammals (e.g., western gray squirrel). They also provide habitat structure for many epiphytics (e.g., lichens, mosses, and ferns). Acorns are an important food source for many animals, as are other foods associated with oaks, such as mistletoe berries and insects sustained by epiphytes.

Lastly, restoring oaks across the conifer-dominated forest can disrupt canopy fuels, potentially reducing the likelihood and spread of large stand-replacing fires across the forest.

In essence, oaks serve as shaded fuel breaks while also providing other ecosystem services.

Suggested Management Actions:

- Map the locations of remaining live, open-grown oaks throughout the forest.
- Assess individual trees according to factors such as vigor, proximity to other oaks or prairies, assigned management strategy, slope, and proximity to upcoming forest operations). Use this information to rank trees or clusters of trees by priority, and select trees for retention in scheduled forest harvest operations or separate release treatments.
- Ensure operators protect oak trees during management operations.
- Assess informational needs and design appropriate plans for study and monitoring, linked to interpretation and education (formal and non-formal).
- Work with the associate director of operations to design oak release harvests and/or remove overtopping conifers during normal Douglas-fir thinnings or special harvests. Consider pre-operational treatment of invasive species.
- Monitor and design subsequent management actions as needed.

Preserve High-Quality "Biological Hot-spots" in Remnant Prairies

Open prairie areas have in many cases been reduced to small islands where encroaching woody plants and invasive herbaceous plants are compressing the surviving pockets of high-quality prairie communities. Preserving these high-quality prairie remnants is a high priority because once lost, these areas with high native species diversity would be extremely difficult or impossible to fully reconstruct. Sections of high-quality prairie remnants with high biological diversity of native species should be protected from encroaching trees, shrubs, and invasive plants.

Remnants of native prairies persist as grassy islands in a growing sea of trees in the McDonald-Dunn Forest. These remnants are legacies of earlier climatic conditions and Indigenous land-stewardship practices in the Willamette Valley that provide historical links to the past. Larger prairie remnants include Carson Prairie and Forest Peak Prairie in the Dunn Forest, and Butterfly Meadows, Jackson Place/Meadow and the Oak Creek Prairie Complex in the McDonald Forest.

These prairie remnants enhance biological diversity in the larger McDonald-Dunn Forest ecosystem. They are important structural components in the forest, providing habitat to a suite of wildlife and insects that utilize forest edges or require open habitats or herbaceous plant communities. Also, some of these prairies are rich in native plants, making them a compositional legacy of historical herbaceous prairie communities. Remnant prairies are also culturally significant sites for the Kalapuya ancestors (i.e., the Confederated Tribes of Grand Ronde and the Confederated Tribes of Siletz Indians). The ancestors of the Kalapuya managed these prairies for plants such as camas (*Camassia quamash*) and tarweed (*Madia spp.*). Some prairies in the McDonald-Dunn Forest also have identified archeological sites.

Many of the structurally open prairie remnants existing in the McDonald-Dunn Forest now are occupied or dominated by non-native species and would be considered low quality remnant prairies. However, some of these low-quality remnant prairies contain high-quality patches rich in native species requiring a different management approach. Learning how to protect, restore, and enhance native biological diversity in these prairie remnants is a much needed and a fruitful area of research and education. Prairie community conservation and restoration provides an excellent opportunity for partnerships and co-stewardship with Tribal Nations, and for collaboration with the OSU Department of Botany and Plant Pathology and other external agencies and organizations. Such partnerships would promote holistic and interdisciplinary investigations of the ecological functions in the prairie communities (including mycorrhizal and pollinator relationships), and enable testing of restoration practices and subsequent ecosystem responses.

Suggested Management Actions:

- Identify, delineate and rank high-quality remnant prairie "biological hot- spots" within larger remnant prairie areas in partnership with Tribal Nations and in collaboration with local agencies, faculty and students in the College of Forestry and Department of Botany and Plant Pathology.
- Assess informational needs and design appropriate treatment plans for study and monitoring, linked to interpretation and education (both formal and non-formal).
- Protect these biological hot-spots from encroachment by highly invasive and competitive species. This involves establishing perimeter buffers and spot treatments to remove weeds (using physical, mechanical or chemical controls, as appropriate), and following Tribal guidance about any additional actions necessary for effective ecocultural restoration.
- Seed and/or plant disturbed areas with native plant species to discourage re-occupation by invasive species.
- Monitor and design subsequent management actions as needed.

Retain Select Stand-grown Oaks

Retaining stand-grown oak trees is a lower priority than retaining open-gown oaks, yet this approach provides an important opportunity to maintain biodiversity. In contrast to the open-grown oaks, stand-grown oaks are typically younger, narrow-crowned trees established in a post-fire landscape. They are generally part of mixed forest stands in the McDonald-Dunn Forest. Retaining some of these oaks throughout the forest management cycle could provide ecological functions such as mast production and nesting cavities in exchange for rather small impacts on conifer production. The recommendation is simply for greater retention of selected stand-grown oaks during forest thinning or final harvest operations. Good opportunities for retention include areas adjacent to riparian areas and stand edges.

Suggested Management Actions:

- Survey for living oaks as part of each pre-sale timber harvest operation.
- Assess, rank, and mark trees to prioritize for retention, based on factors such as vigor, proximity to other trees and to riparian areas. Small stands or clusters should be favored for retention during pre-sale operations.
- Work with the associate director of operations on the forest to design harvest with oak leave-trees.
- Monitor and design subsequent management actions as needed.

Include Oak and Prairie Restoration in the Research Forest Budget

Some restoration activities—such as the release of savanna oaks from overtopping conifer trees—may provide some revenue, whereas other restoration activities—such as controlling invasive plants encroaching on high quality prairie areas—represent a substantial expense. As soon as this plan is implemented, funds will proactively be allocated within the research forest annual budget to support oak and prairie restoration. In addition, outside funding will be pursued to enable ecocultural restoration across the forest (see section 3.3.2). Federal and state governments, in this era of climate change, prioritize ecocultural restoration to promote climate resilience. This is particularly relevant when such projects involve Tribal partnerships and Indigenous Knowledge. Funding opportunities to support such partnerships will be prioritized.

Priority 2. Improve Degraded Remnants

The second priority will involve more intensive and comprehensive restoration of lower quality remnant savanna and prairie areas. This will be done through a variety of activities such as removal of encroaching trees and shrubs, removal of non-native species, mastication, herbicide treatments, and seeding and planting of native grasses and forbs. This will also deliver additional opportunities for research, education and demonstration. Co-stewardship with Tribal Communities and restoration treatments informed by Indigenous Knowledge will be important in this strategy.

Likely candidate areas for such work include Carson Prairie, Jackson Place/Meadow and Oak Creek Meadows. Once intensive work begins at one site, it will continue for several years, necessitating a large portion of the resources available for restoration activities and precluding work elsewhere for a long period. This is particularly true of efforts to restore the herbaceous communities of low-quality prairie areas, which are often costly, difficult, and experimental. The results are often uncertain and slow in coming to fruition. The challenge is especially great in areas plagued by invasive grasses such as false brome (*Brachypodium sylvaticum*). Therefore, this valuable but challenging phase of restoration work will not begin in earnest until other at-risk assets have been conserved. Also, selection among candidate sites will proceed very carefully to ensure an optimal return on investment. Experimental use of innovative restoration strategies to eradicate invasive species may be tested to reduce the need for herbicides while aligning with Tribal values.

Interrupt Succession in Designated Oak Savanna and Prairie Areas

Many remnant oak savanna and prairie areas have both conifer and hardwood tree encroachment and establishment along stand edges and across open areas. Although a large portion of the forest's remnant prairie areas are low quality because of low native plant composition, they still provide structural diversity and landscape-level ecological functions. In addition to providing opportunities for ecocultural restoration and co-stewardship, some of these larger prairie areas are high-use recreation sites and could therefore also provide valuable educational and outreach opportunities.

Suggested Management Actions:

- Designate remnant oak savanna and prairie areas to be maintained as structurally open. Work with the associate director of operations and other partners such as the Confederated Tribes of Grand Ronde and the Confederated Tribes of Siletz Indians to plan and execute removal of encroaching trees and shrubs.
- Merchantable trees may be taken as part of timber sales in adjacent units or could be separate sales. Small trees and shrubs may need to be treated with herbicides, girdling, cutting, or grinding/mastication as appropriate.
- When possible, identify encroaching conifer trees that can be converted to snags in accordance with the objective of providing complex structure and wildlife habitat.
- Seed and plant disturbed areas with native plant species to discourage occupation by invasive species.
- Monitor and design subsequent management actions as needed to maintain desired ecological conditions.

Restore Ecological Functions of Low-Quality Remnant Savanna and Prairie Areas

Restoring low quality prairie areas (those dominated by non-native species) to higher quality prairie communities is an important but lower-order priority than more time-sensitive conservation of remaining high-quality remnant prairie areas. Low-quality remnants include areas without trees as well as those where vegetation will be managed to create a savanna structure.

Suggested Management Actions:

- Partner with the Confederated Tribes of Grand Ronde and the Confederated Tribes of Siletz Indians, as well as with agencies, to plan and execute restoration of low-quality remnant prairie areas jeopardized by encroaching trees and shrubs.
- Remove and control non-native dominated herbaceous plant communities (i.e., plants such as false brome or tall fescue) for one or more years using herbicides , tillage, or other means as appropriate.
- Establish mixtures of native grass and forb species by direct seeding and/or transplanting. Consider re-introducing culturally significant and sensitive species of plants and associated invertebrates. Source the seeds from local sites when possible.
- Intensively manage invasive plants as native plants become established.
- Monitor and design subsequent management actions as needed.

Long-term Management and Replacement of Savanna-structure Trees

Existing legacy savanna trees (also called “ancestor trees” by Indigenous Peoples) will be conserved through release treatments. Some of these trees are adjacent to existing prairie remnants and are likely to be included within the future boundaries of designated prairie/savanna areas. Many of these trees are old and have long been suppressed. Maintaining long-term structural and functional objectives requires not only that existing trees be conserved, but that the sites are managed to enable future recruitment of oak (and other appropriate species such as Willamette Valley ponderosa pine) to create mixed-age populations of savanna trees. Research forest staff should take advantage of opportunities as they arise, while monitoring and considering the need for future management activities.

Research, Teaching, and Outreach Activities Associated with Oak and Prairie Restoration

Current conditions in the McDonald-Dunn Forest provide an opportunity for it to be a prime location for advancing understanding of how to effectively maintain and restore oak savanna and prairie habitats. This includes demonstrating sound stewardship and innovative aspects of active sustainably managed forests; promoting climate resilience and enhancing biodiversity; enhancing interpretation opportunities; and providing important connections to and partnerships with Tribal Nations, the general public, neighbors, natural resource professionals, NGOs, and state and federal agencies. This will be accomplished through these simultaneous efforts:

- Conserve and then begin to restore the ecological functions and ecocultural values of the remnant savannas and prairies in the McDonald-Dunn Forest.
- Incorporate research, teaching, and demonstration opportunities with restoration activities.
- Engage in collaborative partnerships with Benton County, State of Oregon, US Fish and Wildlife Service, Confederated Tribes of Grand Ronde, Confederated Tribes of Siletz Indians, and others to maximize effectiveness.

*Note: Much of the material in this Appendix is adapted from Appendix 3 of the 2005 McDonald-Dunn Plan, using insight provided by the Legacy Oaks Task Force and Prairie Task Force.

Appendix F. Recommendations for the Stewardship of Riparian Habitats

Riparian areas are the interface between terrestrial and aquatic ecosystems (see section 2.2.7). These ecological zones play an important role in supporting biodiversity and providing ecosystem services. They serve as vital ecological corridors, provide diverse environments for wildlife, regulate water quality by filtering pollutants, stabilize stream banks through root systems, maintain stream temperatures through shade, provide a source of large wood recruitment in streams, and act as biogeochemical hotspots in the landscape.

Given the many key functions that riparian areas provide, these habitats are explicitly protected under the Oregon Forest Practices Act (OFPA; see section 2.5.2). The intention of the OFPA rules is to ensure that forestry activities do not impair water quality, and that adequate vegetation is retained during forest management activities to provide wildlife habitat and structure both in and adjacent to streams, lakes, and wetlands. For stream riparian areas, the OFPA regulations differ by the size of stream, the presence or absence of fish, and whether there are direct drinking water uses from the system (Figure 8). The highest level of protections – with the largest no-harvest buffer zone - are “fish-bearing” streams (type F), including those where salmon, steelhead, or bull trout are found (type SSBT). Type D streams are used for domestic water, while type N streams have no domestic water use or fish presence. Type N streams are further classified as Np for non-fish-bearing perennial, with water flowing year-round, and type Ns for non-fish-bearing seasonal, with water flowing only at certain times a year. Stream size categories of small, medium, or large are based on the average annual flow and the total area drained by the stream or stream reach with buffer protections that scale with size.

Three distinct watersheds make up the majority of the McDonald-Dunn Forest, comprising the largest percentage of riparian areas (Figure 7). The Jackson-Frazier, Oak Creek, and Soap Creek watersheds are all part of the research forest and are included within the Upper Willamette Sub-basin (section 2.2.6).

Within the McDonald-Dunn Forest, approximately 4% of the acreage falls under the OFPA’s “no-harvest” riparian areas. Outside of those “no-harvest” zones, an additional 4% of the acreage is under two riparian protections: tree retention areas, where cutting trees is limited, and equipment limitation zones (ELZs), where disturbance from equipment use is minimized but harvesting of trees is still allowed.

Given the McDonald-Dunn Forest’s role as a living laboratory that supports a range of research, education, and outreach objectives, the growing and harvesting of trees is one component of what occurs on the forest. As such, managing to meet or exceed the standards set by the OFPA is an appropriate baseline that enables investigation into the efficacy of additional riparian protections.

Because the OFPA water protection rules adopted in 2022 have not yet been in place long enough to study ecological ramifications, adherence to these rules as a foundational guideline in the McDonald-Dunn Forest positions the forest well to investigate effectiveness of the rules. Research efforts in riparian zones may encompass questions about topics such as water quality, water quantity, fire resilience, forest-stream connectivity, and ecosystem responses to disturbance. Long-term monitoring of water quality and quantity could be possible in the future if resources can be obtained to support this work. Riparian forests and streams are recognized as important habitats for many of the species highlighted in the proposed OFPA Habitat Conservation Plan, and future research in the forest may explore habitat use and species movement within and through these riparian zones. Understanding the role of riparian forests for population and meta-population connectivity across forested ecosystems for amphibian (particularly torrent salamanders (*Rhyacotriton spp.*), giant salamanders (*Dicamptodon spp.*) and tailed frogs (*Ascaphus truii*)), mammal, bird, and invertebrate populations inhabiting McDonald-Dunn Forest will inform conservation and management throughout the region. Riparian forests can also serve as vital teaching and outreach/engagement opportunities for students and the community.

Outside of explicit riparian research studies and targeted stream and river corridor restoration work, the forest will be managed to meet or exceed the requirements of the OFPA in all harvest activities. As prescribed for large landowners on the west side of Oregon, stream riparian management areas will follow the standard practice distances for vegetation retention in all riparian management areas. If rules prescribed for private forest lands by the OFPA in 2022 were to sunset, practices outlined within would continue to be followed on the McDonald-Dunn Forest throughout the period this plan is in effect.

Appendix G. Methodology Used to Model Tradeoffs among Land Allocation Scenarios

Effects of forest planning decisions were modeled with Woodstock (Remsoft Corporation 2021), a linear programming software package widely used in forest planning efforts. As inputs, Woodstock requires detailed growth and yield projections developed from forest inventory data that incorporate both the natural growth of trees and the impacts of potential management activities over time. Using the USDA Forest Service's Forest Vegetation Simulator (FVS), growth and yield tables were generated for timber volumes, carbon and other stand metrics (e.g., basal area, height). The software was initially programmed to estimate a series of metrics at 5-year time steps over 125 years for 5 land allocation scenarios in which each existing forest stand was allocated to one of the five stand-scale management strategies (Appendix D). Results were discussed and feedback provided at a *Faculty Planning Committee* meeting, a *Stakeholder Advisory Committee* meeting, and a Community Input Session. A second round of modeling was then conducted to hone the land allocations further, and these results were also discussed and feedback provided at a *Faculty Planning Committee* meeting, a *Stakeholder Advisory Committee* meeting, and a Community Input Session.

In each round of modeling, the objective function for each scenario was to maximize timber yield. Model constraints included the following:

- Reforestation constraint – any stand harvested by clearcut must be replanted.
- Cash-flow positivity constraint – revenue within each 5-year period must equal or exceed expenditures.
- Bounded even flow constraint – harvest volume can fluctuate no more than 10% between lowest and highest periods across the 125-year timeframe to avoid spikes in harvest activity.
- Acreage constraints – must have ≥10 acres oak savanna and meadow each 5-year period (i.e., average of ≥2 acres each year), and must have <750 acres clearcut harvest each 5-year period (i.e., average of <150 acres each year).
- Geographic constraints – a hierarchy of forest stands was established to describe potential allocation to certain management strategies (e.g., *late successional forest*, *ecosystems of concern*) and constraints forced primary candidates to be exhausted before moving on to secondary and tertiary candidates to avoid infeasibilities.

Stand-level treatments in the model represent the forest management options described in the 5 new management strategies (Appendix D). These are fairly typical of management practices in the eastern margins of the Oregon Coast Range, with some exceptions. *Even-aged, short rotation* stands were eligible for clearcut harvest at 35-50 years. Following harvest, regeneration included site preparation and control of competing vegetation with herbicides with intent to retain 5% of hardwoods and planting of seedlings at 300-400 trees per acre. *Even-aged, long rotation* stands were eligible for thinning at 28-34 years and for clearcut harvest at 60-90 years. Following harvest, regeneration included site preparation and control of competing vegetation with herbicides with intention to retain 10% of hardwoods and planting of seedlings at 300-400 trees per acre. Intermediate treatments in *multi-aged, multi-species* stands differed according to which type of silvicultural prescription they were slated to receive: shelterwood with residuals, group selection, or variable retention. Seedlings were replanted at 250-360 trees per acre. Replanting is not planned in *late-successional forest* or in *ecosystems of concern* slated for riparian restoration. Replanting targets were 50 trees per acre in oak restoration areas and <25 trees per acre for meadow restoration areas.

To simplify calculations, discounting and harvests were assumed to occur at the midpoint of each 5-year planning period. Output values for metrics represent 5 years' worth of harvests, unless otherwise specified. Prices and costs in the model are considered real, in that current prices and costs are assumed to only increase with inflation over time (no real price appreciation), and the discount rate is set net of inflation to avoid the need to inflate and then discount using multiple discount rates.

Metrics Used to Evaluate Tradeoffs among Land Allocation Scenarios

The *Faculty Planning Committee* devised eight metrics to be used to evaluate tradeoffs among land allocation scenarios during the modeling described in Appendix G. These eight metrics are described below.

Biodiversity – This metric was used in these comparative analyses to reflect habitat suitability for several forest-

dependent focal taxa: bees, early successional birds, late successional birds, red tree voles, ungulates, and amphibians. Six groups of regional taxonomic experts were convened to provide insight into relationships between habitat quality and forest stand conditions. Each individual provided their expert knowledge on how habitat suitability changed over a 125-year period for each of the 5 management strategies according to the guidelines derived for their management. The single number associated with each scenario reflects the average habitat suitability score across the 125-year period for each taxon, given the proportion of each management strategy in that scenario. The aforementioned taxa included in the biodiversity modeling exercise were selected by a group of experts knowledgeable about wildlife and fish occurring in forests of the Pacific Northwest. Each of these taxa are known to occur within the McDonald-Dunn Forest; for each there is considerable understanding of relationships between habitat suitability and stand characteristics as stands age, as well as an understanding of how they respond to forest management activities. Taxa not known to use the forest at the present time and those for which there remains substantial uncertainty as to relationships between habitat suitability and stand age as well as effects of forest management activities were not selected for the modeling exercise.

Forest carbon – This metric was intended to reflect above and below ground biomass associated with live and dead trees, including stems, branches, foliage, and roots of live and dead trees, as well as shrubs and herbs, litter and duff. Estimates are conservative, due to lack of inclusion and uncertainty about quantities of carbon stored in the soil.

Forest products – This metric describes the volume of timber harvested. Estimates take into account tree species, log diameter, and log length. Tree species include Douglas-fir, grand fir, red alder, western hemlock, madrone, and Oregon ash.

Net revenue – This was a projection of the revenue earned through timber harvest minus that used for reforestation, restoration of *ecosystems of concern*, fuel reduction, roads, recreation, all other forest management activities, and all other maintenance needs and salaries. Fixed costs incurred each year include personnel salaries, admin support, maintenance of roads and buildings and vehicles, cultural resources, wildlife monitoring surveys, outreach and interpretation, fire protection, and research support. Log prices were from 2024, silviculture and logging costs were averaged over the previous three years, and an industry standard discount rate of 6% was used (Table G1).

Recreation acceptability – This metric was intended to serve as a reflection of forest condition preferences of recreational users of the forest. A group of five OSU faculty and staff developed a survey, informed by prior peer-reviewed studies, that was pre-tested in an OSU class before use. Respondents, some online and some at trailheads, were shown 14 photos, always in the same order. Respondents who took the survey online were shown each photo in a compressed size with the option to enlarge it, whereas respondents intercepted at trailheads were shown individual 8.5”x11” laminated photos. Each photo represented a different forest stage with diverse tree sizes, densities, and ground cover at various times after disturbance. Individuals were asked to “rate how acceptable each scenic condition is for maintaining the desired quality of your recreational experience”. Ratings were on a scale of 1 to 5, with 1 being “very unacceptable” and 5 “very acceptable”. This approach of showing photos and requesting recreation acceptability ratings has been in use for decades (Daniel and Boster 1976, Yang et al. 2021, Lupp et al. 2022). Steps were taken to ensure that the total number of individuals representing each recreation type was proportional to known recreational use of the McDonald-Dunn Forest (e.g., 31% mountain biking, 27% trail running, 23% walking or hiking, 12% dog walking, 4% horseback riding, and 4% hunting). After silvicultural experts estimated the length of time stands would be in conditions depicted by each photo for each of the 5 management strategies, photo scores were multiplied by the number of years spent in each, and then multiplied by the percent of acreage of each management strategy in each scenario. The data set (n=51) was generated by asking members from the Forest Recreation Advisory Council to distribute the survey to members within their respective recreation community groups (e.g., mountain bikers, equestrians, runners), and to round out the sample, research forest staff intercepted visitors at trailheads and administered the survey to community trail work volunteers. The responses were anonymous and contained no personal identifying information. To expand on this effort, a graduate student in the department of Forest Ecosystems and Society is now conducting a larger randomized and systematic survey, using the same set of photos, to examine visitor perceptions of forest management practices in the McDonald-Dunn Forest in greater depth, to inform future management decisions.

Resilience-density – This was one of two metrics included in the modeling to reflect characteristics that may confer resilience under changing climatic conditions. Resilience is a measure of the forest's adaptability to a range of stresses. Given unknown future climatic conditions, there is uncertainty as to which forest characteristics could promote resiliency. This metric reflects forest density and is defined as stand density index (SDI) relative to maximum possible stand density index in the region. High SDI values reflect dense stands that typically experience greater individual tree and stand stress, whereas lower SDI values reflect more open spacing that can provide a greater pool of resources to individual trees to handle moisture stress and/or withstand assault from insects or disease. After scaling SDI relative to maximum possible SDI in the region, scores were converted to a range from 0 to 5 such that 0 reflected high stand densities (higher stress conditions) and 5 represented low stand densities (lower stress conditions). For more insight, see Woodall and Weiskittel 2021; North et al. 2022; and Heiderman and Kimsey 2023.

Resilience-composition – This was one of two metrics included in the modeling to reflect characteristics that may confer resilience (the forest's adaptability to a range of stresses). Given unknown future climatic conditions, there is uncertainty as to which forest characteristics could promote resiliency. This metric reflects the degree of dominance of the most common tree species in the region, Douglas-fir. It is derived as % of total basal area that is some tree species other than Douglas-fir.

% Non-Douglas-fir basal area = (Non-Douglas-fir basal area / Total basal area) x 100

Raw values could range from 0 to 100%; these were converted to scores of 0 to 5 to simplify interpretation. Lower values indicate forests are dominated by the dominant species (Douglas-fir), which may mean greater susceptibility to stressors associated with changing climatic conditions, such as drought and pressure from insects and pathogens, whereas higher values indicate greater prevalence of trees of other species, which may mean lower stand-level susceptibility to stressors. Few stands in the region exceed 40% basal area in species other than Douglas-fir, so the maximum score of 5 reflects >40% basal are of any tree species other than Douglas-fir. For more insight, see Ammer 2018.

Wildfire resistance consists of three components that reflect the amount of aerial/canopy fuels (crown bulk density), the average height to that canopy from the ground (canopy base height), and surface fuel loading. Scores would be higher in stands that are more open, have elevated canopies, and less surface fuels. Conversely, scores would be low in stands that have dense canopies close to the ground as well as extensive fuel on the ground. These factors are rooted in the physics of fire behavior in that wildfire resistance is lower in stands where ladder fuels would be present that could connect surface fires to the canopy, making them more vulnerable to torching and crown fire spread (Scott and Reinhardt 2001, Bailey 2024).

Land Allocation Scenarios Investigated

In the first round of modeling, the software was programmed to investigate five land allocation scenarios. One scenario (A) reflected a continuation of current land allocation on the forest, three of the others (B, C, and D) were devised such that one management strategy was allocated a high percentage (39%) and all others 10 or 15%, whereas the final (E) had 38% spread across two management strategies and 15% for all others (Table G2). The intention was to compare the implications of having a forest with vast acreage of each of the management strategies, ensuring there was a minimum of 10% of land in each of the remaining management strategies. After an initial round of modeling was completed, edits were made to inputs and it was re-run.

In the subsequent round of modeling, the software was programmed similarly, but seven new scenarios were investigated. These were developed by members of the *Faculty Planning Committee* and *Stakeholder Advisory Committee*. Because a benchmarking exercise that investigated which scenario would maximize each of the eight forest values had suggested that large acreages of two of the management strategies, *multi-aged, multi-species* and *even-aged, long rotation* led to higher scores on each of the eight metrics of interest, this suite of scenarios generally reflected large acreages of one or both of these management strategies (Table G3).

Results from the modeling efforts suggested little differences among scenarios for some metrics (e.g., *recreation acceptability, resilience-composition, wildfire resistance*) and considerable differences for others (e.g., net revenue, forest carbon) (Table G4).

After taking into account feedback received from the *Stakeholder Advisory Committee* and the community, the *Faculty Planning Committee* developed a final suite of three scenarios to submit to the dean of the College of Forestry for his consideration (Table G5).

Unsurprisingly, given the minor nature of the differences in acreage allocations among these three final scenarios, results revealed limited distinctions in estimates of forest values among scenarios X, Y, and Z (Table G6).

Table G1. *Price and cost information used to estimate economic outputs like timber revenues and discounted cash flows.*

Revenue Generation (timber prices)	
Description	**Value**
Price of Douglas-fir less than 10" ($/MBF)	$624
Price of Douglas-fir between 10" and 14" ($/MBF)	$753
Price of Douglas-fir between 14" and 18" ($/MBF)	$774
Price of Douglas-fir between 18" and 22" ($/MBF)	$774
Price of Douglas-fir greater than 22" ($/MBF)	$796
Price of Grand fir ($/MBF)	$452
Price of Red alder ($/MBF)	$344
Price of Cedar ($/MBF)	$946
Price of Western hemlock ($/MBF)	$452
Price of Bigleaf maple ($/MBF)	$344
Price of White oak ($/MBF)	$344

Expenses (silviculture costs)	
Description	**Value**
Site preparation ($/ac) - includes labor & chemical	$140
Planting ($/ac) - includes labor & seedlings	$400
Chemical release ($/ac) - includes labor & seedlings	$195
Interplanting ($/ac)	$275
Mastication ($/ac)	$ 900
Hand piling ($/ac)	$150
Herbicide ($/ac) – 3 applications	$150
Seeding naturals ($/ac)	$1,500
Planting naturals ($/ac)	$500
Prescribed burn ($/ac)	$200

Expenses (logging costs)		
Description	**Cable logging**	**Ground logging**
Clearcut logging cost ($/MBF)	$327	$189
ITS* logging cost ($/MBF)	$377	$280
GS* logging cost ($/MBF)	$ 377	$222
VRH* logging cost ($/MBF)	$285	$195
Oak restoration logging cost ($/MBF)	$388	$388
Thin 1 logging cost ($/MBF)	$621	$621
Thin 2 logging cost ($/MBF)	$295	$295

**ITS = individual tree selection; GS = group selection; VRH = variable retention harvest.*

Table G2. *The five land allocation scenarios assessed during the first round of modeling to evaluate tradeoffs among forest characteristics. Percentages indicate the acreage allocated to each management strategy.*

Management strategy	Scenario				
	A (baseline)	B	C	D	E
Even-aged, short rotation	25%	39%	15%	10%	15%
Even-aged, long rotation	27%	15%	39%	10%	15%
Multi-aged, multi-species	20%	10%	10%	39%	15%
Late-successional forest	4%	10%	10%	15%	19%
Ecosystems of concern	6%	10%	10%	10%	19%
Long term learning & non-forest*	17%	17%	17%	17%	17%
TOTAL	100%	100%	100%	100%	100%

** Long-term leaning represents acreage allocated to long-term research projects that was unavailable to allocation to management strategies.*

Table G3. *The seven land allocation scenarios assessed during the next round of modeling to evaluate tradeoffs among forest characteristics. Percentages indicate the acreage allocated to each management strategy.*

Management strategy	Scenario						
	G	H	J	K	L	M	N
Even-aged, short rotation	14%	10%	8%	8%	10%	5%	9%
Even-aged, long rotation	35%	24%	8%	50%	20%	35%	25%
Multi-aged, multi-species	20%	24%	50%	8%	33%	25%	26%
Late-successional forest	8%	15%	8%	8%	10%	9%	8%
Ecosystems of concern	6%	10%	8%	8%	10%	9%	14%
Long-term learning & non-forest	17%	17%	17%	17%	17%	17%	17%
TOTAL	100%	100%	100%	100%	100%	100%	100%

Table G4. *Results of the modeling, showing all 12 initial and subsequent scenarios investigated. Cells are coded to show change relative to the baseline (Scenario A): little change in gold (10% increase – 10% decrease), moderate change in light green (10-50% increase) or tan (10-50% decrease), and considerable change in dark green (>50% increase) or brown (>50% decrease).*

Forest Value	Scenario											
	A	K	C	M	G	N	H	L	E	B	D	J
Forest carbon	770K	836K	885K	915K	839K	965K	1004K	962K	1117K	947K	1,040K	962K
Forest products	5.5	5.5	5.1	5.1	5.4	4.8	4.5	4.7	3.8	4.1	4.2	4.7
Direct & indirect jobs	~62 jobs	~62 jobs	~58 jobs	~58 jobs	~61 jobs	~55 jobs	~50 jobs	~53 jobs	~43 jobs	~46 jobs	~48 jobs	~53 jobs
Net revenue	$1.0M	$966K	$812K	$896K	$966K	$780K	$627K	$757K	$307K	$426K	$550K	$779K
Recreation acceptability	3.42	3.47	3.48	3.44	3.47	3.44	3.55	3.52	3.60	3.44	3.58	3.55
Resilience - density	2.87	2.64	2.59	2.73	2.79	2.61	2.56	2.74	2.21	2.46	2.68	2.94
Resilience - composition	2.58	2.56	2.54	2.49	2.51	2.59	2.57	2.58	2.66	2.71	2.65	2.62
Wildfire resistance	2.43	2.43	2.43	2.50	2.47	2.50	2.49	2.54	2.44	2.42	2.57	2.62
Biodiversity (see below)	1.80	1.78	1.83	1.96	1.87	1.98	2.01	2.03	2.01	1.86	2.13	2.13
bees	0.76	0.76	0.80	0.76	0.75	0.84	0.77	0.79	0.87	0.79	0.77	0.76
early seral birds	1.16	1.08	1.09	1.04	1.10	1.01	1.00	1.02	0.95	1.11	0.99	1.03
late seral birds	2.42	2.38	2.49	2.87	2.60	2.96	3.02	3.07	3.05	2.54	3.33	3.34
red tree voles	0.65	0.81	0.92	0.81	0.81	0.78	1.01	0.86	1.08	1.06	0.97	0.72
amphibians	2.93	2.91	2.98	3.19	3.05	3.26	3.29	3.32	3.29	2.96	3.46	3.46
ungulates	2.90	2.74	2.71	3.09	2.92	3.05	3.00	3.15	2.81	2.68	3.25	3.48

Notes: Biodiversity is averaged across all taxa in the first row and partitioned into unique taxa in the bottom portion of the table; Forest carbon is reported in tons; Forest products is reported in MMBF per year and also shown as the number of local direct and indirect jobs supported; Net revenue is estimated per year. Scenarios are ordered from high to low proportions of even-aged, long rotation acreage.

Table G5. *The three land allocation scenarios recommended to the dean of the College of Forestry for consideration after the final round of modeling to evaluate tradeoffs in forest characteristics. Percentages indicate the acreage allocated to each management strategy.*

Management strategy	Scenario		
	X	Y	Z
Even-aged, short rotation	10%	10%	10%
Even-aged, long rotation	30%	26.5%	23%
Multi-aged, multi-species	23%	26.5%	30%
Late-successional forest	10%	10%	10%
Ecosystems of concern	10%	10%	10%
Long-term learning & non-forest	17%	17%	17%
TOTAL	100%	100%	100%

Table G6. *Results of the last round of modeling, showing the final three land allocation scenarios investigated. Cells are coded to show change relative to the baseline (Scenario A): little change in yellow (10% increase – 10% decrease), moderate change in light green (10-50% increase) or orange (10-50% decrease), and considerable change in dark green (>50% increase) or red (>50% decrease).These scenarios were recommended to the dean of the College of Forestry for consideration after the final round of modeling to evaluate tradeoffs in forest characteristics.*

Forest value	Scenario		
	X	Y	Z
Forest carbon	1,067K	1,077K	1,086K
Forest products	4.30MMBF	4.27MMBF	4.24MMBF
Direct/indirect jobs	~49 jobs	~48 jobs	~48 jobs
Net revenue	$528K	$540K	$546K
Recreation acceptability	3.52	3.53	3.54
Resilience - density	2.34	2.37	2.40
Resilience - composition	2.66	2.62	2.61
Wildfire resistance	2.49	2.50	2.50
Biodiversity (see below)	1.98	2.01	2.05
bees	0.62	0.62	0.62
early seral birds	0.83	0.84	0.83
late seral birds	3.00	3.08	3.17
red tree voles	1.11	1.10	1.10
amphibians	3.26	3.31	3.36
ungulates	3.05	3.12	3.19

Appendix H. Recommendations for Selecting Legacy/Character Trees to Retain During Harvest

The Oregon Forest Practice Act (OFPA) mandates the retention of a minimum number of trees during clearcut harvest operations in Oregon forests. More specifically, the OFPA stipulates that in harvests of ≥25 acres, two snags or green trees per acre at least 11 inches DBH be retained. In addition, those retained trees must be at least 30 ft tall, and at least 50% of these must be conifers.

As described in section 3.4.1, all clearcut harvests implemented in the McDonald-Dunn Forest according to the *even-aged, short rotation* or *even-aged, long rotation* management strategies will meet or exceed OFPA standards. More specifically, retention will follow OFPA precisely for all harvests managed according to the *even-aged, short rotation* strategy, and exceed OFPA guidelines for all harvests managed according to the *even-aged, long rotation* strategy (see Appendix D). The guidelines below are intended to aid managers in identifying which trees should be prioritized to meet or exceed retention requirements.

Descriptions of expectations for which trees are retained were intentionally written with little specificity in the guidelines that delineate operations for each of the five management strategies (Appendix D). This was done deliberately to provide research forest staff freedom to operationalize each strategy using situation-specific context. This appendix provides additional, broad guidance about legacy and character tree retention across all McDonald-Dunn Forest acreage. These guidelines apply to the retention of individual trees or small groups of trees during management activities associated with these management strategies: *even-aged, short rotation*; *even-aged, long rotation*; *multi-aged, multi-species*; and *ecosystems of concern*.

The goal behind retaining some trees during harvest activities (beyond regulatory requirements) is to ensure the persistence of some biological and structural legacies into the future. Retention of legacy trees can provide a variety of benefits including structural complexity, wildlife habitat, carbon sequestration, aesthetics, and preservation of genetic material from prior stands.

The following guidelines are written with the overall aim of fostering a diverse suite of tree characteristics across the forest. These guidelines supersede the interim McDonald-Dunn Forest policy of prohibiting the harvest of trees older than 160 years of age, set in summer 2019 by interim dean of the College of Forestry at the time.

It is recommended that a holistic view of tree characteristics is used when selecting trees to retain, rather than a specific age. Tree age is not aligned with the true objective of selecting retention trees so as to ***conserve structural and biological diversity*** across the forest by ensuring there are trees of a variety of ages, forms, and species into the future. The focus should be on ***retaining trees that have characteristics that are ecologically and culturally valuable***.

Certain traits may make specific trees more valuable to the succeeding stand and may contribute more to structural, ecological, and cultural diversity across a landscape scale, and these guidelines provide suggestions for recognizing which factors to prioritize when making these assessments. The large acreage of the research forest makes it infeasible to measure specific characteristics of individual trees. Therefore, the approach recommended for selecting trees to retain uses a collection of characteristics that can for the most part be estimated visually.

Tree characteristics to prioritize when selecting individual trees for retention in harvest areas:

- Bark and Bole – Trees with thick, deeply furrowed bark.
- Branching – Trees with downward-pointing branches throughout the live crown's length, with varied branching patterns throughout the mid to upper bole, and with epicormic branches.
- Crown shape – Trees with broad tops and with long vertical crowns.
- Diameter – Trees with substantially larger diameters than those of other trees in an existing stand.
- Height – Trees with tall stature.
- Species – Trees of all species with mature characteristics (e.g., Douglas-fir, hemlock, redcedar, white oak, madrone).
- Condition – Trees with defect or decay, and with broken tops.
- Age – Older trees.

Bark and bole – Bark characteristics change as trees grow and age. Young Douglas-fir trees tend to have brown to grey to silverish colored bark, and as trees mature the bark loses the silver hue. Also, the bark thickens with age and small, irregular bark plates with little furrowing mature to thicker bark with noticeable furrows. In older trees the bark is thick with furrows that are deep, wide, and long. This thickly furrowed bark can sustain woodpecker foraging holes and provides microhabitats for various wildlife species.

Branching – Younger Douglas-fir trees typically have branches pointed upward or horizontally throughout most of the tree's live crown's length, whereas older trees often have sagging, downward-pointing branches in much of the live crown's length.

The branching pattern of Douglas-fir is more uniform on younger trees than older. As trees age and are exposed to elements over time, the branching pattern becomes more varied and ragged due to shading from neighboring trees; wind, ice and snow damage; and nearby trees falling. The totality of these events over time causes the branching pattern to look more uneven and varied along the mid to upper tree bole of older trees. Furthermore, *epicormic branches* (those that develop from dormant buds within the bark of existing branches or at points along the tree's bole) often sprout when a tree's crown is damaged or suffers dieback. Epicormic branching along the tree bole is typical of older Douglas-fir and grand fir trees after crowns have been damaged or adjacent trees lost and the focal tree's bark is subsequently exposed to sunlight. These branches, in contrast to original branches, are easily identified as often there are several that originate from one spot on the tree's bole, and they take on a shelf-like appearance over time.

Crown shape – The overall shape of a Douglas-fir tree's crown changes as the tree matures from an A-shape crown profile to a more rounded top, and eventually to a broad crown with irregular width. This change is a result of slowing height growth as the tree approaches its maximum height and additional effects by wind or other damage to the crown of the tree during its lifetime.

Also, older trees that initially grew in more open conditions often have a longer vertical crown due to lack of shading from adjacent trees. Such trees that initially established and grew in open conditions that later had other trees grow around them could have large but dead lower branches which are a helpful visual key that the tree is likely older than the surrounding trees within the stand.

Diameter – Tree diameter increases as trees age, but because diameter growth rate is influenced heavily by site conditions (e.g., site productivity, stand density, disturbances, etc.), the relationship is not precise. Species should be taken into account as well as site index in concert with diameter because trees growing on productive sites can attain large diameters at a much earlier age than those on less productive sites.

Height – There is a strong and predictable relationship between Douglas-fir tree height and age such that older trees are generally taller than younger, until the breakage of tops as a result of wind, ice, lightning, etc. In addition to field observation, inspection of a LiDAR canopy height model can be useful for identifying taller trees.

Species – There may be restoration situations that require the removal of large, old Douglas-fir trees to release large trees of other species, such as white oak or madrone, so it's also important to take into account tree species.

Condition – Trees with physical damage to the bole or broken tops and/or trees with internal stem decay can be retained to provide habitat for wildlife.

Age – Thresholds involving tree age are challenging to establish because they are often set according to the time when European settlers began influencing forest composition and structure through fire suppression, and pinpointing an exact date for this is difficult because it was a gradual process. Furthermore, tree age is not feasible to use as a selection criterion operationally, because it is prohibitively time consuming to core each tree in stands planned for harvest to verify age. It is also physically impossible to core especially large trees or those with substantial heart rot or decay. All that said, older trees provide valuable contributions to forests and should be prioritized for retention, using the aforementioned characteristics for identification.

Situations where trees with desirable characteristics may be removed

Trees with the above characteristics may be selected for removal under some circumstances. Hazard trees are those that are at risk of falling or breaking and could be damaging to people, property, and/or infrastructure if they were to fall.

Trees near property lines, buildings, parking lots, roads, trails, utility assets, harvesting equipment, or cultural resources could be considered hazardous under situations such as the examples provided below.

- Trees with evidence of root or stem decay (e.g., presence of conks and other root and butt rot indicators).
- Trees with evidence of fire scars & charcoal, which can also lead to extensive internal decay.
- Trees with broken tops and other physical damage.
- Trees with dead tops.
- Trees with excessive lean.

Although trees with the above characteristics can provide beneficial forest structure, the same characteristics near human activity and/or assets become contextually hazardous. In addition, hazard trees require removal during harvest operations in accordance with OSHA regulations (OAR 437-007-0200 Site Planning and Implementation). During harvest operations, large, old trees may need to be removed from cable corridors when alternative corridors are not operationally available due to logistical or safety concerns.

Removal of trees in these situations would be on a case-by-case basis, assessed individually by research forest staff.

Appendix I. At-Risk Species Occurrence List

The Oregon Biodiversity Information Center (ORBIC) was originally formed by the Oregon Legislature in 1979 as the Oregon Natural Heritage Program. ORBIC is part of the Institute for Natural Resources (INR), and has as its key function the maintenance, development and distribution of biodiversity information in Oregon. The center hosts the most comprehensive database of rare, threatened and endangered species in Oregon.

The results of ORBIC's data system search in January 2024 for rare threatened, and endangered plant, animal, and fungi records for the McDonald-Dunn Forest and a one-mile radius around the perimeter is below. The Scientific name, Common name, type of organism, federal listing status, state listing status, date of most recent reporting, and range of dates of reporting are described for each species.

Federal Status: US Fish and Wildlife Service or National Marine Fisheries Service status that applies to Oregon populations. *C=candidate for listing with enough information available for listing. DL=Delisted (previously had a federal status). E=Endangered. SOC=species of concern, as assigned by the Portland Office of USFWS (taxa whose conservation status is of concern to USFWS, where further information is needed, or species that could use further conservation to keep them from becoming threatened or endangered). T=Threatened. UR=Under Review.*

State Status: For animals, Oregon Department of Fish and Wildlife status; *LE=listed endangered, LT=listed threatened, S=sensitive, SC=sensitive-critical. For plants, Oregon Department of Agriculture status: LE=listed endangered, LT=listed threatened, C=Candidate.*

Scientific Name	Common Name	Organism Type	Federal Status	State Status	Most Recent Reporting	Dates of Reporting
Acetropis americana	American grass bug	Invertebrate Animal	SOC		>50 years ago	1912-1972
Actinemys marmorata	Western pond turtle	Vertebrate Animal	SOC	SC	≤25 years ago	2002-2002
Bombus occidentalis	Western bumblebee	Invertebrate Animal	UR		≤25 years ago	2006-2006
Calicium adspersum	Lichen	Fungus			>25 years ago	1992-1998
Chloealtis aspasma	Siskiyou short-horned grasshopper	Invertebrate Animal	SOC		>50 years ago	1922-1922
Cimicifuga elata var. elata	Tall bugbane	Vascular Plant		C	>25 years ago	1993-1997
Corynorhinus townsendii	Townsend's big-eared bat	Vertebrate Animal		SC	>50 years ago	1956-1956
Criocoris saliens	Salien plant bug	Invertebrate Animal			>25 years ago	1962-1989
Dendrocoris arizonensis	Arizona stink bug	Invertebrate Animal			>50 years ago	1962-1962
Derephysia foliacea	Foliaceous lace bug	Invertebrate Animal			>50 years ago	1973-1973
Eremophila alpestris strigata	Streaked horned lark	Vertebrate Animal	T	SC	>25 years ago	1996-1997
Erigeron decumbens	Willamette Valley daisy	Vascular Plant	E	LE	>25 years ago	1996-1996

Scientific Name	Common Name	Organism Type	Federal Status	State Status	Most Recent Reporting	Dates of Reporting
Euphydryas editha taylori	Taylor's checkerspot	Invertebrate Animal	E		>25 years ago	1957-1996
Homoplectra schuhi	Schuh's homoplectran caddisfly	Invertebrate Animal			≤25 years ago	2013-2013
Hoplistoscelis heidemanni	Heidemann's damsel bug	Invertebrate Animal			>50 years ago	1924-1924
Horkelia congesta ssp. congesta	Shaggy horkelia	Vascular Plant	SOC	C	>50 years ago	1878-1923
Juga hemphilli hemphilli	Barren juga	Invertebrate Animal			>25 years ago	1989-1989
Lathyrus holochlorus	Thin-leaved peavine	Vascular Plant	SOC	LE	≤25 years ago	2014-2014
Lupinus oreganus	Kincaid's lupine	Vascular Plant	T	LT	≤25 years ago	1989-2008
Myotis thysanodes	Fringed myotis	Vertebrate Animal		S	≤25 years ago	2009-2010
Oncorhynchus mykiss pop. 33	Steelhead (Upper Willamette River ESU, winter run)	Vertebrate Animal	T	S	≤25 years ago	1999-2009
Phaeocollybia olivacea	Fungus	Fungus			>25 years ago	1995-1995
†Plebejus icarioides fenderi	Fender's blue	Invertebrate Animal	T		≤25 years ago	1989-2016
Pooecetes gramineus affinis	Oregon vesper sparrow	Vertebrate Animal	SOC	SC	≤25 years ago	2000-2000
Progne subis	Purple martin	Vertebrate Animal		SC	≤25 years ago	2011-2011
Schaereria dolodes	Lichen	Fungus			>25 years ago	1990-1990
Sidalcea nelsoniana	Nelson's sidalcea	Vascular Plant	DL	LT	≤25 years ago	2006-2012
**Speyeria callippe ssp. 1*	Willamette callippe fritillary	Invertebrate Animal			>25 years ago	1965-1989
**Speyeria zerene bremnerii*	Valley silverspot	Invertebrate Animal			>50 years ago	1973-1973
Strix occidentalis caurina	Northern spotted owl	Vertebrate Animal	T	LT	>25 years ago	1995-1998
Sulcaria badia	Lichen	Fungus			>25 years ago	1997-1997
Trillium kurabayashii	Giant purple trillium	Vascular Plant			≤25 years ago	2011-2011
Viola praemorsa ssp. praemorsa	Upland yellow violet	Vascular Plant			≤25 years ago	2007-2007

† species detected on the McDonald-Dunn Forest by USFWS in 2019; no surveys have been conducted for this species since this time
** species is now considered extinct in OR*

Appendix J. Invasive Plant Species List

This list of invasive plant species as of January 2024 was compiled from three data sources: iMapInvasives (iMap), EDDMaps, and iNaturalist. Plant species were eligible for this list if they were listed in the jurisdictional invasive species list within iMap for Benton or Polk Counties in Oregon; this includes 215 species. Common and scientific names listed are primarily attributed to iMap, though other source datasets (EDDMaps, iNaturalist) were consulted where naming discrepancies occurred. If at least one record of a species was recorded within the McDonald-Dunn Forest or Benton or Polk Counties, the value is labeled as "Y" for yes, indicating its presence. Values of "N" for no presence were assigned only at the county level. ODA labels refer to whether a species is listed as a high priority for control or eradication (designated with "A"), or "B" if priority for local control (OAR 603-052-1200). Those plants with target designations ("Y/"N") are either A or B weeds that are prioritized for control by the Oregon State Weed Board; records with a "-" value in this column mean that they were not listed as class A or B weeds. Biocontrol ("Y/"N") denotes whether a biological control agent was presently available for listed noxious weeds from the Oregon Department of Agriculture (ODA 2022).

Scientific Name	Common Names	McDonald-Dunn	Benton	Polk	ODA Label	Target	Bio-control
Abutilon theophrasti	velvetleaf	-	Y	Y	-	-	-
Acer platanoides	Norway maple	-	Y	Y	-	-	-
Acer pseudoplatanus	sycamore maple, planetree maple	-	Y	Y	-	-	-
Aegilops cylindrica	jointed goatgrass	-	Y	N	-	-	-
Aegilops triuncialis	barbed goatgrass	-	Y	N	-	-	-
Aegopodium podagraria	gout weed, bishop's gout weed	-	Y	Y	-	-	-
Agrostis capillaris	colonial bentgrass, browntop	Y	Y	Y	-	-	-
Agrostis gigantea	redtop	-	Y	N	-	-	-
Agrostis stolonifera	creeping bentgrass	-	Y	Y	-	-	-
Ailanthus altissima	tree of heaven, ailanthus, stinking sumac, varnish tree	-	Y	Y	-	-	-
Aira caryophyllea	silver hairgrass	Y	Y	Y	-	-	-
Aira praecox	spike hairgrass	-	Y	N	-	-	-
Ajuga reptans	common bugle, ajuga, bugleweed	-	Y	Y	-	-	-
Alliaria petiolata	garlic mustard	-	Y	Y	-	-	-

Scientific Name	Common Names	McDonald-Dunn	Benton	Polk	ODA Label	Target	Bio-control
Allium triquetrum	three-corner leek	-	Y	N	-	-	-
Allium vineale	wild garlic, cow garlic, field garlic	Y	Y	Y	-	-	-
Alopecurus geniculatus	water foxtail	-	Y	Y	-	-	-
Alopecurus myosuroides	blackgrass	-	Y	N	-	-	-
Alopecurus pratensis	meadow foxtail	Y	Y	Y	-	-	-
Amaranthus retroflexus	redroot amaranth, rough pigweed	-	Y	Y	-	-	-
Ambrosia artemisiifolia	annual ragweed, common ragweed	-	Y	Y	-	-	-
Anthemis arvensis	corn chamomile, field chamomile	-	Y	Y	-	-	-
Anthemis cotula	dog-fennel, mayweed chamomile, stinking chamomile	Y	Y	Y	-	-	-
Anthoxanthum odoratum	sweet vernalgrass	-	Y	Y	-	-	-
Anthriscus caucalis	bur chervil	-	Y	Y	-	-	-
Anthriscus sylvestris	wild chervil	Y	Y	N	-	-	-
Arabidopsis thaliana	thale cress, mouse-ear cress	Y	Y	Y	-	-	-
Arctium lappa	greater burdock	-	Y	Y	-	-	-
Arctium minus	common burdock	Y	Y	Y	-	-	-
Arrhenatherum elatius	tall oatgrass	Y	Y	Y	-	-	-
Artemisia absinthium	absinthe, absinthium, wormwood	-	Y	Y	-	-	-
Arum italicum	Italian arum, Italian lords-and-ladies	Y	Y	Y	-	-	-
Bassia scoparia	mock cypress, burning bush	-	N	Y	-	-	-
Berberis thunbergii	Japanese barberry	Y	Y	N	-	-	-
Betula pendula	European white birch	Y	Y	N	-	-	-
Borago officinalis	common borage	-	Y	N	-	-	-

Scientific Name	Common Names	McDonald-Dunn	Benton	Polk	ODA Label	Target	Bio-control
Brachypodium sylvaticum	false brome	Y	Y	Y	-	-	-
Bromus tectorum	cheatgrass, downy brome, downy chess	Y	Y	Y	B	N	N
Buddleja davidii	orange-eyed butterfly-bush, summer lilac	-	Y	Y	-	-	-
Butomus umbellatus	flowering rush	-	Y	N	-	-	-
Callitriche stagnalis	pond water-starwort	-	Y	N	-	-	-
Calystegia sepium	hedge bindweed	-	Y	Y	-	-	-
Carduus pycnocephalus	Italian thistle, compact-headed thistle	-	Y	Y	-	-	-
Carex pendula	pendulous sedge	Y	Y	N	B	N	Y
Cenchrus longispinus	longspine sandbur	-	Y	N	-	-	-
Centaurea cyanus	bachelor's button, cornflower	-	Y	N	-	-	-
Centaurea diffusa	diffuse knapweed, tumble knapweed	-	Y	Y	-	-	-
Centaurea jacea	brown knapweed	Y	Y	N	B	N	Y
Centaurea macrocephala	giant knapweed	-	Y	N	-	-	-
Centaurea melitensis	tocalote, Maltese starthistle	-	Y	N	-	-	-
Centaurea nigra	black knapweed, hardheads	-	Y	N	-	-	-
Centaurea nigrescens	short fringed knapweed	-	Y	N	-	-	-
Centaurea solstitialis	yellow starthistle, St. Barnaby's thistle	-	Y	Y	-	-	-
Chelidonium majus	celandine	-	Y	N	-	-	-
Chondrilla juncea	rush skeletonweed	-	N	Y	-	-	-
Chorispora tenella	chorispora, crossflower, purple mustard	-	N	Y	-	-	-
Cichorium intybus	chicory	-	Y	N	-	-	-
Cirsium arvense	Canada thistle, creeping thistle	-	Y	Y	-	-	-

Scientific Name	Common Names	McDonald-Dunn	Benton	Polk	ODA Label	Target	Bio-control
Cirsium vulgare	bull thistle, common thistle	Y	Y	Y	B	N	Y
Clematis vitalba	old man's beard, traveler's joy	Y	Y	Y	B	N	Y
Clinopodium vulgare	wild basil, savory	-	Y	Y	-	-	-
Conium maculatum	poison hemlock	-	Y	Y	-	-	-
Convolvulus arvensis	field morning-glory, field bind-weed	-	Y	Y	-	-	-
Cortaderia selloana	pampas grass	-	Y	Y	B	N	N
Corylus avellana	European hazel	-	Y	N	-	-	-
Cotoneaster franchetii	Franchet's cotoneaster	-	Y	Y	-	-	-
Crataegus monogyna	English hawthorn	Y	Y	N	-	-	-
Cyclamen hederifolium	ivy-leaved cyclamen	Y	Y	Y	B	N	N
Cynoglossum officinale	common hound's tongue, beggar's lice, gypsy flower	Y	Y	Y	-	-	-
Cyperus esculentus	yellow nutsedge, yellow nutgrass	-	Y	Y	B	N	N
Cytisus scoparius	Scots broom, Scotch broom	-	N	Y	-	-	-
Daphne laureola	spurge laurel, daphne laurel	Y	Y	Y	B	N	Y
Daucus carota	Queen Anne's lace, wild carrot	Y	Y	Y	B	N	N
Dianthus armeria	Deptford pink, grass pink	Y	Y	Y	-	-	-
Digitalis purpurea	Foxglove	Y	Y	Y	-	-	-
Dipsacus fullonum	wild teasel, Fuller's teasel	Y	Y	Y	-	-	-
Dysphania ambrosioides	Mexican tea, epazote, wormseed	Y	Y	Y	-	-	-
Egeria densa	Brazilian waterweed, South American waterweed	-	Y	Y	-	-	-
Elaeagnus umbellata	autumn olive	-	Y	Y	-	-	-

Scientific Name	Common Names	McDonald-Dunn	Benton	Polk	ODA Label	Target	Bio-control
Elymus repens	quackgrass	-	Y	Y	-	-	-
Epipactis helleborine	broad-leaved helleborine, helleborine	-	Y	N	-	-	-
Euchiton sphaericus	star cudweed, globe cottonleaf	-	Y	Y	-	-	-
Euphorbia esula	leafy spurge	Y	Y	N	-	-	-
Euphorbia lathyris	caper spurge, gopher plant, mole plant	-	Y	N	-	-	-
Euphorbia myrsinites	myrtle spurge	-	Y	Y	-	-	-
Euphorbia oblongata	eggleaf spurge	-	Y	N	-	-	-
Fallopia spp.	bindweed, knotweed	-	Y	Y	A	Y	N
Ficaria verna	lesser celandine	-	N	Y	-	-	-
Foeniculum vulgare	fennel	-	Y	Y	-	-	-
Genista monspessulana	French broom	-	Y	Y	-	-	-
Geranium lucidum	shining crane's bill	-	Y	N	-	-	-
Geranium robertianum	herb Robert, Robert's geranium, stinky Bob	Y	Y	Y	B	N	N
Geum urbanum	herb bennet	Y	Y	Y	B	N	N
Glechoma hederacea	ground ivy, creeping charlie, gill-over-the-ground	Y	Y	Y	-	-	-
Hedera helix	Atlantic ivy	-	Y	Y	-	-	-
Hedera hibernica	Atlantic ivy	Y	Y	Y	B	N	N
Heracleum mantegazzianum	giant hogweed	-	Y	Y	-	-	-
Hesperis matronalis	dame's-rocket, dame's-violet	-	N	Y	-	-	-
Holcus lanatus	velvetgrass	-	Y	Y	-	-	-
Hordeum murinum ssp. leporinum	hare barley	Y	Y	Y	-	-	-

Scientific Name	Common Names	McDonald-Dunn	Benton	Polk	ODA Label	Target	Bio-control
Humulus lupulus var. lupulus	Hop, common hop, hops	-	Y	N	-	-	-
Hyacinthoides hispanica	Spanish bluebell	-	Y	Y	-	-	-
Hyacinthoides non-scripta	English bluebell	Y	Y	Y	-	-	-
Hypericum calycinum	Aaron's beard	Y	Y	N	-	-	-
Hypericum perforatum	common St. John's wort	-	Y	Y	-	-	-
Hypochaeris radicata	hairy cat's-ear	Y	Y	Y	B	N	Y
Ilex aquifolium	English holly	Y	Y	Y	-	-	-
Impatiens balfourii	Kashmir balsam, Balfour's touch-me-not	Y	Y	Y	-	-	-
Impatiens capensis	spotted jewelweed, spotted touch-me-not	-	Y	N	-	-	-
Iris orientalis	yellowband iris	-	Y	Y	-	-	-
Iris pseudacorus	yellow flag, yellow water iris	-	Y	Y	-	-	-
Juglans nigra	black walnut	-	Y	Y	-	-	-
Juglans regia	English walnut, Persian walnut	-	Y	Y	-	-	-
Juncus compressus	round-fruited rush	-	Y	Y	-	-	-
Lamiastrum galeobdolon	yellow archangel	-	Y	N	-	-	-
Lapsana communis	nipplewort	-	Y	N	-	-	-
Lathyrus hirsutus	rough pea, Caley pea, hairy vetch	Y	Y	Y	-	-	-
Lathyrus latifolius	everlasting pea, perennial pea	-	Y	Y	-	-	-
Lathyrus sylvestris	flat pea	Y	Y	Y	B	N	N
Lepidium campestre	field cress, field pepperweed	-	Y	Y	-	-	-
Lepidium chalepense	lens-podded hoary cress, Chalapa hoary cress, lenspod whitetop	-	Y	Y	-	-	-

Scientific Name	Common Names	McDonald-Dunn	Benton	Polk	ODA Label	Target	Bio-control
Lepidium latifolium	broad-leaved peppergrass, broad-leaved pepperweed, perennial pepperweed	-	Y	N	-	-	-
Leucanthemum vulgare	ox-eye daisy	-	Y	N	-	-	-
Ligustrum vulgare	European privet	Y	Y	Y	-	-	-
Linaria dalmatica	Dalmatian toadflax	-	Y	Y	-	-	-
Linaria vulgaris	butter and eggs	-	Y	N	-	-	-
Lonicera periclymenum	European honeysuckle, woodbine	-	Y	Y	-	-	-
Lotus corniculatus	common bird's-foot trefoil	-	Y	N	-	-	-
Ludwigia hexapetala	primrose willow	-	Y	Y	-	-	-
Ludwigia peploides	floating primrose-willow	-	N	Y	-	-	-
Ludwigia spp.	primrose-willow	-	Y	Y	-	-	-
Lunaria annua	honesty, money-plant, moonwort, satin flower	-	Y	Y	-	-	-
Lychnis coronaria	mullein pink, rose campion	-	Y	Y	-	-	-
Lysimachia nummularia	creeping Jenny, moneywort	-	Y	N	-	-	-
Lysimachia punctata	large yellow loosestrife, dotted loosestrife	-	Y	Y	-	-	-
Lysimachia vulgaris	garden yellow loosestrife	-	N	Y	-	-	-
Lythrum salicaria	purple loosestrife	-	N	Y	-	-	-
Melilotus albus	white sweetclover	-	Y	Y	-	-	-
Melilotus officinalis	yellow sweetclover	-	Y	Y	-	-	-
Melissa officinalis	lemon balm, garden balm	-	Y	Y	-	-	-
Mentha aquatica	peppermint	Y	Y	Y	-	-	-
Mentha pulegium	pennyroyal	-	Y	Y	-	-	-

Scientific Name	Common Names	McDonald-Dunn	Benton	Polk	ODA Label	Target	Bio-control
Mentha spicata	spearmint	-	Y	Y	-	-	-
Mycelis muralis	wall lettuce	-	Y	Y	-	-	-
Myosotis scorpioides	common forget-me-not, water scorpion grass	Y	Y	Y	-	-	-
Myriophyllum aquaticum	South American water milfoil, parrot's feather	-	Y	N	-	-	-
Myriophyllum spicatum	Eurasian water milfoil, spiked water milfoil	-	Y	Y	-	-	-
Nasturtium officinale	watercress	-	Y	Y	-	-	-
Nymphoides peltata	yellow floatingheart	-	Y	Y	-	-	-
Oenothera glazioviana	red sepaled evening primrose	-	Y	Y	-	-	-
Ornithogalum umbellatum	star of Bethlehem, nap-at-noon, sleepy dick	-	Y	Y	-	-	-
Paulownia tomentosa	princess tree	-	Y	Y	-	-	-
Pentaglottis sempervirens	green alkanet, evergreen bugloss	-	Y	Y	-	-	-
Persicaria maculosa	redshank	-	Y	Y	-	-	-
Persicaria wallichii	Himalayan knotweed	-	Y	Y	-	-	-
Petasites fragrans	fragrant coltsfoot	-	N	Y	-	-	-
Phalaris aquatica	bulbous canarygrass	-	Y	N	-	-	-
Phalaris arundinacea	reed canarygrass	-	Y	Y	-	-	-
Phragmites australis ssp. australis	Old World common reed	-	Y	Y	-	-	-
Phytolacca americana	Pokeberry, pokeweed	-	N	Y	-	-	-
Poa trivialis	rough bluegrass	-	Y	Y	-	-	-
Populus alba	white poplar, silverleaf poplar, silver poplar	-	Y	Y	-	-	-
Potamogeton crispus	curled pondweed	-	Y	Y	-	-	-

Scientific Name	Common Names	McDonald-Dunn	Benton	Polk	ODA Label	Target	Bio-control
Potentilla recta	sulphur cinquefoil, erect cinquefoil	-	Y	Y	-	-	-
Prunus avium	sweet cherry	-	Y	Y	-	-	-
Prunus cerasifera	cherry plum	Y	Y	Y	-	-	-
Prunus laurocerasus	cherry laurel, hedge cherry laurel	Y	Y	Y	-	-	-
Prunus lusitanica	Portugal laurel	-	Y	Y	-	-	-
Quercus palustris	pin oak	Y	Y	Y	-	-	-
Quercus robur	English oak	-	Y	N	-	-	-
Ranunculus acris	meadow buttercup, tall buttercup	-	Y	N	-	-	-
Ranunculus repens	double flowered creeping buttercup	-	Y	Y	-	-	-
Robinia pseudoacacia	black locust	Y	Y	Y	-	-	-
Rorippa sylvestris	creeping yellowcress, shore yellowcress	Y	Y	Y	-	-	-
Rosa canina	dog rose	-	Y	Y	-	-	-
Rosa eglanteria	sweet briar rose, eglantine rose	-	Y	Y	-	-	-
Rosa multiflora	multiflower rose	Y	Y	Y	-	-	-
Rosa rugosa	Japanese rose	Y	Y	Y	-	-	-
Rubus bifrons	Himalayan blackberry	-	Y	N	-	-	-
Rubus laciniatus	evergreen blackberry, cut leaved blackberry	Y	Y	Y	B	N	N
Rubus vestitus	European blackberry	Y	Y	Y	-	-	-
Rumex obtusifolius	bitter dock	-	Y	Y	-	-	-
Salvia sclarea	clary sage, clear-eye, Europe sage, eye-bright	Y	Y	Y	-	-	-
Saponaria officinalis	bouncing-bet	-	N	Y	-	-	-
Securigera varia	crown vetch, purple crown vetch	-	Y	Y	-	-	-

Scientific Name	Common Names	McDonald-Dunn	Benton	Polk	ODA Label	Target	Bio-control
Senecio jacobaea	tansy ragwort, stinking willie	Y	Y	Y	-	-	-
Silybum marianum	milk thistle	Y	Y	Y	B	Y	Y
Sisymbrium officinale	hedge mustard	-	Y	Y	B	N	Y
Solanum dulcamara	bittersweet, bitter nightshade, bittersweet nightshade, climbing nightshade	Y	Y	Y	-	-	-
Solanum rostratum	buffalobur, spiny nightshade	Y	Y	Y	-	-	-
Sonchus arvensis	perennial sow-thistle	-	Y	Y	-	-	-
Sonchus arvensis ssp. arvensis	corn sow-thistle	-	Y	N	-	-	-
Sonchus oleraceus	common sow-thistle	-	Y	N	-	-	-
Sorbus aucuparia	European mountain ash, rowan	Y	Y	Y	-	-	-
Sorghum halepense	Johnson grass	-	Y	Y	-	-	-
Spartina densiflora	dense-flowered cordgrass	-	Y	N	-	-	-
Sphaerophysa salsula	Austrian peaweed, alkali swainsonpea, swainsona	-	Y	N	-	-	-
Symphytum officinale	common comfrey	-	N	Y	-	-	-
Taeniatherum caput-medusae	medusahead	-	Y	N	-	-	-
Tanacetum vulgare	common tansy	-	Y	Y	-	-	-
Torilis arvensis	field hedge parsley, tall sock-destroyer	-	Y	Y	-	-	-
Torilis japonica	Japanese hedge parsley, Japanese sock-destroyer	Y	Y	Y	-	-	-
Tribulus terrestris	puncture vine, bullhead, caltrop, goat's head	-	Y	Y	-	-	-
Ulex europaeus	common gorse	-	Y	N	-	-	-
Ventenata dubia	ventenata, North Africa grass	-	Y	Y	-	-	-

Scientific Name	Common Names	McDonald-Dunn	Benton	Polk	ODA Label	Target	Bio-control
Verbascum blattaria	moth mullein	-	Y	Y	-	-	-
Verbascum thapsus	common mullein, cowboy toilet paper, flannel plant, great mullein	Y	Y	Y	-	-	-
Verbena bonariensis	purple-topped vervain, Brazilian vervain, cluster-topped vervain, tall verbena	-	Y	Y	-	-	-
Vinca major	greater periwinkle, large periwinkle	-	Y	N	-	-	-
Vinca minor	lesser periwinkle, common periwinkle	Y	Y	Y	-	-	-
Vitis vinifera	wine grape	-	Y	Y	-	-	-

Appendix K. Invasive Animal Species List

The list of invasive animal species is compiled from three main data sources: iMapInvasives (iMap), EDDMaps, and iNaturalist. Data presented here are reported as of January of 2024. Animal species were included on this list if they were present in the jurisdictional invasive species list within iMap; this includes 39 species across all taxa, eight of which have been reported in McDonald-Dunn Forest according to these sources. Common and scientific names listed are primarily attributed to iMap, though other source datasets (EDDMaps, iNaturalist) were consulted where naming discrepancies occurred. If at least one record of a species was recorded within the McDonald-Dunn Forest or Benton or Polk Counties, the value is labeled as “Y” for yes, indicating its presence. Values of “N” for no were assigned only at the county level. “Legal Status” refers to an animal’s status under the Oregon Department of Fish and Wildlife; a prohibited label means that the species may not be “imported, possessed, sold, purchased, exchanged or transported in the state” (OAR 635-056-0050), whereas a “controlled” animal is one that has all of the implications of being prohibited but also has controls in place to protect native wildlife (OAR 635-056-0070).

Scientific Name	Common Names	Animal Type	McDonald-Dunn	Benton	Polk	Legal Status
Agrilus cyanescens	A metallic wood-boring beetle	insect	-	Y	N	-
Ameiurus melas	Black Bullhead	fish	-	Y	N	-
Ameiurus natalis	Yellow Bullhead	fish	-	Y	Y	-
Ameiurus nebulosus	Brown Bullhead	fish	-	Y	N	-
Arion hortensis	Garden Arion	mollusk	-	Y	Y	-
Bipalium adventitium	Wandering Broadhead Planarian	worm	-	Y	N	-
Carassius auratus	Goldfish	fish	Y	Y	N	-
Chelydra serpentina	Snapping Turtle	reptile	-	Y	N	Prohibited
Cipangopaludina chinensis	Chinese Mysterysnail	mollusk	-	Y	Y	Prohibited
Cipangopaludina japonica	Japanese Mysterysnail	mollusk	-	N	Y	-
Corbicula fluminea	Asian Clam	mollusk	-	Y	Y	-
Cyprinus carpio	European Carp	fish	-	Y	Y	-
Deroceras reticulatum	Milky Slug	mollusk	Y	Y	Y	-
Drosophila suzukii	Spotted-wing Drosophila	insect	-	Y	N	-
Eupteryx decemnotata	Ligurian Leafhopper	insect	-	Y	N	-
Gambusia affinis	Western Mosquitofish	fish	-	Y	Y	-

Scientific Name	Common Names	Animal Type	McDonald-Dunn	Benton	Polk	Legal Status
Halyomorpha halys	Brown Marmorated Stink Bug	insect	Y	Y	Y	-
Ictalurus punctatus	Channel Catfish	fish	-	Y	N	-
Lepomis gibbosus	Pumpkinseed	fish	-	Y	N	-
Lepomis gulosus	Warmouth	fish	-	Y	N	-
Lepomis macrochirus	Bluegill	fish	Y	Y	Y	-
Lepomis microlophus	Redear Sunfish	fish	-	Y	N	-
Lithobates catesbeianus	American Bullfrog	amphibian	Y	Y	Y	Controlled
Micropterus dolomieu	Smallmouth Bass	fish	-	Y	Y	-
Micropterus salmoides	Largemouth Bass	fish	-	Y	Y	-
Myocastor coypus	Nutria	mammal	-	Y	Y	Prohibited
Nebria brevicollis	European Gazelle Beetle	insect	Y	Y	Y	-
Pectinatella magnifica	Magnificent Bryozoan	bryozoan	-	Y	Y	-
Perca flavescens	Yellow Perch	fish	-	Y	N	-
Piaractus brachypomus	Redbellied Pacu	fish	-	Y	N	-
Pomoxis annularis	White Crappie	fish	-	Y	N	-
Pomoxis nigromaculatus	Black Crappie	fish	-	Y	N	-
Popillia japonica	Japanese Beetle	insect	-	N	Y	-
Potamopyrgus antipodarum	New Zealand Mudsnail	mollusk	-	Y	N	-
Procambarus clarkii	Red Swamp Crawfish	crustacean	-	Y	N	Prohibited
Siphoninus phillyreae	Ash Whitefly	insect	-	Y	Y	-
Streptopelia decaocto	Eurasian Collared-Dove	bird	-	Y	Y	-
Sus scrofa	Wild Boar	mammal	-	Y	N	-
Trachemys scripta elegans	Red-eared Slider	reptile	-	Y	N	Prohibited

Oregon State University
College of Forestry