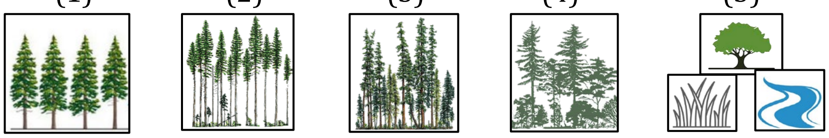
Spring 2024 McDonald-Dunn Research Forest Plan Development
Request for Your Input on Alternative Land Allocation Scenarios

Background:

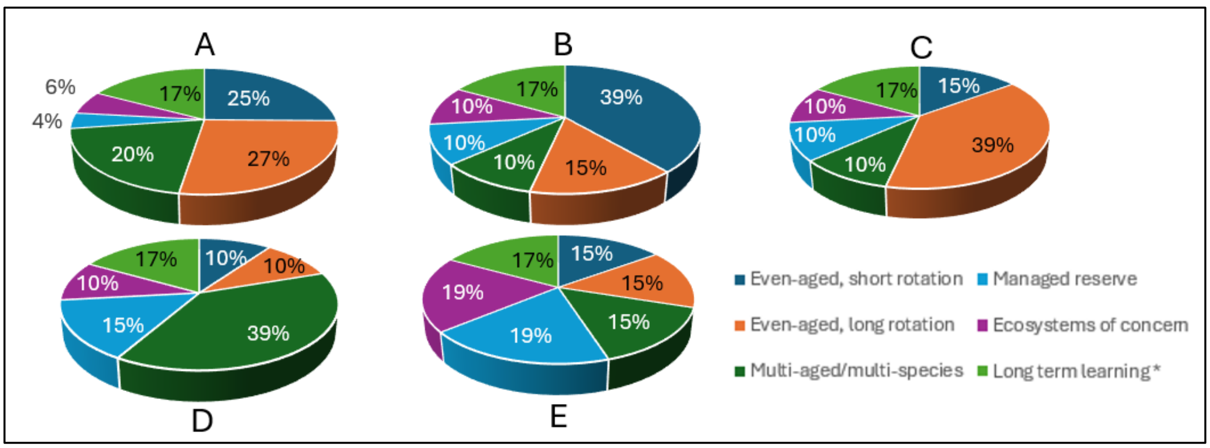
1. Forest management is complex. We're using mathematical programming as a tool to make data-driven decisions. This modeling assists in making decisions on what areas of the forest to harvest and when, by assigning management activities to each forest stand and then simulating the resulting future forest conditions. This allows us to evaluate trade-offs among management options before they are implemented.

2. The 5 new 'forest management strategies' that will be implemented across the forest to enable learning, research, and demonstration opportunities are: (1) even-aged short rotation, (2) even-aged long rotation, (3) multi-aged, multi-species, (4) managed reserves, and (5) ecosystems of concern – includes oak savanna, meadows, and riparian. A summary of the management strategies can be found on page 3 and more thorough descriptions are posted online [here]().

(1) (2) (3) (4) (5)



3. Modeling will aid in our decisions about what proportion of the forest to devote to each of the management strategies. In this first round of modeling, we're exploring tradeoffs among 5 land allocation scenarios: (A) baseline – current conditions, (B) extensive even-aged short rotation, (C) extensive even-aged long rotation, (D) extensive multi-aged multi-species, and (E) extensive managed reserves and ecosystems of concern.



4. Keeping in mind the vision, mission, and goals of the Research Forests, as well as input received from the *Stakeholder Advisory Committee* and 2022 *Community Input Sessions*, we developed 8 measures to help us assess tradeoffs among the 5 initial land allocation scenarios described above. These measures include biodiversity, carbon storage, forest products, recreation acceptability, resilience (tree density), resilience (tree composition), revenue, and wildfire resistance. Each of these is defined on the following pages.

5. We request your input on (1) **which scenario you find most preferable**, (2) **which scenario you find least preferable**, (3) **which additional land allocation scenario you would like to see explored in future modeling**, and (4) **which forest values you care most and least about**.

Research Forests
Vision, Mission, and Goals

Oregon State University and the College of Forestry are stewards of 10 separate tracts of land around the state. This document articulates the collective vision, mission, and goals for the College of Forestry's Research Forests. It reflects how we value our forests, and the benefits we wish to derive from them, now and in the future. Just as college and unit strategic plans are reflections of OSU's strategic priorities, individual forest management and tactical plans will strive to meet the goals in this document to ensure the Research Forests achieve their vision and mission.

Vision:

The OSU Research 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 our broader citizenship.

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.

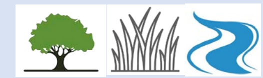
Community Connections - Establish, maintain, and enhance relationships and communication with neighbors, the broader community, and all those connected with the Research Forests.

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.

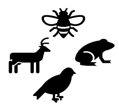
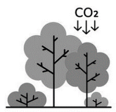
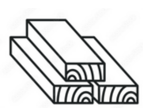
Continuous Improvement - Demonstrate a commitment to continuous improvement in the management and stewardship of the Research Forests based on adaptive management principles.

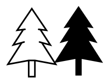
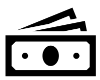
McDonald-Dunn Research Forests draft guidelines for each new 'Management Strategy'

	 **Even-aged short rotation**	 **Even-aged long rotation**	 **Multi-aged multi-species**	 **Managed reserves**	 **Ecosystems of concern**
Guiding Principles	*Manage in a way that creates learning and research opportunities about short-rotation forestry and early seral conditions, under the principle of financial sustainability, informed by both Indigenous knowledge and Western science.*	*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, informed by both Indigenous knowledge and Western science.*	*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.*	*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.*
Brief Summary	Even-aged plantations of Douglas-fir (or other climatic-appropriate species and genetic stock) will be established and managed to be financially competitive by maximizing yields of wood products valuable for domestic mills. Clearcut harvests will not exceed 80 acres (with limited exceptions due to large-scale disturbances). Rotation lengths will be regulated primarily by age that maximizes net revenue production.	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 largescale disturbances). ~10% of hardwood trees and/or resprouts will	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 and visual aesthetics. Multiple native tree species will be encouraged. These harvests will not exceed 40 acres. *<u>Shelterwood-with-residuals</u>* - Final harvest of understory trees will be 60-70 years. The age of the oldest trees harvested from these stands will be 60-120	These areas will be held and conserved outside the management base using only a light touch when needed to promote and maintain historical older-forest structural and compositional diversity, visual aesthetics, and provide for public safety. Forest succession and developmental processes following natural disturbances will proceed with little human intervention. Areas added to the existing reserve base	Restoration and maintenance activities will be undertaken in native oak savanna/woodlands, meadows, 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.

	~5% of hardwood trees and/or resprouts will be identified and purposely left free to grow in the understory. Rotations will be 30-60, likely 35-45 years.	be identified and purposed left free to grow in the understory throughout the rotation. Rotations typically will be 60-90 years, with <10% managed to 120 years.	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 harvest will occur every 15-30 years to create 3-4 age classes.	may need more active operations to promote the development of historical conditions. The age of the oldest trees in these stands will continue to increase over time adding to the age-class diversity across the forest.	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 species, tree age may decrease as they achieve senescence and die.

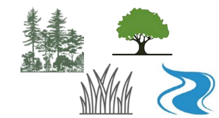
Metrics to be used to evaluate tradeoffs among land use allocation scenarios for the McDonald-Dunn Forest

Forest Value		What does the measurement reflect?	How to interpret what is acceptable or desirable?
Biodiversity		• An index of habitat suitability for 6 focal taxa (bees, early successional birds, late successional birds, red tree voles, ungulates, amphibians) • Values range from 0 to 5	• Lower values indicate lower habitat suitability for all focal taxa across the entire forest. • Higher values indicate greater habitat suitability for all focal taxa across the entire forest.
Carbon storage		• Amount of carbon in live trees, in metric tons • Values could range from a minimum of 0 to maximum a site could support	• Lower values could mean lesser amounts of fuel that increases wildfire hazard. • Higher values indicate additional sequestering of atmospheric carbon and may generate revenue if carbon markets emerge.
Forest products		• Volume of harvested timber, in board feet • Values could range from a minimum of 0 to maximum a site could support	• Total volume is influenced by the amount of each product type created (poles vs lumber vs pulpwood).
Recreation acceptability		• A measure of recreationists' perceptions of aesthetic acceptability of forest conditions • Ratings were on a scale of 1 to 5, with 1 being *very unacceptable* and 5 *very acceptable*	• Lower values reflect lower acceptability of forest conditions across forest recreation users. • Higher values reflect greater acceptability of forest conditions across forest recreation users.
Resilience-density		• A measure of forest density, derived as stand density index (SDI) relative to maximum possible stand density index in the region • Raw values could range from 0 to 100%, and were converted to scores of 0 to 5 to simplify interpretation (see score descriptions at right)	• Lower values reflect lower resilience often associated with dense stands that experience greater individual tree stress. **0** = ≥75% (conditions where even co-dominant-sized trees are stressed and dying) **1** = 65-75% (conditions reflect a thick stand; trees undergo high stress; many standing dead trees are present) **2** = 55-65% (conditions reflect the onset of self-thinning mortality, first expressed only in the smallest tree classes) **3** = 45-55% (conditions provide for optimal stand-level growth rates) **4** = 35-45% (moderately open space; similar to conditions after a heavy thinning) **5** = <35% of maximum SDI (open space such that regeneration is likely; similar to conditions following a shelterwood harvest)

Resilience-composition		• A measure of Douglas-fir dominance, derived as % of total basal area that is some tree species **other than** Douglas-fir • % Non-Douglas-fir basal area (NDFBA) = 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 (see score descriptions at right)	• Lower values indicate forests dominated by a single species (Douglas-fir), which may mean greater susceptibility to stressors associated with changing climatic conditions, such as drought and pressure from insects and pathogens. • Higher values indicate greater prevalence of trees of other species, which may mean lower stand-level susceptibility to stressors. **0** = 0 % | **1** = 0.01 – 10.0 % | **2**= 10.01 – 20.0 % **3** = 20.01 – 30.0 % | **4** = 30.01 – 40.0 % | **5** = > 40 % NDFBA
Revenue		• Total income versus expenditures, in $ • Values could range from a minimum of 0 to some maximum	• Reflects revenue earned through timber harvest minus that used for reforestation, restoration of Ecosystems of Concern, invasive species treatment, fuel reduction, roads and buildings, recreation, and all other maintenance needs and salaries and operational expenses.
Wildfire resistance		• A measure of stand resistance to wildfire incorporating average stand-level *crown bulk density* (the density of available canopy fuel in a stand, CBD) and *canopy base height* (the average height from the ground to the average canopy bottom), CBH • Wildfire Resistance = Sum Scores (CBD + CBH) after converting CBD and CBH scores from raw numbers to 0, 1, 2 • Values range from 0 to 4 (see score descriptions at right)	• Lower values indicate less resistance to wildfire, due to abundant crown fuels and low canopy base height that could enable surface fires to transition into active crown fire. • Scores range from 0 to 4, with interpretations below. **0** = very low | **1** = low | **2** = moderate | **3** = high | **4** = very high

Data for assessing tradeoffs among land allocation scenarios through relative comparisons with baseline



Forest Value (averaged across 5-year period)	2024 Scenario A (baseline)	Scenario B (lots of EASR)	Scenario C (lots of EALR)	Scenario D (lots of MAMS)	Scenario E (lots of MR & EOC)
Biodiversity (avg across all taxa)	1.58	1.41	1.41	1.38	1.17
Carbon storage	1,033,578T	1,121,824T	1,134,613T	1,597,314T	1,456,981T
Forest products	30MMBF	25MMBF	26MMBF	22MMBF	19MMBF
Net revenue	$9.6 Mil	$7.1 Mil	$7.5 Mil	$5.9 Mil	$ 4.0 Mil
Recreation acceptability	3.42	3.44	3.48	3.58	3.60
Resilience - density	2.55	2.42	2.44	1.33	1.62
Resilience - composition	1.59	1.62	1.61	1.91	1.85
Wildfire resistance	2.68	2.68	2.66	2.49	2.55

Forest Value (averaged across 5-year period)	Scenario A (baseline)	Scenario B (lots of EASR)	Scenario C (lots of EALR)	Scenario D (lots of MAMS)	Scenario E (lots of MR & EOC)
Biodiversity (avg across all taxa)	1.58	-11%	-11%	-13%	-26%
Carbon storage	1,033,578T	+9%	+10%	+55%	+41%
Forest products	30MMBF	-15%	-12%	-28%	-36%
Net revenue	$9.6 Mil	-26%	-22%	-39%	-58%
Recreation acceptability	3.42	+1%	+2%	+5%	+5%
Resilience - density	2.55	-5%	-4%	-48%*	-36%*
Resilience - composition	1.59	+2%	+1%	+20%	+16%
Wildfire resistance	2.68	no change	-1%	-7%	-5%

Color-coding	Considerable increase (>50%)	Modest increase (10-50%)	Little change (10% increase – 10% decrease)	Modest decrease (10-50%)	Considerable decrease (>50%)