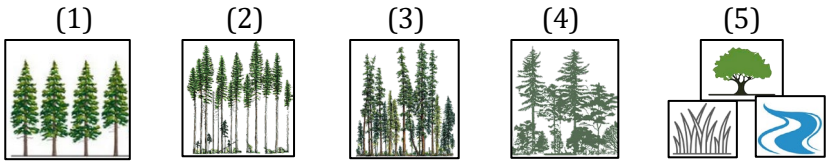
Spring 2024 McDonald-Dunn Research Forest Plan Development
Request for Your Input on Alternative Land Allocation Scenarios

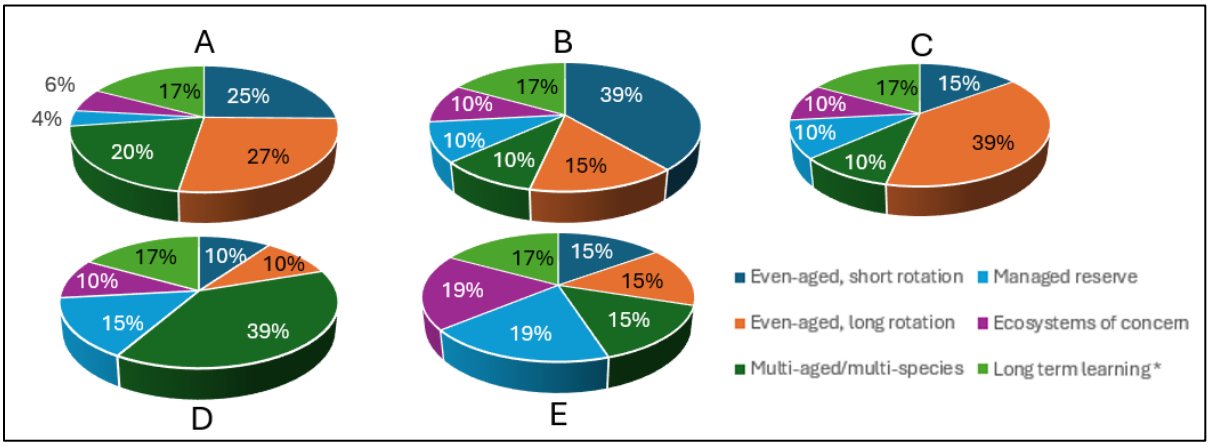
Background:

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. Guidelines describing details about the management strategies can be found here.



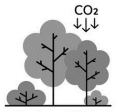
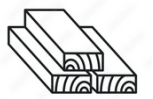
3. Modeling will aid in our decisions about what proportion of the forest to devote to each of the management strategies. In this first round of modeling, we're exploring tradeoffs among 5 land allocation scenarios: (A) baseline – current conditions, (B) extensive even-aged short rotation, (C) extensive 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) what values you believe should be emphasized and promoted in future scenarios**.

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)

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<td>Resilience-composition</td>
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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)

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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.

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<tr><td>0 = 0 %</td><td>1 = 0.01 – 10.0 %</td><td>2= 10.01 – 20.0 %</td></tr>
<tr><td>3 = 20.01 – 30.0 %</td><td>4 = 30.01 – 40.0 %</td><td>5 = > 40 % NDFBA</td></tr>
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<td>Revenue</td>
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Total income versus expenditures, in $
Values could range from a minimum of 0 to some maximum

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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.

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<td>Wildfire resistance</td>
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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)

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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.

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<tr><td>0 = very low</td><td>1 = low</td><td>2 = moderate</td><td>3 = high</td><td>4 = very high</td></tr>
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Data for assessing tradeoffs among land allocation scenarios through relative comparisons with baseline

	2024				
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	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%)