Managing for Resilient Structure and Pattern in Dry Forests

Chelan County Resilience Round Table

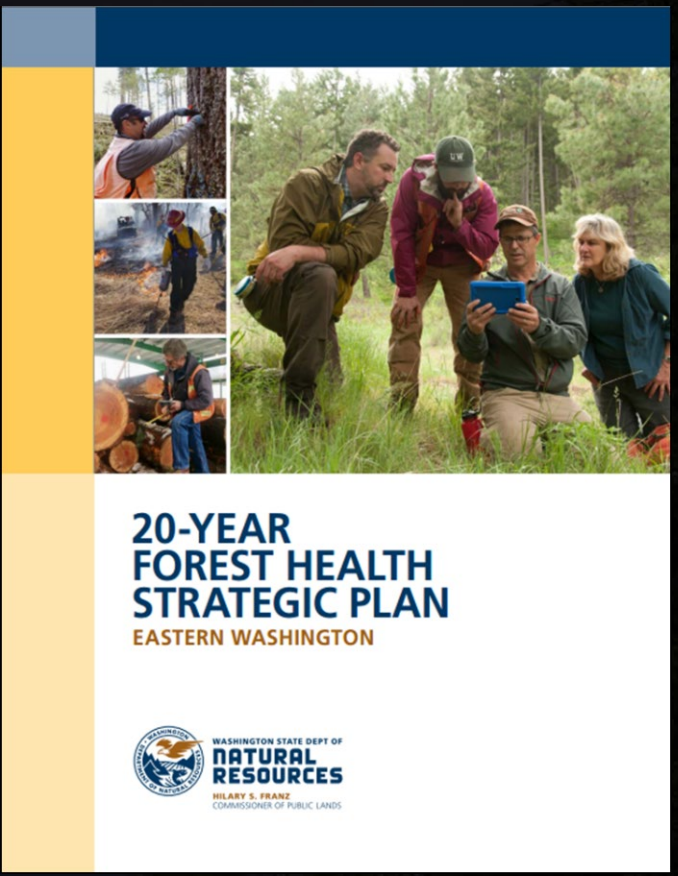
October 2023

Derek Churchill

Forest Resilience Division
WA Department of Natural Resources

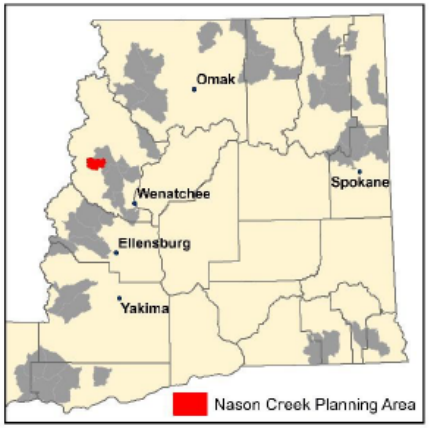
Overview

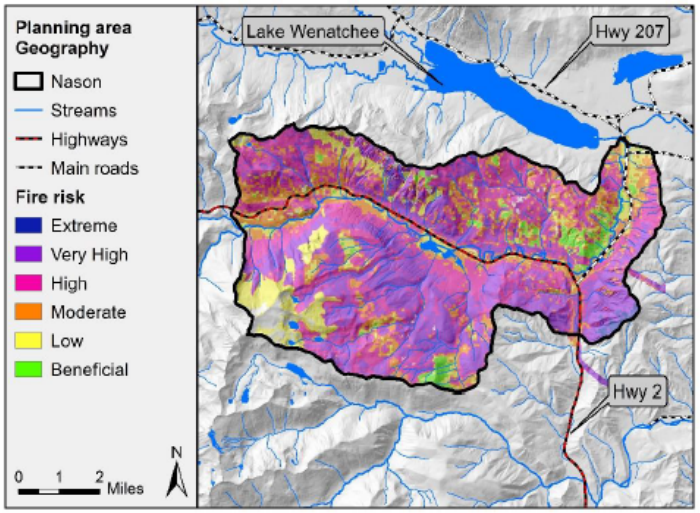
1. Using landscape evaluations to guide treatment locations
2. Stand-level treatments in dry forests
3. Increasing resilience and adaptive capacity



NASON CREEK PLANNING AREA LANDSCAPE EVALUATION SUMMARY (2020)

Total Acres	Forested Acres	Treatment Goal (Acres)
31,679	29,243	6,750 - 11,500





Above: Figure 1. Planning area location.
Right: Figure 2. Planning area geography and fire risk to forests, homes, and infrastructure.

Planning Area Highlights

https://bit.ly/ForestHealthData

Nason Creek Treatment Targets

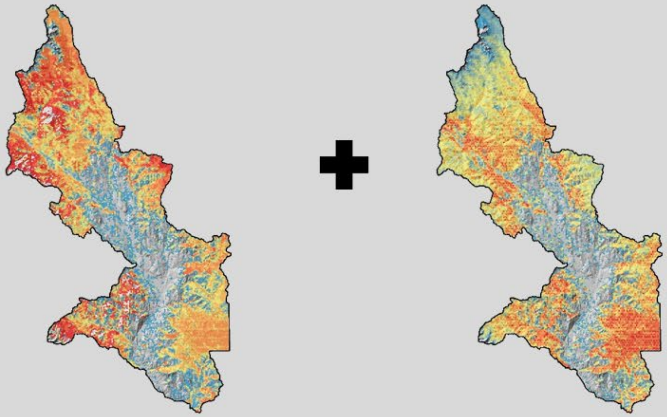
Total Acres	Forested Acres	Treatment Goal (Acres)
31,679	29,243	6,750 - 11,500

Table 1. Summary of forest health treatment needs *(range represents low and high end of treatment need).*

Forest conditions to treat		Treatment need (acres)	Current acres by major landowner*				
Type	**Size class**		**USFS**	**Industrial**	**Community**	**Private**	**DNR**
Dry Dense	Small	250 - 500	20	159	726	114	0
	Medium-Large	3,500 - 4,000	3,719	191	175	979	177
Moist Dense	Small	500 - 1,500	239	801	795	264	0
	Medium-Large	1,500 - 4,000	4,672	524	78	671	249
Dry + Moist Open	Medium-Large	1,000 - 1,500	626	846	611	300	30
Total		**6,750 - 11,500**	**These are current acres, not targets*				
Anticipated treatment type		Noncommercial thin plus fuels treatment. May be fire only (prescribed or managed wildfire).					
		Commercial thin plus fuels treatment if access exists. May be noncommercial, fire only (prescribed or managed wildfire), or regeneration treatment.					
		Maintenance treatment: prescribed fire, managed wildfire, or mechanical fuels treatment. *Target range corresponds to 50-75% of dry open and 25-50% of moist open forests.*					

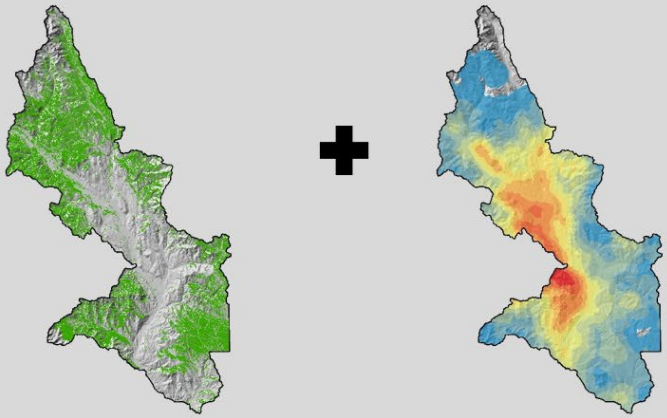
Forest fire risk

Drought vulnerability



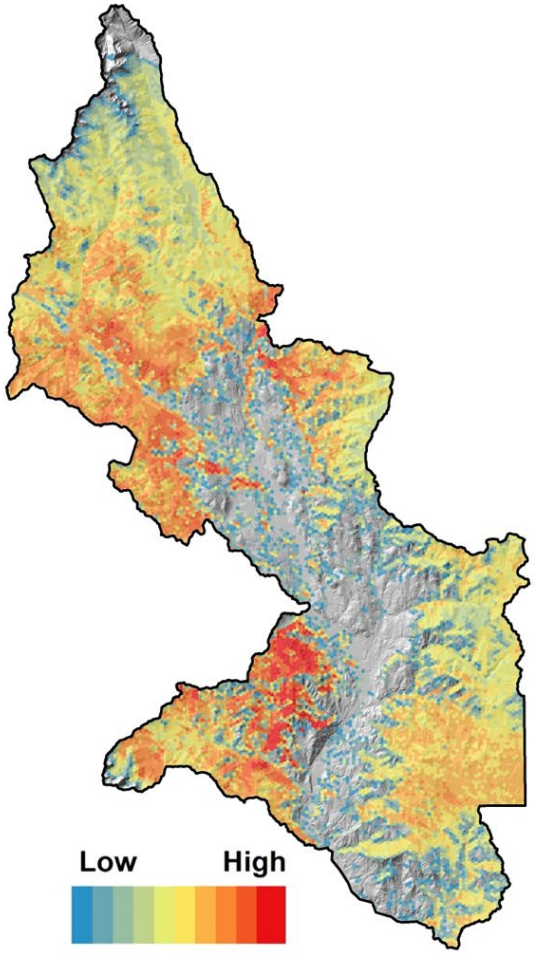
Overabundant forest structure

Wildfire transmission to homes



Low High

Landscape Treatment Priority



➢ ***Prioritization is information, not mandate***

Nason Creek

Landscape treatment priority

High

Low

Current 1981-2010

Future 2041-2070

Moisture deficit

- Low
- Moderate
- High
- Very high

Moisture deficit is a measure of water stress faced by plants.

0 1 2 Miles

N

0 1

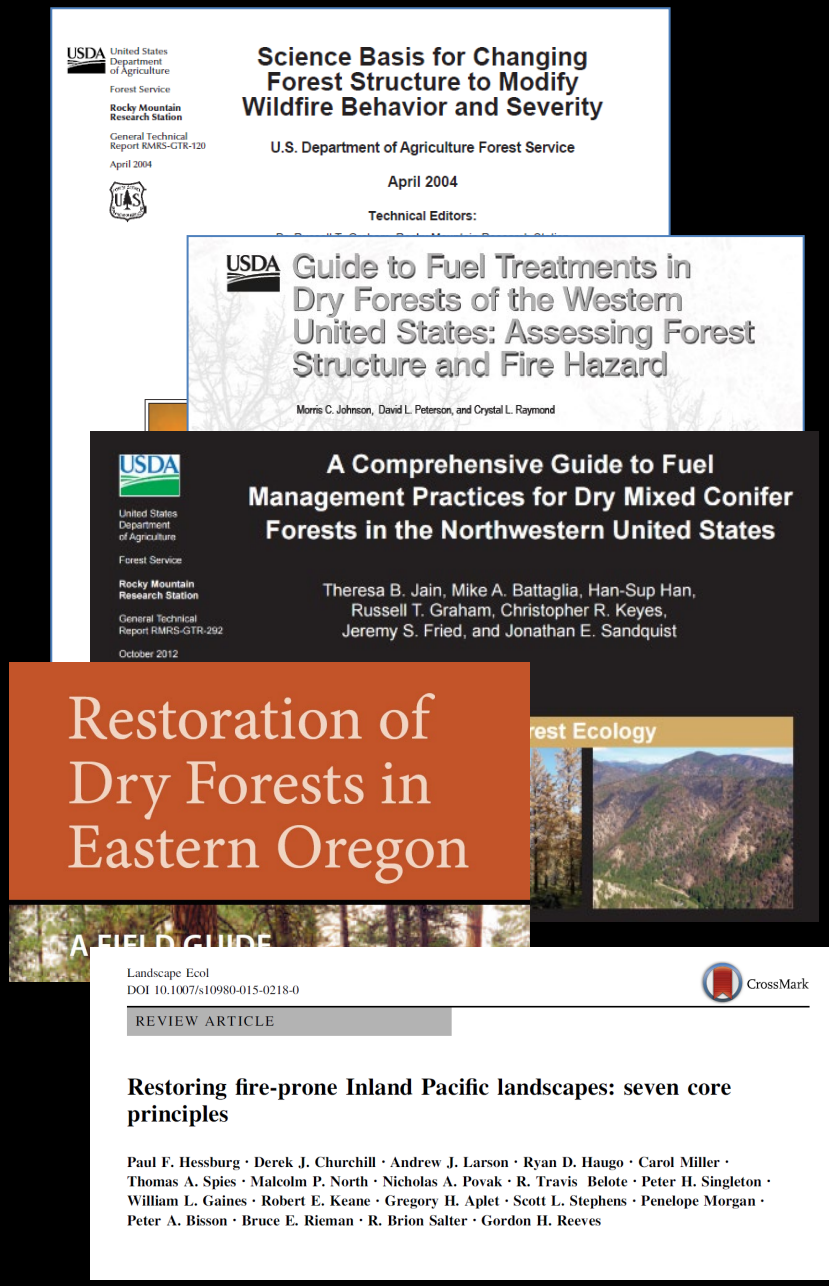
Stand Level Restoration: Dry - Frequent Fire Forests

Illustrations courtesy Robert Van Pelt, 2008

Stand Level Restoration: Frequent Fire Forests

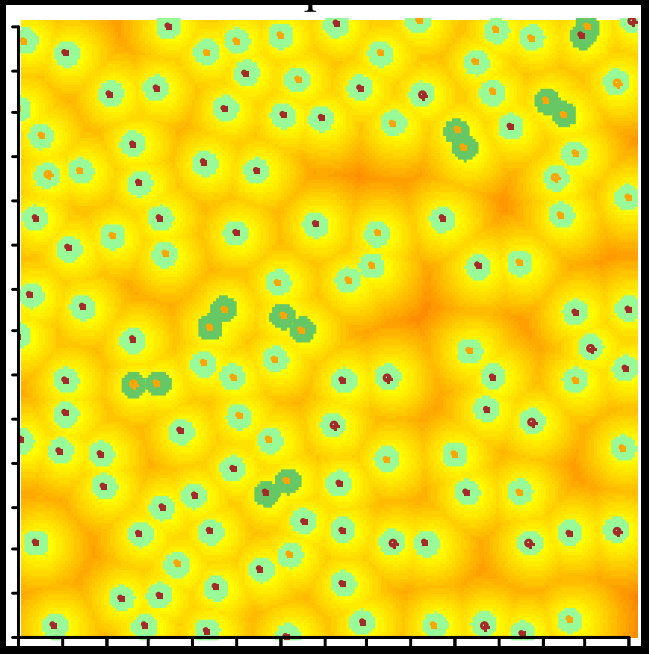
1. Retain & release large & old trees
2. Shift composition to fire and drought tolerant species
3. Thin primarily from below: Reduce ladder fuels
4. Reduce surface fuels & promote understory: prescribed fire

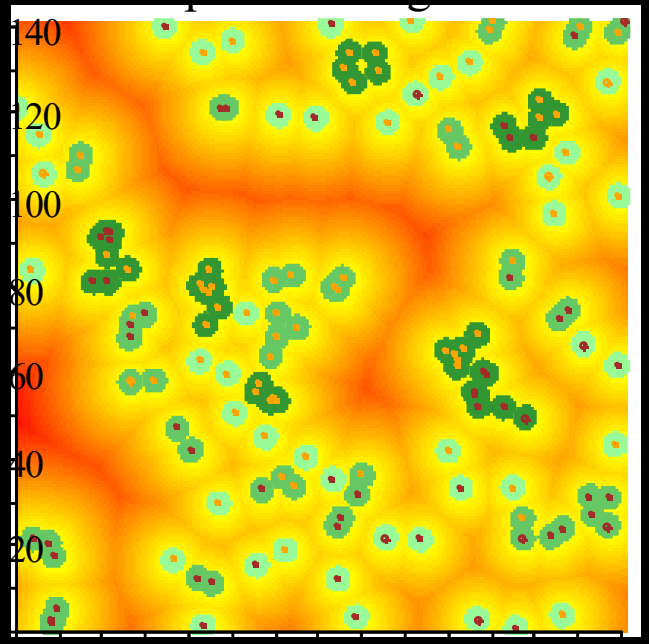
Restore a mosaic spatial pattern



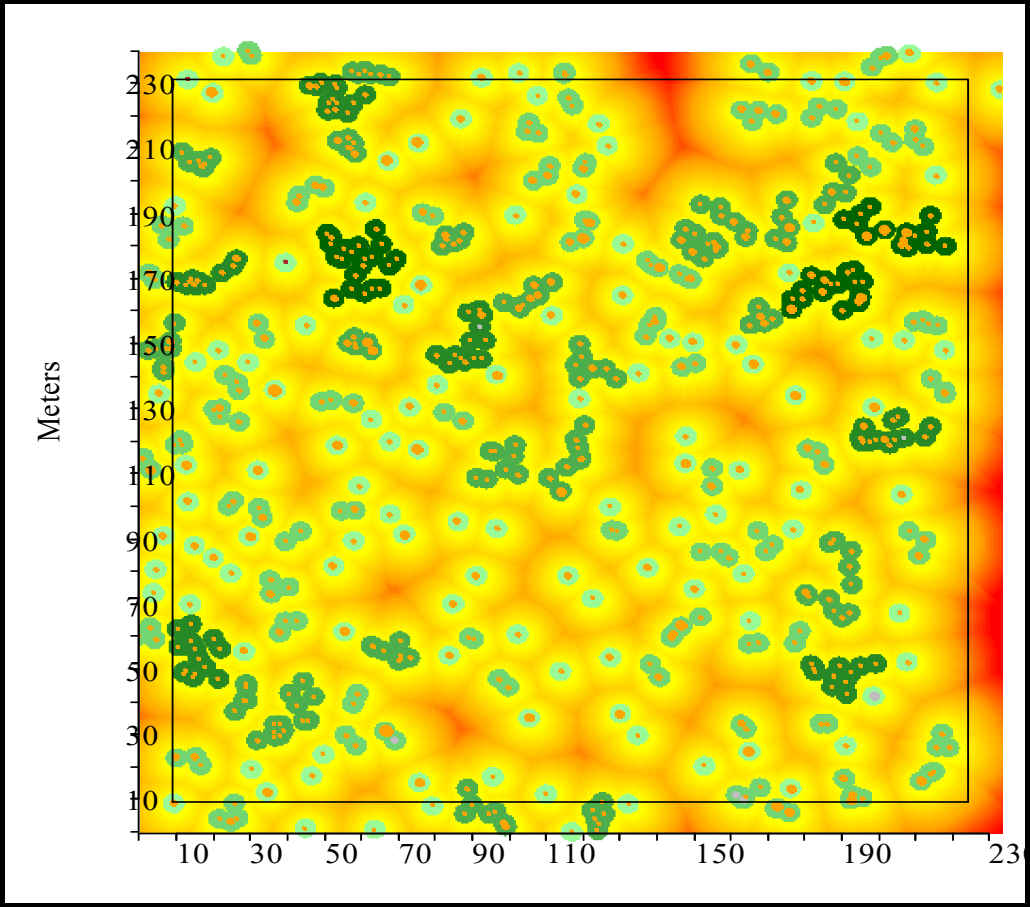
Active Frequent-Fire Forests

Stand Level Restoration: Frequent Fire Forests

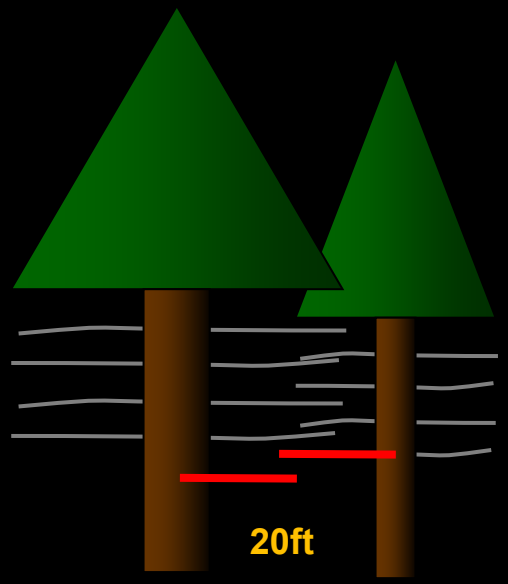




ICO
(Individuals, Clumps & Openings)



20 ft: Max crown interlock distance



	Clump Proportions				
	Clump Size (# of Trees)				
	1	2-4	5-9	10-15	16-30
Trees	0.21	0.29	0.25	0.15	0.11
Basal Area	0.31	0.3	0.2	0.09	0.09

Small Clumps

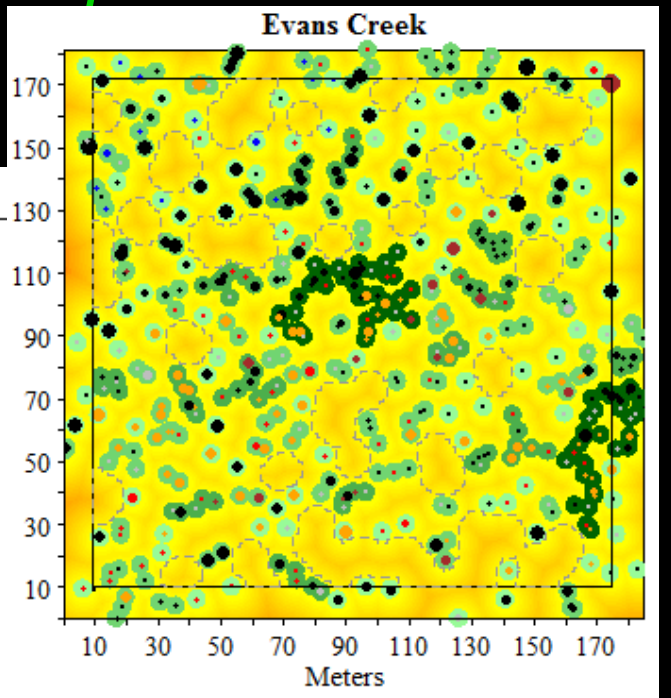
Medium Clumps

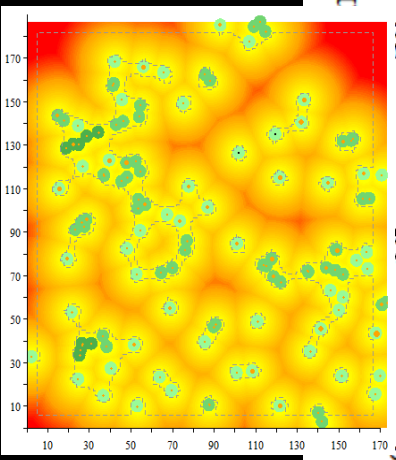
Individual Trees

Large & Super Clumps

Results: Reference Envelope

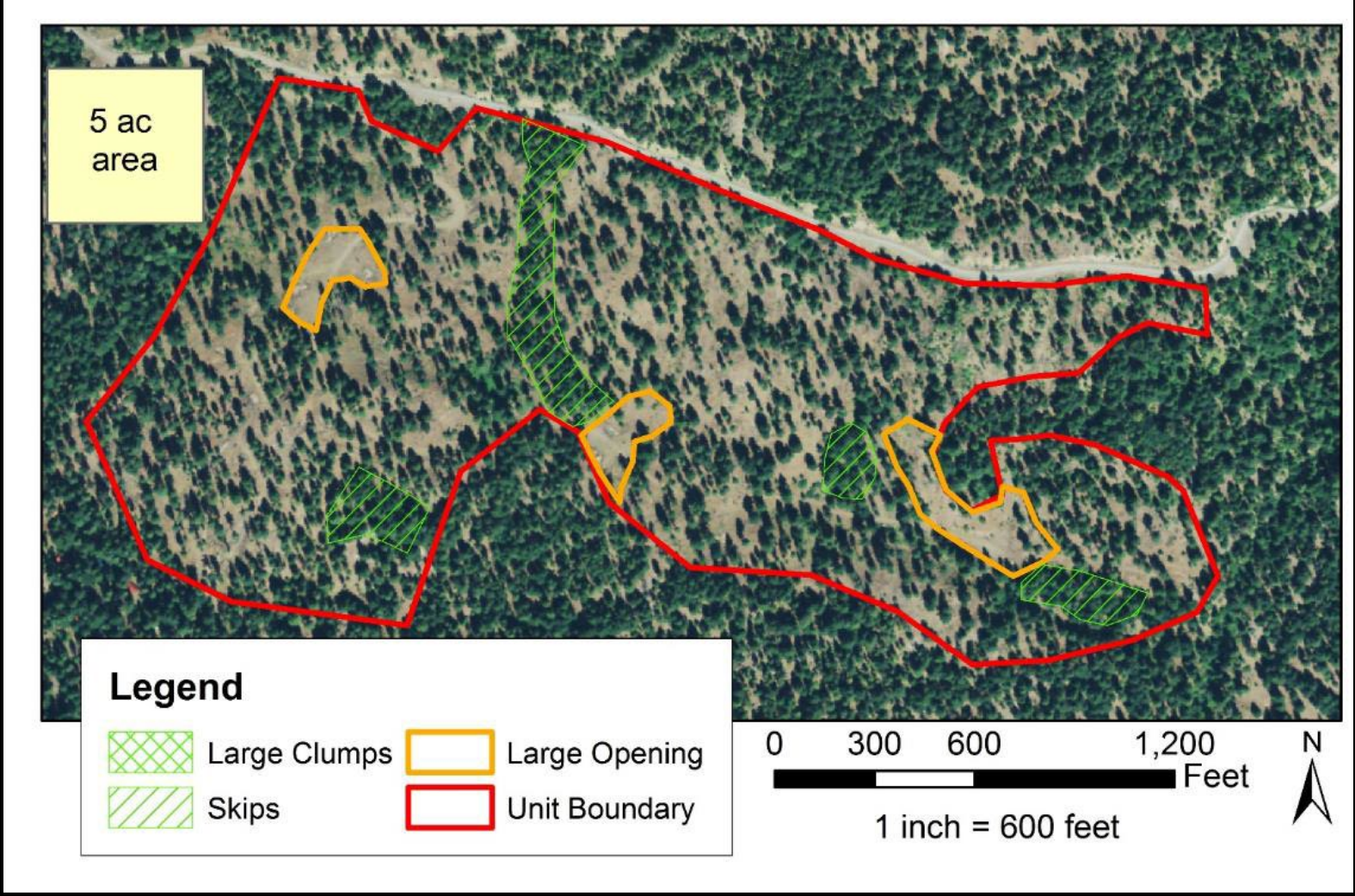
55 Reference stands in Eastern OR and WA





ICO Restoration Prescription

1. ID Skips and large openings



ICO Prescription

Rx:

- Leave all old trees & release 2x dripline
- Favor ponderosa pine
- Thin primarily from below, select for good crowns.
- Leave up to 5/ac wildlife trees
- ***Leave 40 TPA in clump sizes based on reference conditions***

Clump Size	Individuals 1	Small 2-4	Medium 5-10	Large 11-20+
Target Unit	90	50	10	10

Tracking during Marking

Tracking

- Real time monitoring for crew: density, size, & pattern

- Contract compliance and implementation monitoring

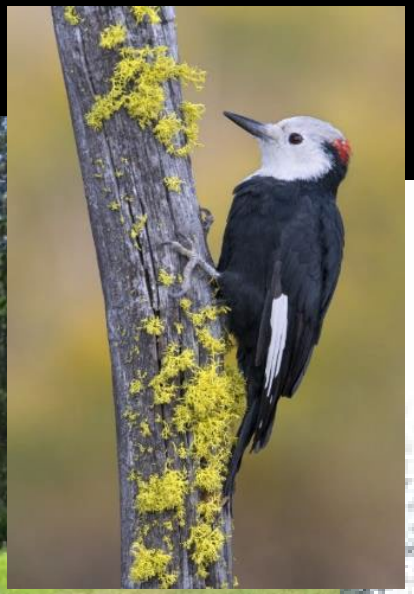
Andriod APP

The ICO Approach to Quantifying and Restoring Forest Spatial Pattern

Implementation Guide

Version 3.3 - October 2016

Why does Pattern Matter?

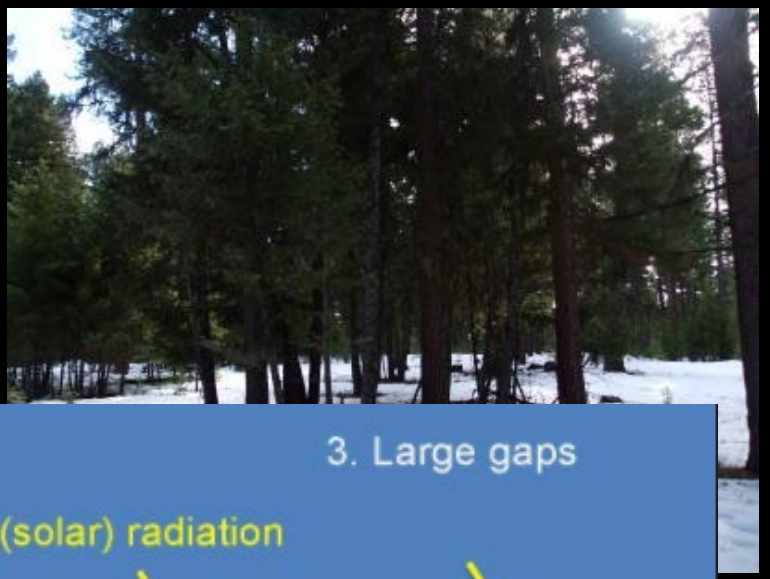


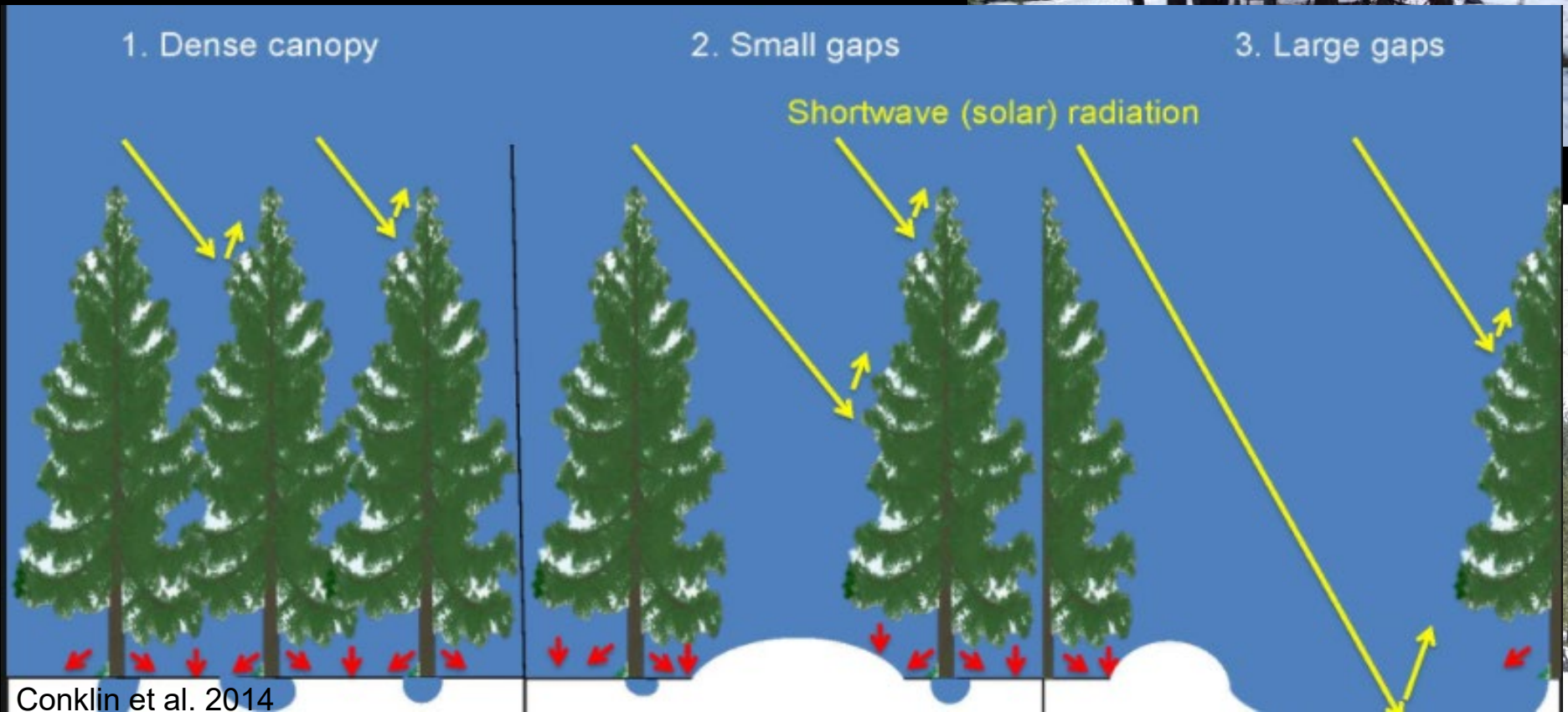
Black Hills Treatment – Bootleg Fire

Why does Pattern Matter? Snow Retention

Erin Schneider
Andrew Larson

- Lower density ➔ more snow!
- Openings: retain more snow
- Clumps: interception, less snow
  shade snow in opening
- More variable pattern > uniform > dense





Conklin et al. 2014

Why does Pattern Matter?
Adaptation

Why does Pattern Matter? Adaptation

Larson & Churchill 2012

Why does Pattern Matter?

The Nature Conservancy
Oregon

Ecological Functions of Spatial Pattern in Dry Forests

Implications for Forest Restoration

Ponderosa pine stand west of Sisters, OR © Alli Steinmetz

Local variability of vegetation structure increases resilience of dry, western U.S. coniferous forests to wildfire

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[3]Earth Lab, University of Colorado-Boulder; Boulder, CO
[4]Pacific Southwest Research Station, U.S.D.A. Forest Service; Davis, CA
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Characteristics and metrics of resilient forests in the Sierra de San Pedro Martír, Mexico

Julia S. Murphy [a], Robert York [a], Hiram Rivera Huerta [b], Scott

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Variable thinning and prescribed fire influence tree mortality and growth during and after a severe drought

Eric E. Knapp[a,*], Alexis A. Bernal[b,1], Jeffrey M. Kane[b], Christopher J. Fettig[c], Malcolm P. North[d]

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CA 95521, USA
, Davis, CA 95618, USA
moth Lakes, CA 93546, USA

nsity, fire-excluded forests experienced an extreme drought accompanied by warmer than s from 2012 to 2015, resulting in the deaths of millions of trees. We examined tree mortality d-conifer stands that had been experimentally treated between 2011 and 2013 with two eatments, one with more structural variability (HighV) and one with less structural varia- d alone or in combination with prescribed burning. Tree mortality between 2014 and 2018

esa

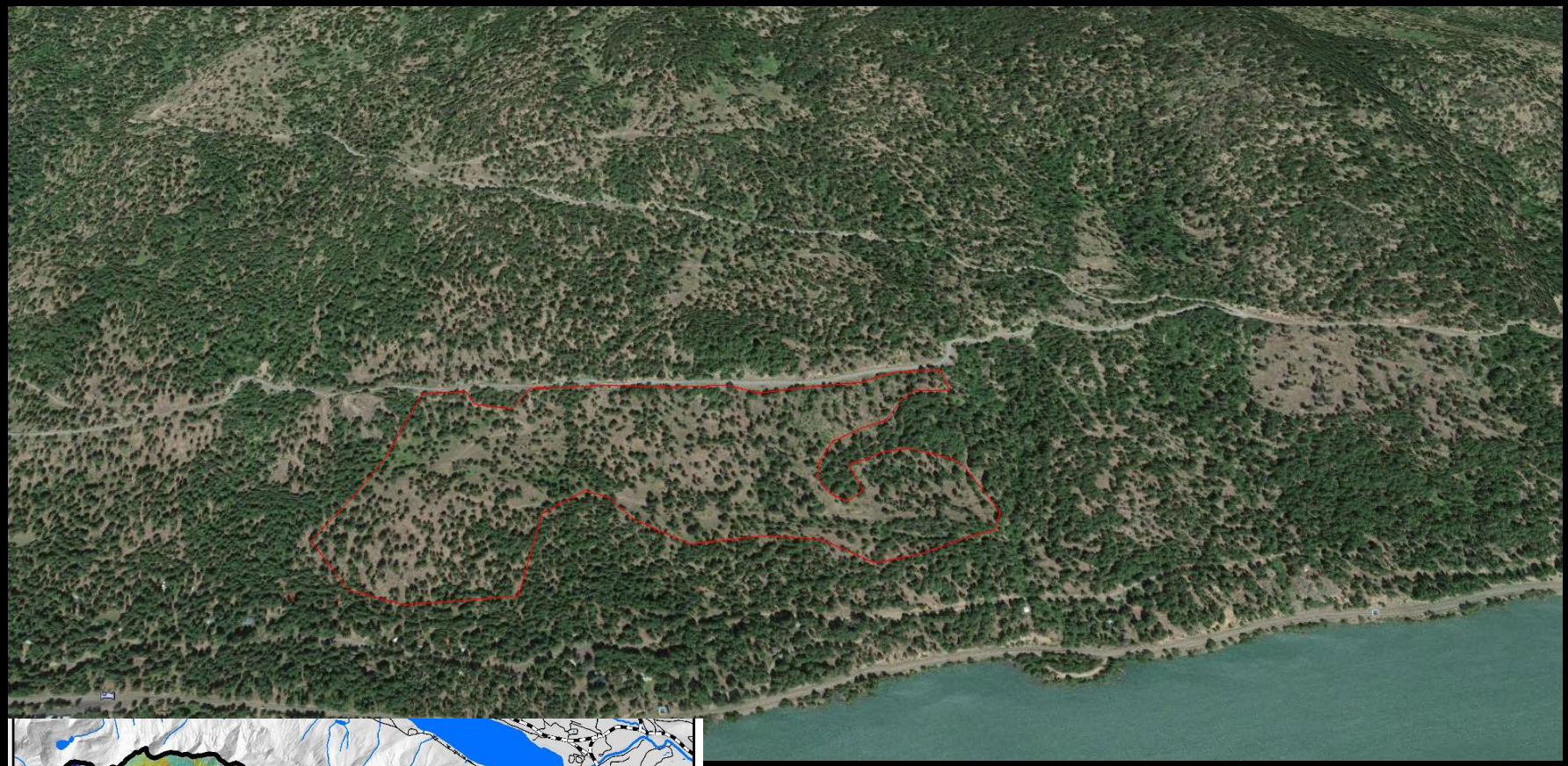
ECOSPHERE

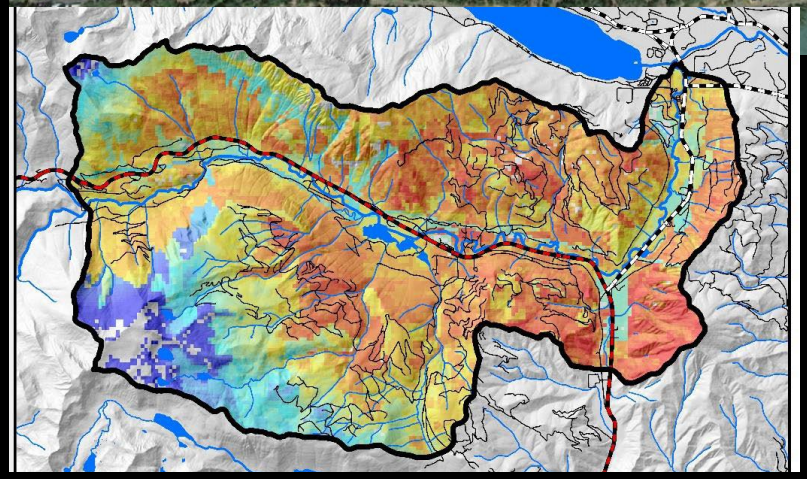
Fine-scale fire patterns mediate forest structure in frequent-fire ecosystems

Scott M. Ritter[1,†], Chad M. Hoffman[1], Mike A. Battaglia[2], Camille S. Stevens-Rumann[1], and William E. Mell[3]

[1]*Department of Forest and Rangeland Stewardship, Warner College of Natural Resources, Colorado State University, Fort Collins, Colorado 80523 USA*
[2]*Rocky Mountain Research Station, USDA Forest Service, Fort Collins, Colorado 80526 USA*
[3]*Pacific Northwest Research Station, USDA Forest Service, Seattle, Washington 98103 USA*

Scaling back up to the Landscape





Scaling back up to the Landscape

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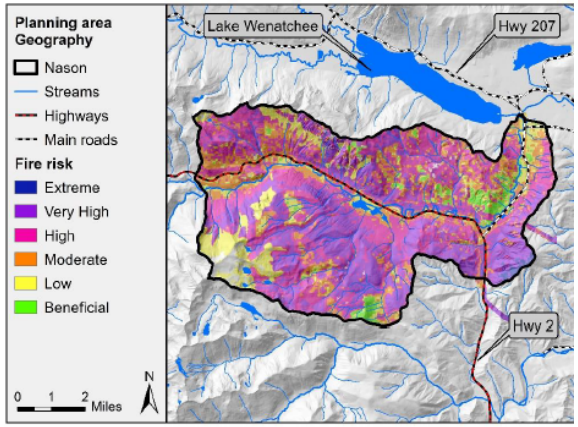

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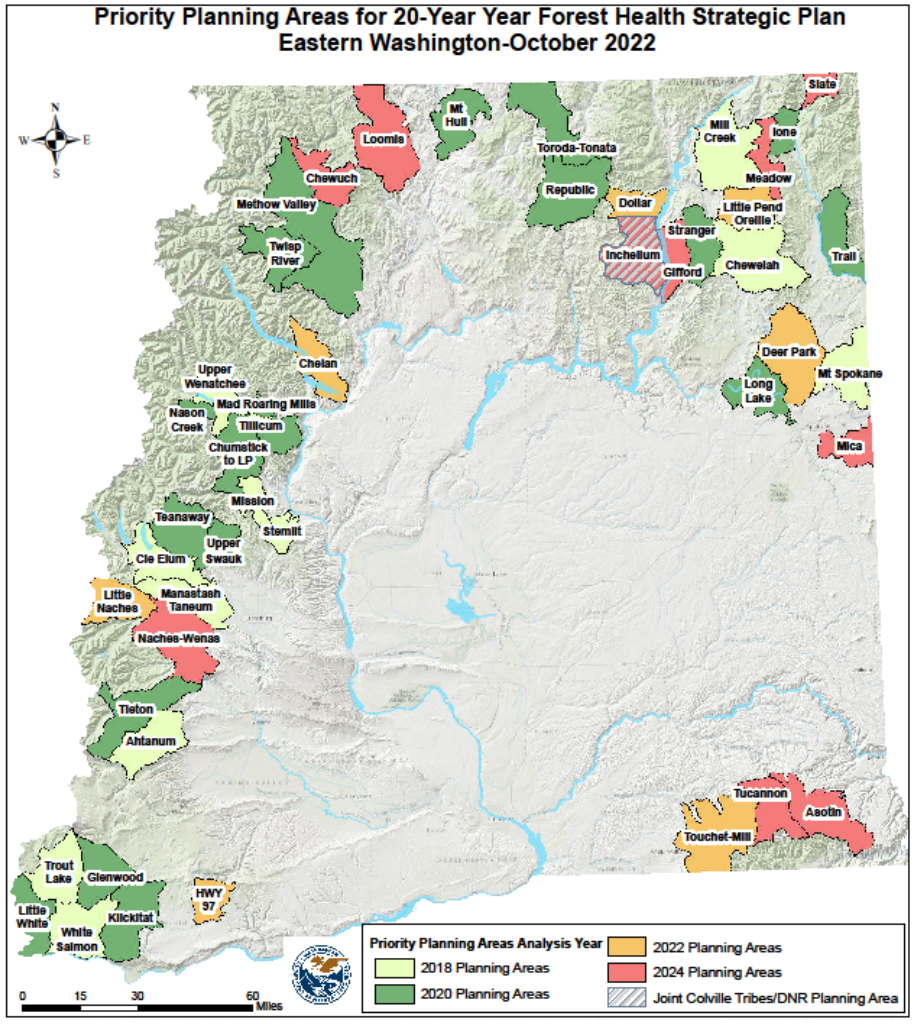

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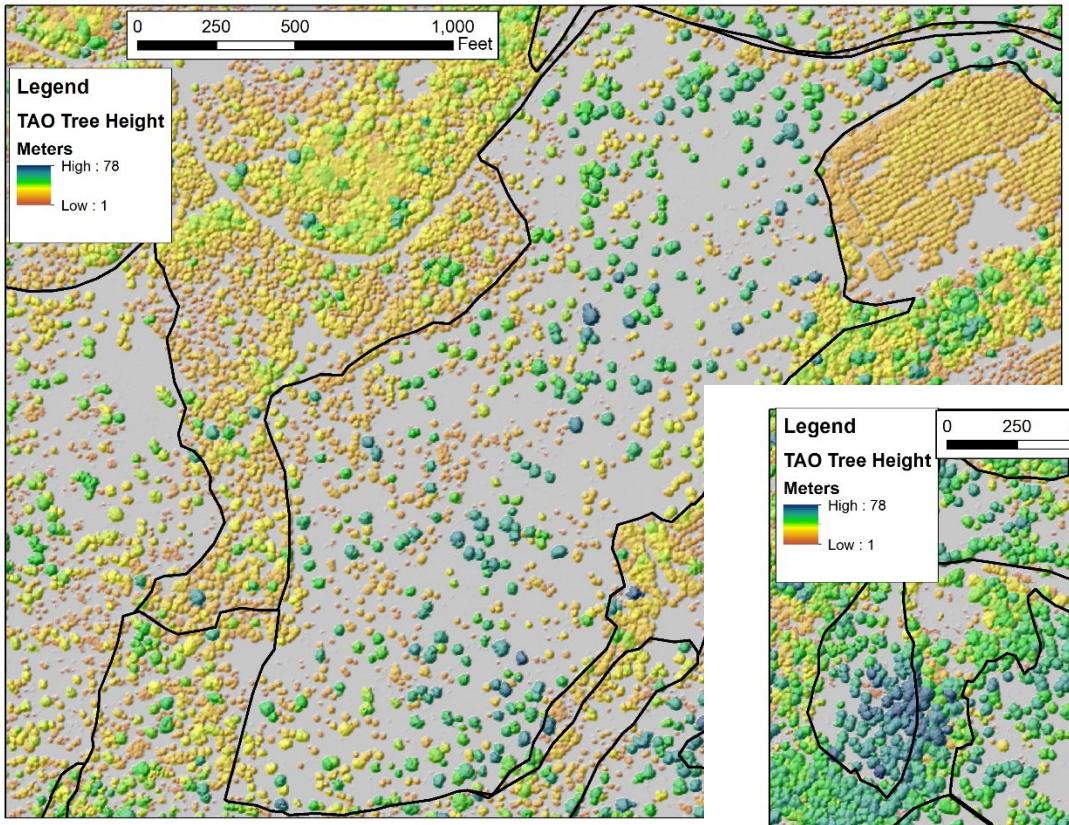
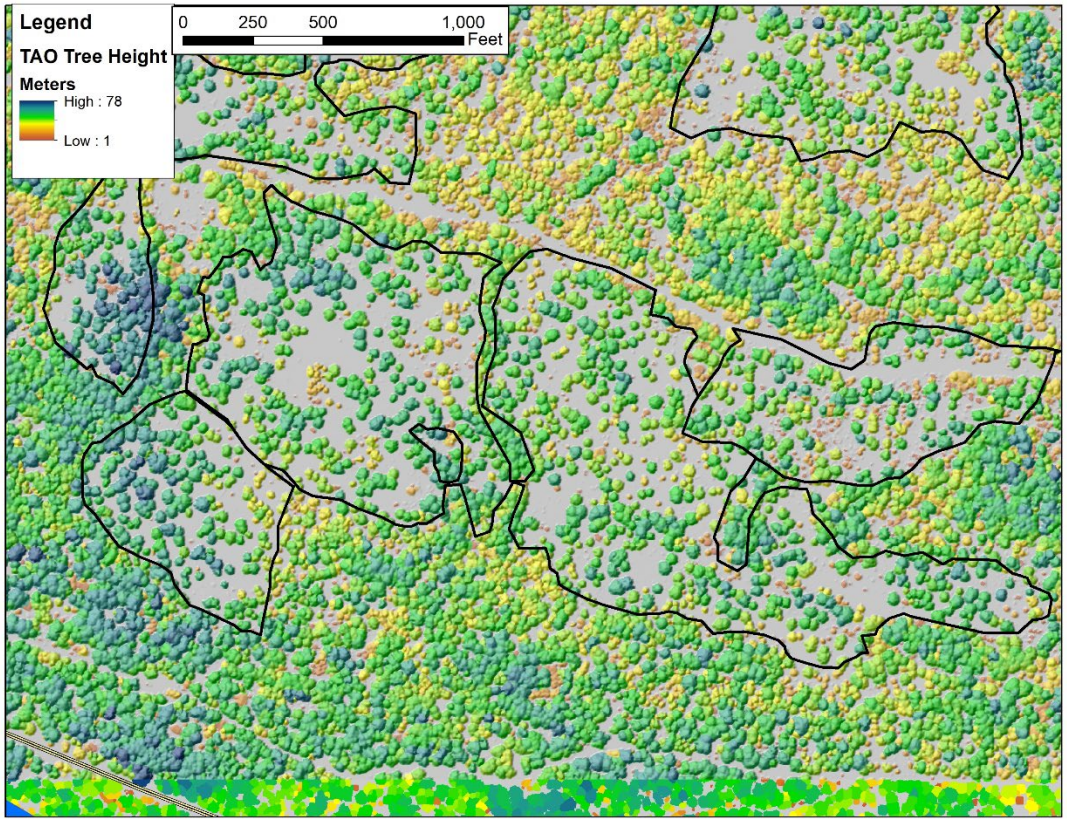
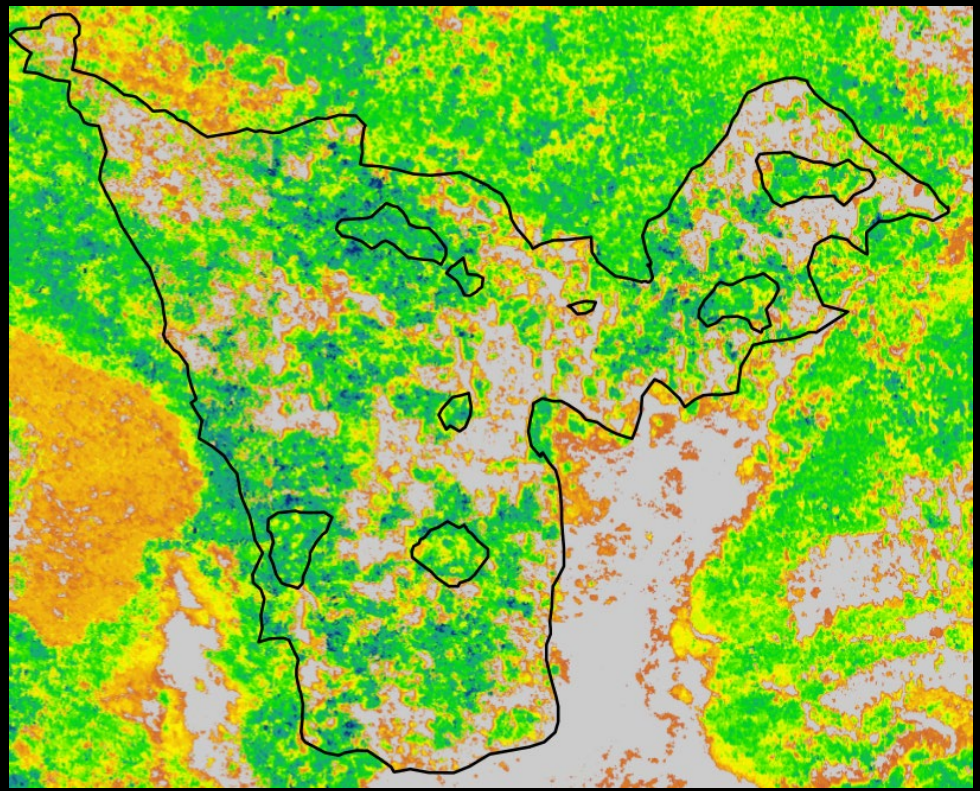
Treatment Monitoring

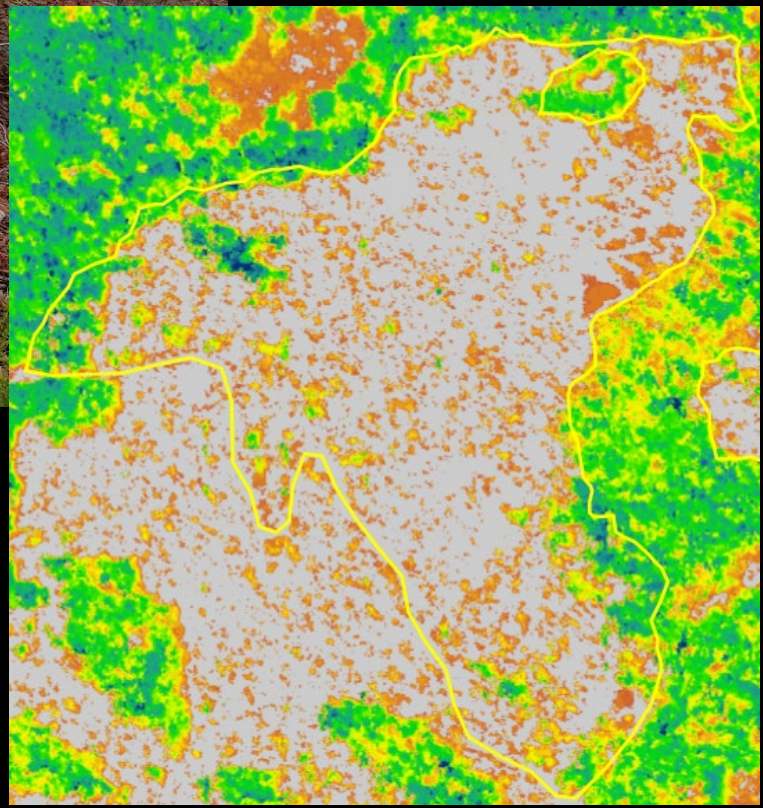


ICO Rx



Basal Area Rx





HB 1784: Dual Benefit