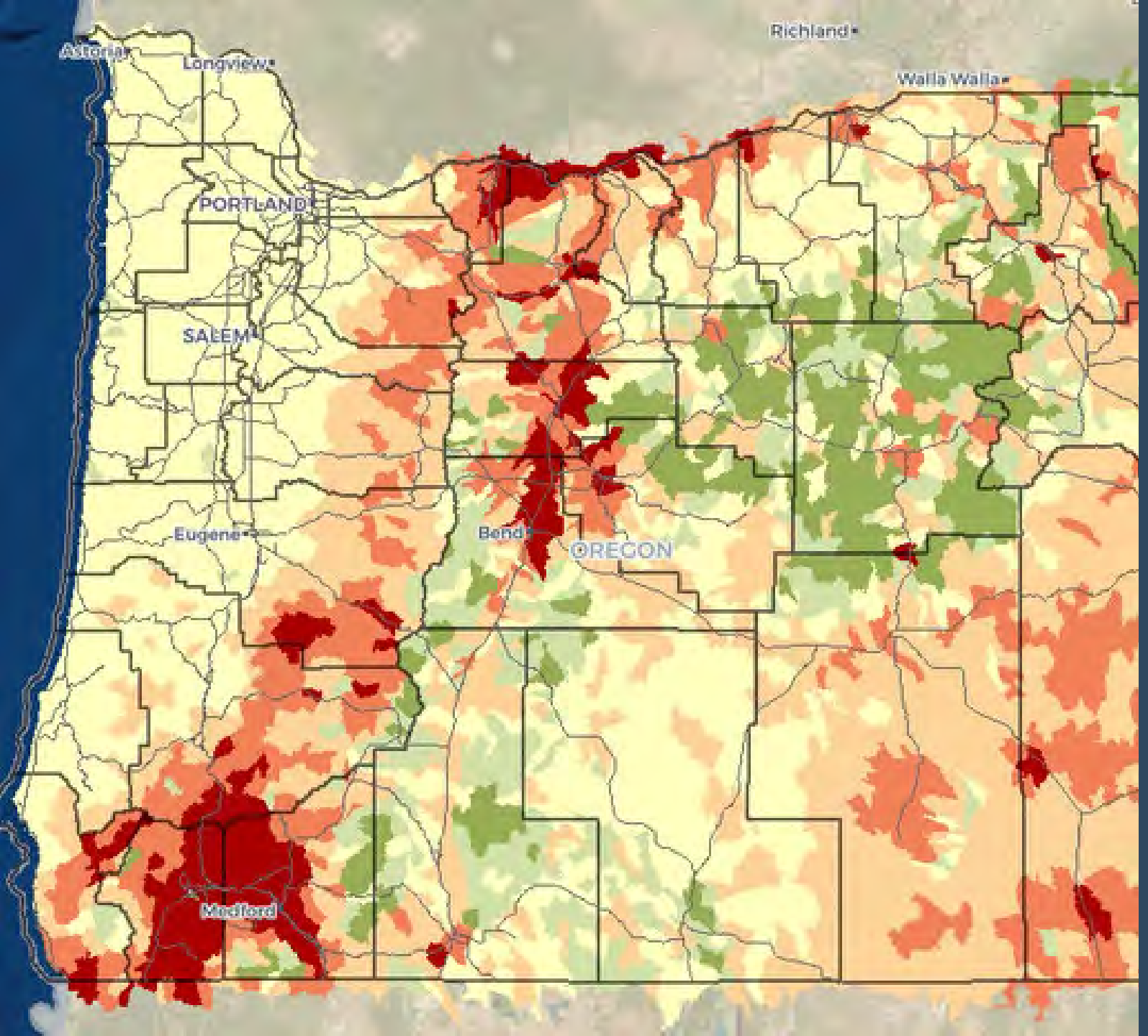
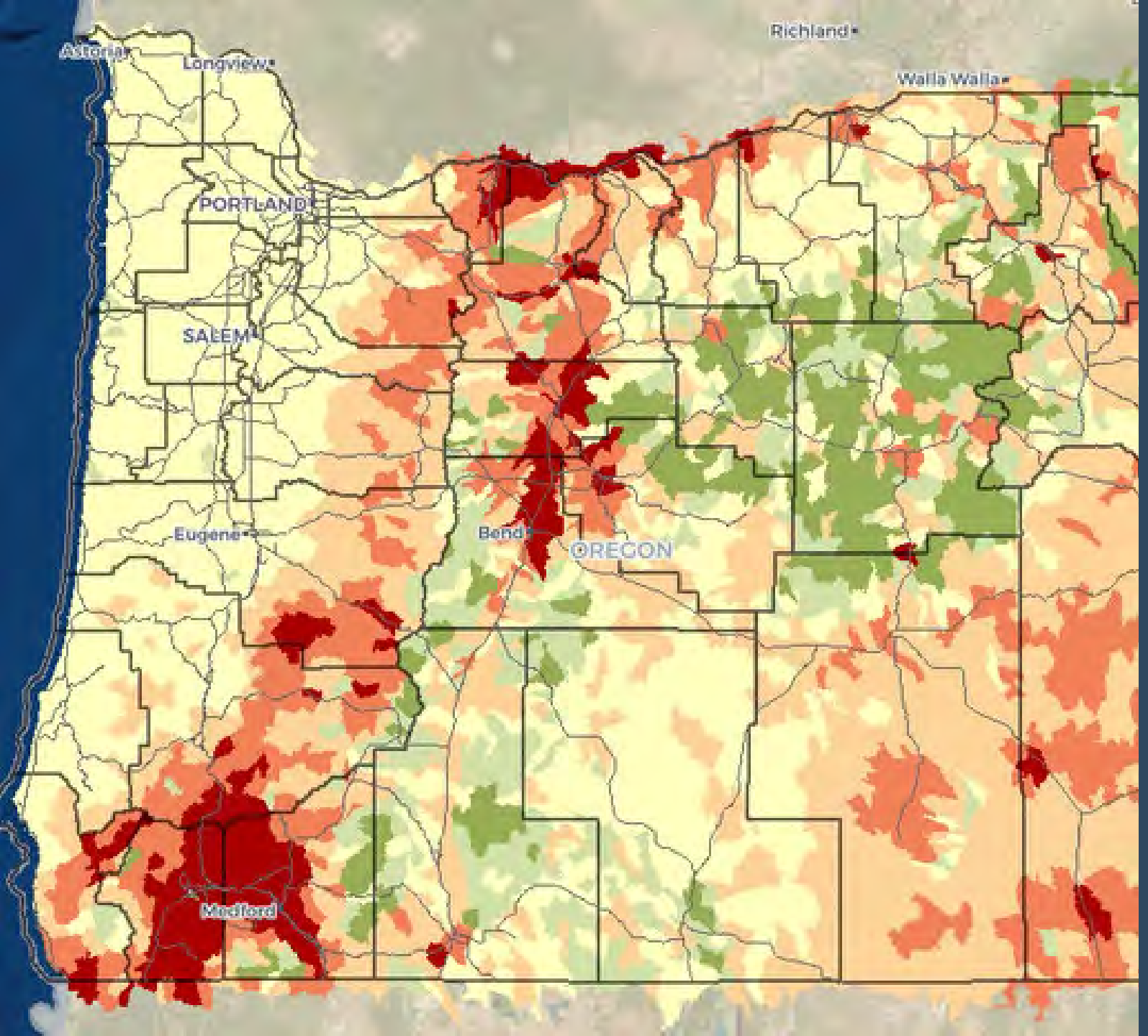


Governor's Council on Wildfire Response

March 18, 2019



Governor's Council on Wildfire Response

March 18, 2019

AGENDA

8:30-9:00am: **Doors Open**
9:00-9:10am: **Welcome, Introductions, Agenda** (Matt Donegan, Wildfire Council)
9:10-9:45am **State & Federal Leadership**

- Governor Kate Brown, State of Oregon
- Donegan, Wildfire Council
- Fire Marshal Jim Walker, State of Oregon
- State Forester Peter Daugherty, State of Oregon
- Under Secretary Jim Hubbard, United States Department of Agriculture
- Chief Vicki Christiansen, United States Forest Service

9:45-10:00am **Break**

The Implications of Wildfire

10:00-10:10am **Implications Framework** (Donegan)
10:10-10:45am **Wildfire in the West** (Paul Hessburg, United States Forest Service)
10:45-11:00am **Implications – Environment**

- Ecological Integrity (Ryan Haugo, The Nature Conservancy)

11:00-12:45 **Implications – Social**

- Public Safety (Sally Russell, City of Bend, Oregon)
- Human Health (Kirsten Aird, Oregon Health Authority)
- Environmental Justice (Charles Wilhoite, Meyer Memorial Trust)
- Electrical Infrastructure (Stefan Bird, Pacific Power)
- Water Infrastructure (Chris Chambers, City of Ashland)
- Public Finance (Travis Medema, Oregon Department of Forestry)
- Government Program Delivery (Peter Daugherty, ODF)

12:45-1:15pm **Lunch**

1:15-1:45pm **Implications – Economy**

- Forest Products (Michael Cloughesy, Oregon Forest Resources Institute)
- Tourism & Other Industries (Sara Morrissey, Travel Oregon)

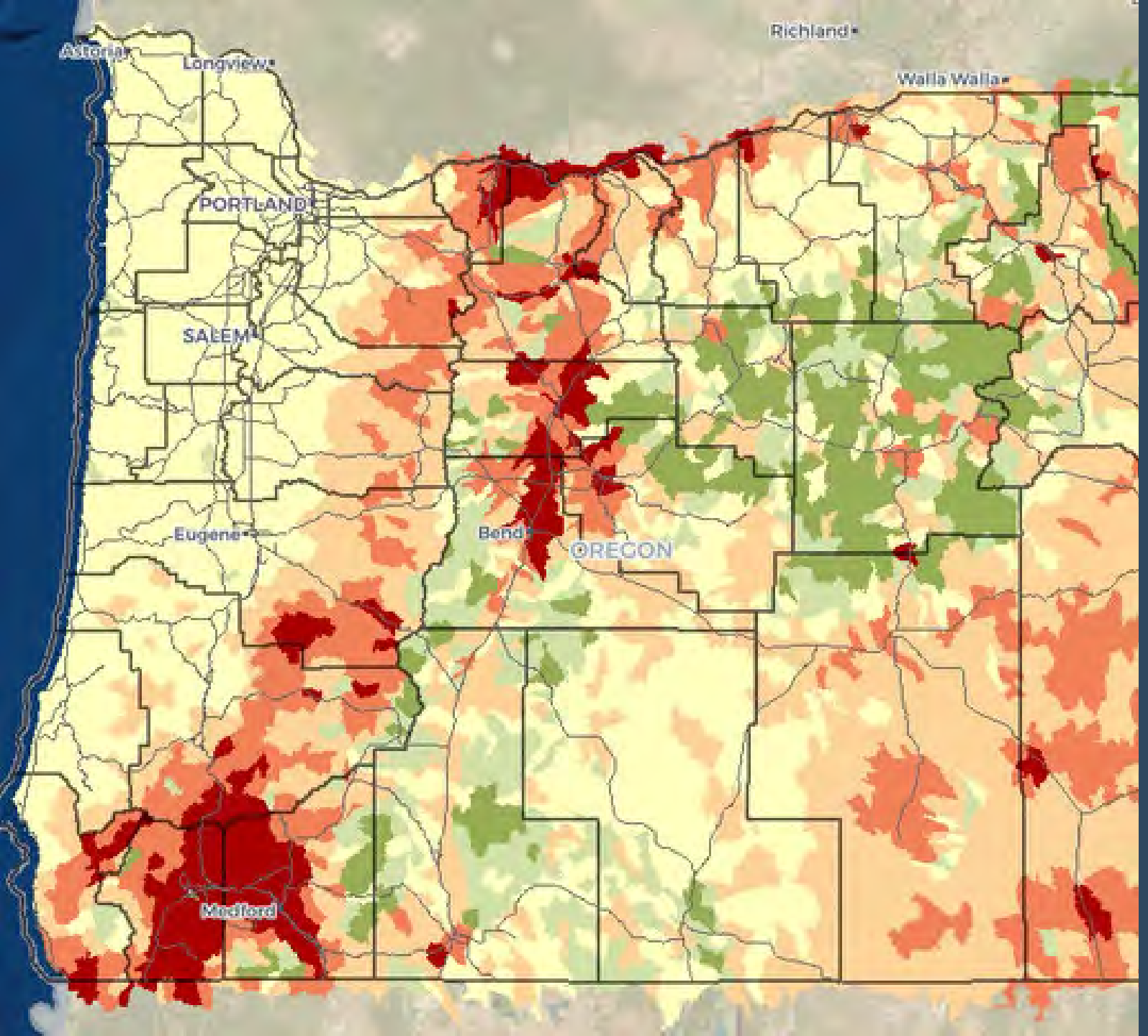
1:45-1:50pm **Recap** (Donegan)

1:50-2:50pm **Council Member Discussion** (Led by Donegan)

2:50-3:00pm **Next Meeting** (Donegan)

- Council Work Plan
- Next Meeting Date, Location

3:00pm **Adjourn and Reception**



Governor's Council on Wildfire Response

March 18, 2019

3 Chambers of Sustainability

I. Environment

II. Social

III. Economy

Governor's Council on Wildfire Response

March 18, 2019

Implications

I. Environment
- Ecological Integrity

II. Social
- Public Safety
- Human Health
- Environmental Justice
- Electrical Infrastructure
- Water Infrastructure
- Public Finance
- Government Program Delivery

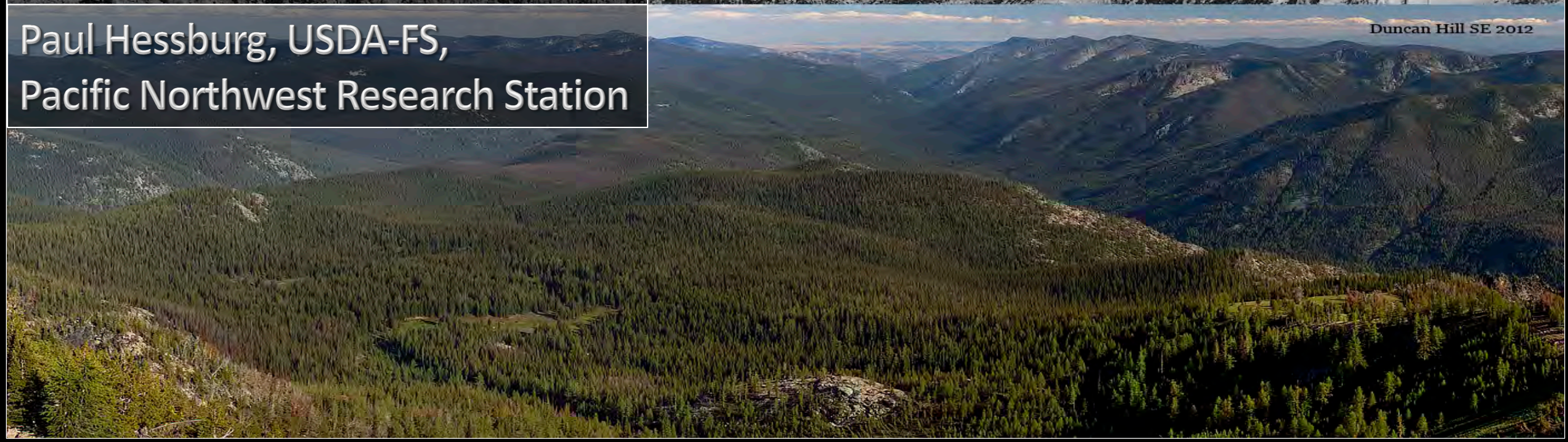
III. Economy
- Forest Products
- Tourism & Other Industries

Governor's Council on Wildfire Response

March 18, 2019

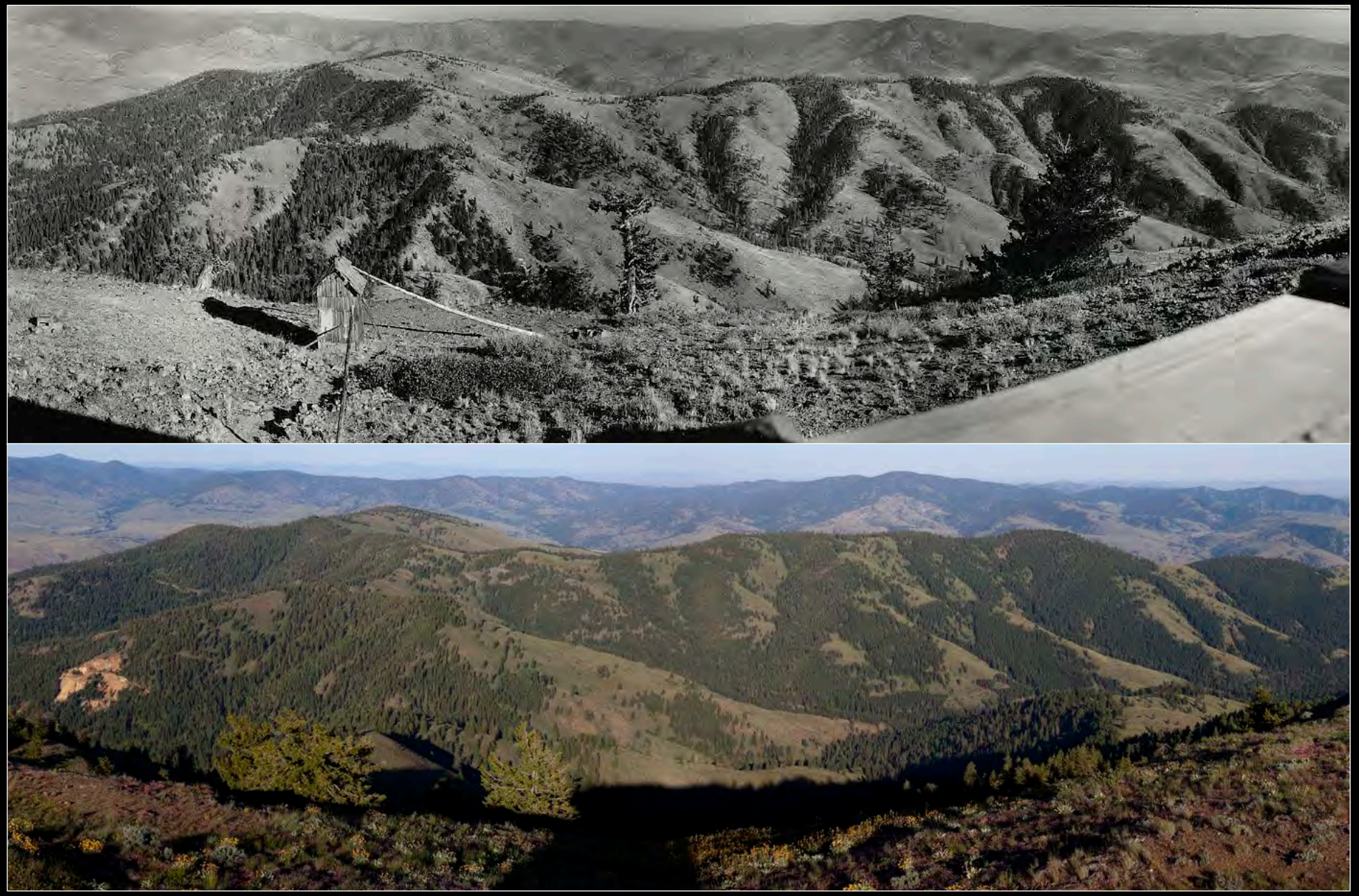
The Changing Landscape and Fire Ecology of Interior Oregon Forests

Paul Hessburg, USDA-FS,
Pacific Northwest Research Station



INTERIOR OREGON

A region of great biotic, cultural, & environmental diversity



Grasslands decreased…

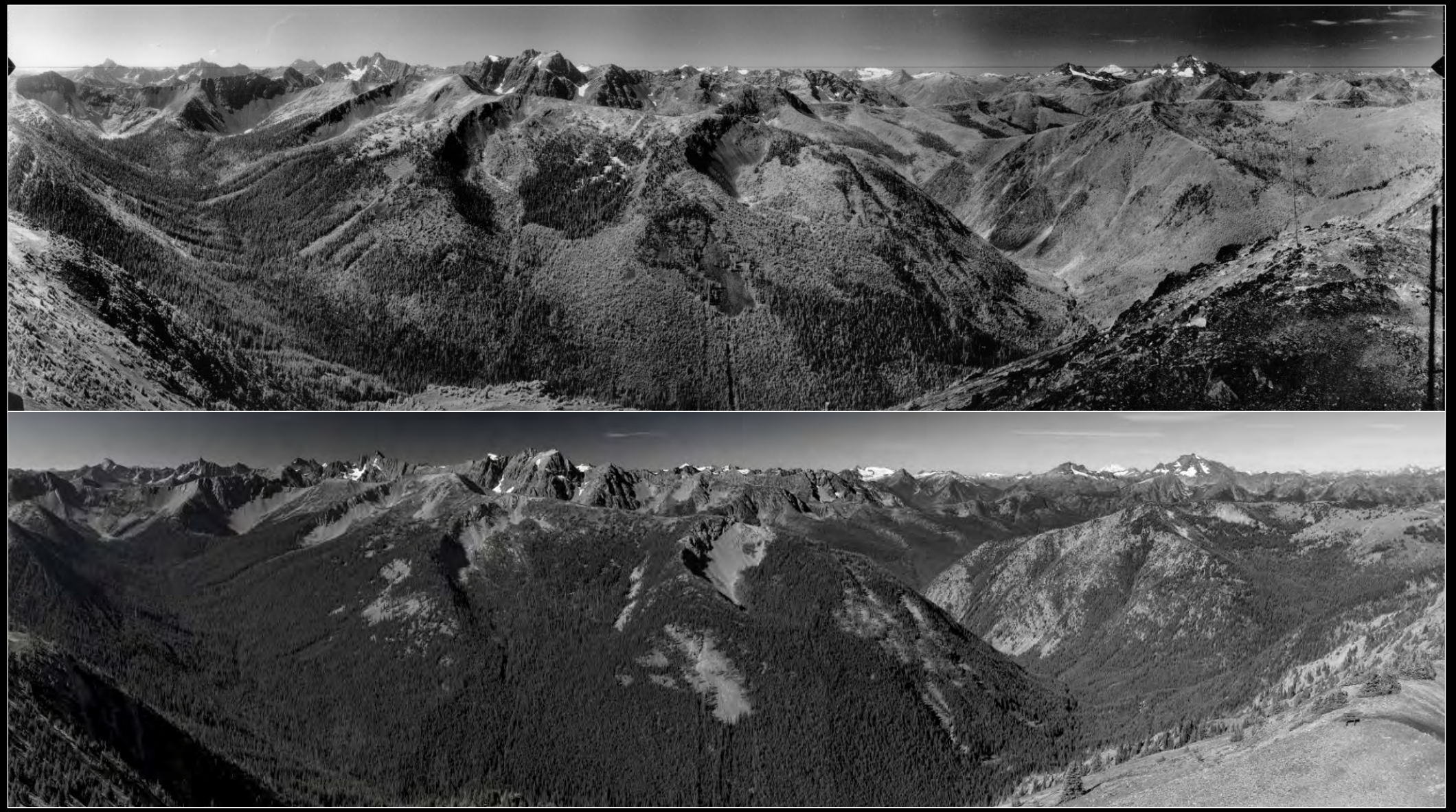
…forests increased

Dry slopes and ridgetops…

…filled in with trees

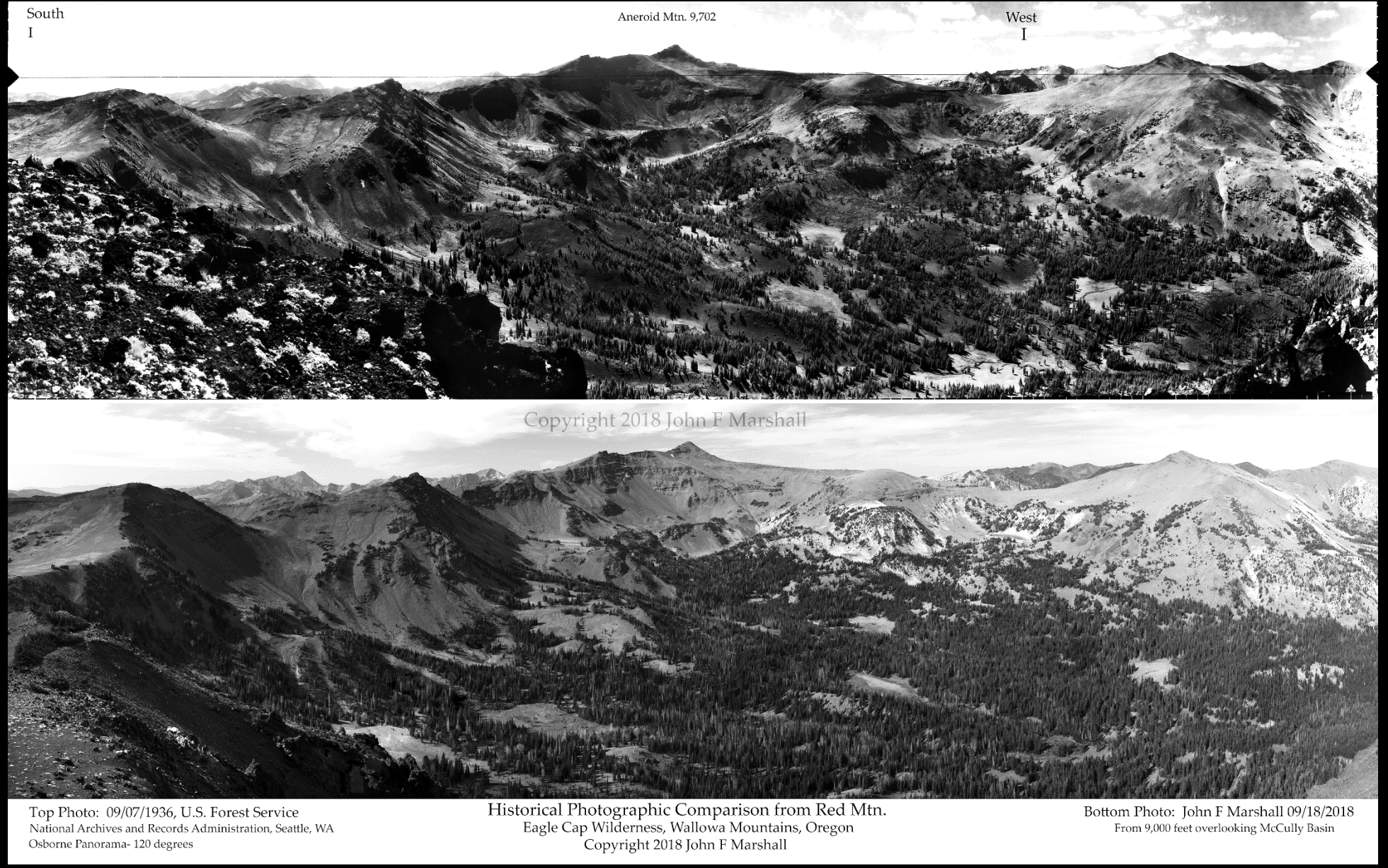
Complex forest age patchworks…

…became uniform



Patchworks of burned and recovering forest…

…gave way to continuous forest



Top Photo: 09/07/1936, U.S. Forest Service
National Archives and Records Administration, Seattle, WA
Osborne Panorama- 120 degrees

Historical Photographic Comparison from Red Mtn.
Eagle Cap Wilderness, Wallowa Mountains, Oregon

Bottom Photo: John F Marshall 09/18/2018
From 9,000 feet overlooking McCully Basin

Abundant high meadows…

…gave way to dense forest

NOT JUST TRUE OF DRY FORESTS

Top: U.S.Forest Service 1936
National Archives

McCully Creek, Wallowa Mtns.
Eagle Cap Wilderness, Oregon

Bottom: John F Marshall 2018

MANY CHANGES
MANY AGENTS

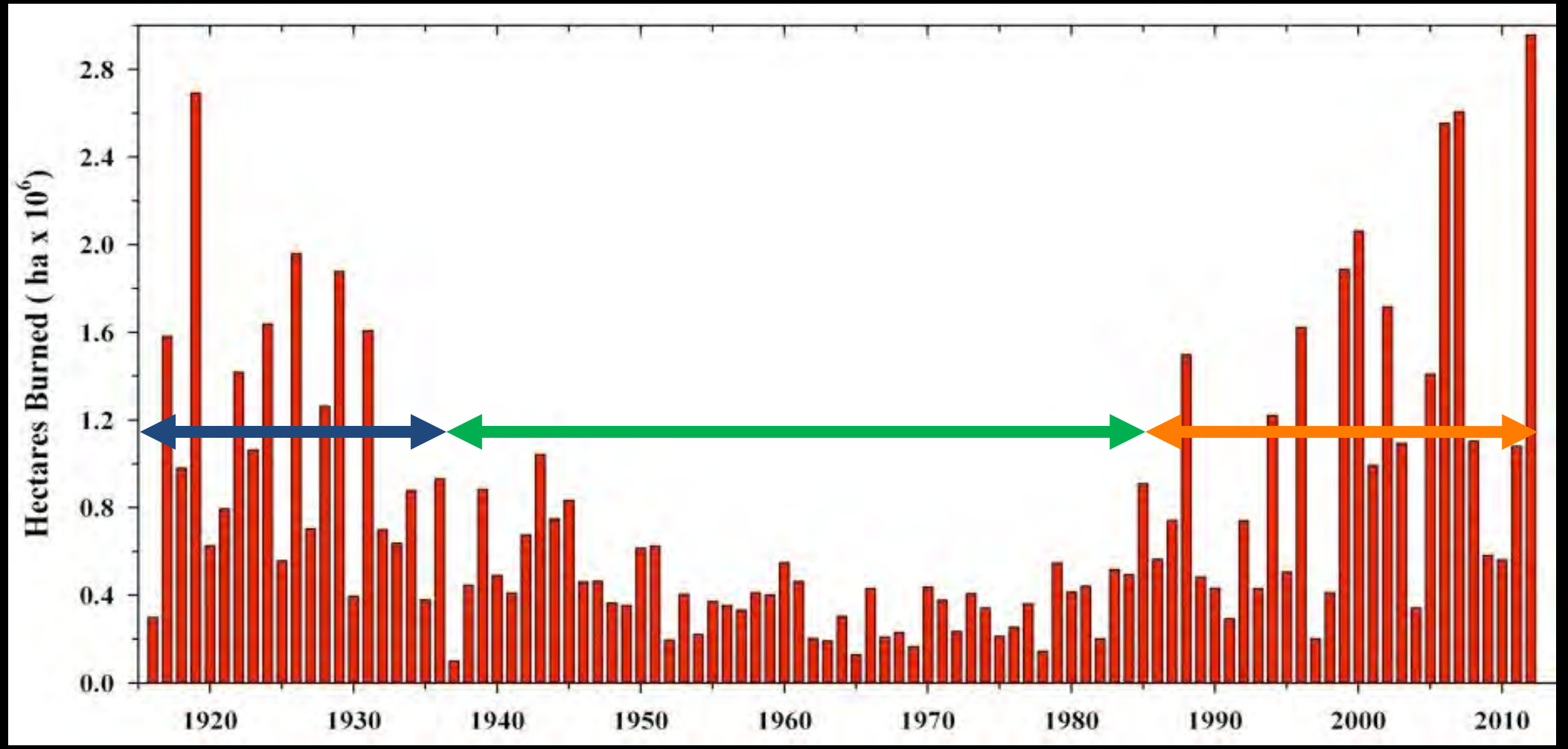
CHANGE AGENTS:

Roads and railroads
Subdividing by ownership
Clearcutting
Selection cutting
Domestic livestock grazing
Fire suppression
Urban/rural development
Agriculture
Climate change

KEY CHANGES:

Created a vast fuelbreak network
Fragmented forests by varied management plans
Cut older forests; Removed large trees; left small trees; increased vulnerability to fire, I&Ds
Livestock ate the grasses, excluding frequent fires
Widely increased forest area and density
Excluded fires, promoted aggressive fire suppression
Eliminated grasslands/shrublands, excluded fires
Larger and more severe fires

THE CLIMATE HELPED WITH FIRE SUPPRESSION



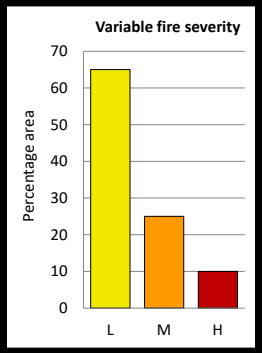
Warm/dry climate

Cool/wet climate, active fire suppression

Warm/dry climate Fire increases

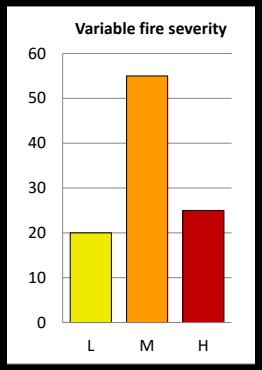
SHIFTING FIRE REGIMES

Historical



⇩

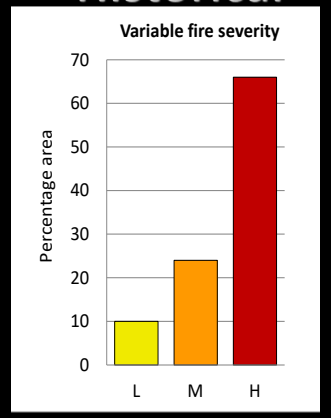
Current



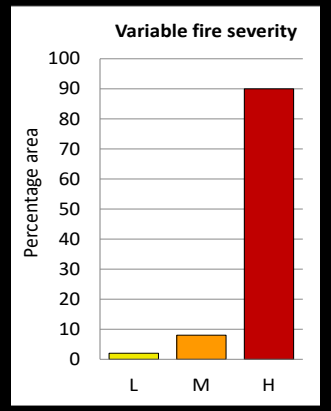
- ✓ Low severity fire (LSF): <20% of the tree cover killed, common in dry forests
- ✓ Fires every 5-30 yrs, reducing surface fuels, thinning trees
- ✓ High-frequency reinforced low severity
- ✓ More extreme climate conditions, more severe fires

SHIFTING FIRE REGIMES

Historical

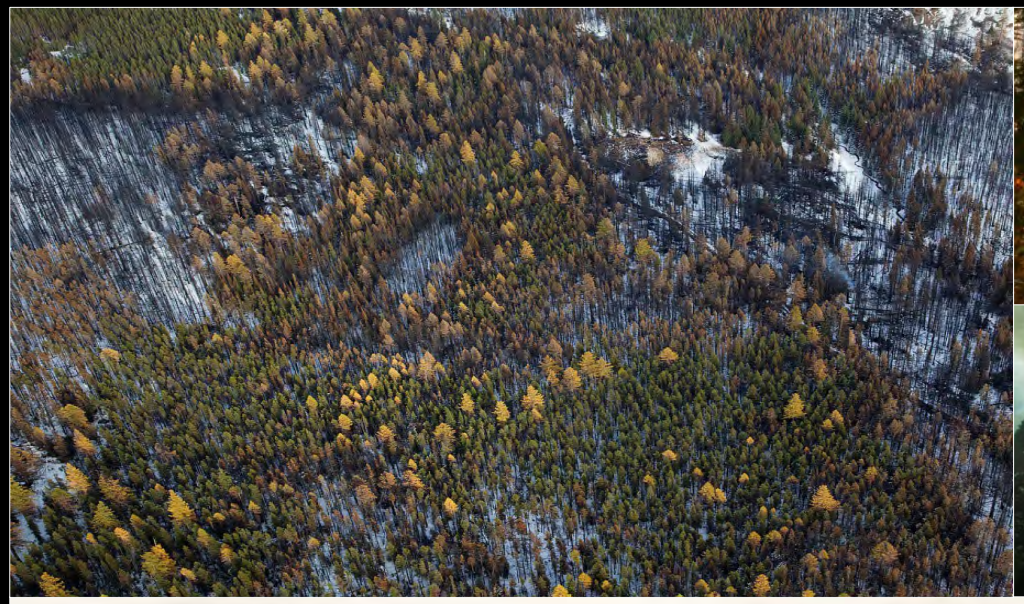


Current

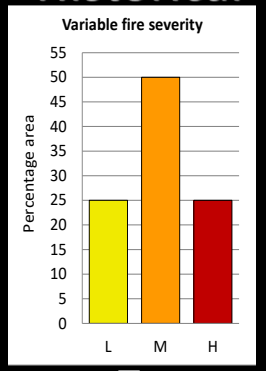


- ✓ High severity fire (HSF): >70% of the tree cover killed
- ✓ Common in moist & cold forests where fires occurred every 150-300+ yr
- ✓ Mild climate/weather conditions favored milder fires
- ✓ Created variation in fire severity & fire event patch size distributions

SHIFTING FIRE REGIMES

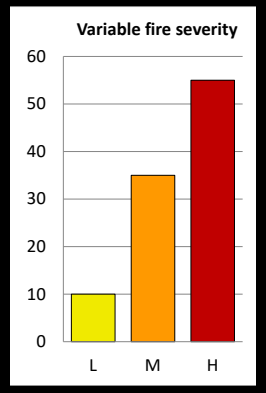


Historical



⇩

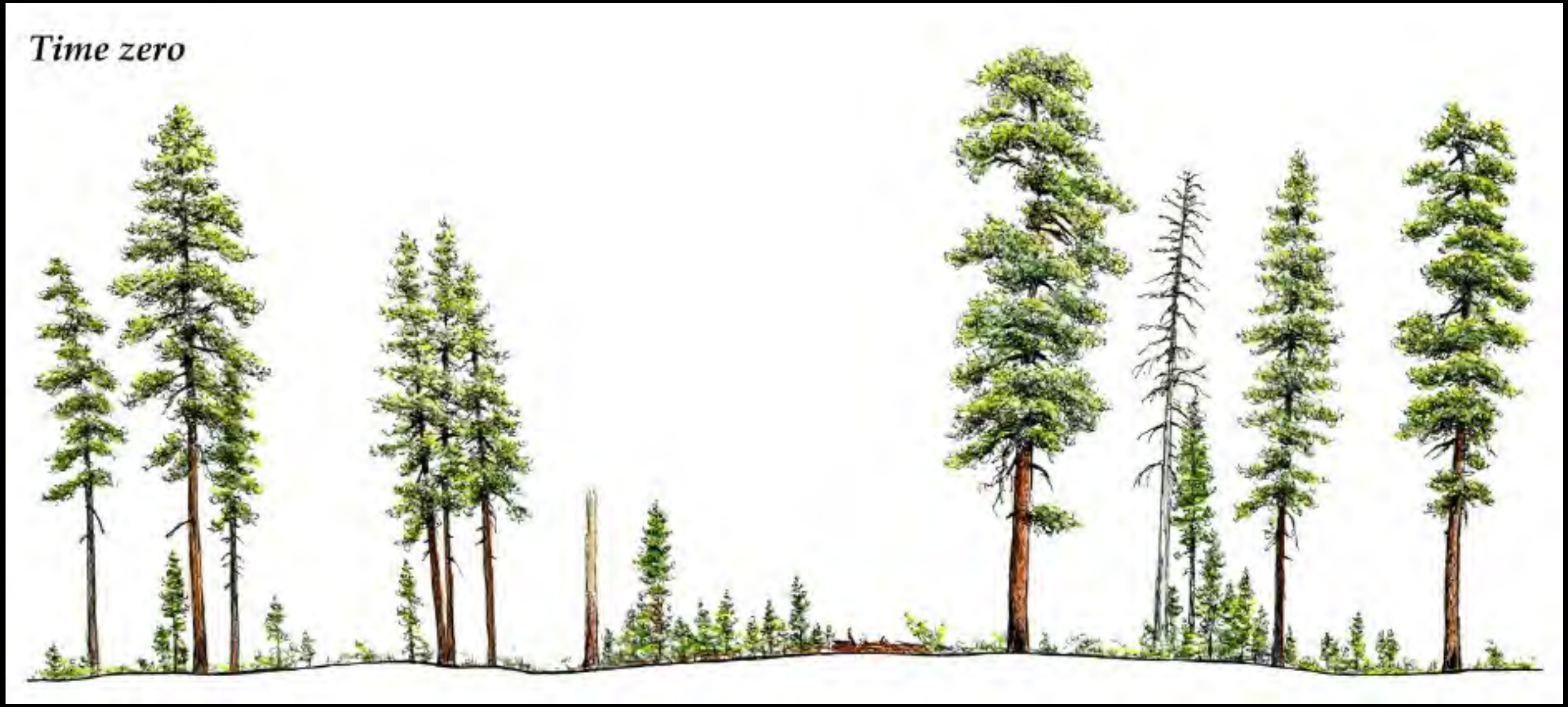
Current



- ✓ Mixed severity fire (MSF): 20-70% of the tree cover killed
- ✓ Common in DMC & MMC forests w/ PP, DF, GF, WL
- ✓ Fires occurred every 30-50+ yrs, both surface and crown fire effects
- ✓ Occasionally both milder & more severe fires occurred, weather/climate driven

IMPORTANT FEEDBACKS

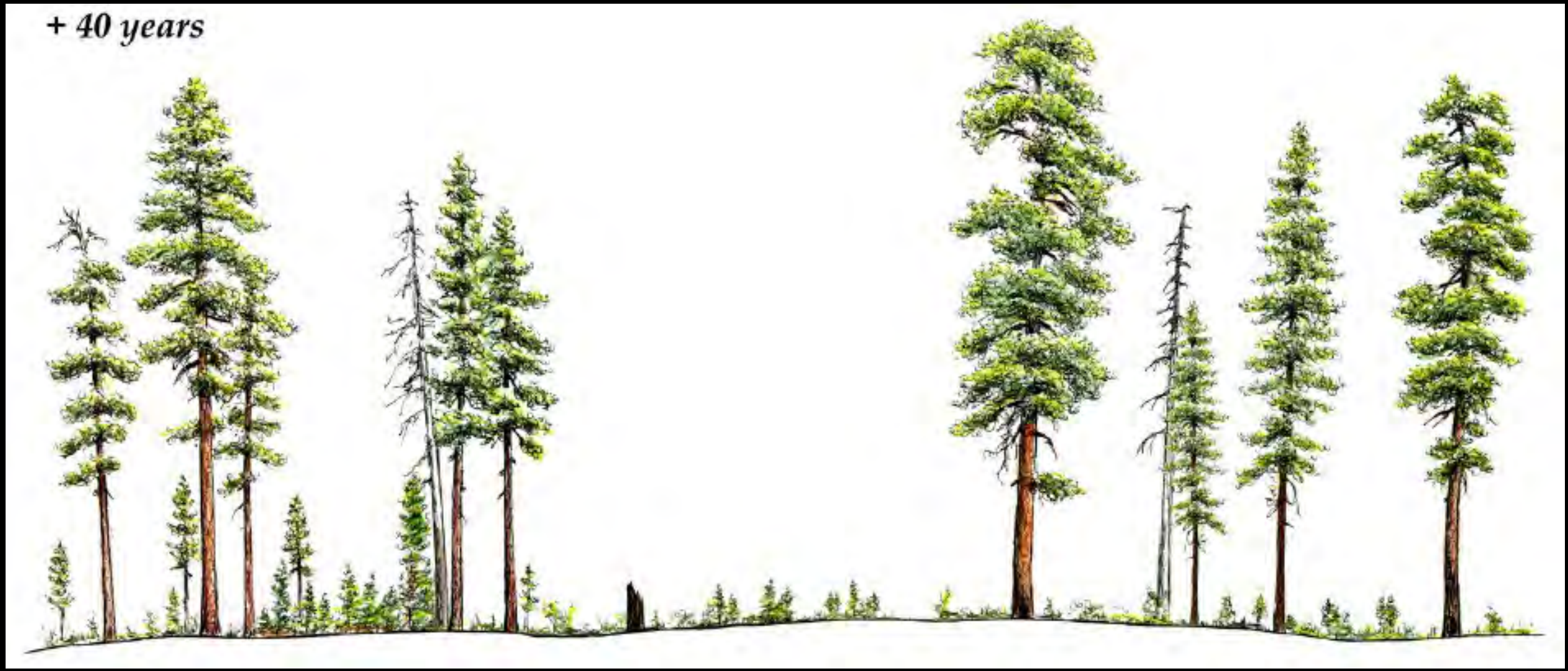
1) Locally—LSFs & MSFs continually thinned forest patches, reducing tree density and fuels



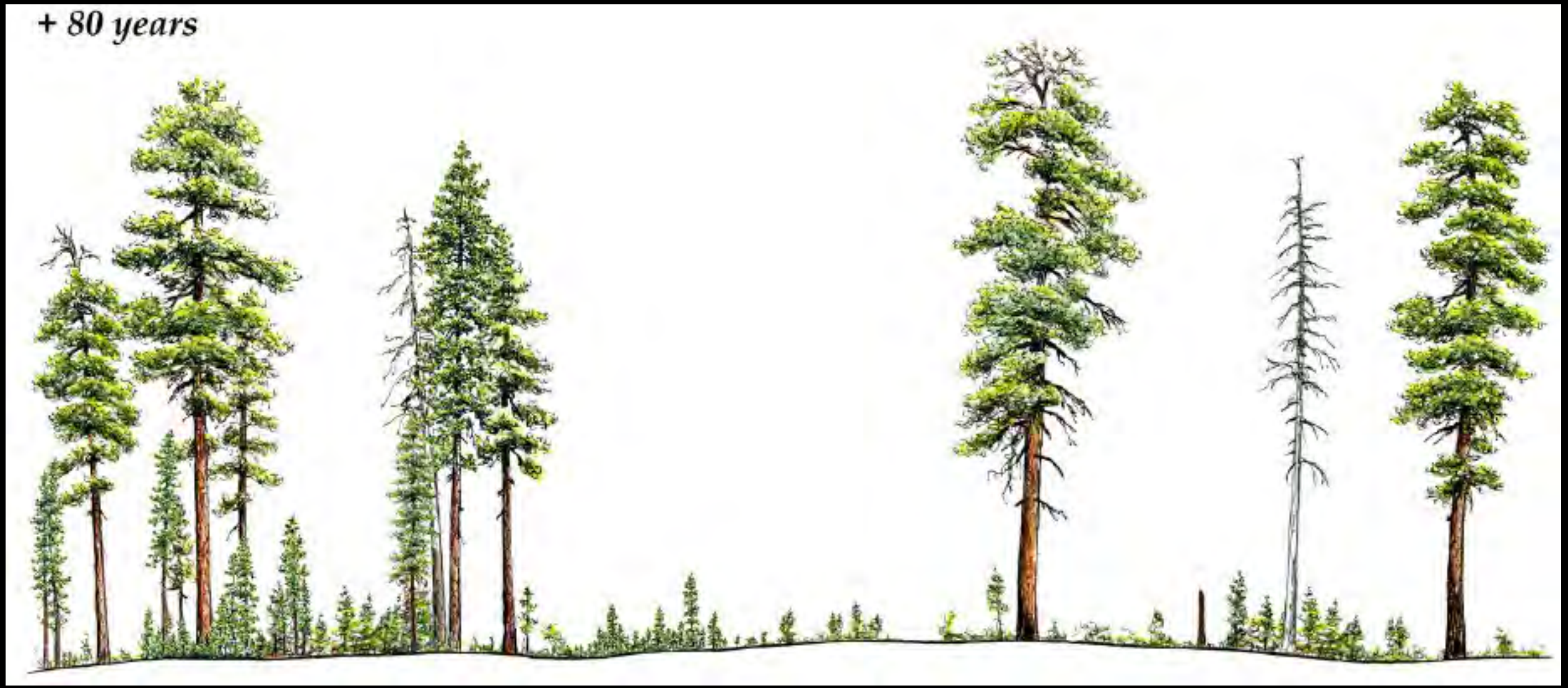
How these patch-level feedbacks worked…

Bob Van Pelt illustrations…

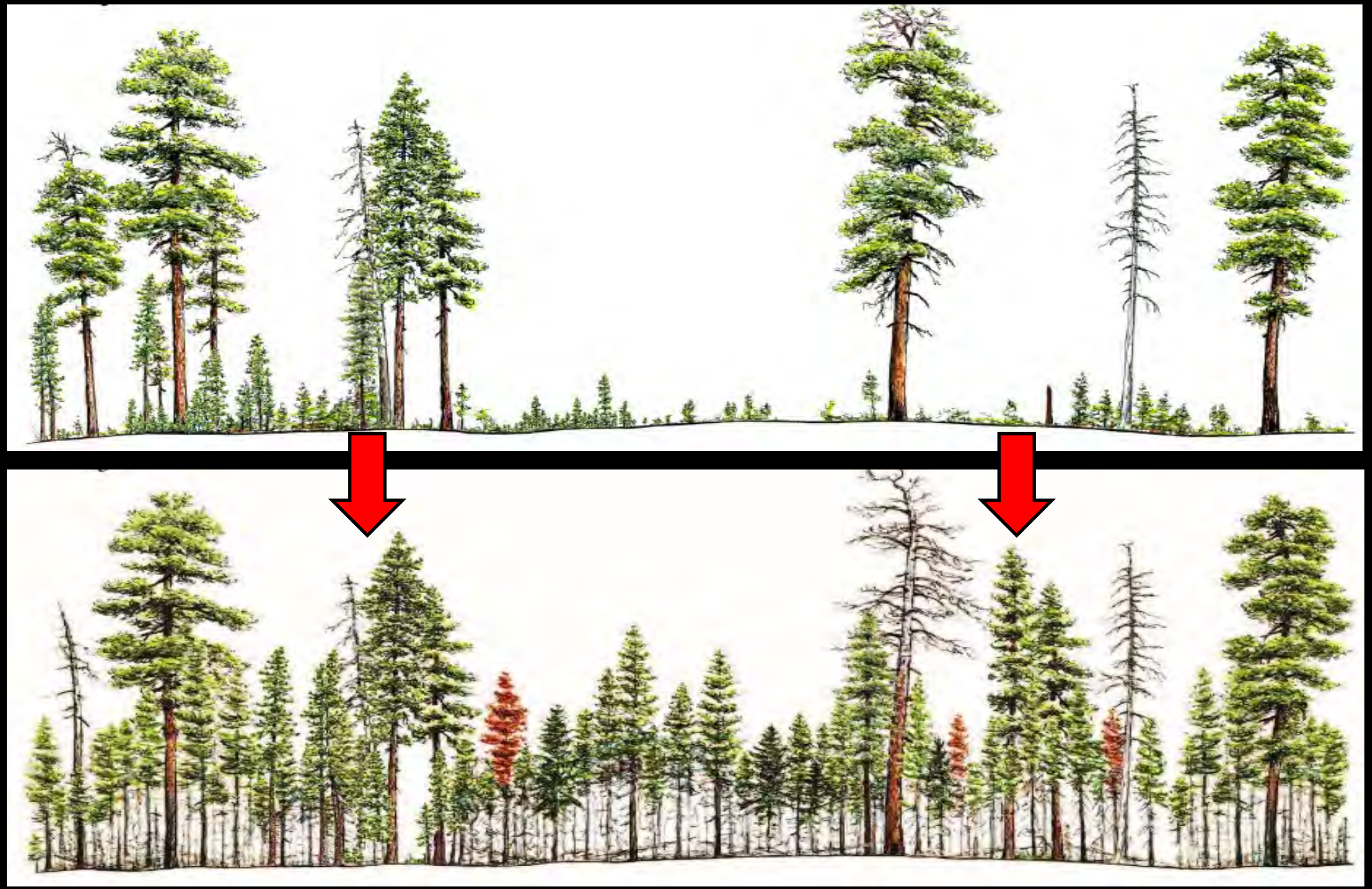
Without fire suppression


+ 40 years


+ 60 years


+ 80 years

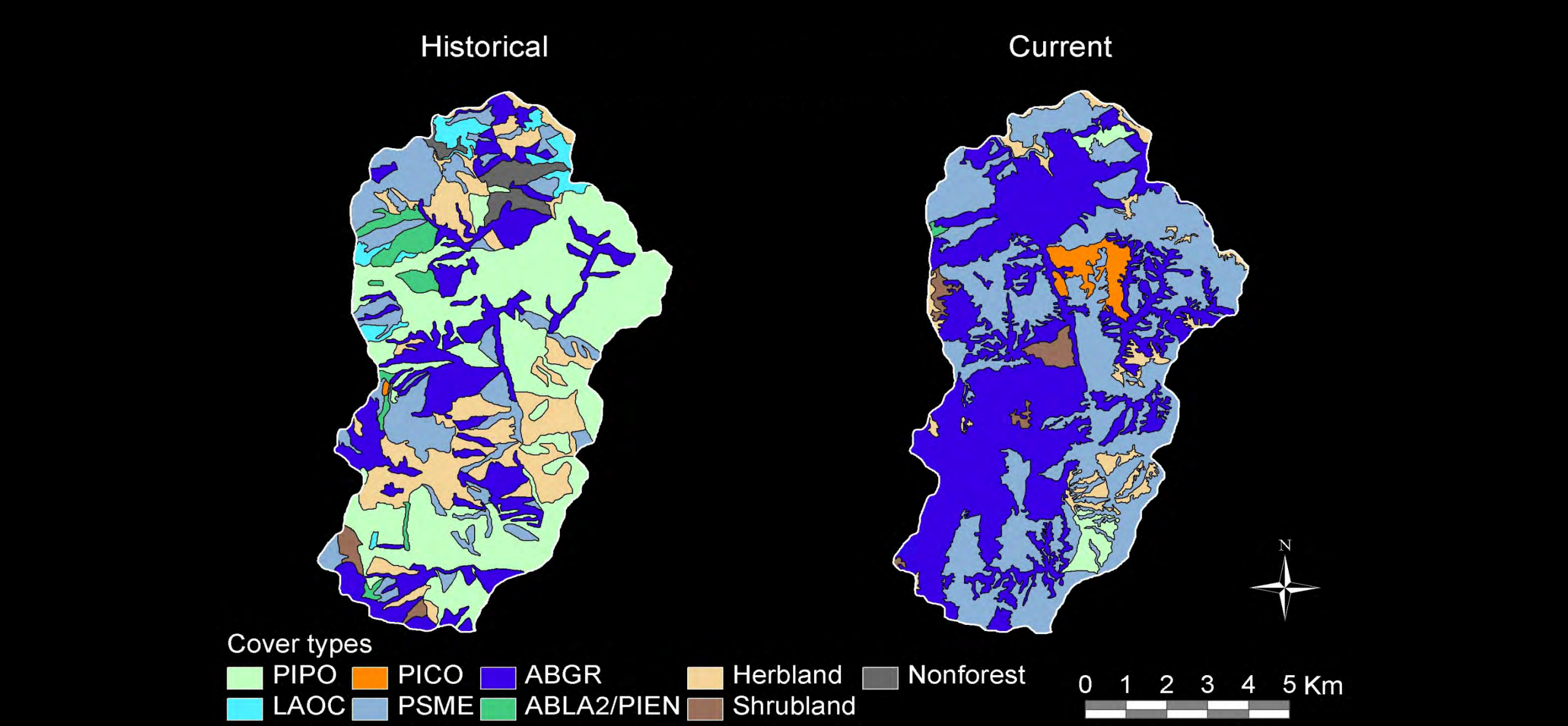
DENSITY, LAYERING INCREASE W/O FIRE



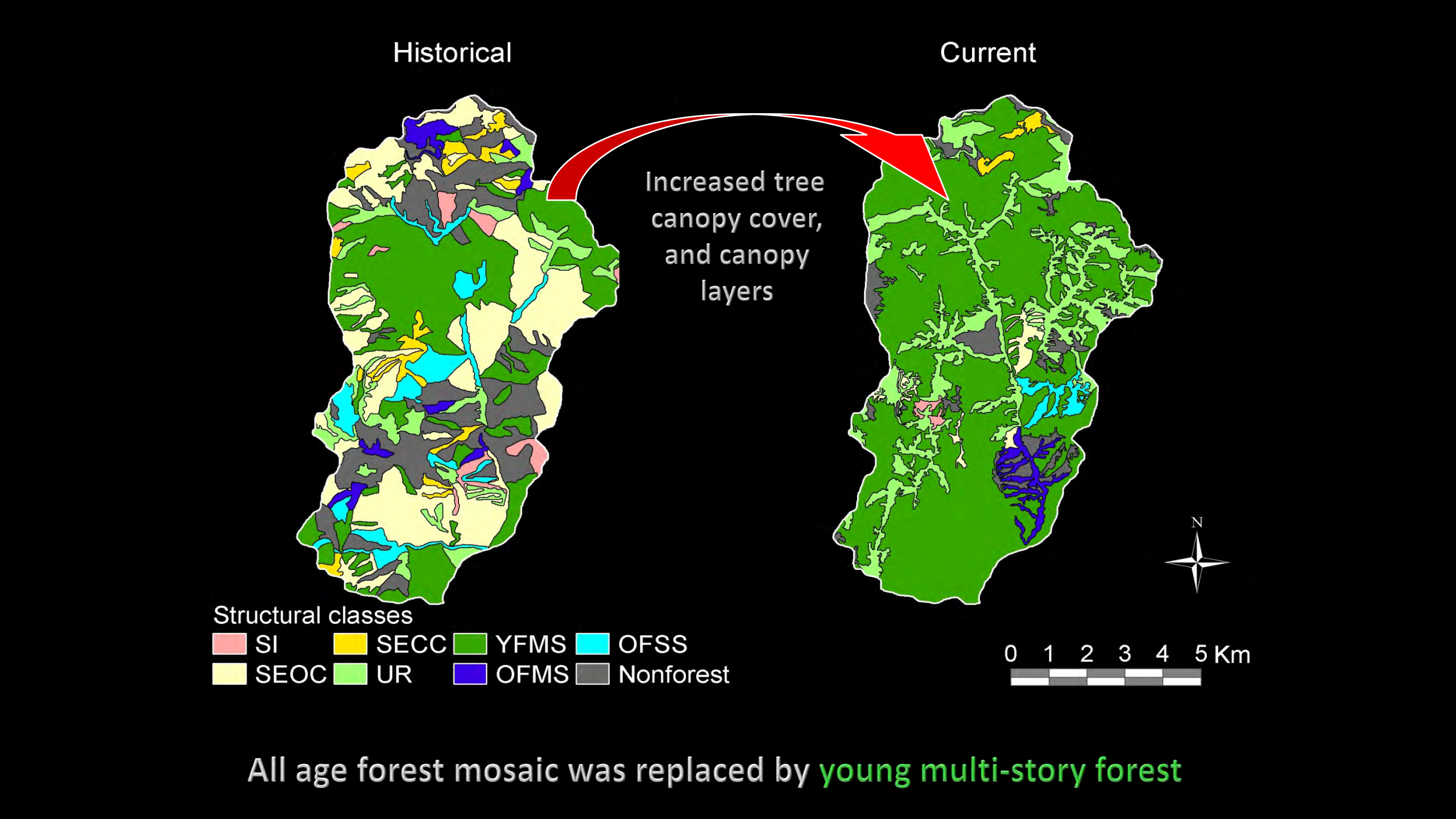
IMPORTANT FEEDBACKS

1) Locally—LSFs & MSFs continually thinned forest patches, reducing tree density and fuels

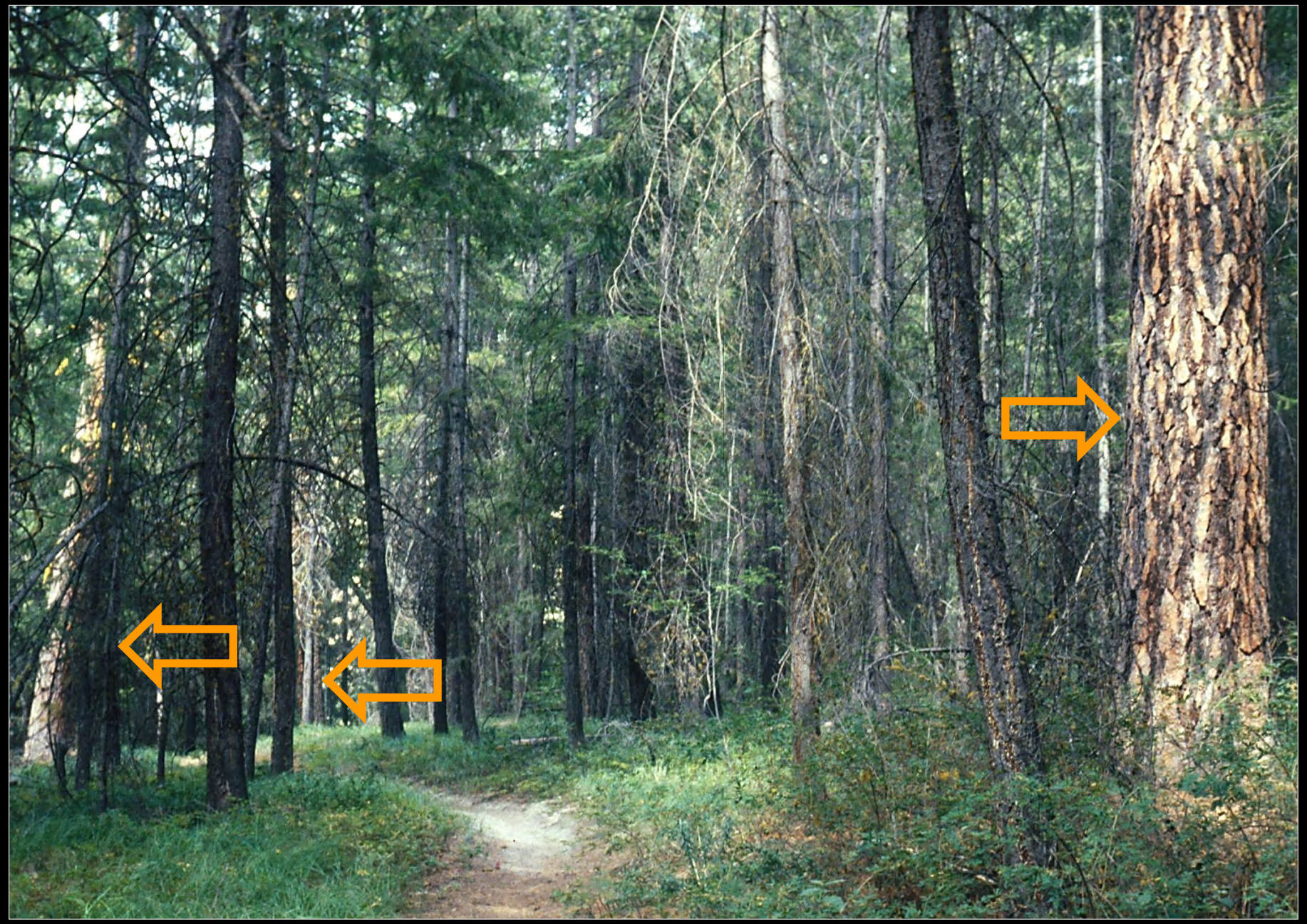
2) Regionally—fires created variable patchworks of nonforest, early, mid, late seral conditions, these patterns spatially controlled future fire size & severity



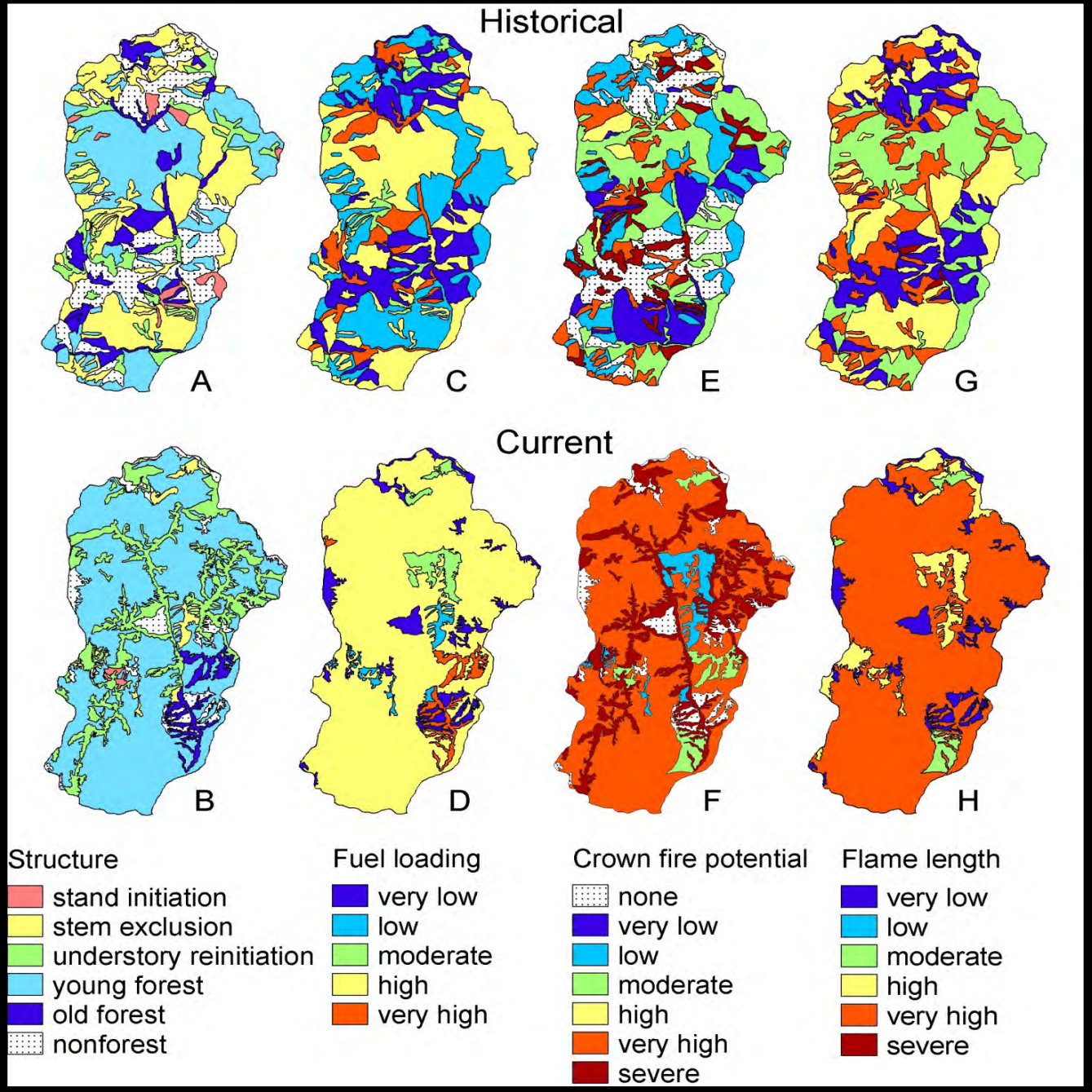
Fire-tolerant cover types decreased, intolerant cover types increased.

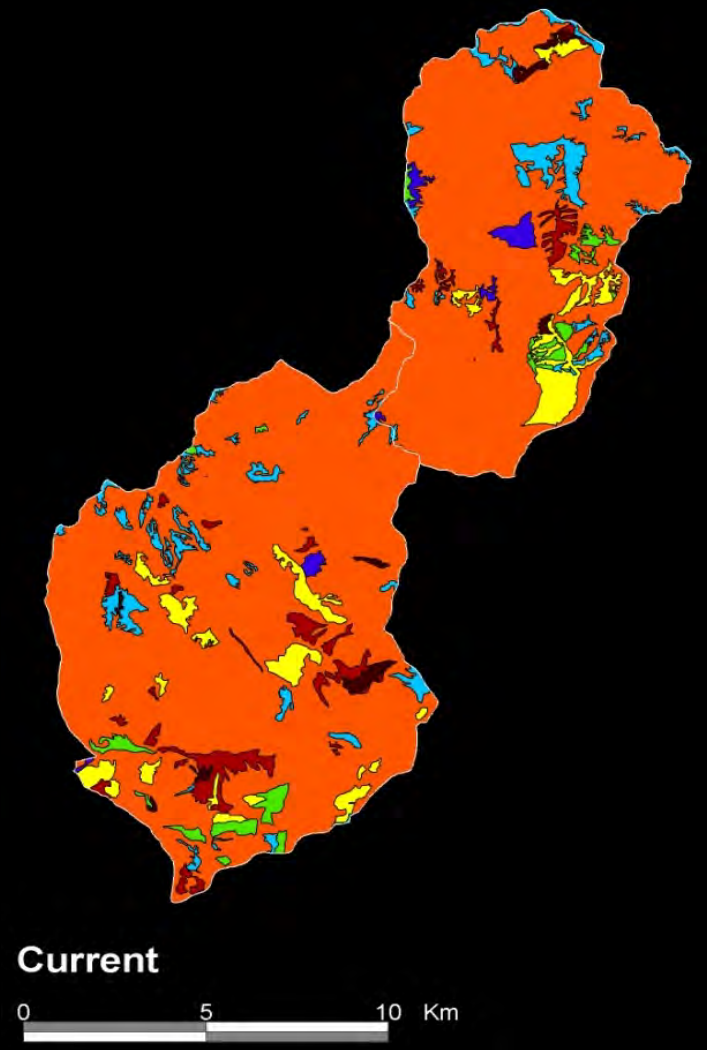


All age forest mosaic was replaced by young multi-story forest

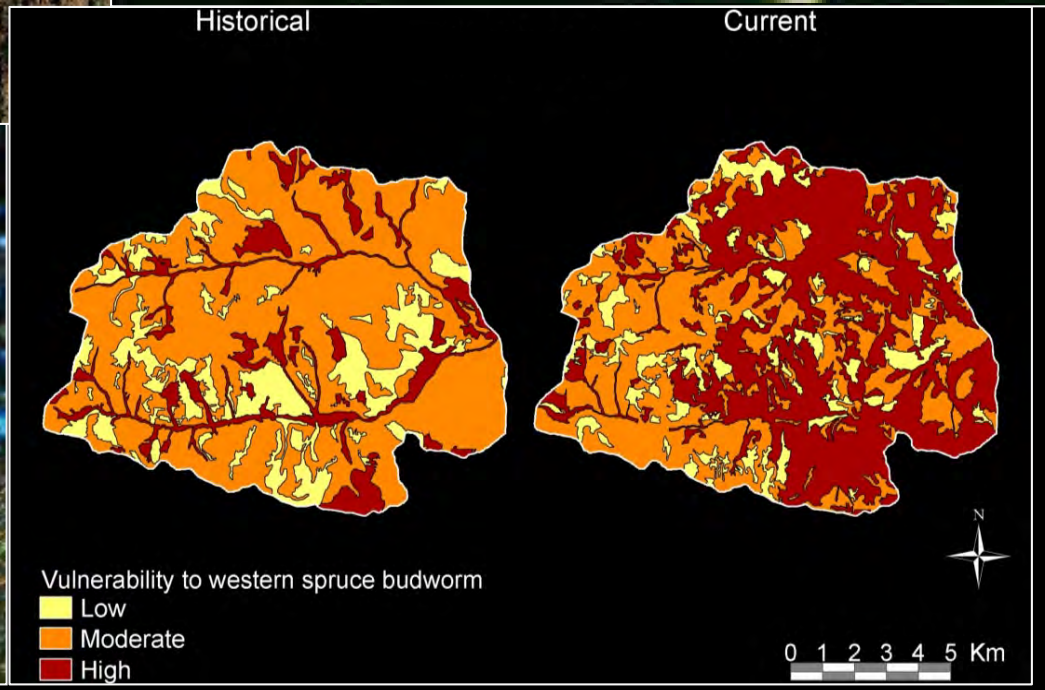


Open stands of PP developed dense, layered DF & GF understories



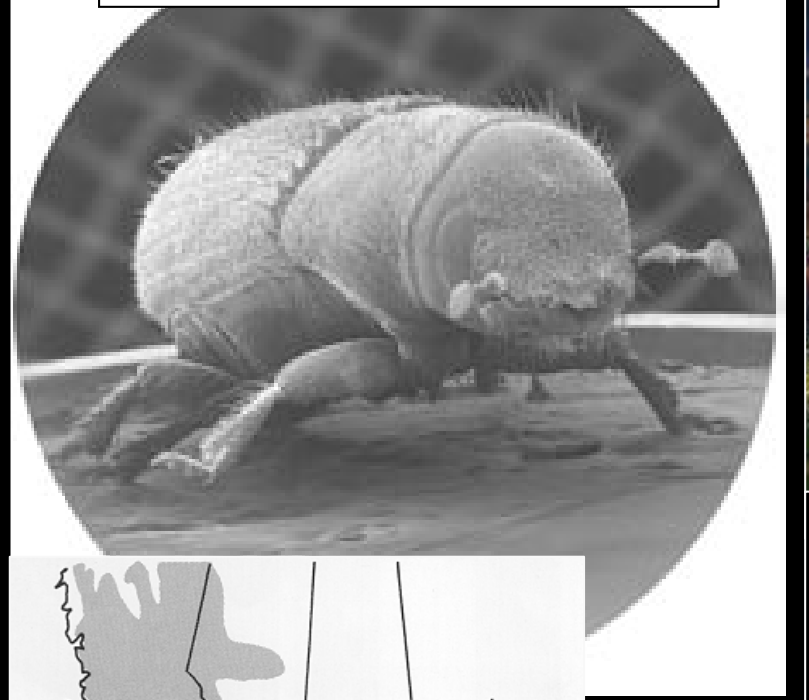


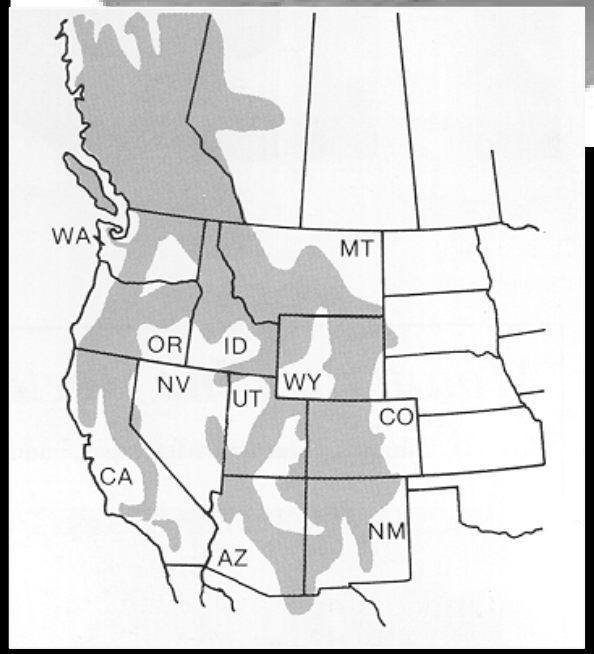
Variable fire behavior replaced by severe fire behavior, w/ high connectivity

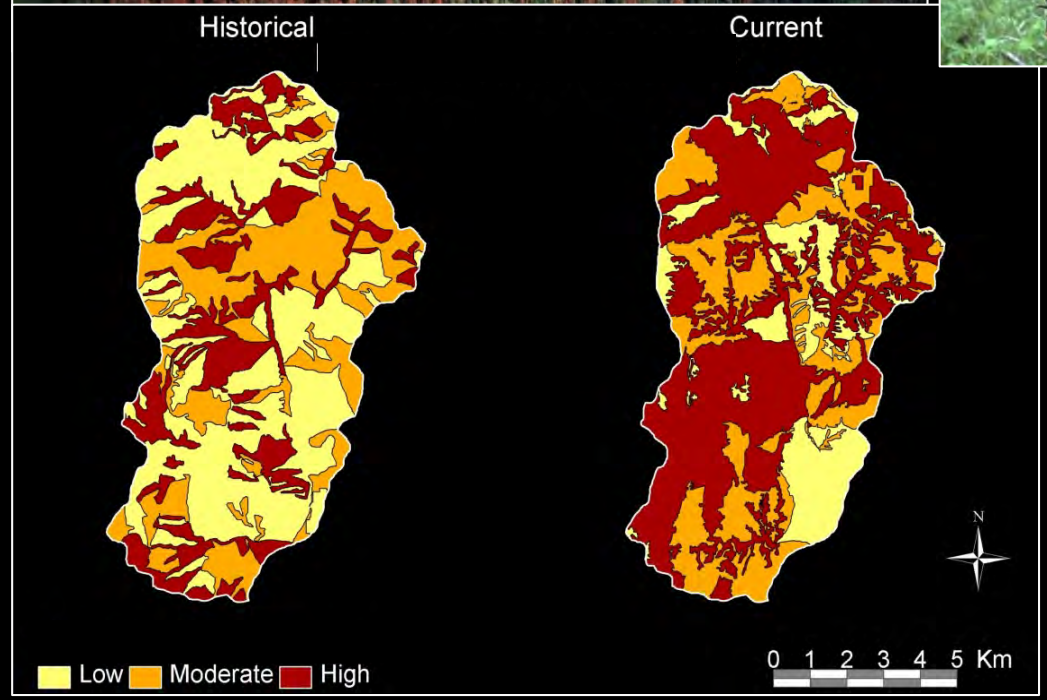


Variable vulnerability to defoliators became high vulnerable, w/ high connectivity

Mountain pine beetle







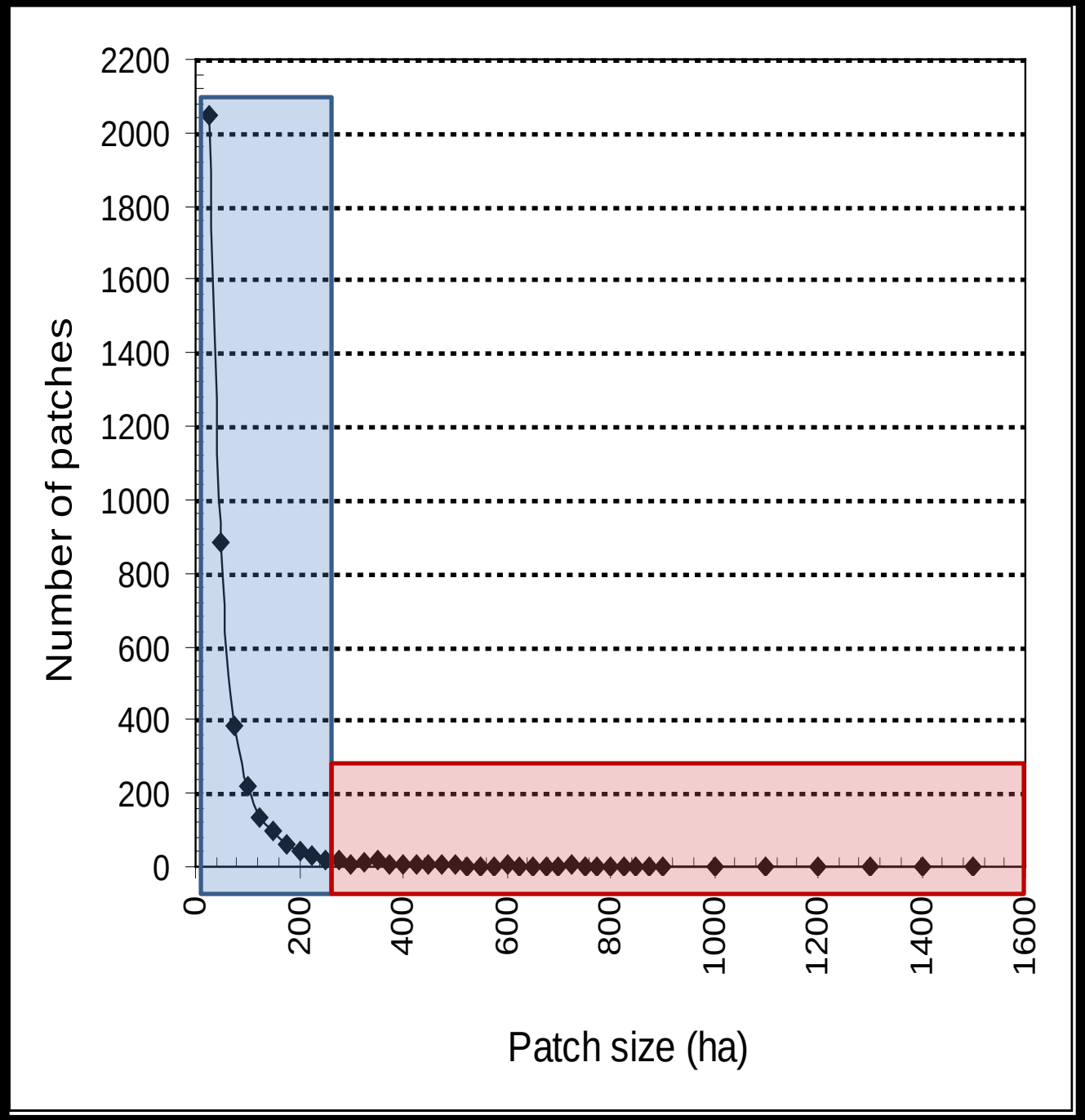
Variable vulnerability to bark beetles became high vulnerability, w/ high connectivity

AN IMPORTANT ROLE FOR EARLY SERAL CONDITIONS…

- ✓ 40-50% of the landscape was likely in early seral or pre-forest conditions.

Patch sizes of nonforest were mostly small- to medium-sized

There were occasional large patches too…



A MORE TYPICAL PATTERN

WHAT DID THIS EARLY SERAL PATCHWORK PROVIDE?

- ✓ A fast & benign fire delivery system, grasses/shrubs were the fuels…
- ✓ Delivering to the interspersed forest…
  - Rapid ROS, short FLs, low FLI, low CFP
  - At night, fires often went out in the grasses, w/ RH recovery

- ✓ Too much mature forest area was a liability to the remaining forest
- ✓ Too much high density forest was a liability as well…

- ✓ With CC, forest area + forest density will continue to reduce

Landscape Ecol (2015) 30:1805–1835
DOI 10.1007/s10980-015-0218-0

REVIEW ARTICLE

Restoring fire-prone Inland Pacific landscapes: seven core principles

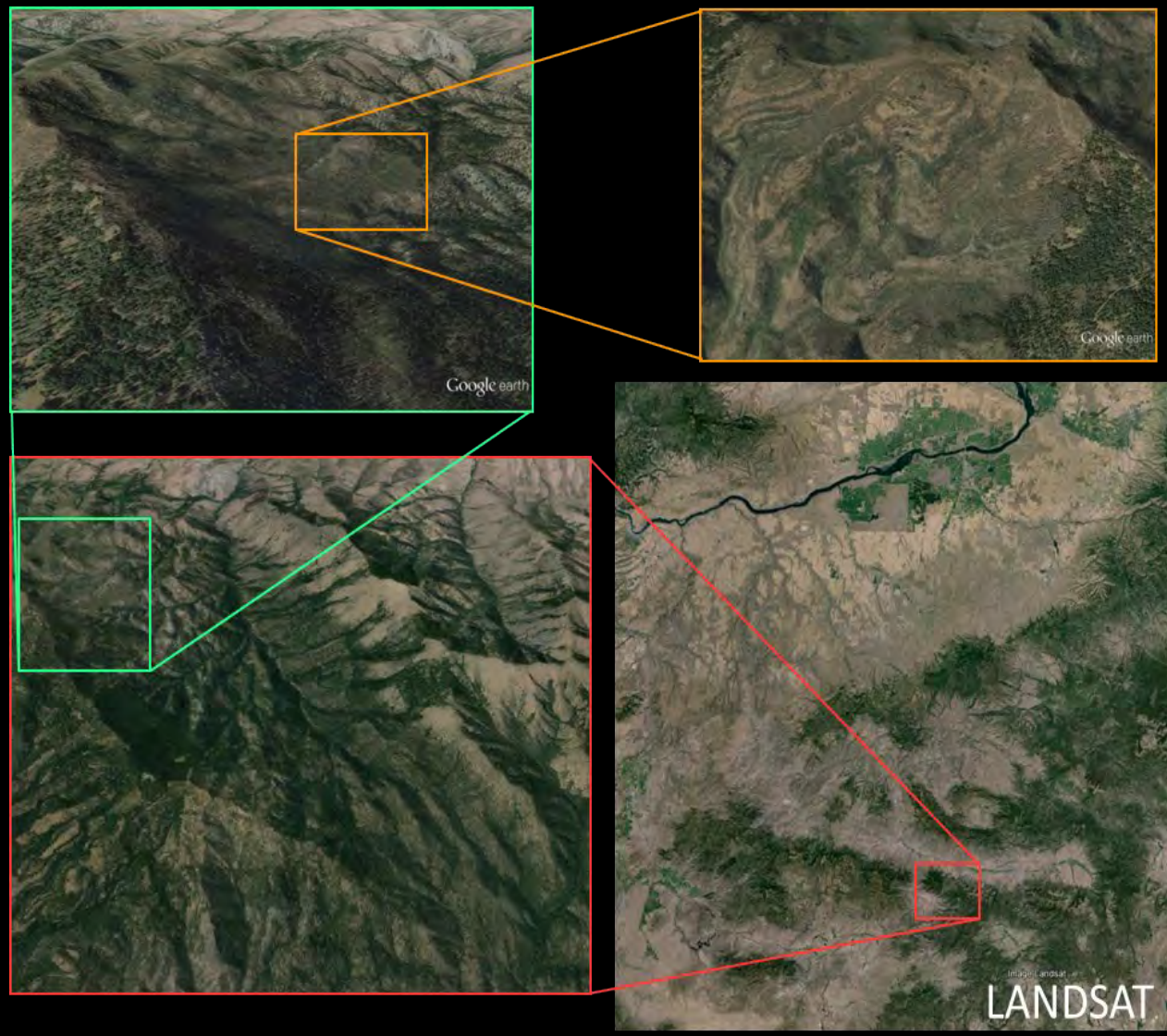
Paul F. Hessburg · Derek J. Churchill · Andrew J. Larson · Ryan D. Haugo · Carol Miller · Thomas A. Spies · Malcolm P. North · Nicholas A. Povak · R. Travis Belote · Peter H. Singleton · William L. Gaines · Robert E. Keane · Gregory H. Aplet · Scott L. Stephens · Penelope Morgan · Peter A. Bisson · Bruce E. Rieman · R. Brion Salter · Gordon H. Reeves

https://doi.org/10.1007/s10980-015-0218-0

Landscape Restoration: Principle 1

Regional landscapes are like nesting Russian dolls…
…smaller landscape levels nest within larger ones

- ✓ Restore patterns, connectivity, and processes at each level



e.g., Blue Mountains Province

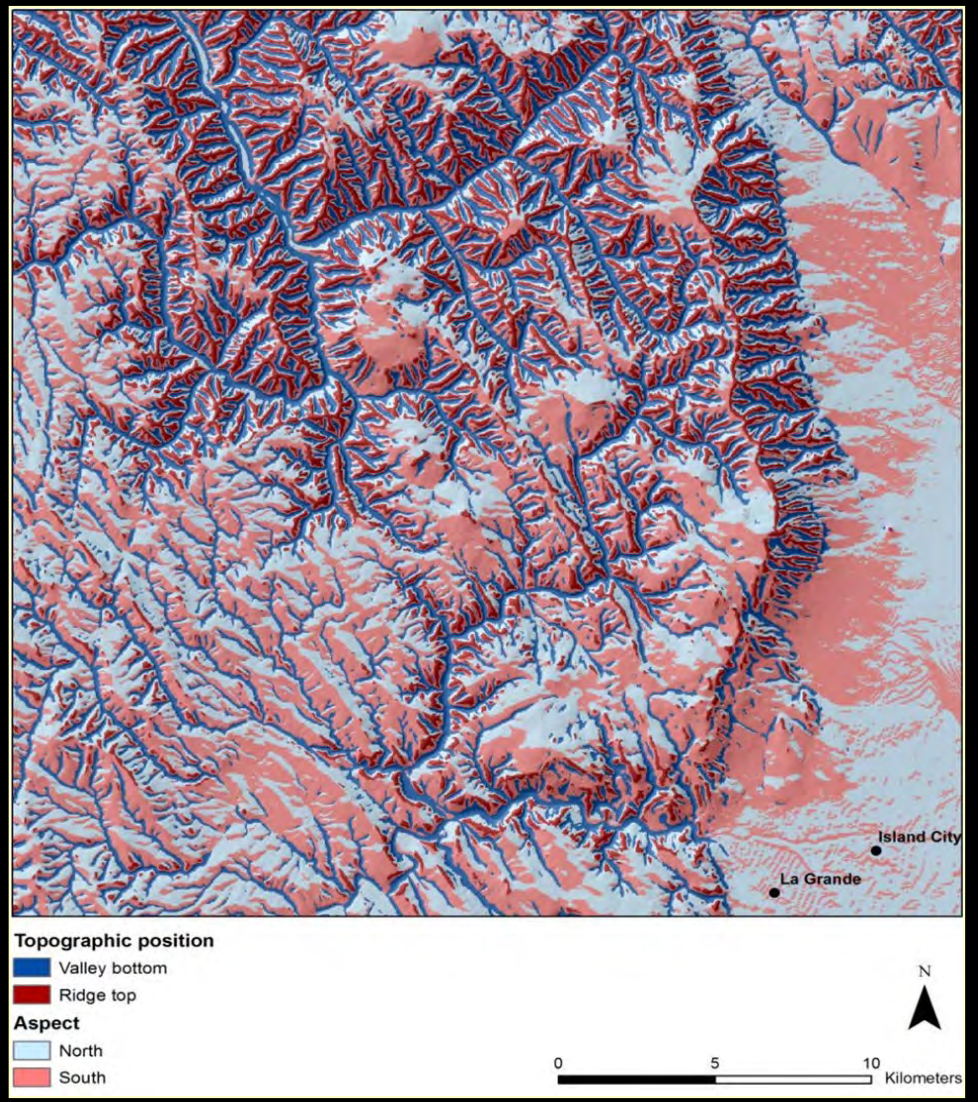
Wu J., & Loucks, O. L. 1995. Quarterly Review of Biology, 439-466
O'Neill 1986, Urban et al. 1987, Holling 1992, Wu & David 2002

Landscape Restoration: Principle 2

The topography provides a natural template for restoring vegetation & habitat patterns

- ✓ Use it to tailor more characteristic forest age, spp., density, & lifeform patterns to the landscape

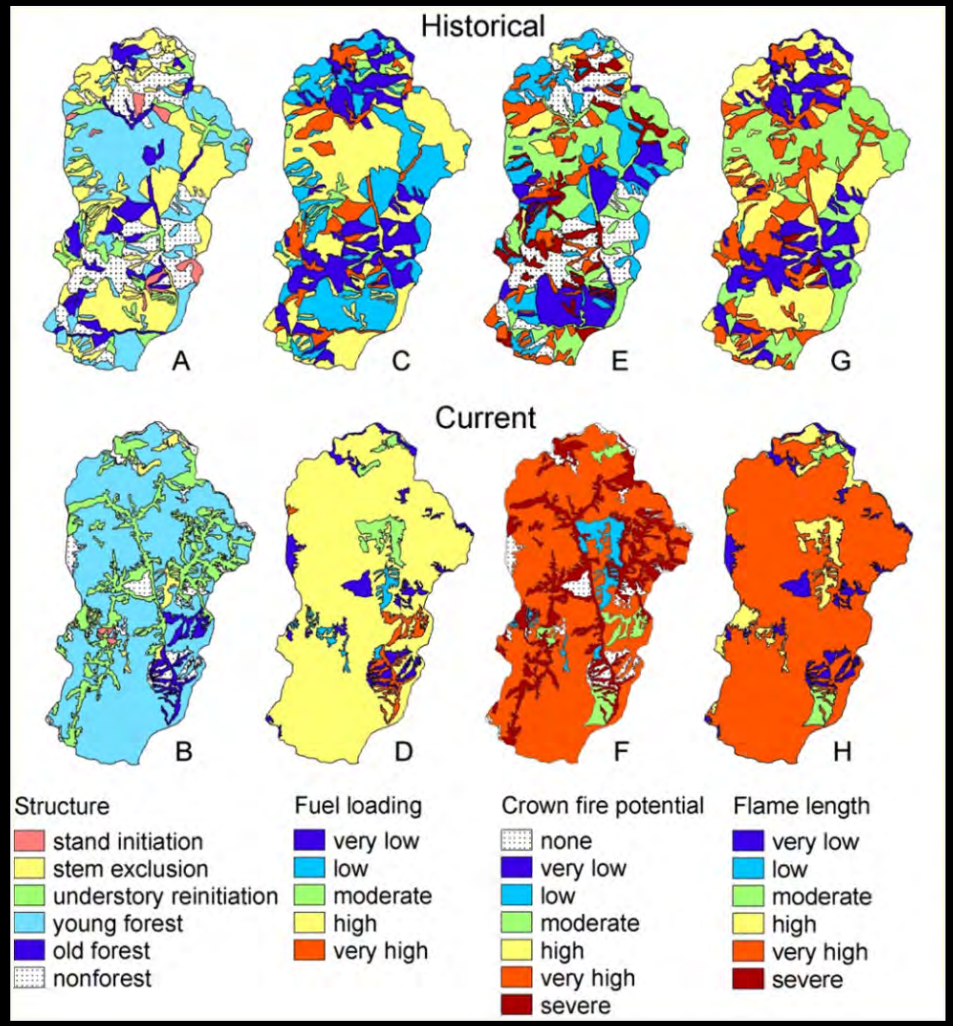
Perry et al. (2011) For Ecol & Mgt 262:703
Lyderson & North (2012) Ecosystems 15: 1134



Landscape Restoration: Principle 3

Fire, forest succession, & climate are the ENGINE that drives the system

- ✓ Restore supportive successional/fuel patterns to restore the fire regime;
- ✓ CC will continually adapt these patterns

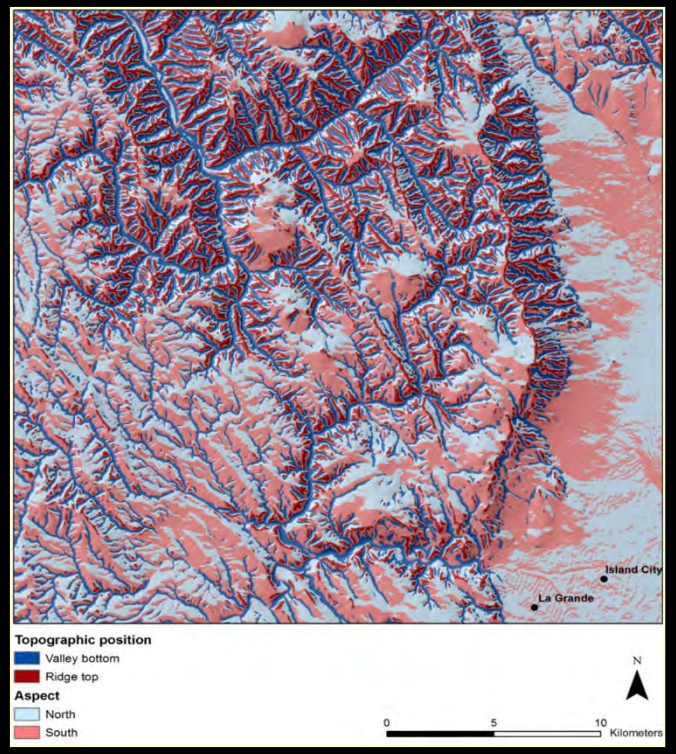


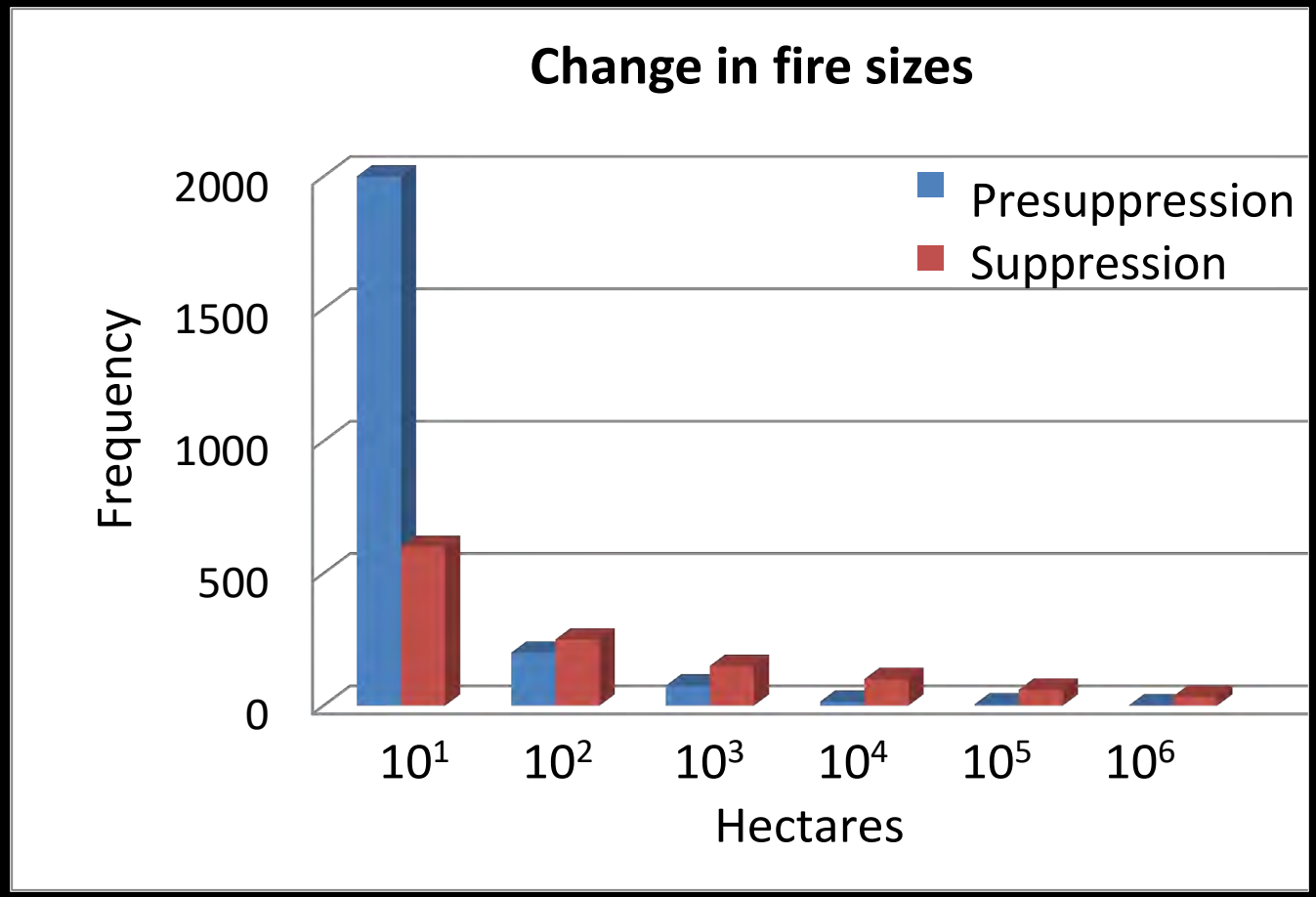
Keane et al. (2009) For Ecol Manage 258:1025-1037
Bisson et al. (2009) Ecol & Soc 14(1), 45;
Collins et al. 2009, Parks et al. 2015;
McGarigal & Romme 2012;
Wiens et al. (2012) Hist. Env Variation… Wiley

Landscape Restoration: Principle 4

Predictable patch size distributions historically emerged from landscape-climate-fire interactions

- ✓ Restore typical size distributions of successional patches & allow CC & disturbances to adapt them





Moritz et al. 2011. Landscape Ecology of Fire, Springer.
Perry et al. 2011. For. Ecol. Manage. 262: 703-717.

Landscape Restoration: Principle 5

Widely distributed older trees provide a critical backbone to DMC + MMC landscapes; they are CC & wildfire adapted & a genetic legacy

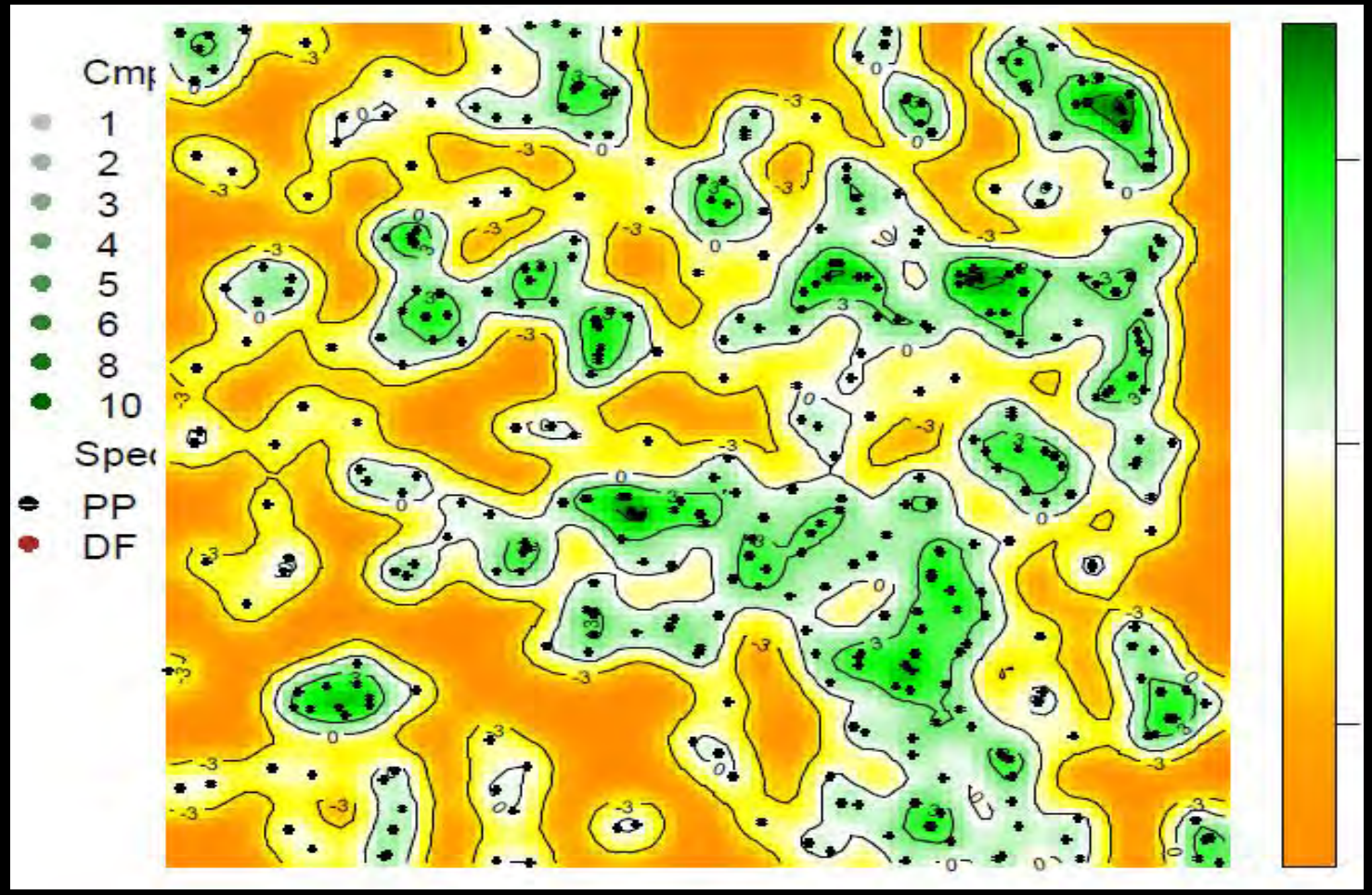
- ✓ Make more of them

Lutz et al. (2009) For Ecol Manage 257: 2296-2307
Hagmann et al. (2013) For Ecol Manage 304: 492-504; (2014) For Ecol Manage 330: 158-170.
Larson & Churchill (2012) For Ecol Manage 267:74-92

Landscape Restoration: Principle 6

Successional patches are really small landscapes w/ in a larger landscape

- ✓ PP, DMC, MMC patches, restore typical tree clump & gap variation

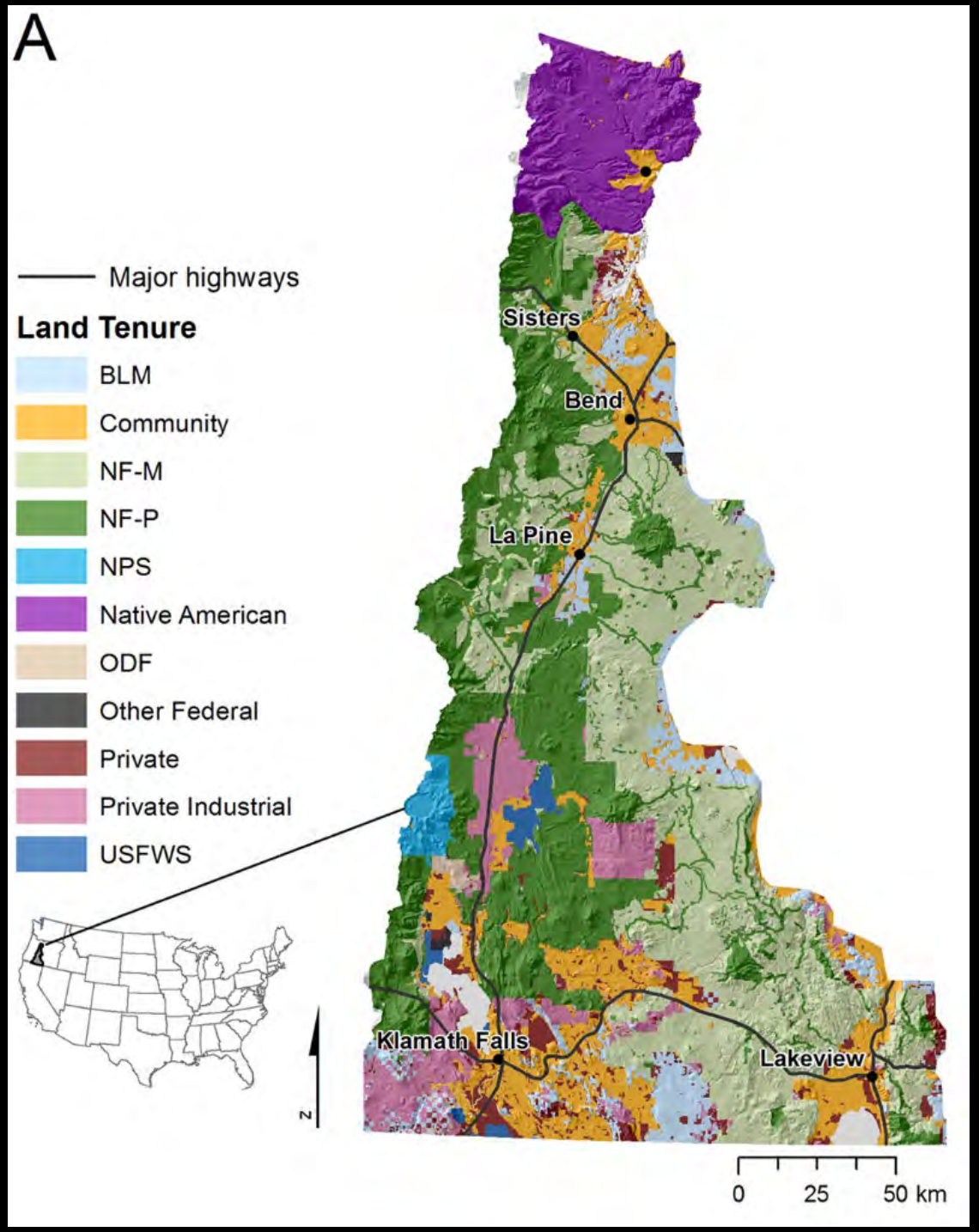


Larson & Churchill (2012) For Ecol Manage 267: 74-92
Churchill et al.(2013) For Ecol Manage 291: 442-457
Lydersen et al. (2013) For Ecol Manage 304: 370-38
Clyatt et al. 2016 For Ecol Manage 361: 23-37

Landscape Restoration: Principle 7

Land ownership & allocation patterns disrupt ecological boundaries

- ✓ Work collaboratively across ownerships to develop restoration projects



Ager et al. (2017) PLoS One
Cheng & Sturtevant (2012) Env Mgt
Rieman et al. (2015) Fisheries

LANDSCAPE PRESCRIPTIONS NEEDED: that re-create varied lifeform, fuel, forest age & density patterns across intermingled ownerships

- ✓ A cultural change for planning and management
- ✓ CC & wildfire adaptation treatments needed at the scale of the problem → 40-50%
- ✓ We have tools to do this work, time is short
- ✓ For C storage, re-creating these patterns → more C stored
- ✓ For smoke emissions, re-creating these patterns → fewer harmful emissions
- ✓ For many acres, Rx burning alone is low feasibility → pair w/ thinning
- ✓ Thinning without Rx burning makes it worse → need to address smoke management
- ✓ In backcountry → large need to use managed wildfire, a chief export of wilderness
- ✓ Buy time for adaptation → increase suppression effectiveness, anchor & control points

Fire & Conservation in Oregon's Forests

Ryan Haugo, PhD
The Nature Conservancy in Oregon

Photo: John Marshall

The Nature Conservancy
Oregon

The Nature Conservancy
Oregon

The Nature Conservancy
Oregon

The Nature Conservancy
Oregon

FIRE & CONSERVATION

Habitat & Nature's Benefits

The Nature Conservancy
Oregon

Photos: John Marshall

FIRE & CONSERVATION

Where, how much, what kinds of management?

The Nature Conservancy
Oregon

RESTORATION NEEDS

Haugo et al 2015, For. Ecol. Manag.
DeMeo et al 2018, Northwest Sci

Contents lists available at ScienceDirect

Forest Ecology and Management

journal homepage: www.elsevier.com/locate/foreco

A new approach to evaluate forest structure restoration needs across Oregon and Washington, USA

Ryan Haugo[a,*], Chris Zanger[b], Tom DeMeo[c], Chris Ringo[d], Ayn Shlisky[e], Kori Blankenship[b], Mike Simpson[f], Kim Mellen-McLean[g], Jane Kertis[g], Mark Stern[h]

[a] The Nature Conservancy, 32 N 3rd St, Ste. 412, Yakima, WA 98901, United States
[b] The Nature Conservancy, 999 Wall Drive, Ste. 104, Bend, OR 97702, United States
[c] US Forest Service, 1220 SW 3rd Ave, Portland, OR 97204, United States
[d] Department of Crop and Soil Science, Oregon State University, Corvallis, OR 97331, United States
[e] US Forest Service, 72510 Coyote Rd., Pendleton, OR 97801, United States
[f] US Forest Service, 63095 Deschutes Market Rd., Bend, OR 97701, United States
[g] US Forest Service, 3200 SW Jefferson Way, Corvallis, OR 97331, United States
[h] The Nature Conservancy, 821 SE 14th Ave, Portland, OR 97214, United States

ARTICLE INFO

Article history:
Received 30 June 2014
Received in revised form 12 September 2014
Accepted 15 September 2014

Keywords:
Pacific Northwest
Ecological restoration
Landfire
Fire Regime Condition Class
Gradient nearest neighbor
Natural range of variation

ABSTRACT

Widespread habitat degradation and uncharacteristic fire, insect, and disease outbreaks in forests across the western United States have led to highly publicized calls to increase the pace and scale of forest restoration. Despite these calls, we frequently lack a comprehensive understanding of forest restoration needs. In this study we demonstrate a new approach for evaluating where, how much, and what types of restoration are needed to move present day landscape scale forest structure towards a Natural Range of Variability (NRV) across eastern Washington, eastern Oregon, and southwestern Oregon. Our approach builds on the conceptual framework of the LANDFIRE and Fire Regime Condition Class programs. Washington–Oregon specific datasets are used to assess the need for changes to current forest structure resulting from disturbance and/or succession at watershed and regional scales.

Across our analysis region we found that changes in current structure would be needed on an estimated 4.7 million+ ha (40% of all coniferous forests) in order to restore forest structure approximating NRV at the landscape scale. Both the overall level and the type of restoration need varied greatly between forested biophysical settings. Regional restoration needs were dominated by the estimated 3.8+ million ha in need of thinning and/or low severity fire in forests that were historically maintained by frequent low or mixed severity fire (historical Fire Regime Group I and III biophysical settings). However, disturbance alone cannot restore NRV forest structure. We found that time to transition into later development structural classes through successional processes was required on approximately 3.2 million ha (over 25% of all coniferous forests). On an estimated 2.3 million ha we identified that disturbance followed by succession was required to restore NRV forest structure.

The results of this study are intended to facilitate the ability of local land managers to incorporate regional scale, multi-ownership context into local forest management and restoration. Meeting the region-wide restoration needs identified in this study will require a substantial increase in the pace and scale of restoration treatments and coordination amongst governments, agencies, and landowners.

1. Introduction

Ecological restoration has become a dominant paradigm for the management of many public forests across the United States (USDA Forest Service, 2012a,b). Ecological restoration is "the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed" (SER, 2004). Within western states, this present focus on restoration is largely in response to the widespread degradation of terrestrial and aquatic habitats and uncharacteristic fire, insect, and disease outbreaks resulting from a century or more of wildfire suppression, intensive harvesting, grazing, and mining (Brown et al., 2004; Franklin et al., 2008; Hessburg and Agee, 2003; Hessburg et al., 2005; North et al., 2009; Peterson et al., 2005; Schoennagel et al., 2004). Since 2010 $20 to

* Corresponding author. Tel.: +1 509 248 6672.
E-mail address: rhaugo@tnc.org (R. Haugo).

http://dx.doi.org/10.1016/j.foreco.2014.09.014
0378-1127/

Tom DeMeo[1], USDA Forest Service, Pacific Northwest Region, 1220 SW Third Avenue, Portland, OR 97204
Ryan Haugo, The Nature Conservancy, The Nature Conservancy, 821 SE 14th Avenue, Portland, OR 97214
Chris Ringo, Department of Crop and Soil Science, Oregon State University, Corvallis, OR 97331
Jane Kertis, USDA Forest Service, 3200 SW Jefferson Way, Corvallis, OR 97331
Steve Acker, USDA Forest Service, 16400 Champion Way, Sandy, OR 97055
Mike Simpson, USDA Forest Service, 63095 Deschutes Market Rd., Bend, OR 97701
and
Mark Stern, The Nature Conservancy, 821 SE 14th Avenue, Portland, OR 97214

Expanding Our Understanding of Forest Structural Restoration Needs in the Pacific Northwest

Abstract

Ecological departure, or how much landscapes have changed from a natural range of variation (NRV), has become a key metric in forest planning and restoration efforts. In this study we define forest restoration need as the specific change in structural stage abundance necessary to move landscapes into the NRV. While most restoration projects in the forested ecosystems of the Pacific Northwest, USA (Oregon and Washington) have embraced this paradigm, our understanding of what treatments to apply where, when, and at what magnitude is evolving and continues to be refined. We build on a body of existing LANDFIRE/Fire Regime Condition Class (FRCC) work on ecological departure to assess the ecological departure of all forested landscapes in the region. Moreover, we assess departure in moister forests west of the Cascade crest, and compare them with fire-dependent forests east of the crest and in southwest Oregon. These "moister Westside" forests have received relatively less attention in a fire ecology context, and we hypothesize restoration needs there are quite different. We show a substantial need for disturbance-related treatments in the drier fire-dependent portion of this region (east of the Cascade crest plus southwest Oregon), with over half of this treatment type falling on Federally-administered land. On the Westside the need for succession is more pronounced. The lack of pronounced disturbance need west of the Cascade crest suggests restoration there may require strategies more nuanced than in the fire-dependent zone.

Introduction

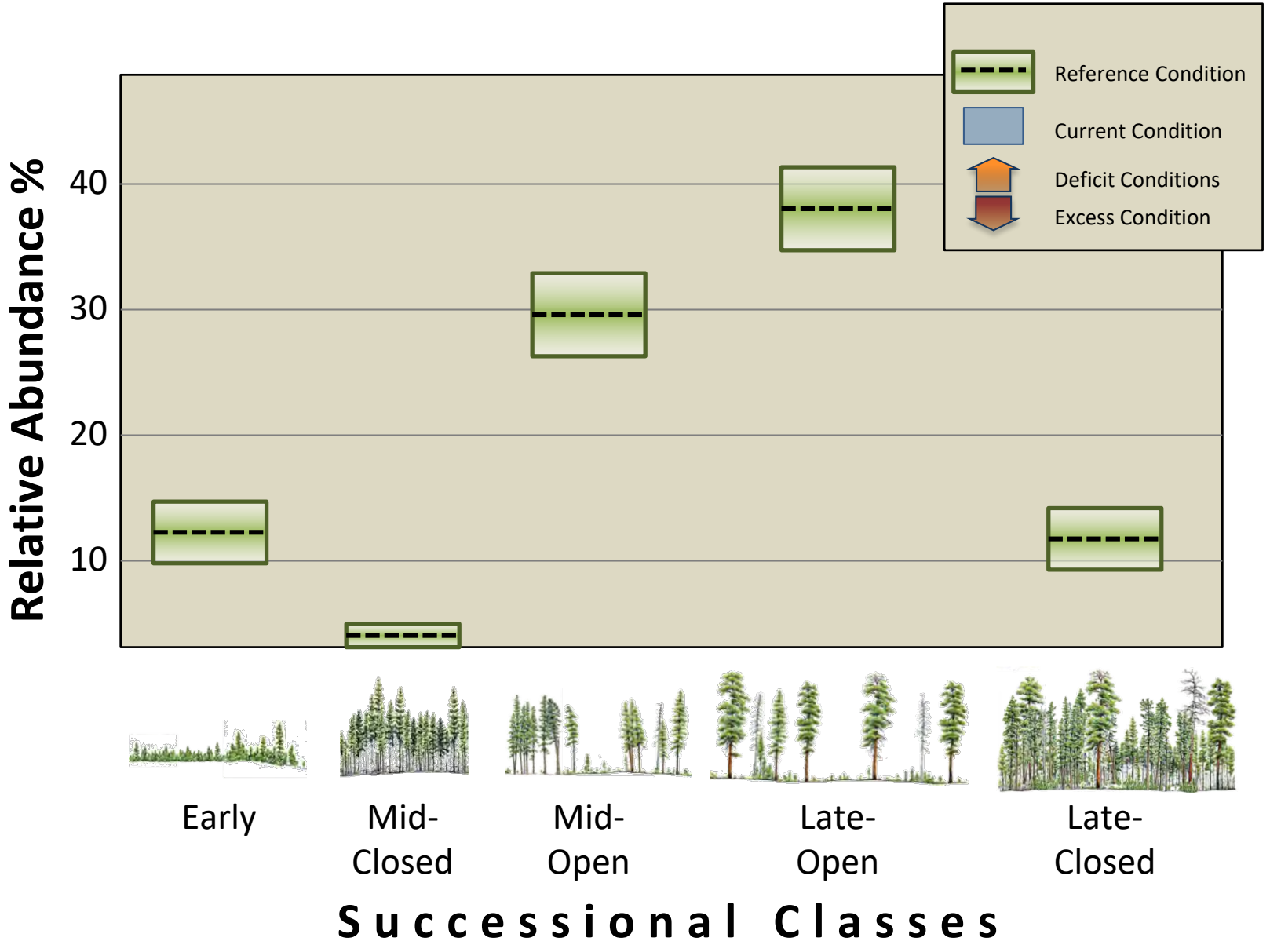
In recent years, forest management in western North America has been shaped by a growing awareness that substantial areas are departed from a natural, sustainable range of variation (Landres et al.1999, Morgan et al. 1994, Swetnam et al. 1999, Keane et al. 2009, Wiens et al. 2012). The natural range of variation (NRV) is the central tendency in variation of the structure, processes, and composition of landscapes over time, in the absence of modern human interference (Landres et al. 1999, Barrett et al. 2010). Because this can be difficult to quantify in the current era, particularly with a changing climate, the historical range of variation is used as an approximation of the natural range. In the Pacific Northwest, this is commonly defined as the 400 years prior to European settlement, or 1450-1850 (Hann et al. 2003). Departure from the central tendency in structure (seral stages) or processes (such as disturbance, notably fire) is assumed to indicate landscapes less resilient and sustainable than those within the natural range.

Landscape management initiatives such as the Eastside Restoration Project in Oregon (Aney 2016), the Ecological Restoration Implementation Plan in California (USFS 2013), or projects

[1]Author to whom correspondence should be addressed.
Email: tdemeo@fs.fed.us

The Nature Conservancy
Oregon

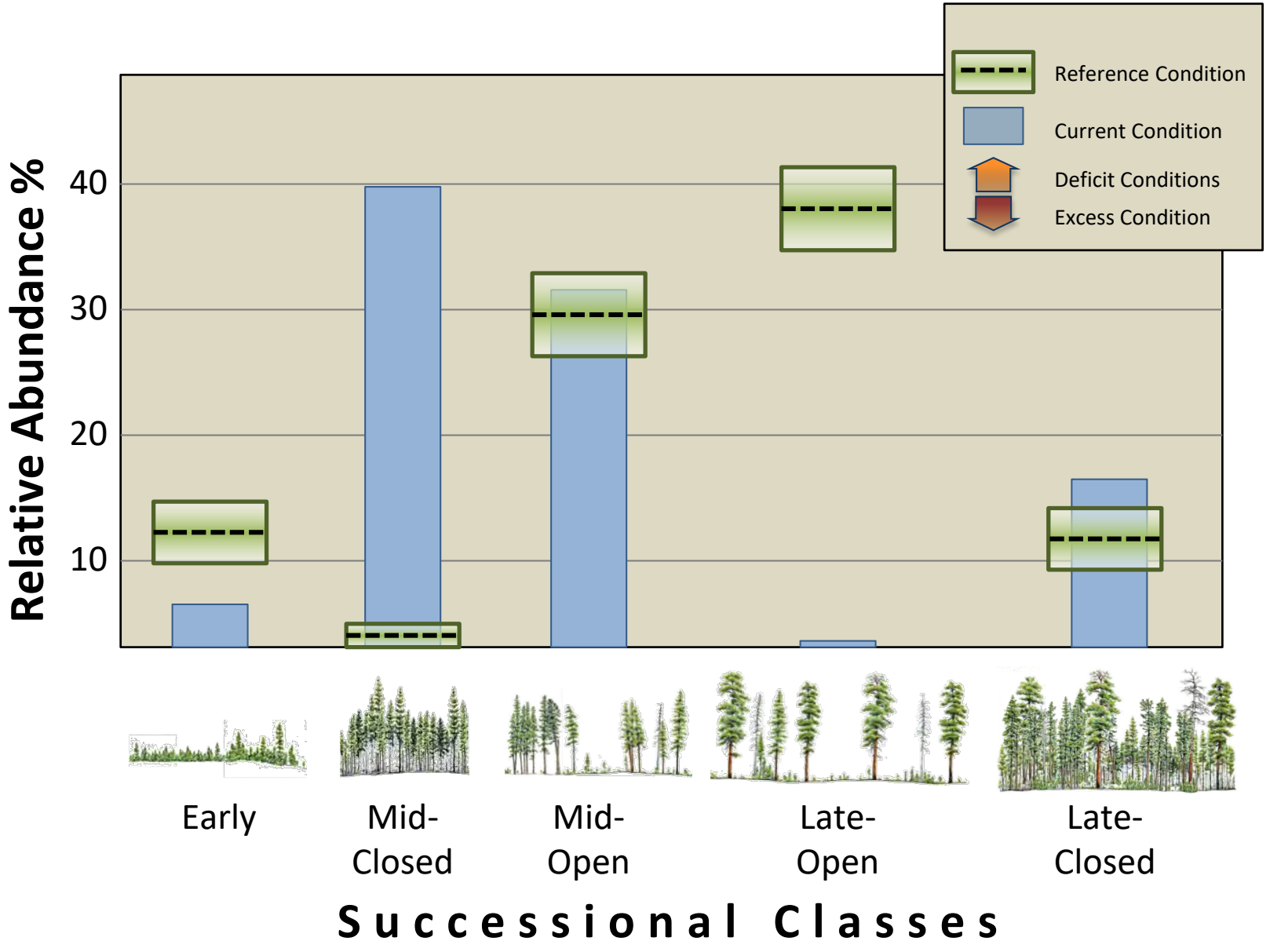
RESTORATION NEEDS



Haugo et al 2015, For. Ecol. Mang.
DeMeo et al 2018, Northwest Sci

The Nature Conservancy
Oregon

RESTORATION NEEDS

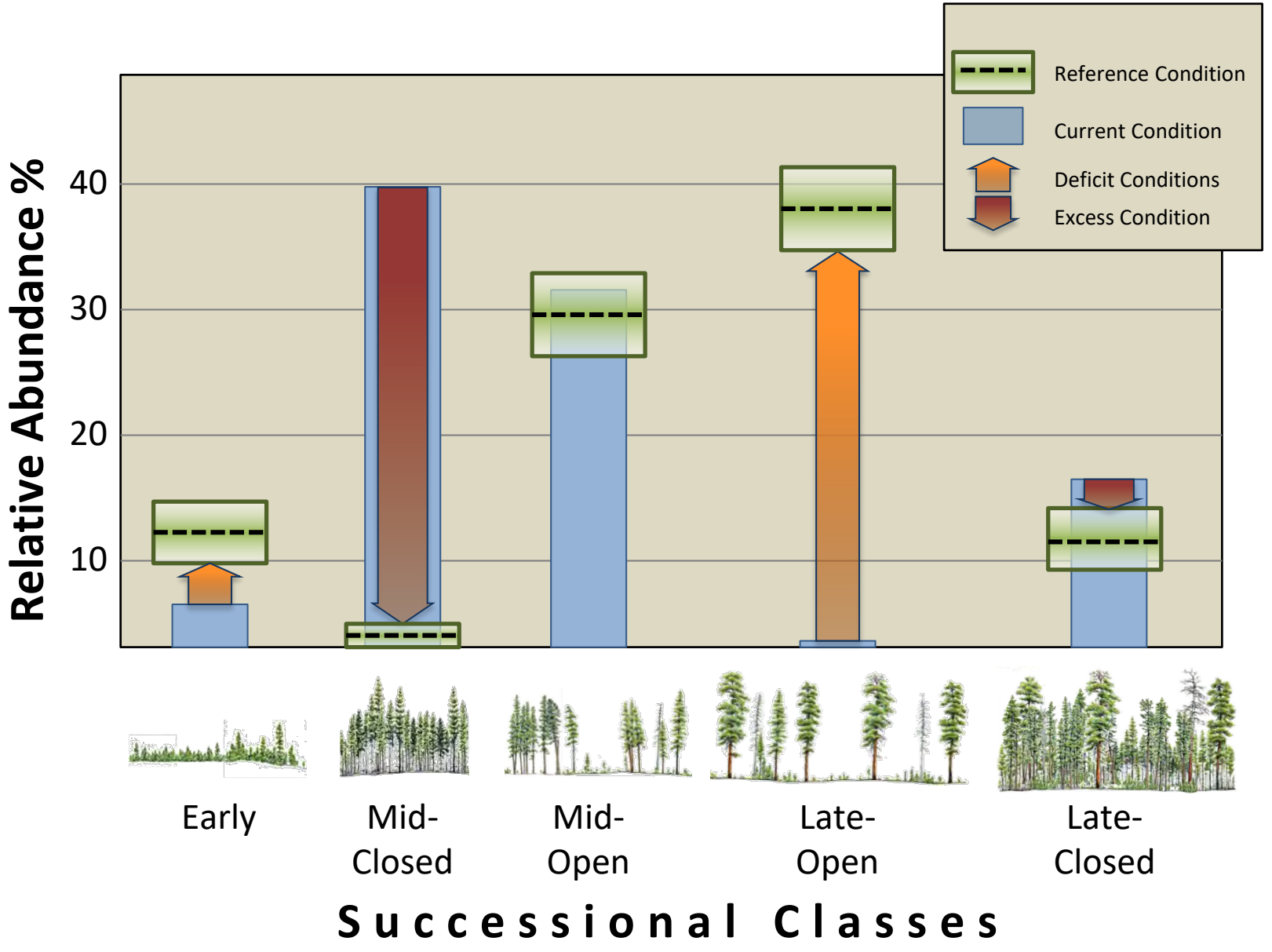


Haugo et al 2015, For. Ecol. Mang.
DeMeo et al 2018, Northwest Sci

The Nature Conservancy
Oregon

RESTORATION NEEDS

Haugo et al 2015, For. Ecol. Mang.
DeMeo et al 2018, Northwest Sci



The Nature Conservancy
Oregon

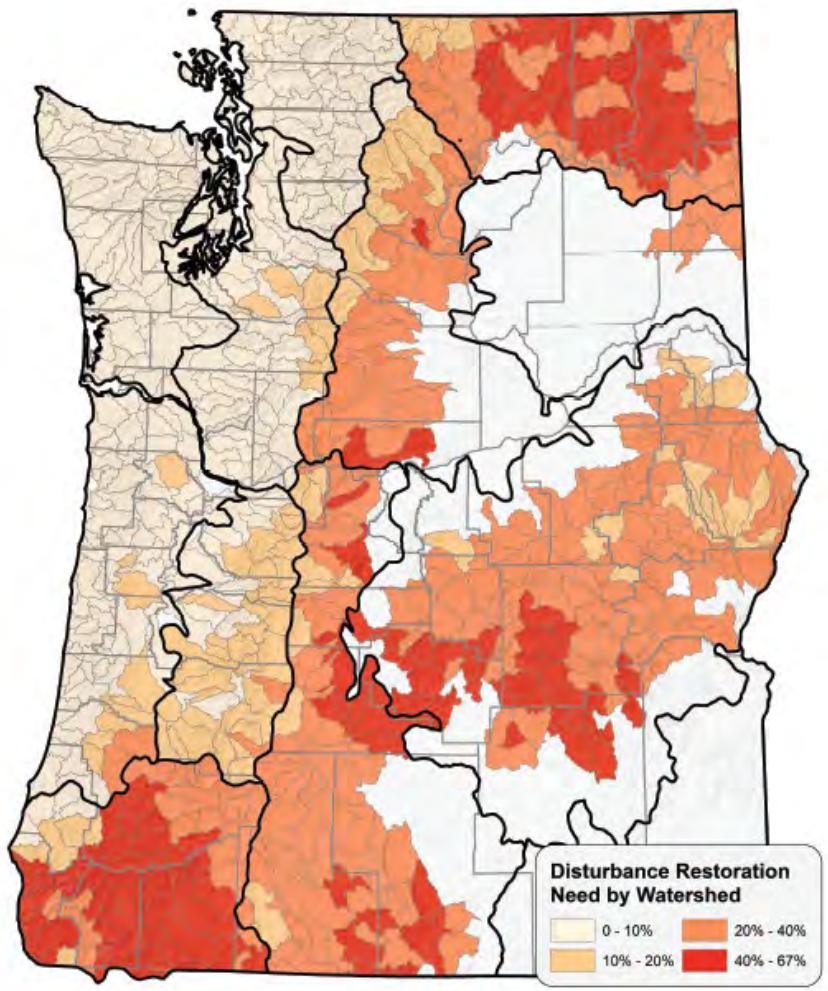
RESTORATION NEEDS

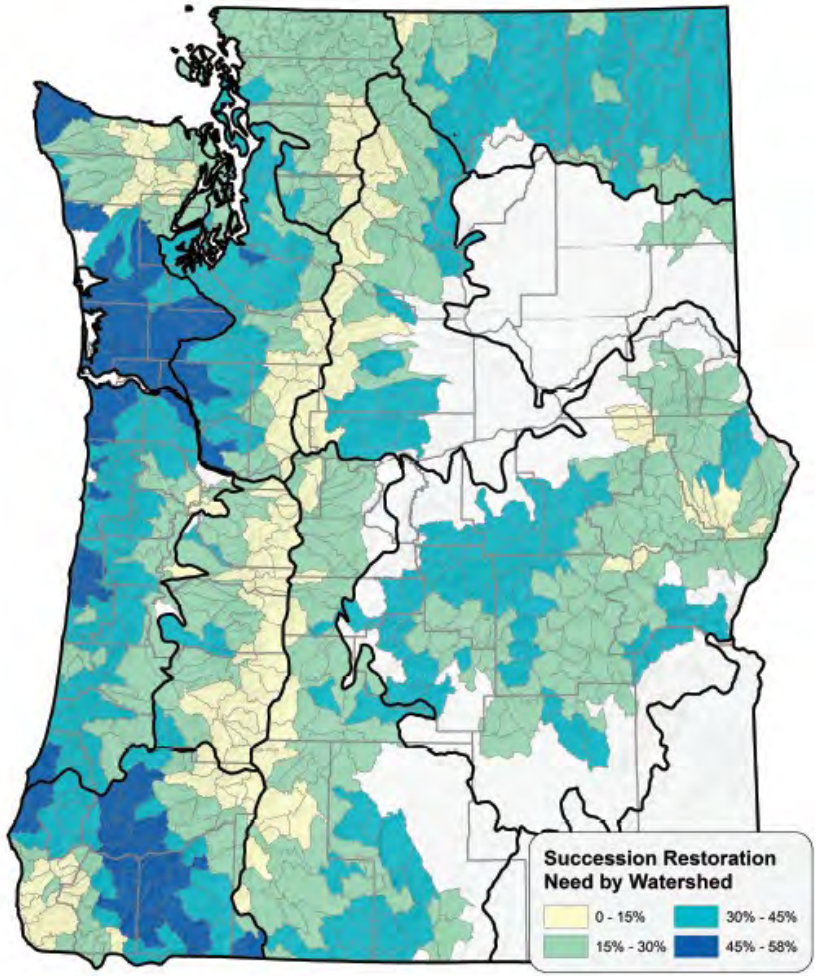
Total PNW Disturbance

- 11 million acres

Total PNW Succession

- 14 million acres





The Nature Conservancy
Oregon

RESTORATION NEEDS

E & SW Oregon Forests

Total Disturbance Needs

- **34% of all forests**
- **6.5 million acres**

Total Succession Needs

- **27% of all forests**
- **5.1 million acres**

The Nature Conservancy
Oregon

STATE OF SCIENCE

OSU Fire Summit Recommendations

1. Expand thinning, prescribed & managed fire
2. Improved coordination across boundaries
3. Pre-Fire Response Plans and Strategies
4. Liability inequities
5. Data mapping, risk assessment, research

The Nature Conservancy
Oregon

The Nature Conservancy
Oregon

Questions?

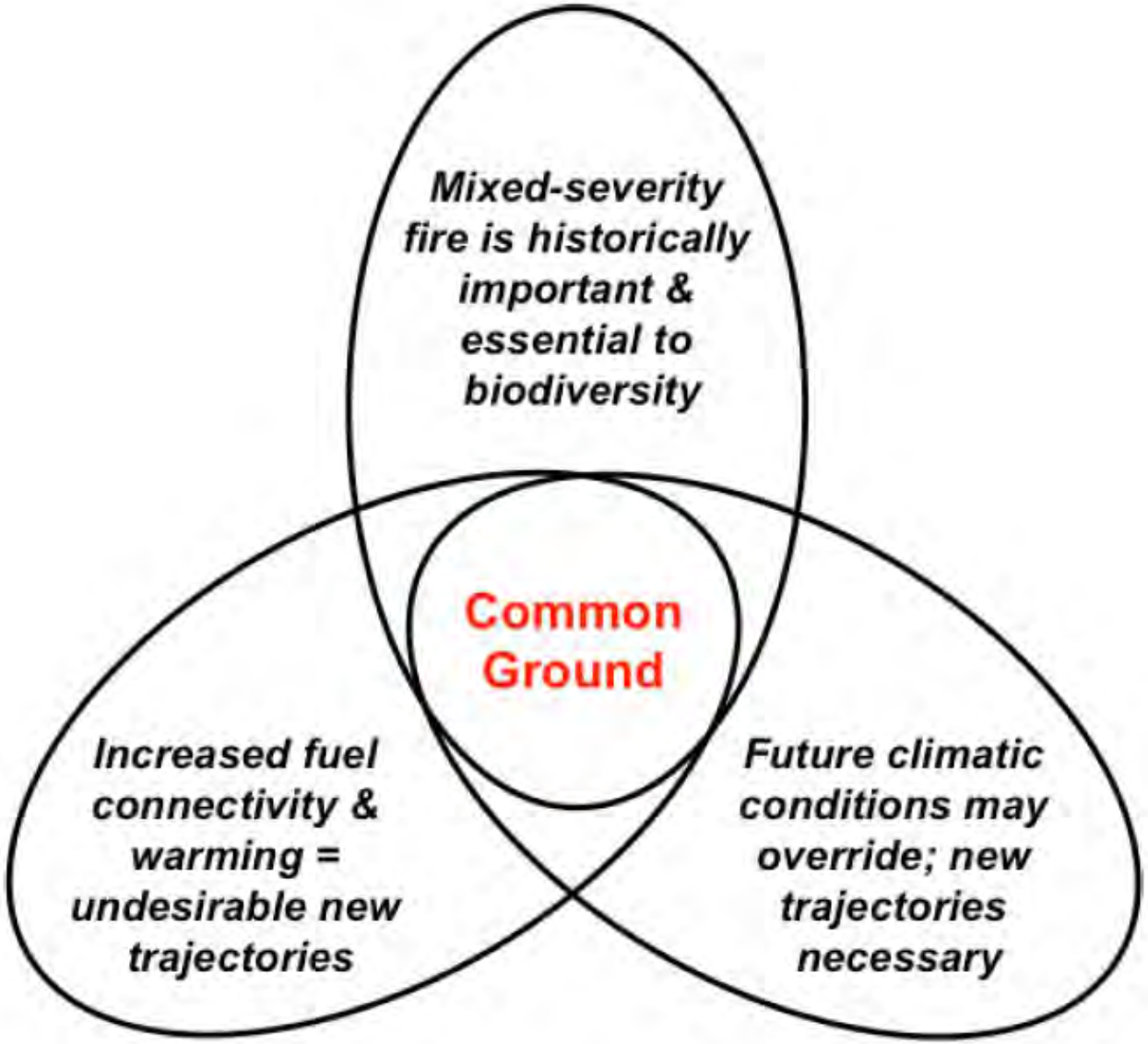
rhaugo@tnc.org

The Nature Conservancy
Oregon

STATE OF SCIENCE

Fire Consensus Working Group

- Survey of active fire scientists
- Science for Nature and People Partnership & National Center for Ecological Analysis and Synthesis



The Nature Conservancy
Oregon


EXIT
JIC
MANAGER
LEAD


KIRKLAND

Forest Fire Smoke and Health Impacts

Governor's Wildfire Response Council

March 18th, 2019

Presented by Kirsten Aird
Oregon Public Health Division

Oregon Health Authority

Overview

- What's the issue?
  - Composition of forest fire smoke
- What's the impact?
  - Chronic health conditions and smoke exposure
- Who is impacted the most?
  - Vulnerable populations and smoke exposure
- What is the cost?
  - Costs of selected health conditions in Oregon
- What's the role of Public Health?

Oregon Health Authority

Forest fire smoke

- Contains numerous potentially harmful components, including: particulate matter, nitrogen dioxide, ozone, carbon monoxide, polycyclic aromatic hydrocarbons, and volatile organic compounds (Reid *et. al*., 2016)

More about particulate matter

- Particulate Matter (PM) is a mixture of small particles and liquid droplets found in the air. Studies have shown that there are harmful health effects from breathing PM particles (US Environmental Protection Agency, 2018)
- PM is present in smoke from wildfires and smoke from planned burning events (Centers for Disease Control and Prevention, 2016)
- Particle pollution, found in smoke, can trigger chronic conditions (American Lung Association, 2017).

Oregon Health Authority

Health effects of particulate matter

	Short term effects (hours-1 month)	Long term effects (1 month or more)
Respiratory *(asthma, COPD, etc.)*	X	X
Cardiovascular (*heart disease, stroke, etc.)*	X	X
Nervous system		X
Cancer		X
Total mortality	X	X

Oregon Health Authority

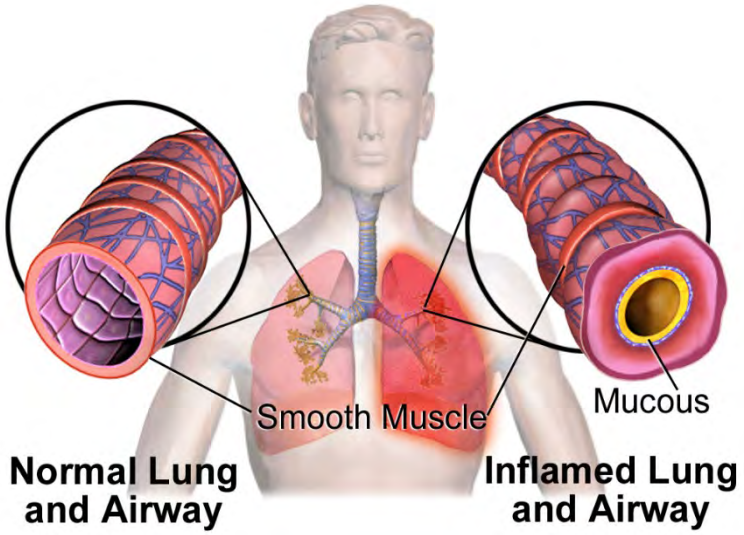
Asthma

Definition

Asthma is an obstructive lung disease. The airways become temporarily inflamed and produce excess mucus, and the muscles tighten making it harder to breathe.

Common Triggers

- Smoke
- Air pollution
- Dust mites
- Dander
- Mold



Wikimedia Commons

Acute smoke exposure can trigger asthma attacks. It also may decrease lung function in non-asthmatic children.

Oregon Health Authority

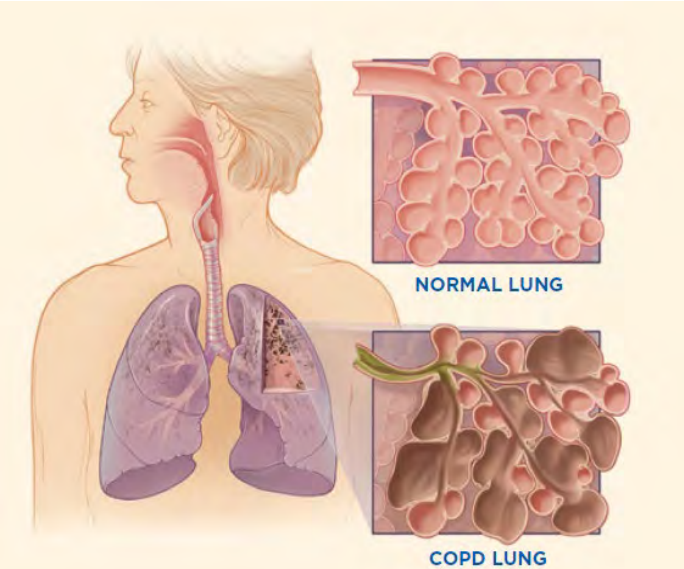
Chronic obstructive pulmonary disease (COPD)

Definition

COPD is a progressive lung disease that makes it hard to breathe. The lungs may lose their elastic properties that move air in and out, or they may become clogged with mucus.

Some things cause shortness of breath for people with COPD

- Smoke
- Dust
- Strong fumes



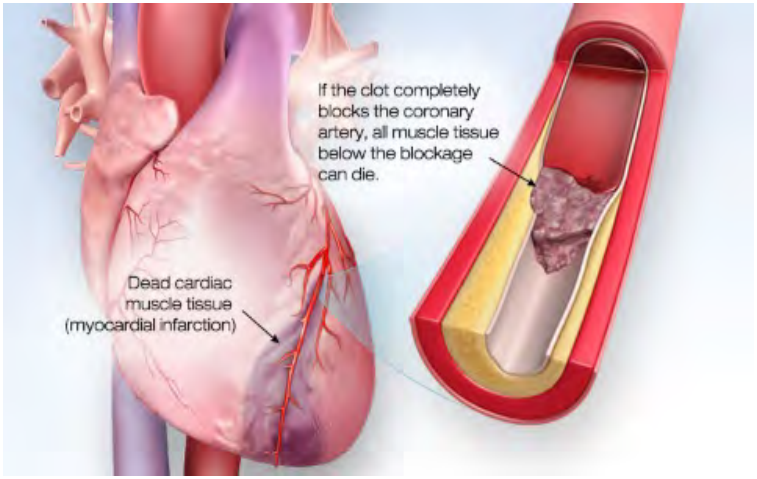
National Heart, Lung, and Blood Institute

Acute smoke exposure can irritate the lungs and make breathing harder for people with COPD

Oregon Health Authority

Heart disease

Definition | Heart disease includes a range of conditions that affect the function of the heart and the blood vessels.



Activities or substances that stress or inflame the heart and vessels can cause pain, irregular heartbeat, or heart attacks

When acute smoke exposure interferes with lung function, the heart works harder to pump blood and oxygen to the body. Chemical messengers released into the blood can also trigger cardiac events.

Oregon Health Authority

Vulnerable Populations

- People with asthma, COPD, other lung disorders, or heart disease
- Older adults
- Children
- Pregnant women
- People living in poverty

Oregon Health Authority

Vulnerable Populations in Oregon

	Number of People in Oregon
People with pre-existing conditions*	
Asthma (adults)	362,900
Asthma (youth)	50,000
Heart Disease	130,800
COPD	189,600
Children (0-14)**	722,570
Adults 65+**	714,200
Pregnant women***	43,000
People living in poverty**	547,000

**2017 BRFSS*
***Oregon Population Research Center, 2017*
****2018 Oregon vital statistics, number of births in 2017*

Oregon Health Authority

Costs of Disease in Oregon

	Estimated cost of medical treatment* (2010)	Hospitalization costs** (2017)
Asthma (adults & children)	$411 million	$8.9 million
COPD***		$52.1 million
Heart disease		$666 million
Congestive heart failure	$182 million	
Coronary heart disease	$1.1 billion	
Other heart disease	$603 million	

*CDC Chronic Disease Cost Calculator. Estimates may account for more than one disease and cannot be summed.
** Hospital Discharge Dataset, Oregon 2017
*** COPD = Chronic Obstructive Pulmonary Disease

Oregon Health Authority

Why does this matter?

Forest fire smoke has a health impact on all exposed communities, particularly vulnerable populations.

- Specifically, forest fire smoke has a health impact due to the particulate matter.
- Even small amounts of smoke can trigger acute events in vulnerable populations.
- Knowing this, what can communities do to support optimal health?

Oregon Health Authority

Public health mitigation strategies

- Preparedness planning
- Emergency response
- Continuous air quality monitoring
- Communicate about risks and available resources and practices for minimizing health impacts
- Establish and maintain cleaner air spaces
  - Homes
  - Community

Oregon Health Authority

The role of public health

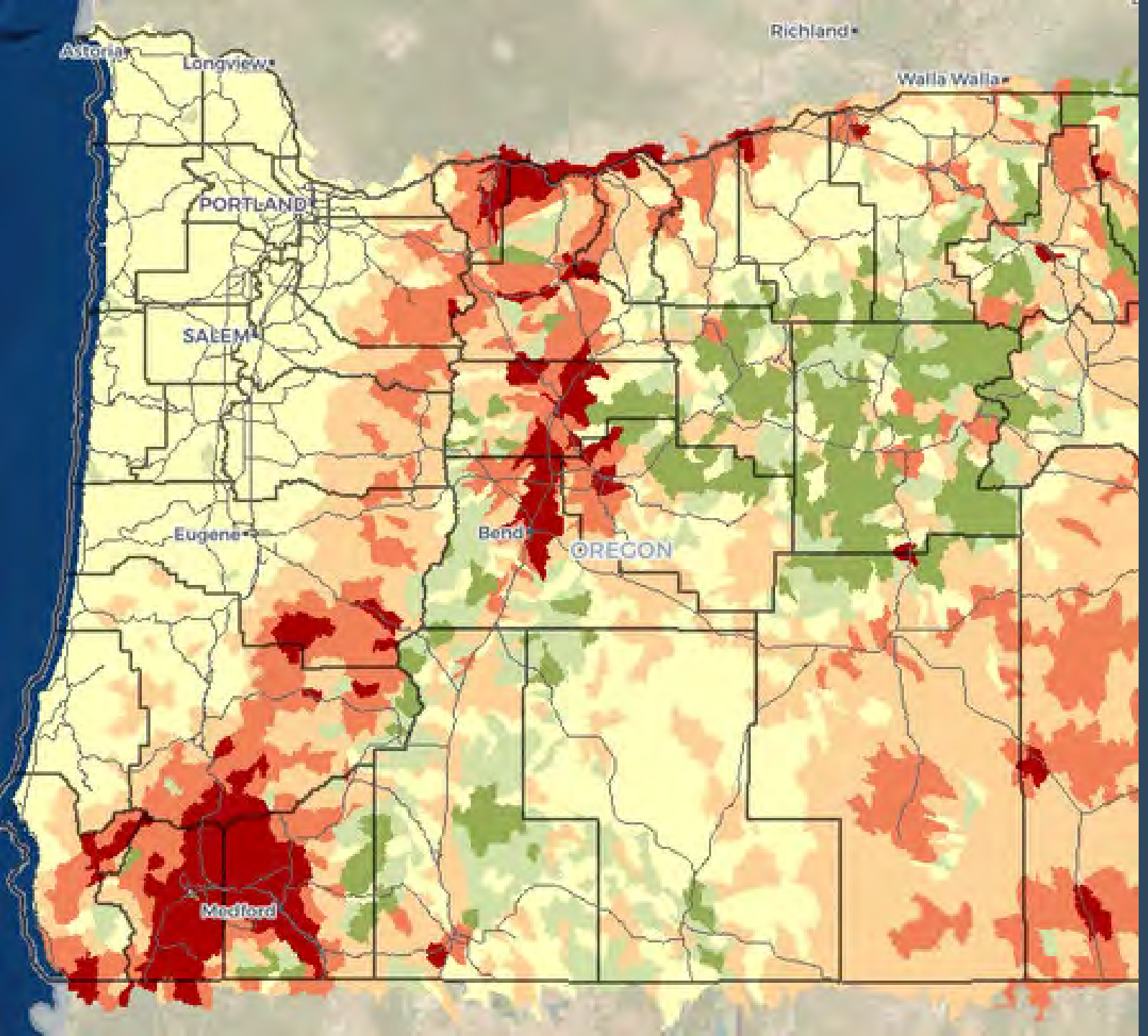
- Technical support, coordinator & convener.
- Local agencies fulfill these roles in their jurisdictions, with support from State, as needed.
- PHD facilitates connections & co-convenes smoke calls.
- Local & tribal health often issue air quality notices in coordination with DEQ & weather agencies, unless:
  - Local or tribal partners ask NWS or DEQ to issue the notice.
  - Smoke is widespread across the state, particularly in areas not traditionally affected.

Oregon Health Authority

References

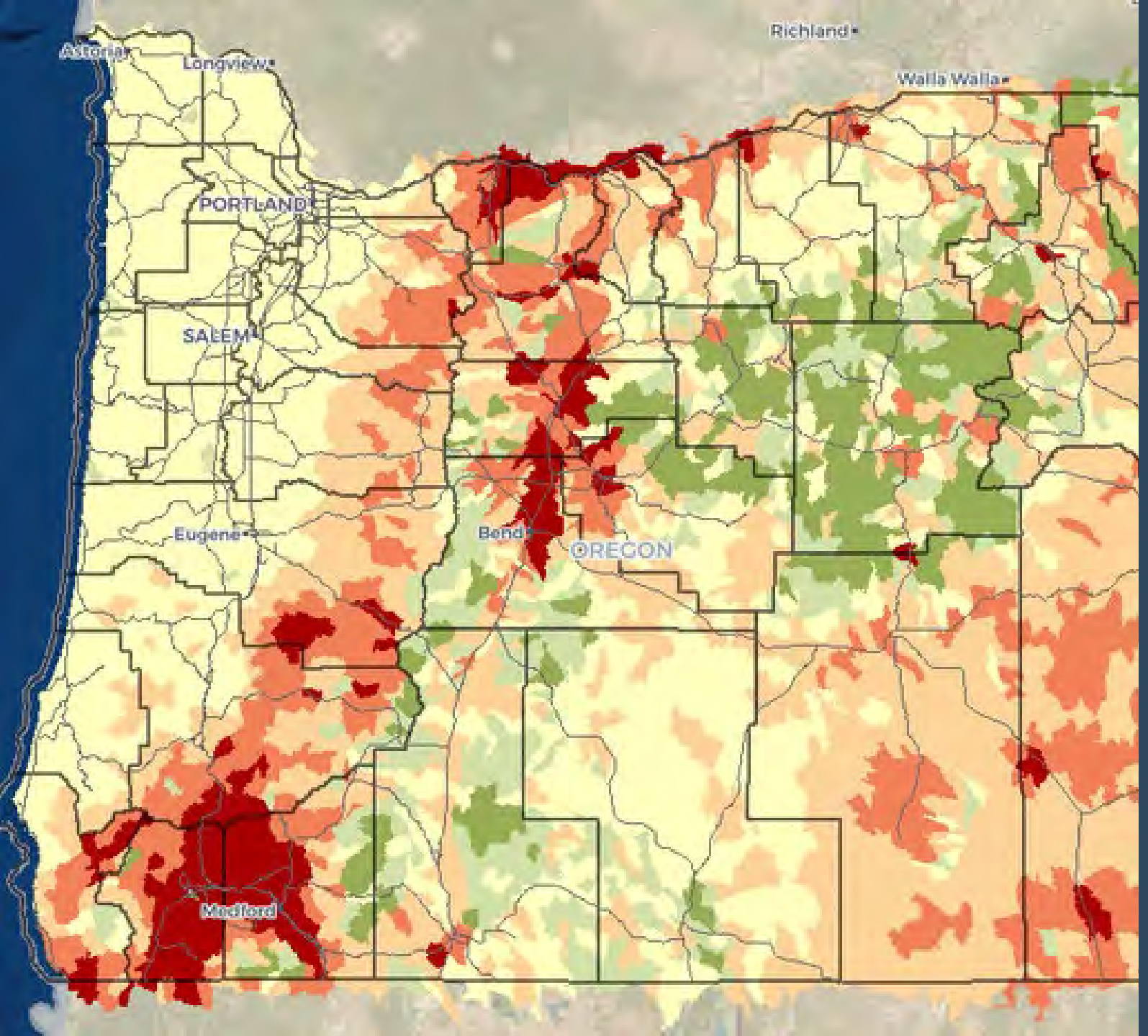
- American Lung Association (ALA). Particle Pollution. Available at http://www.lung.org/our-initiatives/healthy-air/outdoor/air-pollution/particle-pollution.html. 2017.
- Centers for Disease Control and Prevention (CDC). Coronary Artery Disease (CAD). Available at www.cdc.gov/heartdisease/ coronary_ad.htm. Updated December 7, 2009. Accessed January 13, 2014
- Centers for Disease Control and Prevention (CDC). National Center for Chronic Disease Prevention and Health Promotion, Division of Population Health. Chronic Obstructive Pulmonary Disease (COPD). Available at www.cdc.gov/copd/index.html. Updated September 16, 2016.
- Centers for Disease Control and Prevention (CDC). National Center for Environmental Health. Asthma. www.cdc.gov/asthma/faqs.htm. Updated January 27, 2017.
- Centers for Disease Control and Prevention (CDC). National Center for Environmental Health. Particle Pollution. Available at www.cdc.gov/air/particulate_matter.html. Updated July 22, 2016.
- Department of Environmental Quality (DEQ). Particulate Matter. Available at www.oregon.gov/deq/aq/Pages/Particulate-Matter.aspx. 2017.
- Wildfire Smoke: A Guide for Public Health Officials (2016) US Environmental Protection Agency. Available at: https://www3.epa.gov/airnow/wildfire_may2016.pdf
- Reid CE, Brauer M, Johnston FH, Jerrett M, Balmes JR, Elliott CT, Critical Review of Health Impacts of Wildfire Smoke Exposure (2016) Environmental Health Perspectives. 124:1334-43.
- US Environmental Protection Agency (EPA). Integrated Science assessment for Particulate Matter (External Review Draft) October 2018. Available at: https://cfpub.epa.gov/ncea/isa/recordisplay.cfm?deid=341593

Oregon Health Authority



Governor's Council on Wildfire Response

March 18, 2019



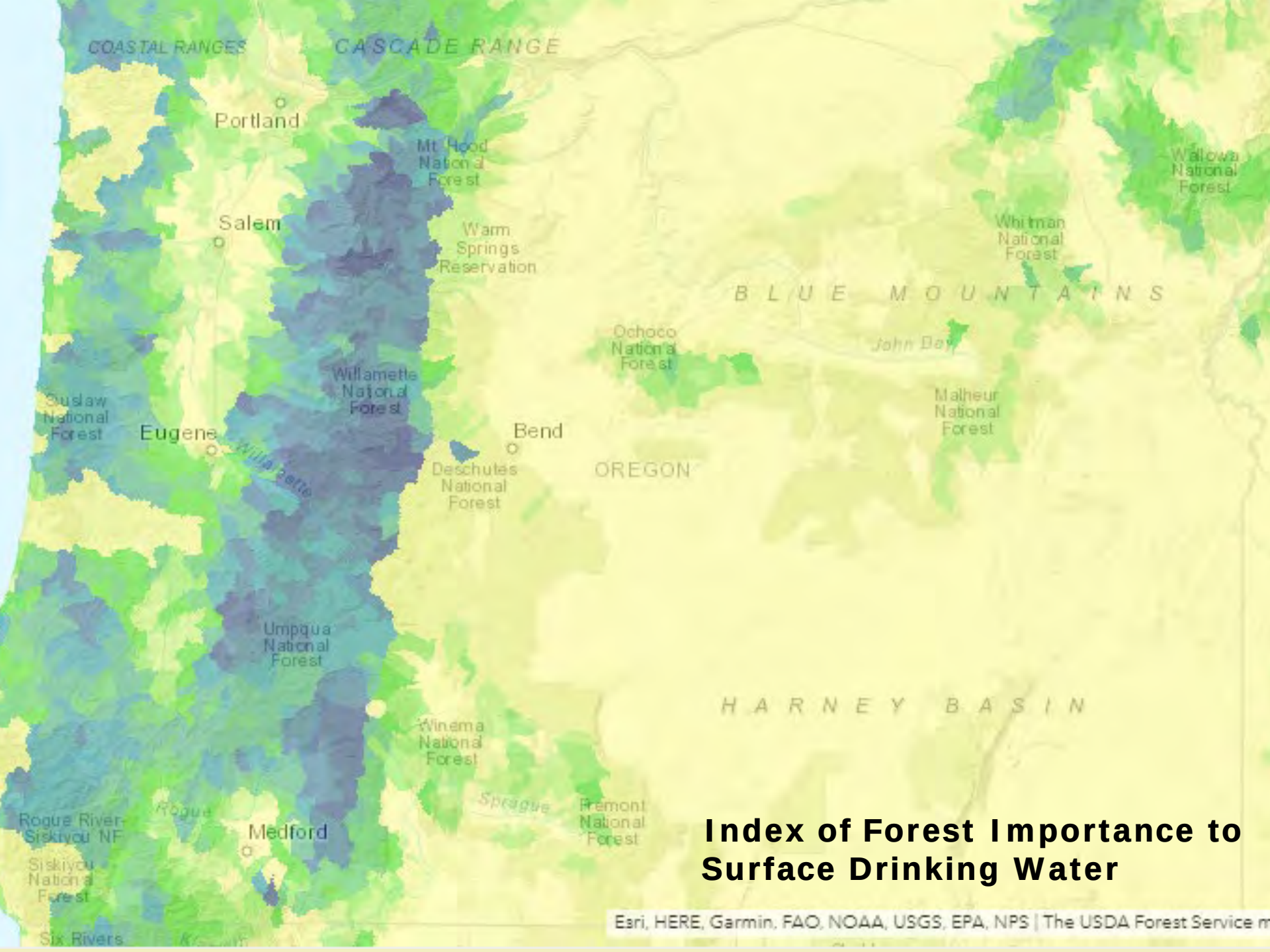
Governor's Council on Wildfire Response

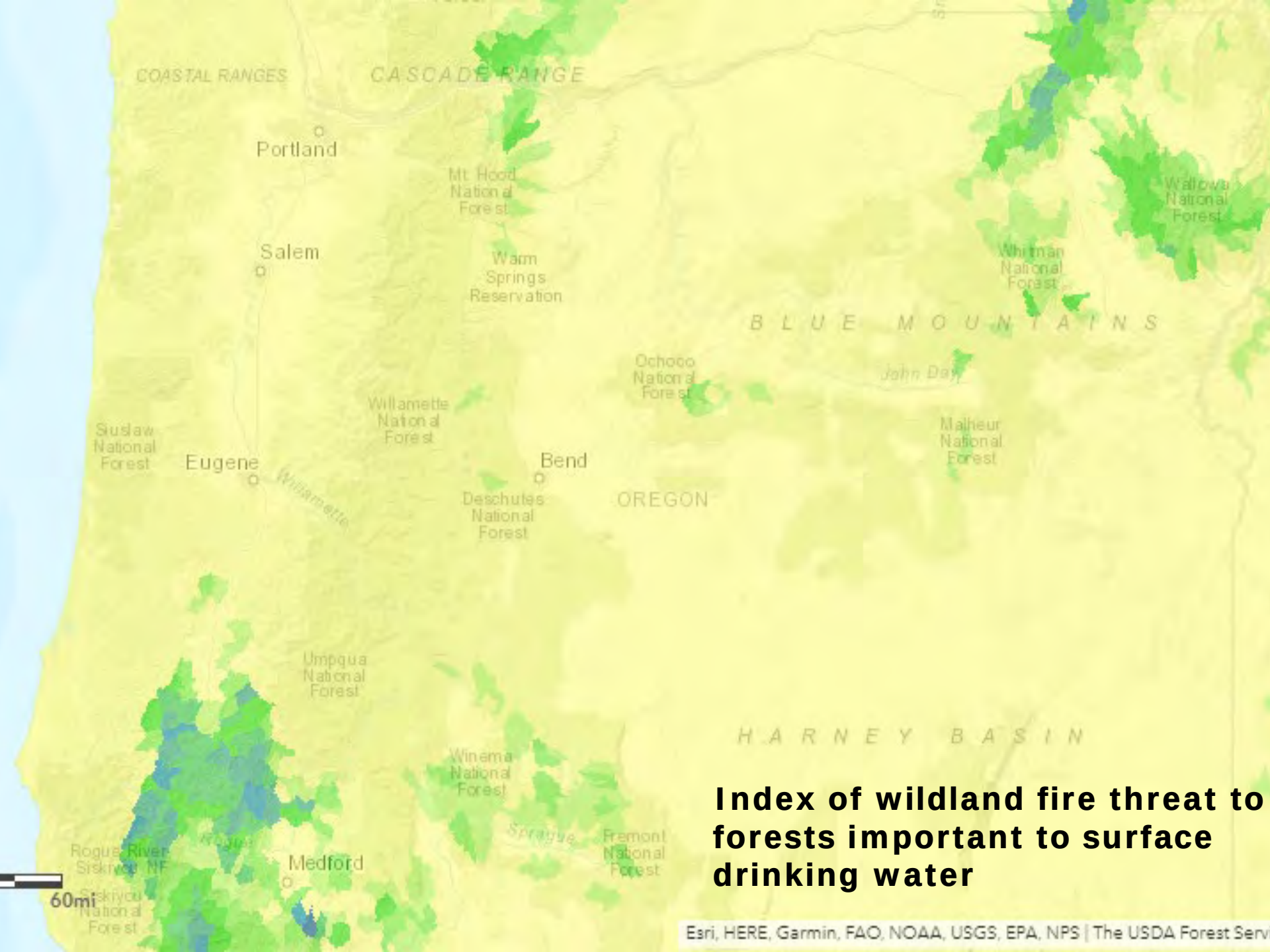
March 18, 2019

Ashland Forest Resiliency: An All-lands Restoration Project

Partnering to Protect the Ashland Watershed– March 18th, 2019

Presented By: Chris Chambers - City of Ashland/Ashland Fire & Rescue


COASTAL RANGES
CASCADE RANGE
Portland
Mt Hood National Forest
Salem
Warm Springs Reservation
Wallowa National Forest
Whitman National Forest
BLUE MOUNTAINS
Ochoco National Forest
John Day
Willamette National Forest
Malheur National Forest
Siuslaw National Forest
Eugene
Willamette
Bend
Deschutes National Forest
OREGON
Umpqua National Forest
HARNEY BASIN
Winema National Forest
Sprague
Fremont National Forest
Rogue River-Siskiyou NF
Rogue
Medford
Siskiyou National Forest
Six Rivers
Index of Forest Importance to Surface Drinking Water
Esri, HERE, Garmin, FAO, NOAA, USGS, EPA, NPS | The USDA Forest Service m


COASTAL RANGES
CASCADE RANGE
Portland
Mt. Hood National Forest
Salem
Warm Springs Reservation
Wallowa National Forest
Whitman National Forest
BLUE MOUNTAINS
John Day
Ochoco National Forest
Willamette National Forest
Siuslaw National Forest
Eugene
Willamette
Bend
Deschutes National Forest
OREGON
Malheur National Forest
Umpqua National Forest
HARNEY BASIN
Winema National Forest
Fremont National Forest
Rogue River Siskiyou NF
Medford
Siskiyou National Forest
60mi
Index of wildland fire threat to forests important to surface drinking water
Esri, HERE, Garmin, FAO, NOAA, USGS, EPA, NPS | The USDA Forest Serv

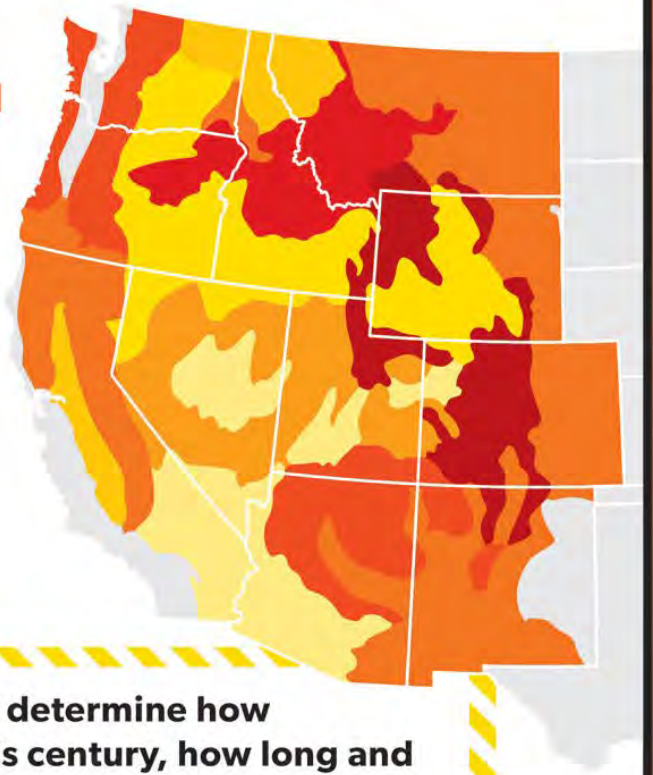
SCIENCE CONNECTIONS →

WESTERN WILDFIRES & CLIMATE CHANGE

Wildfires are projected to burn more land as temperatures continue to rise.

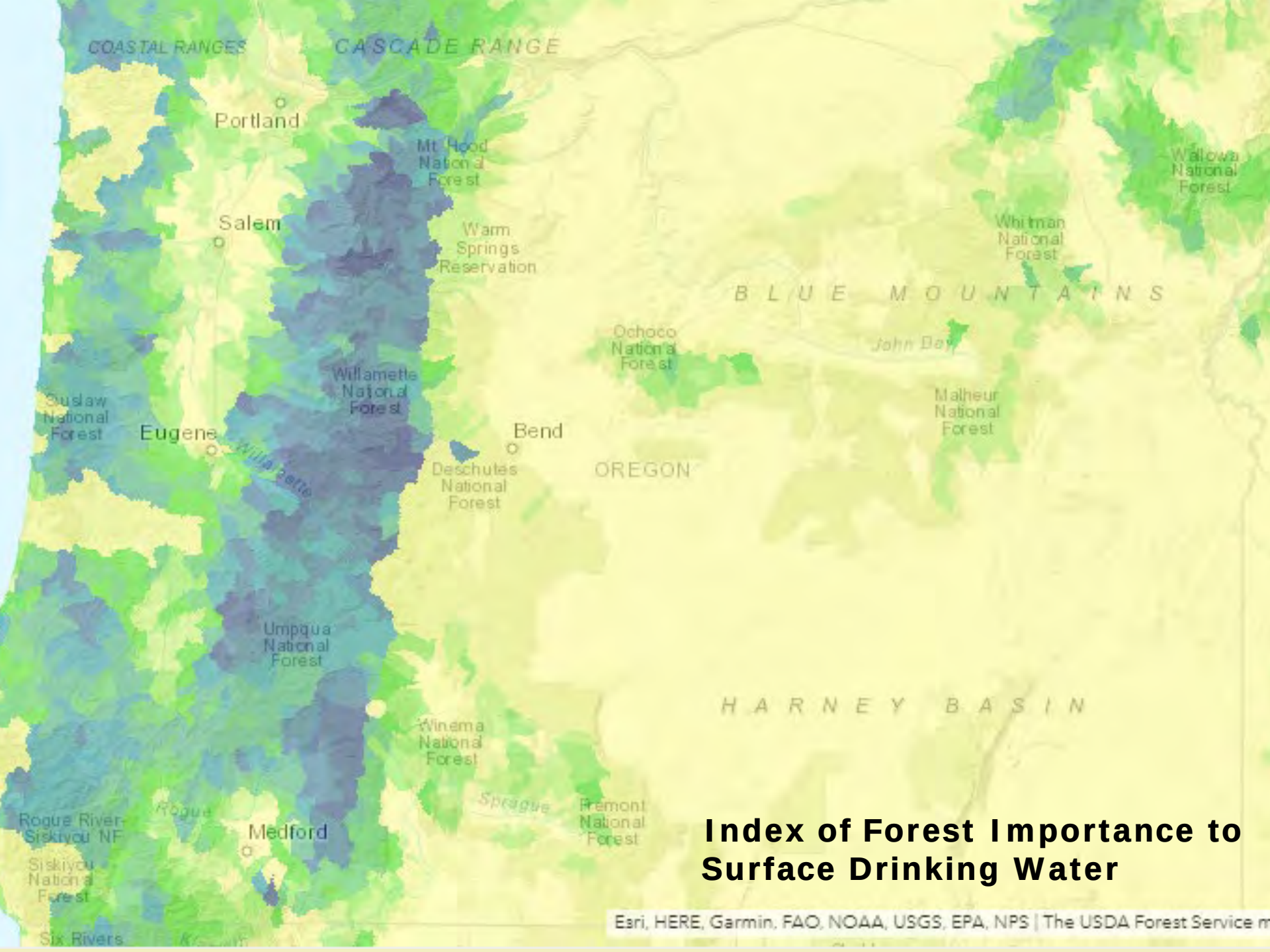
Projected increase in annual burn area

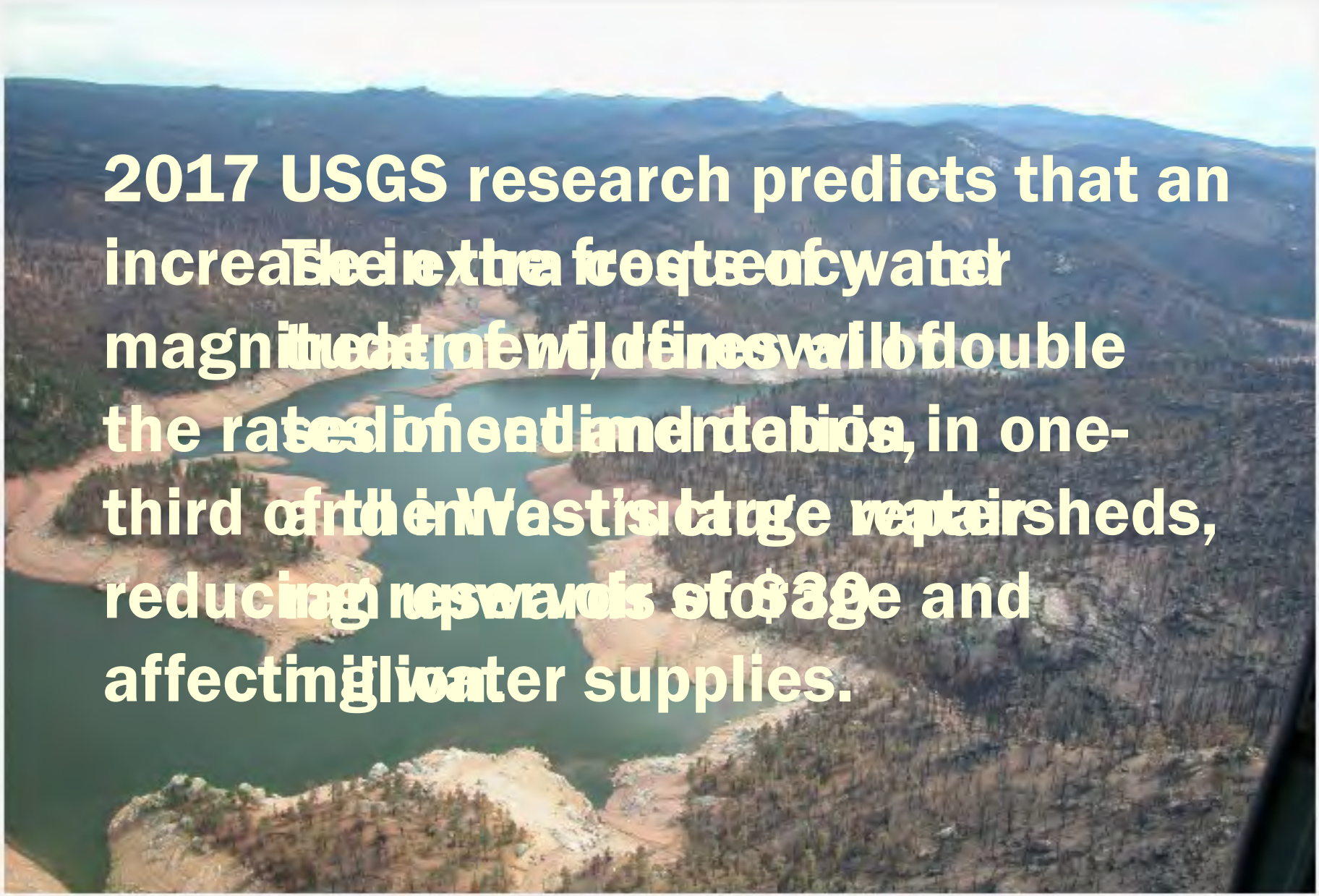
with an additional 1.8° F rise in temperature



By mid-century, temperatures in the Western U.S. are expected to increase even more **(2.5°–6.5° F)** due to heat-trapping emissions from human activity.

The choices we make today will determine how much temperatures increase this century, how long and damaging wildfire seasons become, and how prepared communities are for the growing risks of wildfires.


COASTAL RANGES
CASCADE RANGE
Portland
Mt Hood National Forest
Salem
Warm Springs Reservation
Wallowa National Forest
Whitman National Forest
BLUE MOUNTAINS
Ochoco National Forest
John Day
Willamette National Forest
Malheur National Forest
Siuslaw National Forest
Eugene
Willamette
Bend
Deschutes National Forest
OREGON
Umpqua National Forest
HARNEY BASIN
Winema National Forest
Sprague
Fremont National Forest
Rogue River-Siskiyou NF
Rogue
Medford
Siskiyou National Forest
Six Rivers
Index of Forest Importance to Surface Drinking Water
Esri, HERE, Garmin, FAO, NOAA, USGS, EPA, NPS | The USDA Forest Service m



The devastation following the Hayman Fire, coupled with the crippling effects of a severe drought, stretched as far as the eye could see in this photo of Cheesman Reservoir taken in August 2002. The fire destroyed 7,500 of the 8,500 forested acres Denver Water owns at Cheesman Reservoir.

Rio Grande Watershed, NM After 2011 Las Conchas Fire

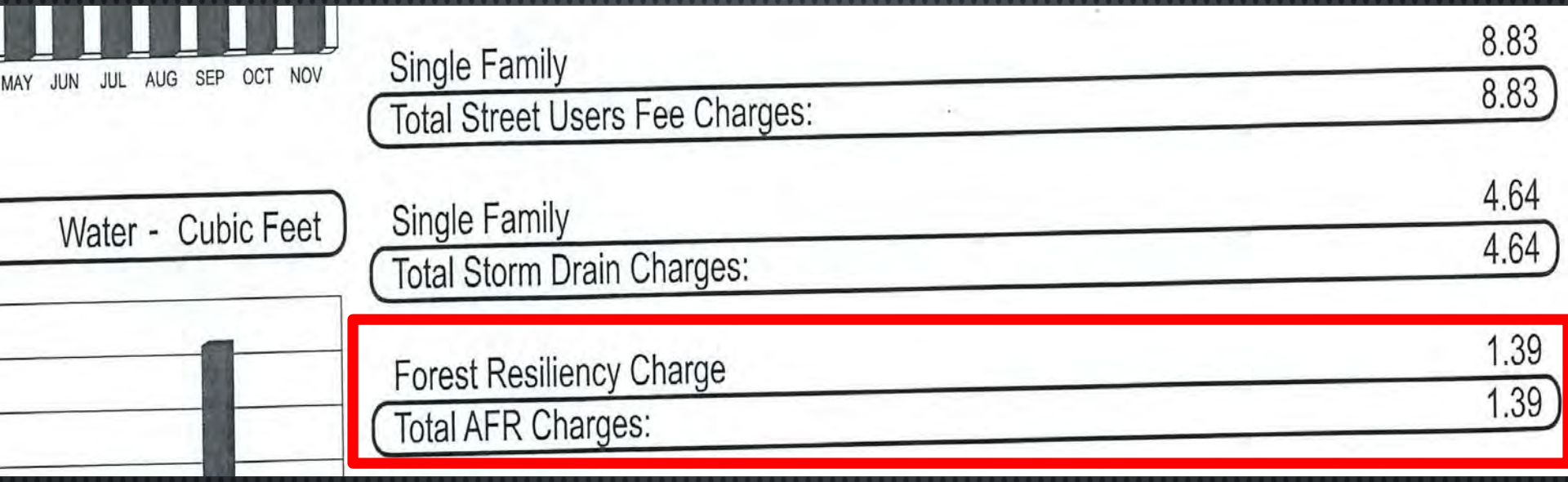
Nation | Local | News | *Northwest Wildfires 2017*

Surging Wildfire Reaches Watershed For Portland Area's Drinking Water

by **Amelia Templeton** Follow and **Ryan Haas** OPB Sept. 5, 2017 4:35 p.m. | Updated: Sept. 11, 2017 5:01 p.m.

Officials say the Eagle Creek Fire entered the Bull Run watershed Tuesday.

The watershed provides drinking water for around 1 million Oregonians.



Utility-funded Wildfire Mitigation and Forest Resilience

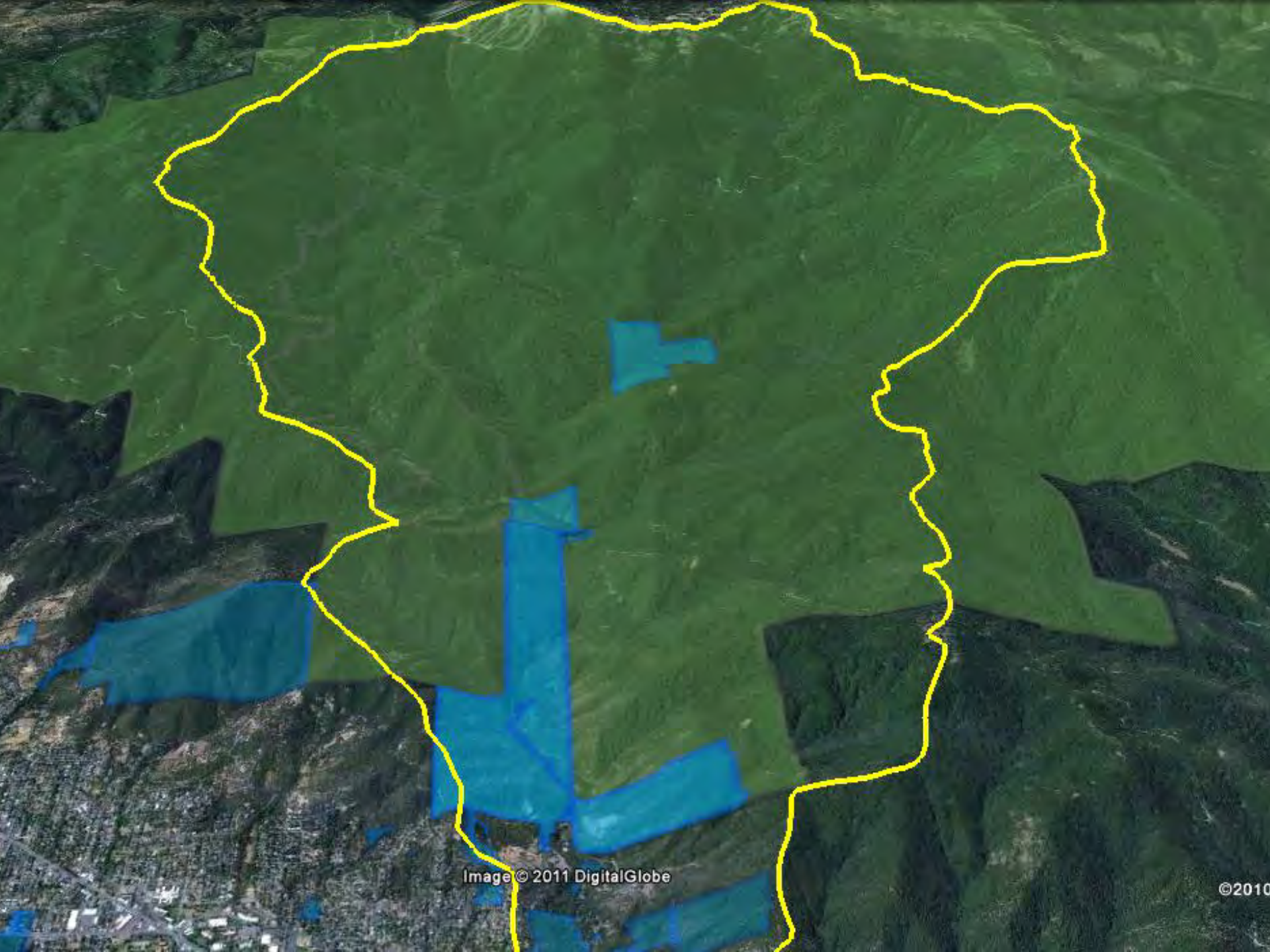
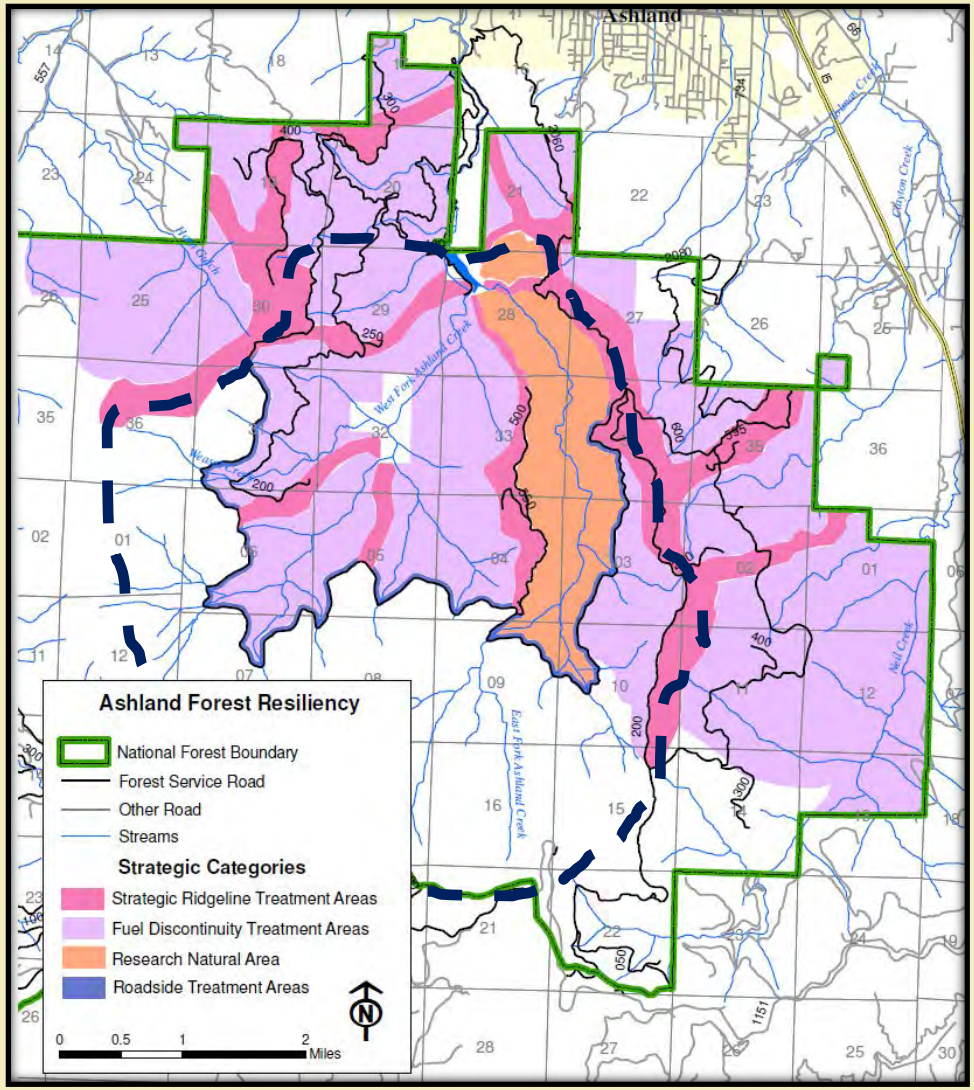


Image © 2011 DigitalGlobe
©2010


THE ASHLAND WATERSHED
THIS AREA OF THE ROGUE RIVER NATIONAL FOREST SERVES AS THE WATERSHED FOR THE CITY OF ASHLAND. THE RAIN AND SNOW THAT FALLS ON TH'S GROUND EVENTUALLY FLOWS INTO REEDER RESERVOIR AND THE CITY'S WATER SYSTEM.
HELP KEEP OUR EXCELLENT WATER QUALITY. FOR SANITATION REASONS DO NOT CAMP OVERNIGHT OR DUMP ANY TYPE OF REFUSE.
THE DECOMPOSED GRANITE SOILS ARE EASILY ERODED. KEEP MOTORIZED VEHICLES ON IMPROVED ROADS AND TREAD LIGHTLY WHEN ON FOOT.
THE TERRAIN, WEATHER CONDITIONS AND VOLATILE VEGATATION PRESENT A THREAT OF CATASTROPHIC FIRE. THEREFORE DO NOT BUILD CAMPFIRES.
IF YOU OBSERVE ANY ACTIVITY DETRIMENTAL TO THE WATERSHED, PLEASE REPORT IT TO THE ASHLAND RANGER DISTRICT AT 482-3333.
YOUR COOPERATION IS APPRECIATED. THANK YOU FROM, U.S.FOREST SERVICE AND WATER USERS OF ASHLAND.

Preferred Alternative



- **A strategic approach**
- **Treats 7,600 acres of National Forest lands**
- **Utilizes a combination of:**
  - **Surface and ladder fuel treatments**
  - **Density management**
  - **Prescribed Underburning**


2009 Siskiyou Fire
Ashland, Oregon
scotthardingphoto.com

Ashland Forest Resiliency Stewardship Project (AFR)

A 10-year stewardship project to reduce the risk of severe wildfire in the watershed and to protect water quality, older forests, wildlife, people, property and quality of life.

The Nature Conservancy
Protecting nature. Preserving life.

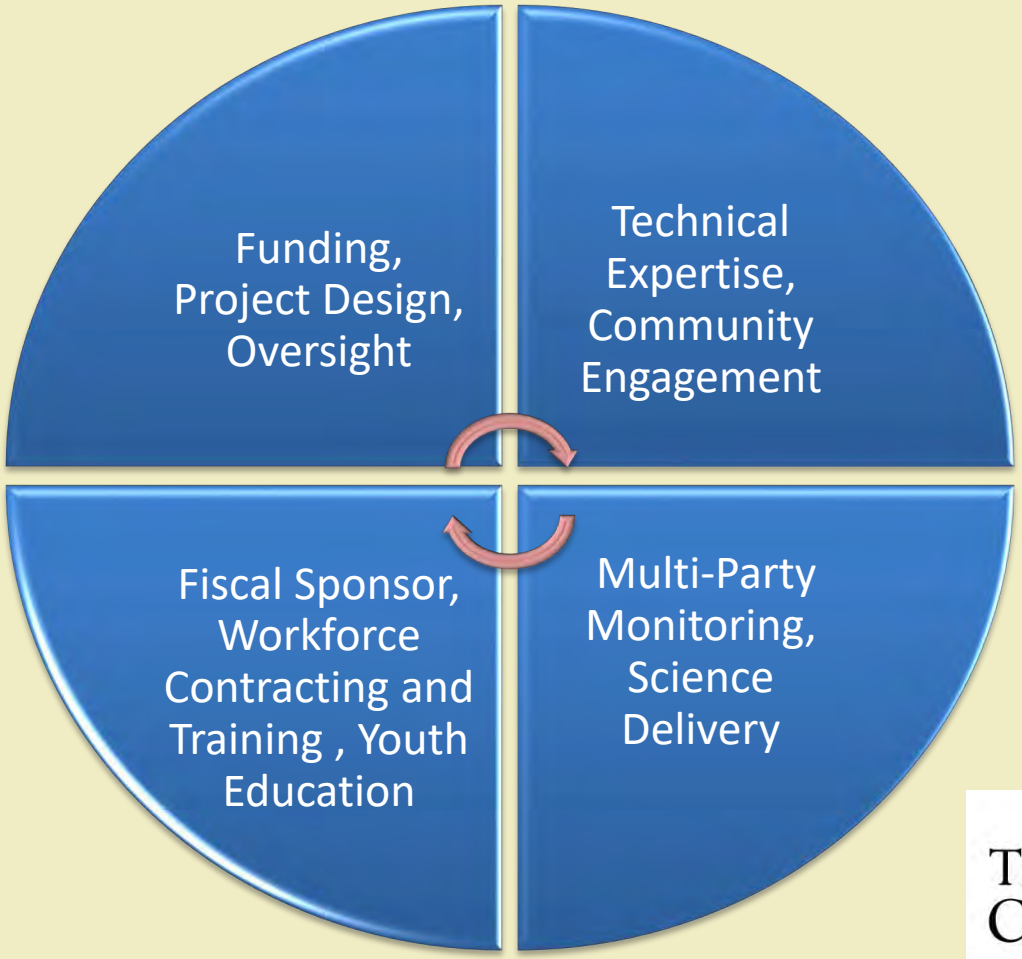
City of Ashland

Forest Service
USDA
Department of Agriculture

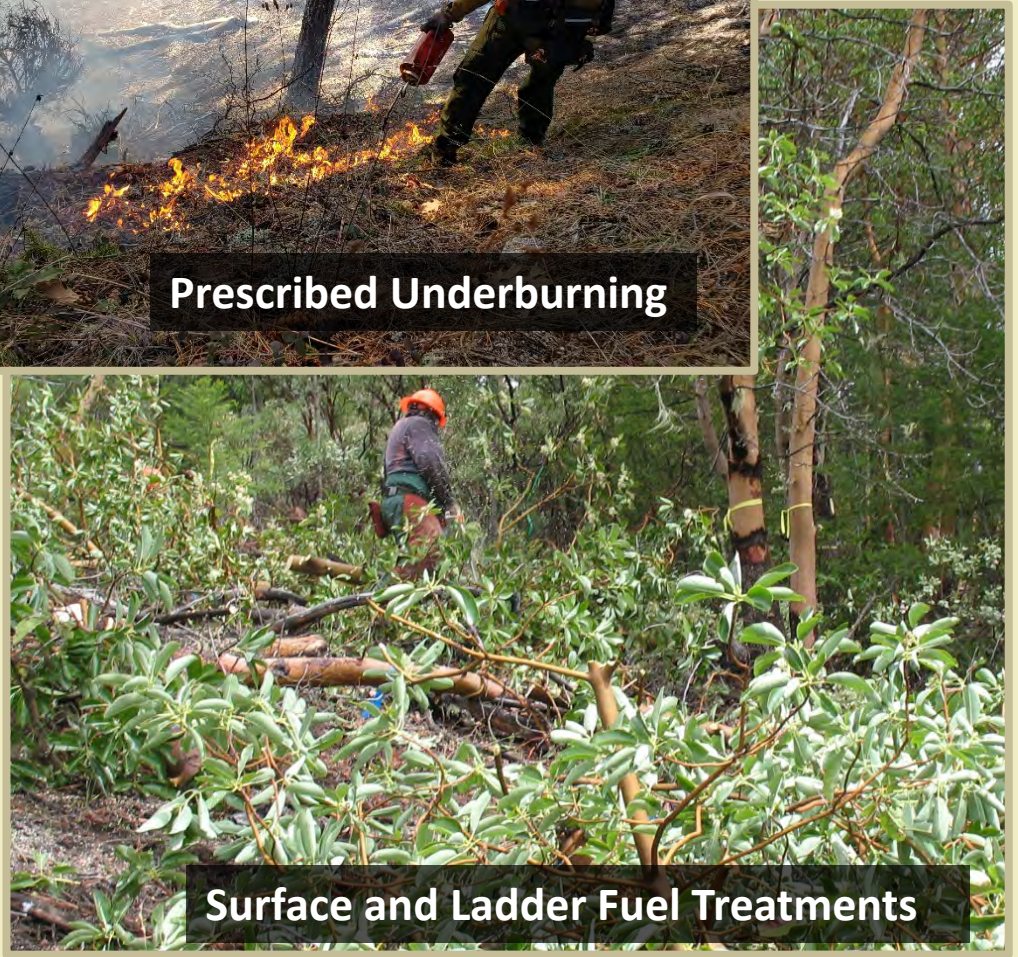
Lomakatsi Restoration Project
Restoring Ecosystems. Sustaining Communities.

Siskiyou Mountains Ranger District
Rogue River-Siskiyou National Forest

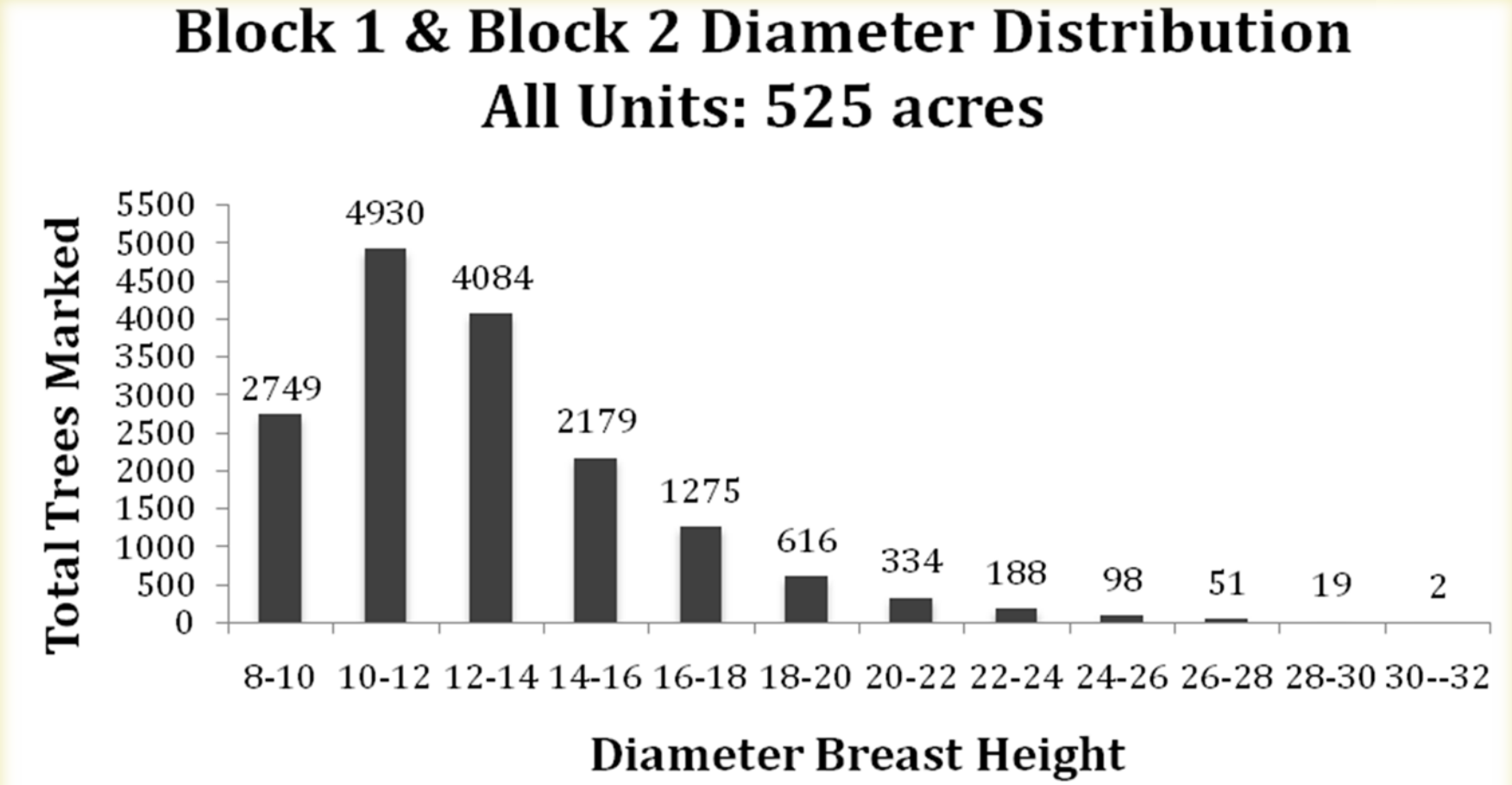
Ashland Forest Resiliency Stewardship Agreement



AFR Implementation



AFR Density Management



Meeting Competing Objectives

AFR Restoration By-Products

550 acres Ground-Based Thinning

Prescribed Fire in AFR

AFR: Engaging Community, Building Social License for Ecological Forest Stewardship

Outreach for Burning/Smoke

Ashland Forest Resiliency
STEWARDSHIP PROJECT

Controlled burns protect forests and our watershed.

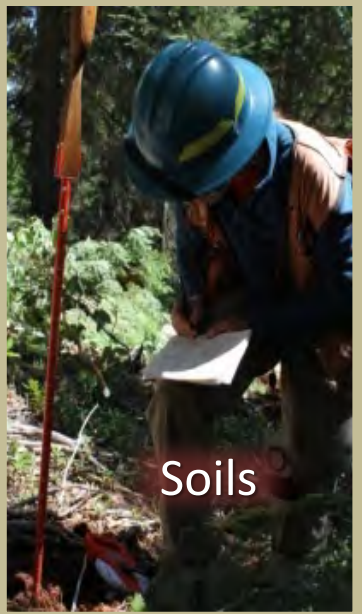
- Reduce fire danger to firefighters, residents, and the places we love
- Reduce the fuels that feed catastrophic fires
- Produce much less smoke than severe wildfires

When you see controlled burns during the cool time of year, know we are working for healthier forests and community: for today and for future generations.

AFR Student Engagement

Over 4,000 youth received instruction in 7,300 hours of classroom and field sessions

Multi-Party Monitoring



The Nature Conservancy
Protecting nature. Preserving life.

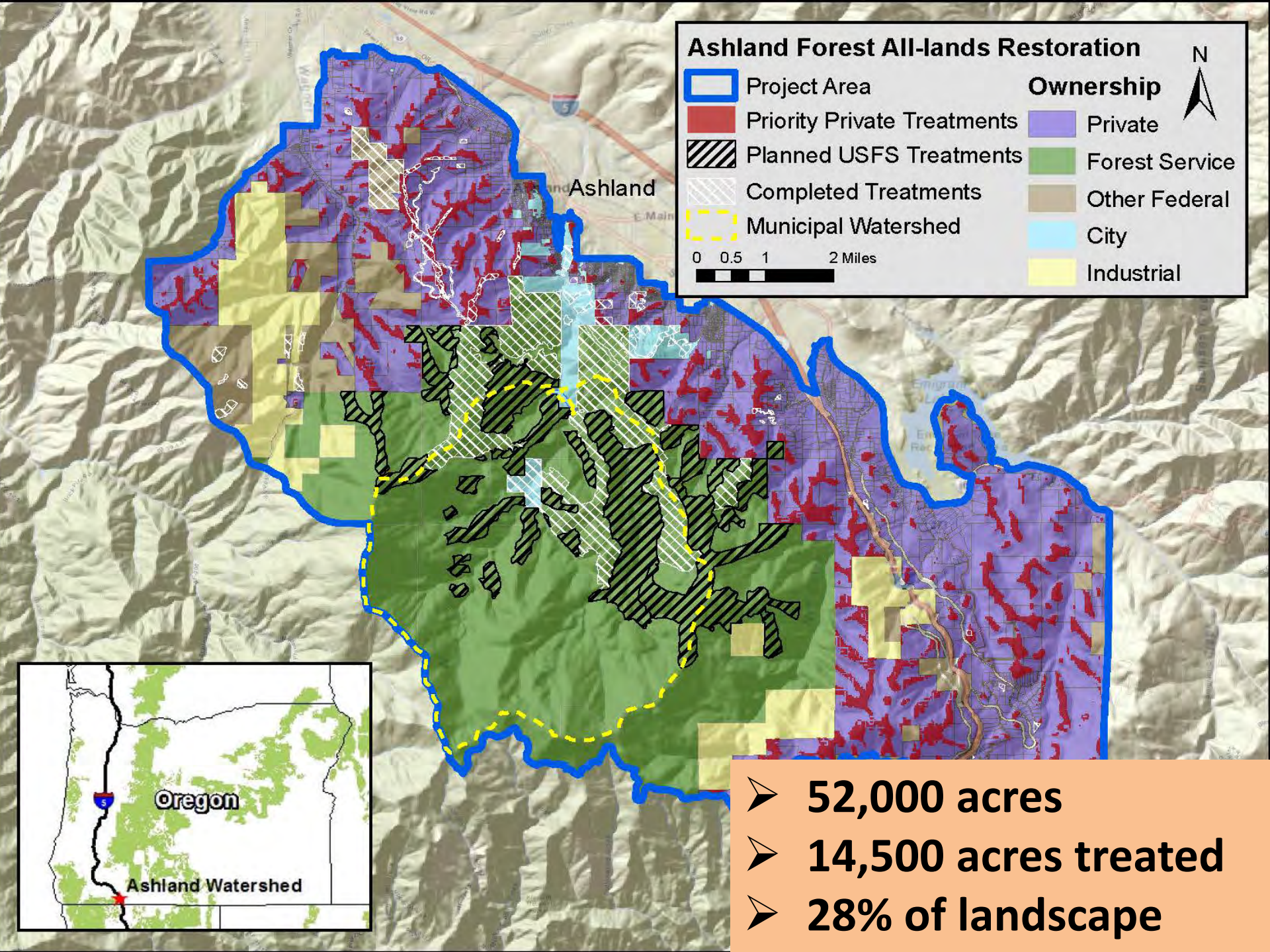
AFR Workforce Training

LOMAKATSI
RESTORATION PROJECT

Ecological Workforce Training Program

AFAR Workforce training & employment

- 17 FTE
- 200 personnel employed
- 15 contractors hired
- $25 million infused into communities


Ashland Forest All-lands Restoration
Project Area
Priority Private Treatments
Planned USFS Treatments
Completed Treatments
Municipal Watershed
0 0.5 1 2 Miles
N
Ownership
Private
Forest Service
Other Federal
City
Industrial
Ashland
Oregon
Ashland Watershed
52,000 acres
14,500 acres treated
28% of landscape

Ashland Forest All-lands Restoration Project (AFAR)

Implement forest restoration and fuels reduction treatments through a cross boundary, all-lands approach on federal and private non-industrial lands in and around the Ashland Creek Watershed.

USDA NRCS

CITY OF ASHLAND

LOMAKATSI RESTORATION PROJECT

FOREST SERVICE US DEPARTMENT OF AGRICULTURE

The Nature Conservancy
Protecting nature. Preserving life.

U.S. FISH & WILDLIFE SERVICE
DEPARTMENT OF THE INTERIOR

OREGON WATERSHED ENHANCEMENT BOARD
OWEB

Jackson Soil & Water Conservation District

OREGON DEPARTMENT OF FORESTRY

AFR: A Nationally Recognized, Replicable Model

Wildland Fire Leadership Council Visit , July 28, 2015

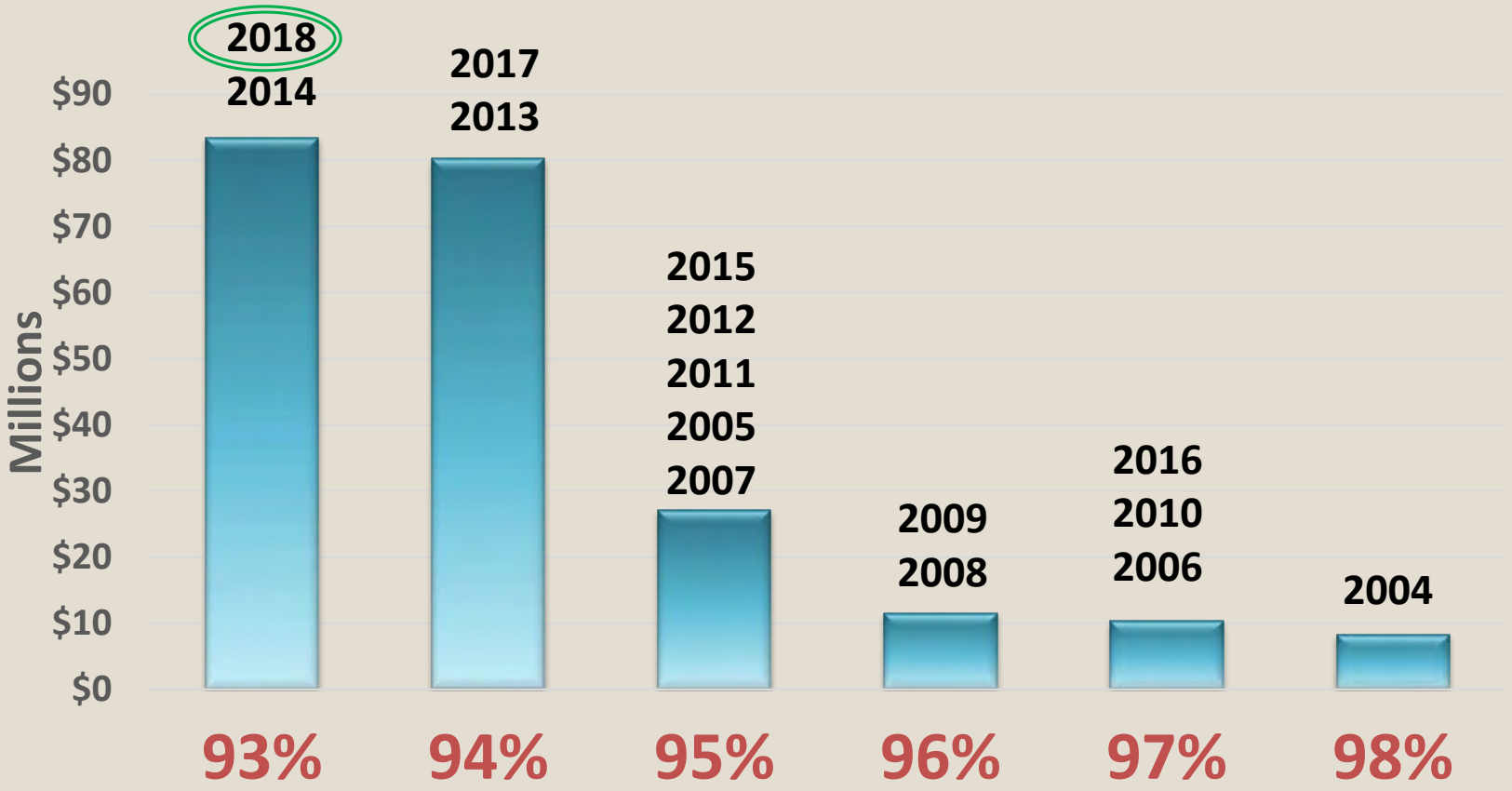

Questions?

Oregon Department of Forestry

Oregon Wildfire Council
Implications to Oregonians

March 18, 2019

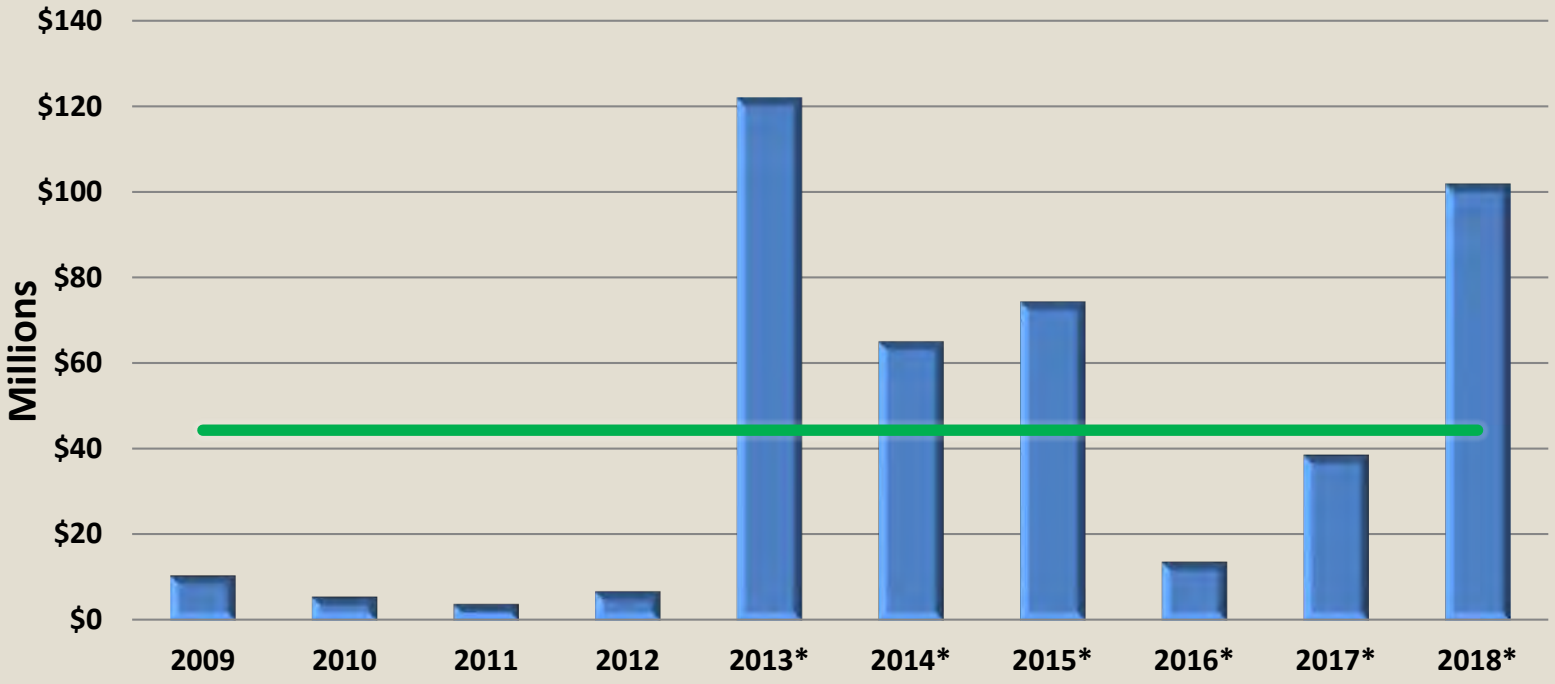
Keeping fires small means big savings



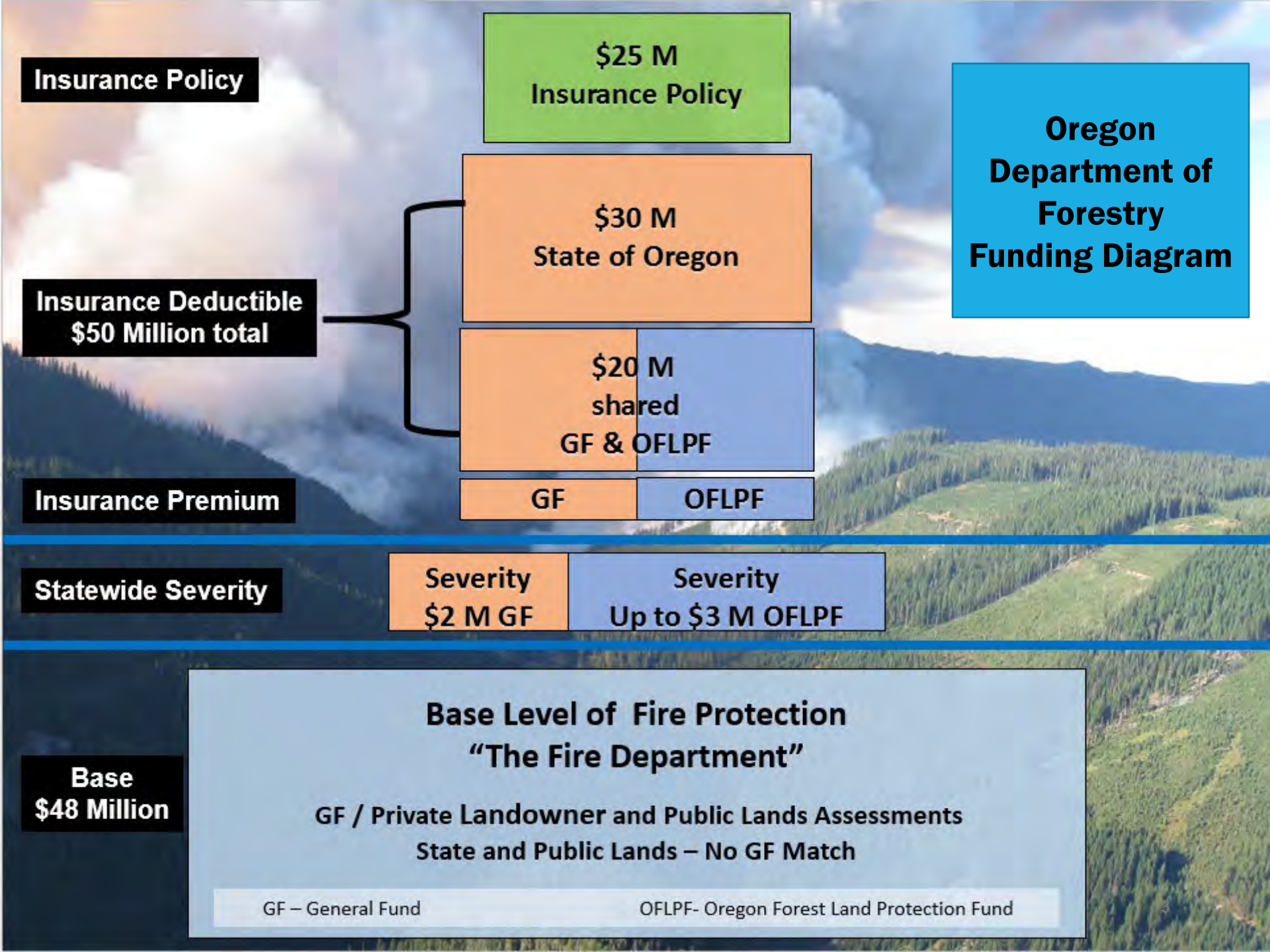
Key Performance Measure: Percentage of Fires Caught at 10 Acres or Less

Large fire costs

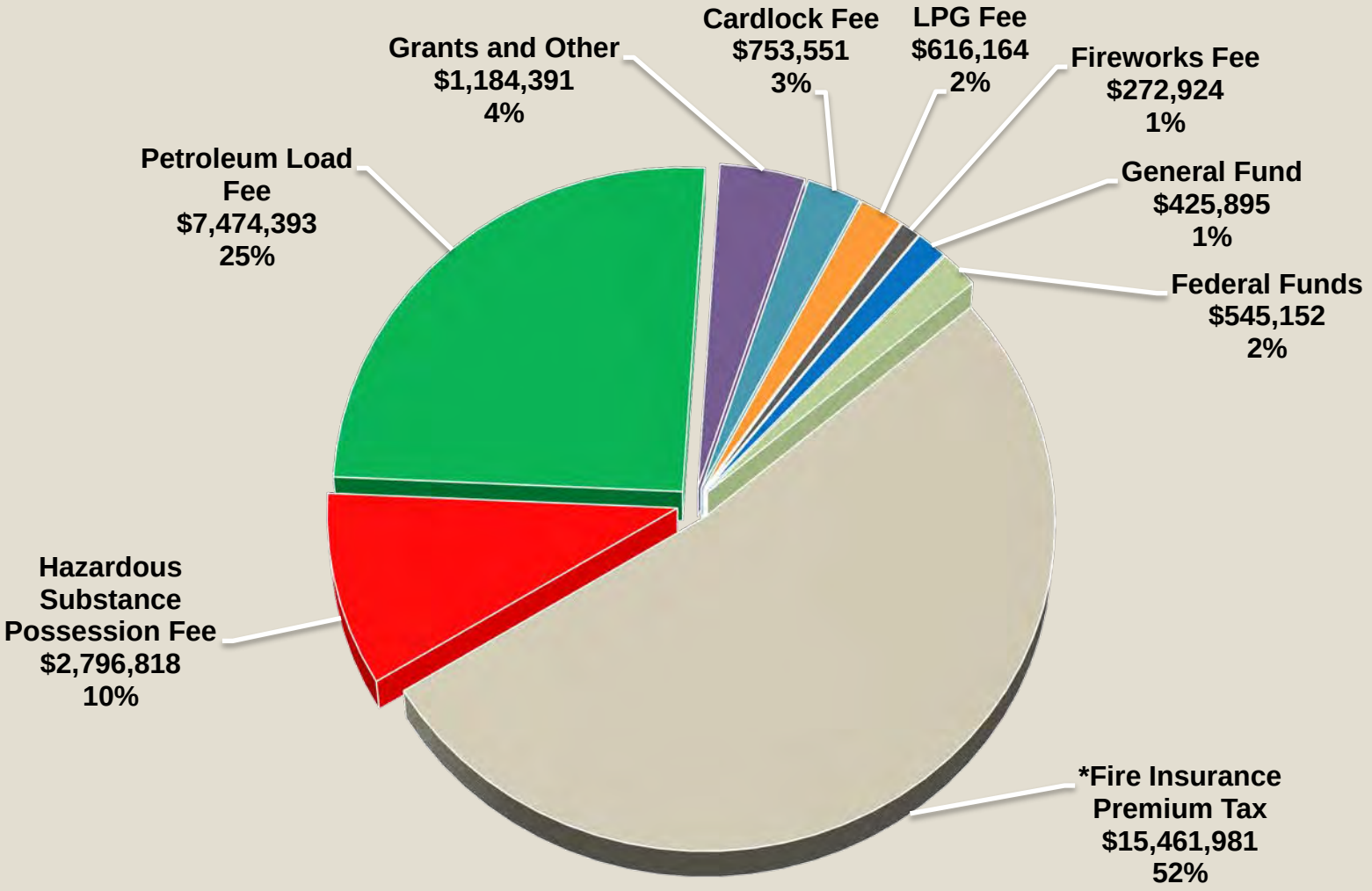
Actual Gross Costs. Values are by Calendar Year.
10-Yr Average 2009-2018: $44.3M



*includes draft claims figures

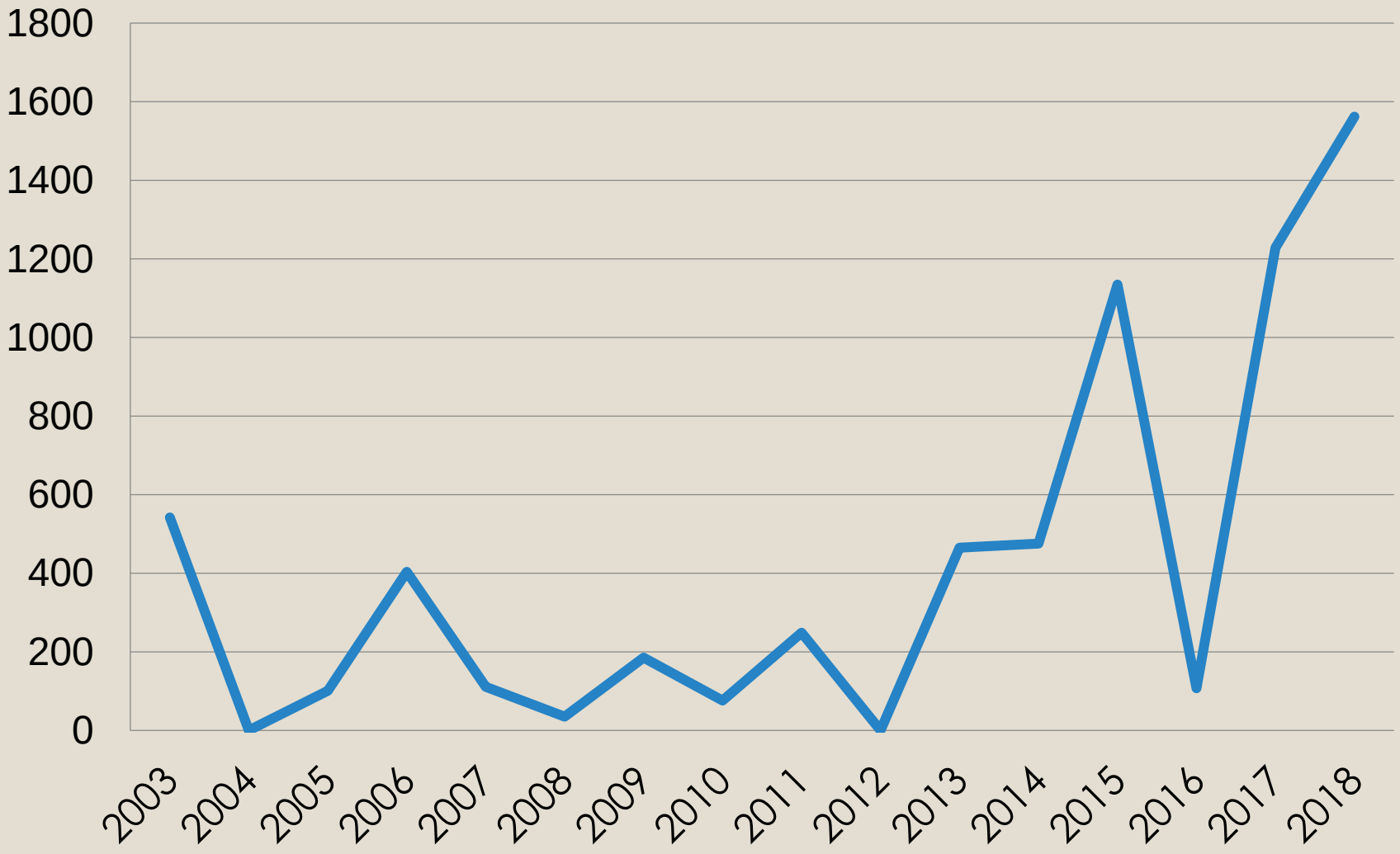

Insurance Policy
$25 M
Insurance Policy
Oregon Department of Forestry Funding Diagram
$30 M
State of Oregon
Insurance Deductible
$50 Million total
$20 M
shared
GF & OFLPF
Insurance Premium
GF
OFLPF
Statewide Severity
Severity
$2 M GF
Severity
Up to $3 M OFLPF
Base
$48 Million
Base Level of Fire Protection
"The Fire Department"
GF / Private Landowner and Public Lands Assessments
State and Public Lands – No GF Match
GF – General Fund
OFLPF- Oregon Forest Land Protection Fund

Office of State Fire Marshal: 2019-21 Governor's Budget



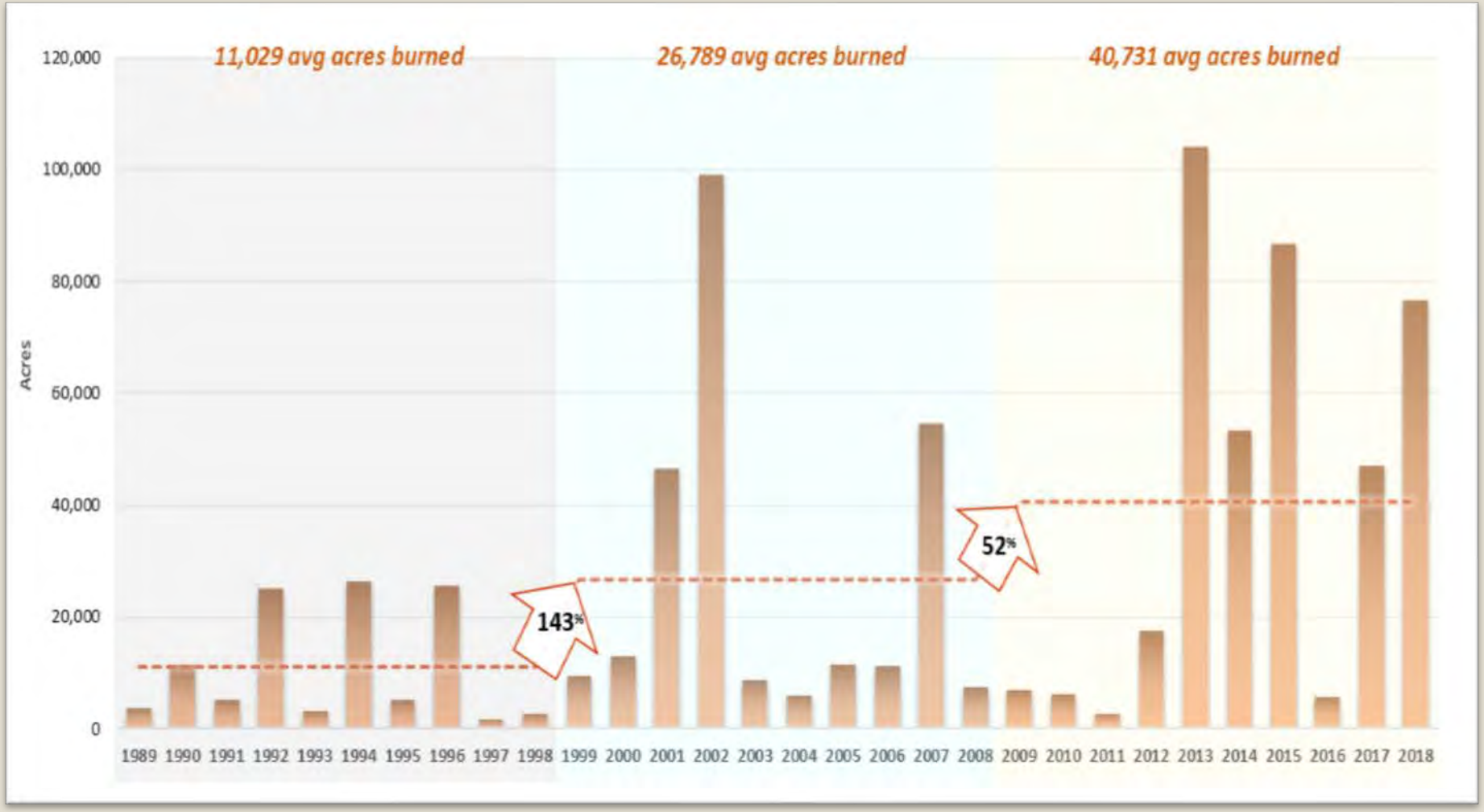
All Funds = $ 29,531,269

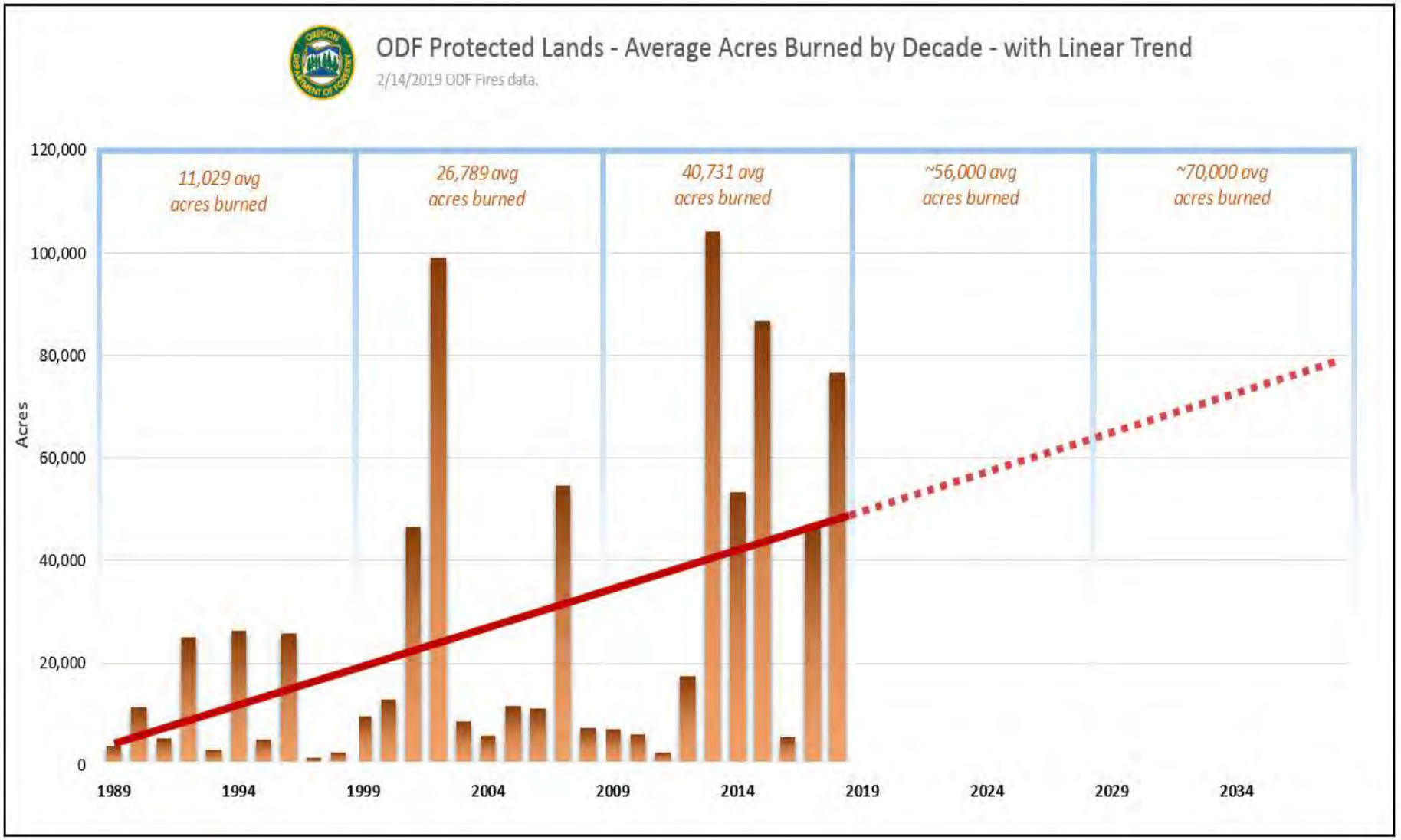
OSFM hours mobilized to fire incidents



OSFM structural fire response costs

Acres burned on ODF protected lands




ODF Protected Lands - Average Acres Burned by Decade - with Linear Trend
2/14/2019 ODF Fires data.
11,029 avg acres burned
26,789 avg acres burned
40,731 avg acres burned
~56,000 avg acres burned
~70,000 avg acres burned
Acres
120,000
100,000
80,000
60,000
40,000
20,000
0
1989
1994
1999
2004
2009
2014
2019
2024
2029
2034

Summary

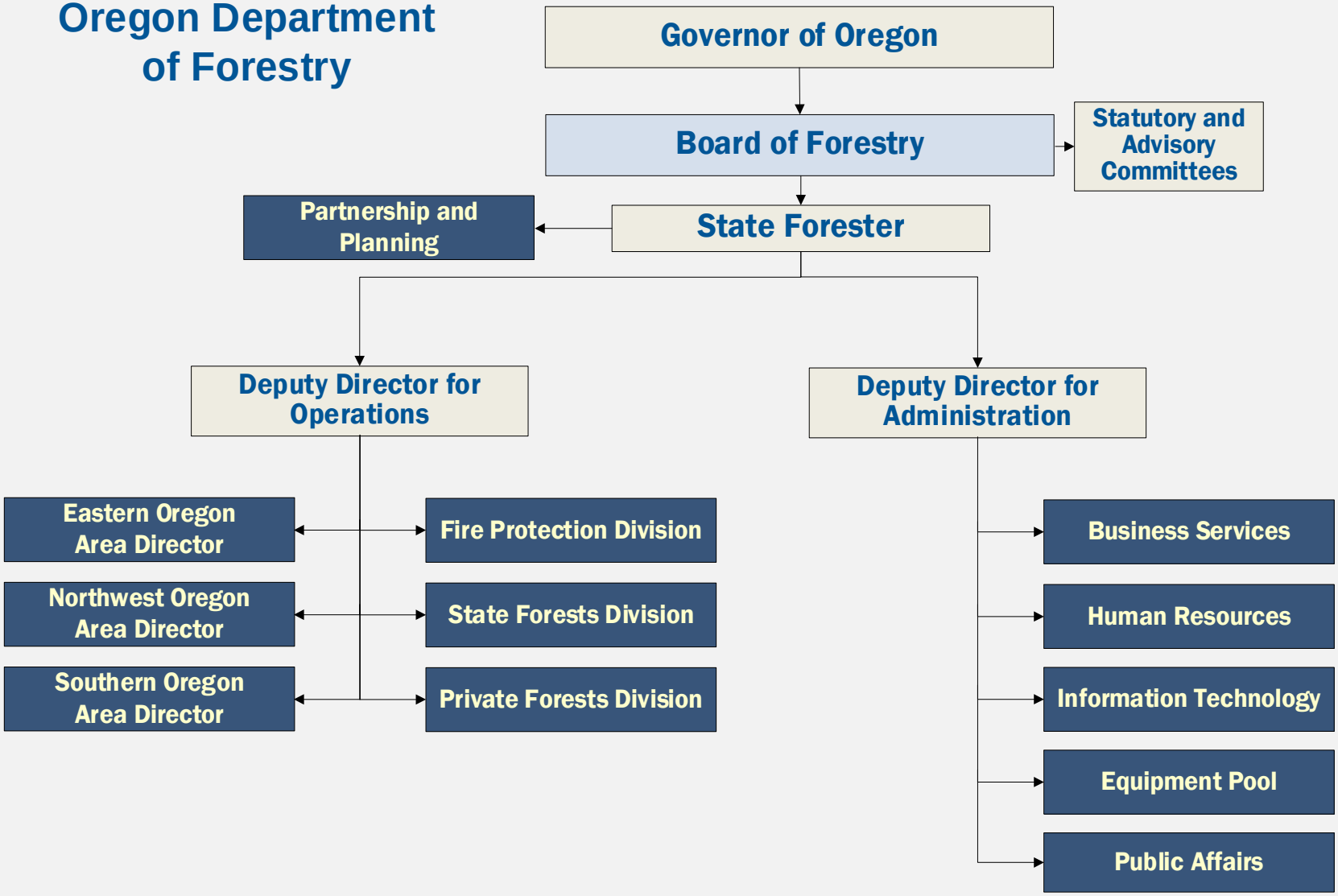
- Wildfire response- a leader and national model
- High asset value- translates into high cost and risk
- Costs are shared between the state and landowners
  - including a one of kind insurance policy
- No dedicated funding for structural response of wildfires
- Costs and losses are drastically increasing

Oregon Department of Forestry

Oregon Wildfire Council
Organizational Resources

March 18, 2019

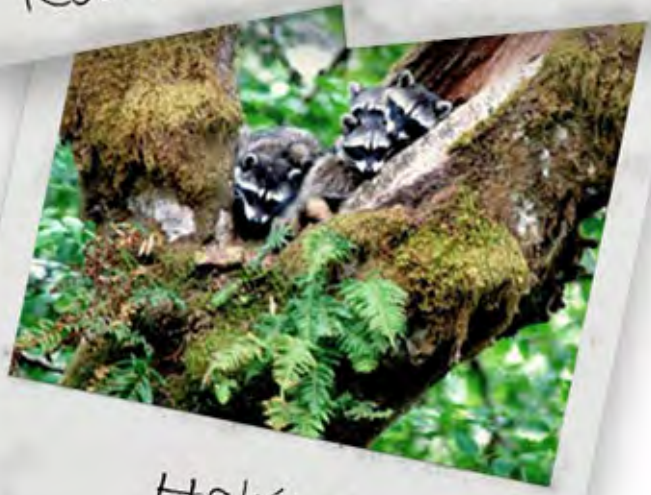
Oregon Department of Forestry



Recreation

Sustainability

Jobs & Revenue



Habitat

Clean Water

Public investment is important to maintaining our forests

Agency Challenges

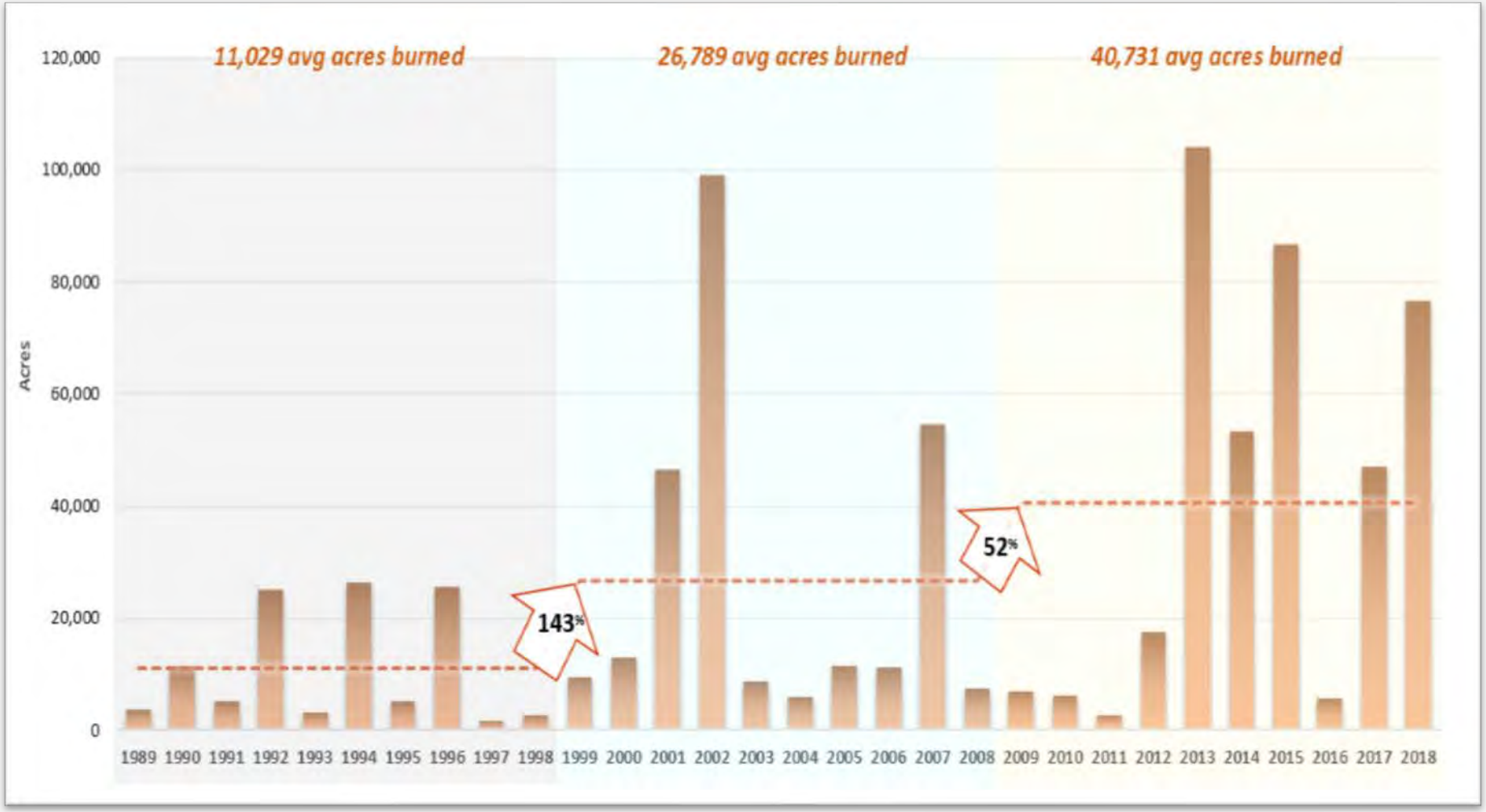
ODF Fire Season

- Oregon is experiencing an increased severity, complexity and duration of fire seasons.

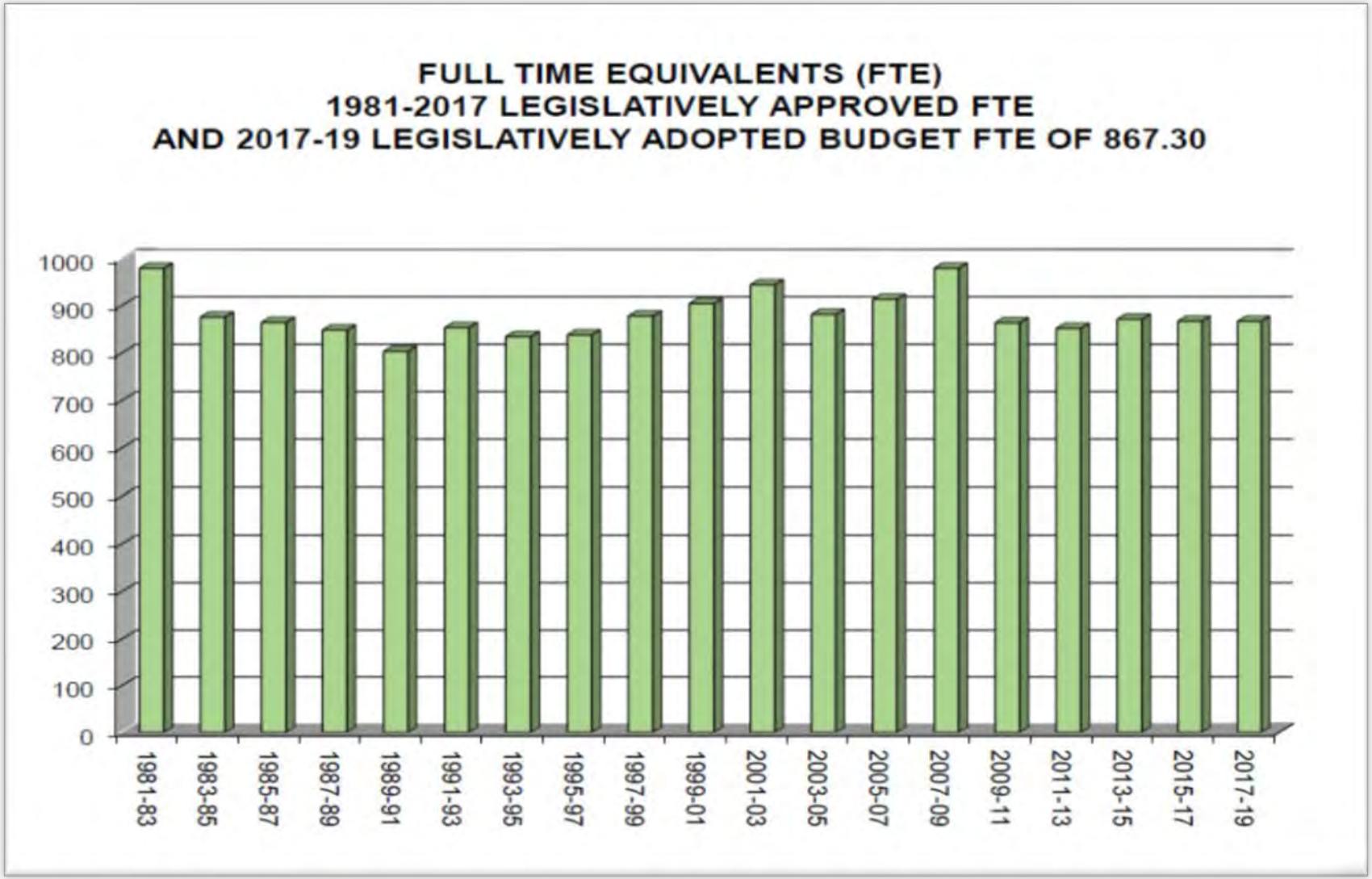
- Challenged ODF's ability to respond to the wildfire workload and sustain its other core businesses.

- Proactively protecting Oregonians, Forests and Communities from wildfire.

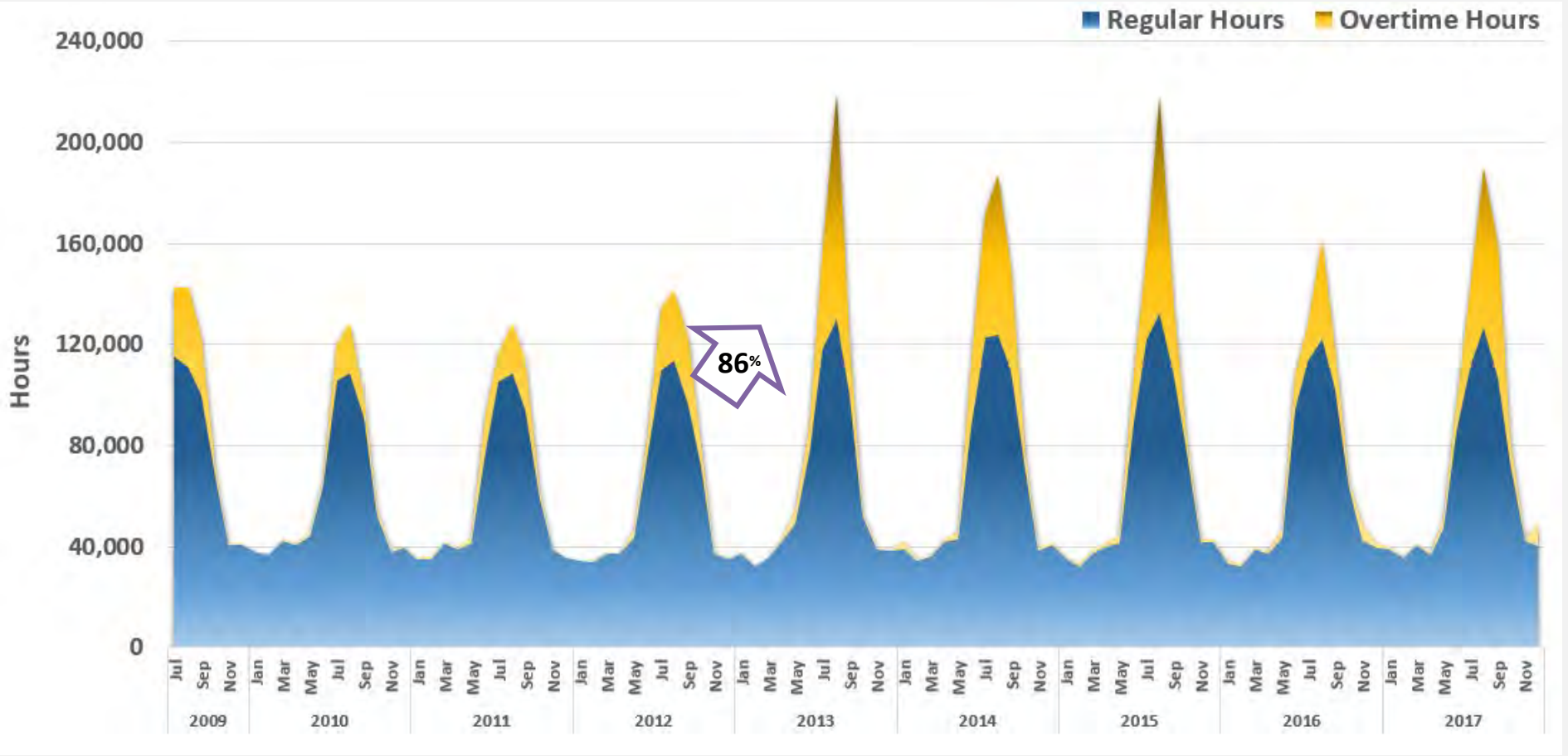
Challenging Fire Seasons - ODF Protected Lands



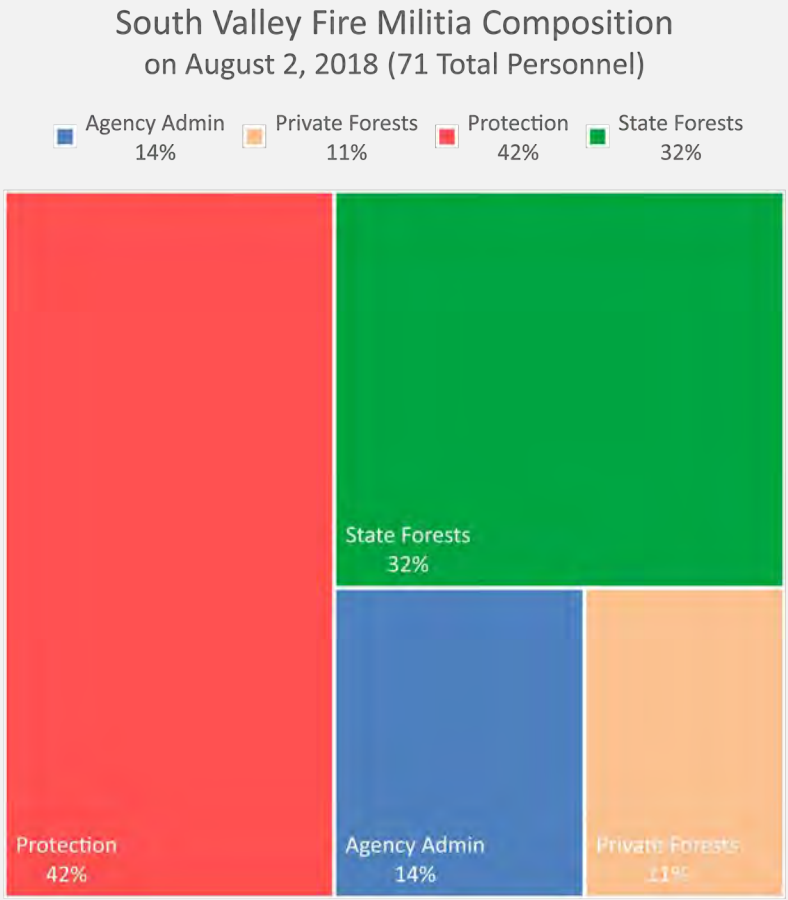
ODF Full Time Equivalents (FTE)



Fire Protection Related Hours
All ODF Employees



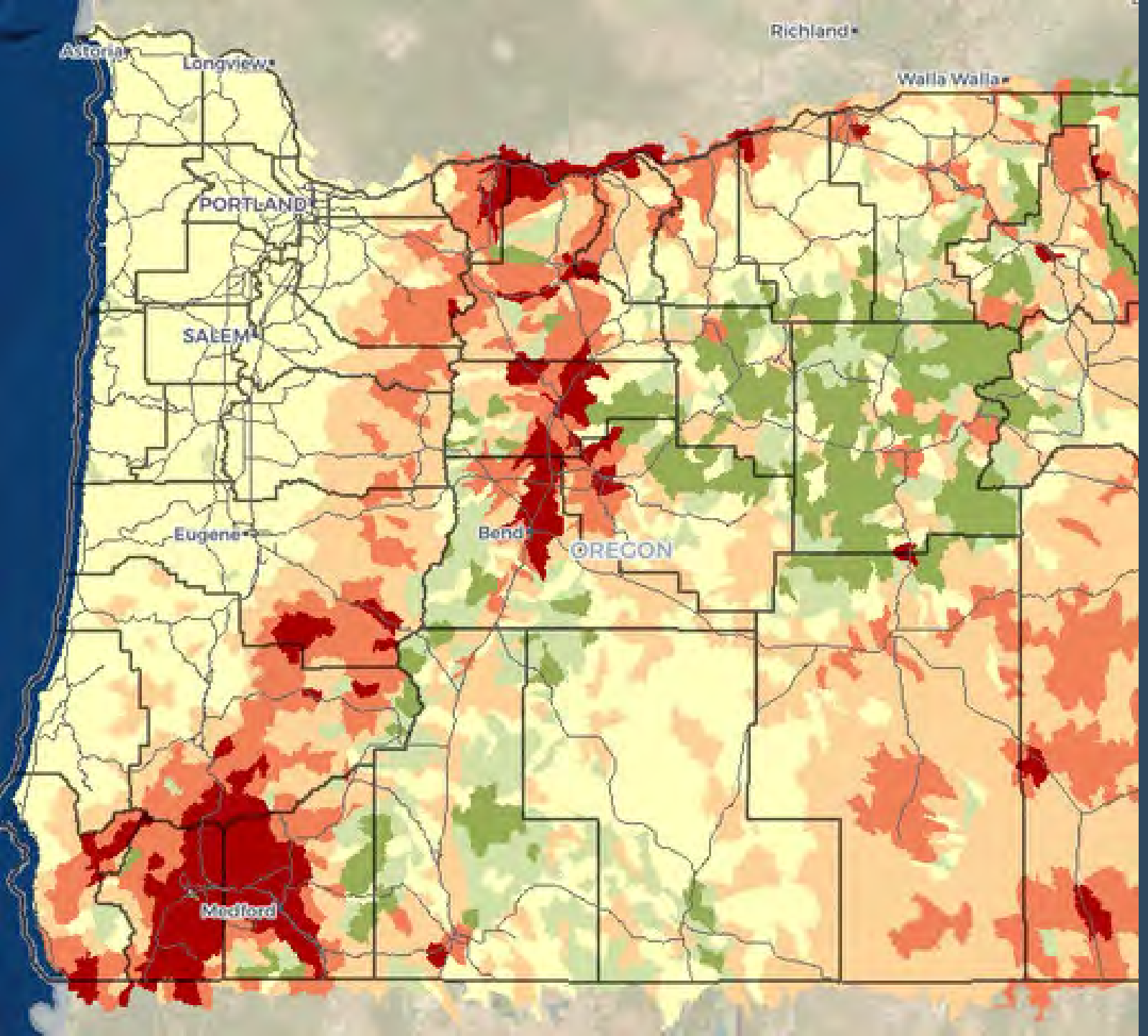
ODF Fire Militia



Oregon's Complete & Coordinated Fire Protection System

Peter Daugherty, State Forester

(503) 945-7211
peter.daugherty@oregon.gov



Governor's Council on Wildfire Response

March 18, 2019

FOREST SECTOR IMPACTS OF WILDFIRE

Mike Cloughesy

Presented to Governor's Council on Wildfire Response
March 18, 2019

Oregon Forest Resources Institute

Forest fires and acres burned in Oregon 2014-2018

	ODF Protected			USFS Protected			Combined Total		
Year	**Fires**	**Size**	**Average**	**Fires**	**Size**	**Average**	**Fires**	**Size**	**Average**
	(number)	(acres)	(ac/fire)	(number)	(acres)	(ac/fire)	(number)	(acres)	(ac/fire)
2018	964	90,704	94	667	349,123	523	1,631	439,827	270
2017	1,090	47,165	43	718	470,718	656	1,808	517,883	286
2016	396	4,529	11	561	45,663	81	957	50,192	52
2015	1,139	72,439	64	1,104	256,835	233	2,243	329,274	147
2014	1,184	114,089	96	1,410	119,280	85	2,594	233,369	90
Total	4,773	328,926	**69**	4,460	1,241,619	**278**	9,233	1,570,545	**170**

Direct Cost of Wildfires

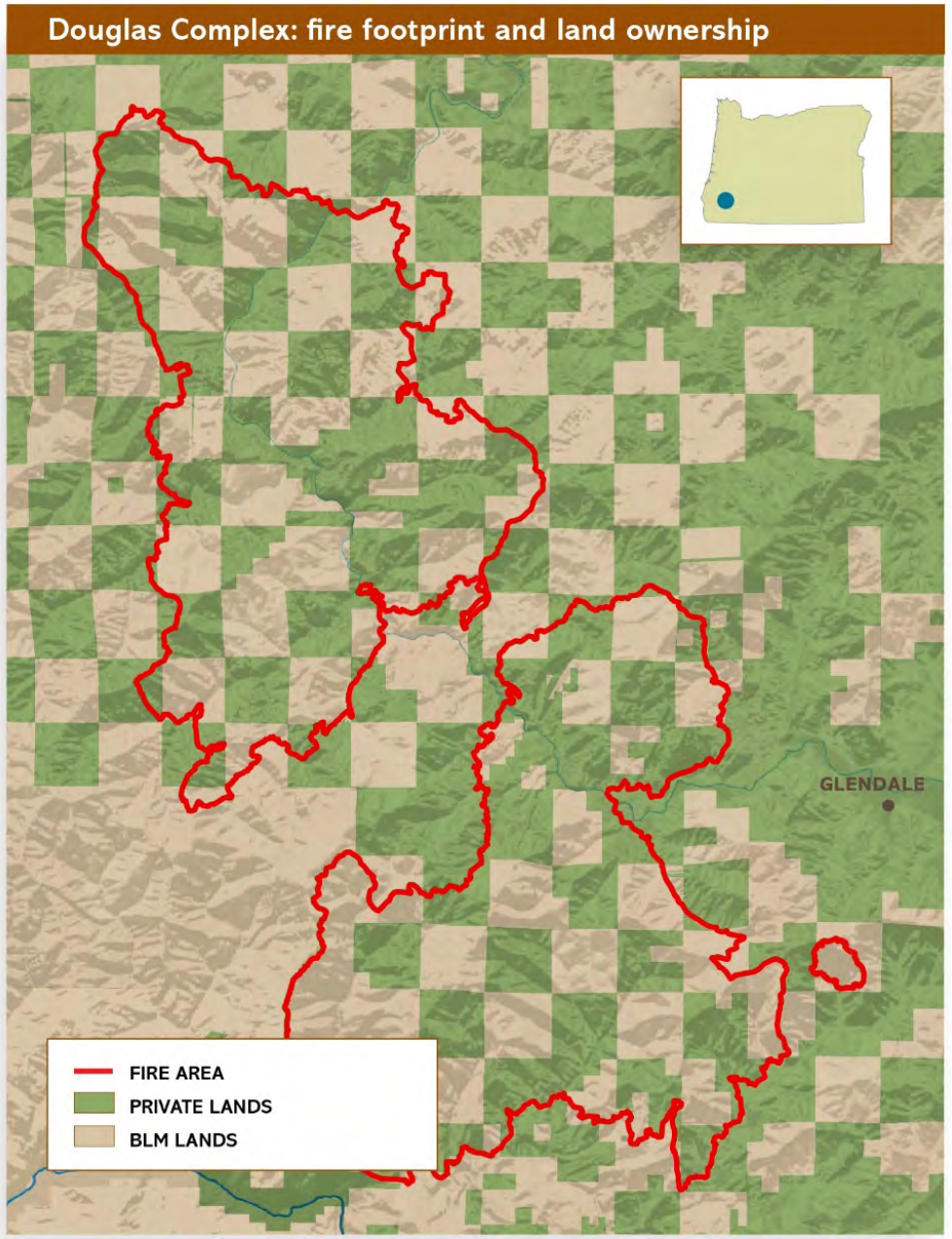
- Average of 314,000 acres of forest land burned per year
- Average of 66,000 acres of ODF protected land burned per year
- Average of 248,000 acres of USFS protected land burned per year
- Merchantable timber may be salvaged but value is reduced
- Pre-merchantable stands are a total loss
- Salvage logging takes place of green harvest
- Restoration goals may not be met
- Site preparation after fire is added expense
- Logging equipment can be burned up
- Roads and bridges can be damaged

Oregon Forest Resources Institute

Indirect Cost of Wildfires

- Restrictions on logging hamper timber output
- Summer is peak time for mill production & purchasing logs may be difficult with fire restrictions
- Reduced log supply can raise prices and even close mills
- Loggers, foresters and others are working on fires rather than their normal jobs
- Seedling supply is often not adequate
- Green tree restoration work may be delayed
- Salvage logging is hard on equipment

Oregon Forest Resources Institute



Douglas Complex Fire

- Ignition: July 26, 2013; Lightning strike
- Acreage burned: 48,000
- Firefighting cost: $54 million
- Private: 23,000 acres
- BLM: 25,000 acres
- Roseburg Resources:
  - 11,000 acres;
  - 8,000 acres of young trees;
  - 3,000 acres of salvageable trees

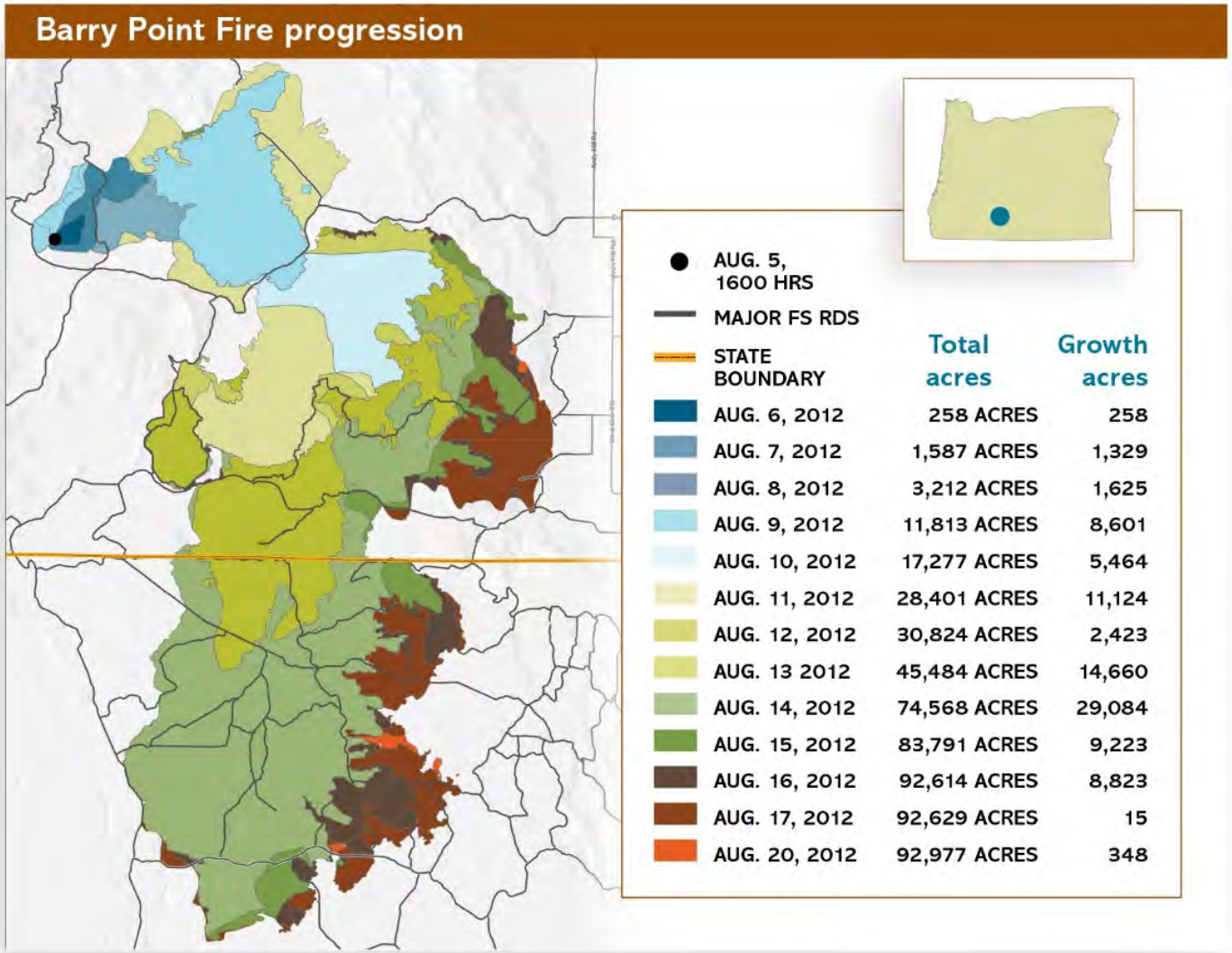
Oregon Forest Resources Institute

Roseburg Resources 3 Year Preliminary Costs/Loss - Large SWO Fires

Douglas Complex and Stouts Creek Fires 2013-2016

- **Hard Costs**
  - Unscheduled Capital Outlays -$12-15MM
    - Reforestation costs(net of salvage acres)
    - Accelerated road and infrastructure repair/construction
- **Investment Loss**
  - Reduction in Appraised Value (NPV) -$12-13MM
    - Current rotation only
- **Operations Costs**
  - Replacement of Future Volume Contribution -$ 9-11MM
    - -Incremental replacement cost of 180 MMBF lost from harvest schedule
- **Total Enterprise Cost** **-$33-39MM**

Barry Point Fire



- Ignition: Aug. 5, 2012; lightning strike
- Acreage burned: 93,000 ac
- National Forests: 60,000 ac
  - Fremont-Winema & Modoc NFs
- Private: 33,000 ac
- Firefighting cost: $23 million
- Collins loss: 23,000 acres of mixed age timber
- Salvage and reforestation after the fire

Active forest management

- Thin forests of brush and small trees
- Leave fewer trees which will become larger and more fire resilient
- Removal of merchantable material can cover some or all of the treatment costs
- Timber harvest -->11 forest sector jobs/MMBF
- Forest restoration work --> 13 jobs/$1 million
- Small wood markets are limited, especially pine
- Firewood, posts & poles, biomass & Mass Timber are possibilities

Oregon Forest Resources Institute

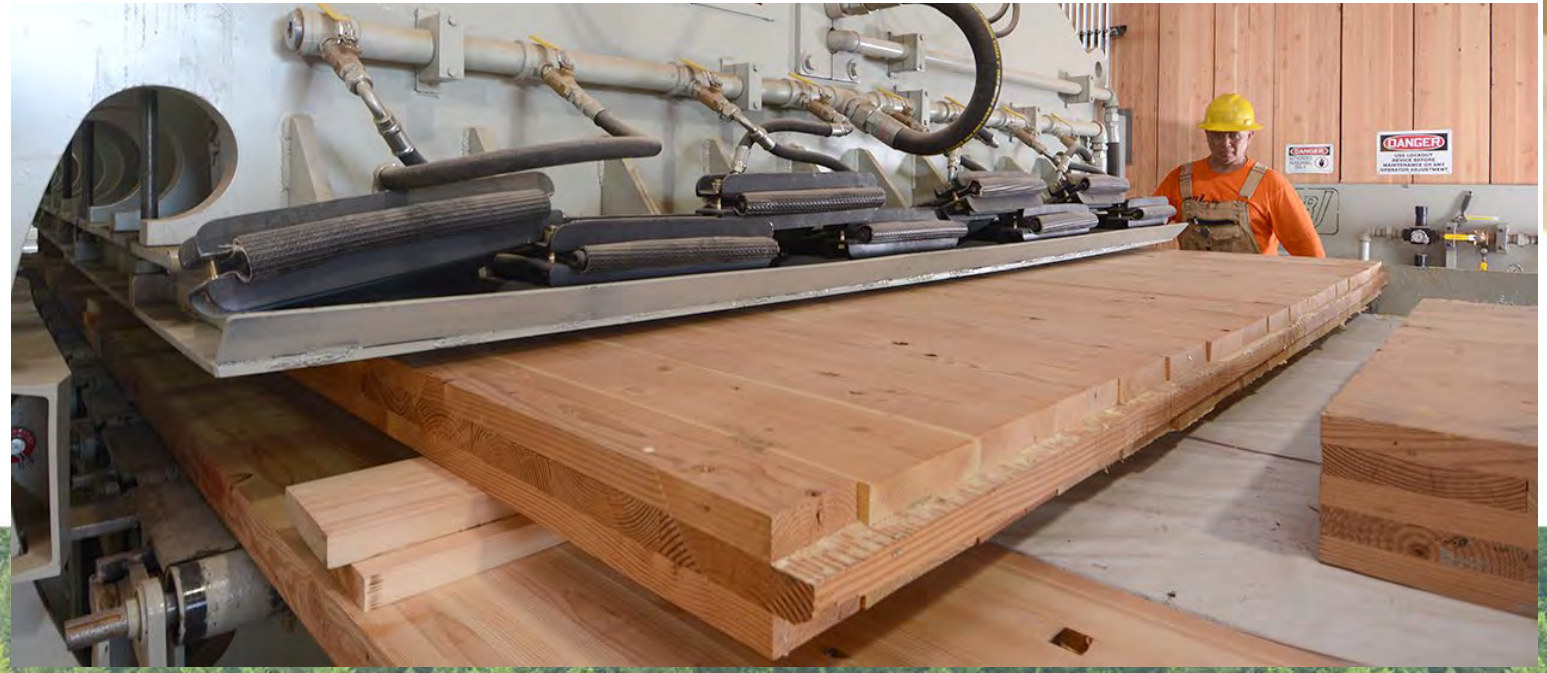
Woody biomass from small wood

- **Electricity** - Combined heat & power (CHP) from biomass is more expensive than natural gas today - Market for steam heat is key
- **Thermal** - Pellets as heat source for public building is competitive where natural gas is not available - small market
- **Biofuels** - Biodiesel and jet fuel - new Red Rock facility in Lakeview - Carbon friendly fuel & energy independence
- **Torrefied Biomass** - Ochoco Lumber in John Day - use as fuel in power plants
- **Fast pyrolysis -** produce syngas & biochar

Oregon Forest Resources Institute

MASS TIMBER from small wood?

- Cross Laminated Timber (CLT) and Mass Plywood Panels (MPP) are typically made from Douglas-fir. Other species are possible. Smaller logs could be used.
- Ponderosa pine is being tested for CLT at Oregon State University through a pair of US Forest Service Wood Innovation grants
- Katerra in Spokane and Vaagen Timbers in Colville, WA are building plants specifically to use small diameter material for CLT



Oregon Forest Resources Institute

Summary - Forest Sector Impacts

- Wildfire acreage of fire is increasing - largest fires are on USFS lands
- Wildfire has huge direct & indirect costs to Oregon's forest sector
- Wildfire costs include burned timber, burned reproduction, lost logging output, reduced log inventories at mills
- Active management to reduce hazard produces jobs through timber harvest and restoration investment
- Markets for small wood are necessary to cover restoration cost
  - Woody biomass: CHP, Thermal, Biofuels, Torrefaction & Fast pyrolysis
  - Mass timber: CLT & MPP from small wood & pine may be feasible

Oregon Forest Resources Institute

Thank you!!!

Mike Cloughesy
Director of Forestry
cloughesy@ofri.org

Questions???

Oregon Forest Resources Institute

THE IMPACTS OF THE 2017 & 2018 WILDFIRES ON OREGON'S TRAVEL AND TOURISM INDUSTRY

3.18.19

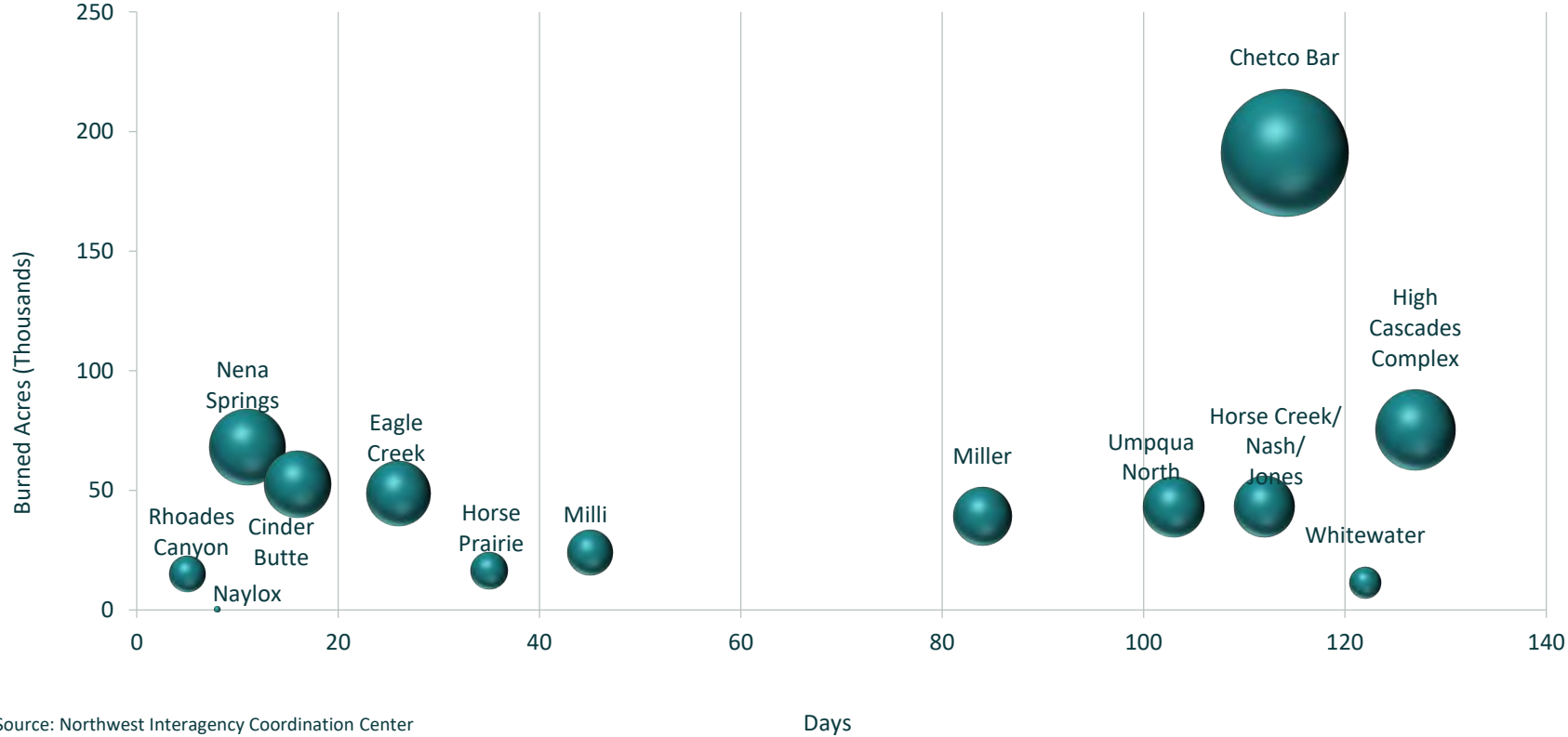
PRIMARY OBJECTIVES

- Explain Travel Oregon’s role during wildfire season
- 2017 wildfire impact study results
- Additional 2017 wildfire economic impacts
- 2018 wildfire economic impacts
- Explain upcoming Travel Oregon wildfire research

Travel Oregon

- Semi-independent state agency
- Communication with agencies, visitors and industry partners
- Conduct research to measure impact on industry
- Work with tourism industry leaders to drive visitors to areas impacted by wildfire

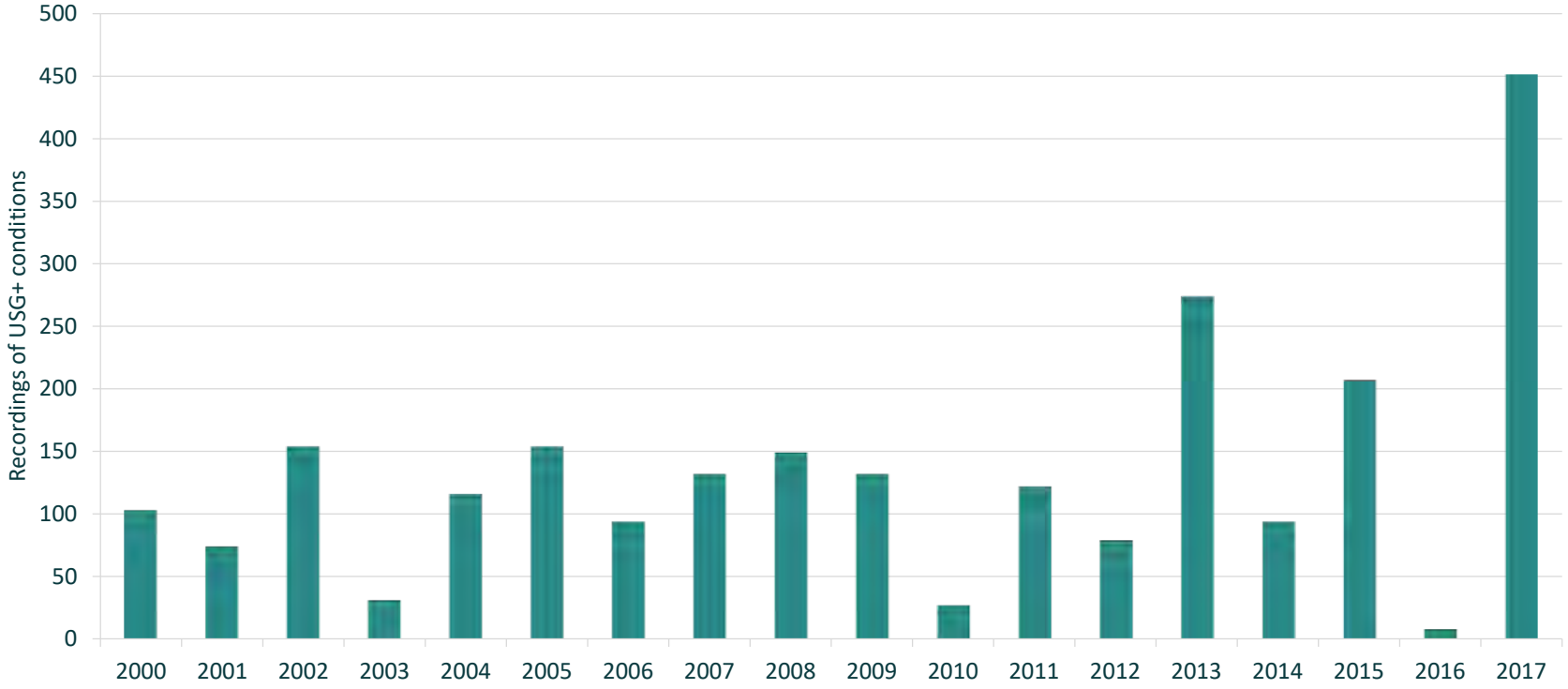
SELECTED WILDFIRES IN OREGON
2017



Source: Northwest Interagency Coordination Center

AIR QUALITY READINGS OF USG* OR GREATER

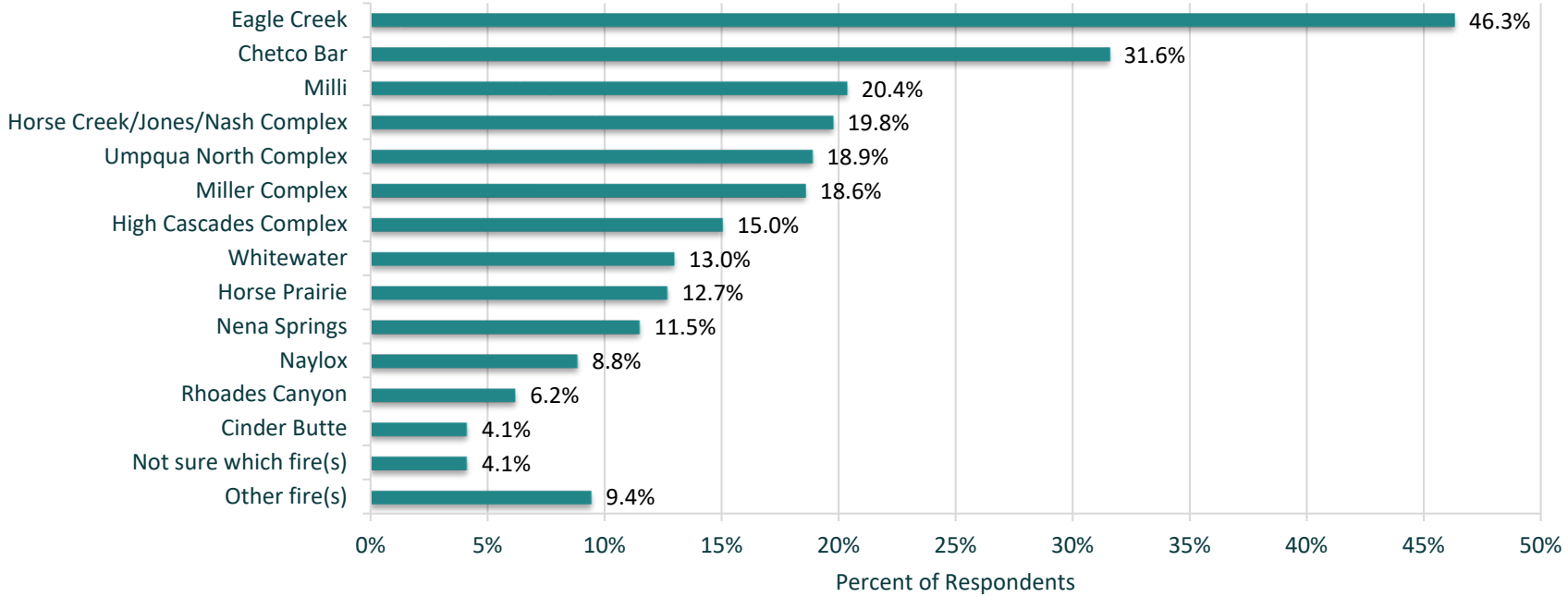
STATEWIDE, 2000--2017



*Unhealthy for Sensitive Groups
Source: Environmental Protection Agency

DAMAGING FIRE
RESPONDENT PERCEPTION

Which 2017 Oregon wildfires had an impact on your business or organization's operations/performance?



Source: Dean Runyan Associates

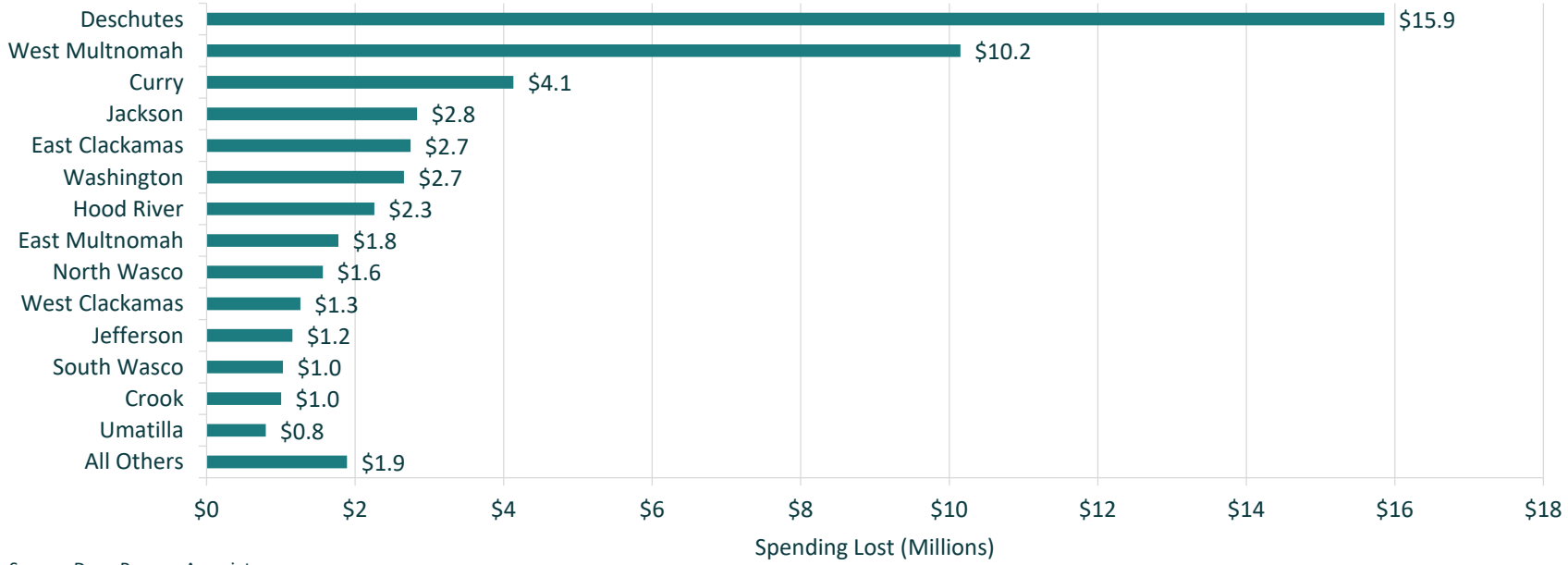
REVENUE LOSS DUE TO FIRE
PERCEIVED CAUSE

Source: Dean Runyan Associates

OREGON WILDFIRE TRAVEL IMPACT, 2017

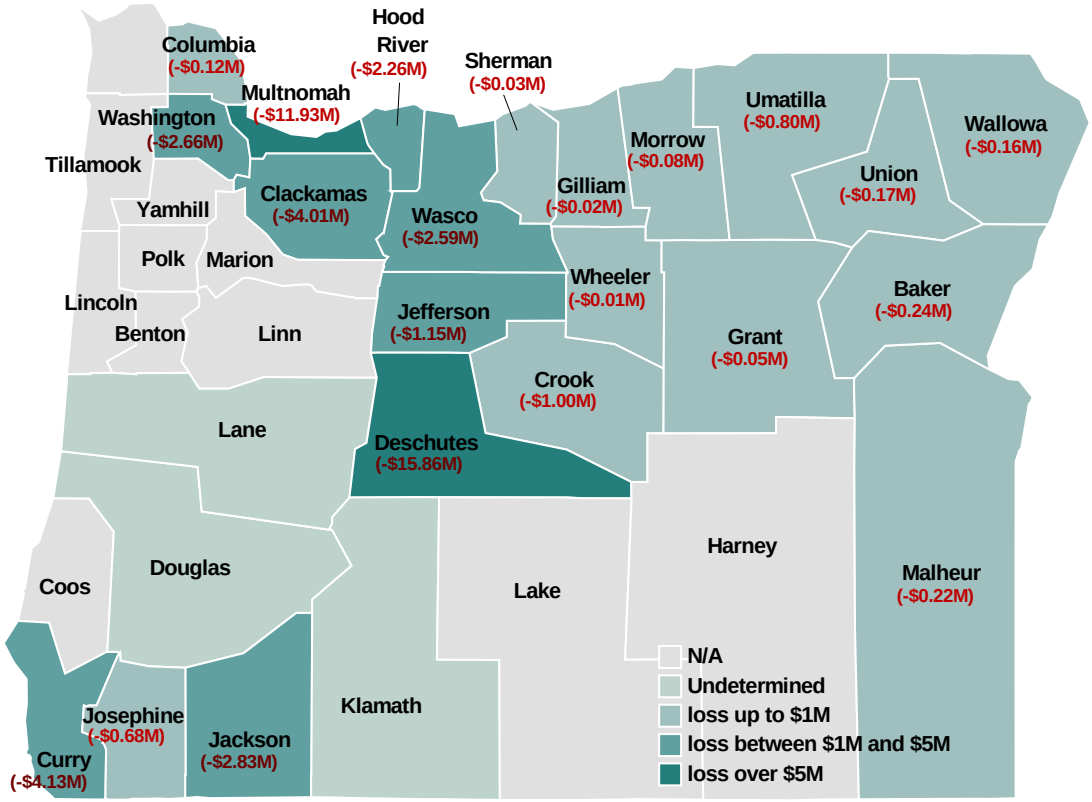
$51.1 MILLION

Destination Spending Loss by County (Millions)



Source: Dean Runyan Associates

WILDFIRE RELATED VISITOR SPENDING LOSS
2017 BY COUNTY, $ MILLIONS

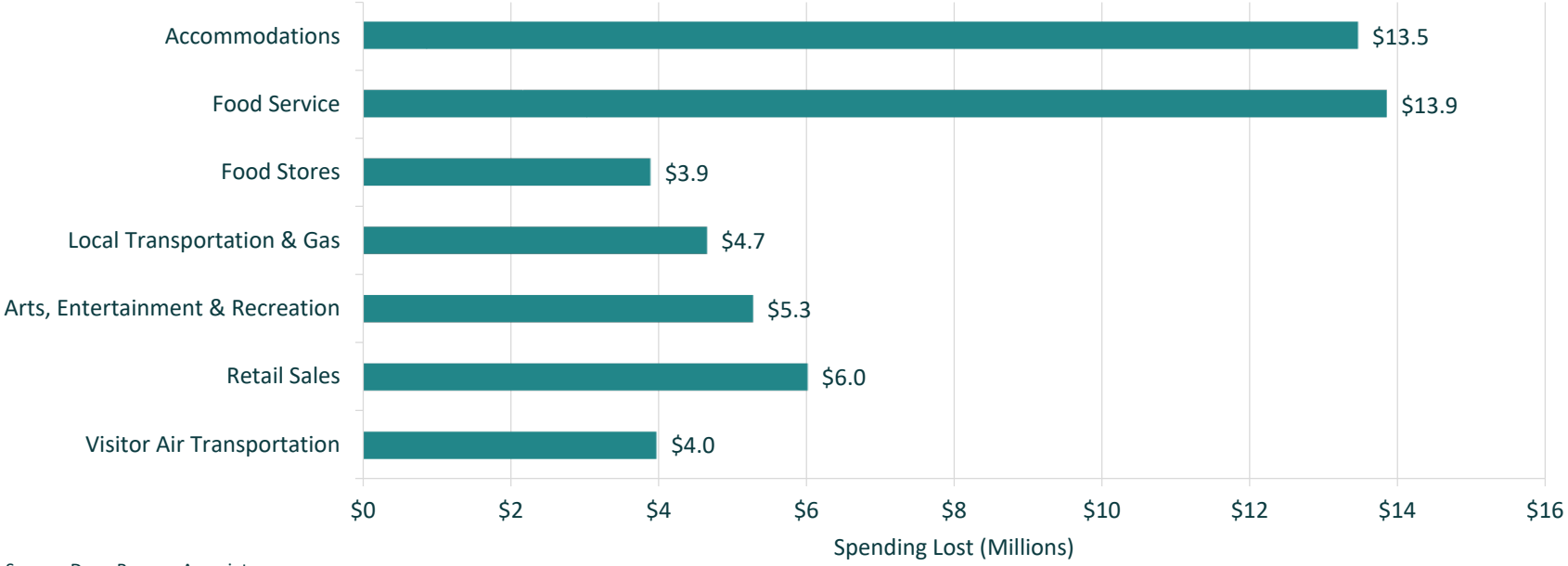


Source: Dean Runyan Associates

OREGON WILDFIRE TRAVEL IMPACT, 2017

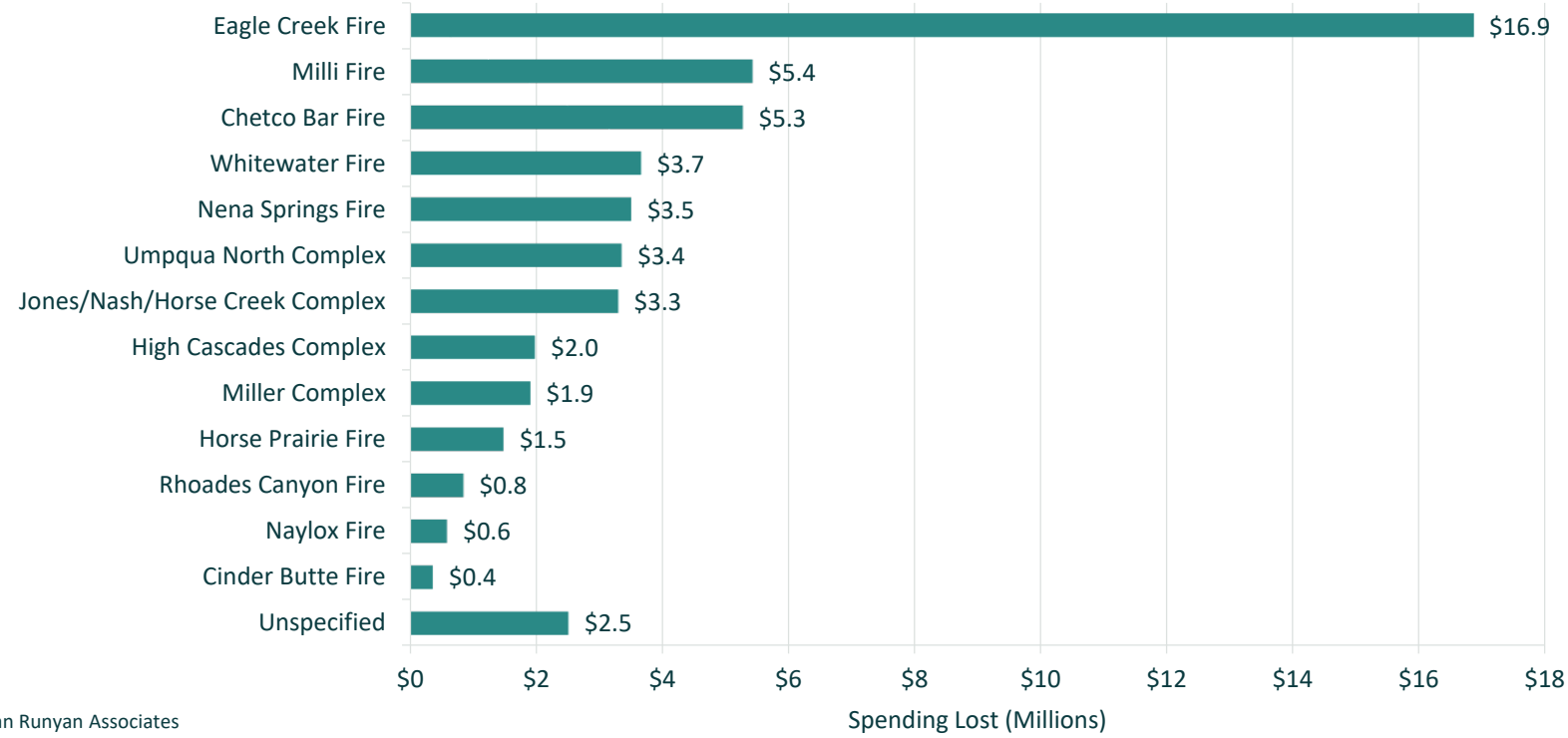
$51.1 MILLION

Destination Spending Loss by Industry (Millions)



Source: Dean Runyan Associates

IMPACTS
BY FIRE



Source: Dean Runyan Associates

2017 ADDITIONAL ECONOMIC IMPACTS

- Employment & Economy
- Transportation
- Events
  - Oregon Shakespeare Festival
  - Sisters Folk Festival
  - Cycle Oregon
- Outdoor Recreation
  - Mt. Jefferson Wilderness
  - Columbia Gorge Trails
  - North Umpqua River Trail System

2018 SOUTHERN OREGON
BUSINESS IMPACTS

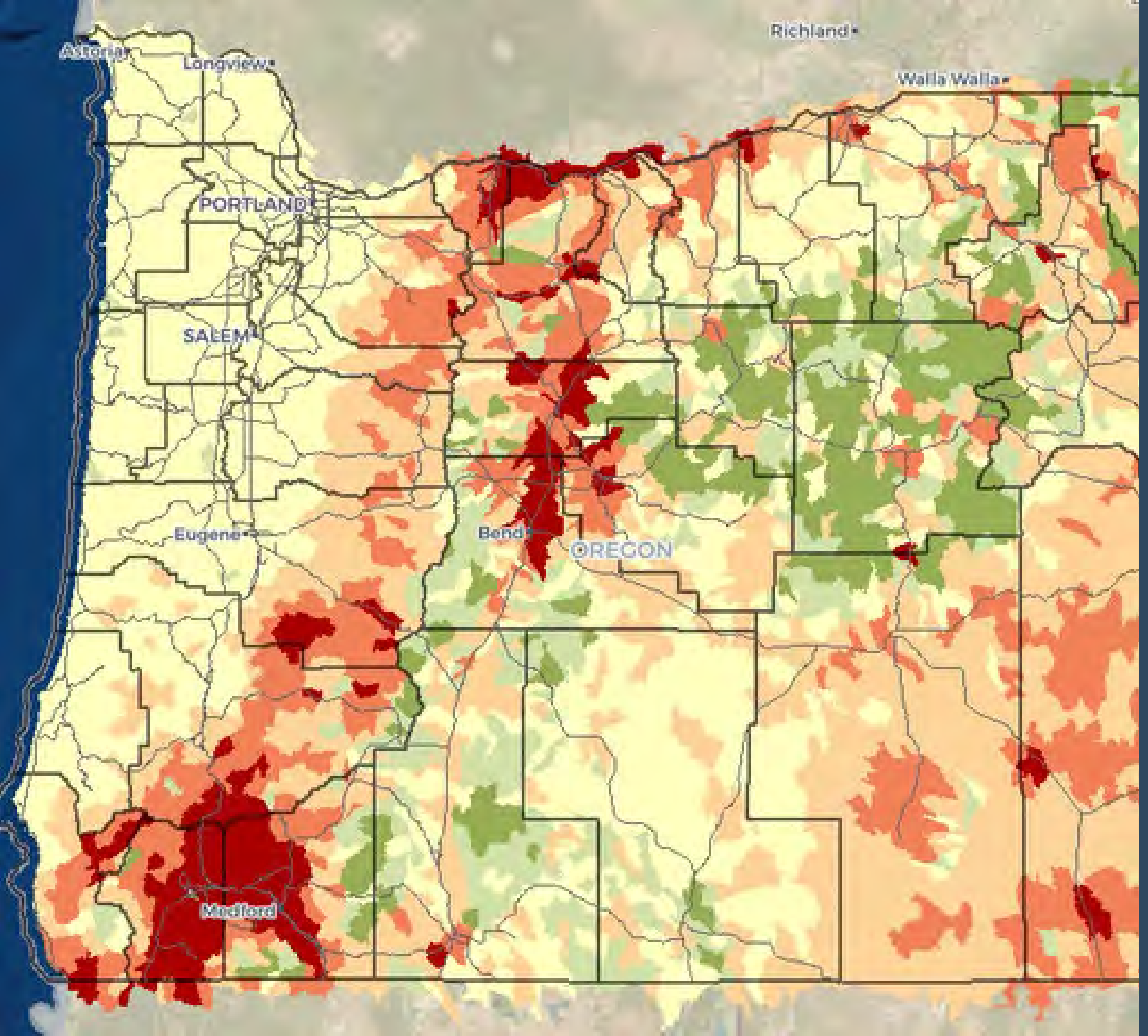
- Oregon Shakespeare Festival
- Britt Festival Orchestra
- Lodging & Restaurants
- Outdoor Recreation
    - Hellgate Jet Boats
- Golf Courses
- Tour Operators
- Sporting Events
- Airport Operations

2018 CRATER LAKE
ECONOMIC IMPACTS

Total Visits	2018	2017	% Change
JULY	186,070	214,737	-13.35%
AUGUST	138,528	161,329	-14.13%

2018 WILDFIRE STUDIES

- Travel Southern Oregon is working with Southern Oregon University on studying how 2018 wildfire smoke impacted visitor behavior and will impact their future travel plans.
- Travel Oregon is working with Longwoods International on a study to understand whether or not visitors change or cancel their travel plans due to wildfires.
- Both reports will be released April 2019.



Governor's Council on Wildfire Response

March 18, 2019