
# DF decline and mortality in SW Oregon: status, trends, and impacts

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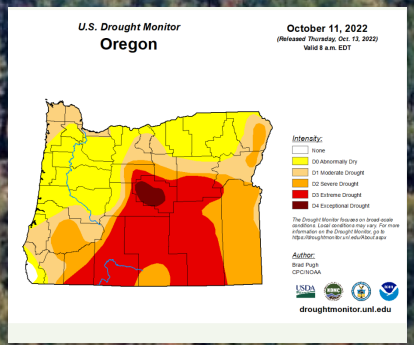
2016 Aerial Detection Survey
Applegate watershed

USFS photo (B. Schroeder)

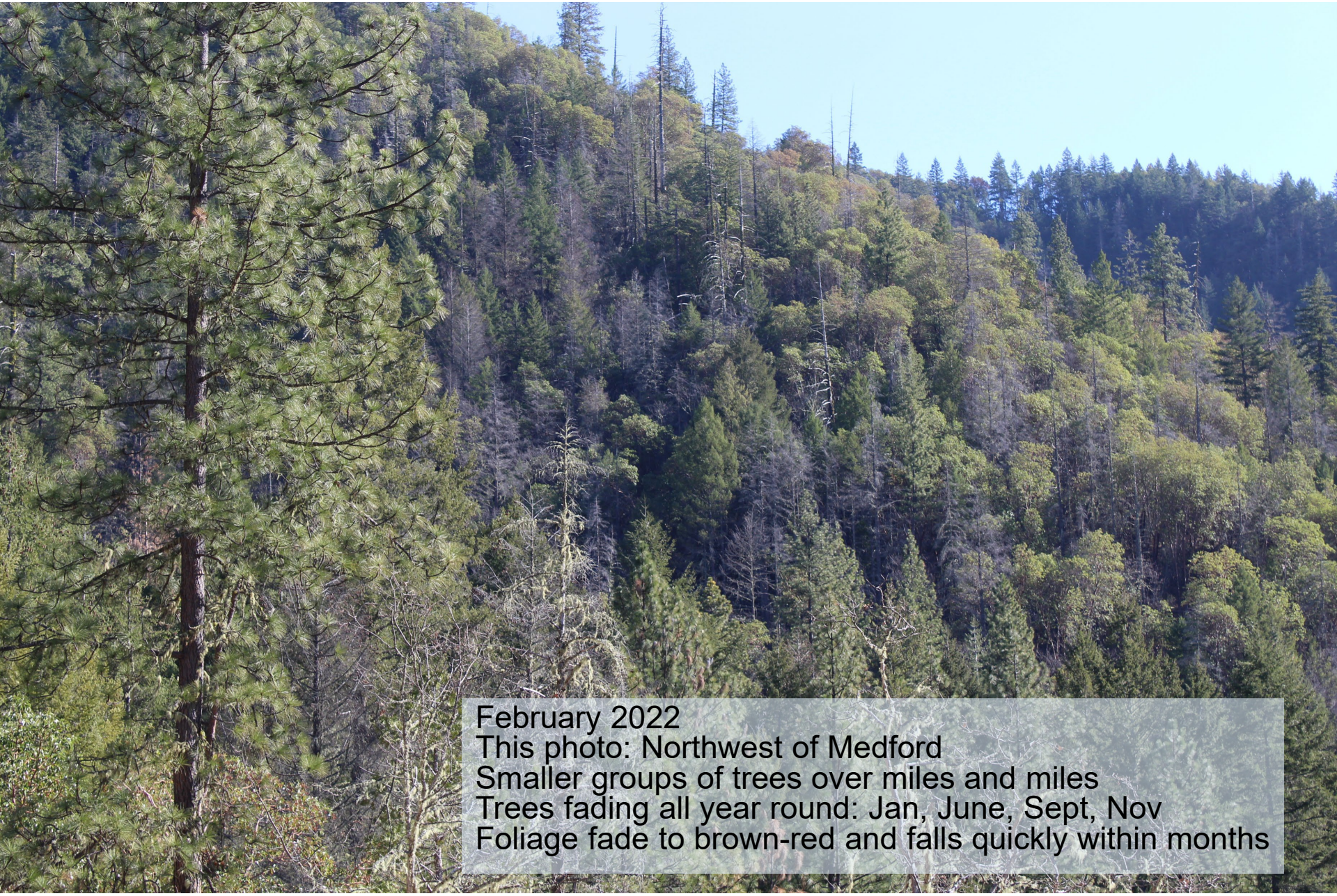
# Elevated Levels of Douglas-fir Mortality Detected

- One of the most important tree species in PNW
- Found in abundance across Oregon and Washington from sea level to 7,000 ft in the Cascades.
- Douglas-fir mortality in southwestern Oregon (Jackson, Josephine, and Douglas Counties) is a serious and growing issue.
- DF have declined  and are predisposed DF to attacks from insects like th Flatheaded fir borer(*Phaenops drummondi* prev. *Melanophila*), probable role of cavitation

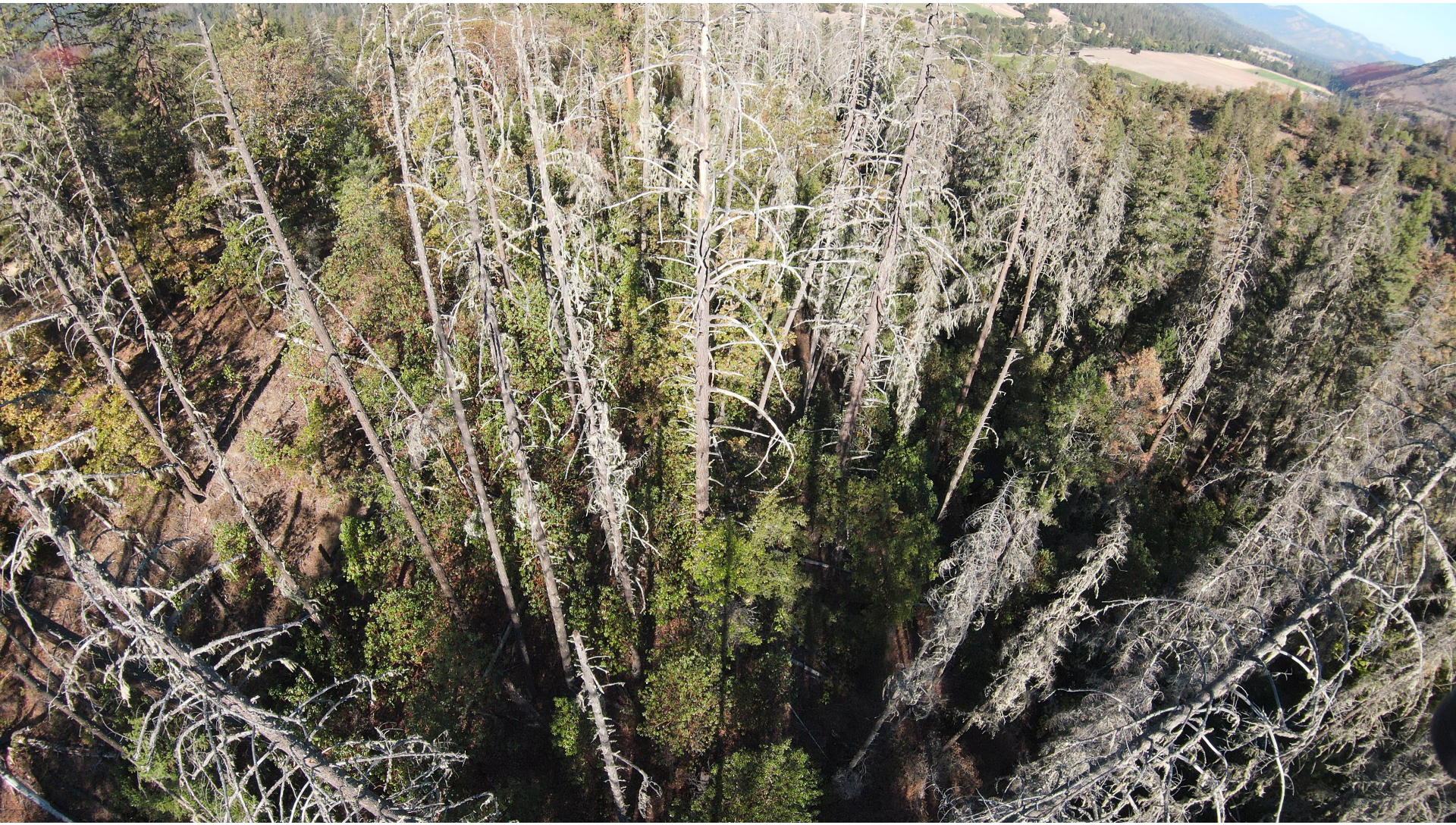




July 2016 Ferris Gulch
Applegate watershed
B. Schaupp, photo


February 2022
This photo: Northwest of Medford
Smaller groups of trees over miles and miles
Trees fading all year round: Jan, June, Sept, Nov
Foliage fade to brown-red and falls quickly within months


February 2022
Applegate watershed
Note: woodpeckering, snapped and standing dead,
excessive down dead



October 2022
Boaz Gulch, Applegate


April 2021
Near Canyonville

# Stealth Mortality

# Describing Tree Mortality: By Plane


## Aerial Detection Survey - “Capture the essence”

- Aerial detection surveys typically involve observing forests change events from a light, fixed-wing aircraft at approximately 500 - 1500 ft. above the ground.
- Recent mortality, where, how bad, what is causing it is recorded using a digital mobile sketch-mapping tablet system.
- Code assigned to mortality – codes have signatures (patterns of color, crown shape over the landscape), vetted on the ground, multiple factors
- Surveys are conducted annually in the summer providing a snapshot of forest damage.
- Tree mortality in fire scars is not recorded for about two years post-fire to avoid mapping direct fire-related mortality to focus on damage attributed to insects and diseases.

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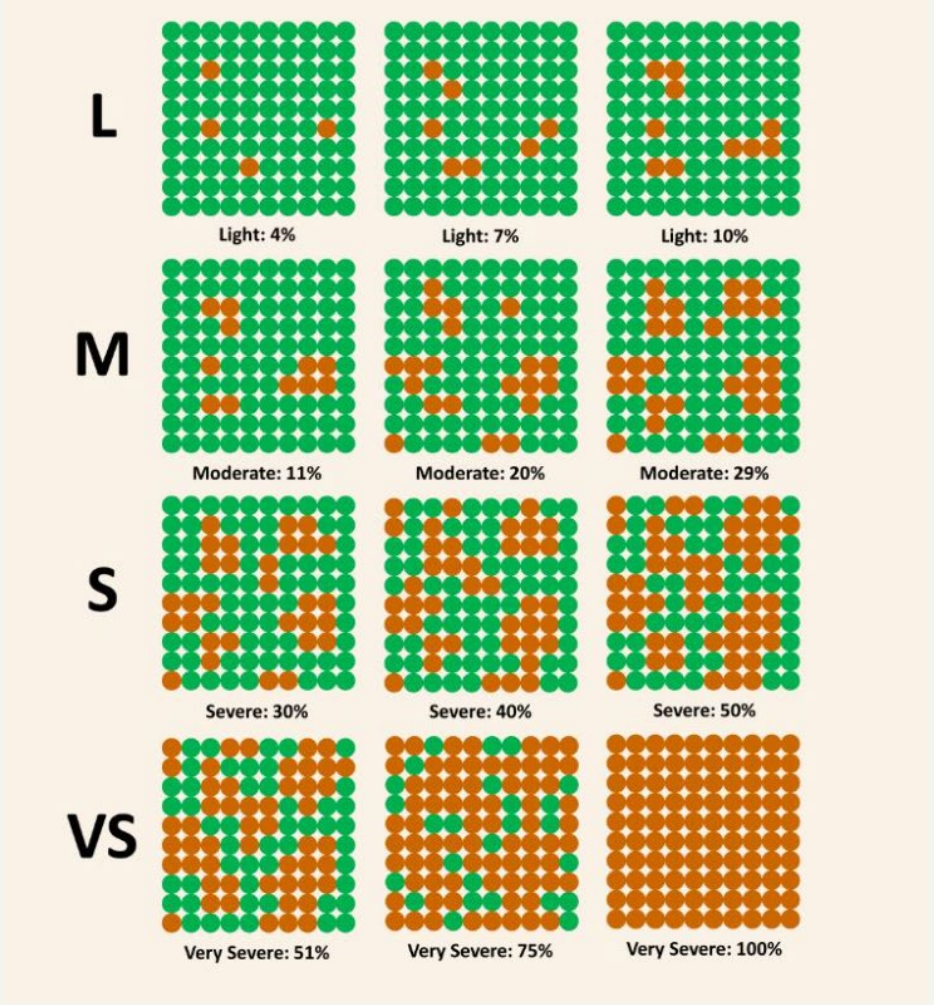
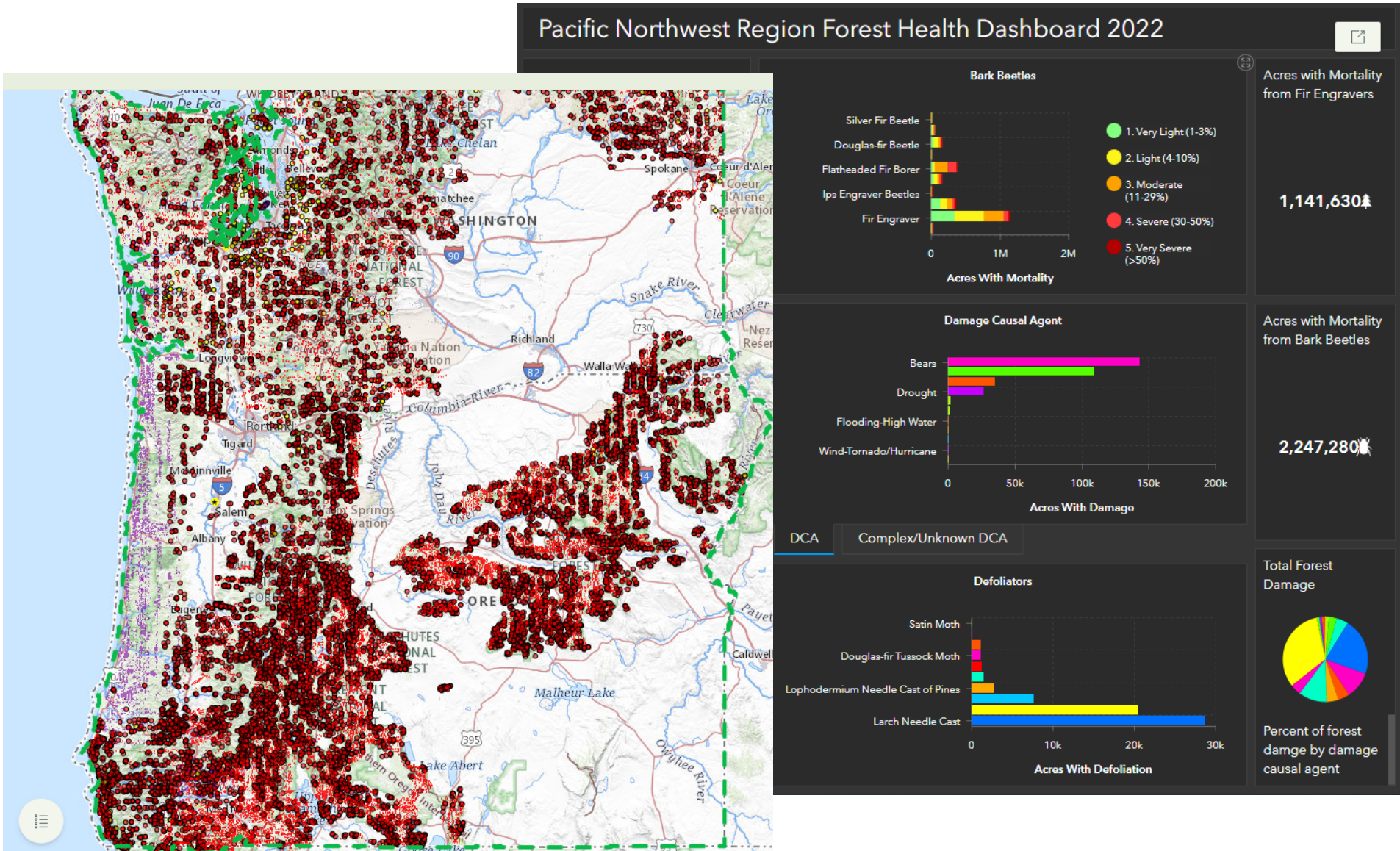
# Aerial Detection Survey




Visual aid used by surveyors to assist in estimating percent affected classification.

# R6 Forest Damage Observed in 2022



# Cumulative Mortality of Douglas-Fir Caused by Flatheaded Fir Borer Beetles In Jackson and Josephine County


**How the Aerial Surveys Are Conducted:**

Data represented on this map are based on trees visibly affected by forest insects and diseases detected and recorded during aerial survey flights conducted by the USDA Forest Service, the Washington Department of Natural Resources and the Oregon Department of Forestry. Observers have just a few seconds to recognize the color difference between healthy and damaged trees of different species; diagnose causal agents correctly; estimate intensity; delineate the extent of damage; and precisely record this information on a georeferenced, digital map. Air turbulence, cloud shadows, distance from aircraft, haze, smoke, and observer experience can all affect the quality of the survey. These data summaries provide an estimate of conditions on the ground and may differ from estimates derived by other methods.

The aerial survey provides information on the current status for many causal agents, and is important when examining insect activity trends by comparing historical and current survey data over large areas.

Overview surveys are a 'snap shot' in time and therefore may not be timed to accurately capture the true extent or severity of a particular disturbance activity. Specially designed surveys with modified flight patterns and timing may be conducted to more accurately delineate the extent and severity of a particular disturbance agent. Special surveys, such as Swiss needle cast surveys, are conducted when resources are available to address situations of sufficient economic, political or environmental importance.

Coordinate System: NAD 1983 Oregon Washington Albers

0 2.5 5 10 15 Miles

Print Date: 3/11/2013


**Insect and Disease Aerial Survey Data**

**Year**

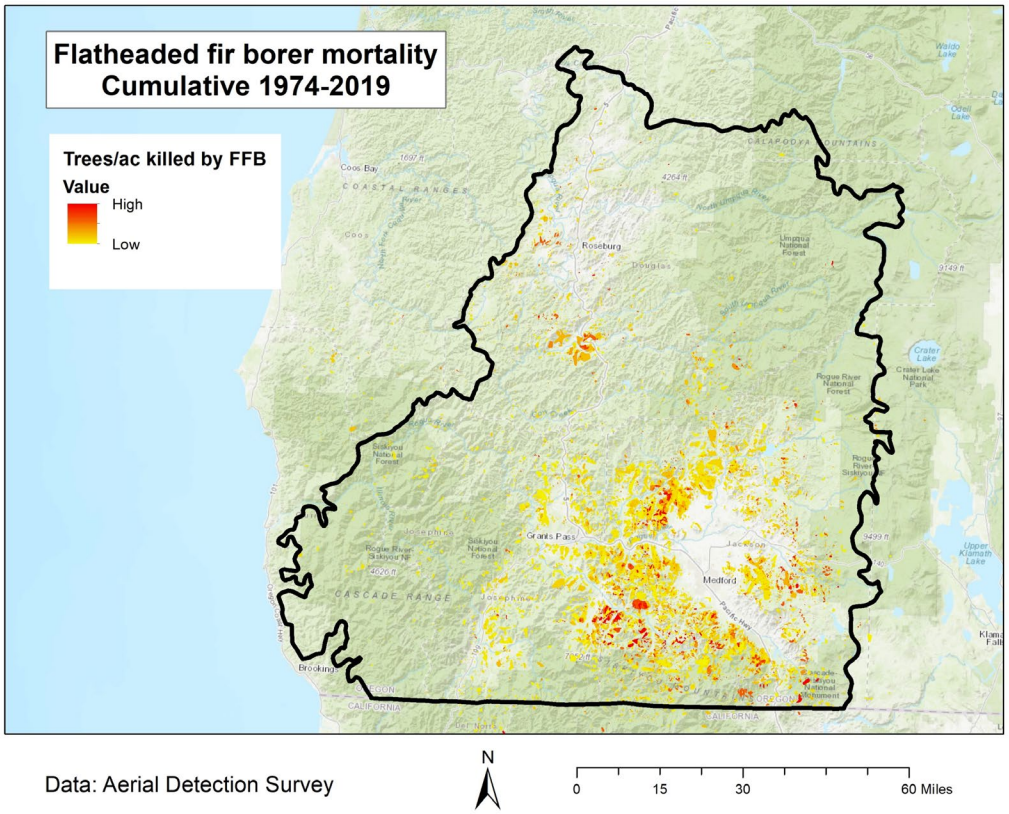
- 2012
- 2011
- 2010
- 2009
- 2008
- 2007
- 2006
- 2005
- 2004
- 2003
- 2002
- 2001
- 2000
- 1999
- 1998
- 1997
- 1996
- 1995
- 1991
- 1990
- 1989
- 1988
- 1986
- 1979
- 1978
- 1977
- 1976
- 1975
- 1974

**Road Type**

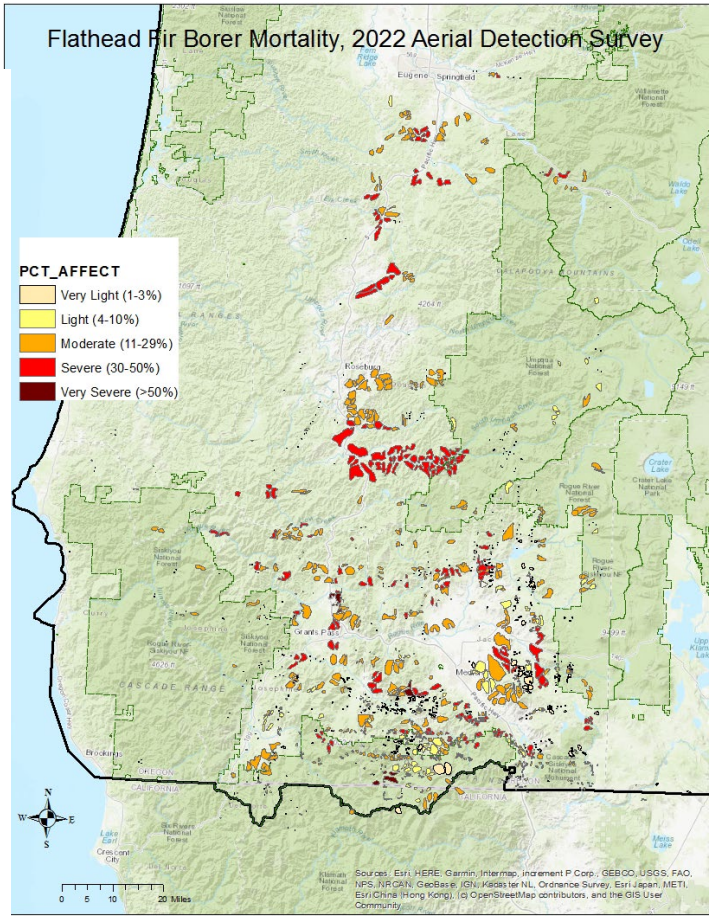
- US Interstate
- US Highway
- State Highway

# ADS and Flatheaded Fir Borer

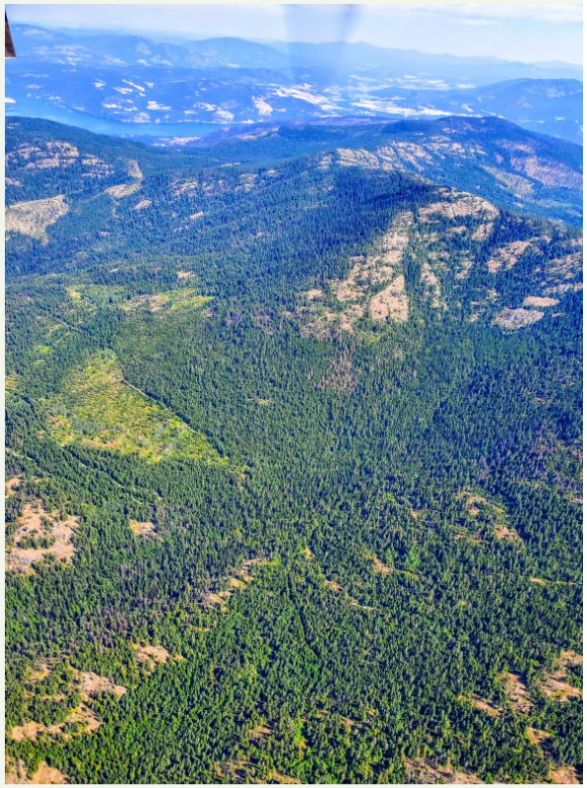
- Old severity display



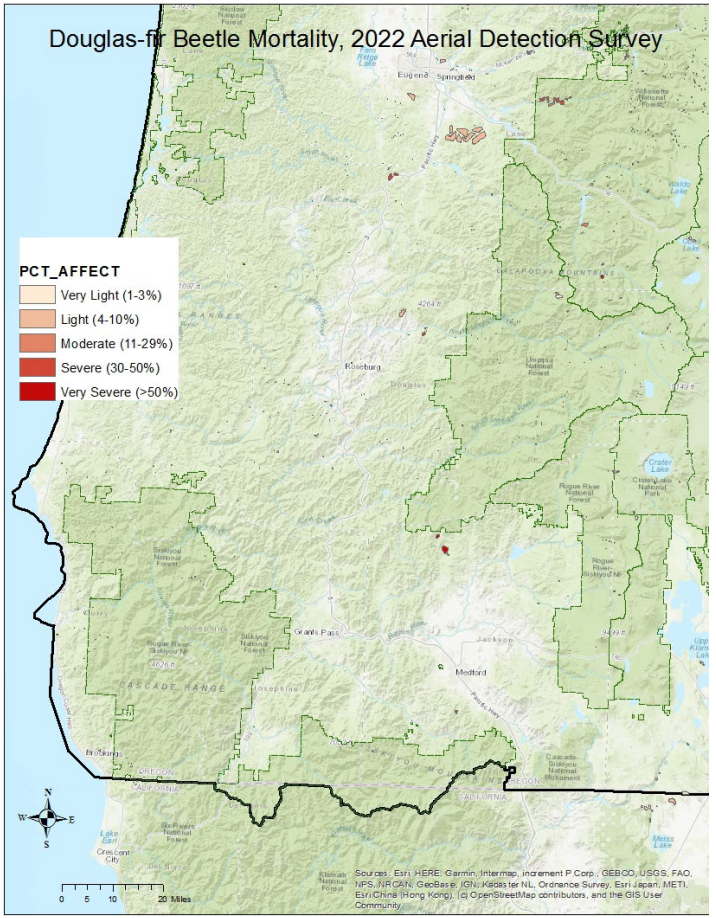

- New severity display



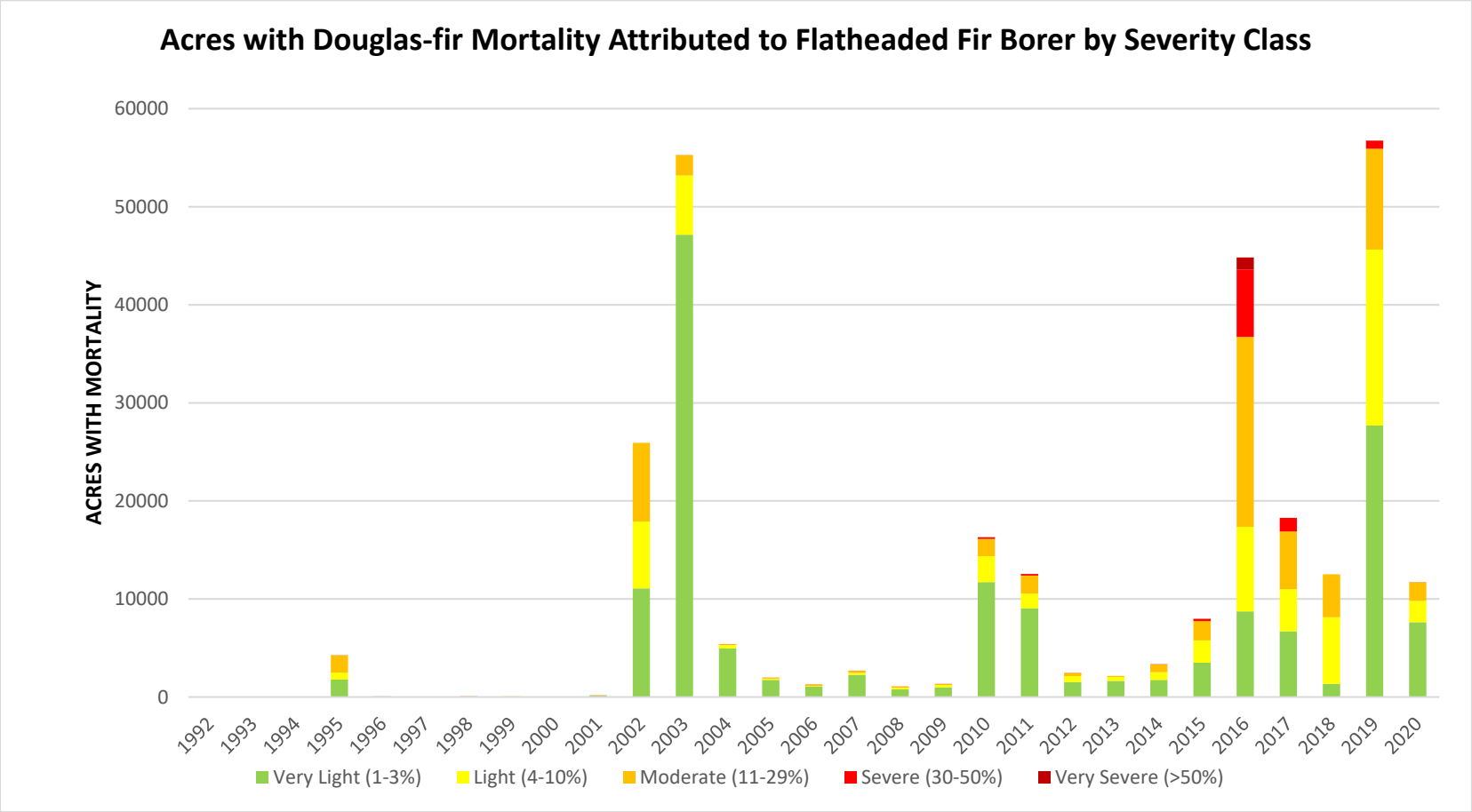
# Why so little DFB



Douglas-fir beetle attributed mortality pockets near Hoodoo Mountain on Coleville National Forest, Washington, 2022.



# Mortality Trends from ADS



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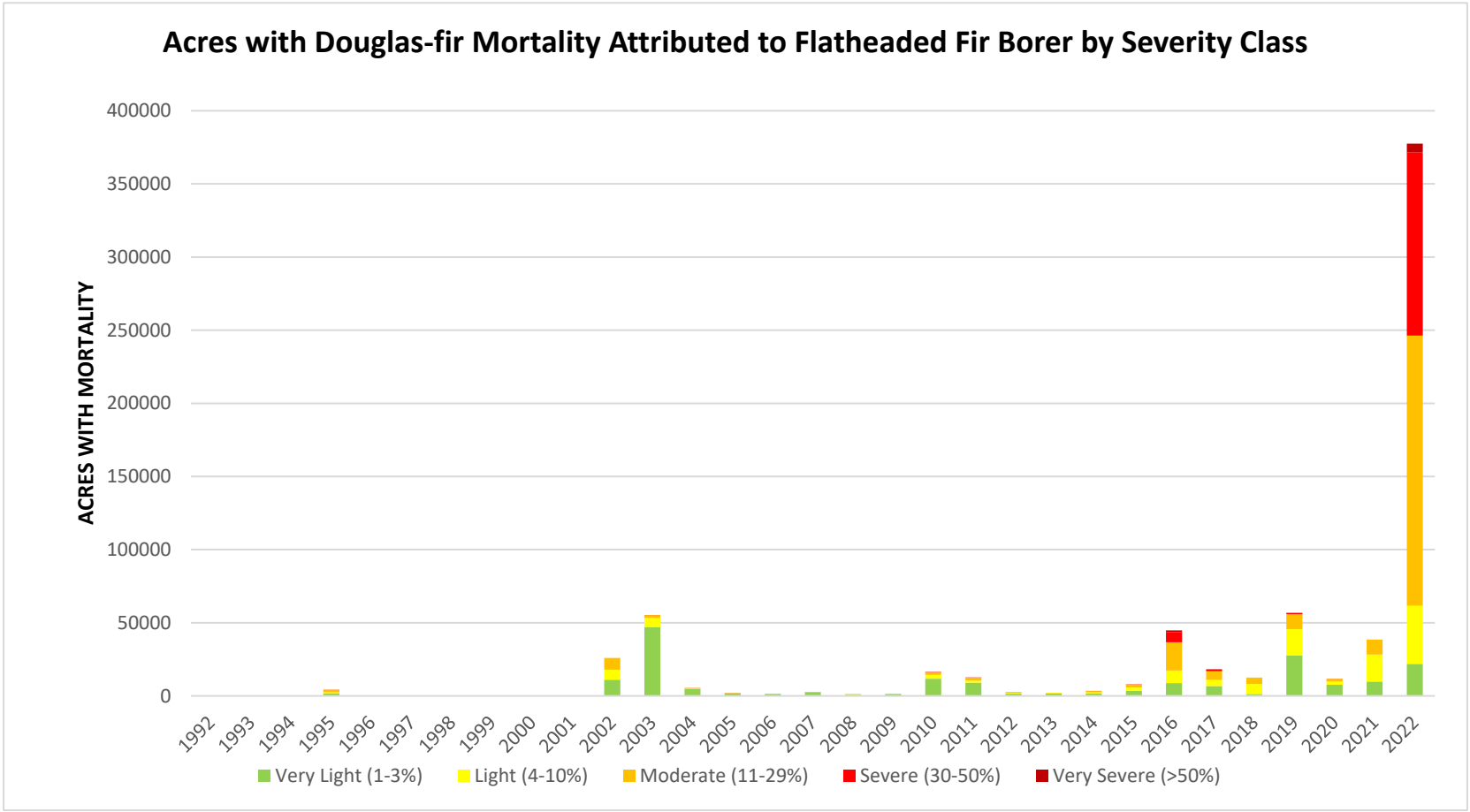
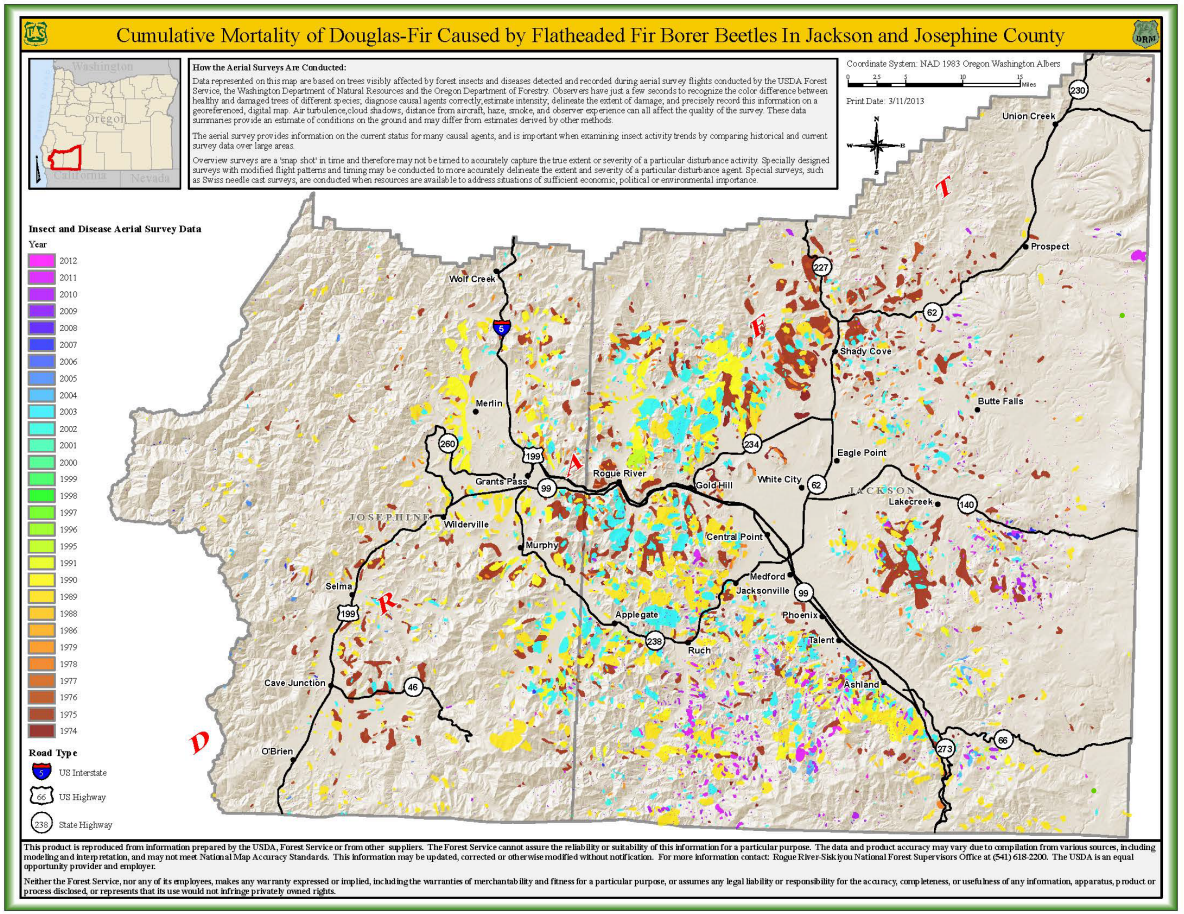
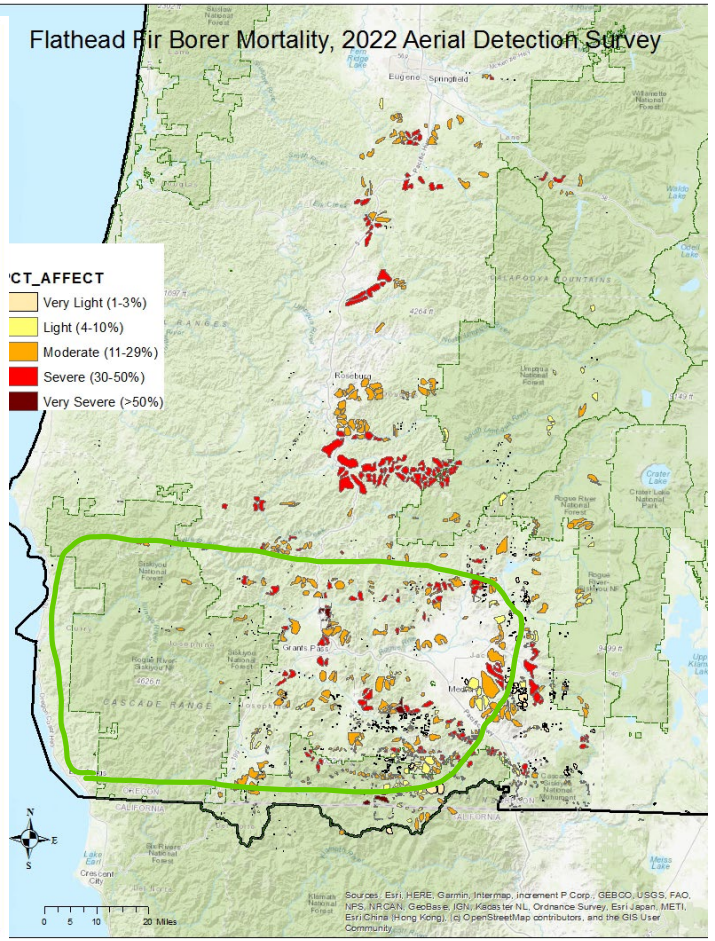


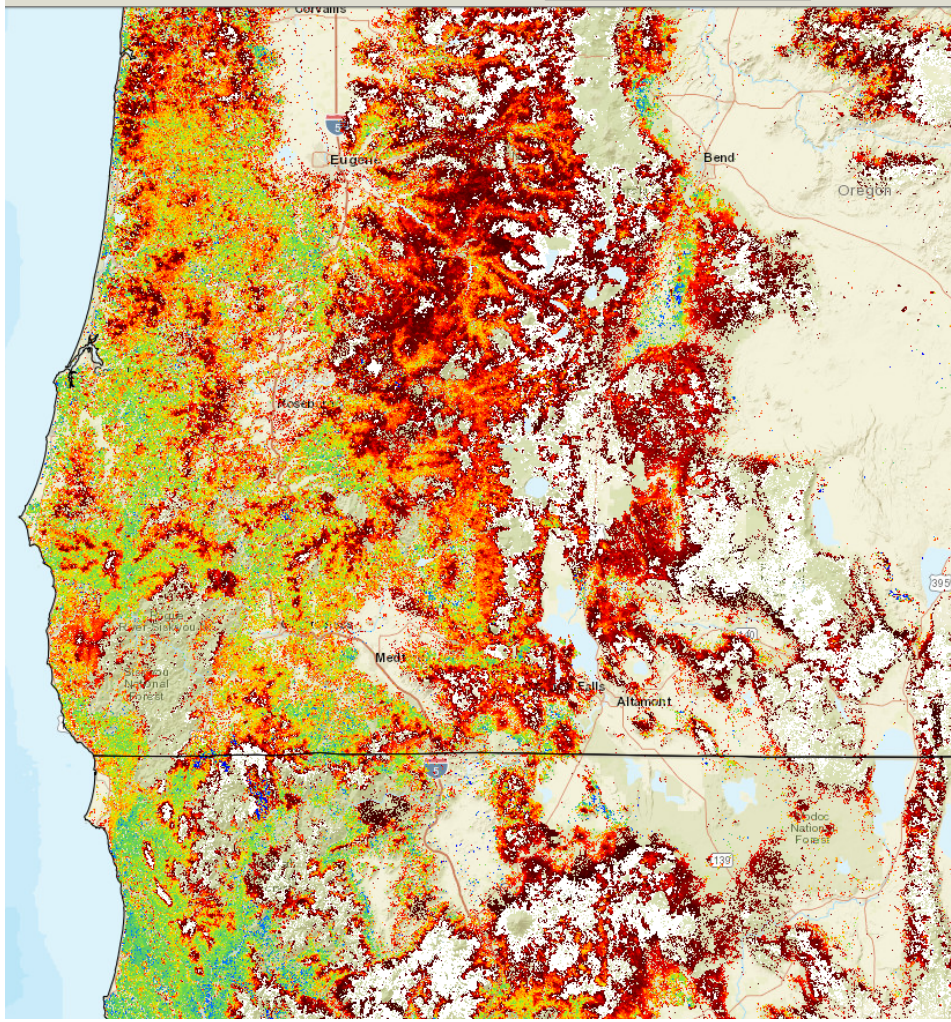
# Expansion of DF Decline



# Digging Deeper for Trends

- Spatial patterns of mortality and explanatory factors
  -Bennett, Shaw, Lowrey 2023 (Journal of Western Forestry)
- Evaluate increasing damage severity levels and agent trends across a range of DF-dominant forest types; validate stand and landscape hazard and risk ratings
- Use Remote Sensing (Sentinel, others) to demonstrate year-round mortality and advise damage assessments - planning
- Photo monitoring 50+ trees - ongoing




U.S. Forest Change Assessment Viewer
Seasonal Progress Current % Departure
Marc 22- April 14 (Muted Grass/Shrub)

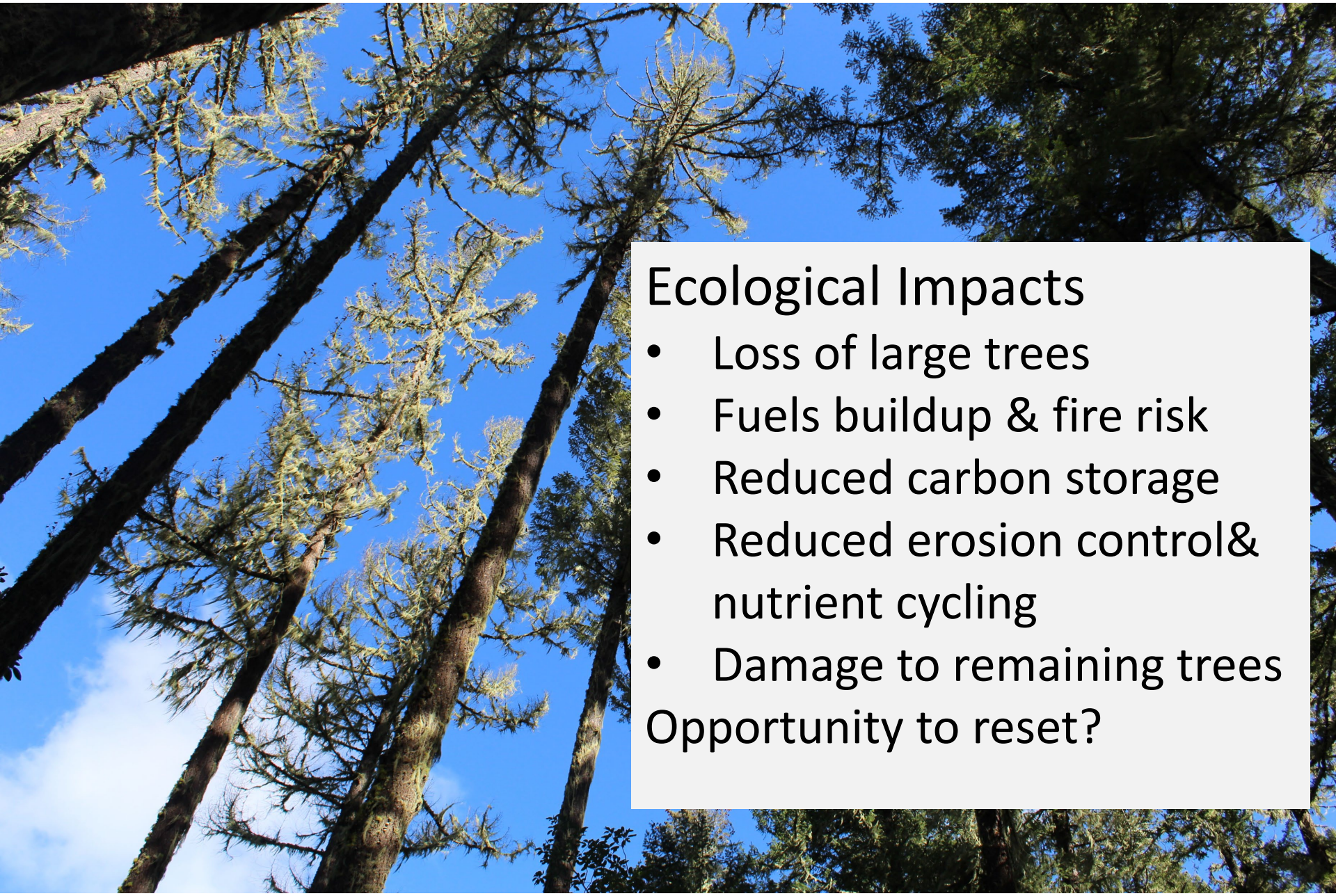
# DF DECLINE PHOTO MONITORING of 50+ Trees, 5 SWOR Sites

OBJECTIVES:

1. Marking guideline development for trees eminently dead (within 1-3 years) because of Cavitation, FFB and associated agents;
2. Individual Tree Hazard-Risk Rating Development;
3. Crown Signature Development

# DF Decline Trend Knowledge Gaps

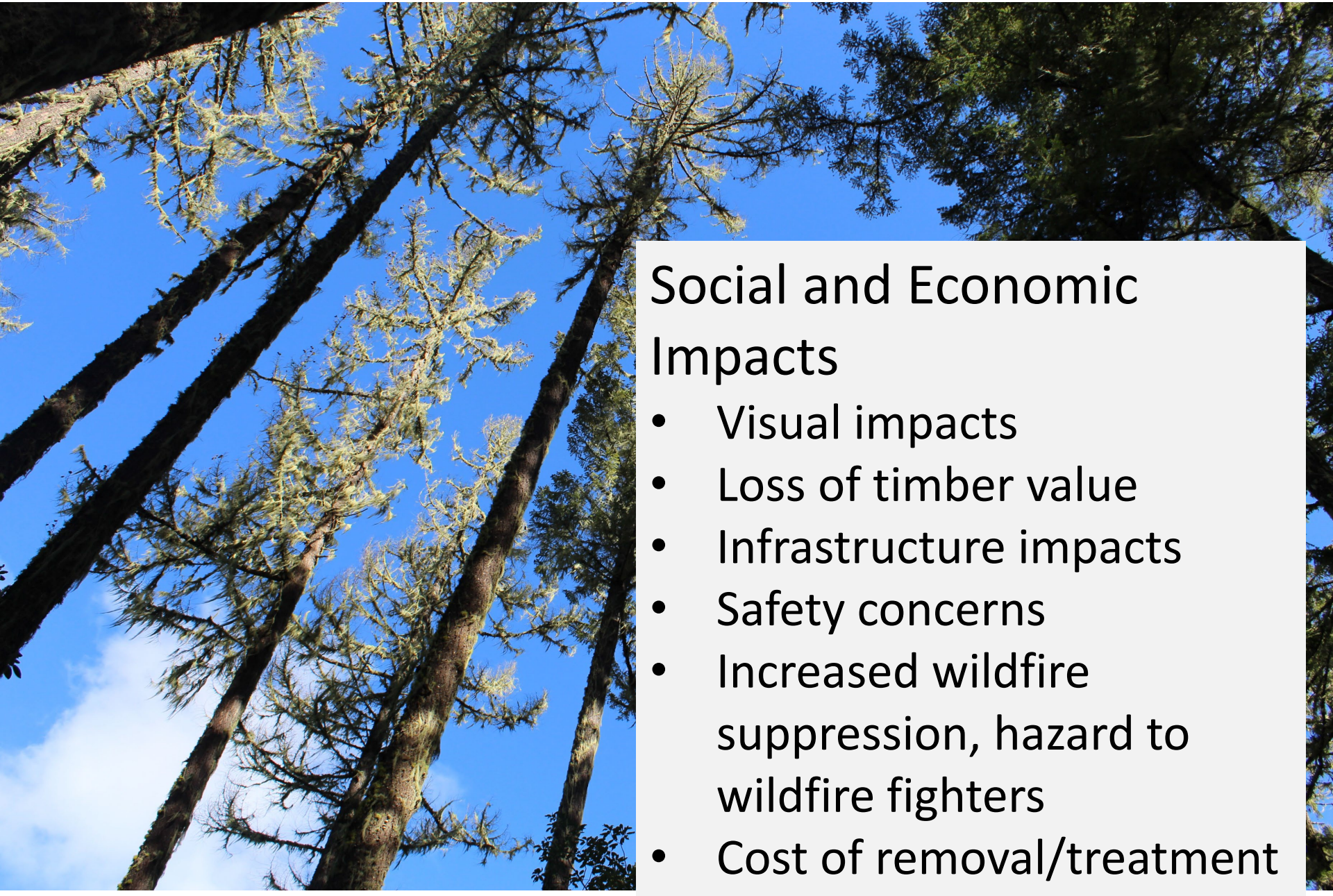
- Improve Mortality Estimations to address landscape-level yearlong mortality
  - -Remote Sensing project, or special ADS flights more than once a year
- Identify mechanism for inciting factors
  - -DF phenology timing differences –summer shutdown, wake-up
  - -Roles of cavitation, carbon starvation and hydraulic failure
  - -Role of contagion, where next
- Evaluate Interactions and shifts in DFB and FFB populations, why so little DFB and will that change with more frequent wildfire
- Learn more about increasingly important FFB population dynamics and biology
  - -FFB population dynamics, FFB phenology, and mechanisms of host selection behavior (such as host vigor indicators like scents and cavitation sounds)



## Ecological Impacts

- Loss of large trees
- Fuels buildup & fire risk
- Reduced carbon storage
- Reduced erosion control& nutrient cycling
- Damage to remaining trees

Opportunity to reset?



# Social and Economic Impacts

- Visual impacts
- Loss of timber value
- Infrastructure impacts
- Safety concerns
- Increased wildfire suppression, hazard to wildfire fighters
- Cost of removal/treatment