

Forest Pathogens in Oregon



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Root Diseases are the most important diseases in Oregon Forests

Laminated Root Rot

Annosum Root Disease

Port-Orford Cedar Root Disease

Armillaria Root Disease

Black Stain Root Disease

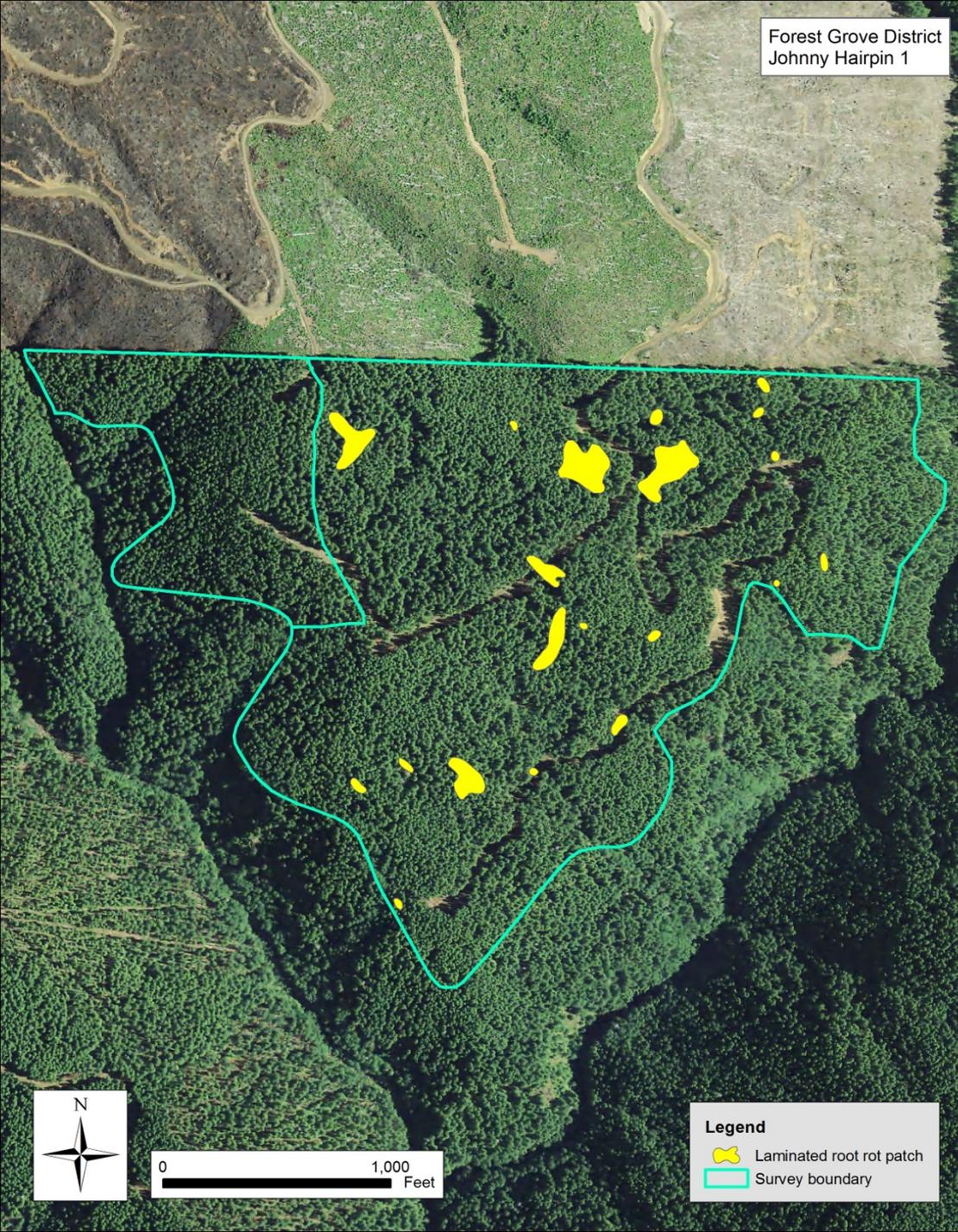


Laminated root rot patch, Forest Grove District



Root Disease Surveys

- Inexpensive (\$15 / acre, 2015)
- Not difficult
- Conduct early in planning phase
- Best time: stand age >30 years



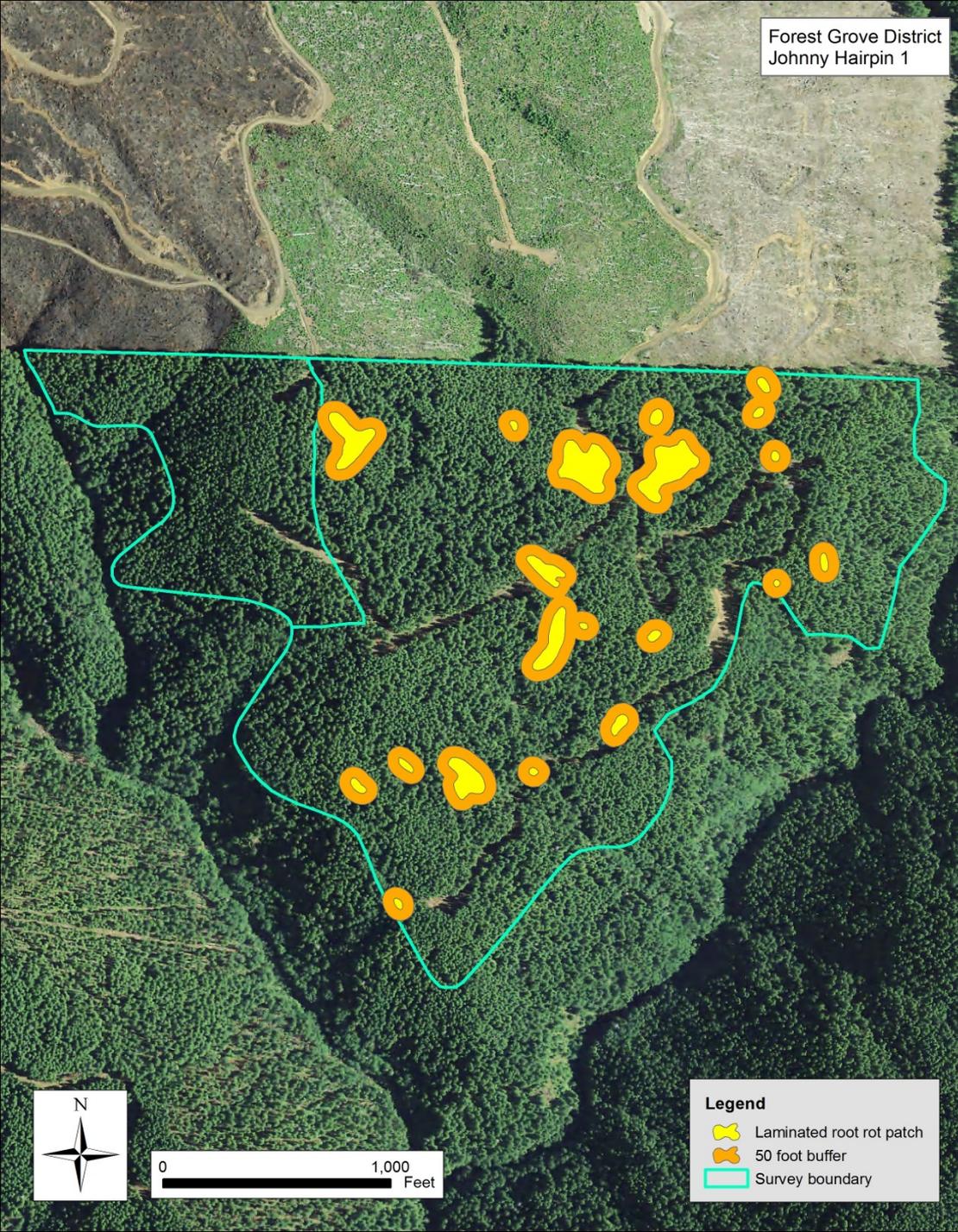
0 1,000 Feet

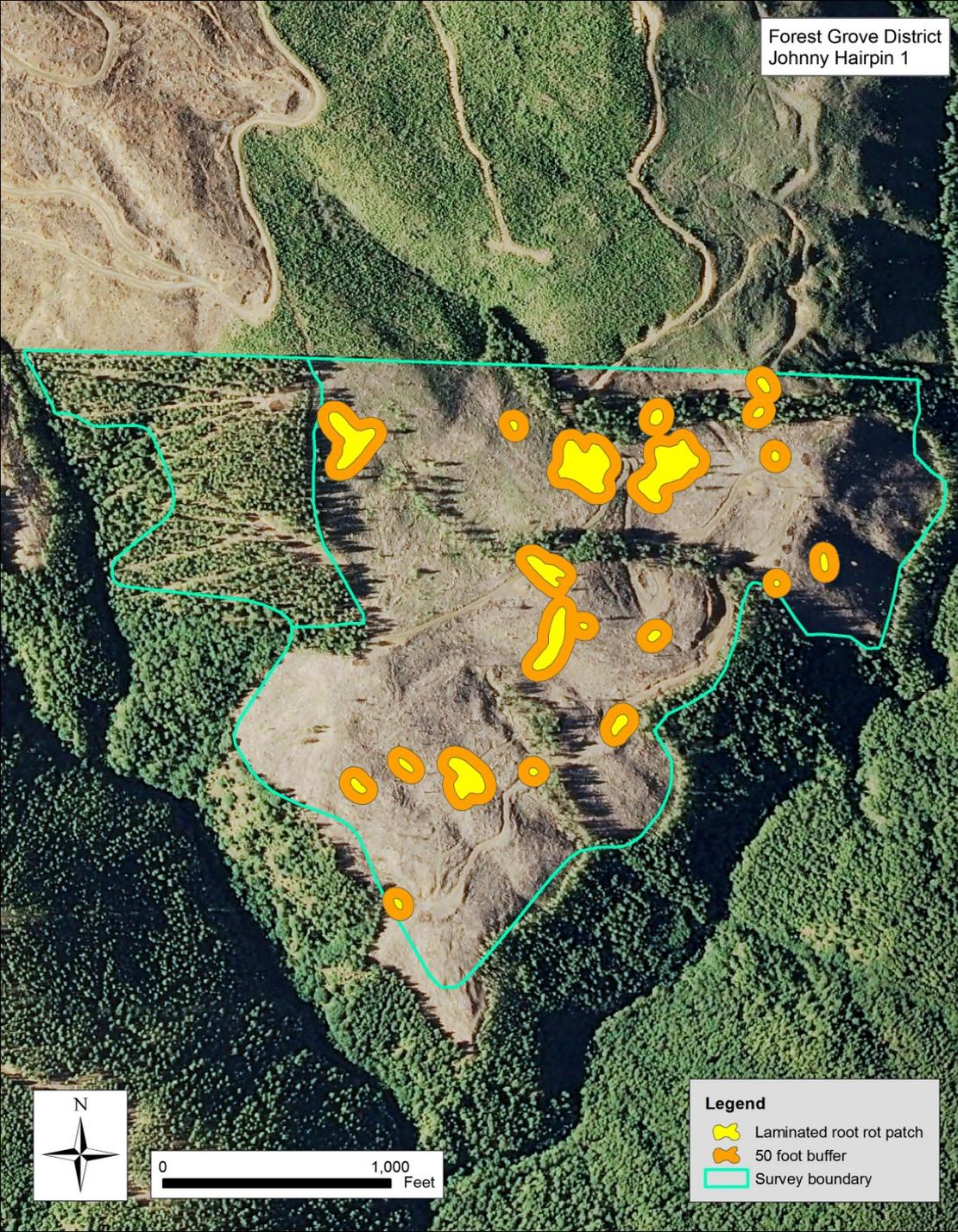
Legend

-  Laminated root rot patch
-  Survey boundary

Root Disease Surveys

- Inform decisions about:
 - Harvesting
 - Regeneration
 - Wildlife habitat (down wood, snags, gaps)
- Long-term monitoring of management outcomes

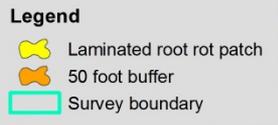




They also provide locations for post-harvest planting of resistant tree species (cedar, alder, white pine, hemlock).

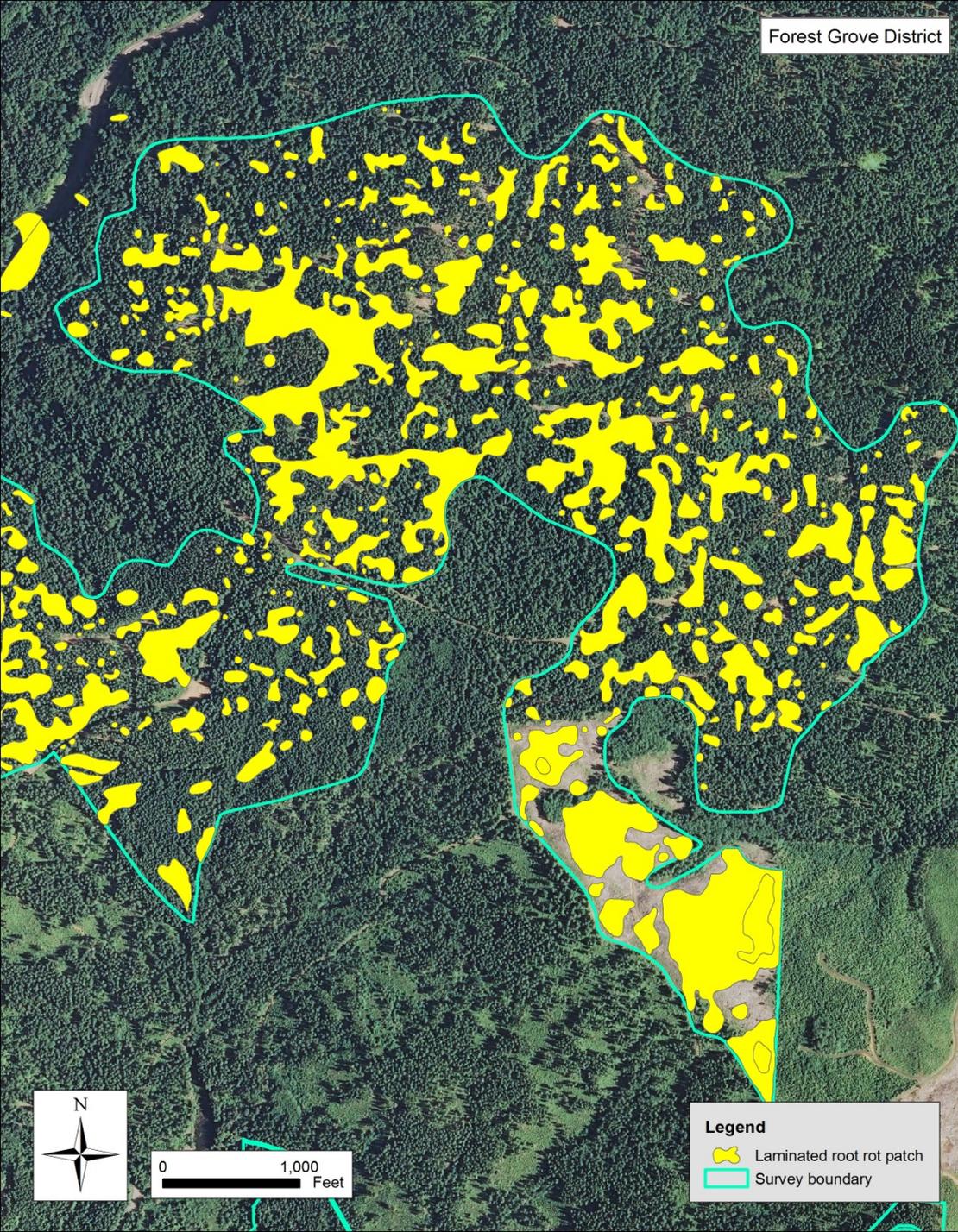


Western white pine in laminated root rot patch, Forest Grove District



Root Disease Surveys

May prevent poor management decisions



Black Stain Root Disease

- Vascular wilt disease, much like Dutch Elm Disease
- Spread by root feeding insects and root to root contact
- Most damaging in 10-25 year-old Douglas-fir plantations in western Oregon, also affects Ponderosa pine in eastern Oregon.
- Most severe on disturbed sites and following pre-commercial thinning.
- Recently observed in very young plantations



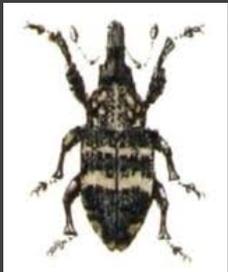
Black Stain Root Disease Management

Manage the insect vectors



- Evaluate disease risk (disease in area)
- Complete pre-commercial thinning in June - August
- One large PCT operation better than several small ones
- Minimize soil disturbance and injury to residual trees during operations (attracts beetles)
- Favor species other than Doug-fir in “stress” situations (roadsides, landings, etc.)

Black stain, Roseburg area, 2015 (Hansen and Leboldus)



Root Feeding Weevils



Stump and Root Bark Beetle

Insights into the epidemiology and dispersal capabilities
of *Leptographium wageneri* var. *pseudotsugae* within
and between young Douglas-fir stands
Patrick Bennett and Jared LeBoldus



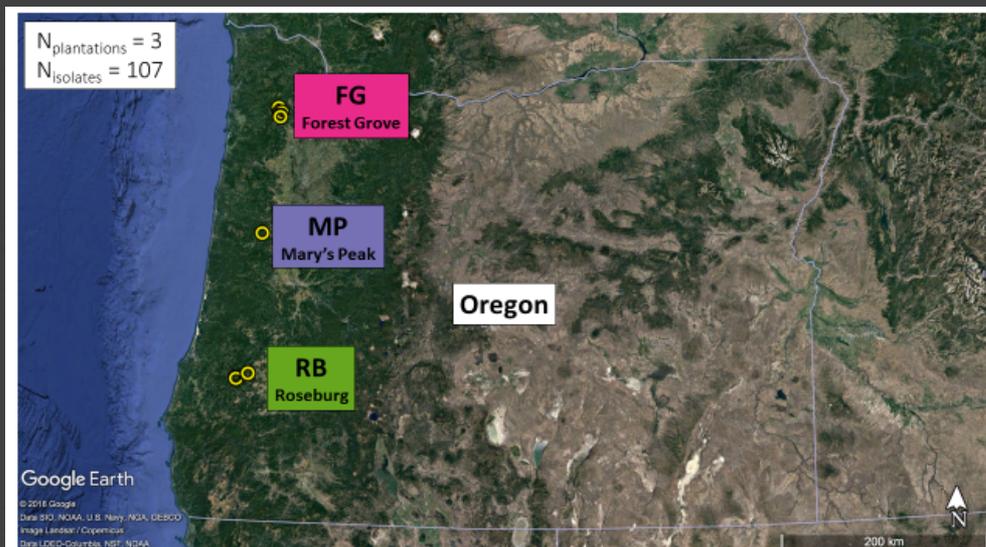
Objectives

- Apply the principles of population genomics to better understand the epidemiology of BSRD
- Provide knowledge that will aid the development of effective management strategies for BSRD

Methods

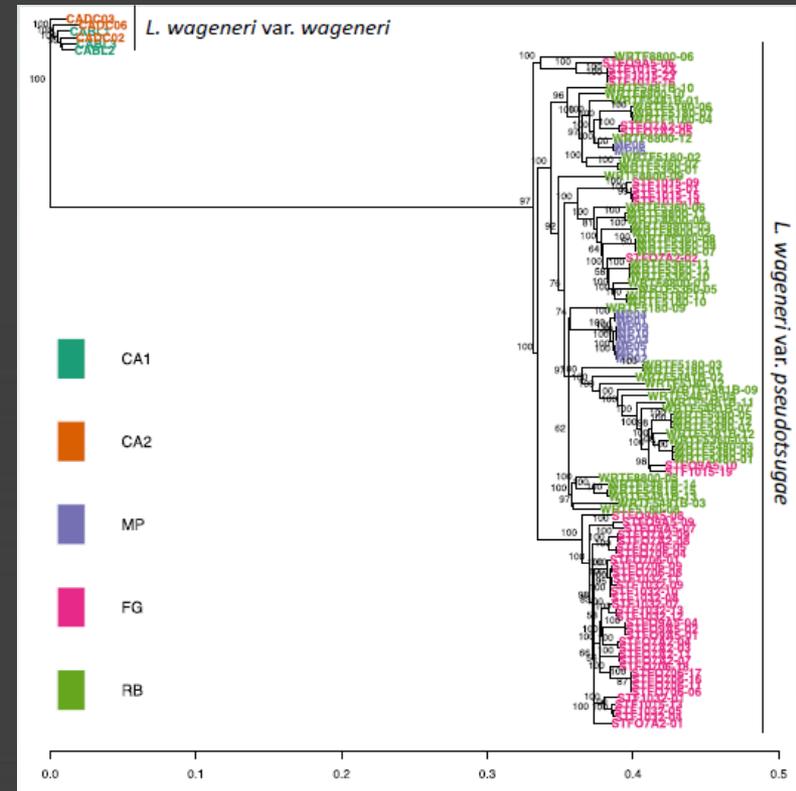
Survey conducted in Oregon in 2016 (N = 20 stands)

- 4–7-year-old stands randomly selected from western Oregon plantations
- BSRD was present killing trees in 76% of surveyed stands.
- *This indicates a change in the impact of this disease, and suggests that BSRD is an emerging threat to young Douglas-fir forests.*



Conclusions

- **Genetic differentiation between plantations suggest gene flow or common source**
 - Dispersal by insects over this distance is **unlikely**, but may be “stepping-stone”
 - Human-mediated movement of infected plants, soil, equipment?
 - BSRD (or vectors) present in nursery stock?
- **Infected stands consist of several distinct genotypes, often distantly related**
 - BSRD within a stand is not solely the result of a single infection and subsequent vegetative spread
 - Stands consist of multiple independent infections
- ***Long distance dispersal is important for spreading BSRD and structuring L. wagneri populations***



Foliage Diseases



Bynum's blight, Ponderosa pine, west slope Cascades

Web Blight and Phytophthora needle cast



Jim Hall photo



Wyatt Williams 14 May 2014

SNC discoloration is detected and mapped annually by a cooperative aerial survey;
OSU Swiss Needle Cast Cooperative, USDA Forest Service, ODF

Diplodia (Sphaeropsis) Tip Blight of Ponderosa Pine



Localized outbreaks, NE Oregon and SW Oregon

Drought stress increases damage

Management: thinning, tree selection, patience (trees do recover)



Sudden Oak Death

Slowing the spread in Oregon Forests, 2001-2019

Oregon Department of Forestry

(Sarah Navarro, Randy Weise, Casara Nichols, Danny Norlander, Alan Kanaskie)

USDA Forest Service

(Ellen Goheen, Charlie Grell, Blakey Lockman)

Oregon State University

(Everett Hansen, Wendy Sutton, Paul Reeser, Jared LeBoldus, Kelsey Sondreli, Nik Grunwald)

Oregon Department of Agriculture

(Elizabeth Savory, Helmuth Rogg)

USDI Bureau of Land Management

(James Kirkpatrick, George McFadden)

North Carolina State University

(Devon Gaydos, Ross Meentemeyer, Chris Jones, Anna Petrasova, Vaclav Petras, Garrett Millar)

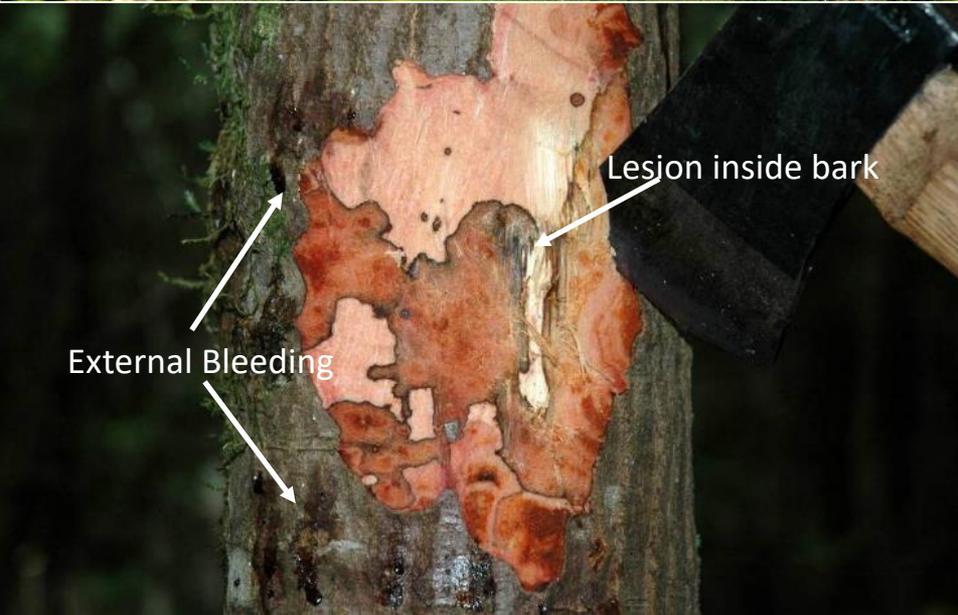
Landowners of Curry County

SOD in Oregon

- *Phytophthora ramorum* (non-native)
- Tanoak is the key host species
- Many hosts infected (and regulated)
- Requires mild/moist environments
- Survives in a variety of substrates – plant debris, soil, water
- Reproduces by spores
- Origin unknown
- Many pathways for dispersal
- Aerial spread



Curry County, 2014. Tanoak mortality



External Bleeding

Lesion inside bark



Rhododendron



Douglas-fir



Grand fir

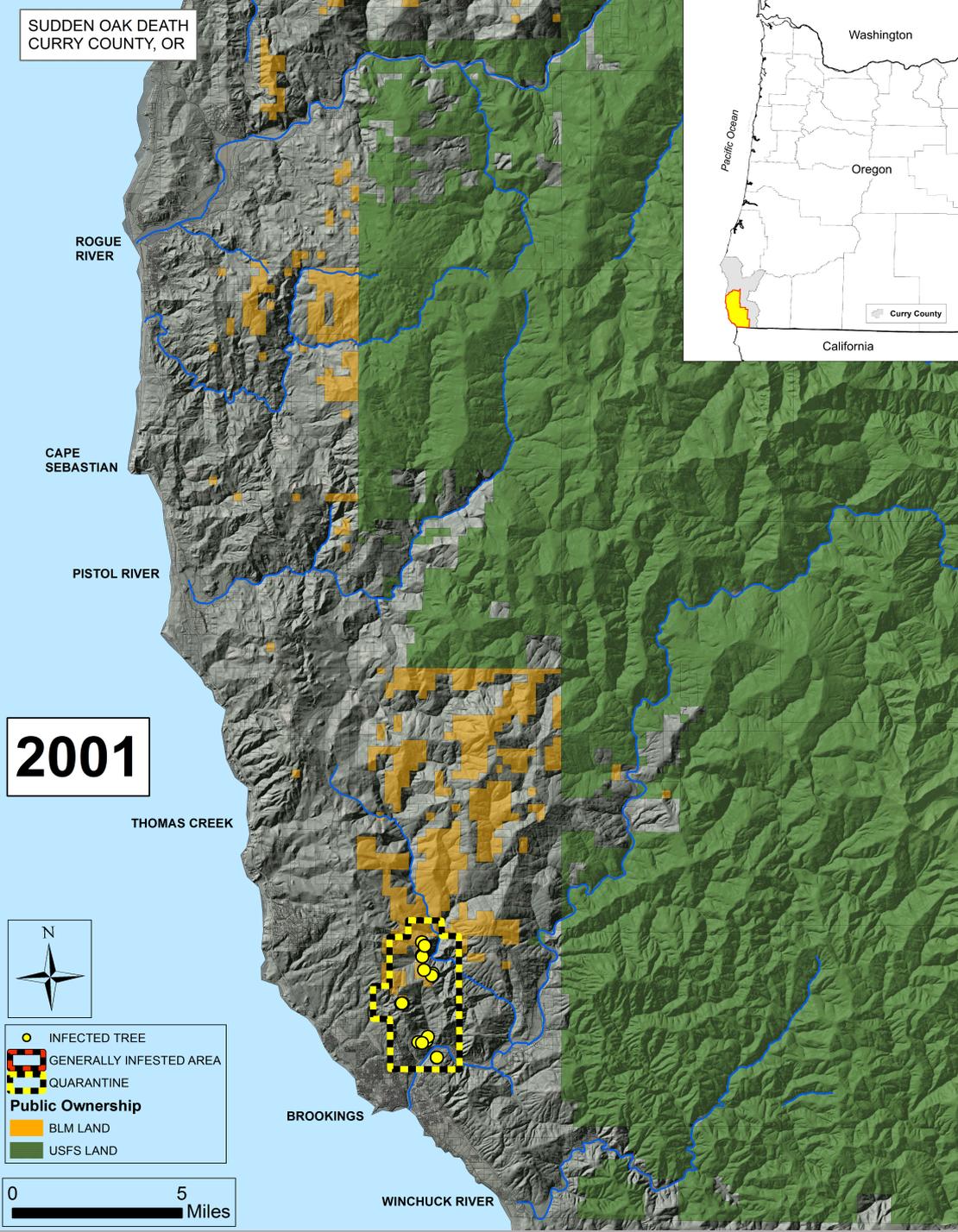


Oregon myrtle

Sudden Oak Death Program in Oregon Forests



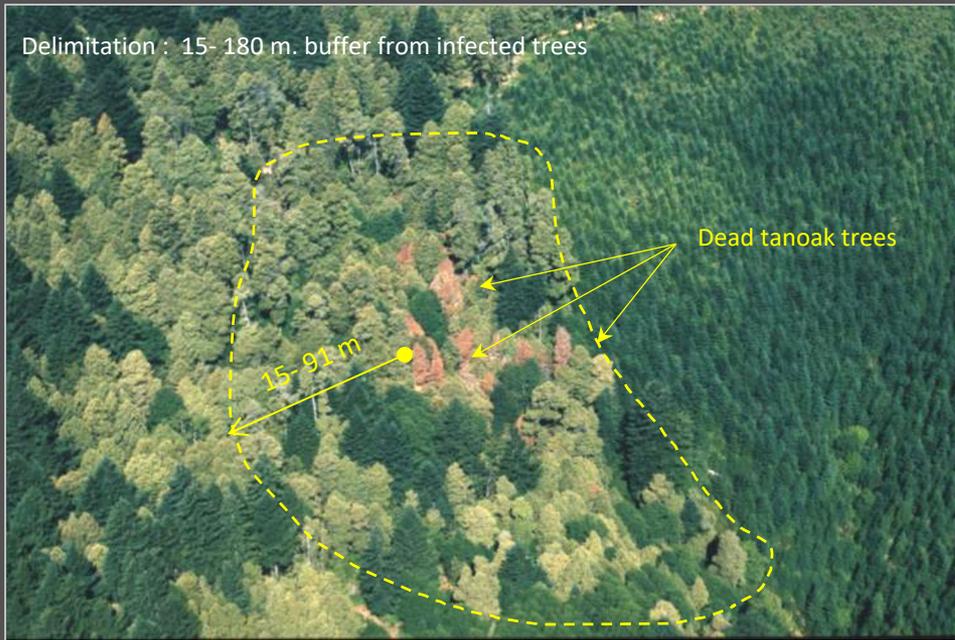
1. Survey and detection
2. Delimitation of infected sites
3. Treatment of infected sites
4. Regulation / education
5. Monitoring / research



SOD in Oregon

- **State Quarantine (ORS 603-052-1230)**
 - Managed under the regulatory authority of the Oregon Dept. of Agriculture
 - Requires private and state landowners to treat SOD on their property
 - ODF pays for treatments when required under the Quarantine
- **Federal Agencies, USFS and BLM, conduct SOD treatments on their ownership**
- Started as an eradication program in 2001
- Shifted to the current slow-the-spread program in 2010
 - Generally Infested Area (GIA) was established in 2012

Delimitation : 15- 180 m. buffer from infected trees



Disease Treatment

1. Cut and burn tanoak, rhododendron, huckleberry, sometimes myrtle.
2. Larger treatment areas (300-600 ft buffer) most effective
3. Costs : \$cost is \$5,000-8,000/acre
4. No cost to private landowners where treatment is required by quarantine rule, but no compensation for loss.
5. To date approx. 7,300 acres have been treated in Oregon



2012



0 300 600 Feet



2016



0 300 600 Feet



2019



0 300 600 Feet



17 JANUARY 2020

SUDDEN OAK DEATH 2019-2020

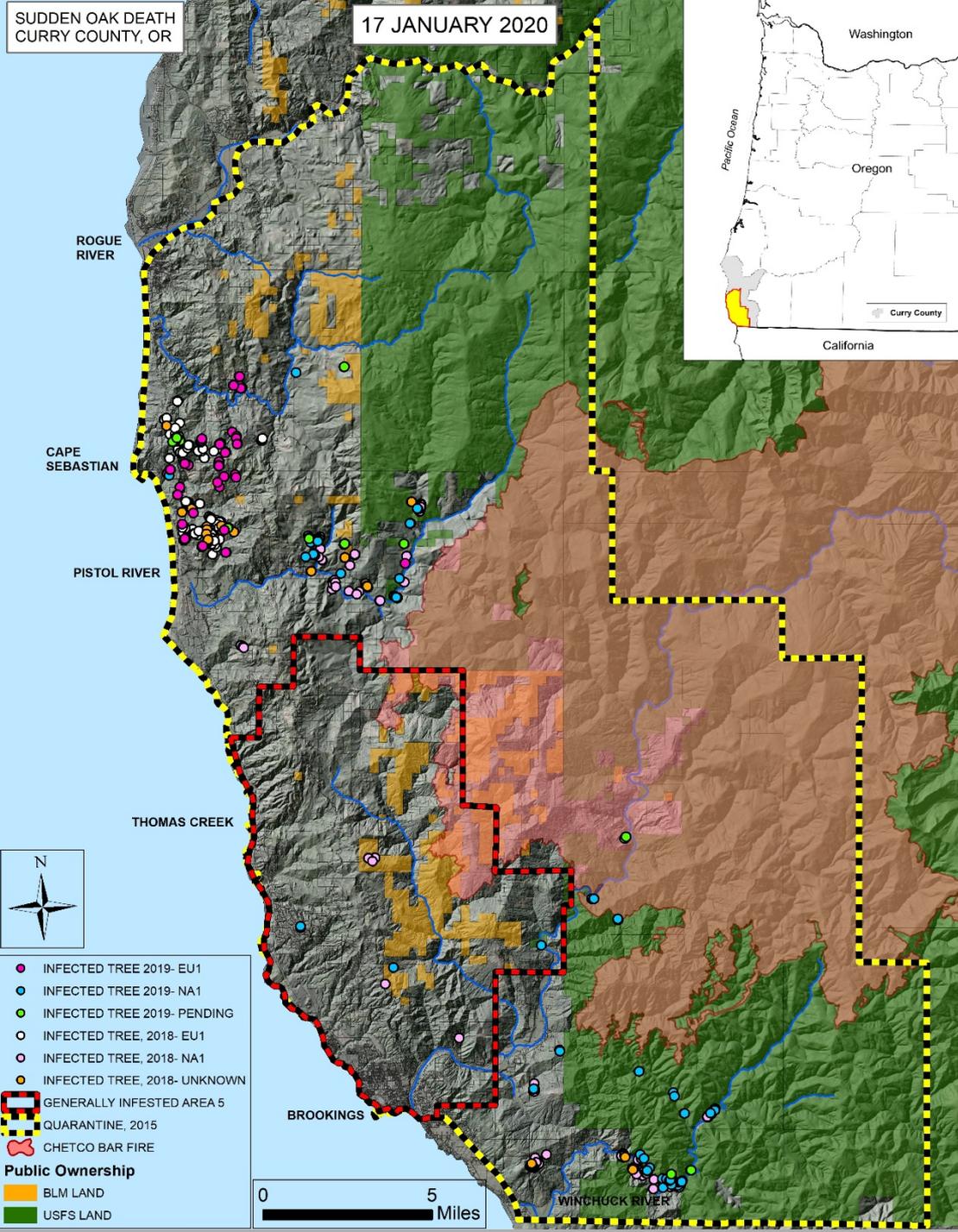
2019: 49 new sites outside the GIA.

Treated Acreage:

- ODF: 306 acres
- BLM: 249 acres
- USFS: 128 acres

2020 Outlook:

- BLM plans to finish two 40 acre parcels in the Meyers Creek/ Pistol River and other areas that come up
- USFS has 94 -150 acres under consideration for treatment
- ODF currently has 420 acres of SOD treatments in progress



Sudden Oak Death in Oregon Forests

Total Program Costs: 2001-Present *by Currency*

4,000,000

3,000,000

2,000,000

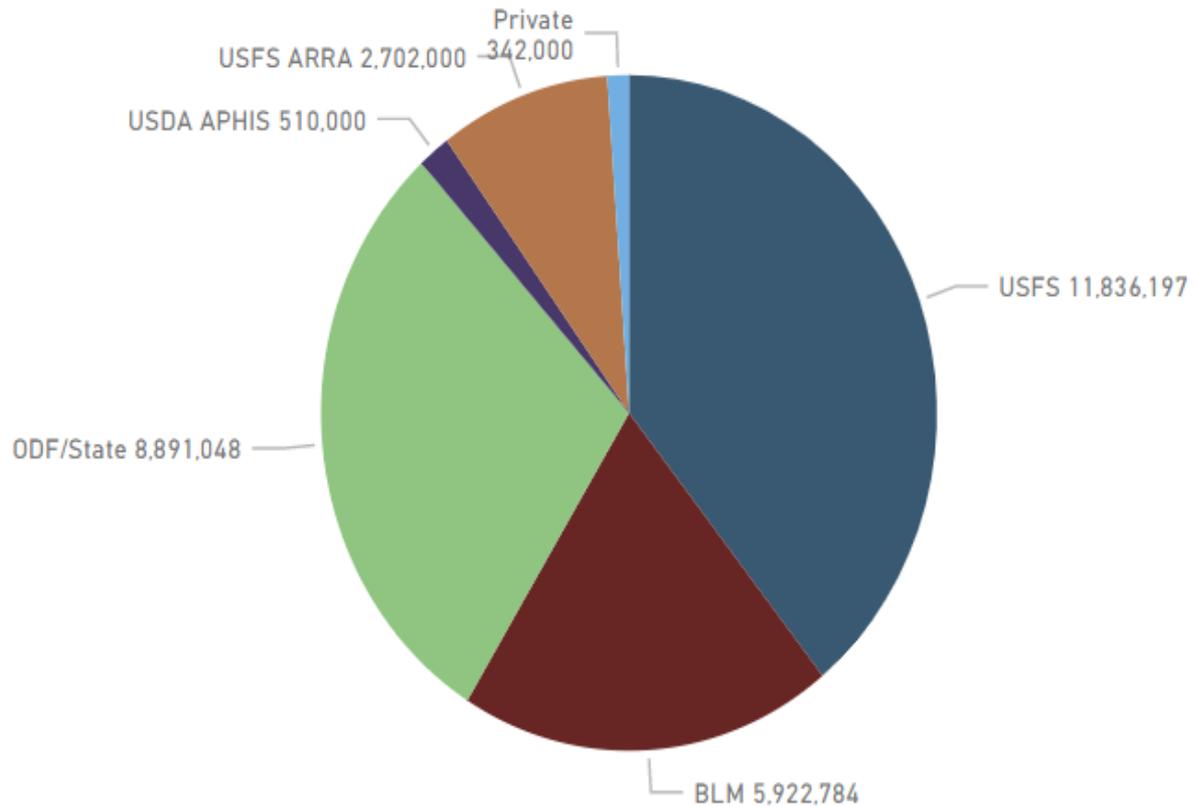
1,000,000

0

2001 20

SOD Program Costs 2001-Present (with ARRA)

Detection, monitoring, eradication, administration



Oregon SOD Task Force

- Established 2016 through a block grant to the Association of Oregon Counties
- Originally co-convened by US Senator Jeff Merkley and State Rep. David Brock Smith
- Subcommittees were formed to address different issues of SOD
- A strategic plan was adopted in May 2017
 - Includes subcommittee recommendations
 - Funding requests and recommendations

SOD Task Force Subcommittees

Funding

Communication
and Civic
Engagement

Core Science
Team

Economic Impact
and Workforce
Development

All Lands

Adaptation

Sudden Oak Death Economic Impact Assessment

- The assessment examined timber-based economic impacts:
 - Since the discovery of SOD in 2001 up until 2018
 - Potential future economic impacts from 2019 through 2038, for the four-county region of Coos, Curry, Douglas, and Josephine County.
 - Under three scenarios:
 - Halting current treatment regime
 - Current service level
 - Focused EU1
- The assessment also examined non-timber impacts, many of which are hard to quantify in economic value.
 - These included:
 - Property values
 - Ecosystem Services
 - Cultural values
 - Wildfire risk

Sudden Oak Death Economic Impact Assessment

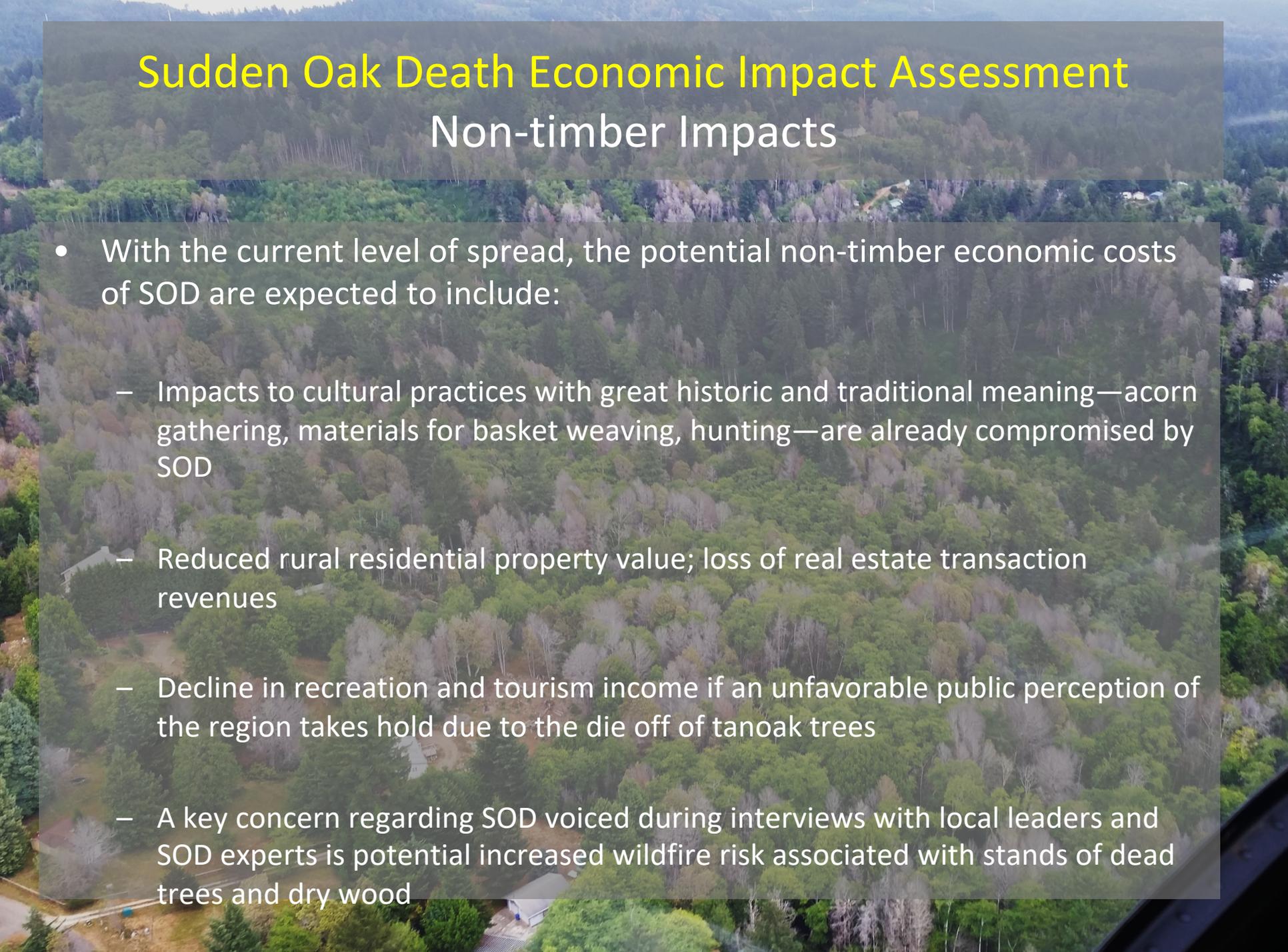
Timber Impacts

- Current Impacts
 - No detectable job and wage losses from 2001-2018

Funding SOD treatments for a total cost of \$30 million over the next 20 years could offset loss of 1,200 jobs by 2028 and \$580 million in wages over the course of 10 years.

In the Oregon SOD treatment regime were terminated as of January 1, 2019, impacts might occur as SOD expands to Coos County, which could happen as soon as 2028 (could be offset to 2038):

- Sanctions on southwest Oregon timber exports by China, Japan, and/or Korea
- Loss of 1,200 jobs related to timber export; \$57.9 million in annual wages
- Reduction of timber harvest by 15%
- Decline of rural residential property value

An aerial photograph of a forest landscape. The forest is a mix of green and brownish-grey trees, indicating a mix of healthy and dead trees. The terrain is hilly, and there are some buildings and roads visible in the lower part of the image. The text is overlaid on a semi-transparent dark grey box.

Sudden Oak Death Economic Impact Assessment

Non-timber Impacts

- With the current level of spread, the potential non-timber economic costs of SOD are expected to include:
 - Impacts to cultural practices with great historic and traditional meaning—acorn gathering, materials for basket weaving, hunting—are already compromised by SOD
 - Reduced rural residential property value; loss of real estate transaction revenues
 - Decline in recreation and tourism income if an unfavorable public perception of the region takes hold due to the die off of tanoak trees
 - A key concern regarding SOD voiced during interviews with local leaders and SOD experts is potential increased wildfire risk associated with stands of dead trees and dry wood

SUDDEN OAK DEATH RISK IN SOUTHWESTERN OREGON

Looking into the Future...

- Continue to slow the spread of SOD in Oregon
- Greater focus on ensuring tanoak conservation, including researching resistance to the pathogen
- A deeper dialogue on transitioning to living with the disease that is SOD
- Establishing a long-term approach to identifying and funding public safety, infrastructure and property damage concerns associated with SOD such as wildfire hazard and public roads

