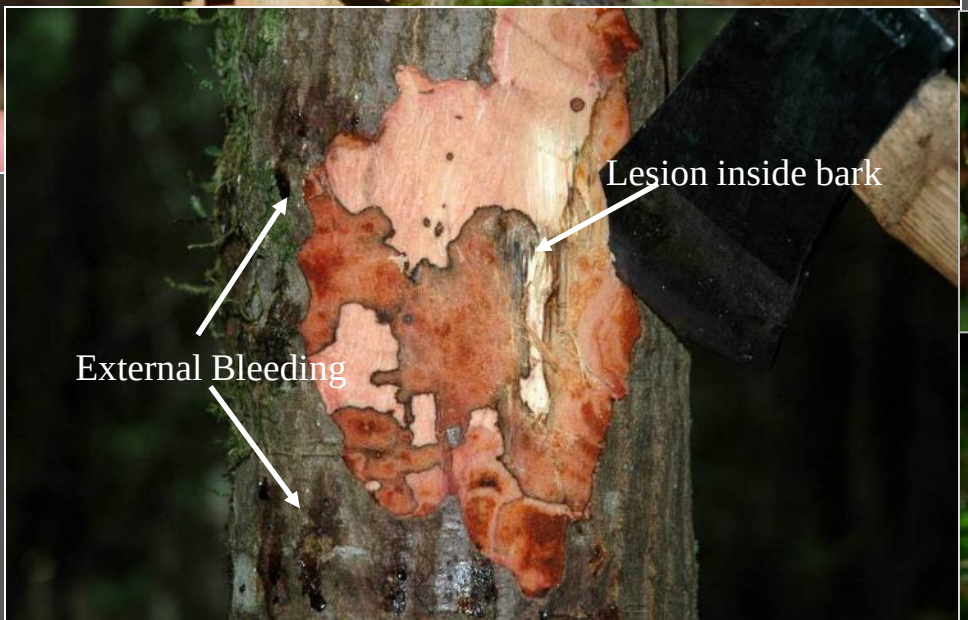
Oregon Department of Forestry
Oregon Department of Agriculture
Oregon State University

Sudden Oak Death in Oregon Forests

House Committee On Agriculture and Natural Resources
June 16, 2015

Background

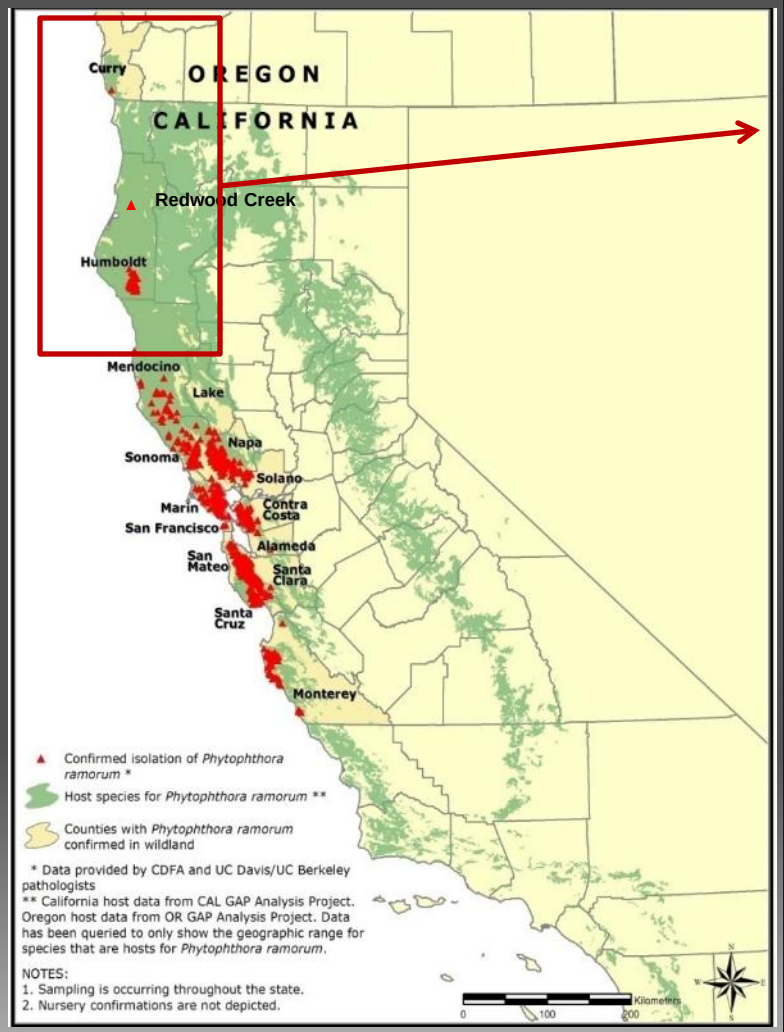
- *Phytophthora ramorum* (non-native)
- Tanoak is the key host species
- Many hosts infected (and regulated)
- Requires mild/moist environments
- Survives in a variety of substrates – plant debris, soil, water
- Reproduces by spores
- Origin unknown
- Many pathways for dispersal
- Aerial spread

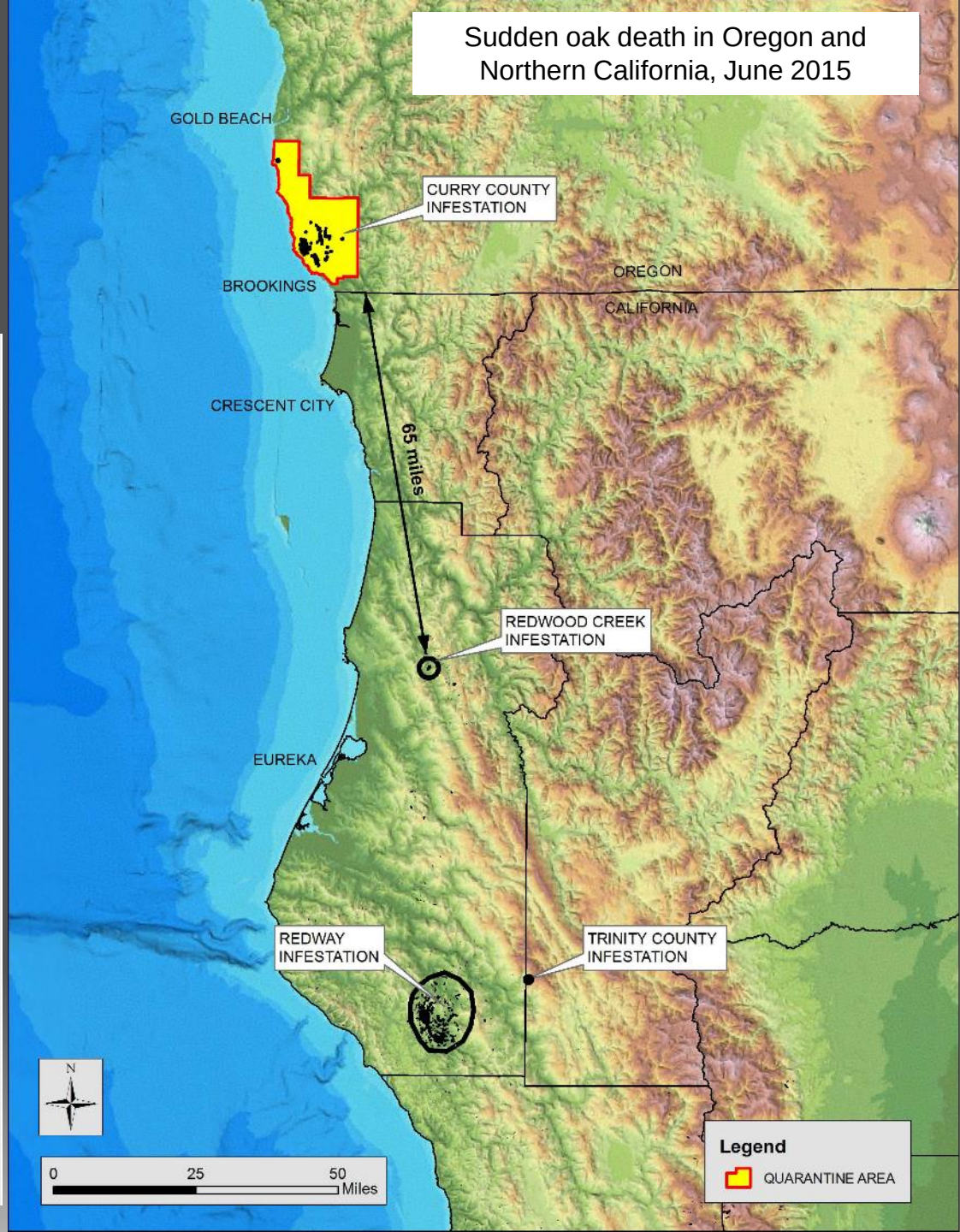


Curry County, 2014. Widespread mortality of tanoak

SOD Oregon and California

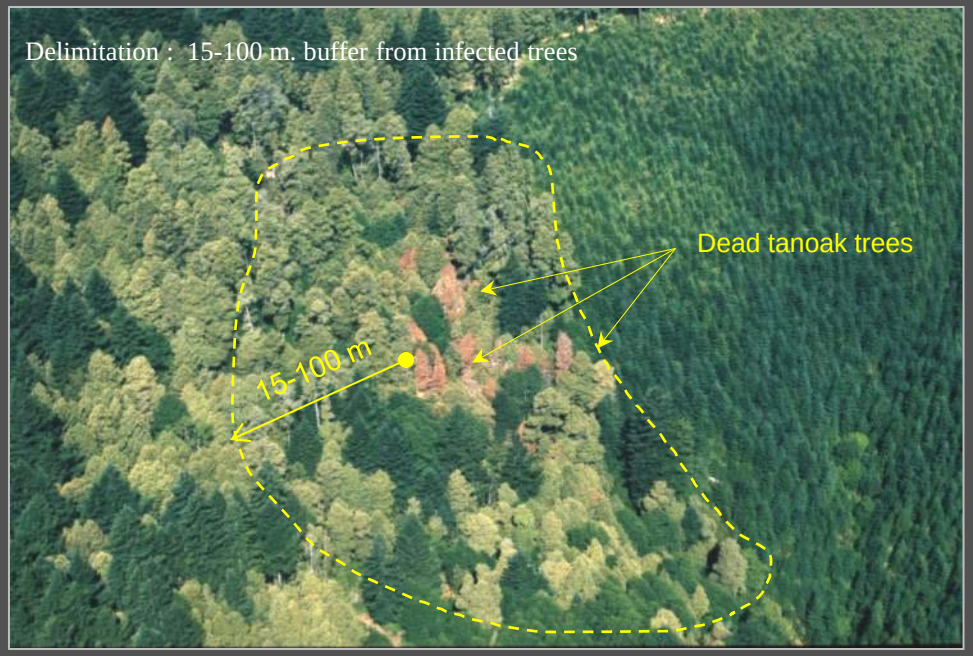
- Oregon: discovered 2001, present since 1998
- Second introduction – 2010
- Origin unknown / California





Sudden Oak Death Program in Oregon Forests

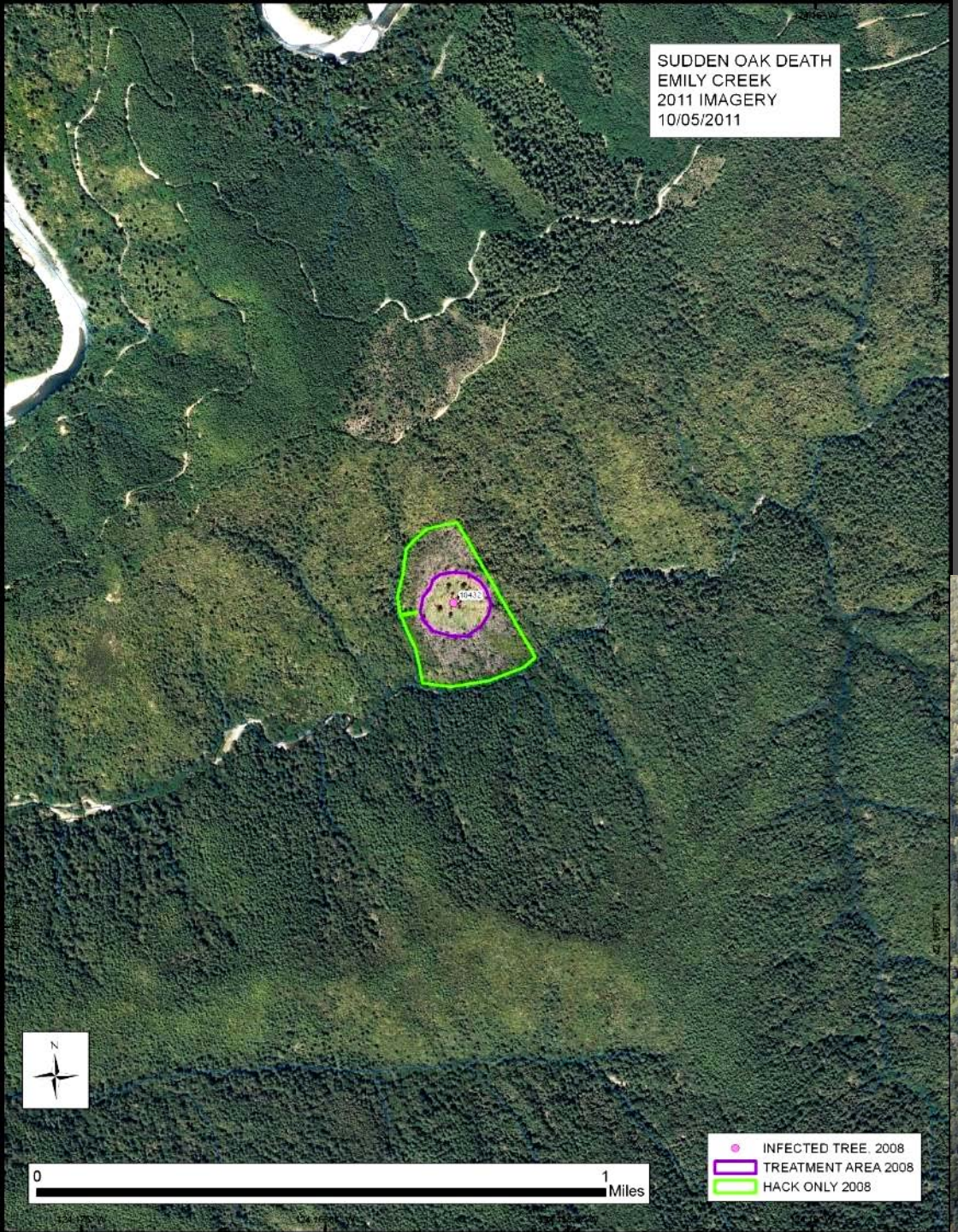
1. Survey and detection
2. Delimitation of infected sites
3. Treatment of infected sites
4. Regulation / education
5. Monitoring / research



Delimitation and Treatment

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

More than 6,000 acres have been treated

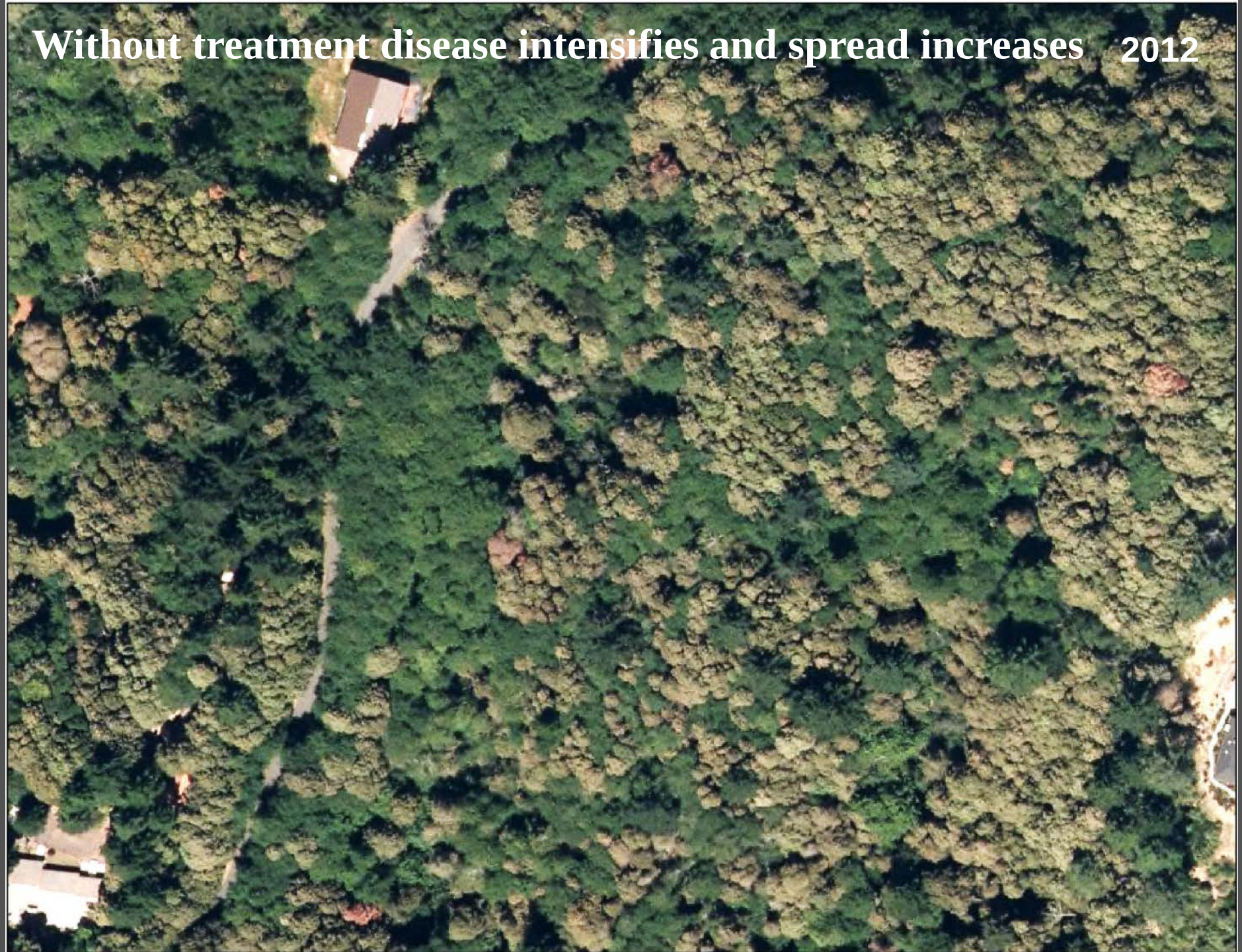


Eradication can be effective.

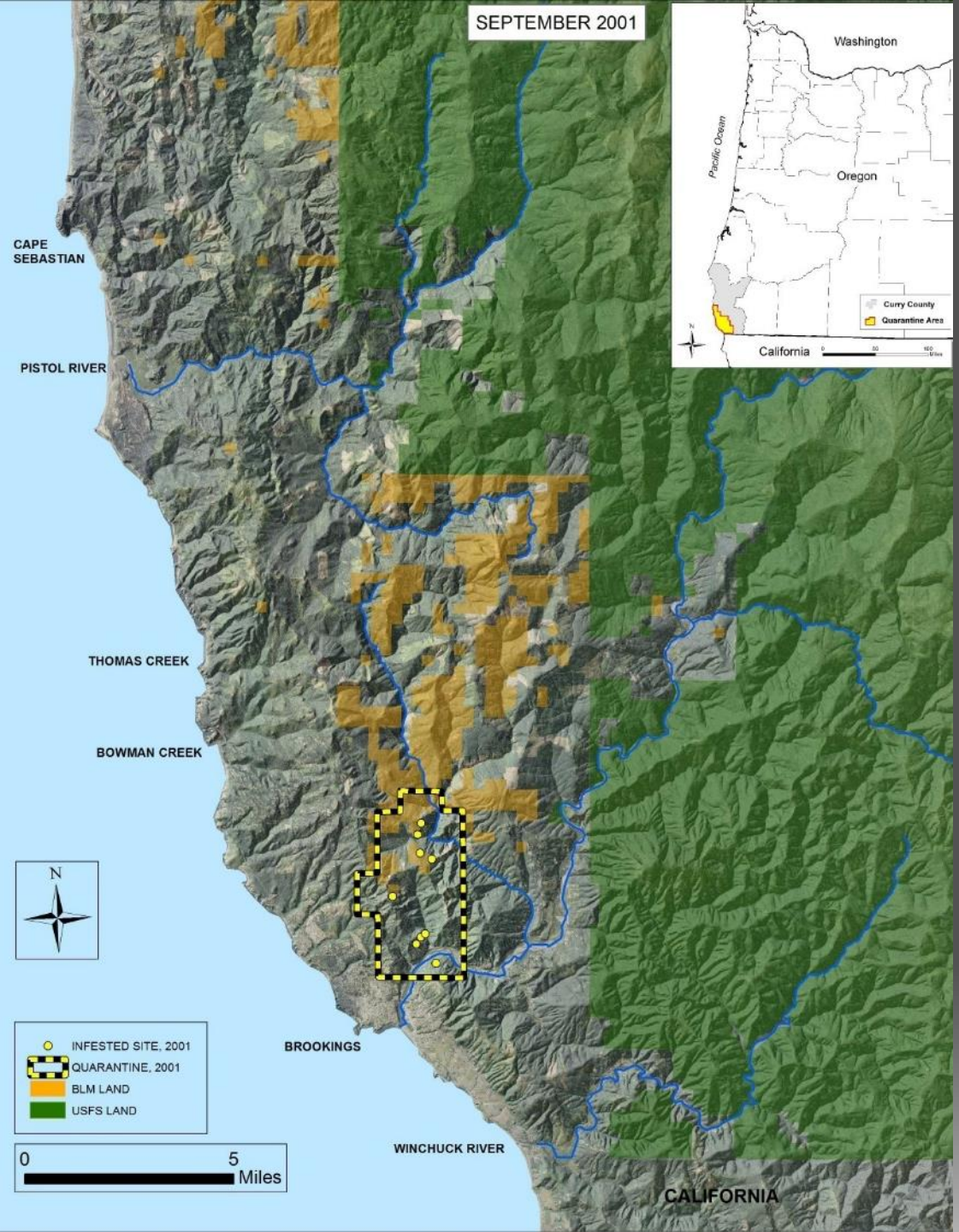
Infestations detected early and treated with wide buffers can eliminate disease and stop spread

Emily Creek site (USFS)

- Discovered and treated in 2008
- Total treatment area = 27 acres
- No disease on site or nearby after 6 yrs


Without treatment disease intensifies and spread increases
2012


50 percent mortality in 2 years
2014



SUDDEN OAK DEATH
September, 2001

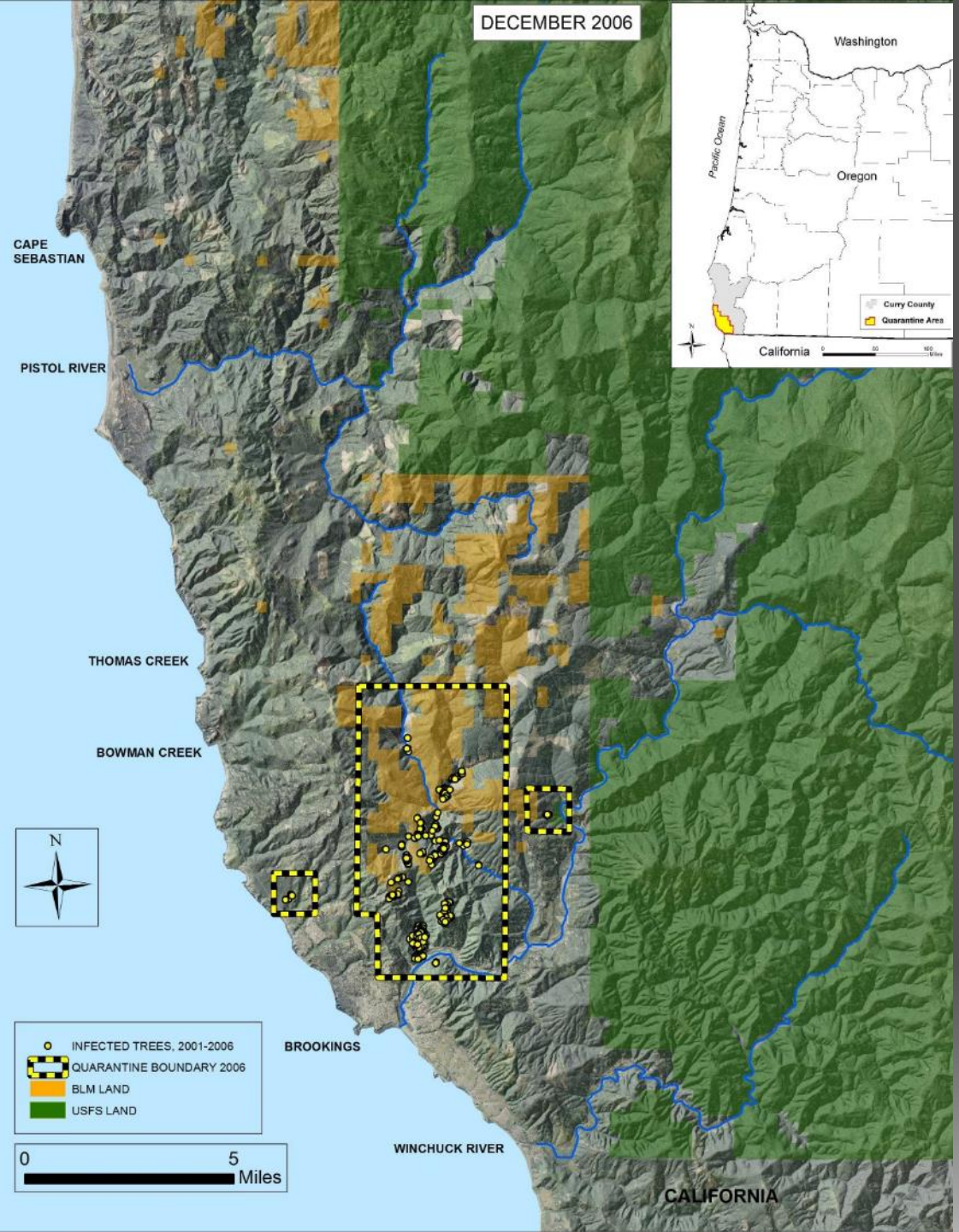
Nine infested sites

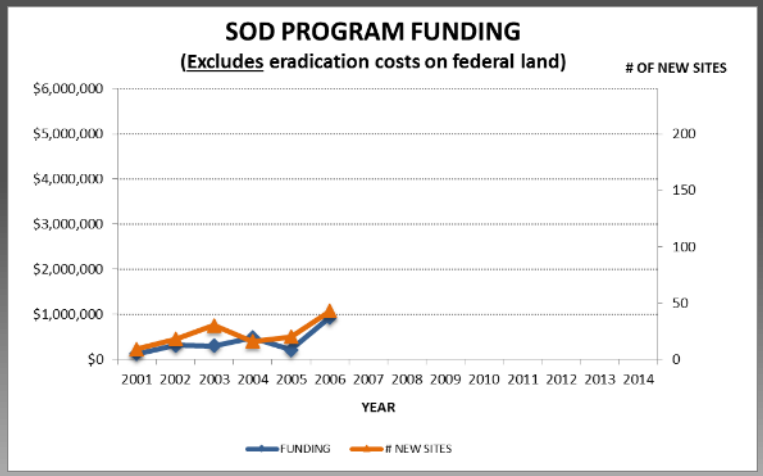
Quarantine area = 9 square miles.

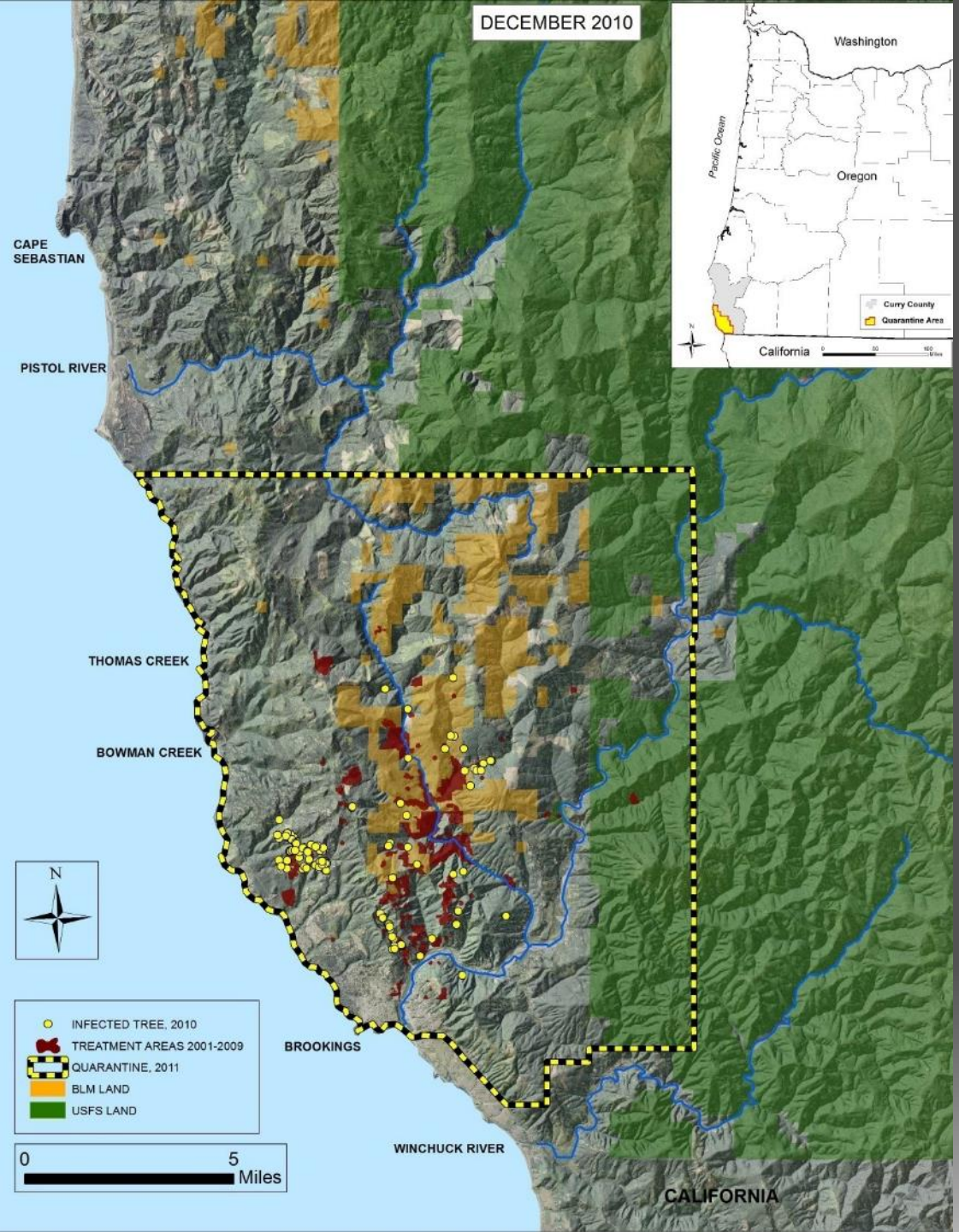
SUDDEN OAK DEATH
December, 2006

Quarantine area = 25 square miles.

Eradication efforts slowed spread but did not stop it.







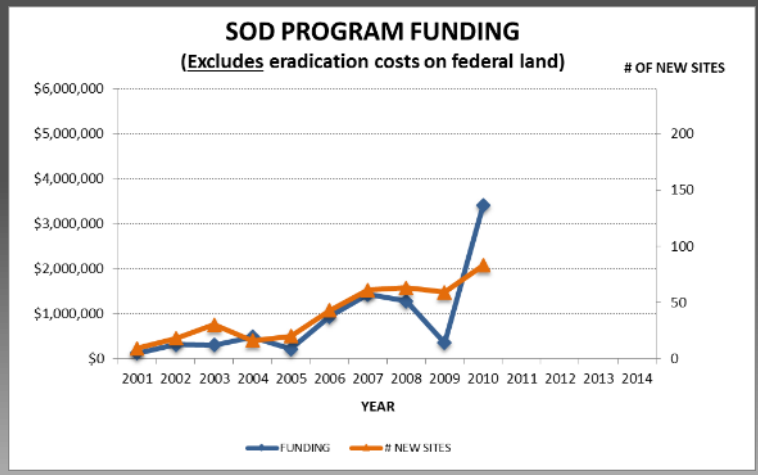
SUDDEN OAK DEATH
December, 2010

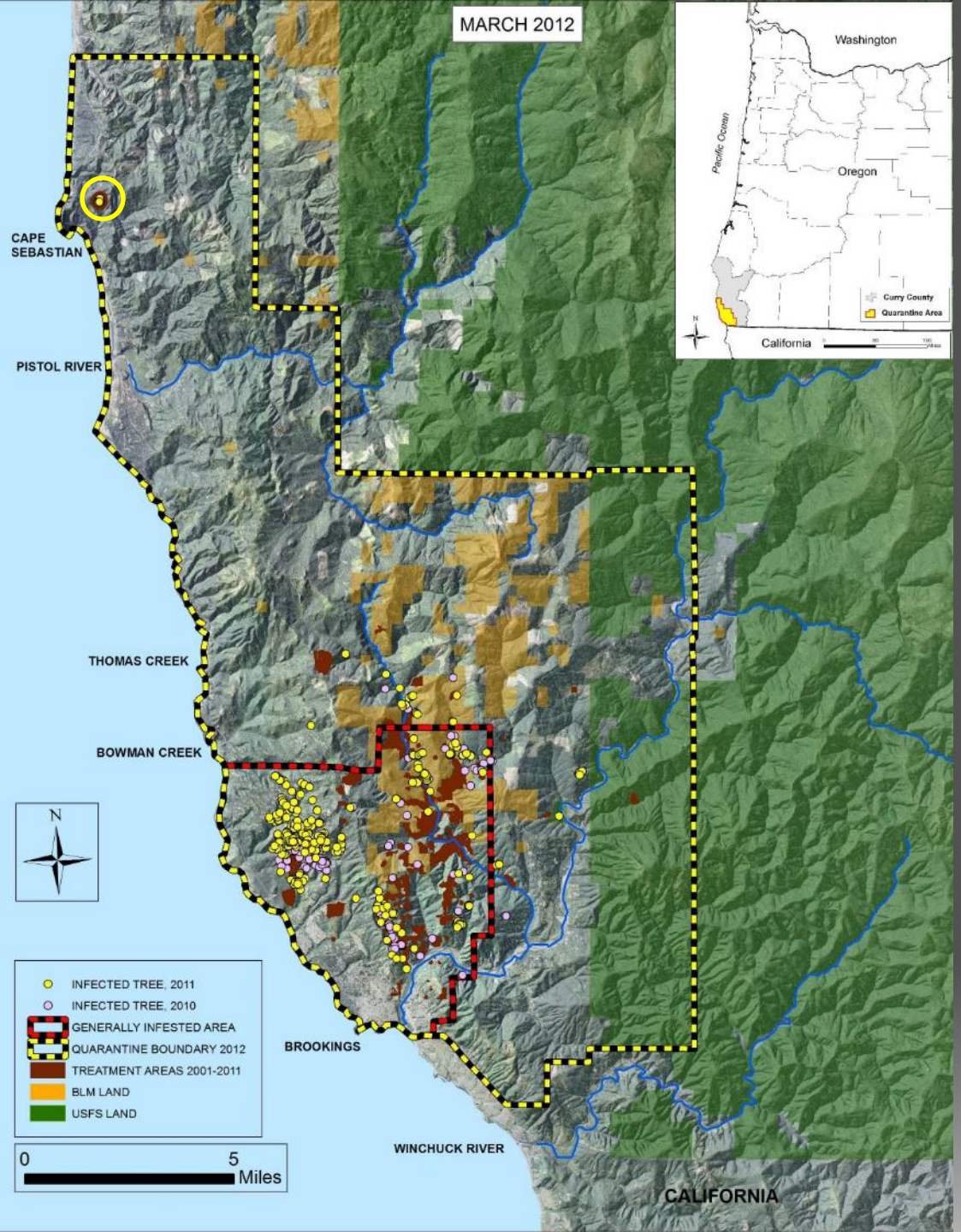
Quarantine area –154 square miles

On private land, amount of disease exceeding our capacity to cut and burn all infested sites on non-federal land.

BLM continues to treat all their sites

Strategic decision to treat high-priority sites near edge of quarantine area, leave other areas untreated



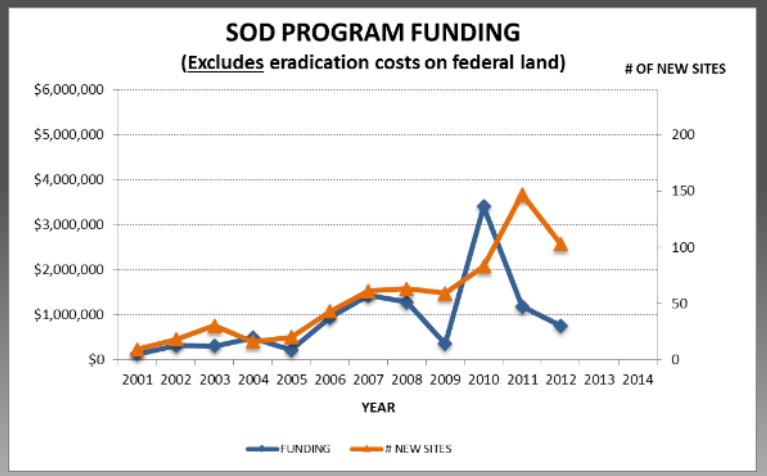


SUDDEN OAK DEATH
March, 2012

Quarantine expands to 202 square miles. Established a Generally Infested Area (GIA).

Eradication treatments not required within the GIA; required outside of GIA. Expands as needed.

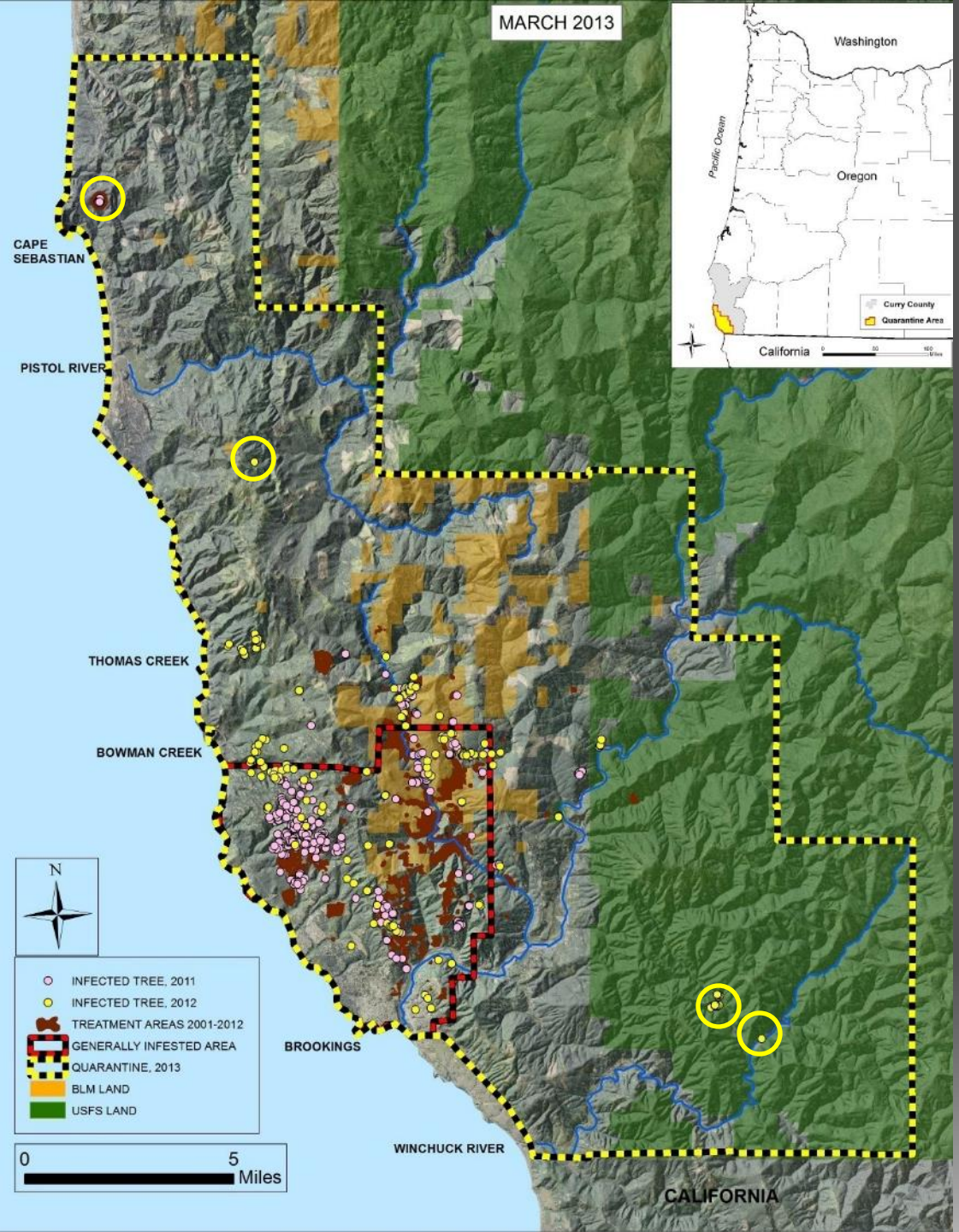
Treatment priorities based on importance for slowing disease spread and funding.

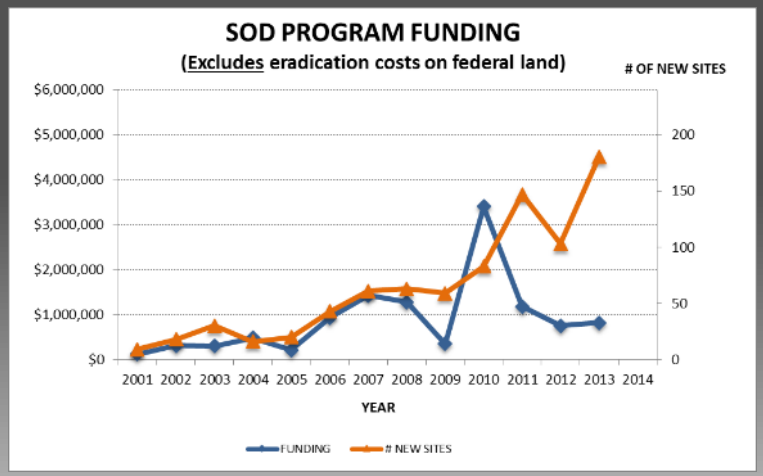


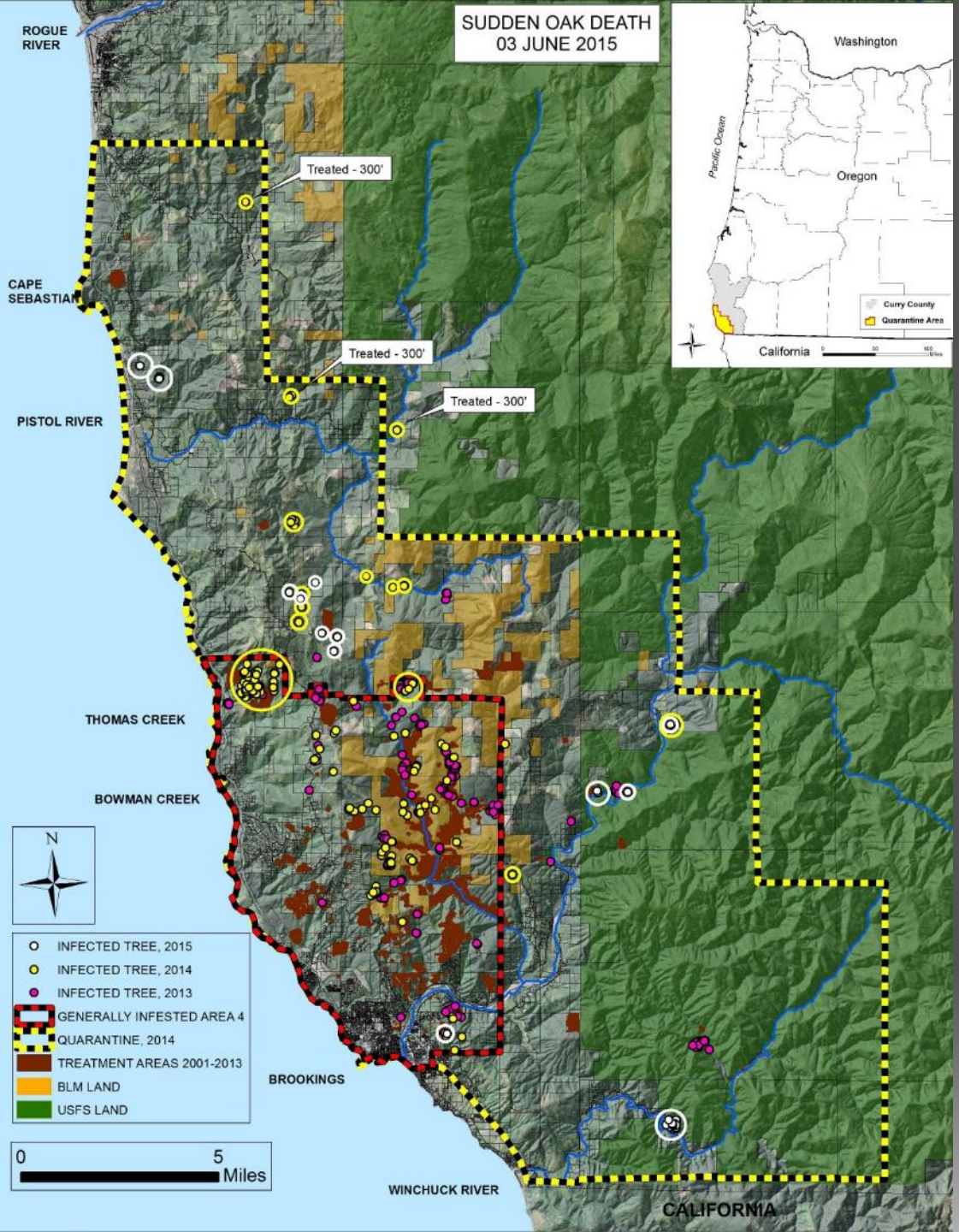
SUDDEN OAK DEATH
March, 2013

Quarantine area expanded to 264 square miles.

Intensification of disease in GIA; wildfire and tree-fall risk increasing.







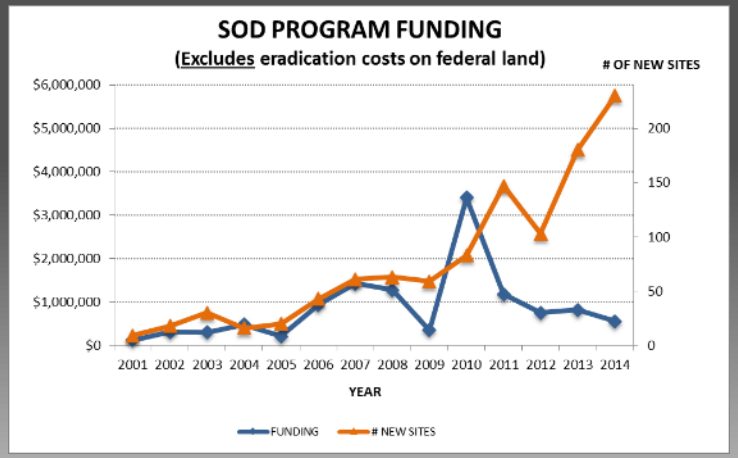
SUDDEN OAK DEATH
June, 2015

Infestations at northern edge of GIA are too large and costly to treat; GIA expanded to include them; they remain untreated.

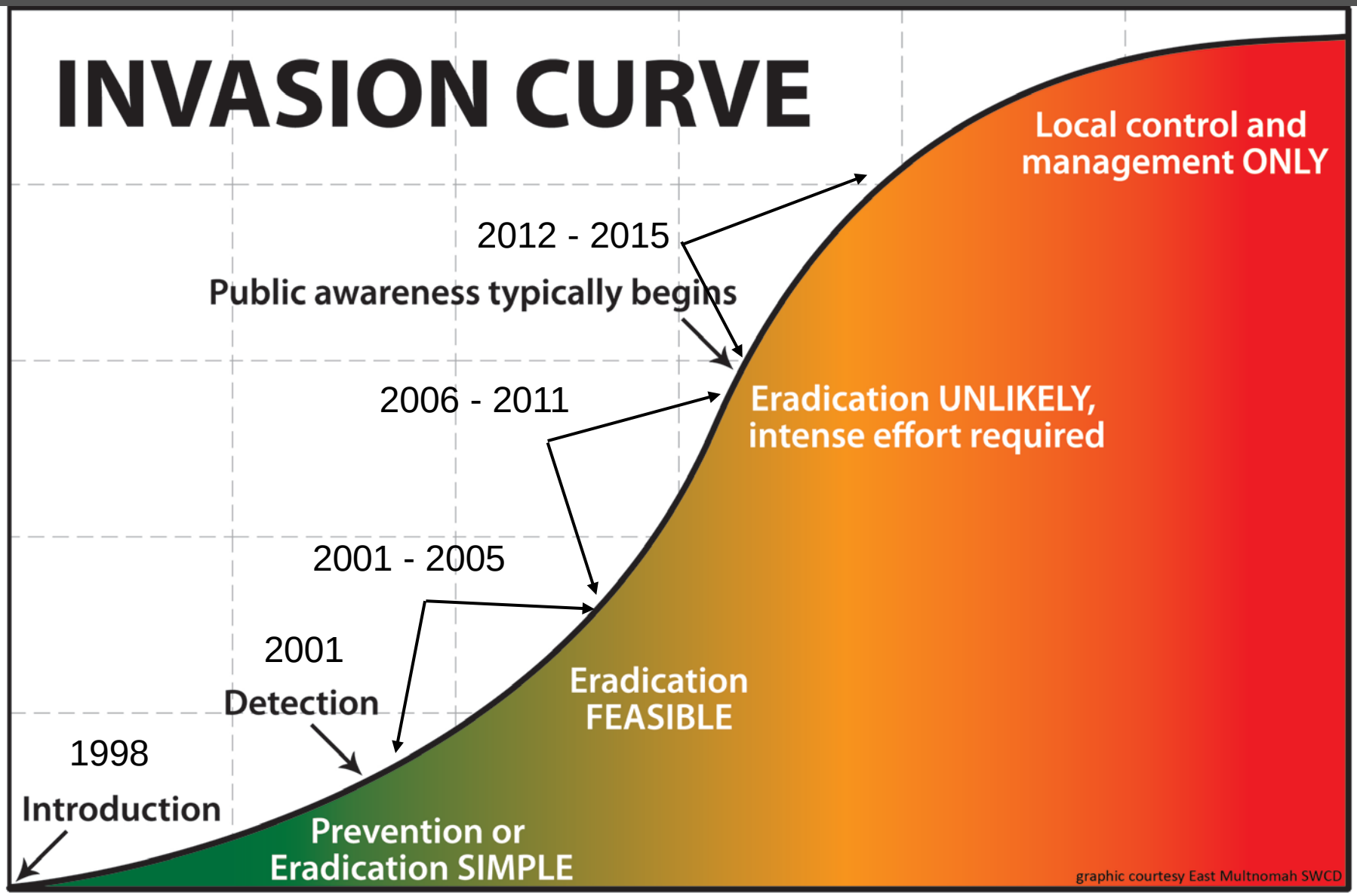
Scale treatment area size and intensity to importance of the site.

2014 infestations: 12 outside GIA; 300’ buffer on 3 sites, others minimum treatment (20-50’ buffer).

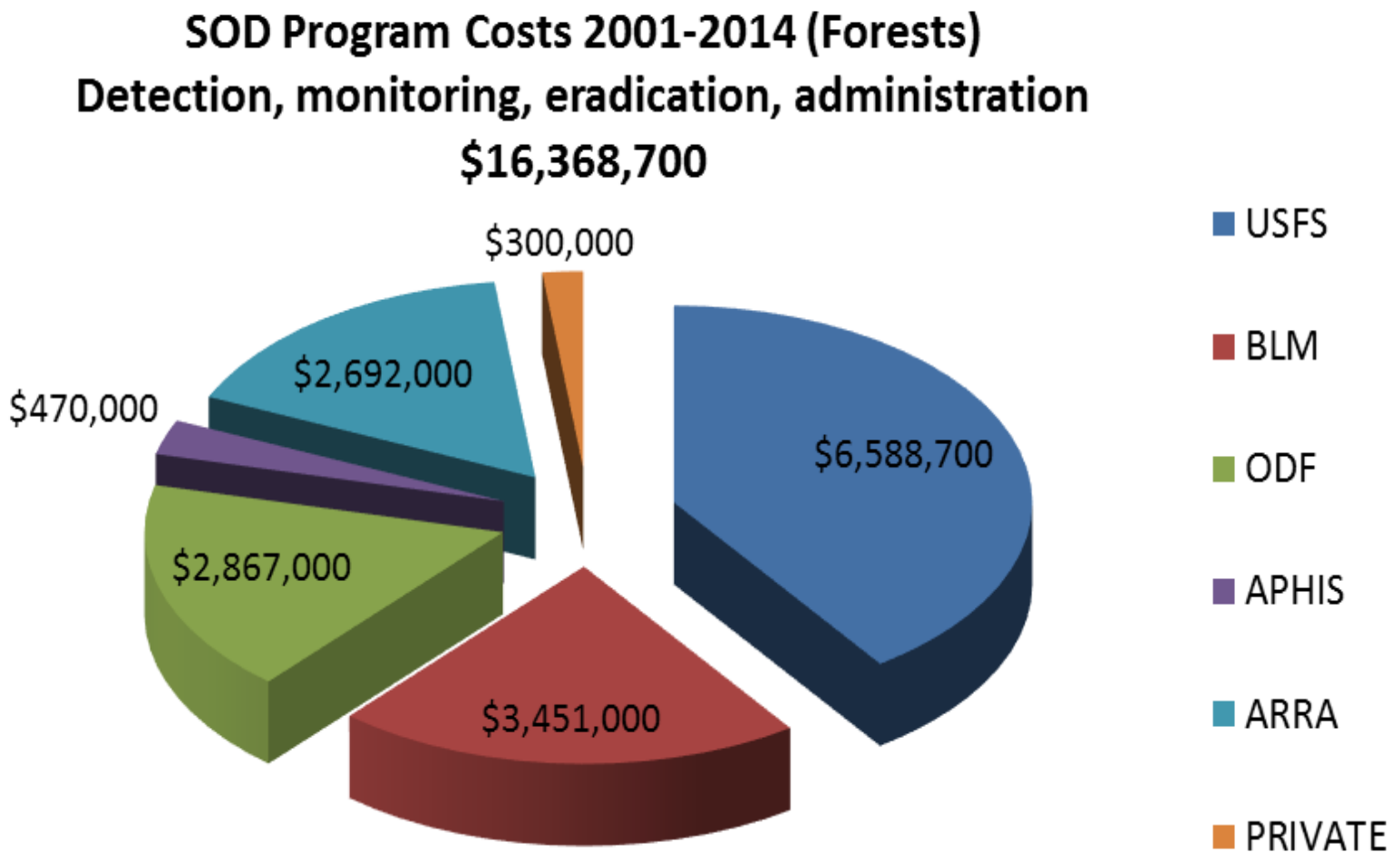
2015 infestations (as of June 8): 11 outside GIA, including a large one near CA border.



Context of SOD as an invasive species



SOD Program Expenditures 2001-2014

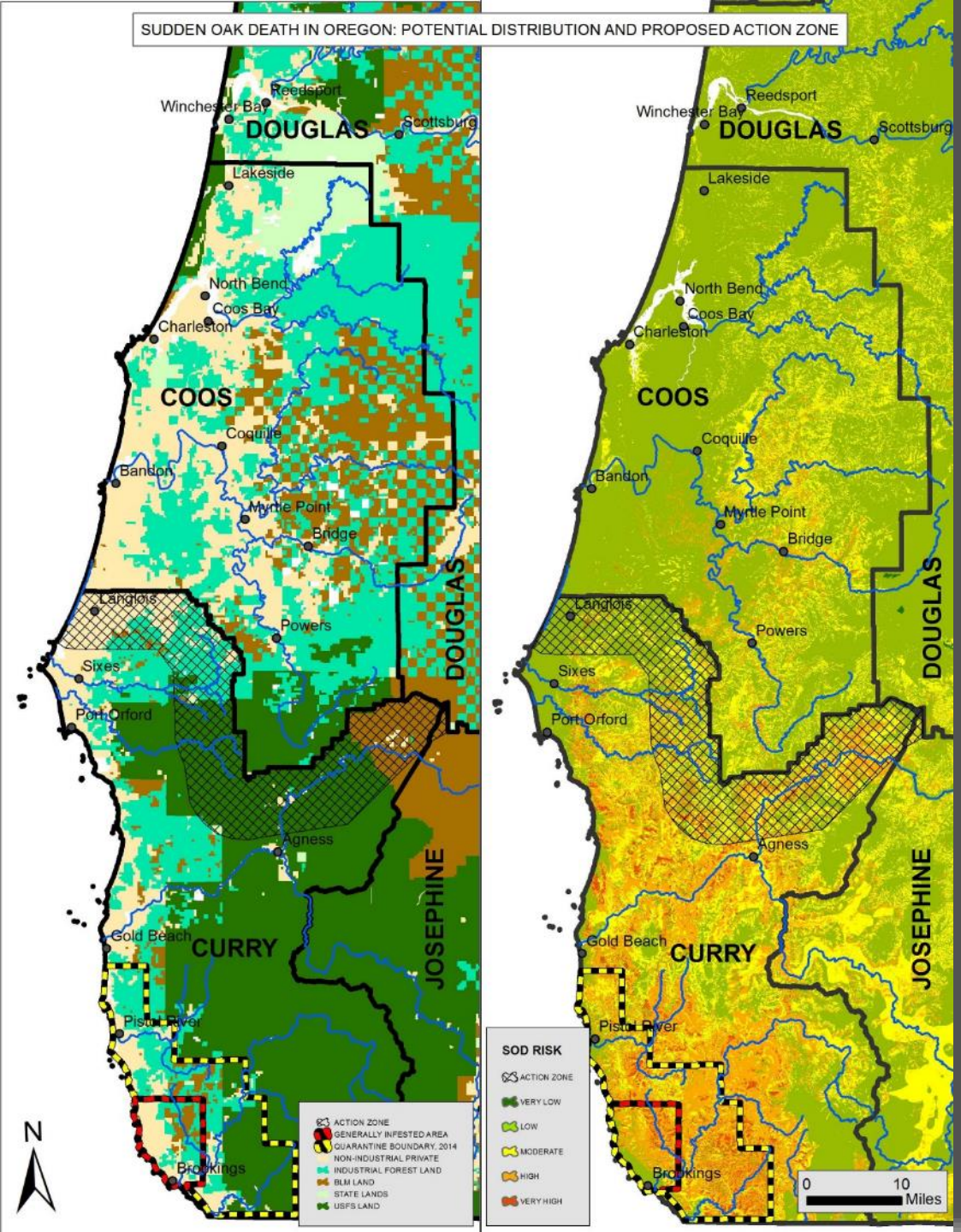


SUDDEN OAK DEATH
April, 2015

Proposed Quarantine Expansion (7^{th} expansion).

519 square miles.

Will go all the way to CA border.



SOD Program Alternatives

Alternative 1. Transition to living with the disease : technical assistance, education, best management practices (BMPs).

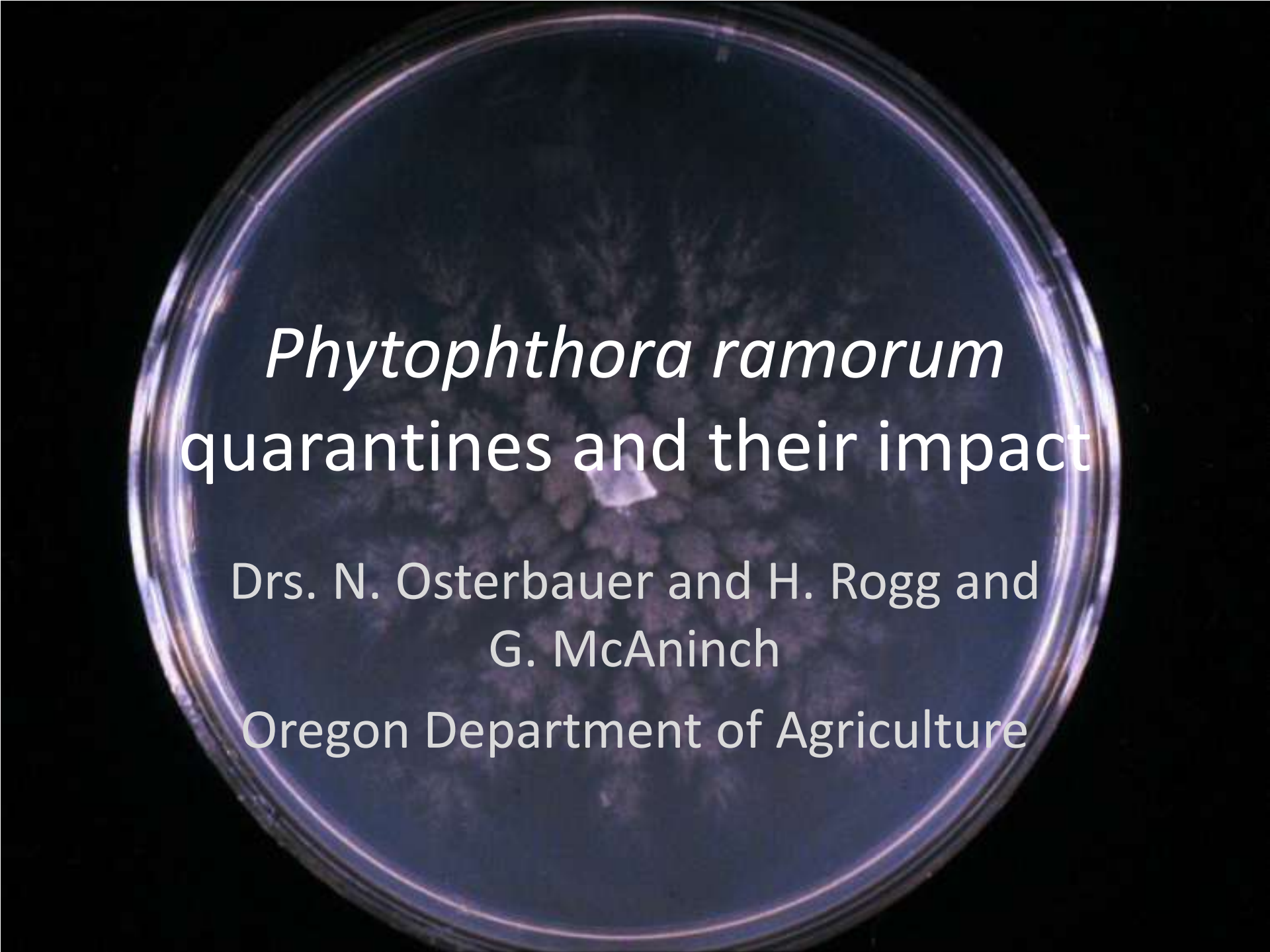
Alternative 2. Continue current slow-the-spread program as funded today.

Alternative 3. Continue slow-the-spread program with enhanced funding to enable treating all new infestations with 300-foot buffer.

Alternative 4. Contain to Curry County, establish Action Zone, enhance surveys, create contingency fund for rapid response in Action Zone or sites outside of Curry County.

Why Develop Alternatives?

- Provide basis for policy decision.
- Protect tanoak and other ecosystems.
- Evaluate costs to nursery and forest products industries:
  - Production costs due to regulations.
  - Loss of domestic and international markets.



Phytophthora ramorum quarantines and their impact

Drs. N. Osterbauer and H. Rogg and G. McAninch

Oregon Department of Agriculture

Domestic quarantines

- OAR 603-052-1230
  - State level quarantine
  - Applies to all **intrastate** movement of susceptible plants
- 7 CFR 301.92
  - Federal quarantine
  - Applies to all **interstate** movement of susceptible plants

Treating a forest site for *P. ramorum*.

Image by South Coast

Tanoak logs, lumber, and firewood

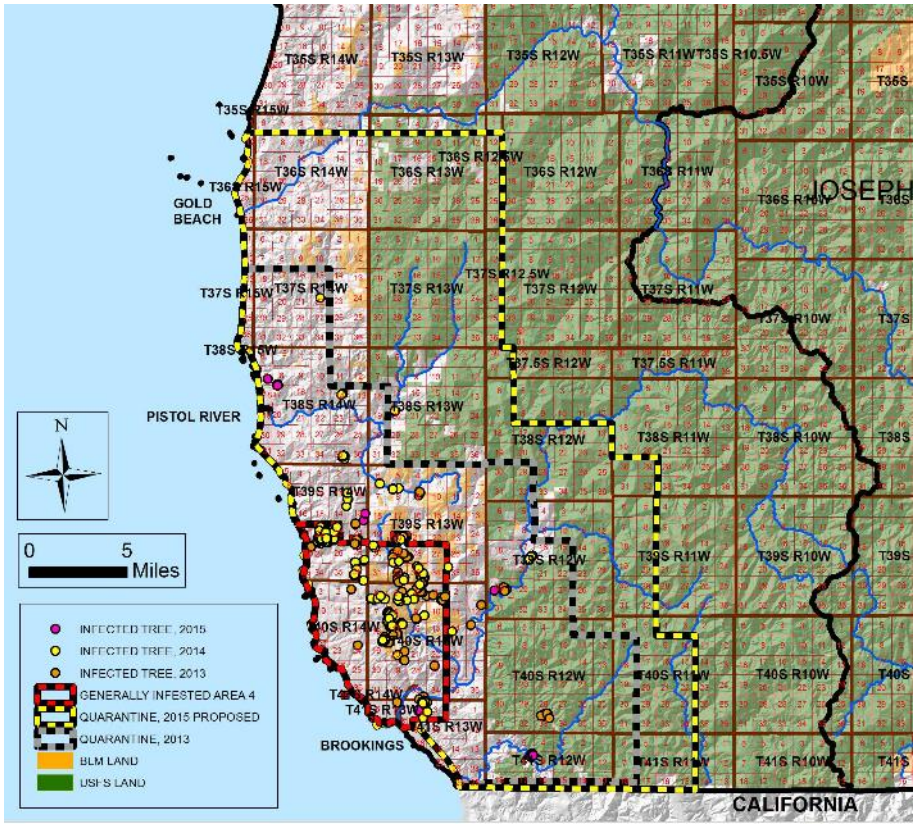
- Exported **interstate**
- Requirements:
  - Accompanied by official certificate (CQC)
  - Harvested from a disease-free area
    - No infected plants within ¼ mi
    - Officially surveyed in last 6-mo
  - Debarked prior to export

Log debarker.

Image from Google

Tanoak (cont.)

- Tanoak moving **intrastate**
  - Harvested from disease-free area
  - Protected from contamination prior to shipment
- **Tanoak from within the Generally Infested Area must stay in the quarantine zone**
  - 58 mi^2
  - In and around Brookings



Red box indicates GIA.

Map by ODF

Non-bole or non-host logs, lumber, and firewood

- May move freely within or outside of the quarantine area
- Exceptions
  - Soil, needles, foliage, and plant debris (≤ 1” diameter) cannot leave quarantine area
  - Logs harvested within an infested area must be washed prior to leaving the site

Douglas-fir.

Image from www.britannica.com

Other commodities

- Nurseries/Xmas trees
  - Inspected monthly
  - Tested annually
  - CQC for interstate shipments
- Specialty forest products
  - From disease-free area or treated
  - CQC for interstate shipments
- Soil/media from an infested site
  - Heat treated (122°F for 30-min measured at the core)
  - CQC for interstate shipments

Infected *Rhododendron.*

ODA file photo

International markets

- 52 countries list *P. ramorum* as a harmful organism
  - Can inspect shipments for *P. ramorum*
  - If detected, can reject, treat, or destroy the shipment
- 7 countries have quarantined Douglas-fir logs from Curry County. Requirements vary:
  - Prohibited; or,
  - Prohibited unless kiln-dried; or,
  - Prohibited unless shipped under an Import Permit

Logs loaded for export to China.

Image by WDNR

Economic effects

Timber

- Consequence
  - Must wash logs harvested from infested sites
  - Loss of markets (quarantines)
  - Lost income from leaving tanoak at infested sites
  - CQC for interstate/international markets required
- Offsets
  - USDA funds for treatment depending upon site location
  - ODF surveys for disease-free areas (USFS funds, for now)

Nursery and Xmas tree

- Consequence
  - Responsible for all eradication (treatment) costs if *P. ramorum* is found
  - Loss of plants
  - Loss of markets (quarantines)
  - CQC for interstate/international markets required
- Offsets
  - For now, federal funds pay for all survey and inspection costs

Current situation in Curry County

- > 11 new infested sites in 2015
  - Several are within 1 mi of quarantine boundary
  - One is 0.3 mi outside the boundary
- *P. ramorum* is spreading farther, faster
  - Recent epidemiology data shows natural spread has doubled since 2009
  - Jumps as far as 5 mi

Sudden oak death canker on tanoak.

ODA file photo

Quarantine area (QA)

- Natural spread is accelerating
- Must expand QA because of positive detections
  - Have expanded QA annually since 2009
- What do we do?
  - Whole county?
  - Partial county?

P. ramorum-infected tanoak shoots

ODA file photo

How much do we expand?

Whole county

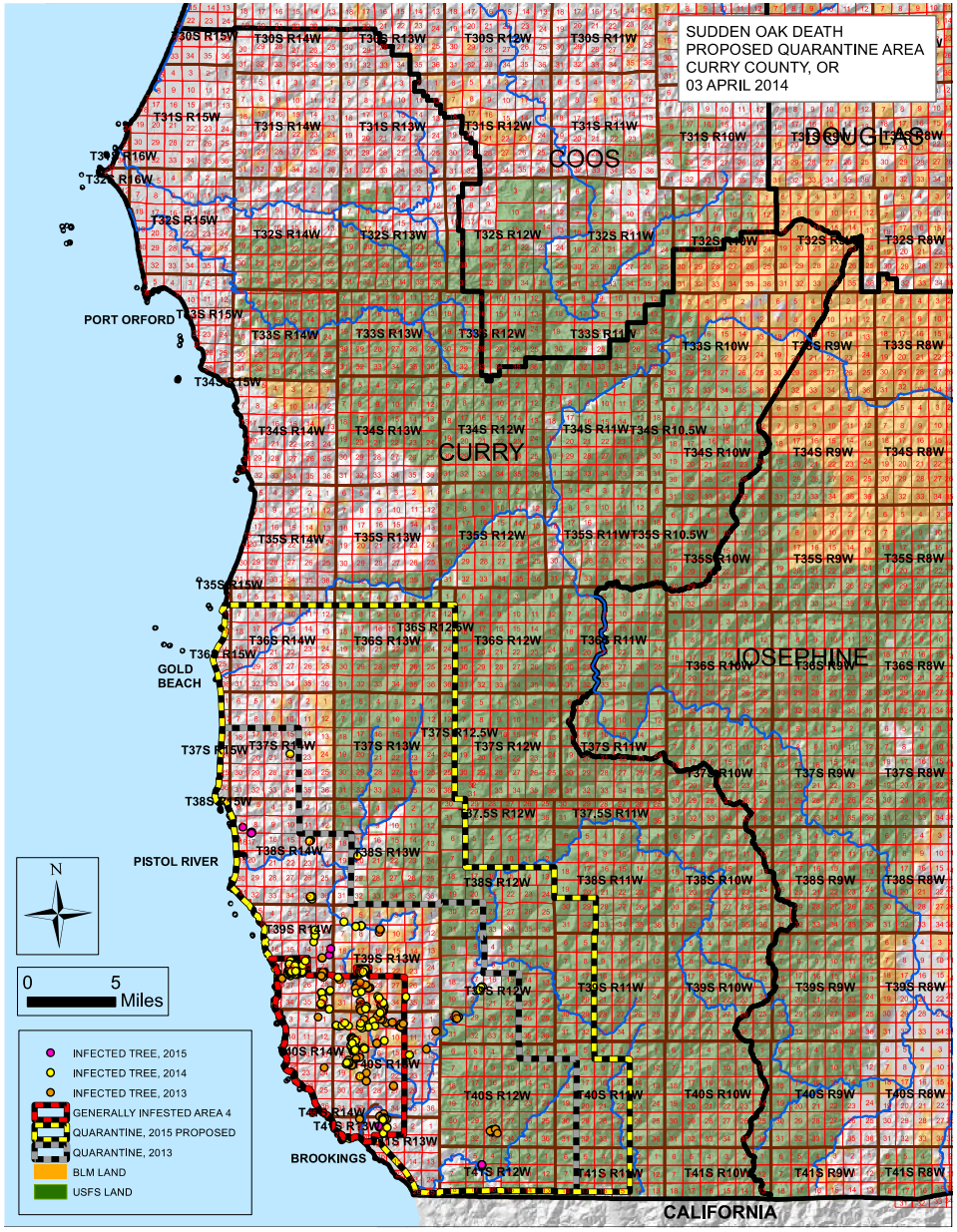
- Pros
  - Matches the natural range of tanoak
    - Natural host-free barrier between Coos and Curry
  - Matches international quarantines
  - Easier to comply/enforce
- Cons
  - Affects more landowners

Partial county

- Pros
  - Fewer landowners affected
  - Could buy time for a last, concerted effort to stop spread
- Cons
  - More difficult to comply/enforce
    - Can cut across a landowner's property lines
  - Not recognized internationally

Proposed expansion

- 8 mi to the north/northeast
  - Prevailing direction of spread
- 6 mi to the east
  - Mainly Federal land
  - USFS and BLM continue to treat
- State line to the south
  - Encompasses the southernmost detection



Map by ODF

Proposed amendment to quarantine

- Public hearing
  - June 16, 2015, 8:30am
  - Docia Sweet Exhibit Hall, Gold Beach
- Written comments
  - Accepted until June 22, 2015, 5:00pm
  - Submit to:

Rules Coordinator

Oregon Dept. of Agriculture

635 Capitol St NE

Salem, OR 97301

Private landowner's property post-treatment. All tanoaks are gone.

ODA file photo

Contacts

- Dr. Helmuth Rogg, State Plant Regulatory Official, hrogg@oda.state.or.us
- Dr. Nancy Osterbauer, Plant Health Program Manager, nosterbauer@oda.state.or.us
- Gary McAninch, Nursery & Christmas Tree Program Manager, gmcaninch@oda.state.or.us

COLLABORATIONS

- Oregon Department of Forestry

Oregon Department of Agriculture

- USDA Forest Service

USDI BLM

- Oregon State University

OREGON STATE UNIVERSITY

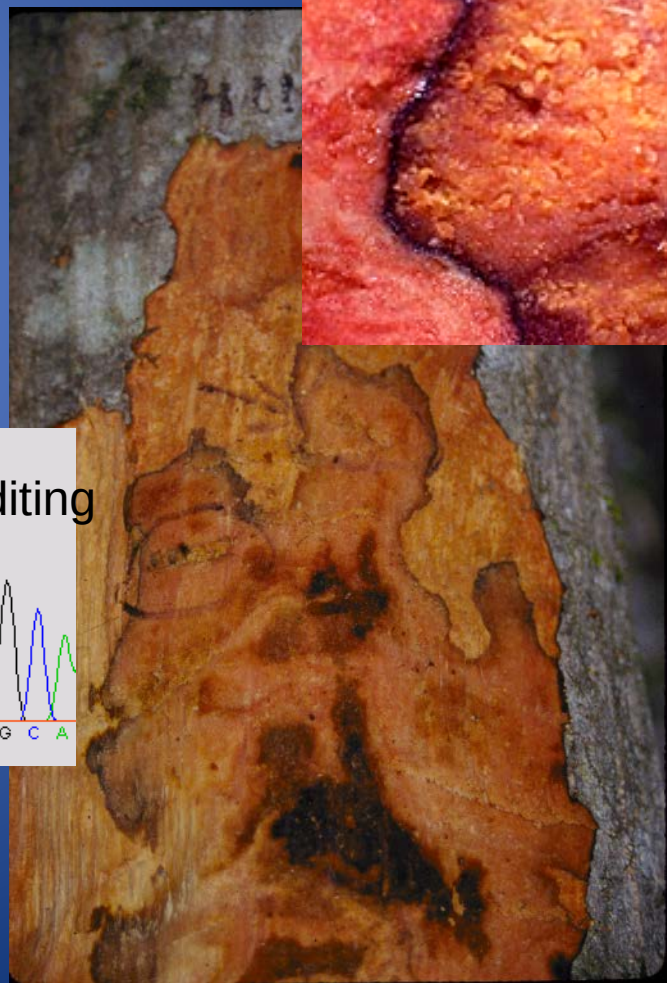
- **College of Forestry**
  - Log treatments
  - Cost benefit analysis
  - Bark amendments (**USDA Forest Service**)

- **College of Agricultural Sciences**
  - Nurseries, Best Management Practices (with OAN)
  - DNA fingerprinting, pathways analysis (**USDA Agricultural Research Service**)

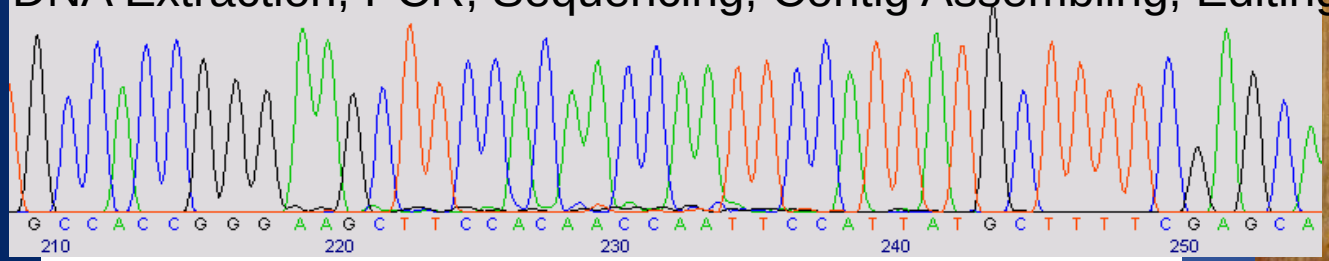
Department of Botany and Plant Pathology

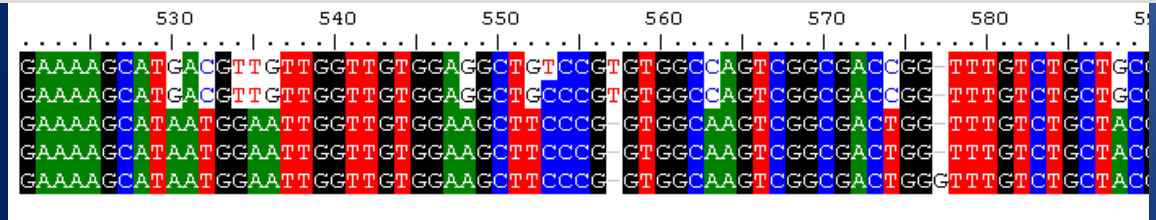
Colleges of Forestry and Agriculture

- Isolation and Diagnostic Methods



DNA Extraction, PCR, Sequencing, Contig Assembling, Editing





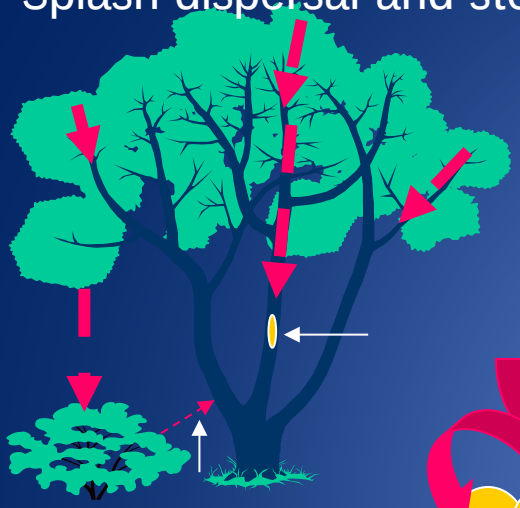
Host Range Testing

Leaf symptoms
on Myrtlewood

Shoot dieback of
Douglas-fir

Epidemiology

Local spread
Splash dispersal and stem flow

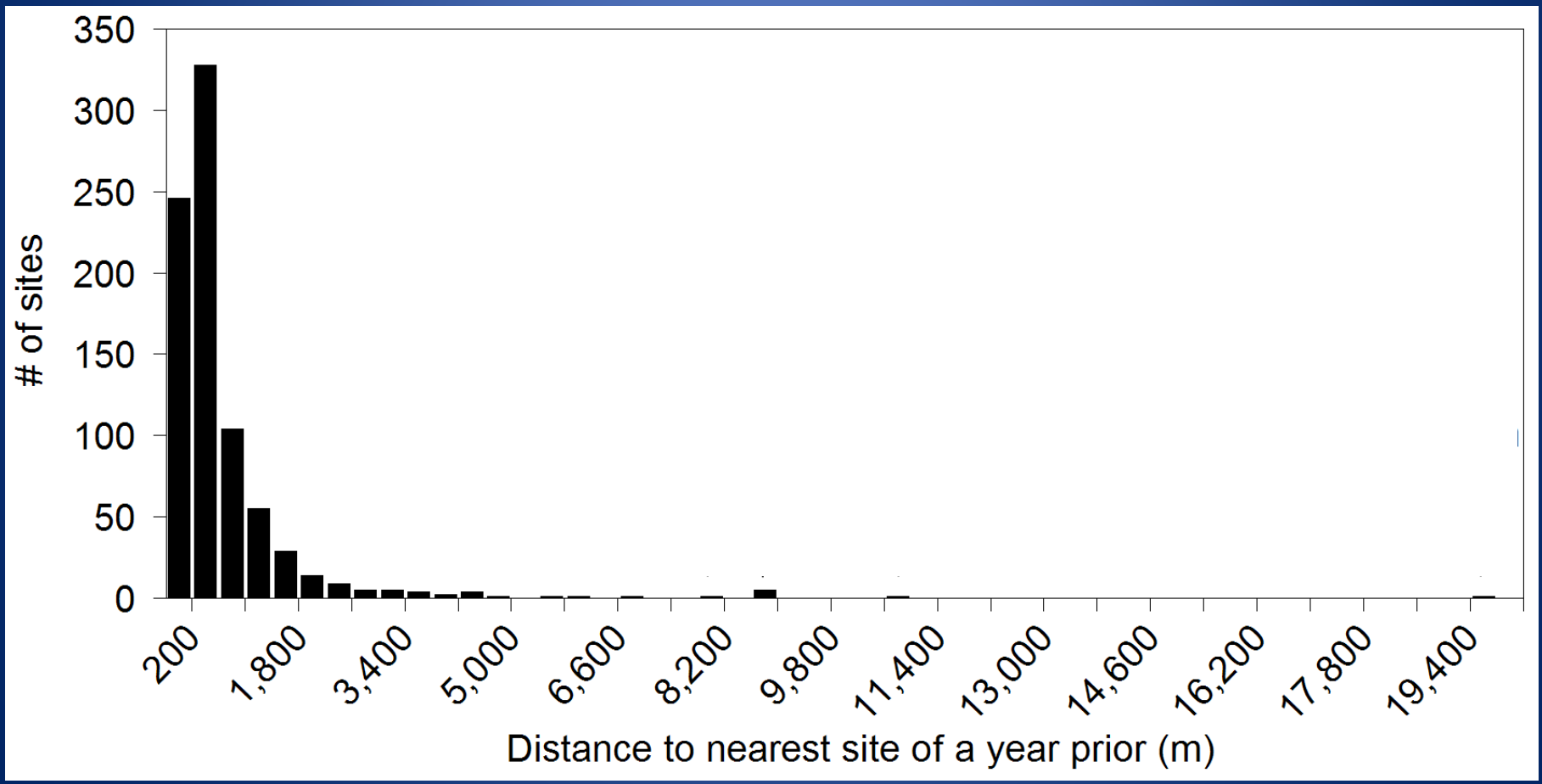


Landscape-level spread
Airborne

Long-distance spread
Nursery Stock

ODA

EPIDEMIOLOOGY

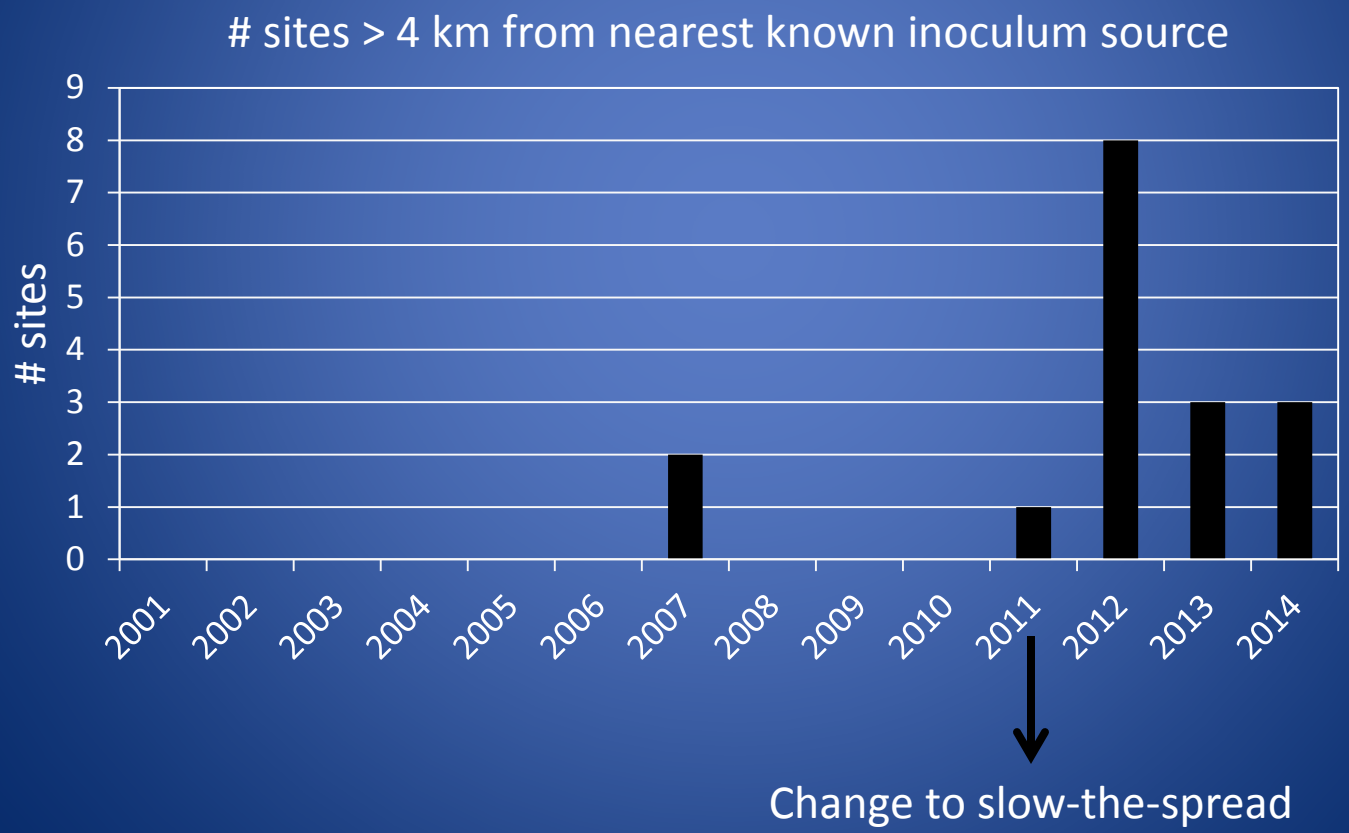


Peterson et al. 2015

SPORANGIA

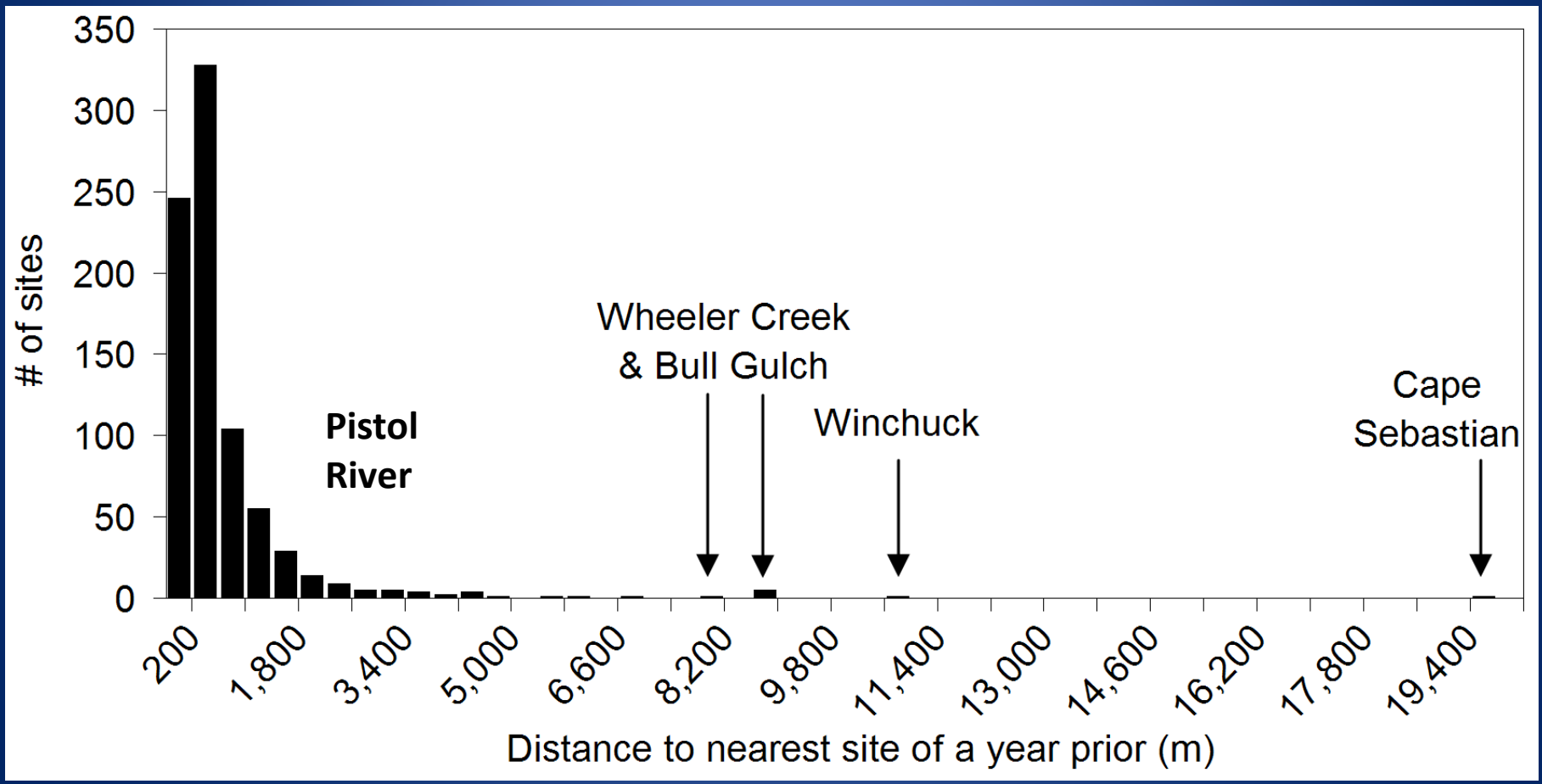
ROADS- NO **“STREAMS”- YES**

More frequent long distance dispersal events

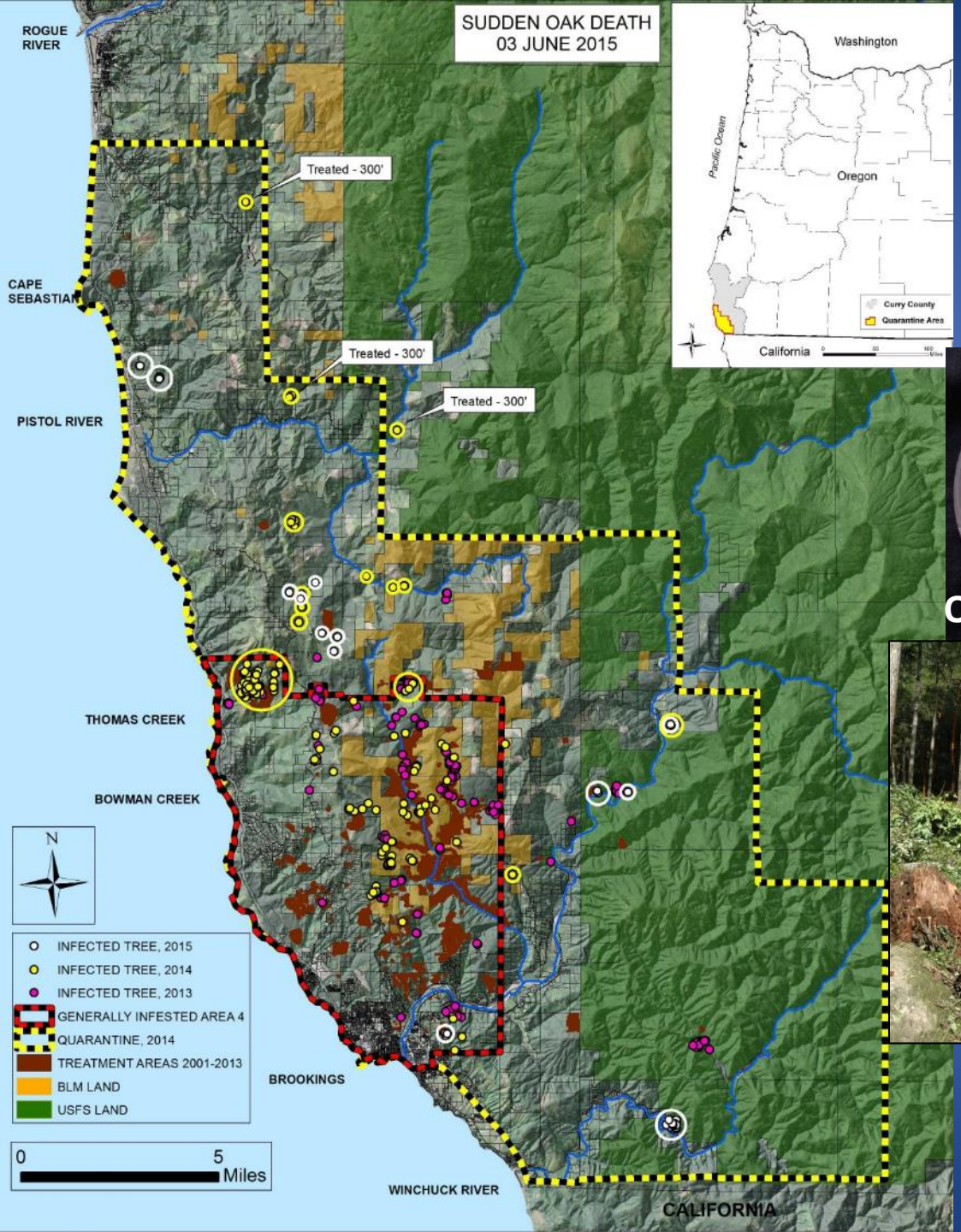


Peterson et al. 2015

COLLABORATION: HOW IT WORKS



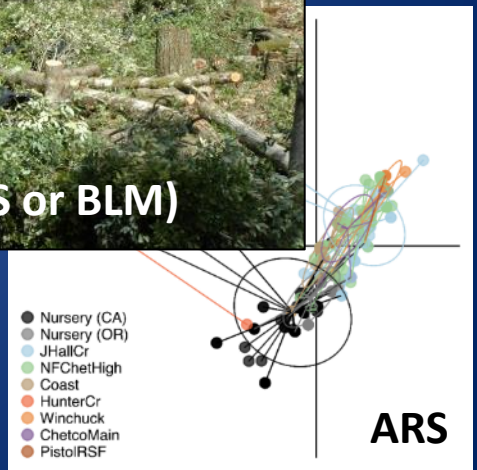
Peterson et al. 2015



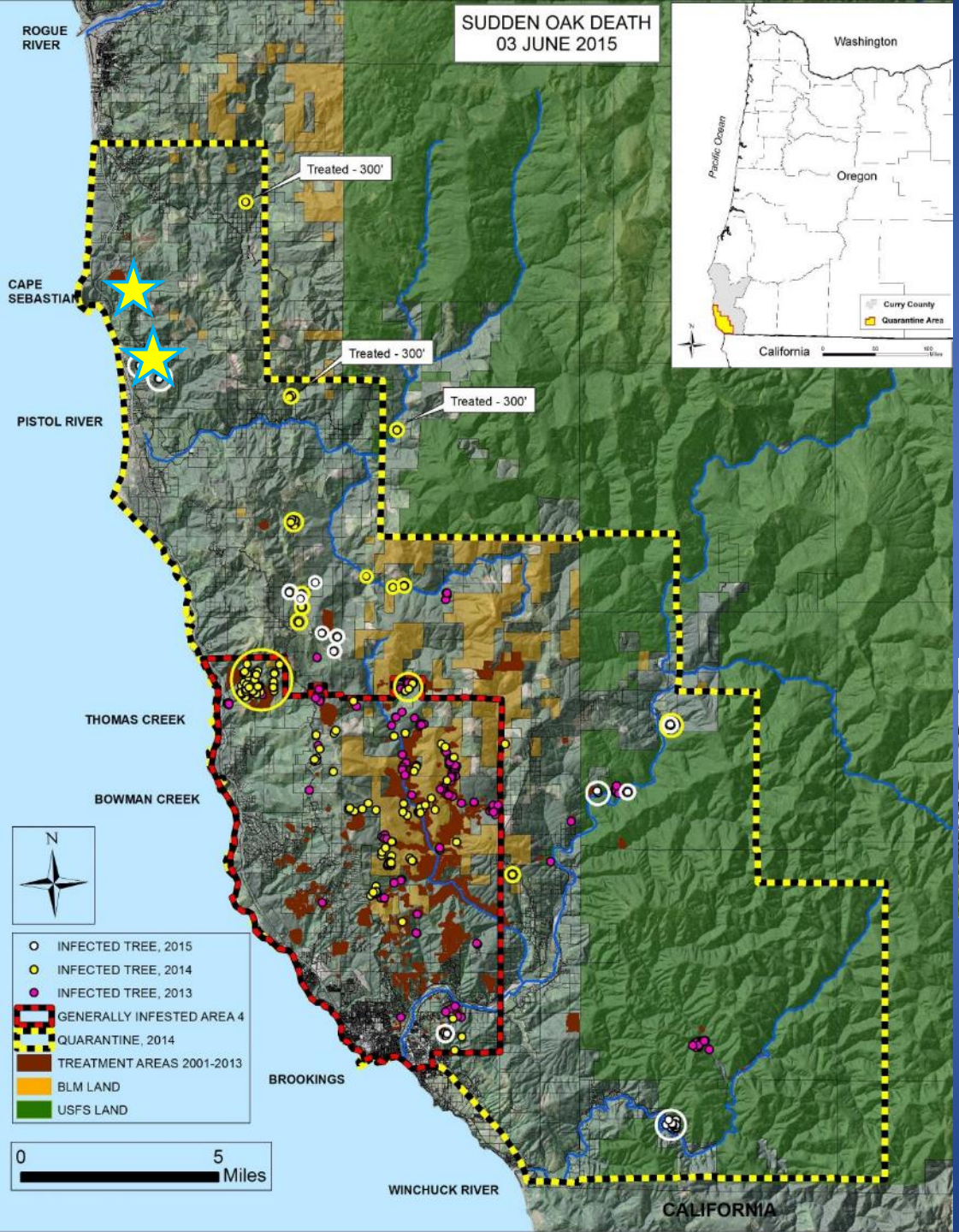
ODF AND USFS

OSU

ODF (or USFS or BLM)



ARS

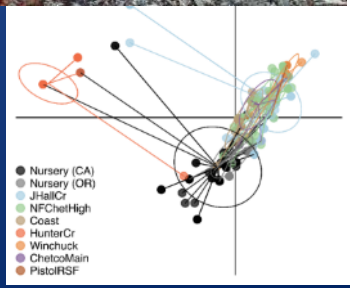


Cape Sebastian

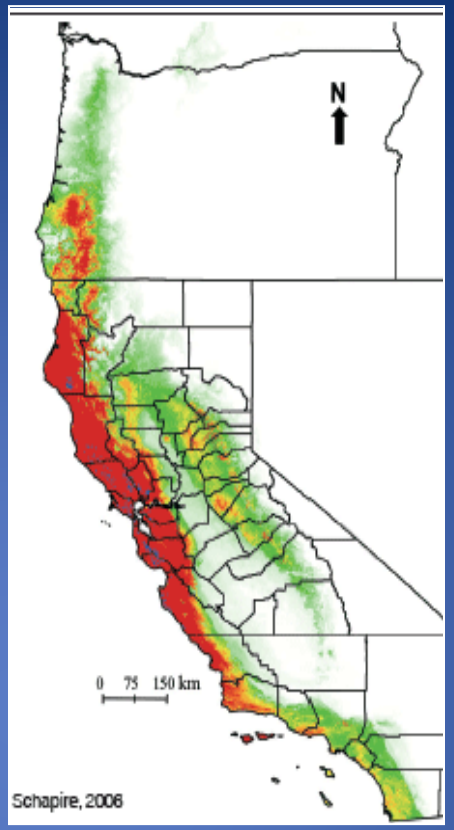
ODF>OSU> **ODA>Public Hearing> USDA APHIS (quarantine)**

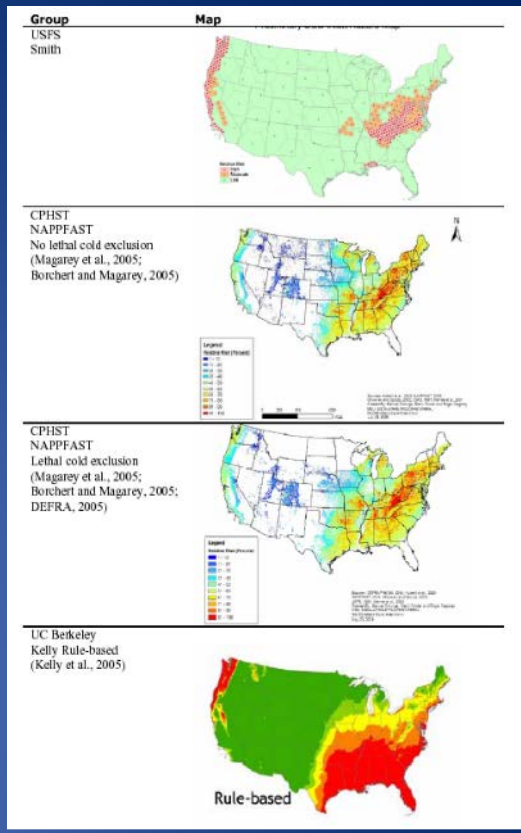
Pistol River

ODA>nursery inspection, eradication >ARS genotype> New Oregon pathway



WHY?


N
0 75 150 km
Schapire, 2006


Group
Map
USFS
Smith
CPHST
NAPPFAST
No lethal cold exclusion
(Magarey et al., 2005;
Borchert and Magarey, 2005)
CPHST
NAPPFAST
Lethal cold exclusion
(Magarey et al., 2005;
Borchert and Magarey, 2005;
DEFRA, 2005)
UC Berkeley
Kelly Rule-based
(Kelly et al., 2005)
Rule-based

Brasier and Webber 2011

Sudden Oak Death

- Acknowledging 14 years of Public Service

Oregon Department of Forestry

– Alan Kanaskie, Randy Weise, Danny Norlander, Jon Laine

Oregon Department of Agriculture

– Nancy Osterbauer, Dan Hilburn, Helmuth Rogg

Oregon State University

– Everett Hansen, Wendy Sutton, Paul Reeser, Nik Grunwald, Zhian Kamvar

USDA Forest Service

– Ellen Goheen, Ron Rhatigan, Bob Schroeter, Doug Daoust

USDI Bureau of Land Management

– Bernie Miller, Rick Schultz, James Kirkpatrick, George McFadden