Sudden Oak Death

Oregon Update: Shifting from eradication to containment? (Hell No!)

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"Eradication: control of plant disease by eliminating the pathogen after it is established or by eliminating the plants that carry the pathogen" (Agrios)

Oregon Department of Agriculture
Phytophthora ramorum quarantine (603-052-1230)

"The disease must be eradicated from the property as quickly as possible in accordance with USDA APHIS's Confirmed Residential Protocol or the APHIS Response Protocol for Forest and Wildland Environments"

Wild-land Distribution of *P. ramorum*

<u>Oregon</u>: discovered 2001, present since 1998

Brookings, OR site

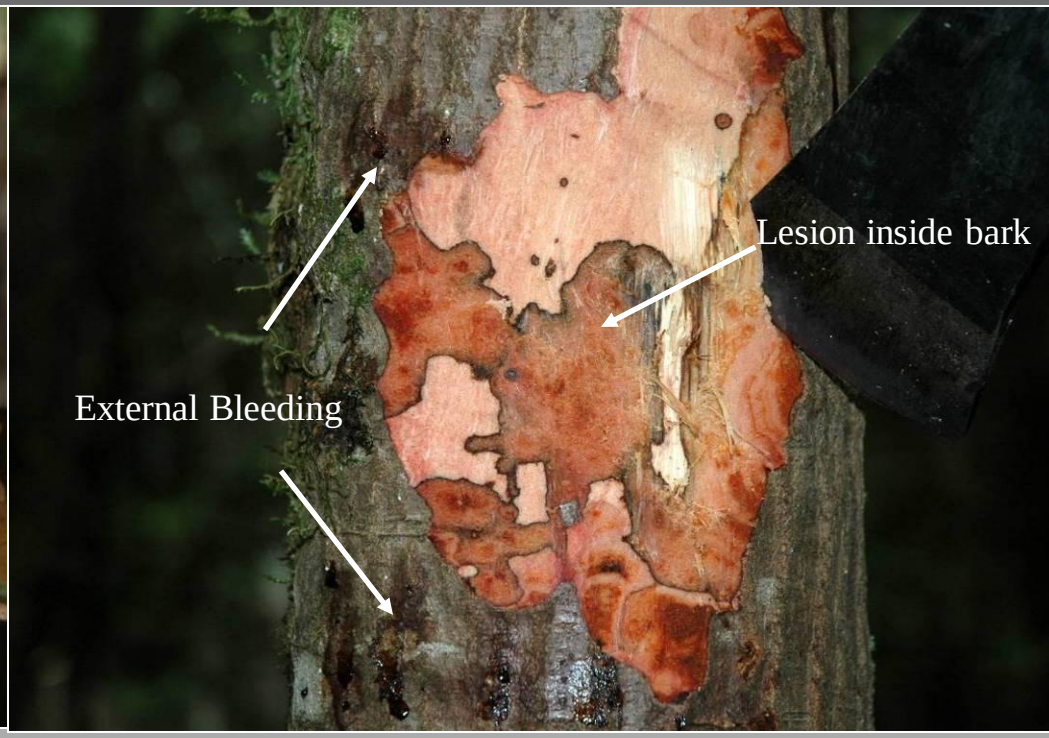
Humboldt county, CA site

Phytophthora ramorum in Oregon Forests.

Tanoak is the key host species

Readily killed by the pathogen

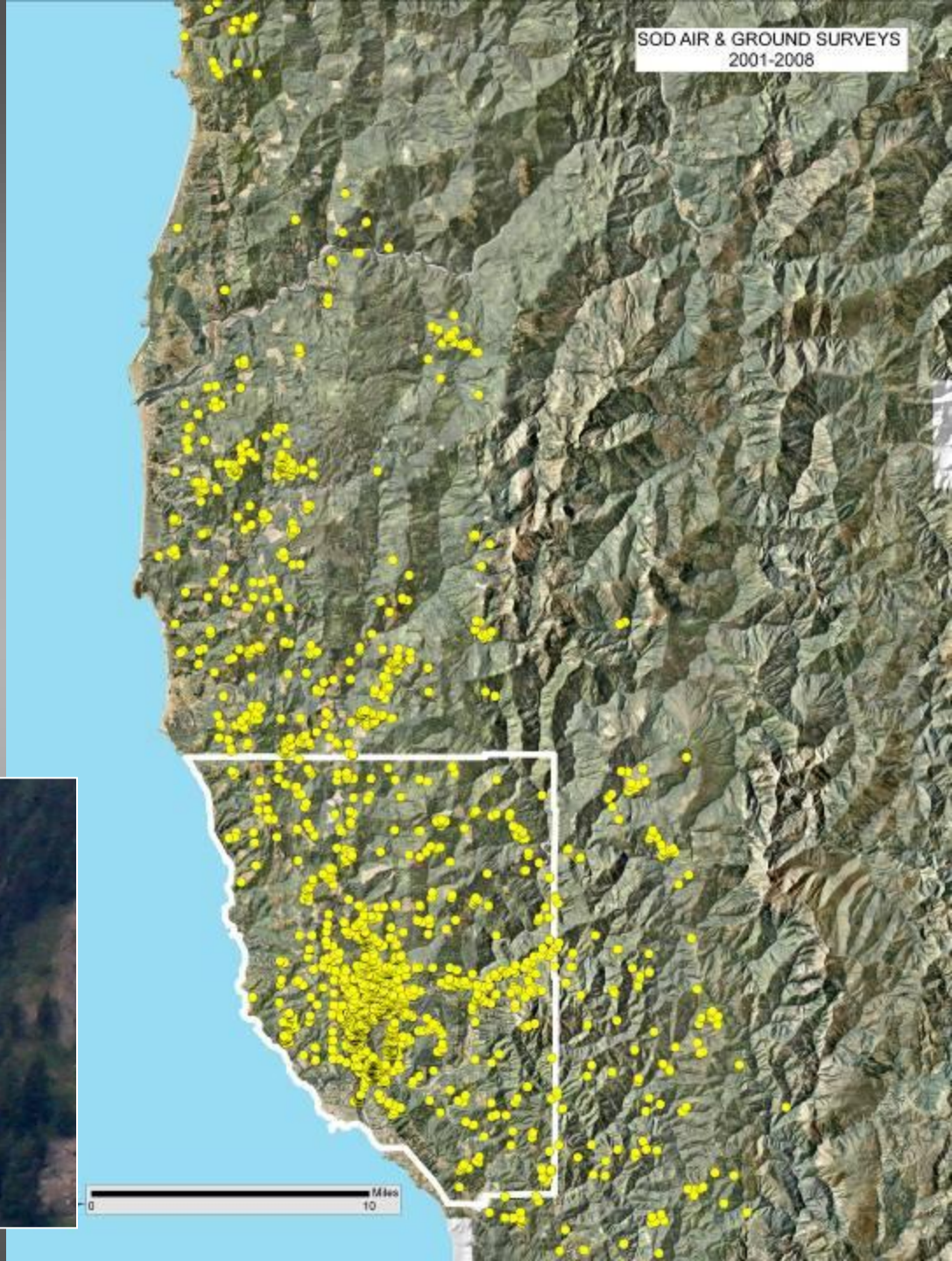
Primary inoculum producer



Sudden Oak Death Program in Oregon Forests

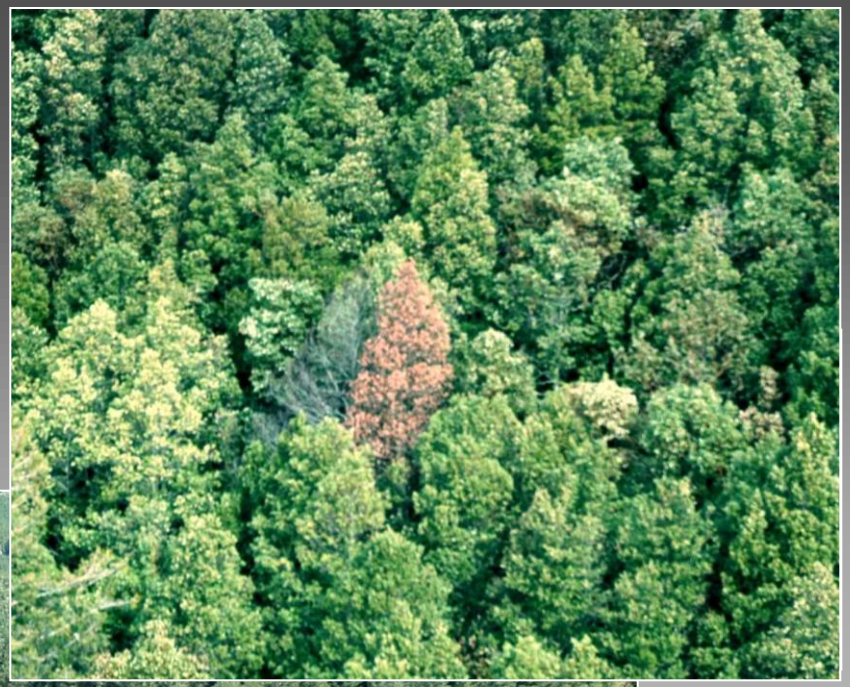
1. Early Detection
2. Delimitation
3. Eradication
4. Host reduction
5. Monitoring / Research

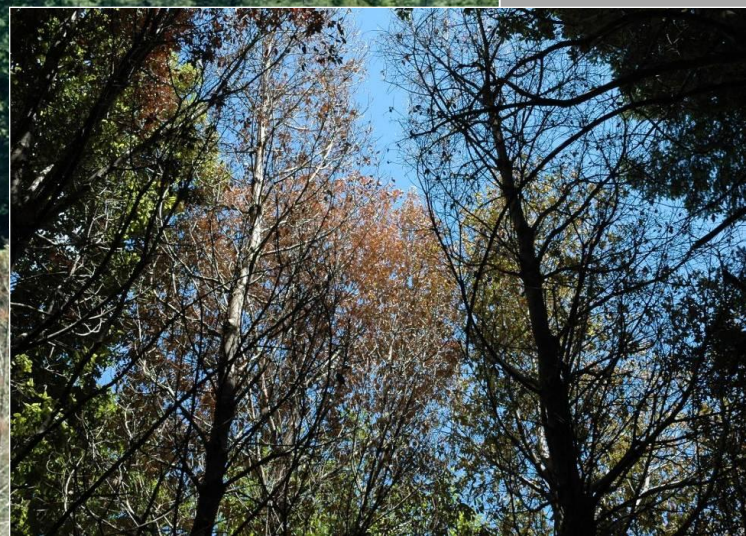
Aerial Surveys and ground Checks, 4 per year: 2001-2009



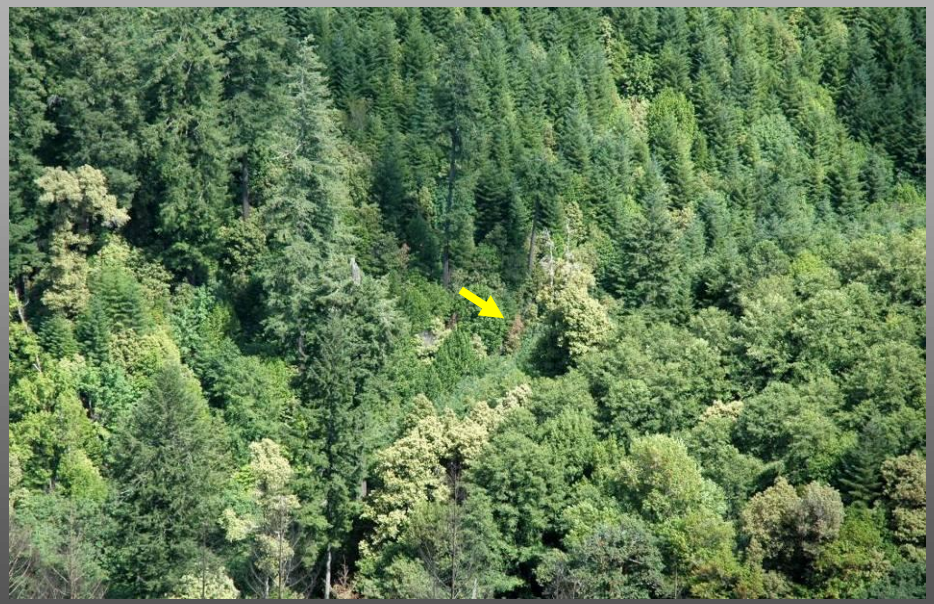
Aerial Surveys

Difficult in some stands;
New detections usually only a few trees



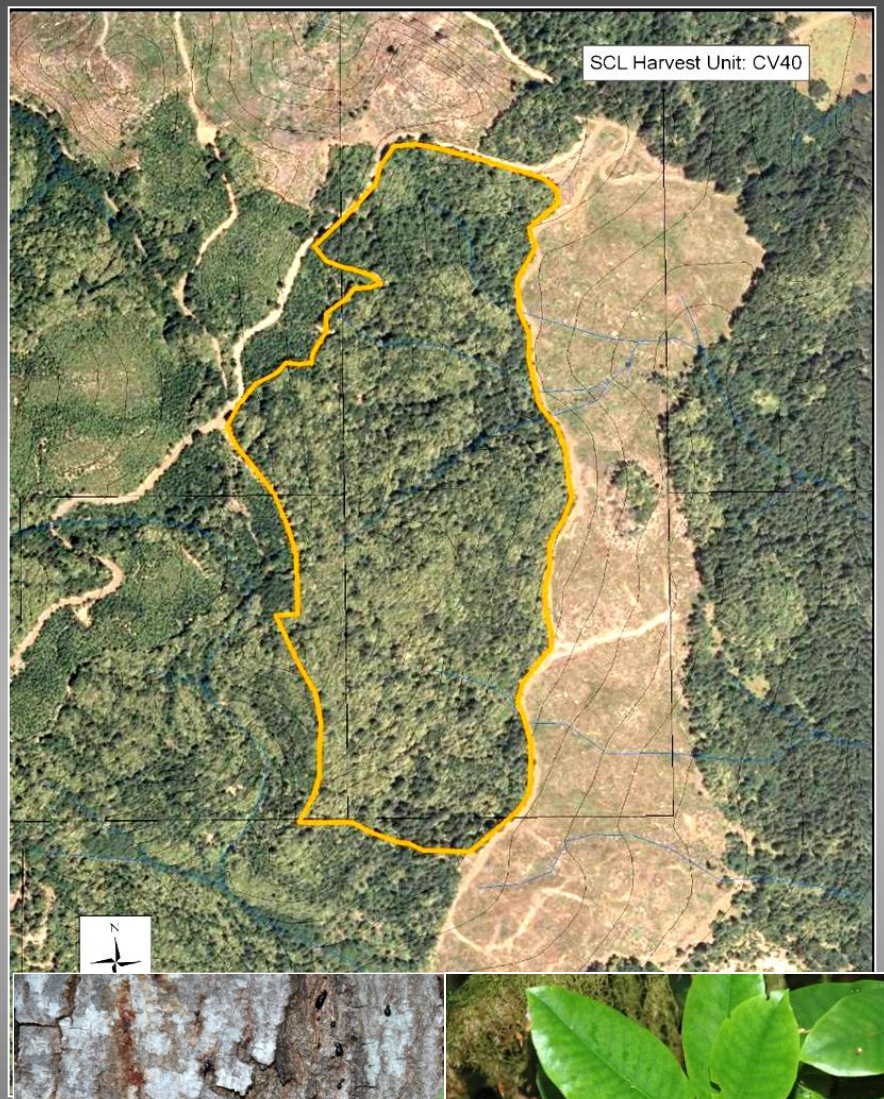


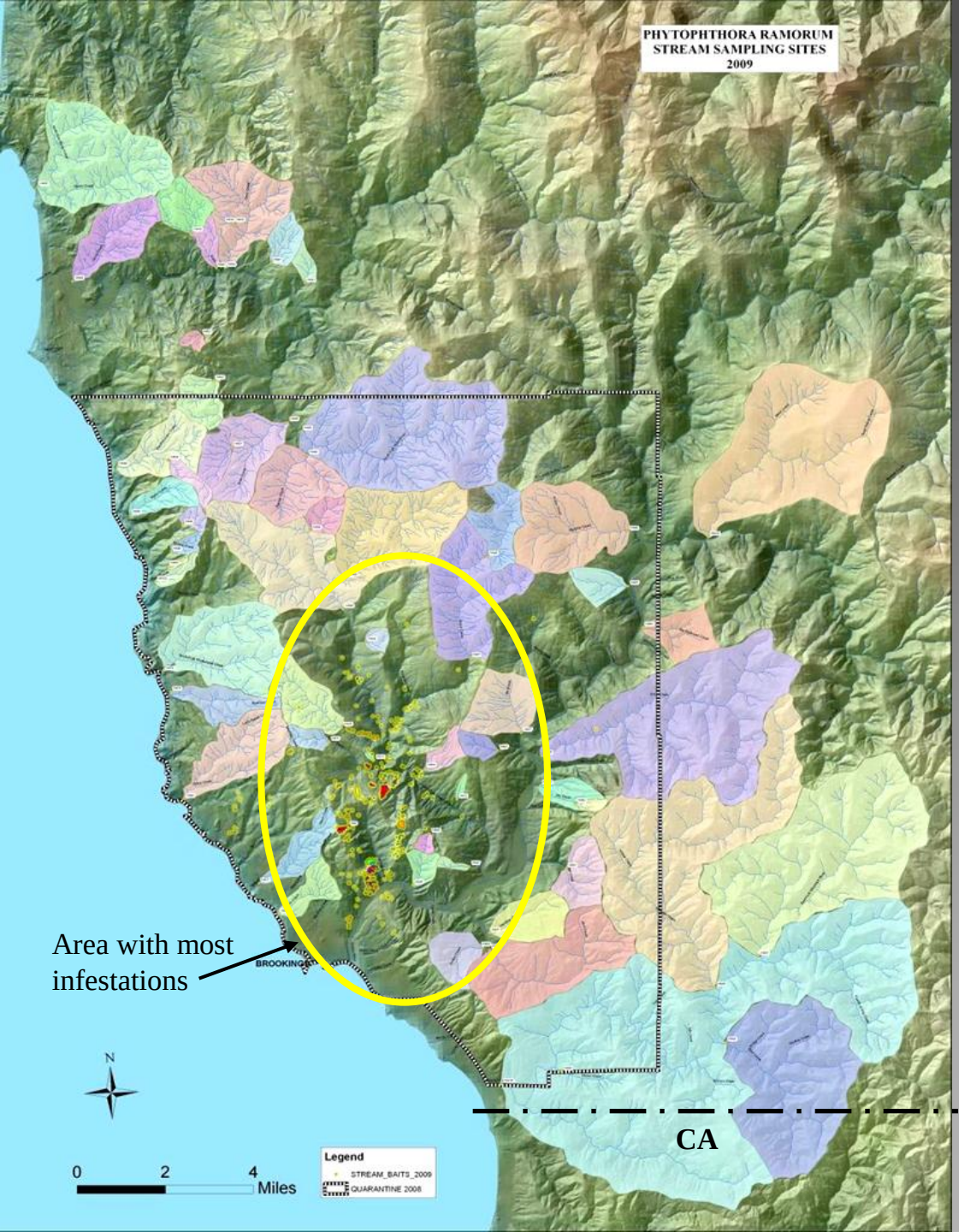
Scouting:
Early symptoms
Sub-canopy trees



TRANSECT SURVEYS

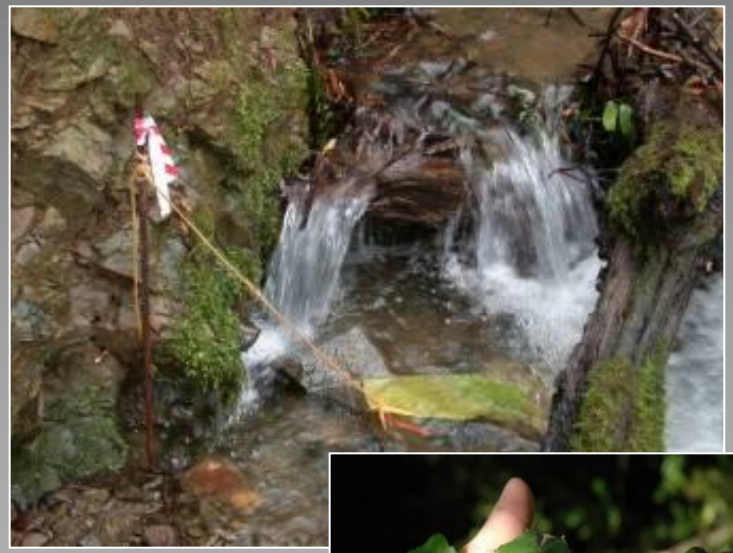
- Proposed timber sales (for pest-free certification)
- High risk areas



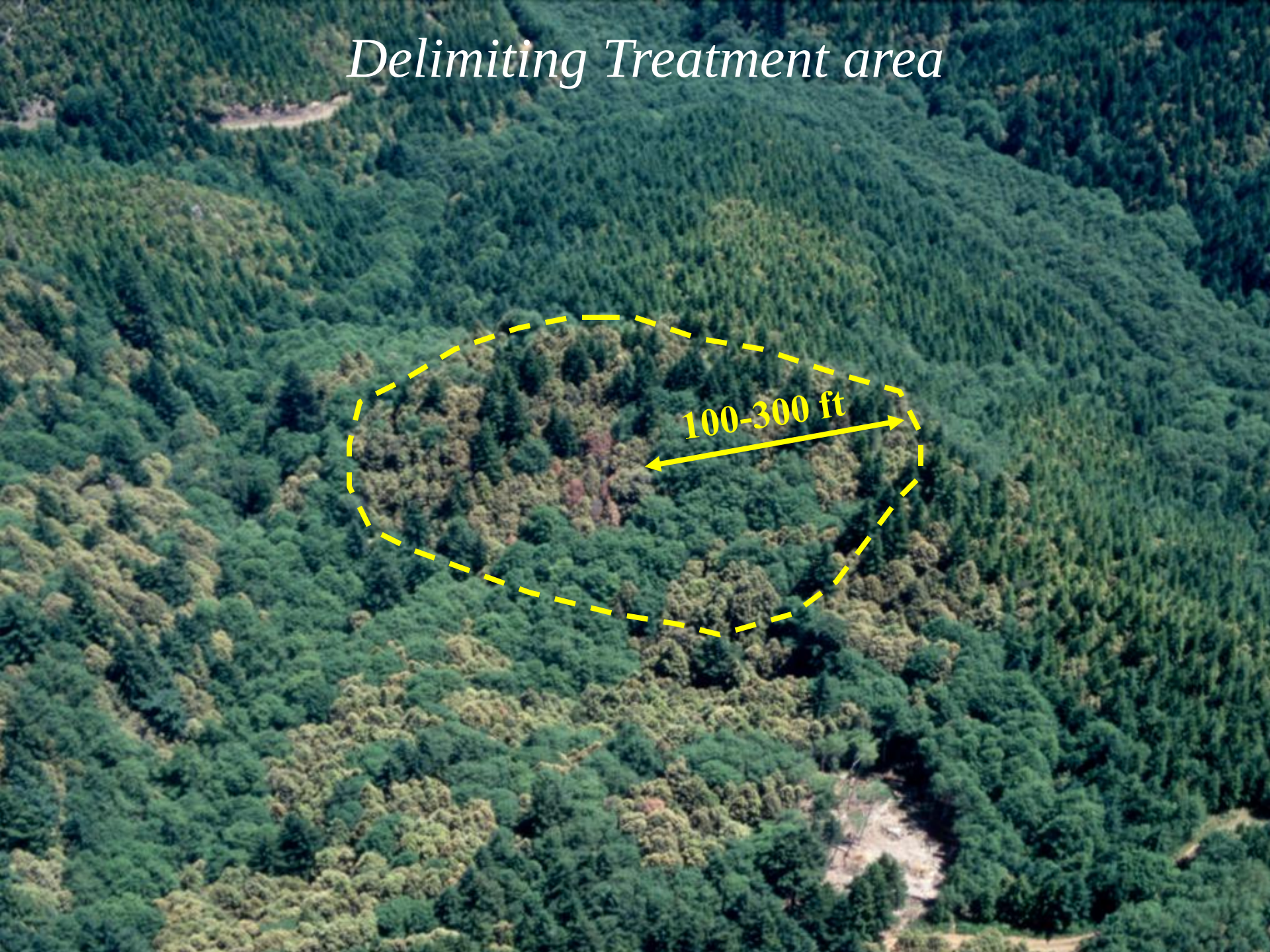


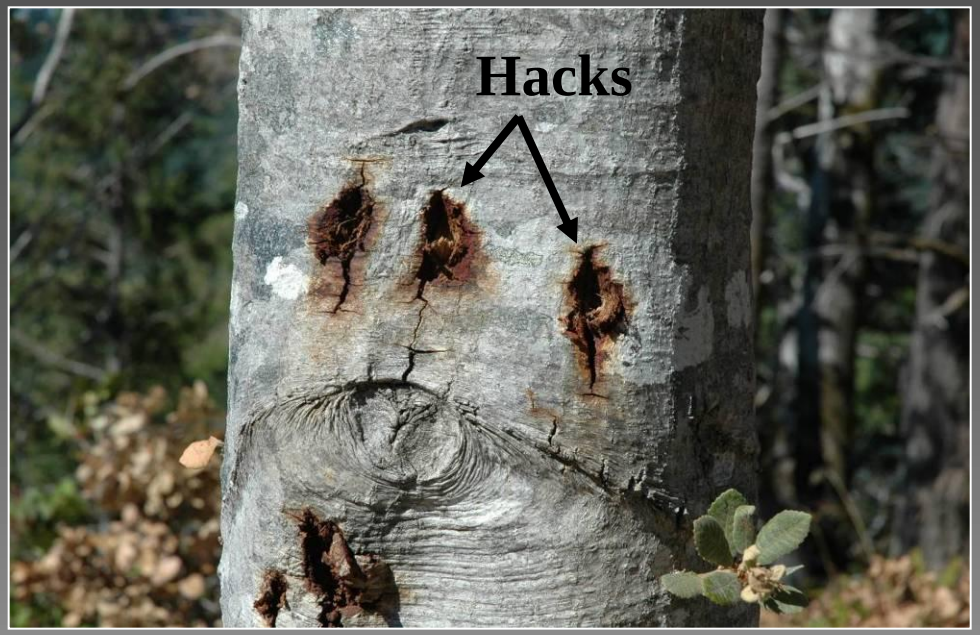
Stream Baiting locations
58 active sites

1. *P. ramorum* detected in 7 streams prior to finding infected plants
2. No culture + beyond general area of infestation, but several PCR +
3. Detection distance limits?



Delimiting Treatment area

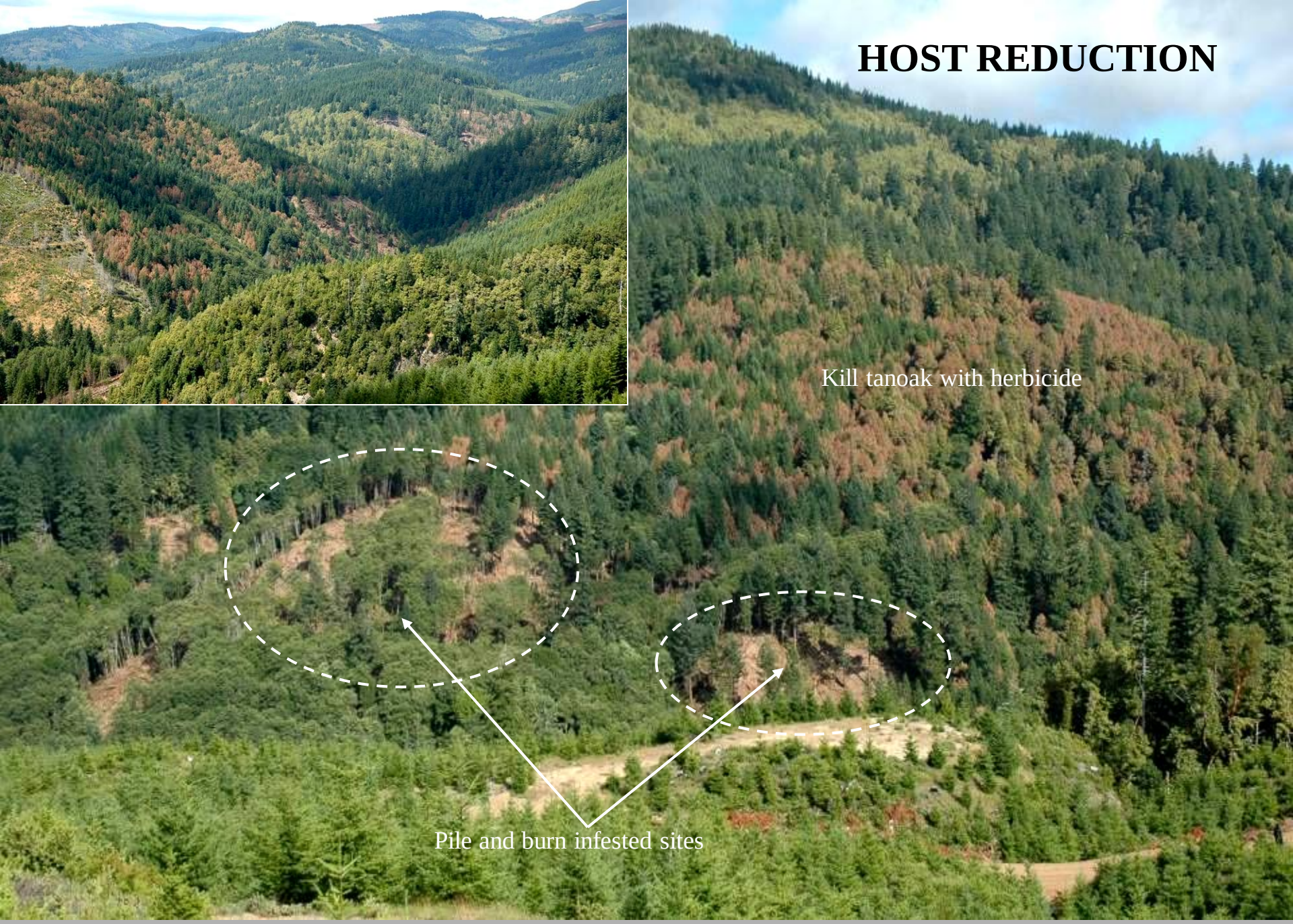




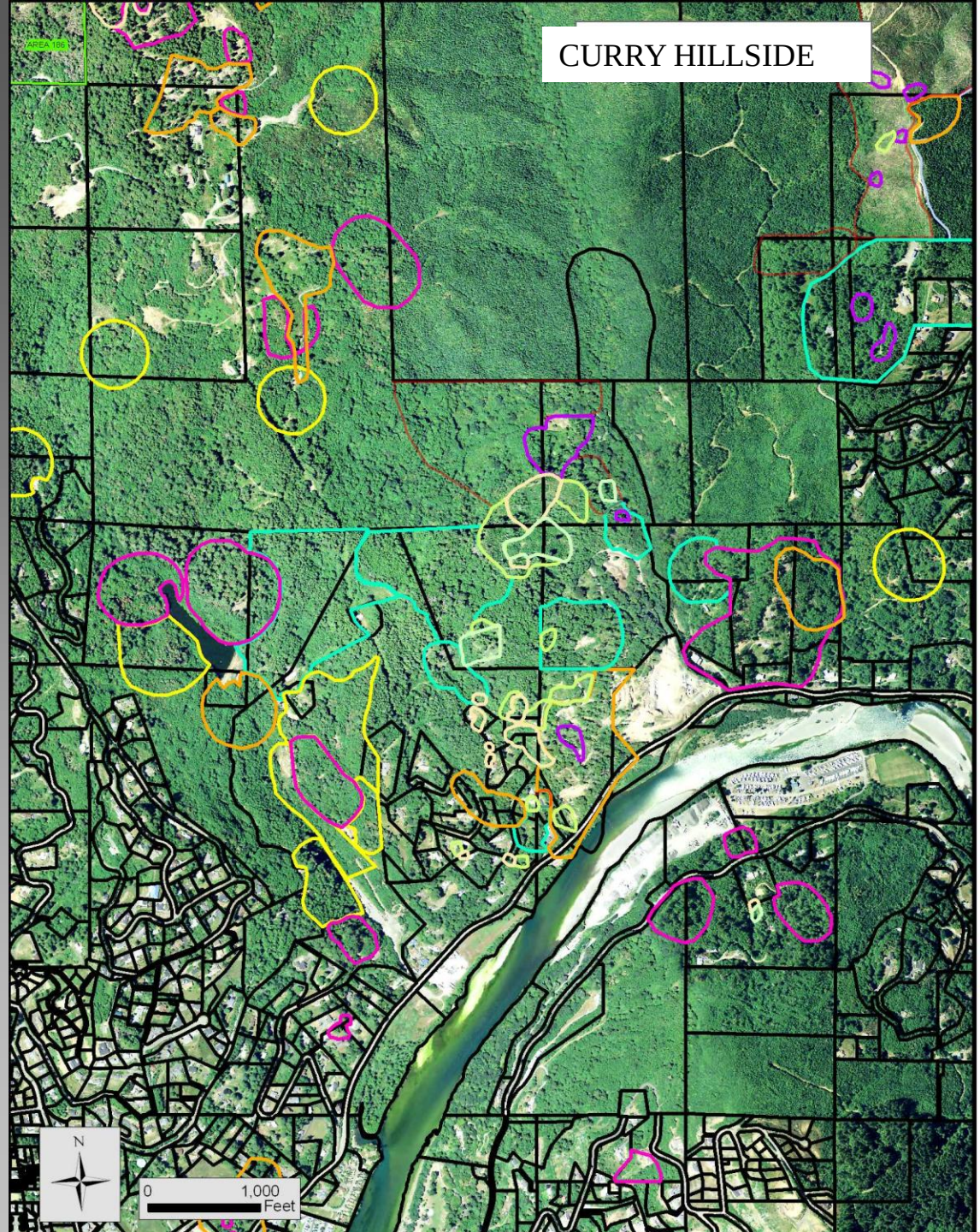
Treatment

1. Herbicide injection to prevent stump sprouting (except on BLM)
2. Cut tanoak, rhododendron, huckleberry, sometimes myrtle.
3. Burn (piles or broadcast)
4. Plant, follow-up treatments
5. No cost to landowners

HOST REDUCTION



Creating a tanoak-free zone at the periphery of infested sites, South Coast Lumber



SOD Eradication Sites

Non-industrial Private land

2001-2009

MONITORING / RESEARCH

Effect of treatments on pathogen survival and disease spread

(USFS PSW Research Station and USFS-FHP R-5 Funding)

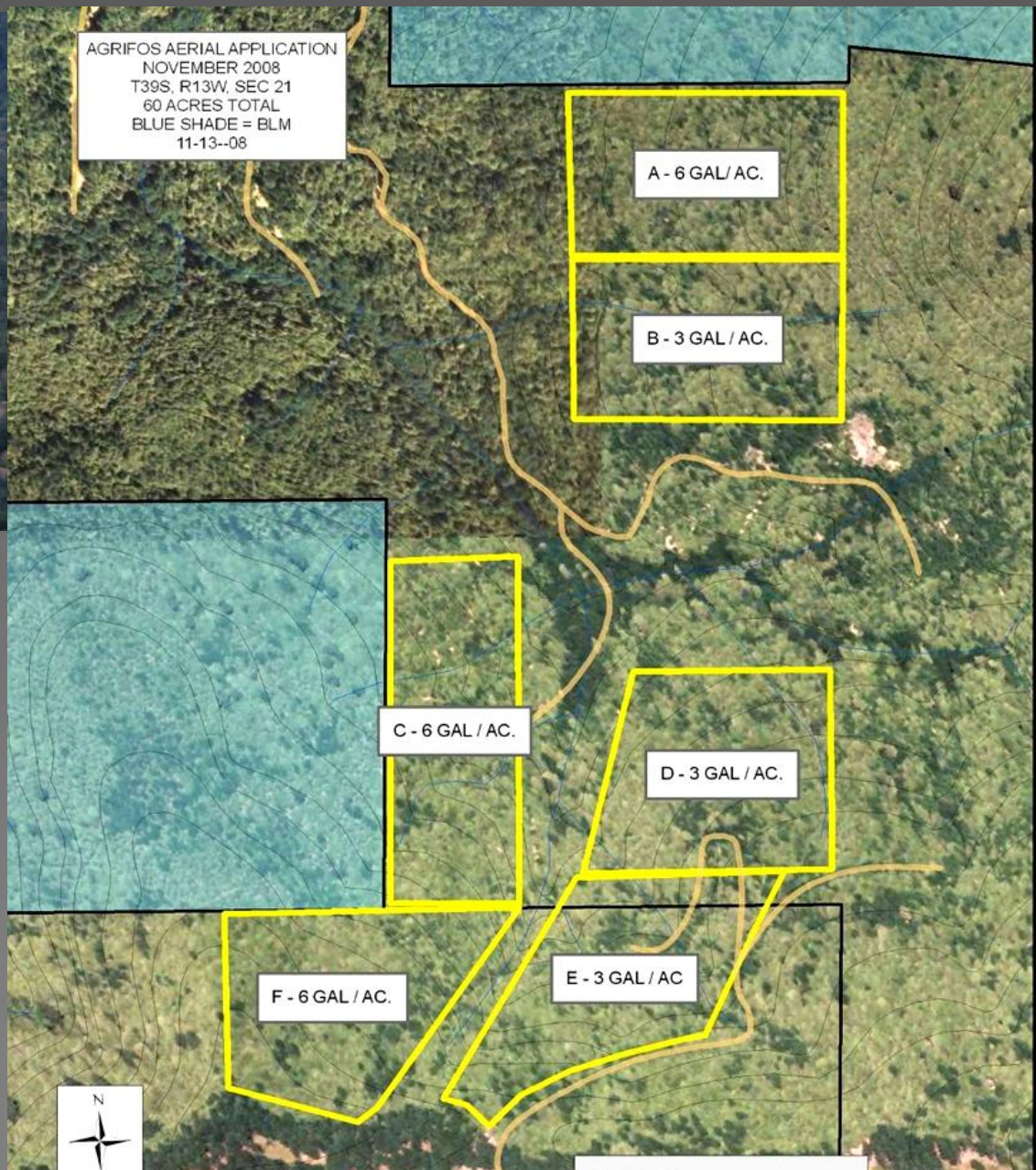
Soil and plant samples from treated sites assayed for ***P. ramorum*** (2 years)

- ***P. ramorum*** from soil on 41% of plots
- ***P. ramorum*** from plants on 11% of plots
- Overall recovery rate very low
- Eradication worked on many sites

Baited rainfall buckets to measure spore production before and during treatments

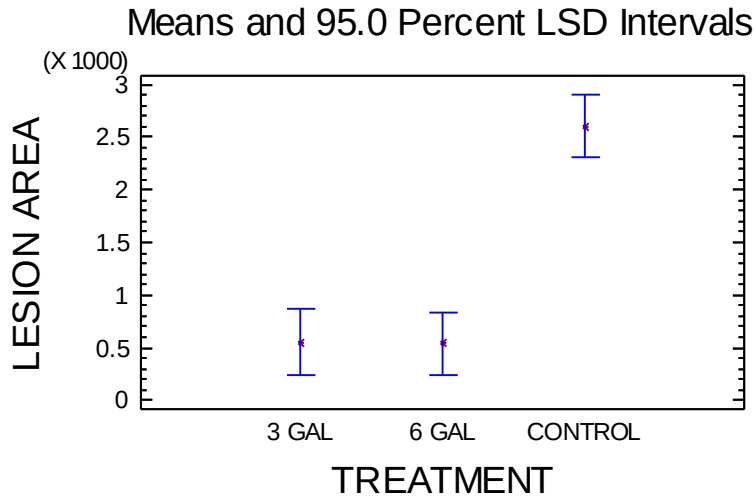
- Captured year-round in wet weather.
- Captured near infected trees during various stages of treatment;
- Not captured at perimeter of treatment sites or elsewhere in forests

AgriFos 400 (phosphonate) Aerial application

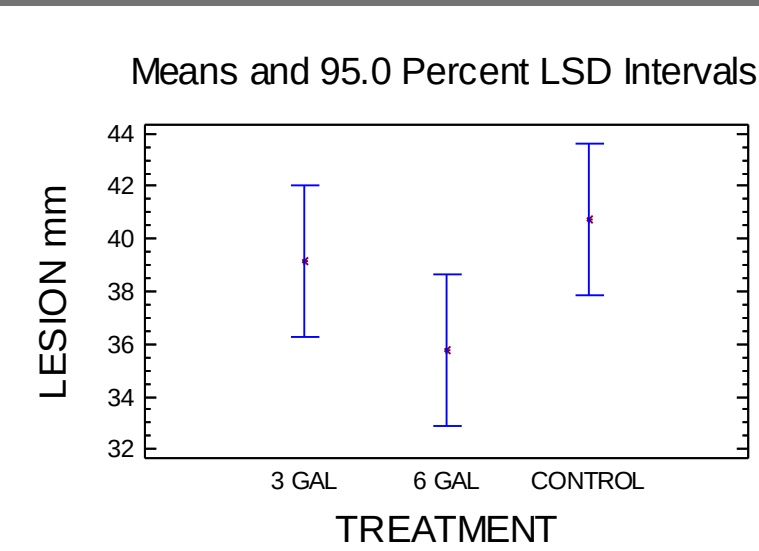


Nov 2008 & May 2009 Aerial Spray, Assay Jan 2010 (8 months p.t.)

Bole Assay



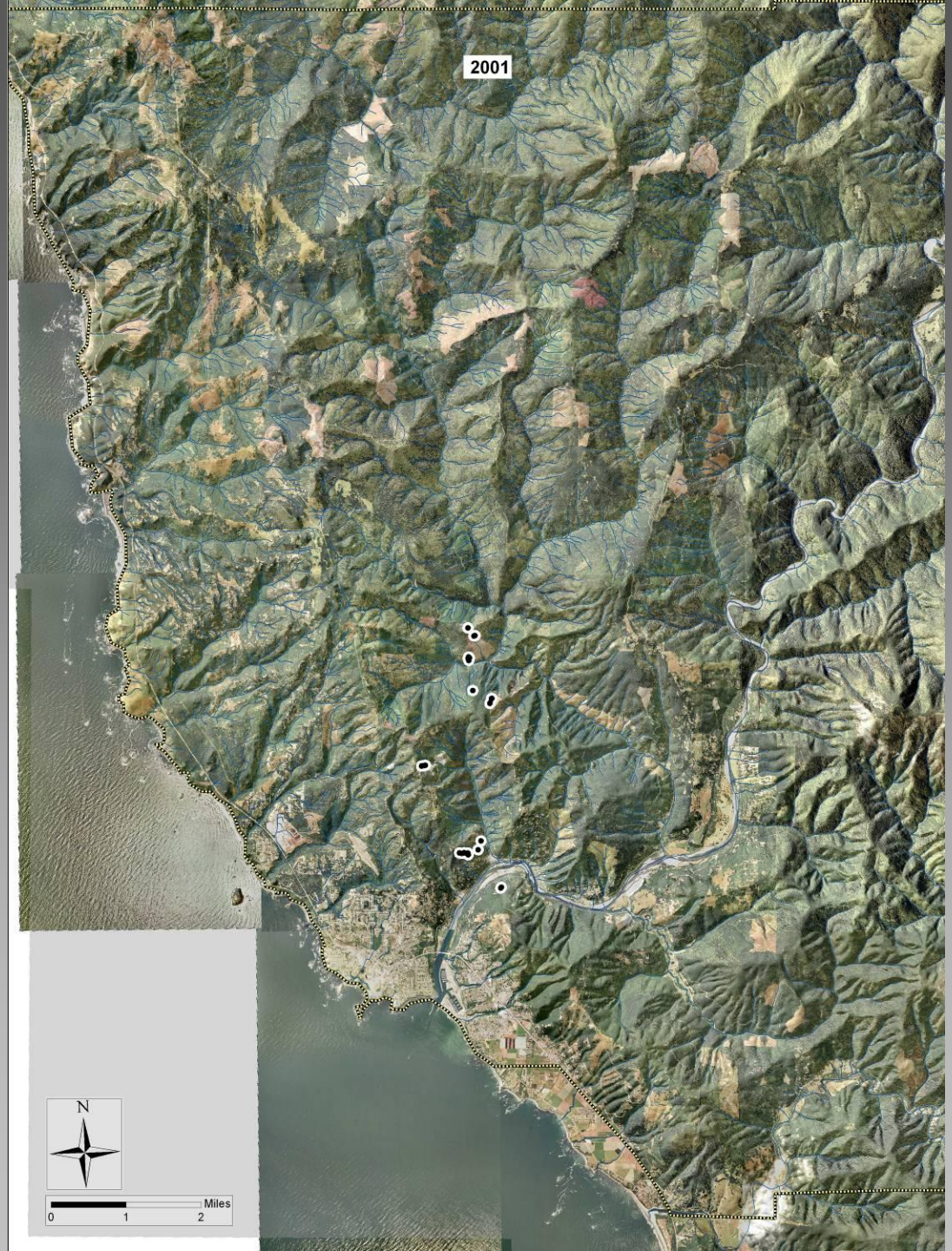
Canopy Assay



Cumulative Disease Progression 2001-2009

Shows all sites, even those that were treated

Sites enlarged for visibility



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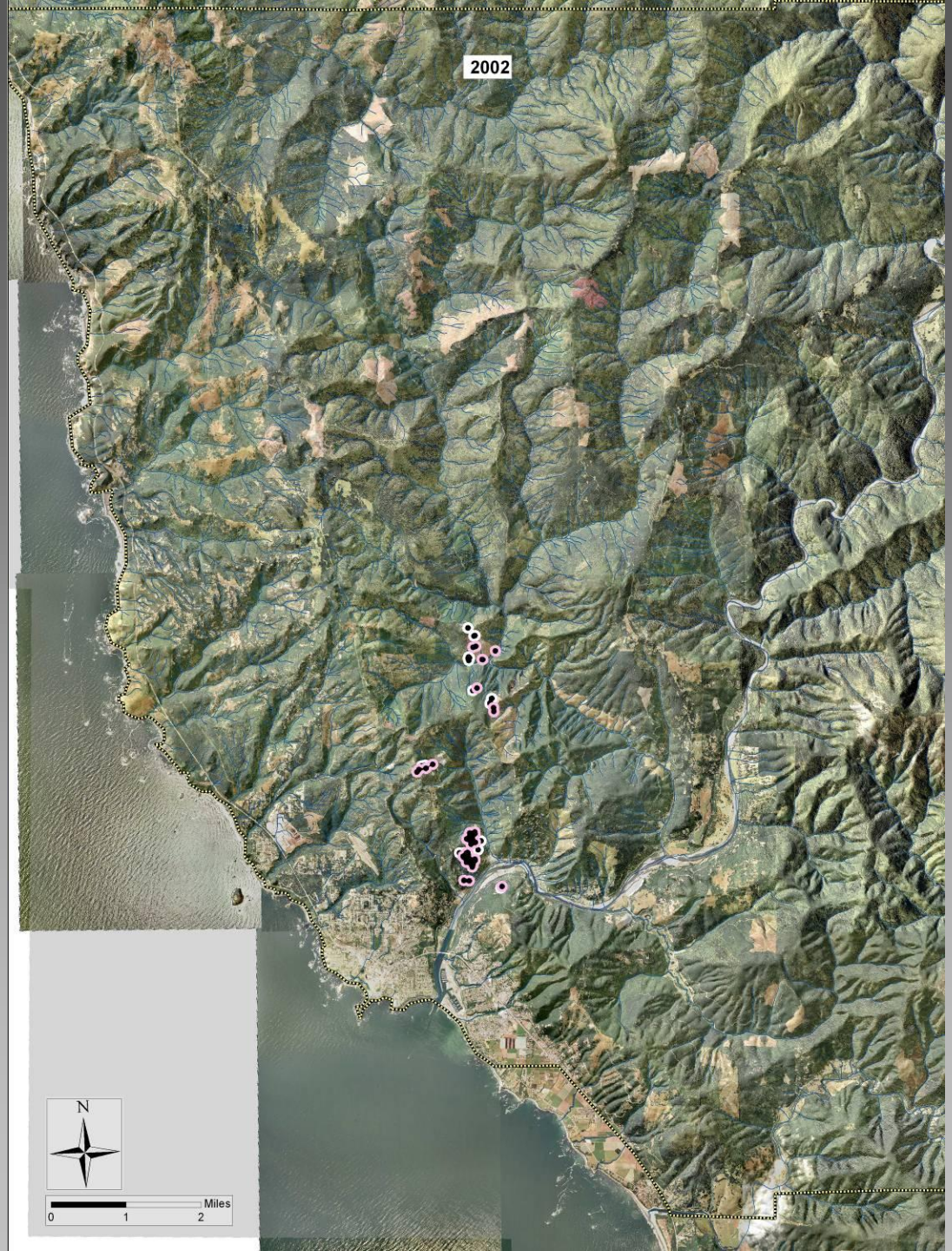

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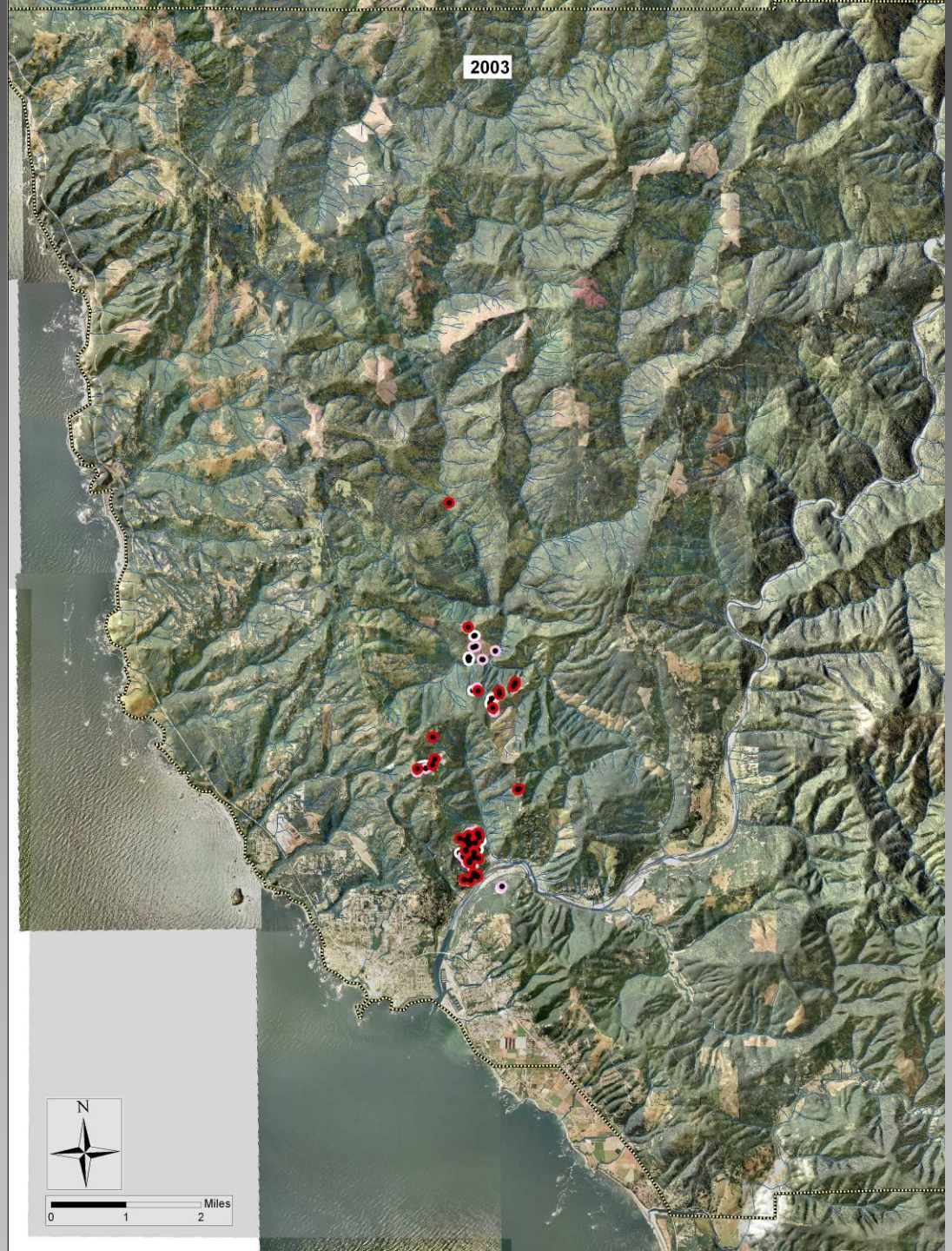

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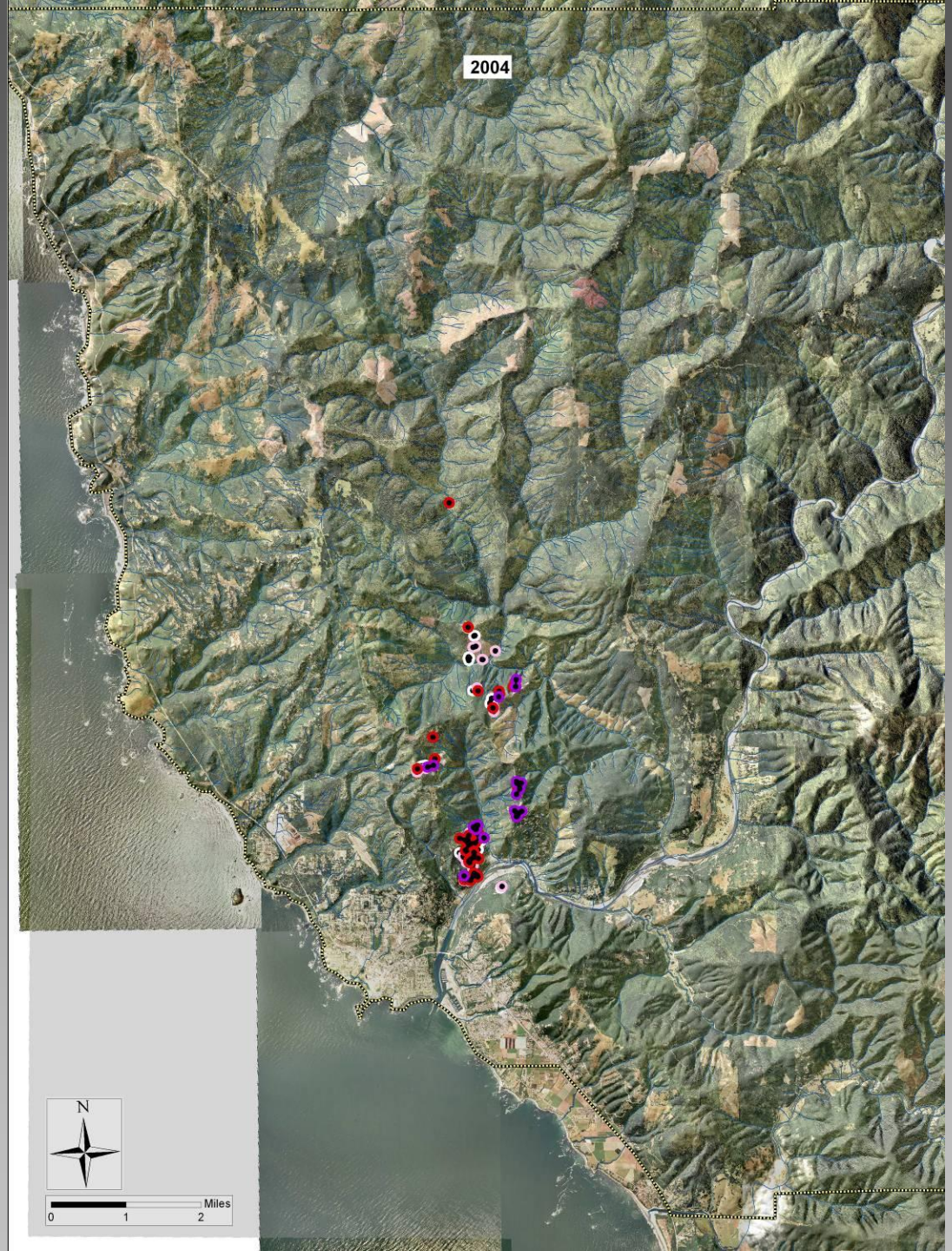

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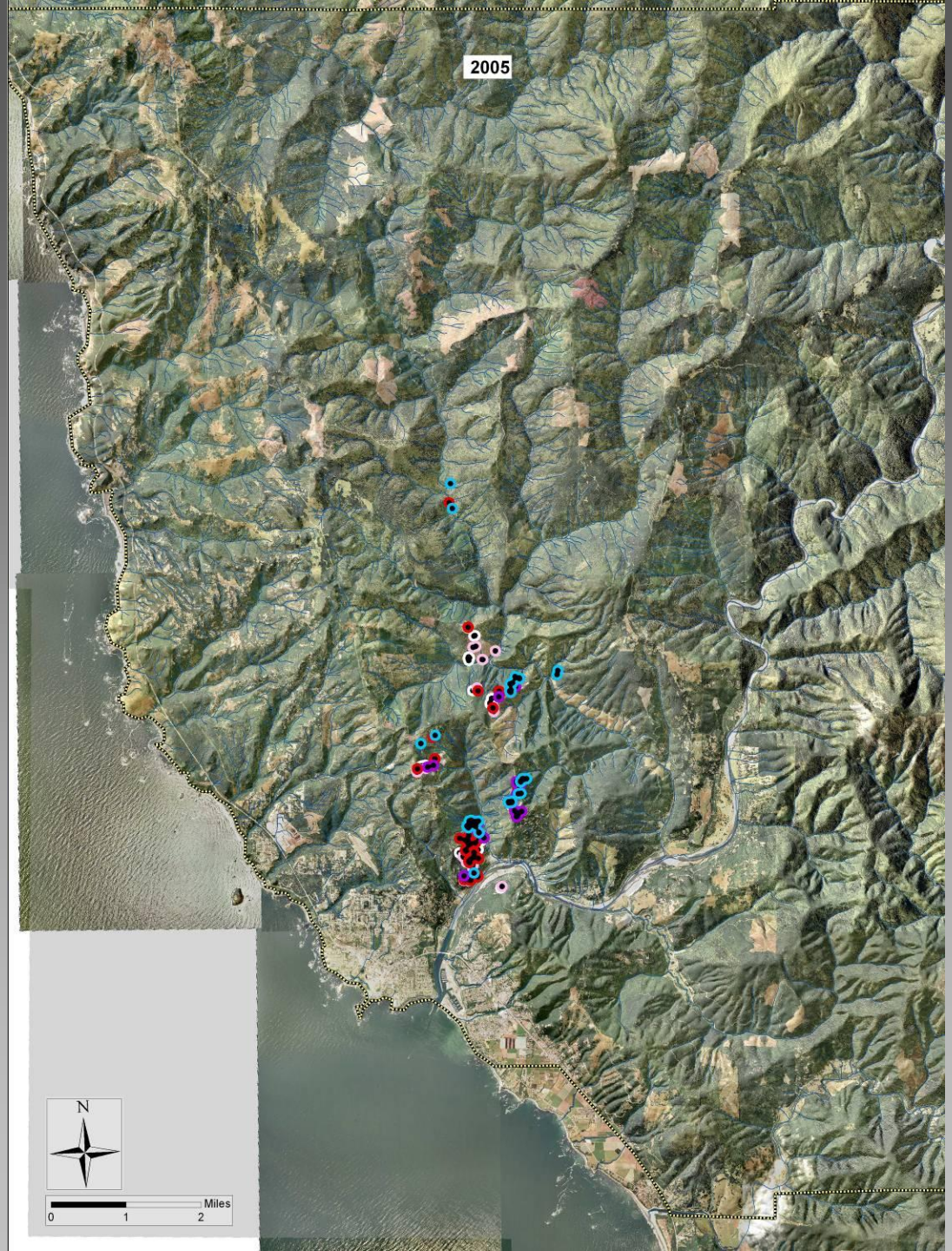

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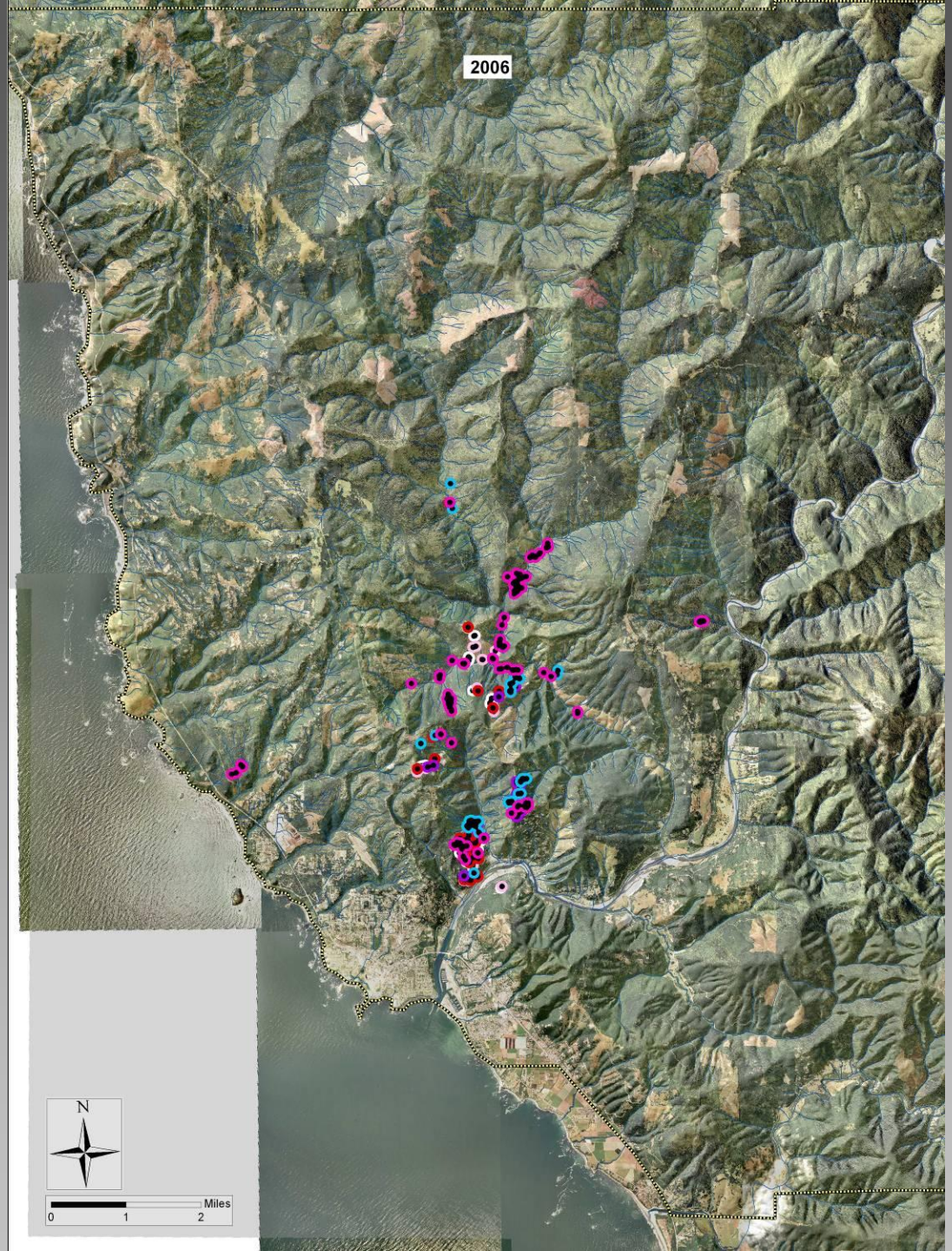

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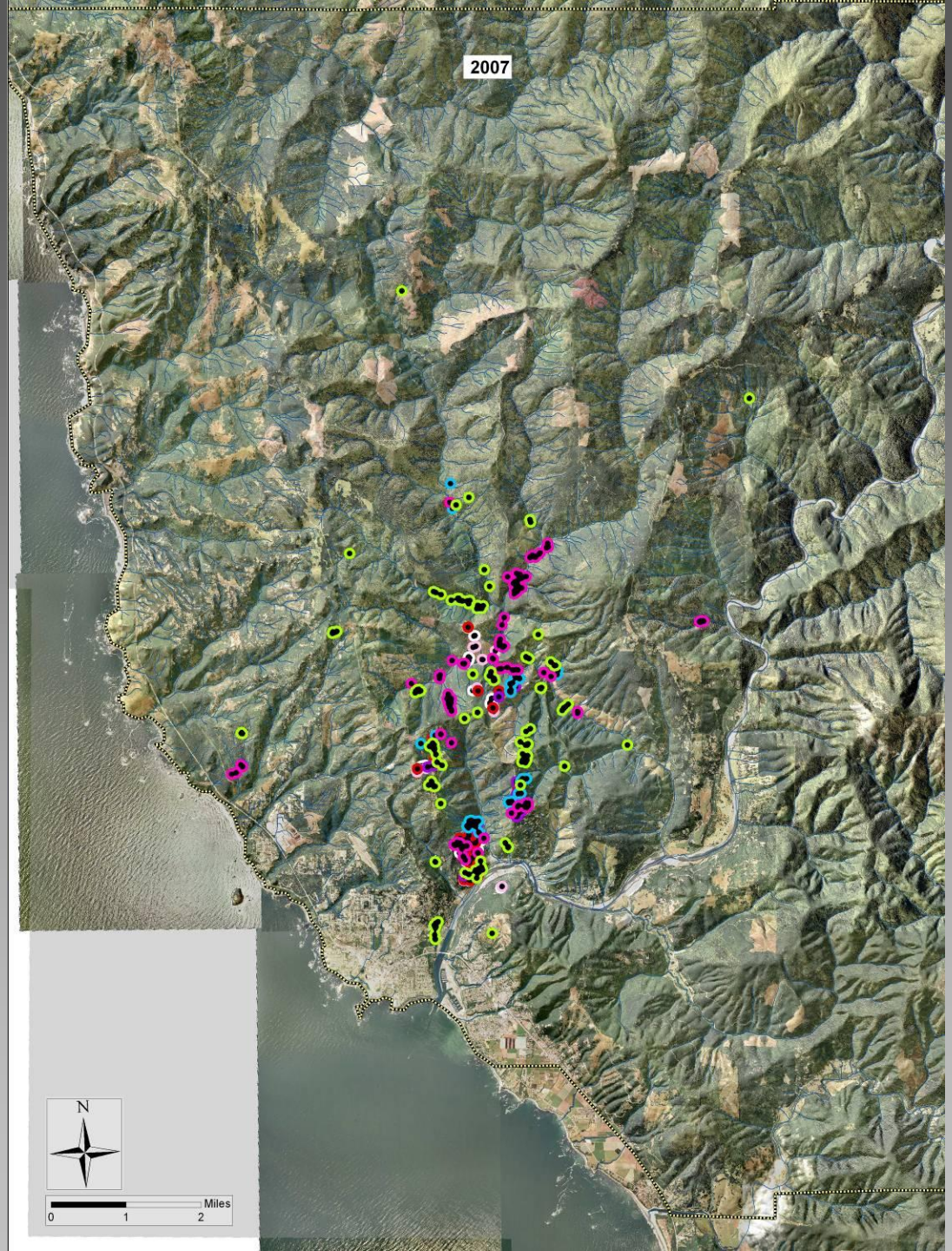

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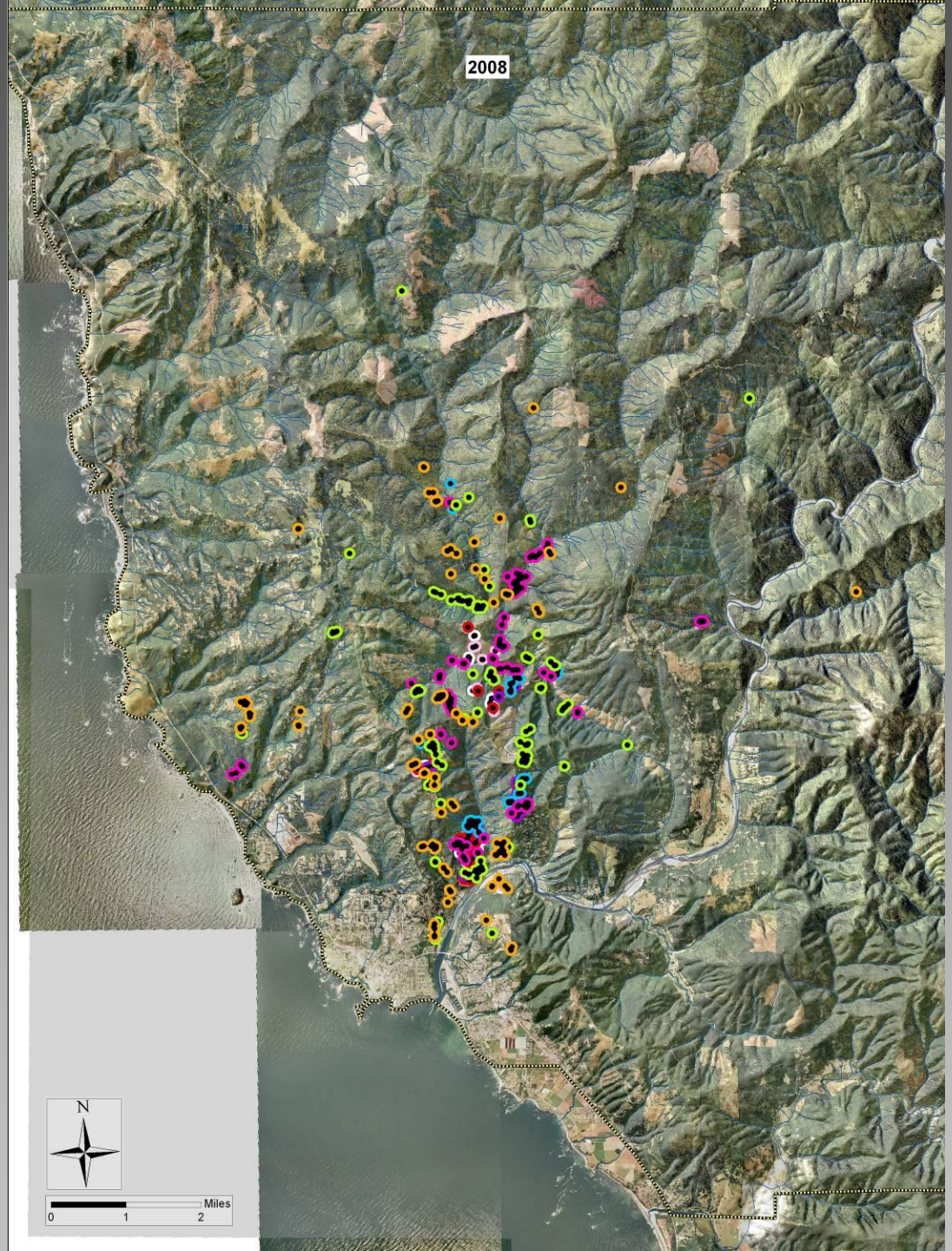

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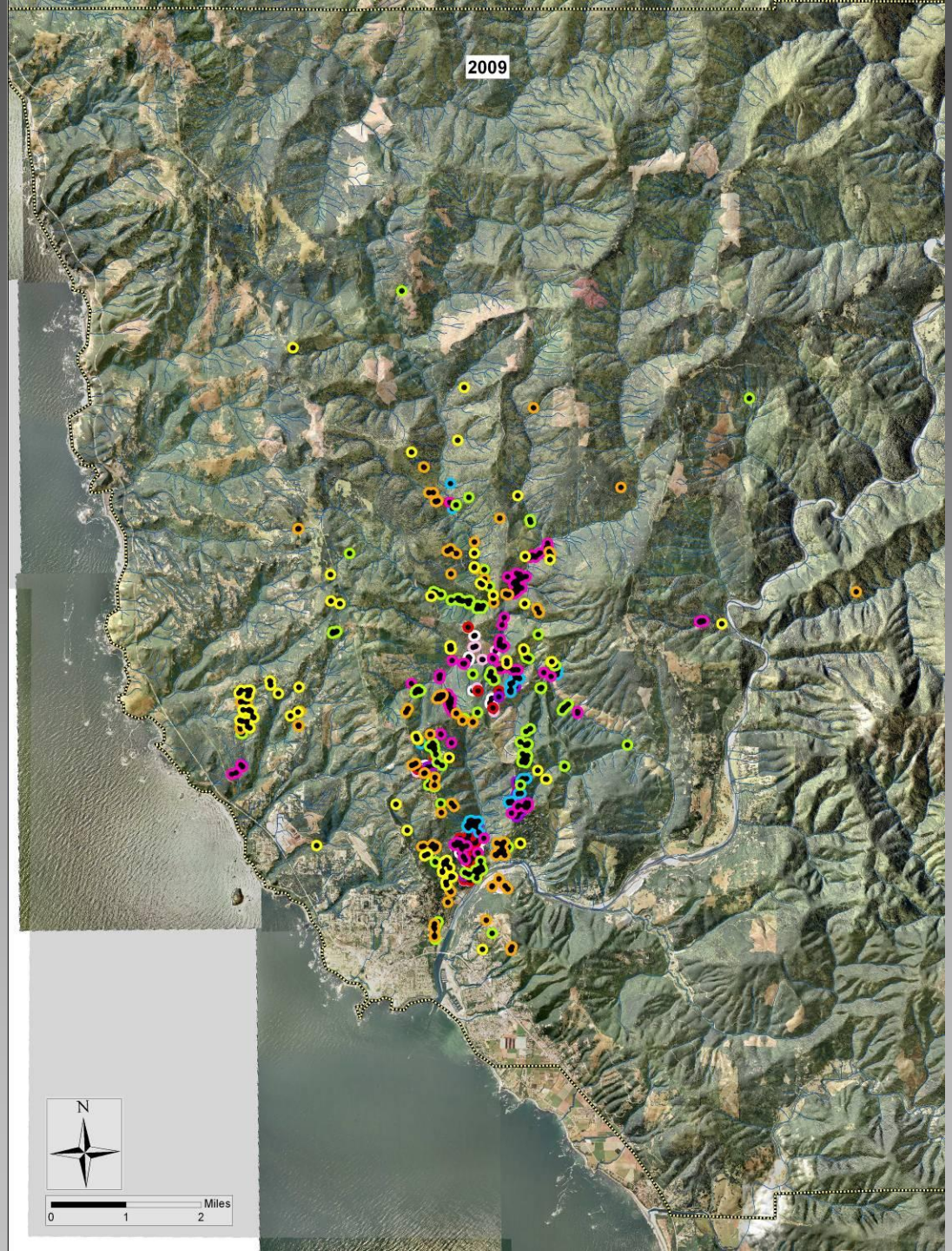
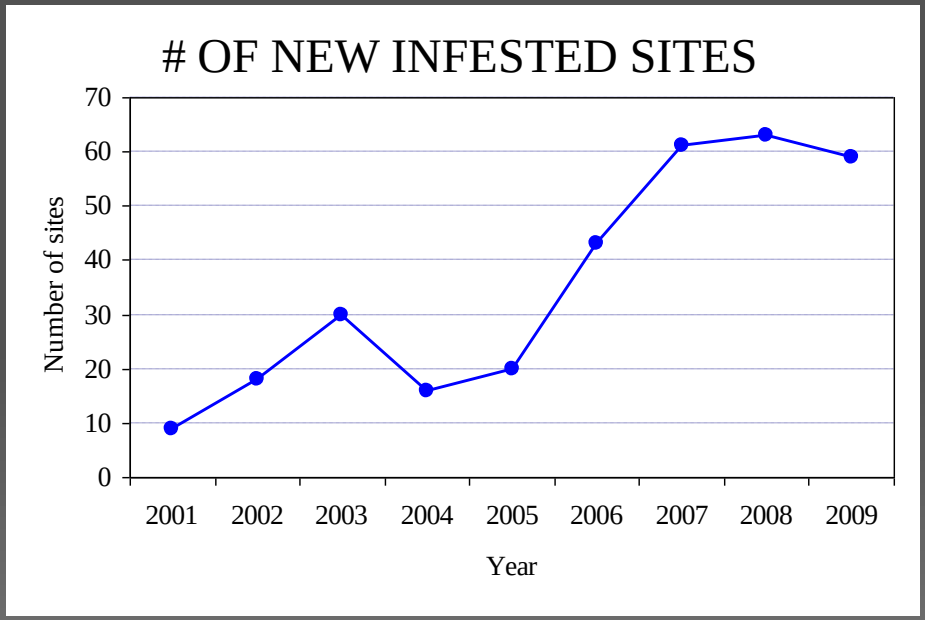
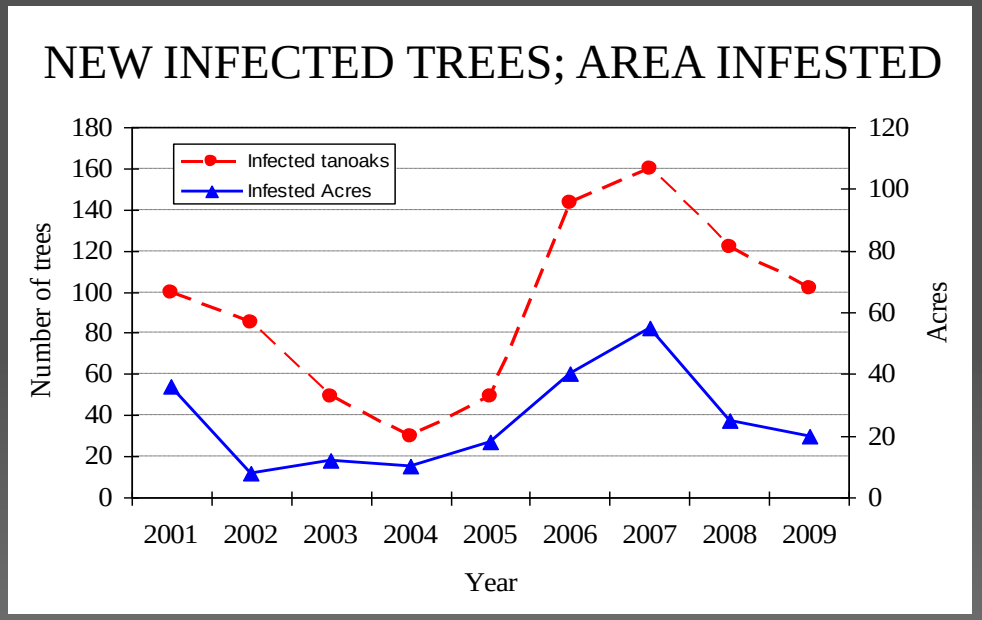
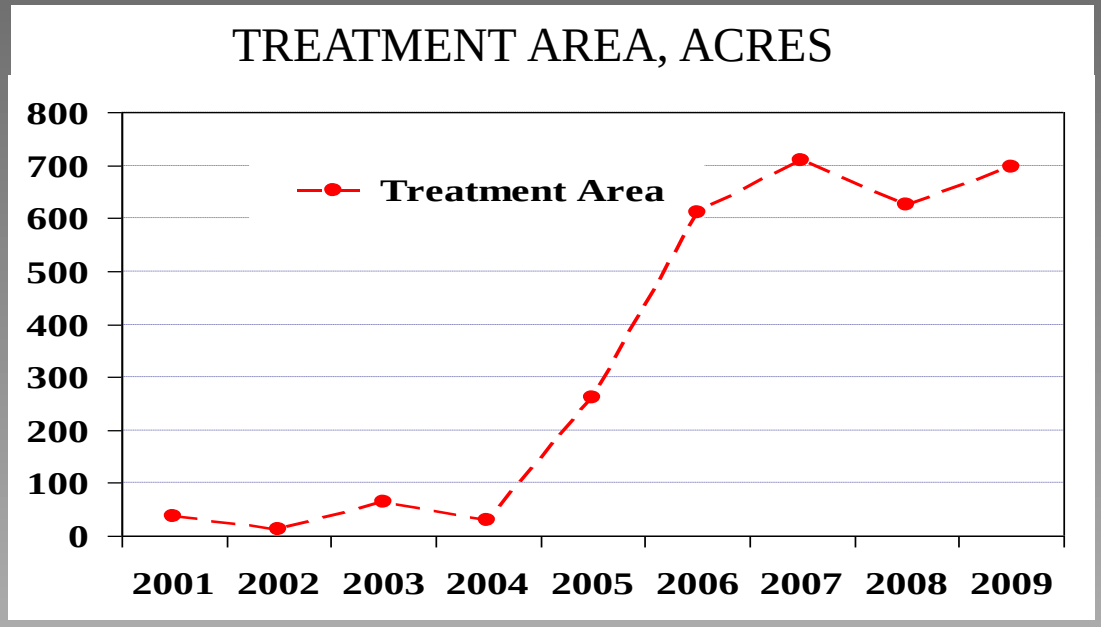
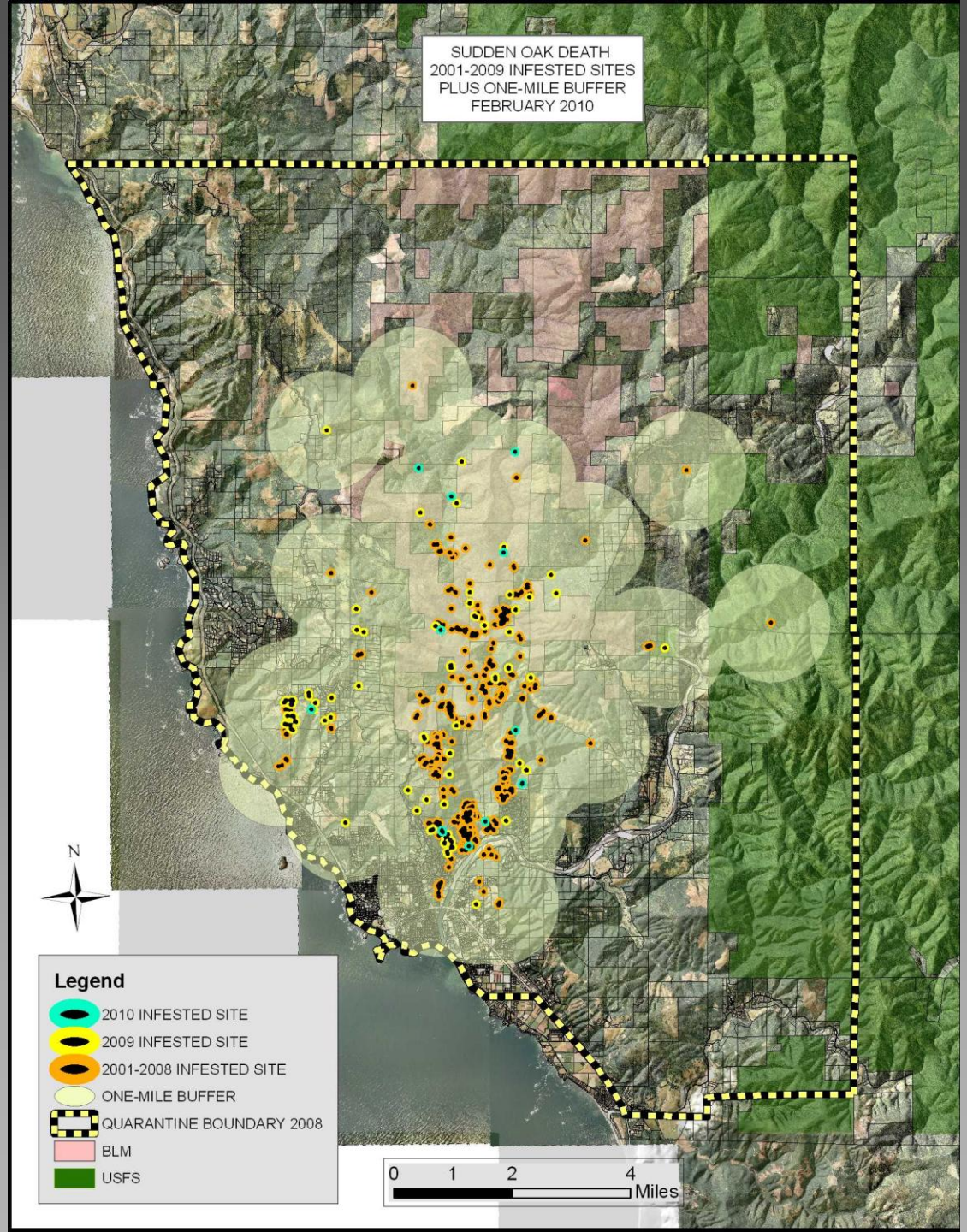



OF NEW INFESTED SITES
Number of sites
70
60
50
40
30
20
10
0
2001
2002
2003
2004
2005
2006
2007
2008
2009
Year


NEW INFECTED TREES; AREA INFESTED
Infected tanoaks
Infested Acres
Number of trees
Acres
180
160
140
120
100
80
60
40
20
0
120
100
80
60
40
20
0
2001
2002
2003
2004
2005
2006
2007
2008
2009
Year


TREATMENT AREA, ACRES
Treatment Area
800
700
600
500
400
300
200
100
0
2001
2002
2003
2004
2005
2006
2007
2008
2009



One-mile buffers

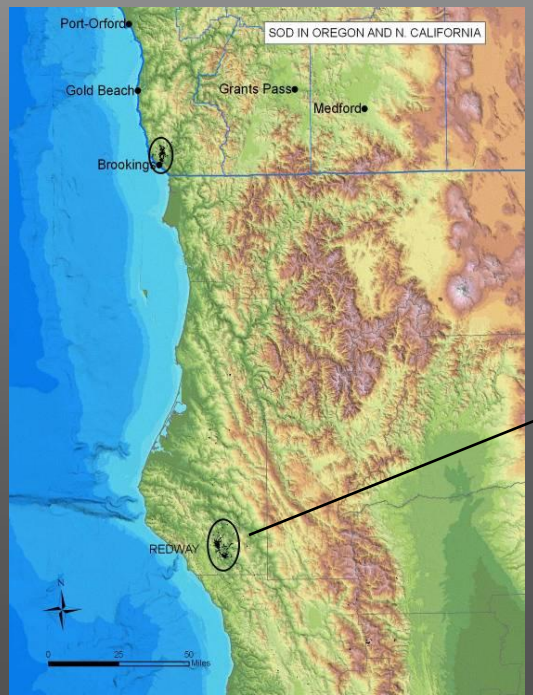
New 2010 Sites

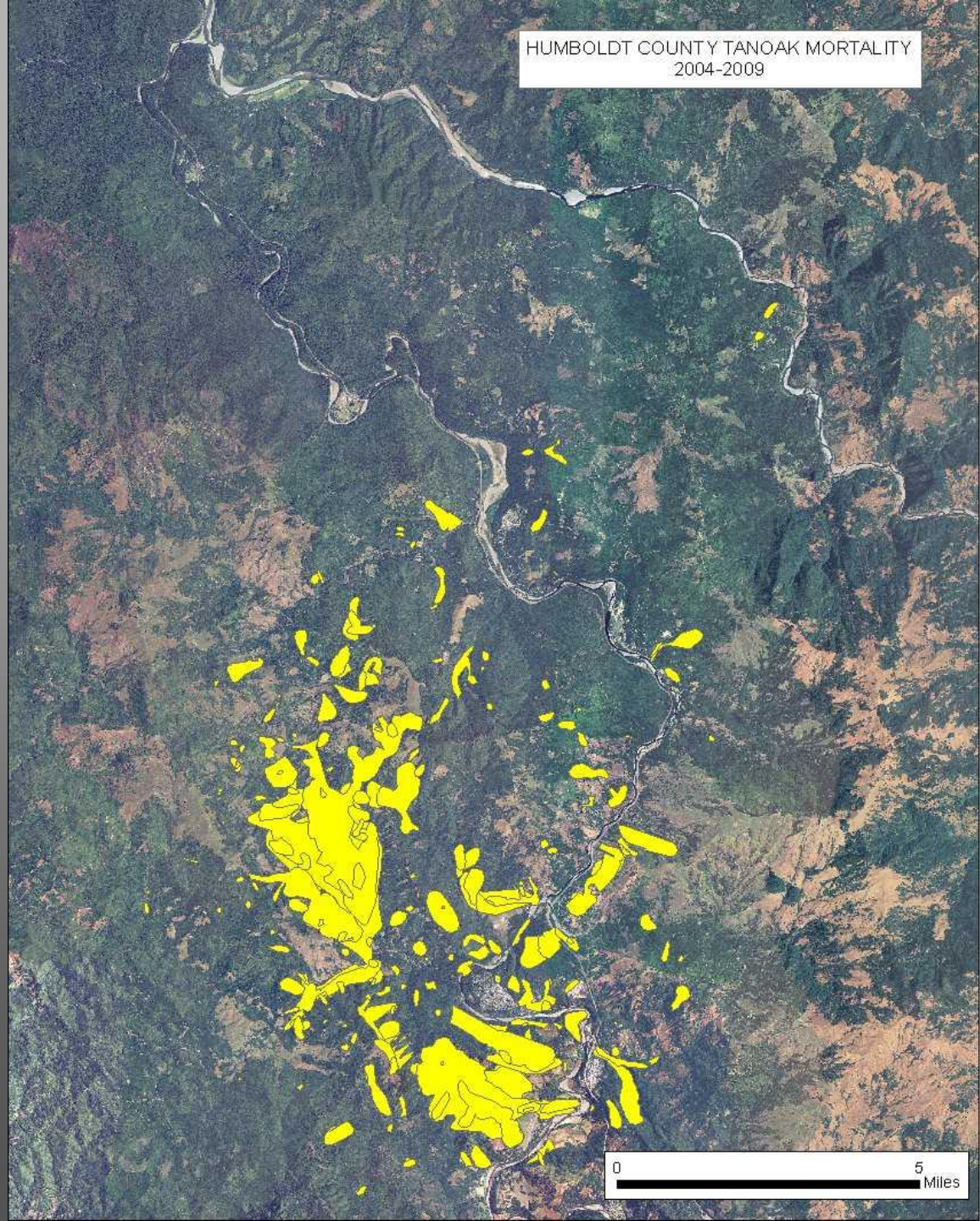
Conceptually eradication seems simple. Why does SOD continue to spread?

- *Does P. ramorum survive treatments?*
- *Detection Delays (Latency of the pathogen)*
- *Treatment Delays*

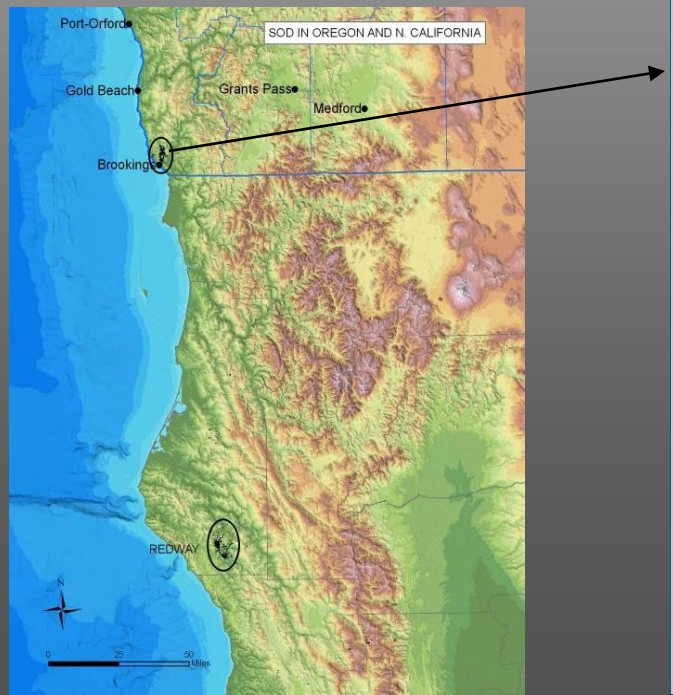
Photo by Rick Schultz, BLM

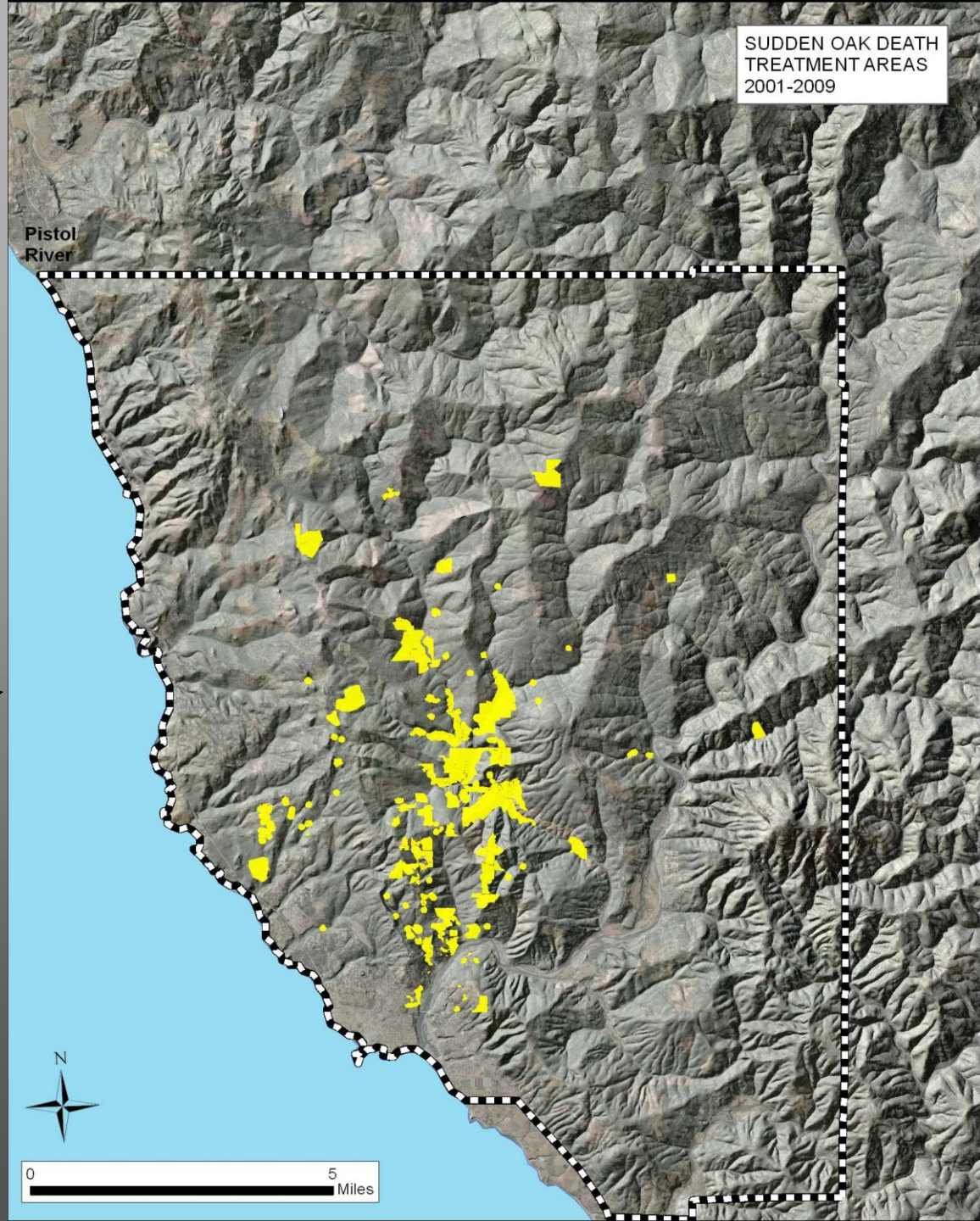
- Humboldt county, CA infestation
- Began 2001
- Initially smaller than Oregon infestation
- Limited control measures
- Cumulative area with mortality: 15,717 acres



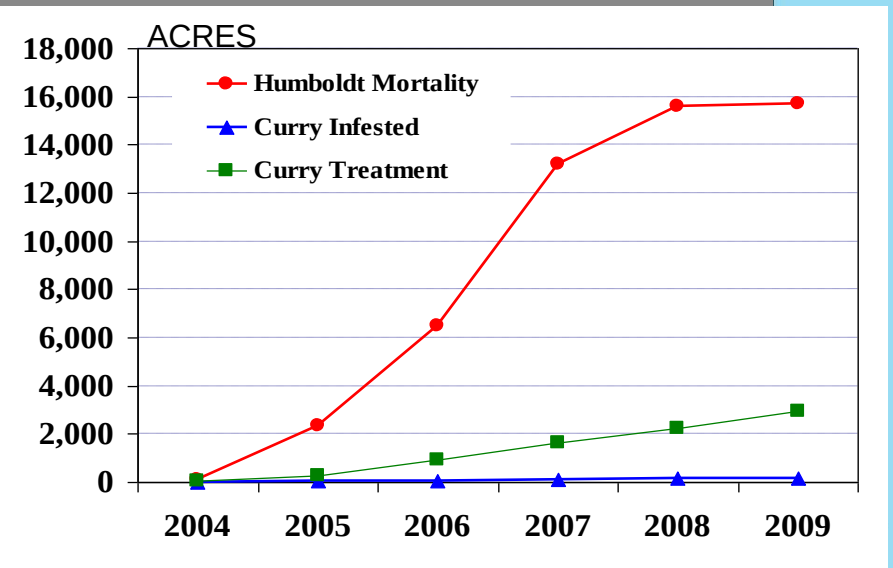


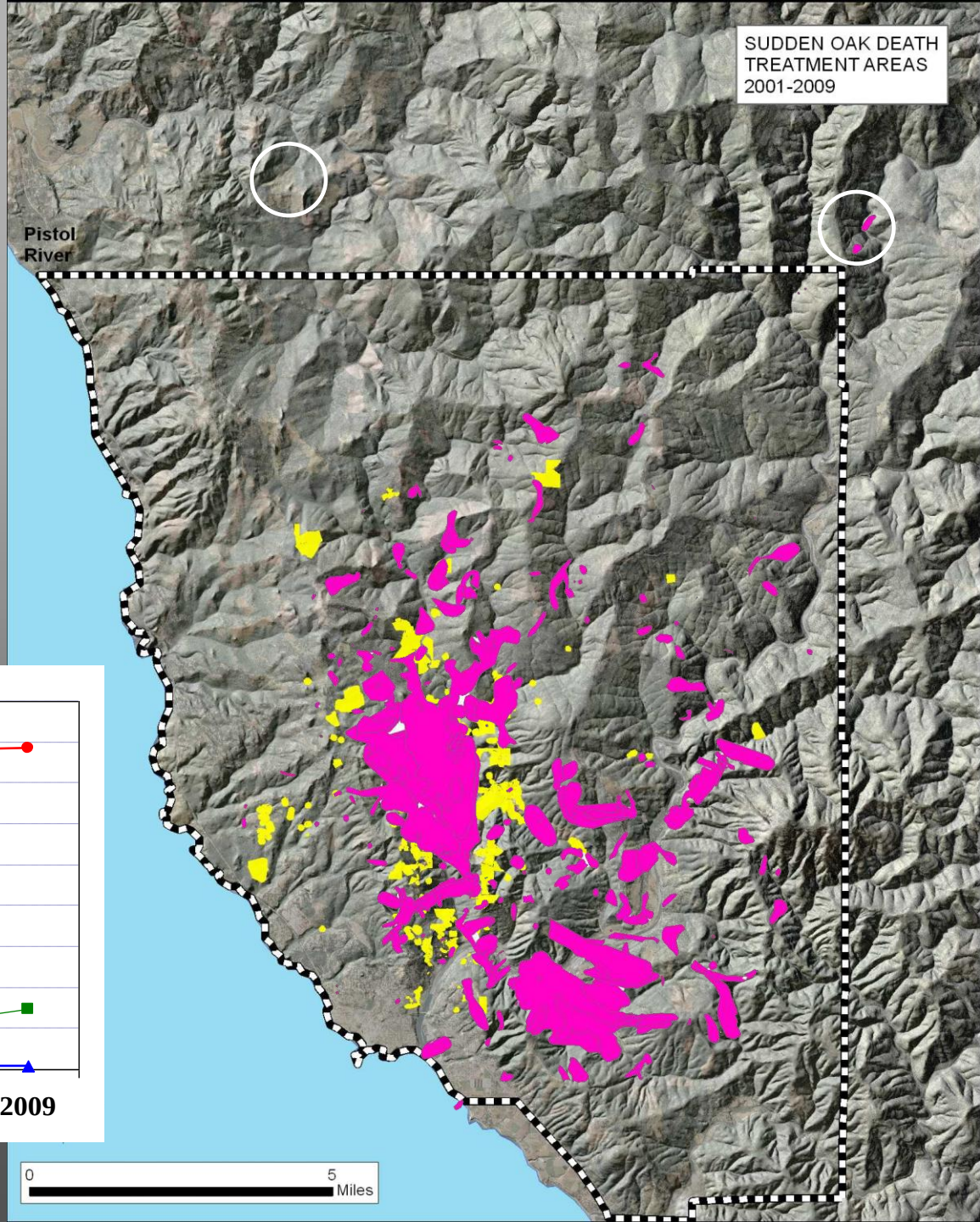
- Curry County, OR treatment areas
- Began 2001
- Ongoing eradication measures
- Cumulative infested area: <u>168 acres</u>
- Cumulative area treated: 2,931 acres



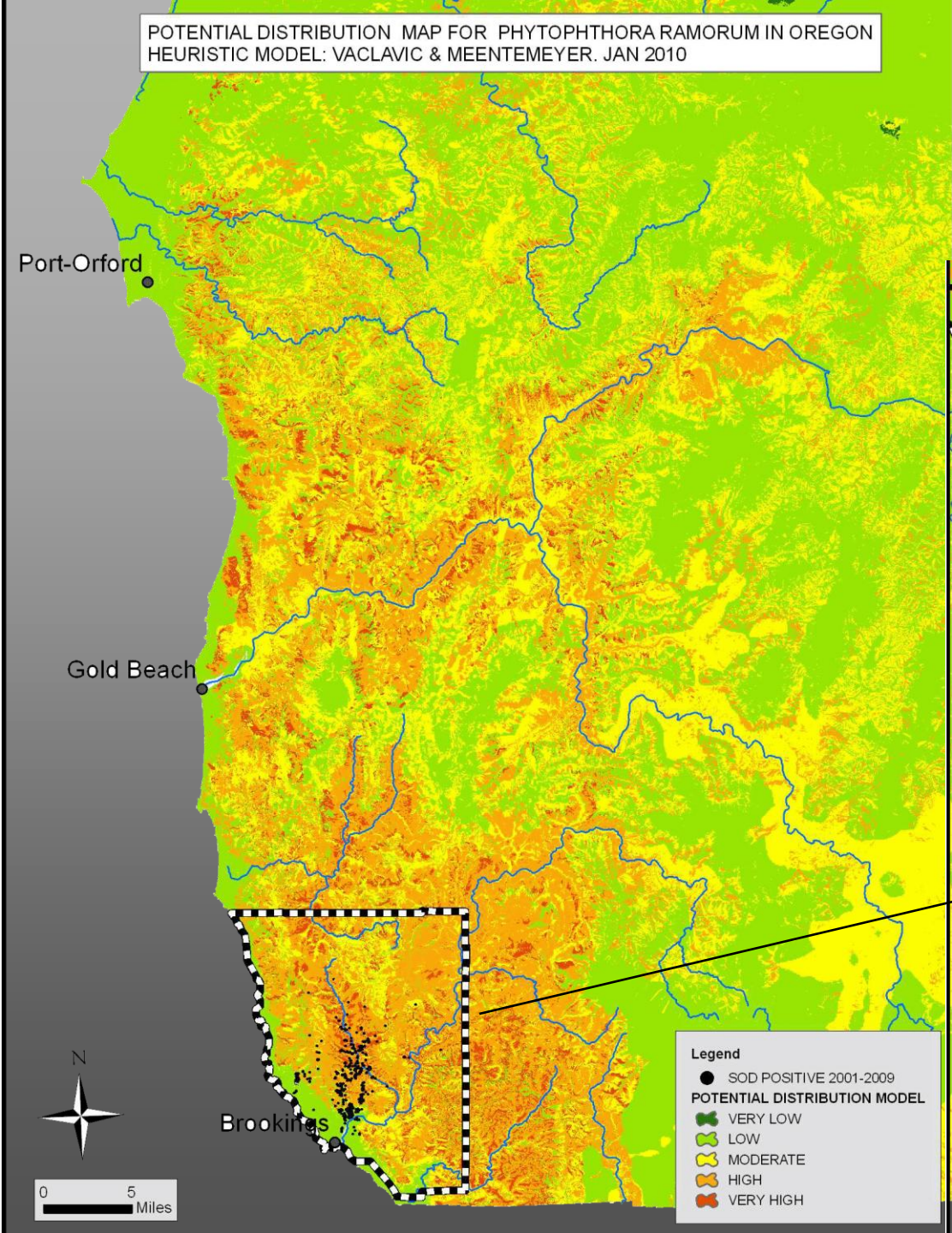


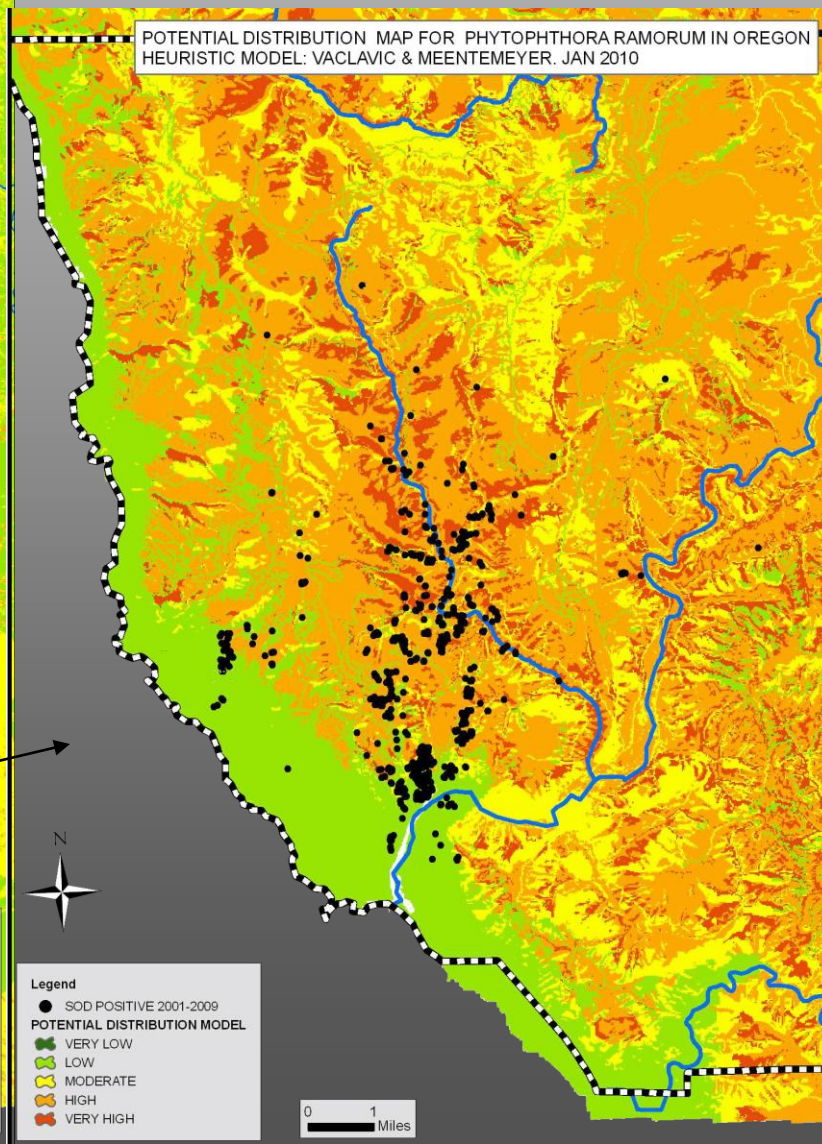
- Humboldt County infestation overlaying Curry County infestation
- A similar expansion in Oregon would have increased quarantine area
- Brookings climate more conducive to disease spread than Humboldt.



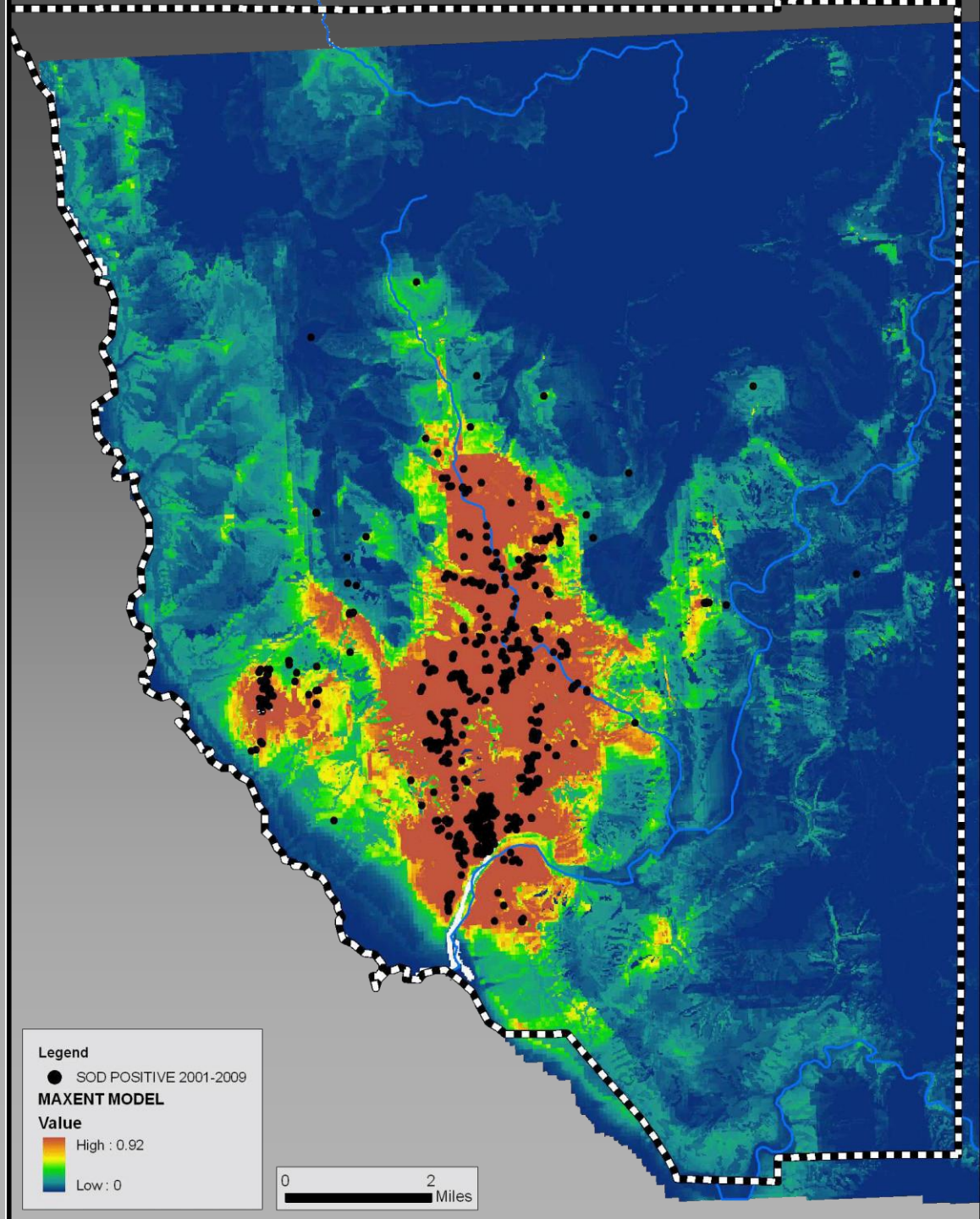


Potential Distribution Model: Vaclavic et al, February 2010





Actual Distribution Model: Vaclavic et al, February 2010



Summary and Next Steps

- **Continuing the current effort is worthwhile**
- **Our aim is eradication**
- **We reduce inoculum and thereby slow spread**
- **If funds become limited we:**
  - **Continue early detection**
  - **Treat the epidemiologically most important areas first**
  - **Reduce size of treatment areas**
  - **Find funding and partner opportunities**

- **ARRA Project ($2.67 million) – allows us to treat infested sites and do limited host removal for this year.**

- **USFS funding – contingent on non-federal matching funds**