

Monitoring *Phytophthora ramorum* in the Western US

Susan Frankel, USDA Forest Service,
State and Private Forestry, Forest Health
Protection, Pacific Southwest Region,
Vallejo, CA



Outline

1. CA – quick overview of *P. ramorum* status
2. Oregon – pathogen status and activity
3. 2003 Results: research plots, CA aerial survey and targeted ground-based survey
4. Humboldt County – case study
5. 2004 CA monitoring strategy



Marin County, 2000



Marin County, 2000



Marin County, 2000



Big Sur, 2004





Big Sur, 2003



Sonoma County, 2003

Susceptible Species

Tanoak

Canyon live oak

Bigleaf maple

Coffeeberry

California buckeye

Salmonberry

Western starflower

California hazelnut

Mountain laurel**

Pieris species

Camellia species

Rhododendrons

Northern red oak**

Horse Chestnut**

Coast live oak

California black oak

Toyon

Cascara

Coast redwood

Manzanita

Grand fir

Lingonberry**

European yew**

Strawberry tree**

Viburnum species

California bay laurel

Southern red oak**

Shreve oak

Madrone

Lilac**

Huckleberry

Honeysuckle

Poison oak

Douglas-fir

Witch-hazel**

Victorian box

European beech**

Holm oak**

Sweet Chestnut**

** Europe only

Distribution of Sudden Oak Death as of December 10, 2003



- 525 confirmations in oakmapper – GIS, Kelly, Tuxen UCB
- 260 in Rizzo lab (UC-D) research database
- Over 200 from Garbelotto research database (UC-B)



Oregon: *Phytophthora ramorum* status

Alan Kanaskie, Michael McWilliams - ODF

Ellen Goheen, Bob Schroeter – USDA-FS

Everett Hansen, Wendy Sutton – OSU

Nancy Osterbauer – Oregon Dept. of Agric.

Curry County, Oregon



Photo by Mike McWilliams ODF, 2001



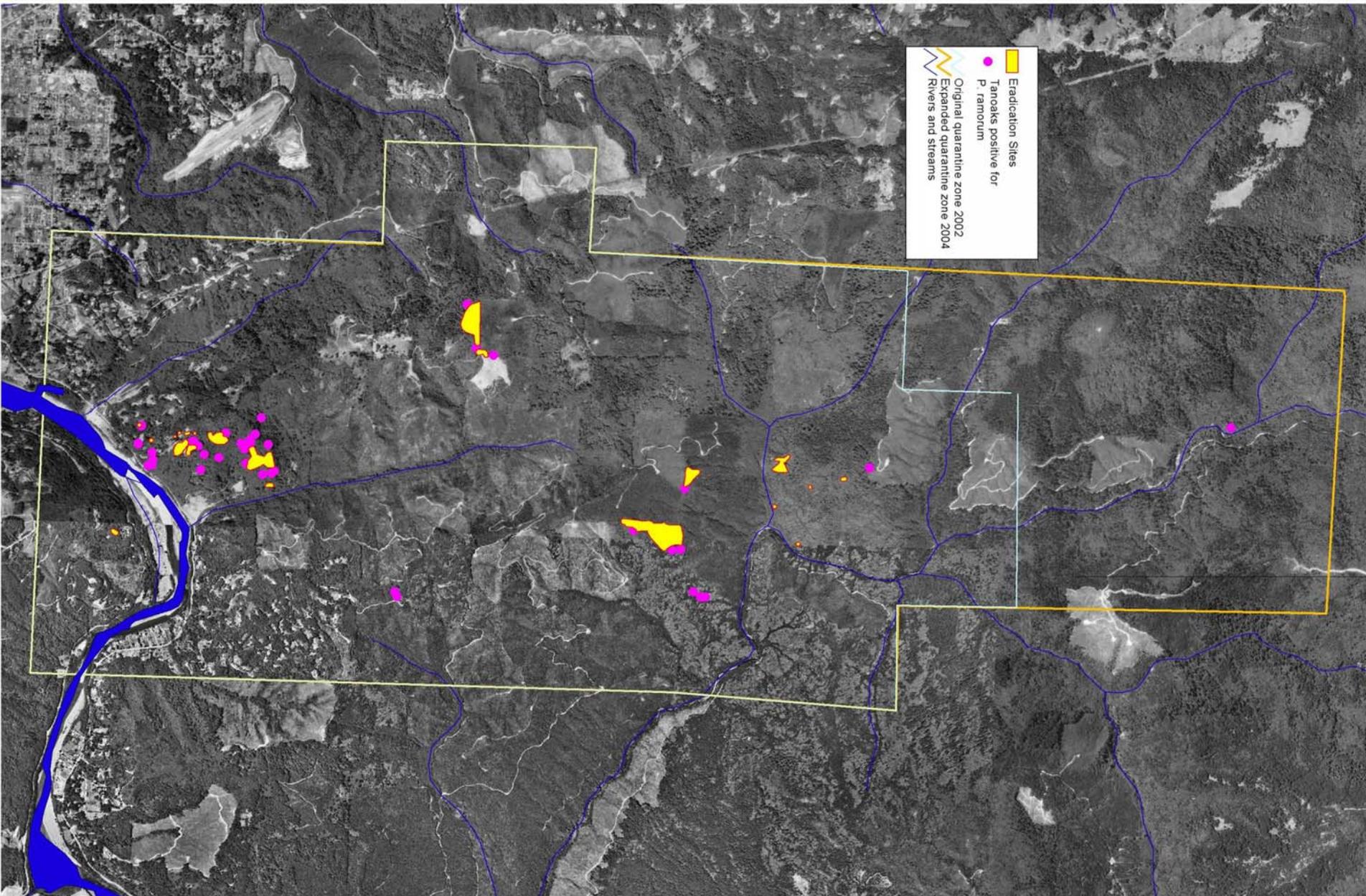
Goheen, USDA-FS, 2002

Oregon Activity

- 60 total acres under eradication
- 12 New patches - 1.8, 0.8 and 0.25 miles from eradication sites. Expanding regulated area from 9 m² to 11 m²
- Stream baiting – 9 of 17 positive
- Rainwater collection – negative six sites
- Monitoring eradication sites – 50% of sites show infected tanoak sprouts

Disease status – Oregon

Year	New detects	New patches	Acres
2001	91	9	40
2002	85	12	8
2003	48	12	11.5



Yellow rectangle: Eradication Sites
Pink dot: Tanoaks positive for *P. ramorum*
Light blue rectangle: Original quarantine zone 2002
Yellow rectangle: Expanded quarantine zone 2004
Blue lines: Rivers and Streams

Kanaskie, ODF



Hansen, OSU photo



Hansen, OSU photo



Hansen, OSU photo

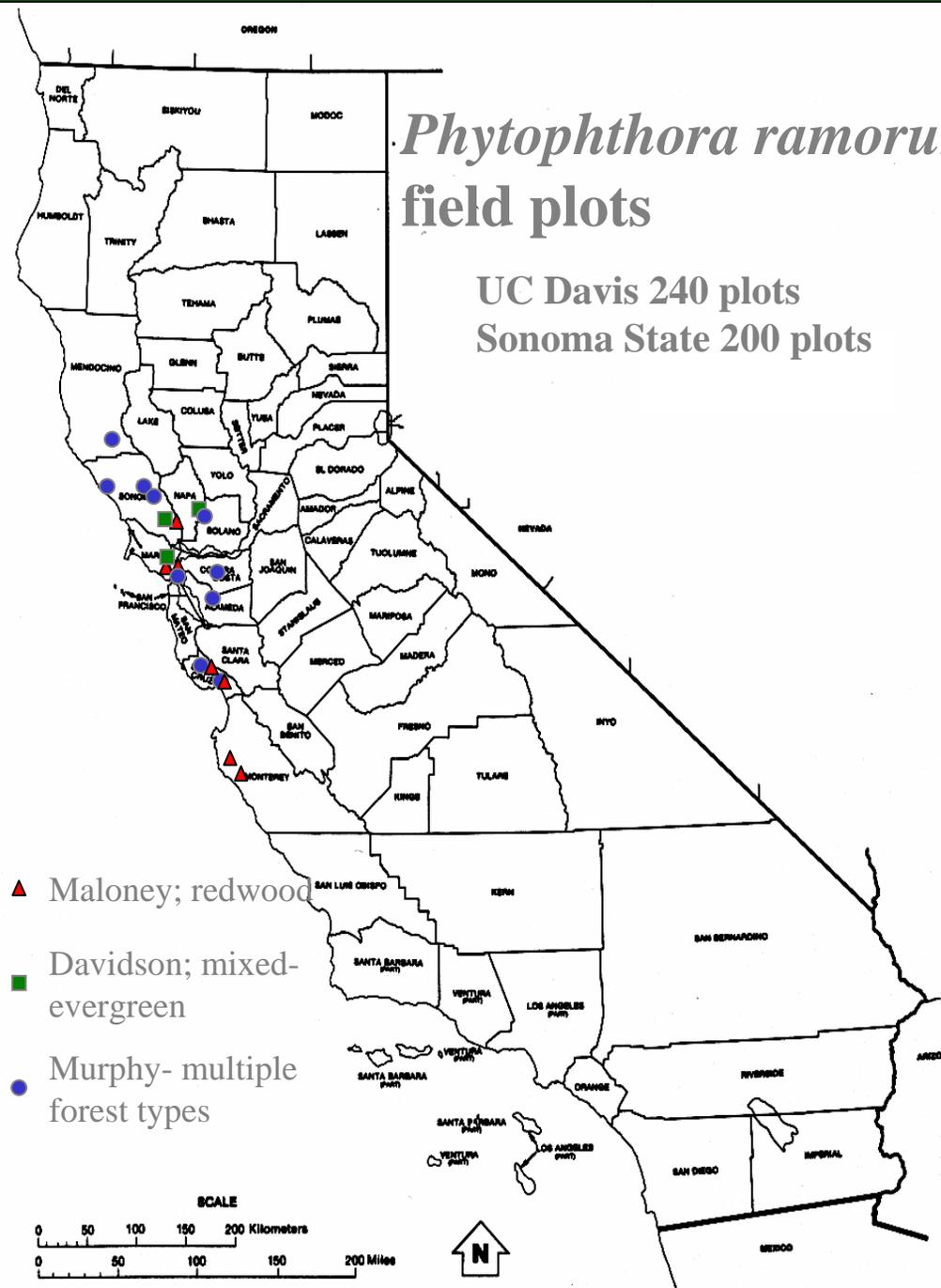
2003 results from CA



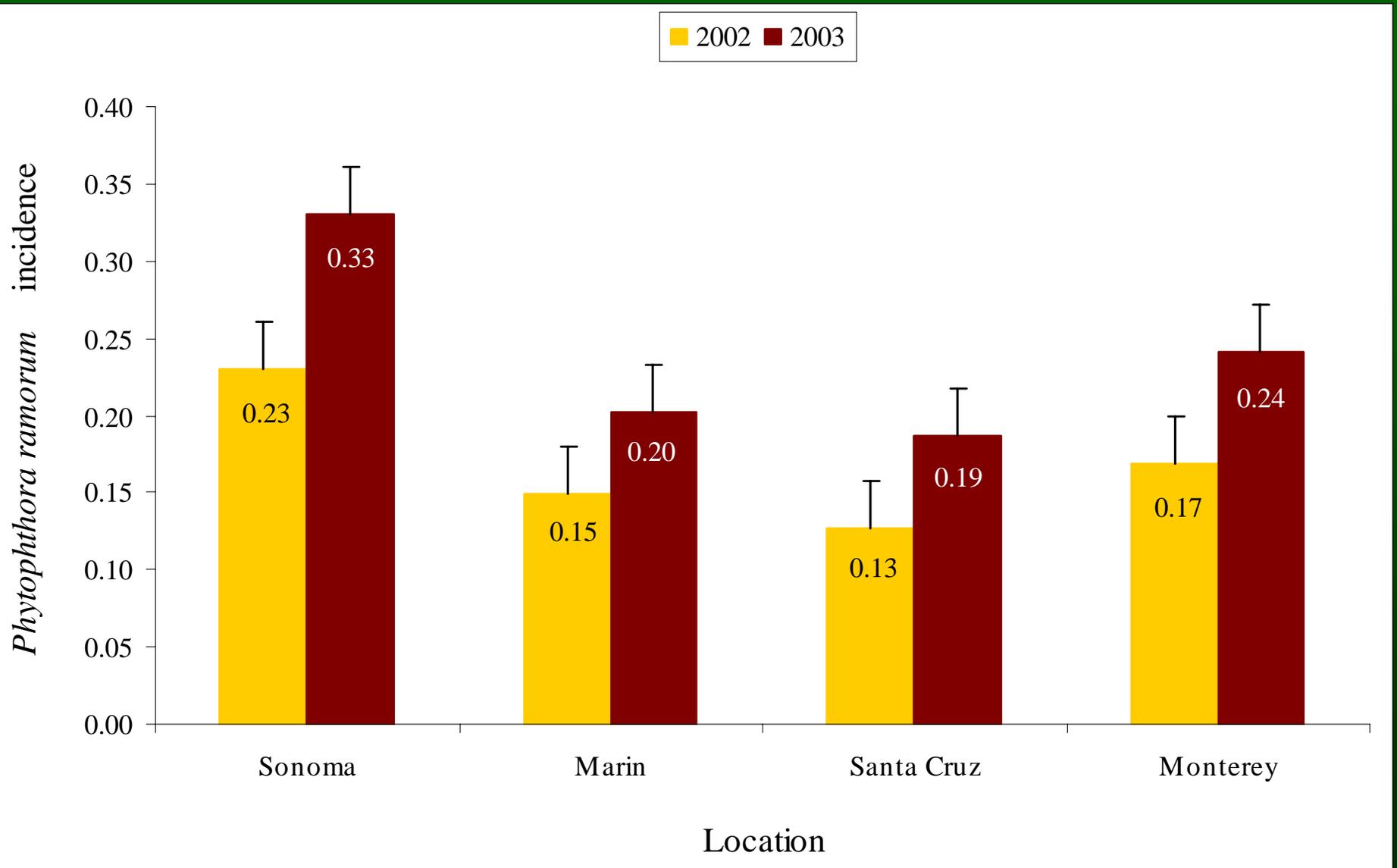
Big Sur, 2004

Phytophthora ramorum field plots

UC Davis 240 plots
Sonoma State 200 plots

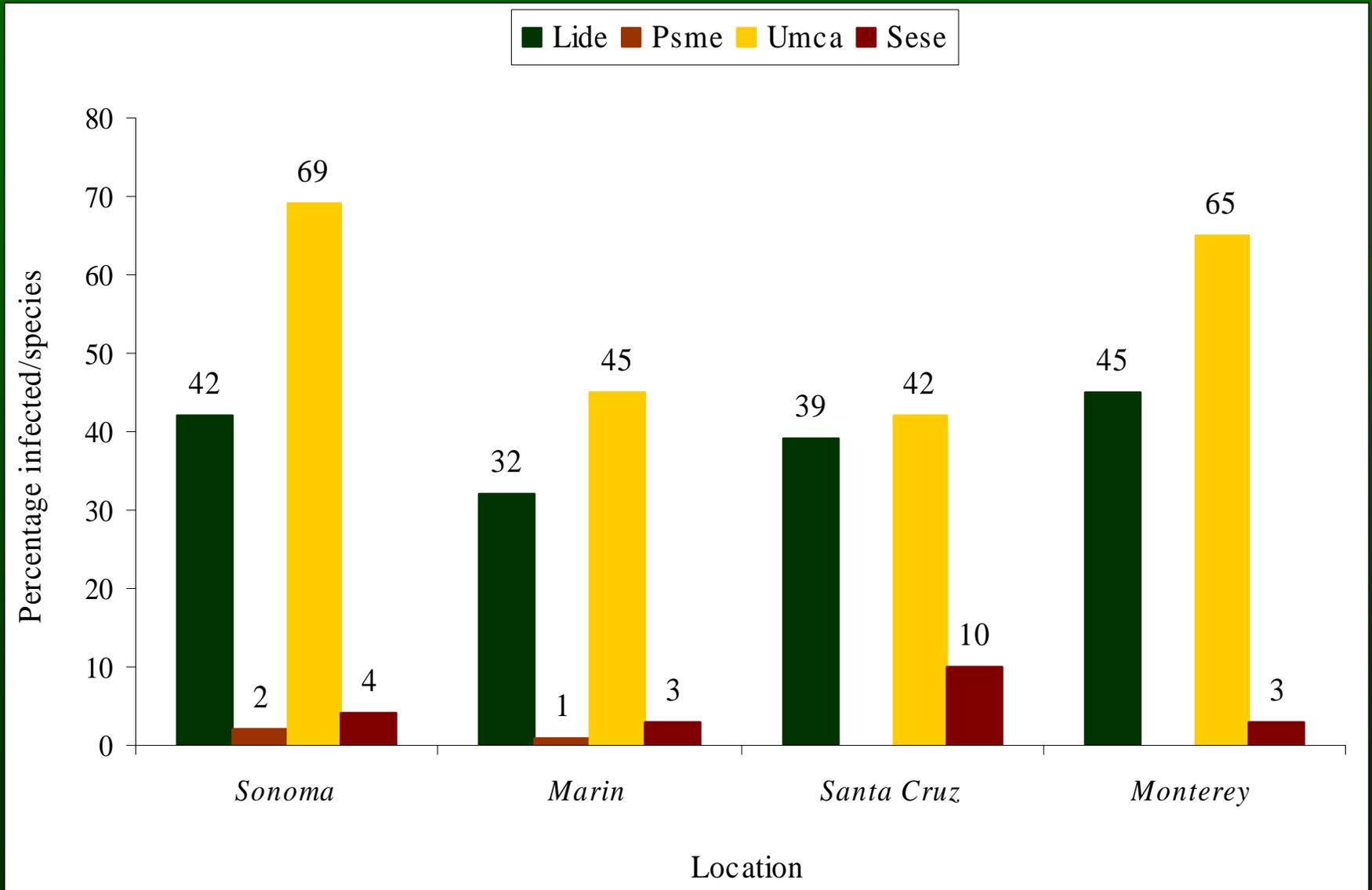


P. ramorum incidence during 2002 and 2003 in Redwood forests (Rizzo, UC-D)



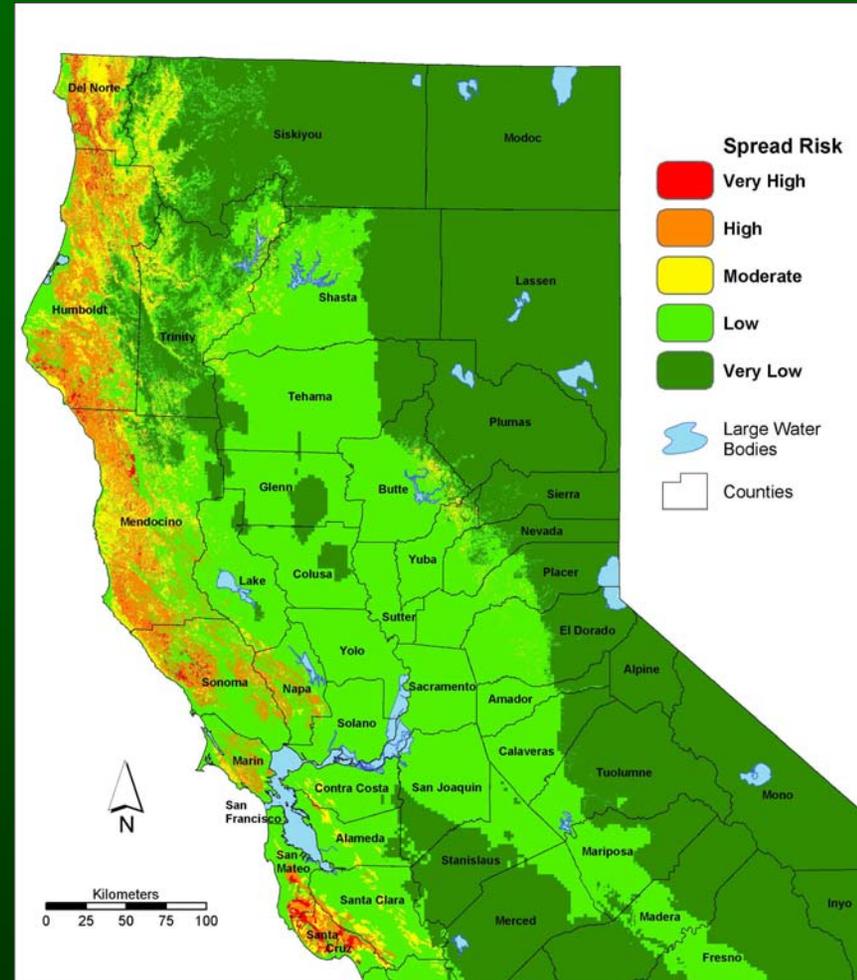
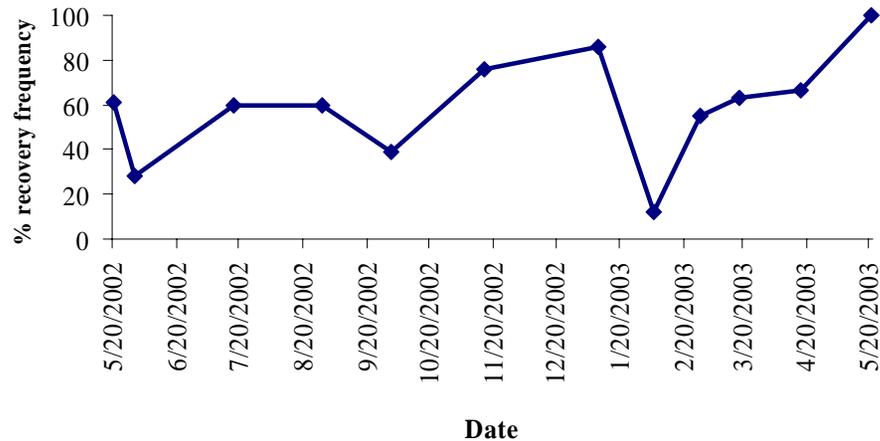
Redwood forest type

Percent infection of dominant host tree species



Streamwater recovery – Rizzo, UC-D

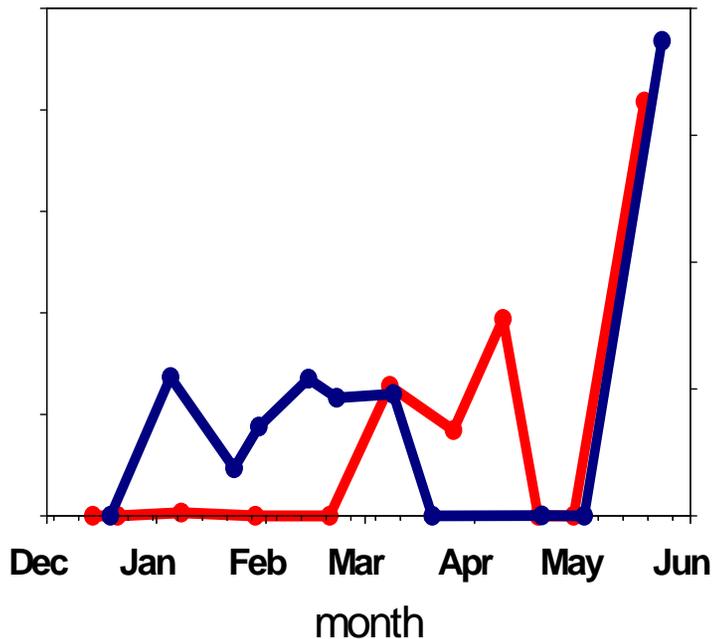
% recovery frequency of *P. ramorum* from streamwater



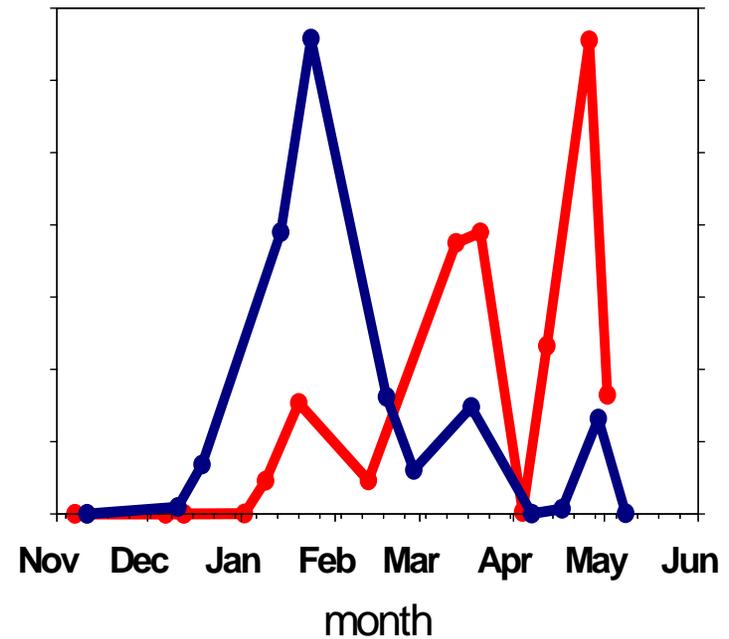
Spore load in rainwater

Mixed-evergreen vs. tanoak-redwood

2002



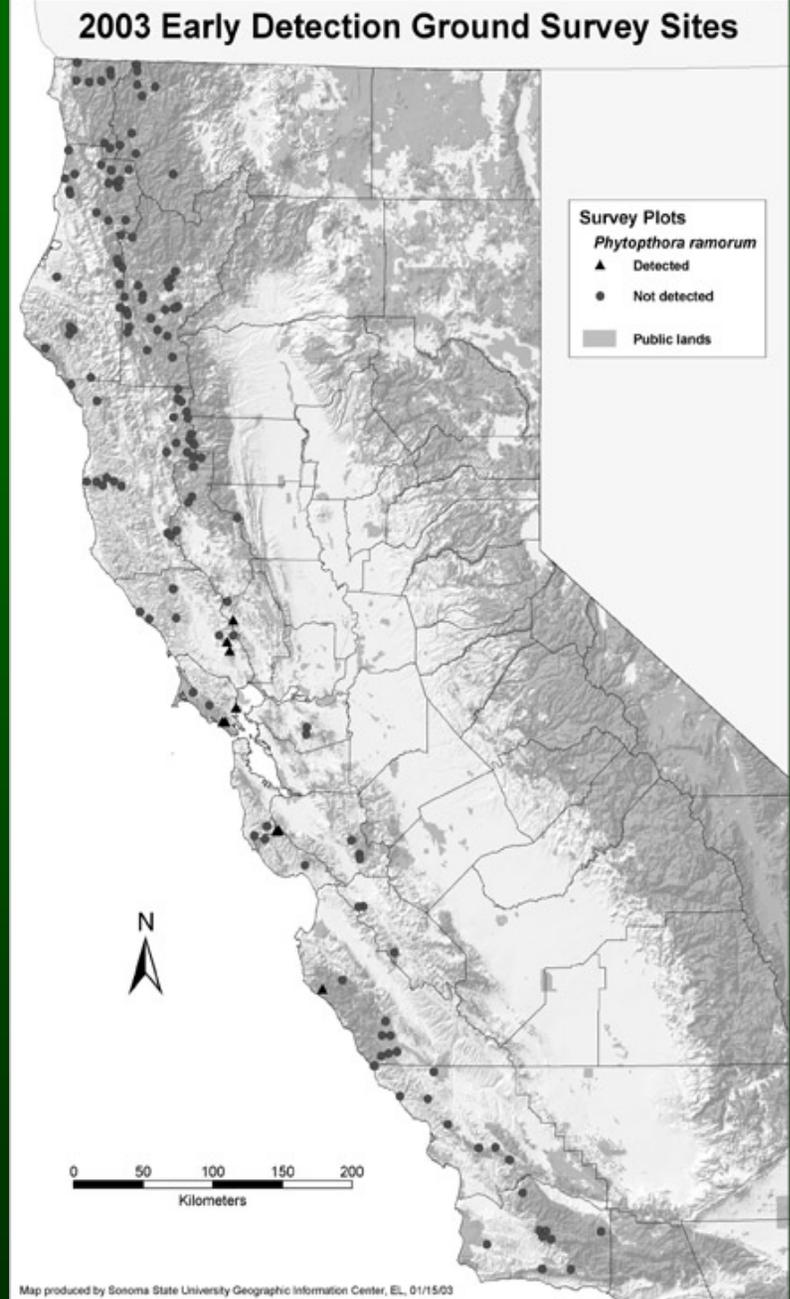
2003



Ross Meentemeyer,
Sonoma State University

Risk-targeted survey

- Only on public lands
- 0.2 acre plots on high, moderate and low risk habitats



2003 Risk –targeted ground survey

Meentemeyer and Mark

Area	Plots Visited	Confirmations
Northern CA coast	94	0
Bay Area	26	8 (31%)
South Central CA	28	1 Monterey County (3.5%)
Total	148	9 (6%)

2003 CA Sudden Oak Death Aerial Survey

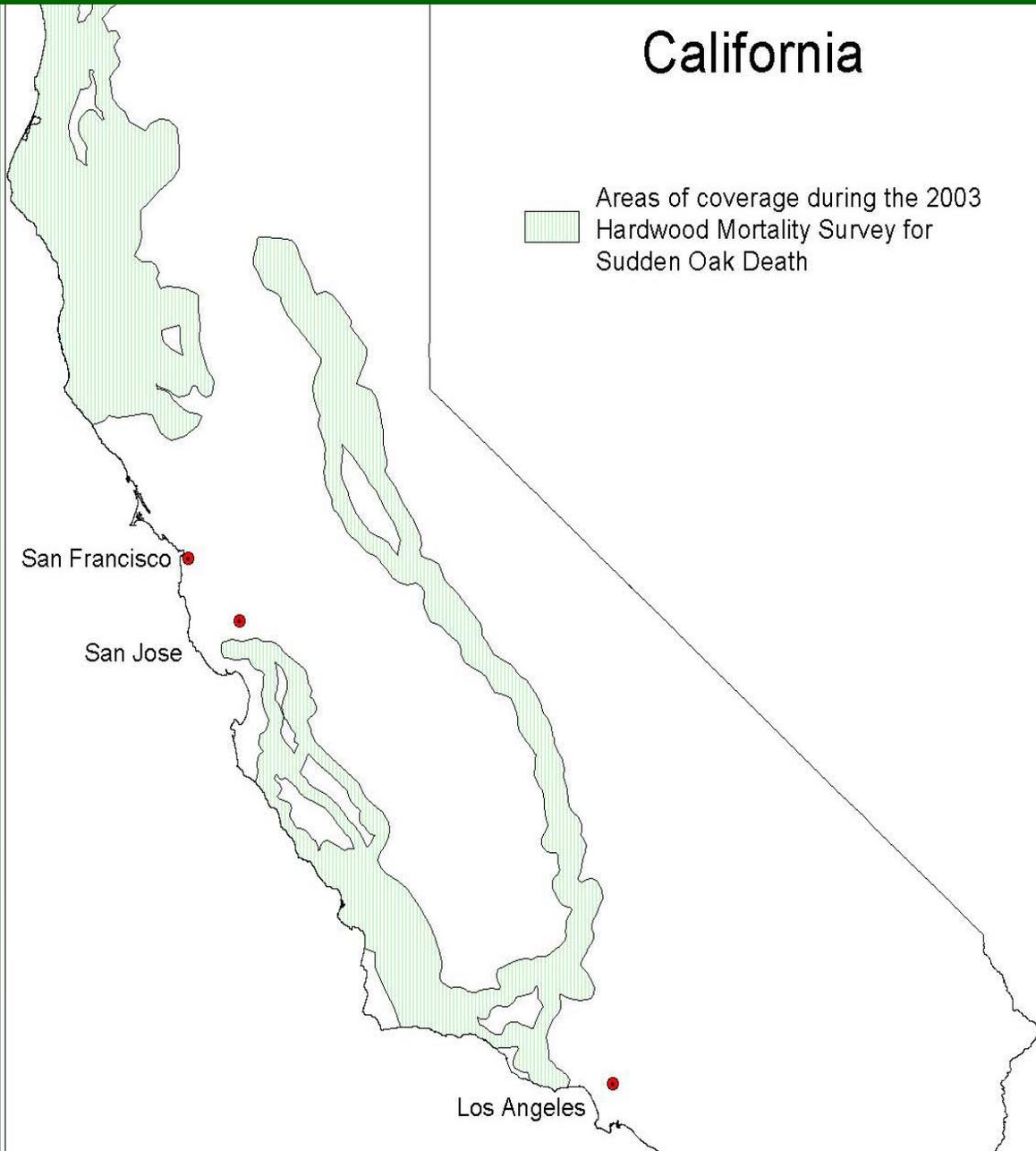
Fischer and Mai, USDA –Forest Service

Mark and Jirka, Cal Poly University, SLO

- Established new southern infestation boundary, 15 miles north of San Luis Obispo Co.
- Flew 10,000 miles, observed 13 million acres, ground-checked 100 mortality polygons
- Only one confirmation of *P. ramorum*

California

Areas of coverage during the 2003
Hardwood Mortality Survey for
Sudden Oak Death



CA 2003 Sudden Oak Death Aerial Survey Coverage

P. ramorum monitoring activity in Humboldt Co.

16 confirmations all from Redway area

Negatives

- 136 in CDFA database, 16 *P. nemorosa*
- FIA 2001-2002 checked 77 inventory plots
- Targeted-survey 26 plots, 40 aerial survey 2002-2003
- Planned Humboldt Co. surveys for 2004: river baiting, ground-survey, aerial survey, FIA plots, targeted risk, recreation sites survey and Bienapfl +.

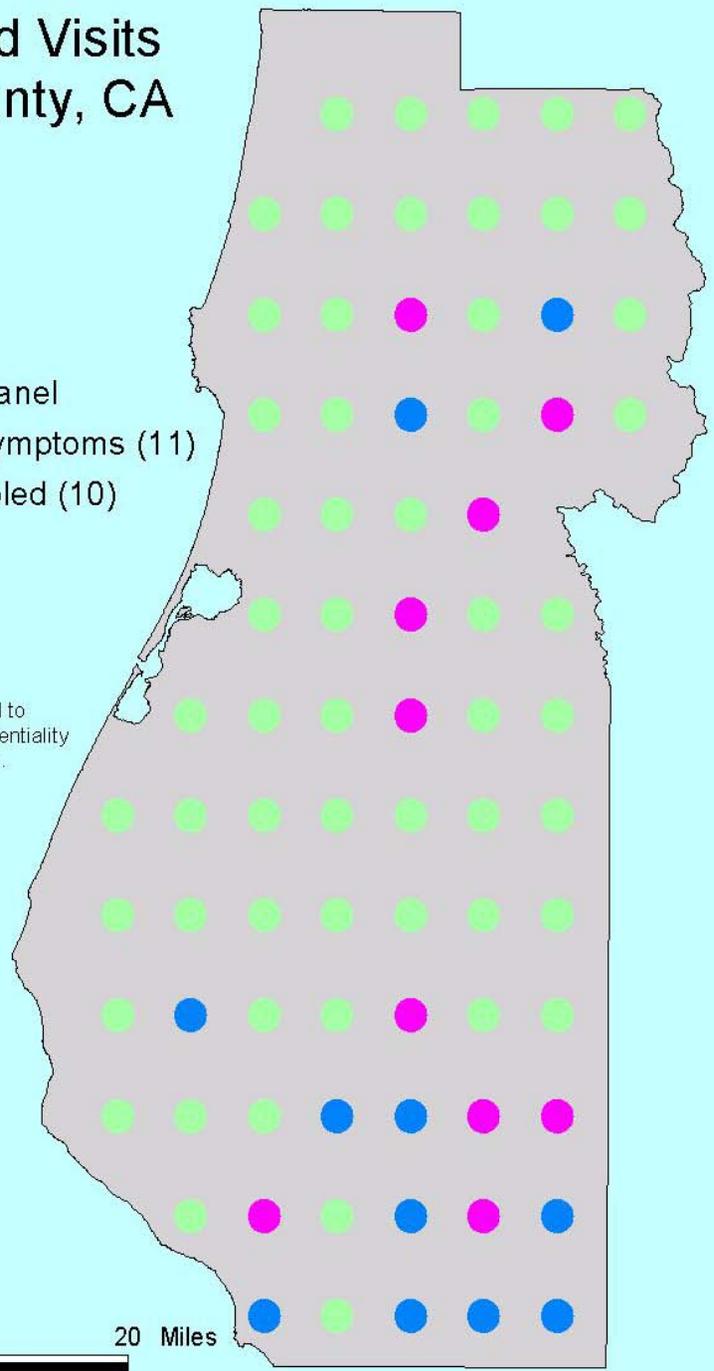
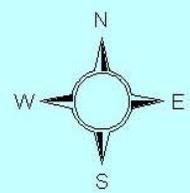
PNW-FIA Field Visits Humboldt County, CA 2001-2002

FIA Field Visits

- Standard FIA Panel
- SOD Plot No Symptoms (11)
- SOD Plot Sampled (10)

Note: Plot locations were assigned to an arbitrary grid to maintain confidentiality but approximate actual distribution.

Source: USDA Forest Service, PNW-FIA, Portland, Oregon.



77 FIA plots in Humboldt Co. 2001-2002

2004 CA *P. ramorum* monitoring strategy

Difficulty: Can't predict spread so can't hone in on pathogen

□ Use research plot data to determine trends.

Continue multiple approaches:

- Early detection aerial survey,
- Risk-based ground early detection survey,
- River baiting network,

- Education and follow-up on reports,
- FIA inventory plots,
- Transects in areas with limited infestations.

Nursery surveys

CA Food and Ag. – 50 nurseries February 2004

Annual and quarantine inspections –shippers with hosts are inspected monthly



John Bienapfl and Shannon Murphy– Rizzo lab, UC-Davis

Funding (well over \$2 million)

USDA Forest Service, State and Private Forestry,
Forest Health Protection

USDA Forest Service, Research

California Department of Forestry and Fire Protection

The Gordon and Betty Moore Foundation

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Slaughter, UC-Davis (retired) and Everett Hansen,
Oregon State Univ.

For more information:

www.suddenoakdeath.org

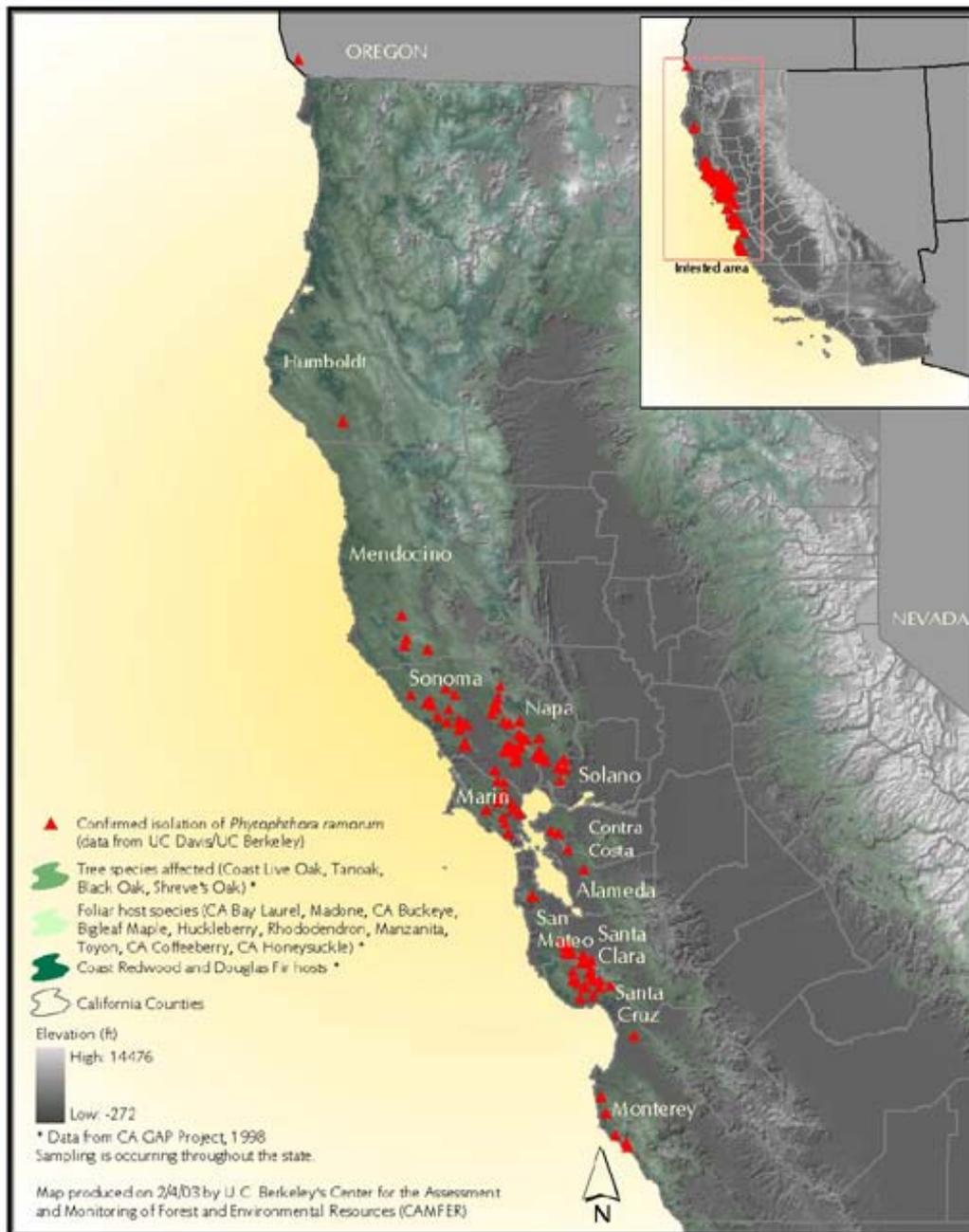
March 9-10 – COMTF meeting
and field trip, Sonoma County

April 22 and May 19 –
recognition & treatment training
sessions



FHM 2004, Sedona - February 11

Distribution of Sudden Oak Death as of February 4, 2003



For more information:
<http://www.suddenoakdeath.org/>
<http://kellylab.berkeley.edu/SODmonitoring/>