Monitoring the Effectiveness of *Phytophthora ramorum* Eradication Treatments in Southwest Oregon Tanoak Forests

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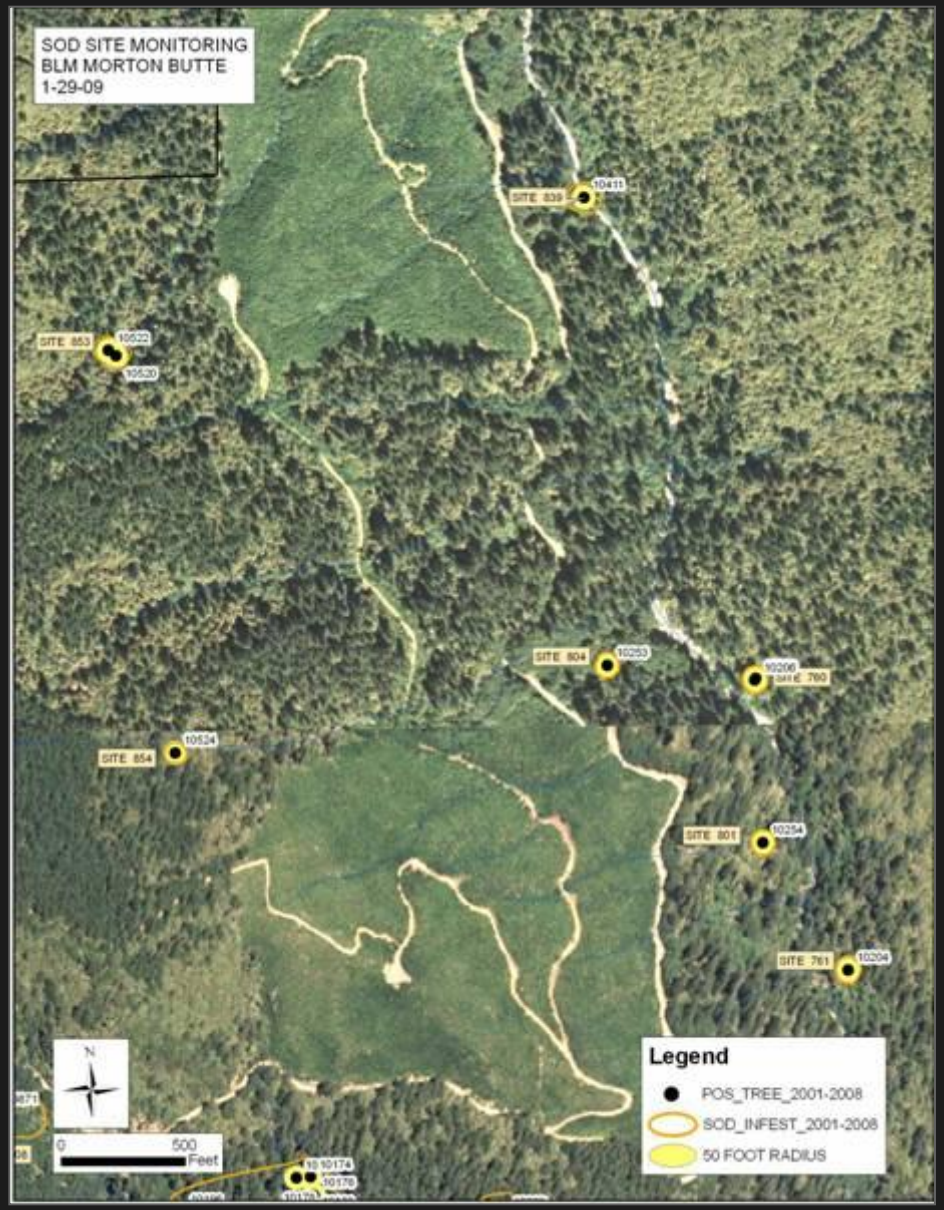
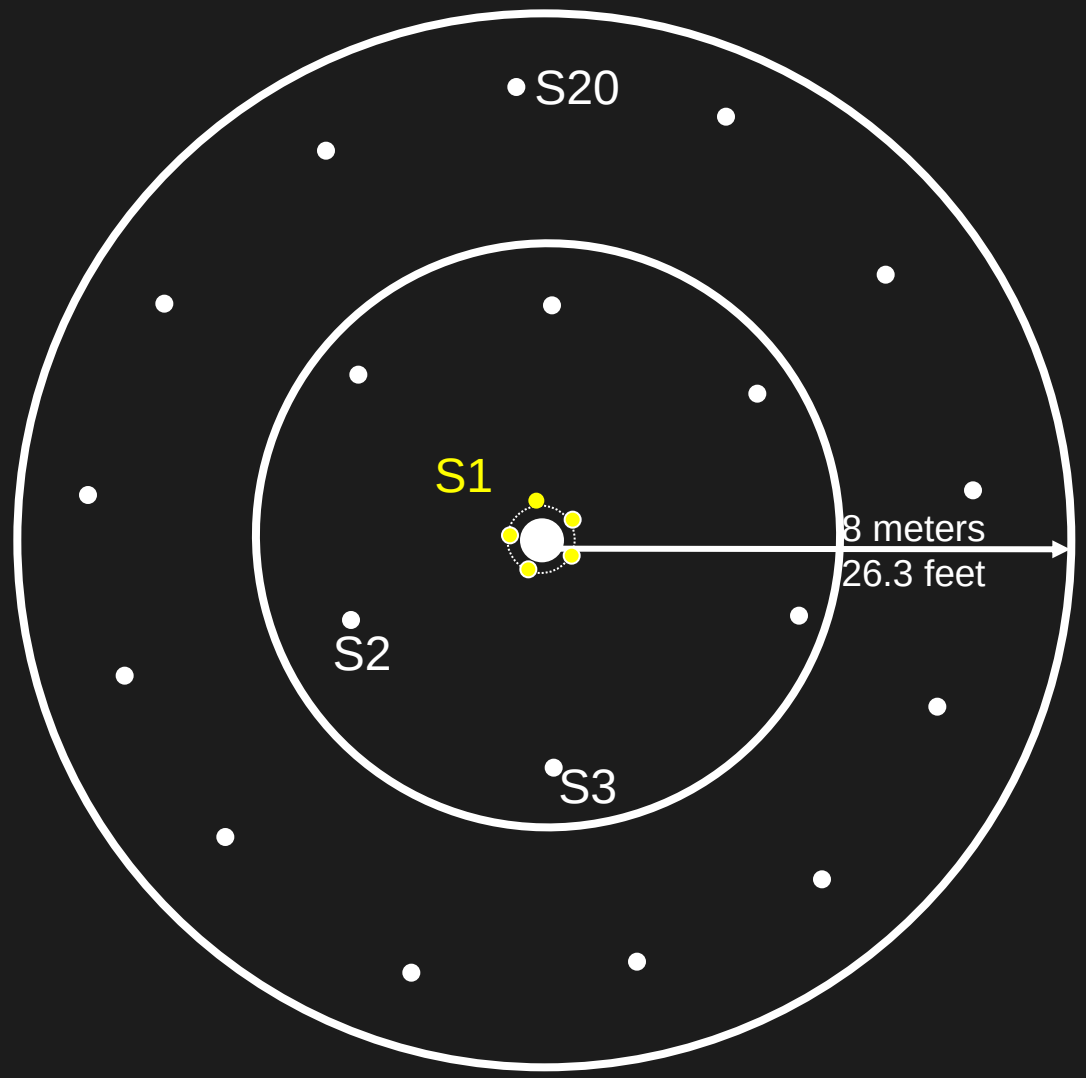
Timeline for Sudden Oak Death Treatments in Oregon

2001	2002	2003	2004	2005	2006	2007	2008-present
No herbicide							
		Cut/ Burn sprouts					
			Foliar herbicide of stump sprouts				
				Cut stump surface herbicide			
					Hack and squirt standing tanoaks		
50 to 100 foot buffer				transition	300 foot buffer		
						Treatment delays	

Curry County, OR


SOD SITE MONITORING
BLM MORTON BUTTE
1-29-09
SITE 839
10411
SITE 853
10022
10520
SITE 804
10203
10206
SITE 760
SITE 854
10534
SITE 801
10204
SITE 761
10204
N
0
500
Feet
10174
10170
Legend
POS_TREE_2001-2008
SOD_INFEST_2001-2008
50 FOOT RADIUS

Nested plot design



- 20 Soil Samples

- Tanoak stumps
- Standing trees
- Host Vegetation Samples

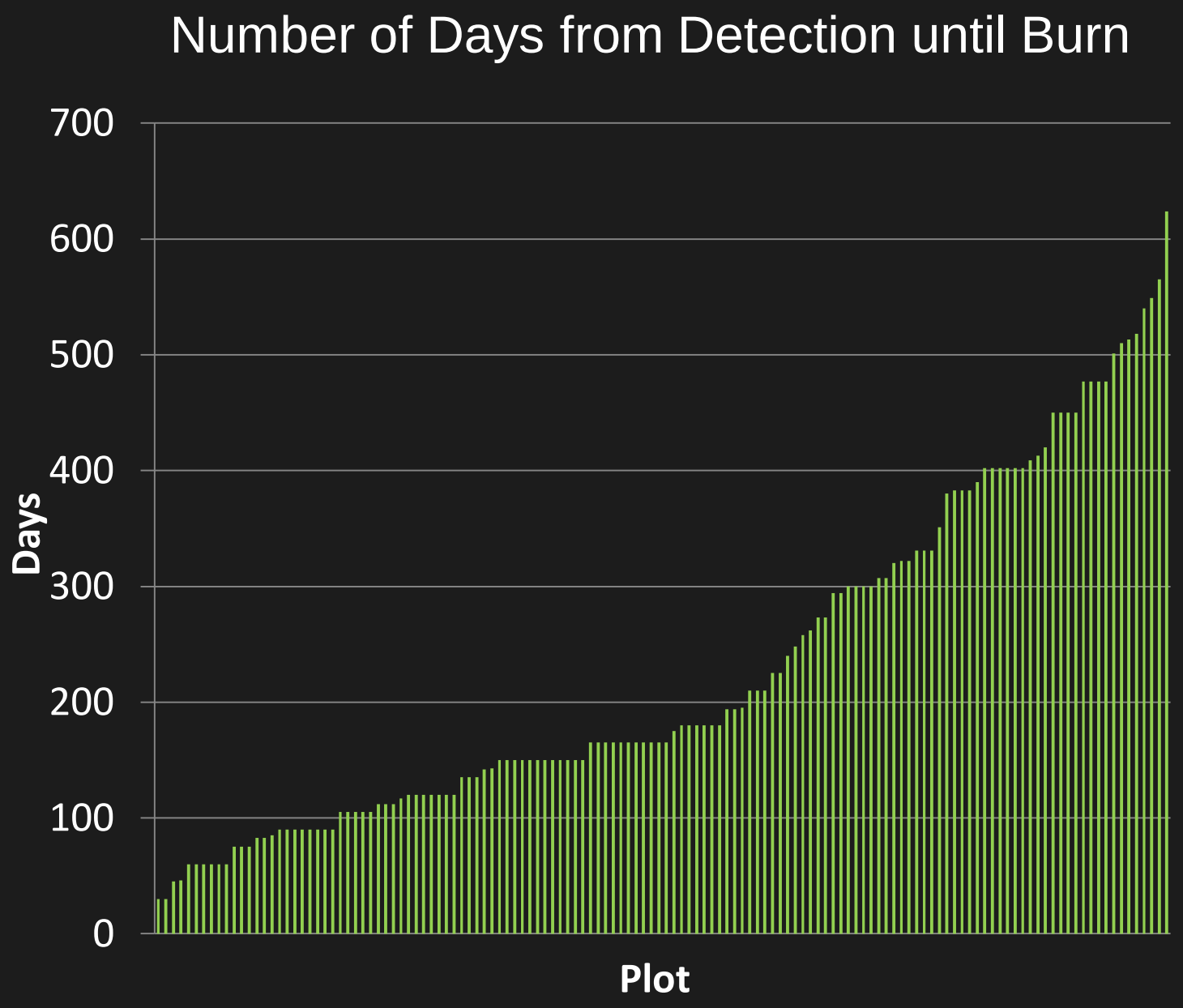
- Tree seedlings/saplings
- Cover

	Number of Monitoring Plots Established in the Sampling Year	
Year *P. ramorum* detected on plot	**2008-2009**	**2010**
2001	11	9
2002	8	6
2003	17	15
2004	7	8
2005	15	11
2006	29	28
2007	34	36
2008	24	29
Total	**145**	**143**

109 Plots visited in both years

Herbicide	Burn
Hack and squirt	Pile/burn green
Hack and squirt	Broadcast
Hack and squirt	None
Hack and squirt	Pile/burn later
None	Broadcast
None	None
None	Pile/burn green
None	Pile/burn later
Sprout spray	Broadcast
Sprout spray	Pile/burn green
Stump top	Broadcast
Stump top	Pile/burn green
Unknown	Pile/burn green

Herbicide	Burn
Hack and squirt	**Pile/burn green**
Hack and squirt	Broadcast
Hack and squirt	None
Hack and squirt	Pile/burn later
None	Broadcast
None	None
None	Pile/burn green
None	Pile/burn later
Sprout spray	Broadcast
Sprout spray	Pile/burn green
Stump top	Broadcast
Stump top	Pile/burn green
Unknown	Pile/burn green


Number of Days from Detection until Burn
700
600
500
400
300
200
100
0
Days
Plot

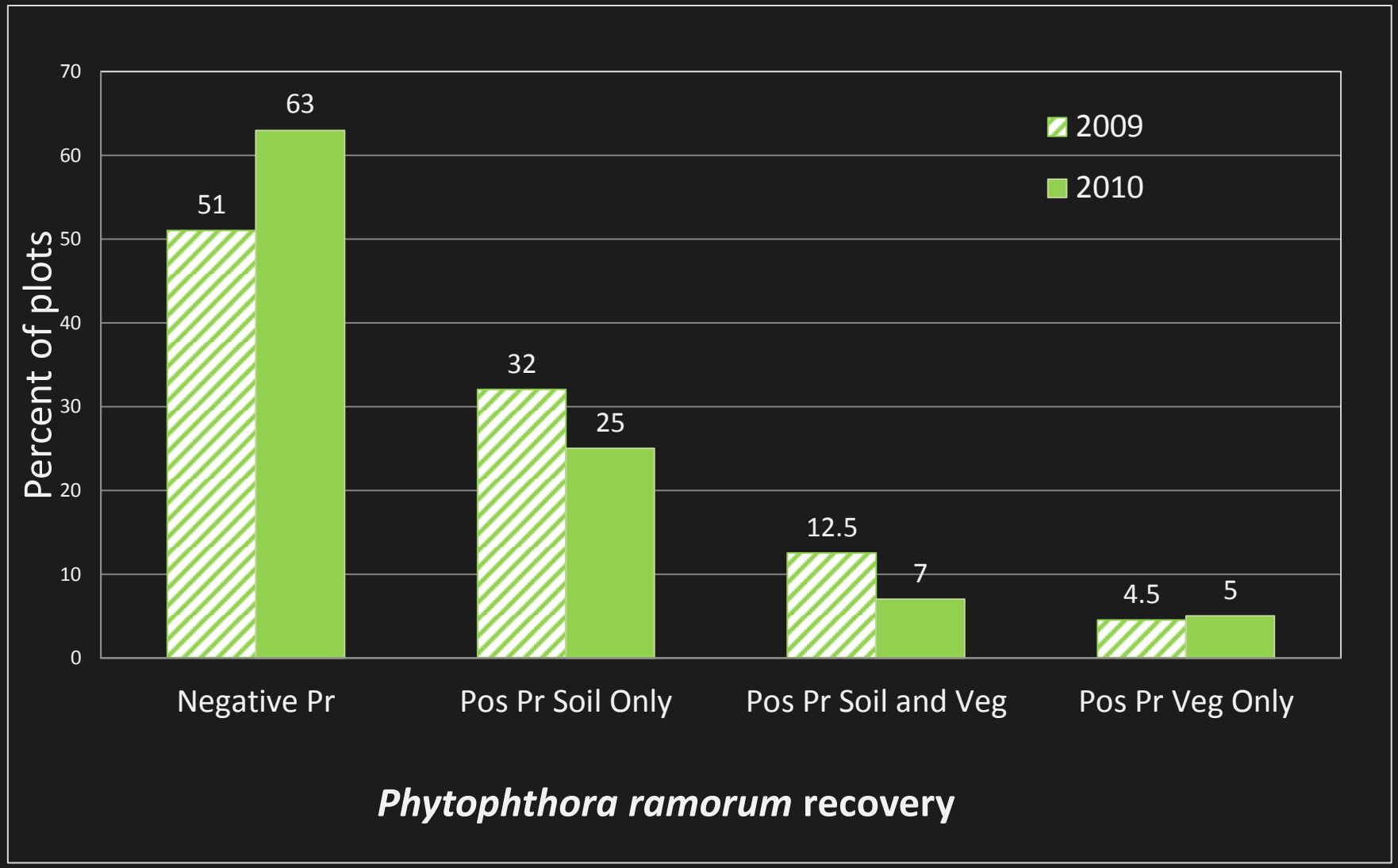
- All plots with some level of vegetative cover after treatment:
    - Sword fern
    - Evergreen huckleberry
    - Salmonberry
    - Salal
- Trees: ~1/3 plots with no live tree basal area
- ~1/2 plots have Douglas-fir or red alder or some combination of the two
- Other tree species present:
    - Sitka spruce
    - Oregon myrtle
    - Bigleaf maple
    - Pacific madrone
    - Cascara
- 12(2009) or 14(2010) percent plots with Oregon myrtle

Persistence of tanoak

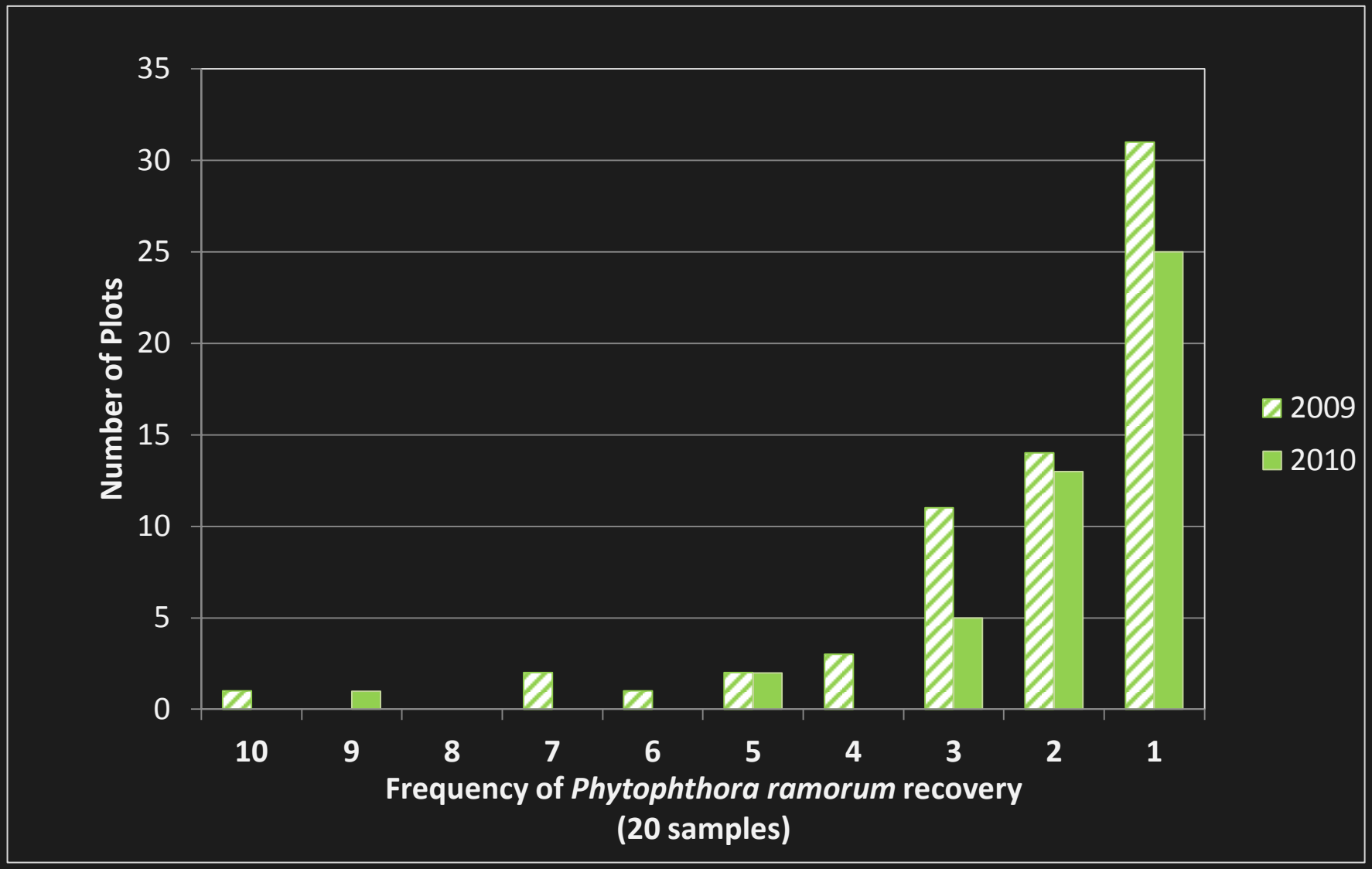
Tanoak sprouts after cutting and burning

88 percent (2009) and 86 percent(2010) plots had some live tanoak basal area (stumps)

Phytophthora ramorum Recovery from Monitoring Plots on Sites Treated 2001-2008

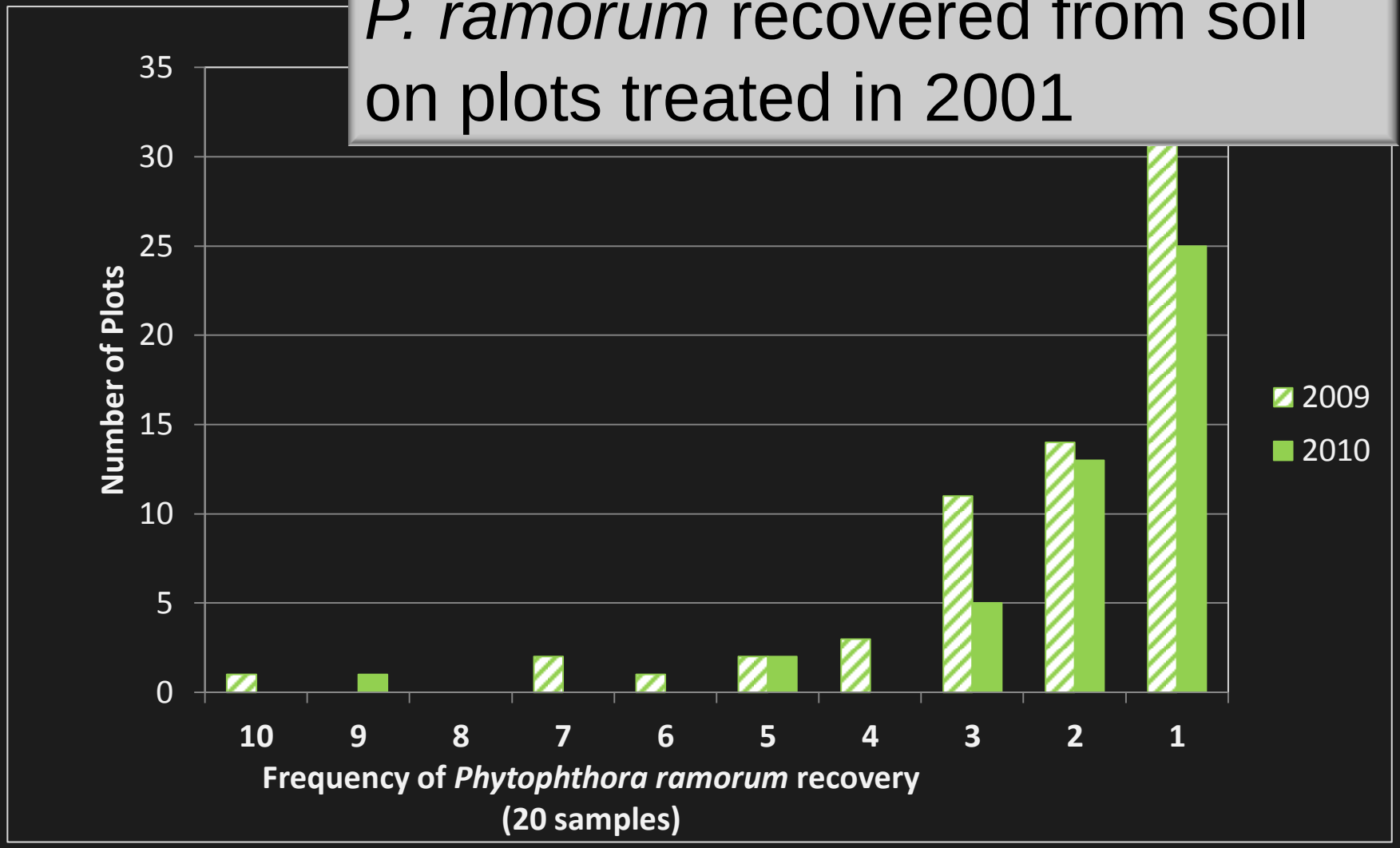


Frequency of Recovery of *Phytophthora ramorum* from Soil Samples



Frequency of Recovery of *Phytophthora ramorum* from Soil Samples

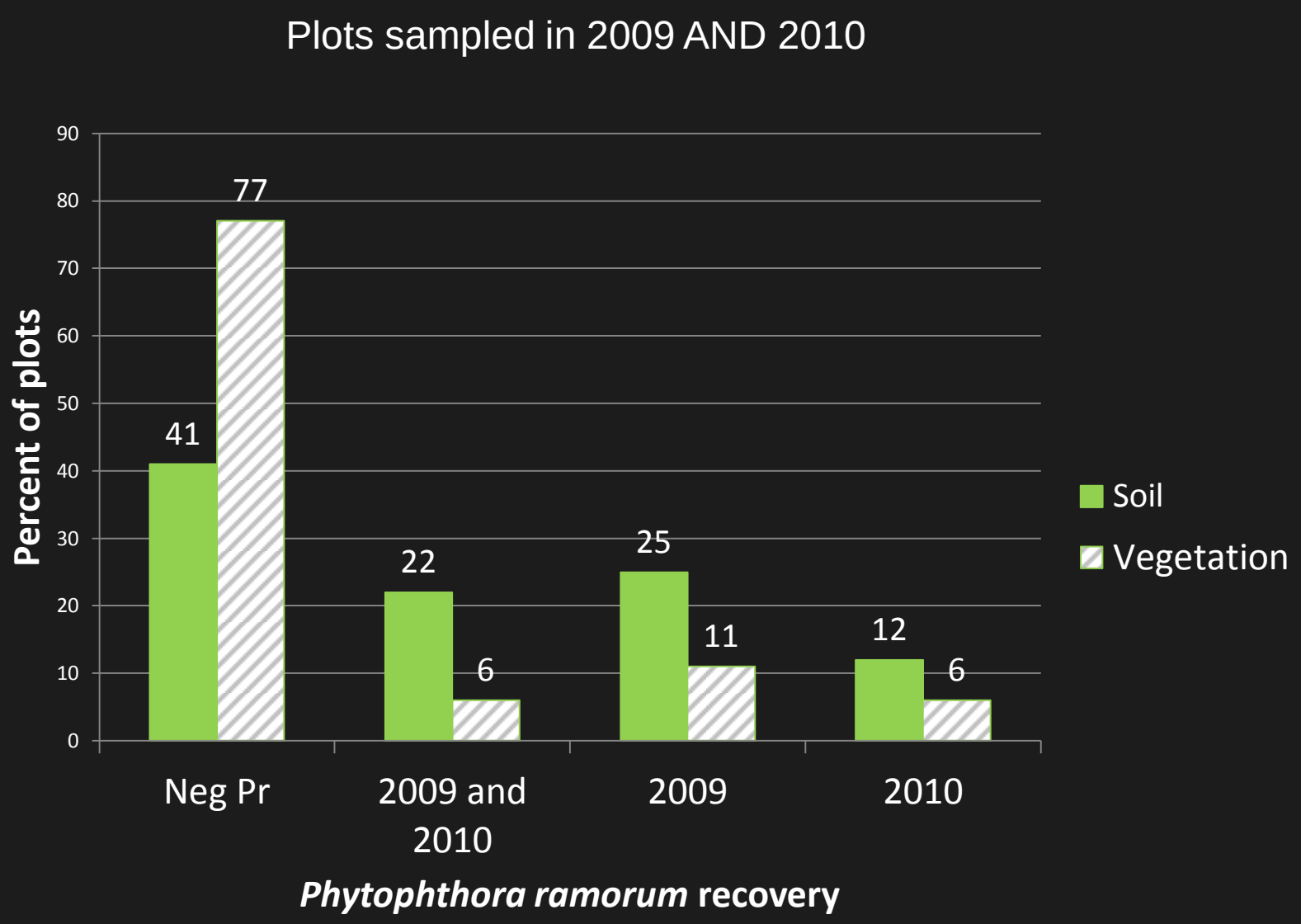
P. ramorum recovered from soil on plots treated in 2001



Vegetation

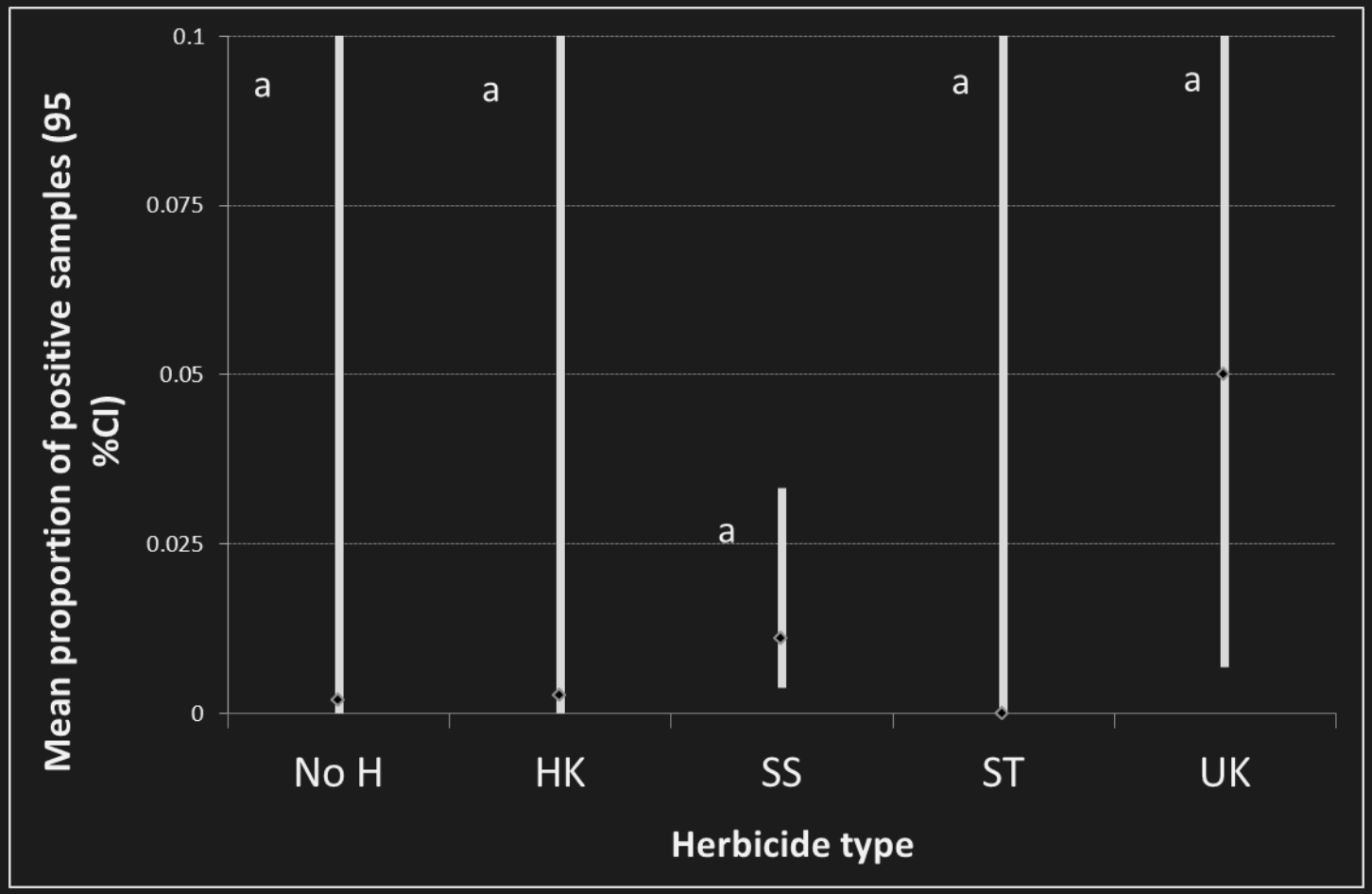
- 17 percent of 2009 plots with vegetation samples positive for *Phytophthora ramorum*
  All tanoak; mostly sprouts

- 12 percent of 2010 plots with vegetation samples positive for *Phytophthora ramorum*
  Tanoak sprouts and Oregon myrtle


Plots sampled in 2009 AND 2010
Percent of plots
90
80
70
60
50
40
30
20
10
0
77
41
22
6
25
11
12
6
Neg Pr
2009 and 2010
2009
2010
Phytophthora ramorum recovery
Soil
Vegetation

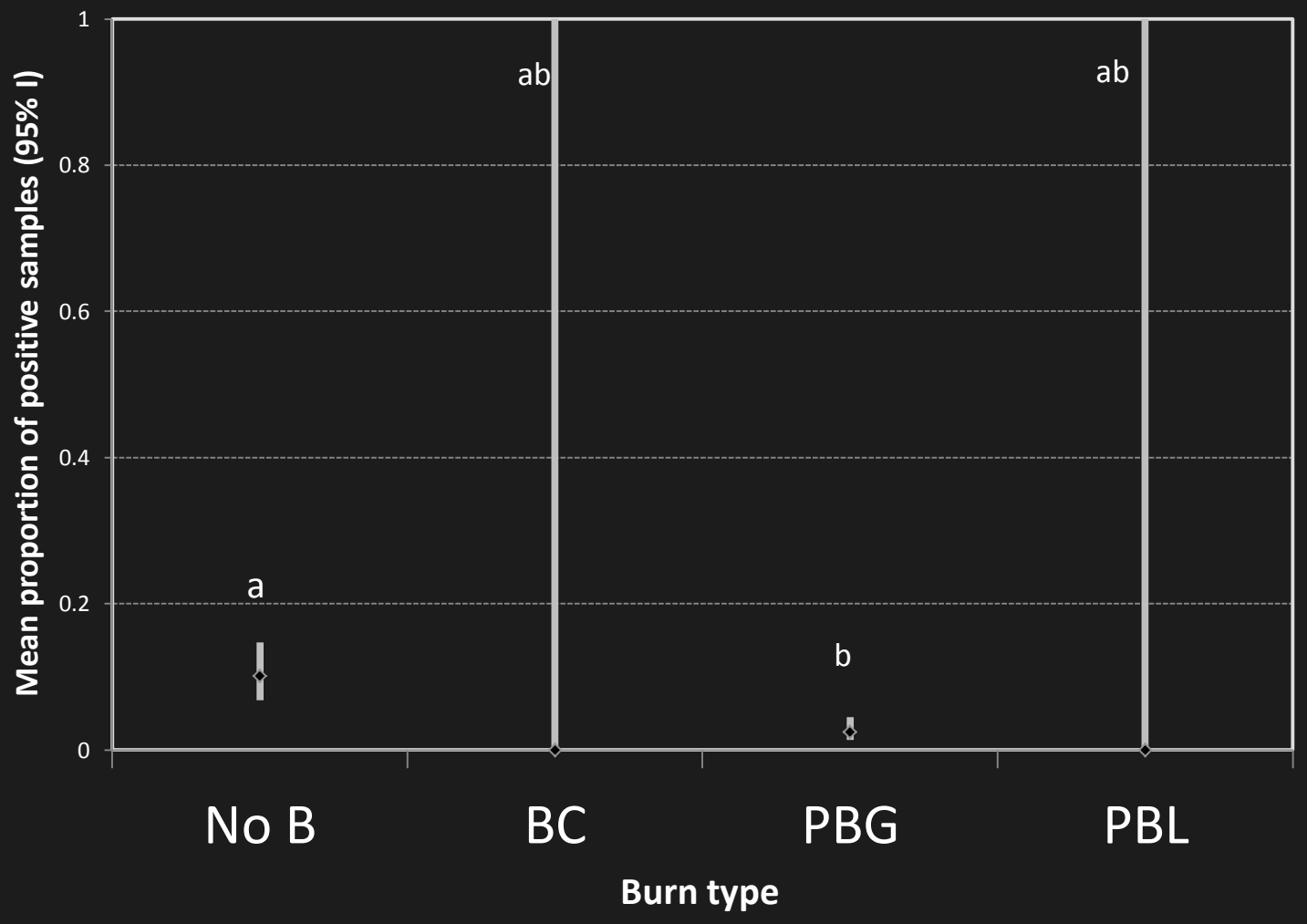
N=109

No significant differences between type of herbicide treatment and recovery of *P. ramorum* from soil or vegetation



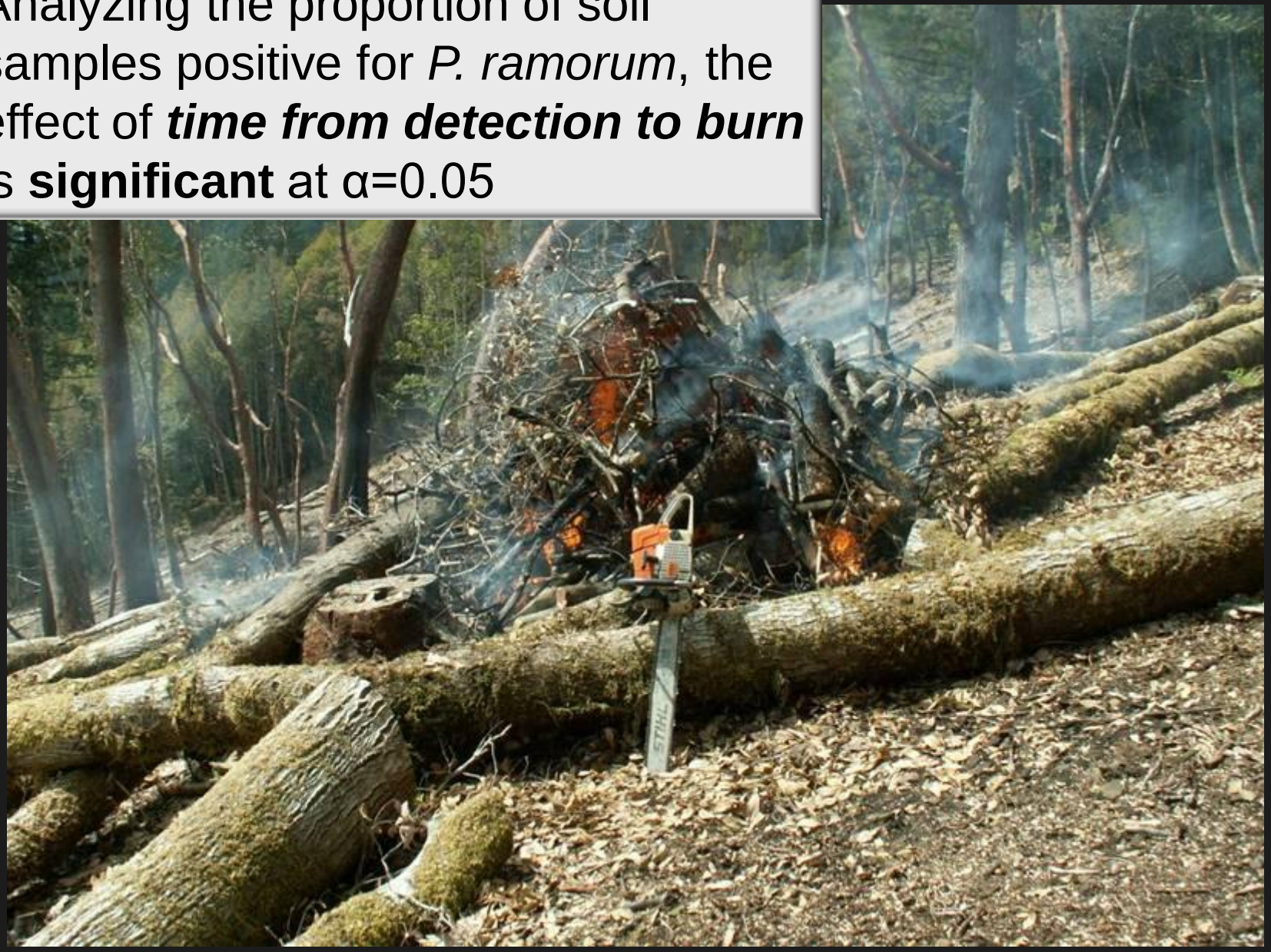
2009 data

No significant differences between type of burn and recovery of *P. ramorum* from soil (2010) or vegetation (both years)



2009 data

Analyzing the proportion of soil samples positive for *P. ramorum*, the effect of ***time from detection to burn*** is **significant** at α=0.05



The longer we wait to get a site burned after we find it, the greater the chance we will the recover of *P. ramorum* from the soil.

Analyzing the proportion of soil samples positive for *P. ramorum*, the effect of ***percent live tanoak stump basal area i***s **significant** at α=0.05 in 2010 and trending that way for 2009 data

The more live tanoak basal area on the plot, the greater the chance we will the recover of *P. ramorum* from the soil.

Treatment is more effective when:

- We treat as quickly as possible
- We do a thorough job

What next?

- Continue this analysis
- Continue monitoring
- Used these data to inform 2012 sampling

THANKS!!

- *USDA Forest Service, Pacific Southwest Region, Forest Health Protection for funding this project.*
- *Sylvia Mori for statistical wisdom and toil.*
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- *OSU and ODA laboratory crews for processing 1440 gallons (12,000 pounds) of soil and 1440 plant samples.*