Citizen science in action: The 2019 SOD blitzes

M. Garbelotto and D. Schmidt, U.C. Berkeley

50+ local blitz organizers

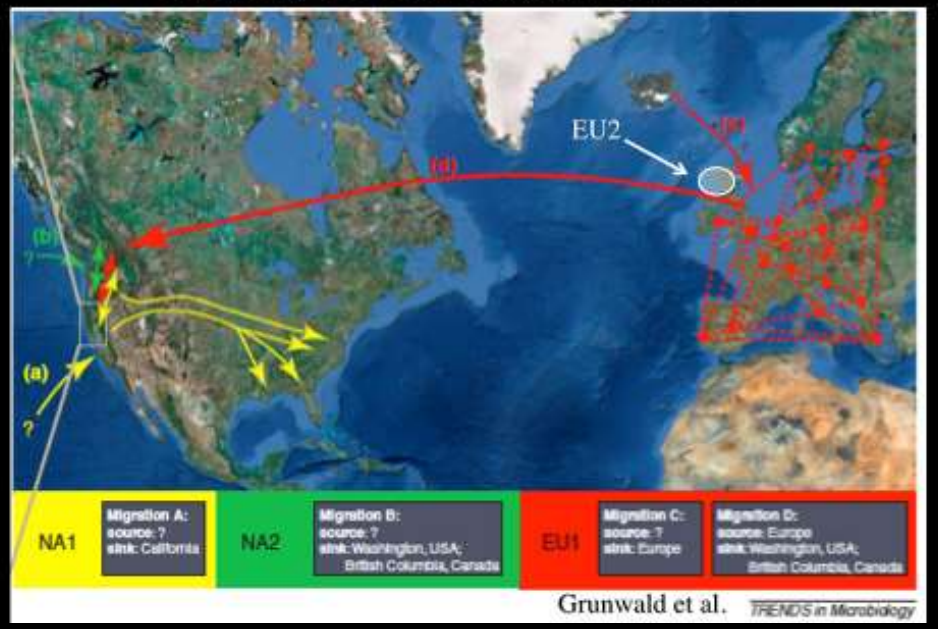
&

3000-plus volunteers

Phytophthora ramorum the SOD pathogen was moved from Asia to California via infected ornamental plants

- 4+ lineages of pathogen worldwide
- Origin: Vietnam/China?
- Ornamental trade, worldwide
- Hundreds of host species
- Different severity of disease based on species

Origin unknown, 4 distinct lineages: nursery-mediated global spread



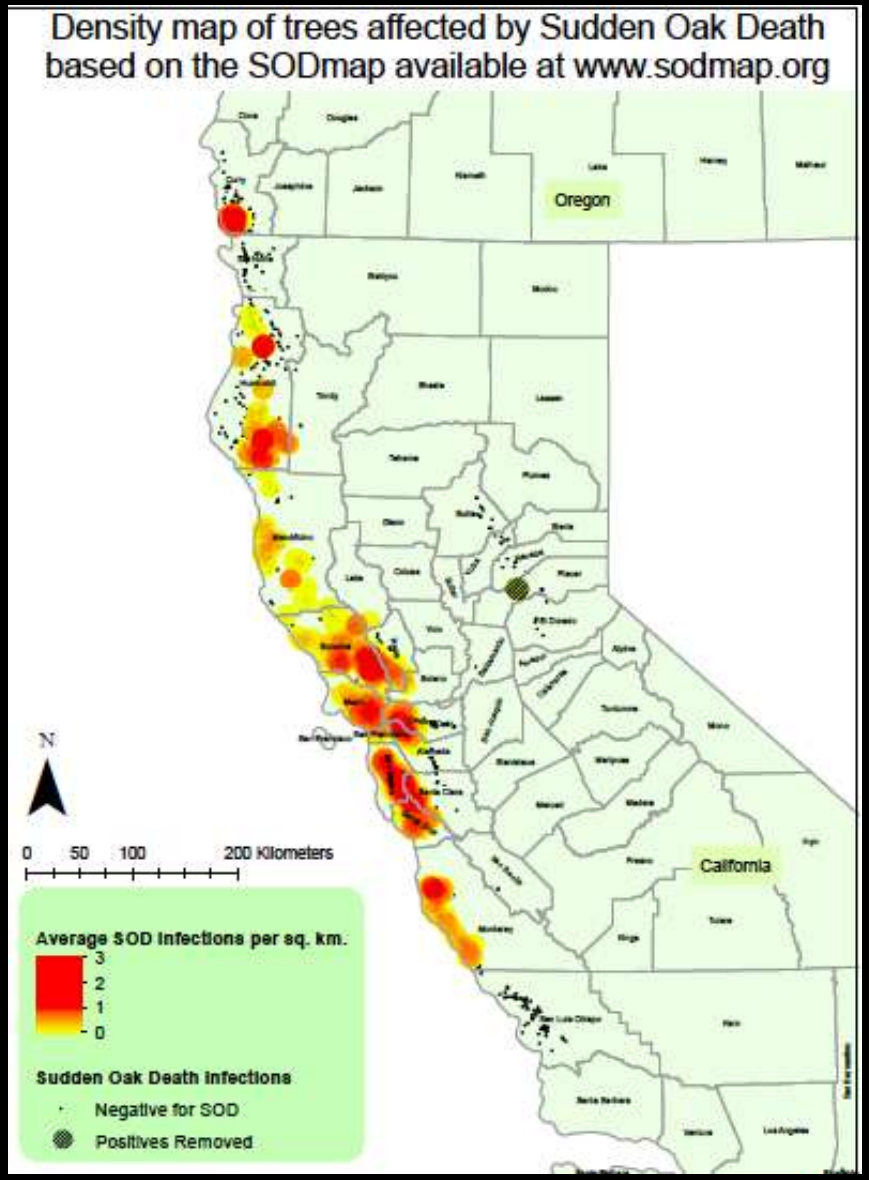
Phytophthora ramorum: SOD

- Ramorum Blight
- 4 lineages
- Origin unknown
- Ornamental trade, worldwide
- Hundreds of species
- Progressive dieback

- Sudden oak death (West Coast)
- 1 strain only (NA1) in CA forests
- Tens of native species infected
- Mortality of *Fagaceae* and *Ericaceae*
- Lethal girdling lesions and dieback
- Introduced via infected ornamentals

Croucher et al. Biol Invasions 2013

Repeated introductions and not "natural" long-distance spread are responsible for extensive SOD distribution. This was determined by presence of identical genotypes at long distance and by coalescent analysis

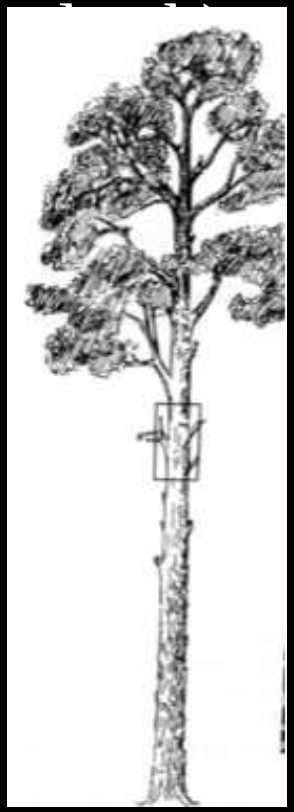


= up to 100% mortality adult tanoaks
up to 70% mortality adult oaks

Bay- oak relationship in CA forests

- CA Bay Laurel :

Transmissive host

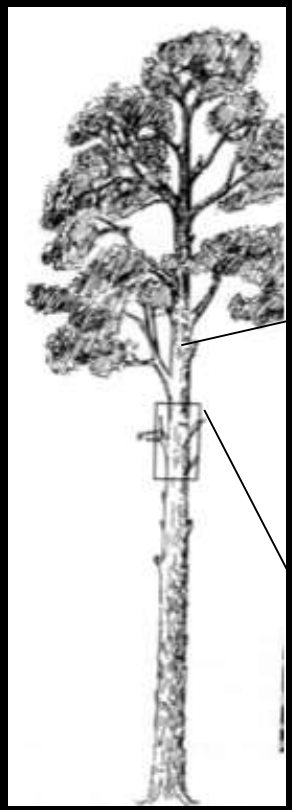


Oak trunks

Only leaves,
highly infectious

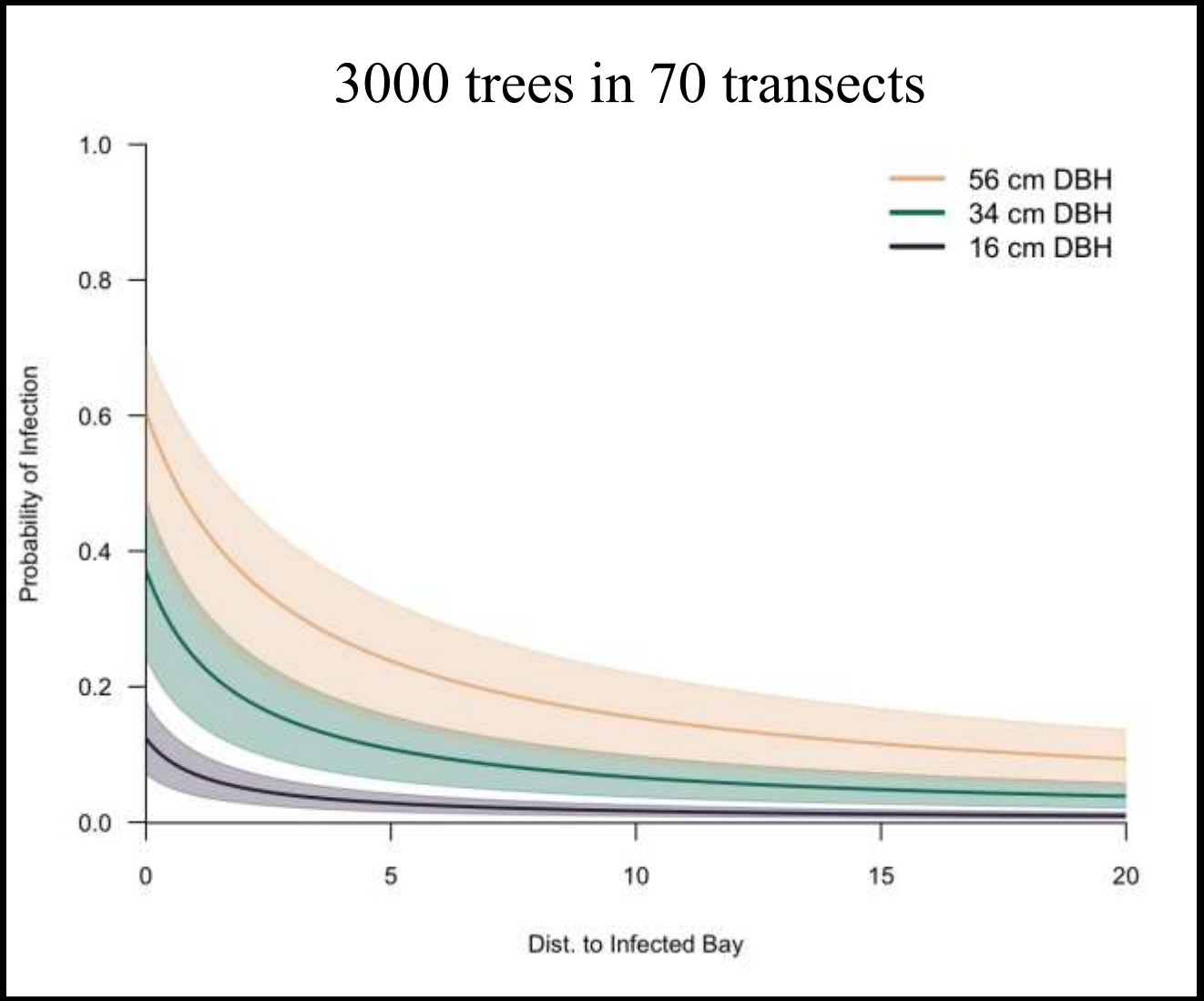
- Oak:

Dead-end host



Only trunks lesion,
Lesions girdle tree but
are not infectious

Oak are infected by bays less than 20 m away



MAJOR SURVEYING PROBLEMS

- Zone of infestation is about 700 Km in length, yet less than 30% of available habitat has been colonized so far

- Outbreaks are not contiguous but occur in discrete patches, so there is no a clear and unique advancing front

- To predict risk of infection for oaks, the scale needs to be in the tens of meters, i.e. extremely fine scale

SOD Blitzes

- Yearly volunteer-based survey to: a)- identify new outbreaks, and b)- track expansion and contraction of the pathogen's range by sampling infectious host (bay laurel leaves) identifying hotspots that are crucial for disease spread

- Volunteers have to attend training and then collect over a weekend during wet spring

- Local environmentalists or UC Master Gardeners organize meetings. UC Berkeley tests all samples

SOD Blitzes: unique features

- **All necessary sampling materials are provided to attendants** free of charge, we do not use high tech platforms on purpose (no I Naturalist)

- SOD Blitz trainings are locally organized: **each may have a different angle.** Volunteers can sample any location they want to

- Data are confirmed by UC Lab and made public **in real time** over the web (SODmap.org) and using the App Sodmap mobile

2019 SOD blitzes

- We will be testing for new dangerous strain (EU1) already present in Oregon forests, but sill absent in California Forests

- Very important year due to rainfall!!

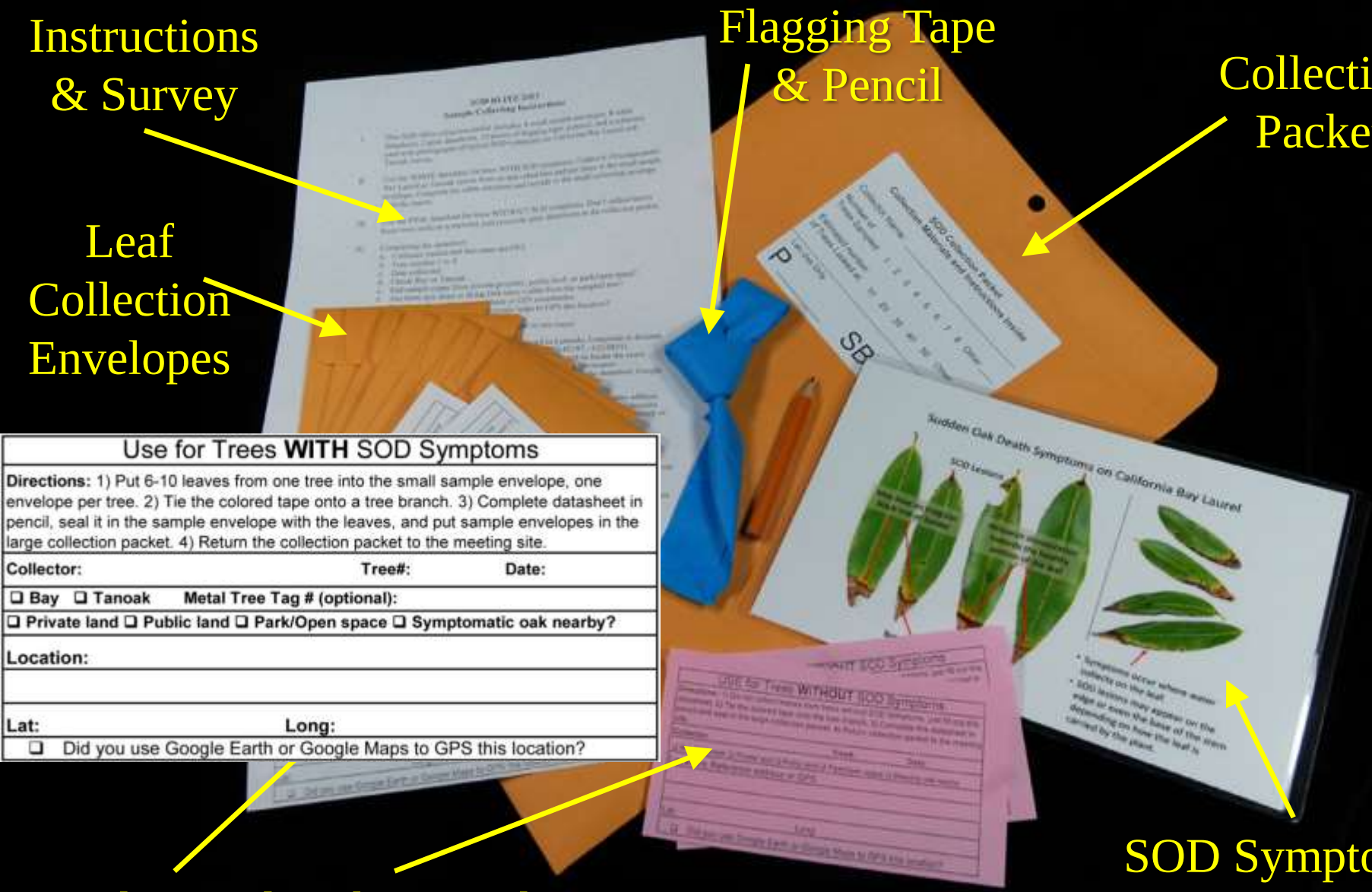
SOD Blitz Collection Materials

Instructions & Survey

Flagging Tape & Pencil

Collection Packet

Leaf Collection Envelopes



White and Pink Data Sheets

SOD Symptoms Reference Card

Trainings: personally taught, now video has helped standardize them

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SOD Blitz 2017 How to Survey

Doug Schmidt | May 19, 2016 | All Posts

Welcome to the SOD Blitz Survey Project 2016.

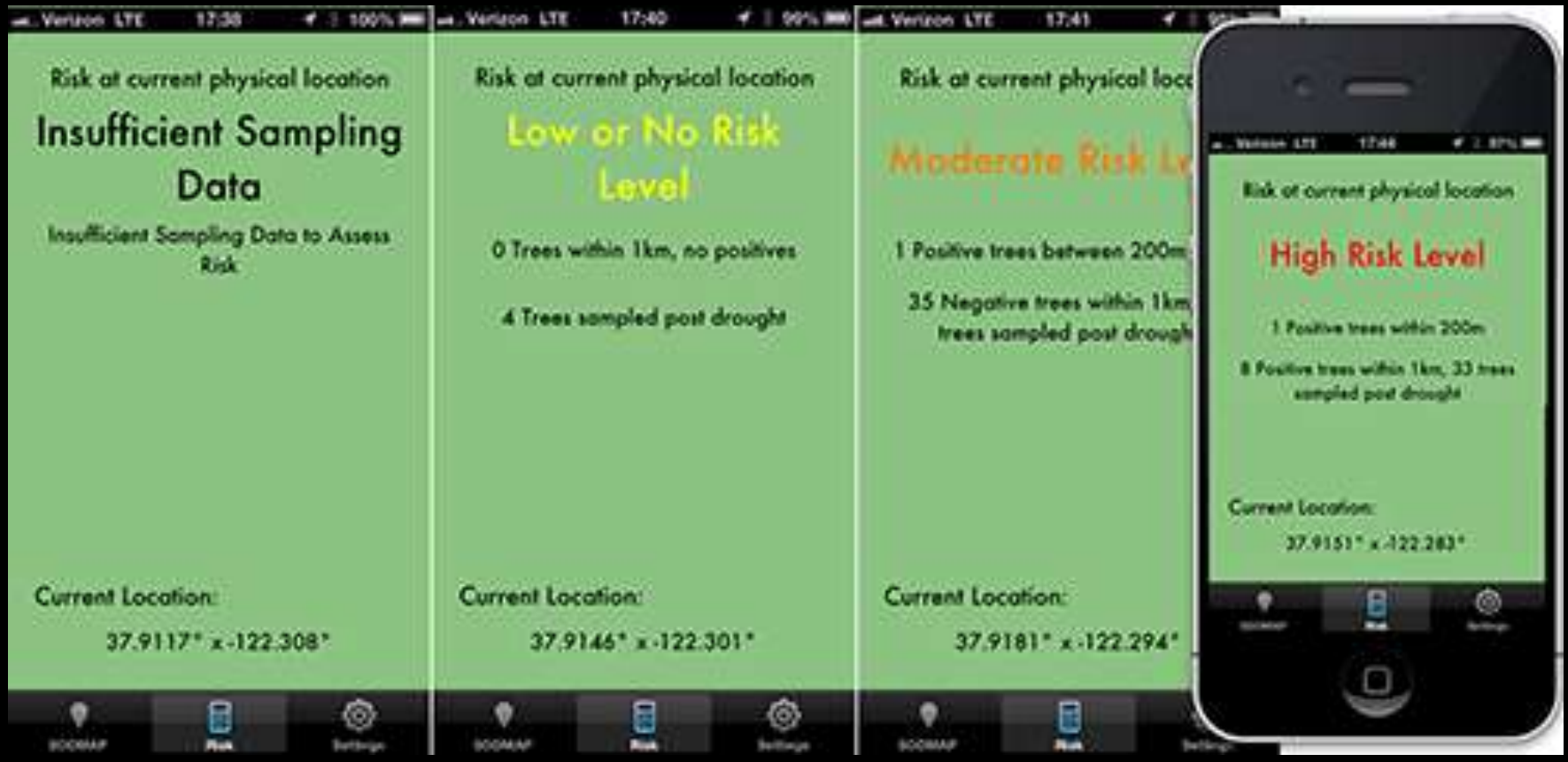
Special Event: An Evening to Support California Wild Lands and Native Forests

Web-based SOD map

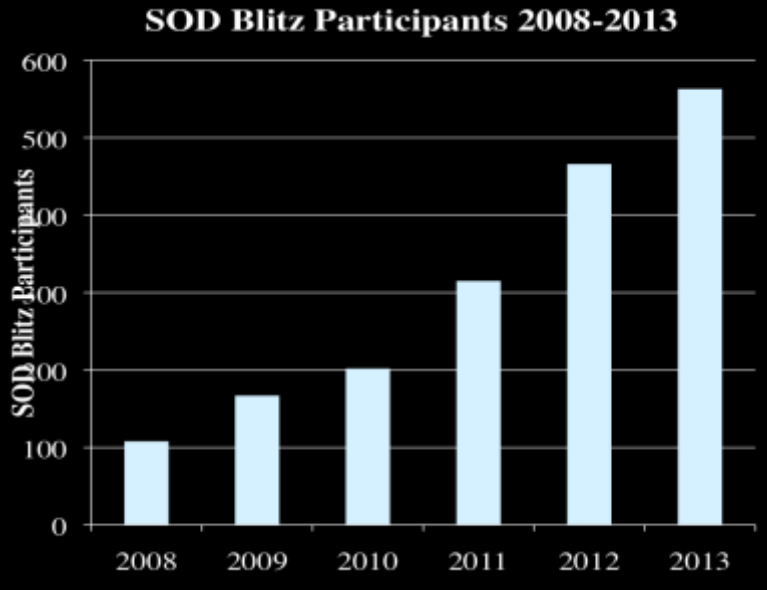
App Sodmap mobile

170.000 observations
RESULTS ARE PUBLIC
Red icons= SOD positive
Green = SOD negative

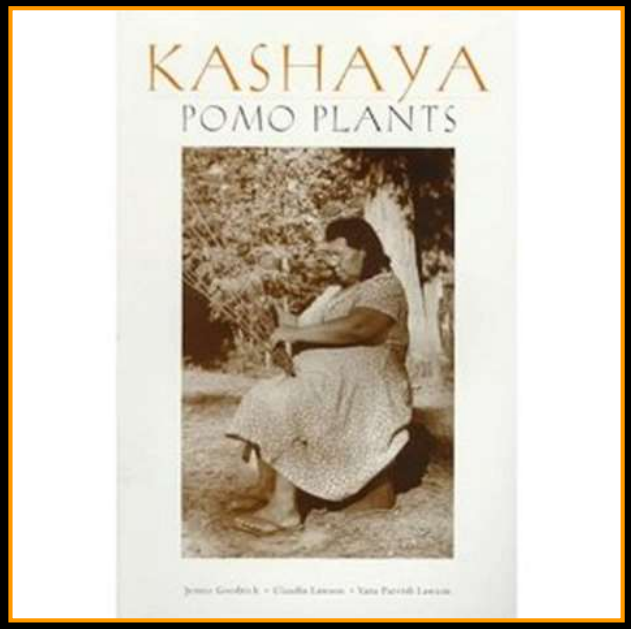
App also calculates risk of oak infection at physical location of user, based on proximity to outbreaks



Why do citizen-scientists remain involved?



Property value reduced 3–6% to 8–15%



- Taken together, our data suggest that :
  - Locally organized SOD Blitz informational sessions and training efforts were highly effective and attractive to stakeholders (program is 10 years old with high rate of return participants)
  - Citizen science produces useful data for understanding disease epidemiology: two “hard science” papers published
  - Working with citizen scientists as peers we have created the largest database in the world for a forest disease

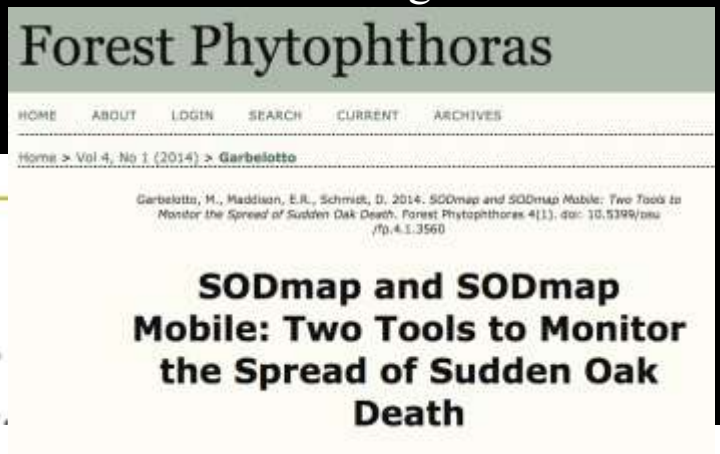

RESEARCH COMMUNICATIONS RESEARCH COMMUNICATIONS

Citizen science helps predict risk of emerging infectious disease

Ross K Meentemeyer[1,2*], Monica A Dorning[2], John B Vogler[2], Douglas Schmidt[3], and Matteo Garbelotto[3,4]

Engaging citizen scientists is becoming an increasingly popular technique for collecting large amounts of
ical data while also creating an avenue for outreach and public support f
study, in which citizen scientists played a key role in the spatial predictior
yearly citizen-science program called "Sudden Oak Death (SOD) Blitz" eng
ing the causal pathogen during peak windows of seasonal disease expr
which were collected from under-sampled urban ecosystems – to develop
inform stakeholders on where they should prioritize management effor
Blitz program over 6 consecutive years improved our understanding of di
racy of our predictive models. We also found that self-identified non-prof
ing the disease as were professionals. Our results indicate that using long-
risk of emerging infectious plant diseases in urban ecosystems holds subst

Front Ecol Environ 2015; 13(4): 189–194, doi:10.1890/140299

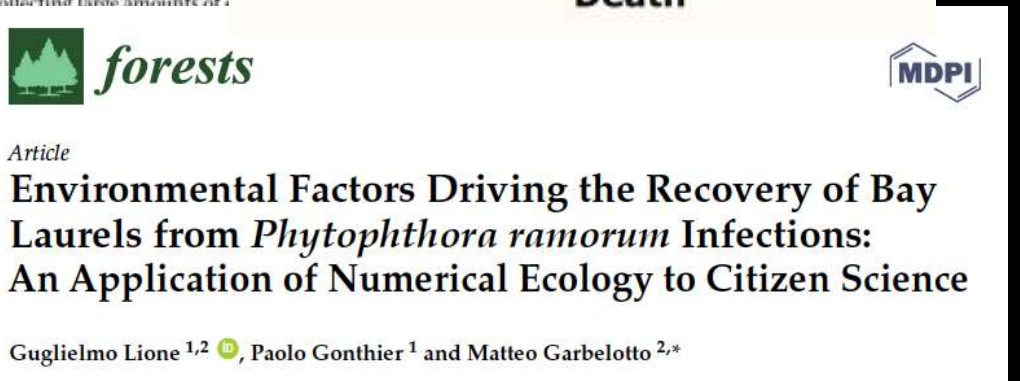

Forest Phytophthoras

HOME ABOUT LOGIN SEARCH CURRENT ARCHIVES

Home > Vol 4, No 1 (2014) > Garbelotto

Garbelotto, M., Maddison, E.R., Schmidt, D. 2014. SODmap and SODmap Mobile: Two Tools to Monitor the Spread of Sudden Oak Death. Forest Phytophthoras 4(1). doi: 10.5399/osu/fp.4.1.3560

SODmap and SODmap Mobile: Two Tools to Monitor the Spread of Sudden Oak Death


forests

MDPI

Article

Environmental Factors Driving the Recovery of Bay Laurels from *Phytophthora ramorum* Infections: An Application of Numerical Ecology to Citizen Science

Guglielmo Lione [1,2], Paolo Gonthier [1] and Matteo Garbelotto [2,*]

However: (I)

- Early diagnosis of SOD on bays is critical, but often landowners want to have confirmation of infection on oaks. Infected oaks should not be treated, but adjacent healthy oaks would become immediately a high priority for treatment

- SOD confirmation on oaks was until now very difficult to do and prohibitively expensive

- In 2019 U. C. Berkeley launches the **OakSTeP** program to train licensed arborists to correctly sample oaks, while UC personnel will test oak samples collected by arborists who participate in the program. **OakSTeP** makes SOD diagnosis from oaks possible and affordable

- Any licensed tree care worker or worker for a public entity or NGO can register . Registration is free if you bring the **OakSTeP** registration form filled in when you return samples or you can register online at **oakstep.org** for 200 USD

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OakSTeP Project

What is OakSTeP? **Oak S**OD **Te**sting **P**rogram is a new program aimed at making a step in the right direction towards the detection and control of Sudden Oak Death (SOD). The other major program aimed at empowering communities in the fight against SOD is called "SOD Blitzes" and allows lay people to identify and confirm the presence of SOD on California Bay Laurel and Tanoak leaves, the two major vectors for the disease in California forests. OakSTeP is a new program launched by the U.C. Berkeley Forest Pathology Laboratory aimed at filling the gap of knowledge on SOD in oaks. Currently, oak testing for SOD is prohibitively expensive and too complex to perform, even for tree care specialists. OakSTeP facilitates the cooperation between professional tree care specialists, oak owners who are their clients, and U.C. scientists to provide a rapid and inexpensive diagnostic service on SOD infection on oaks. Although "SOD blitzes" remain key in protecting oaks from SOD, by identifying the disease in its major vectors (Bay Laurels and Tanoaks) before oaks are infected, early detection of SOD on an oak in any given property, may allow a tree care specialist to save that oak, or more realistically, it may allow her or him to save uninfected oaks that grow nearby.

How Does OakSTeP Work?

OakSTeP stands for "**Oak S**OD **Te**sting **P**rogram". It is a program directed at licensed tree care workers to provide them with all that is needed to sample symptomatic oaks at a fraction of the cost. By enrolling in the program, a licensed tree care worker will have access to the following:

1. Sets of Petri dishes and associated data forms directly delivered to them and to be used when sampling oaks.
2. Instructional Video and written instructions describing step by step all tools needed to sample oaks: when, where and how to sample oaks; where and how to send samples.
3. Analysis by the U.C. Berkeley state-of-the-art Diagnostic Lab.
4. Easy to read diagnostic reports that may be shared with clients.

Matteo's Instructional Video

OakSTeP

Special Event: An Evening to Support California Wild Lands and Native Forests

Secure Donation Page

CLICK HERE TO DONATE

Oakstep.org

-Program description

-Instructional video on how to sample oaks

-How to get all necessary materials

-Written instructions

-All forms needed

However: (II)

- Diagnosing SOD is the first step, but what about **treatments** to prevent disease spread? Only treatment swill make a difference

- SOD treatment has a cost but is easy, all treatment to de done in the Fall: 1)- Identify high risk areas using SODmap mobile; 2)- Remove bay laurels 15 -30 feet around oaks you want to protect; 3)- Treat oaks that have very high value with phosphites

- We need to record all treatment efforts from the past, present, and future to assess their efficacy and to gain momentum to get governmental support for treatment funds. **Fill in the extended Treatment form record included in your collection packet.**

THIS WILL CREATE A DATABASE OF HOW MUCH CALIFORNIANS ARE WILLING TO INVEST TO STOP SOD

Fill in form inside packet or go to www.sodquest.org

Sudden Oak Death (SOD) TREATMENT SURVEY

Date: **Full Name:**

Zip code: **Email:**

Your position, circle one:

Owner Manager Renter Arborist or similar

Year when SOD was first officially diagnosed in property:

How was it diagnosed, circle all that applies:

SOD Blitz results

Ag commissioner/CDFA

Professional Arborist/private lab

Circle all tree species present in property:

Coast live oak	Shreve's oak	Black oak
Canyon live oak	Tanoak	California bay laurel

What actions have you taken to control SOD, circle all the apply:

Removed bay laurels around oaks

your contribution will remain anonymous

However: (III)

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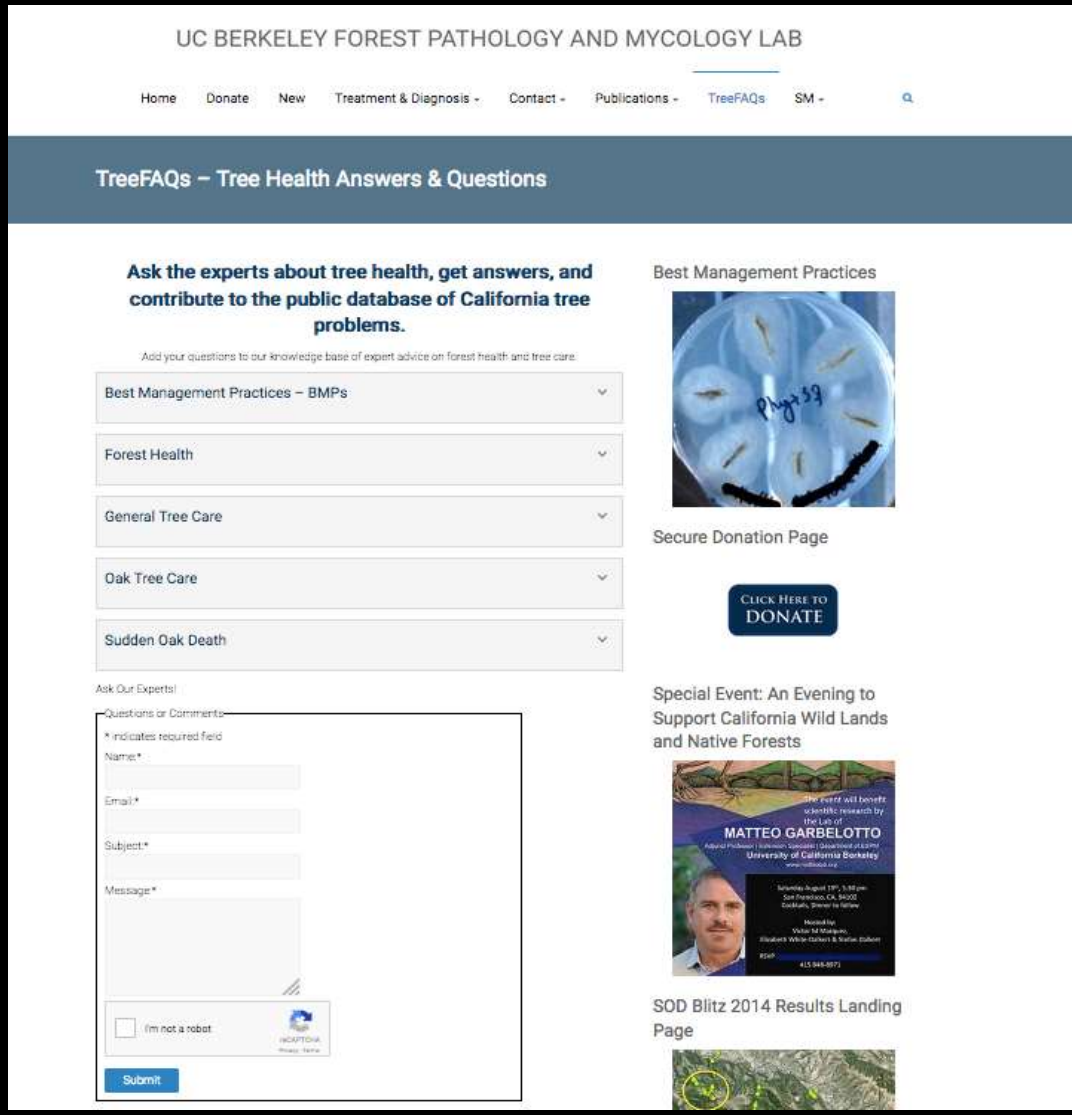
WE NEED TO KEEP AN OPEN COMMUNICATION CHANNEL.

USE THE PORTAL AT TREEFAQS.ORG




EARLY DETECTION: SOD BLITZES
SOD on oak CONFIRMATION OakSTeP.org
Two-way Communication: Treefaqs.org
SOD Treatments: Do and report them In SOD treatment survey

EARLY DETECTION:SOD BLITZES

www.sodblitz.org
www.sodmap.org
www.sodmapmobile.org

SOD CONFIRMATION ON OAKS

www.sodblitz.org
www.oakstep.org

Reporting and questions

www.sodblitz.org
www.sodquest.org
www.treefaqs.org

Learn SOD Treatments

www.sodblitz.org
www.matteolab.org
www.suddenoakdeath.org

This is the “whole enchilada” to protect our oaks

- Thanks to NSF, Gordon and Betty Moore Foundation, PG&E Foundation, MidPen Open Space and USFS State and Private Forestry