Thanks to funding from:

- State and Private Forestry, US Forest Service
- Pacific Southwest Station, US Forest Service
- The PG&E Foundation
- National Science Foundation
Two publications
www.matteolab.org

• SOD map and SOD map mobile
• Citizen science data as good as scientists’ data: sod blitz info used to generate predictive model. The model shows likelihood of SOD infection is positively correlated to precipitation, bay density, and infection level of previous year, and negatively correlated to max average temp and population density
Citizen science helps predict spread of sudden oak death

By Sarah Yang, Media Relations | May 1, 2015

BERKELEY — Efforts to predict the emergence and spread of sudden oak death, an infectious tree-killing disease, have gotten a big boost from the work of grassroots volunteers.

A joint study reveals the power of citizen science in SOD Blitz, a survey project in which volunteers are trained to identify symptoms of sudden oak death. Led by Matteo Garbelotto at UC Berkeley and Ross Meentemeyer at North Carolina State University, the study was published today (Friday, May 1) in the journal *Frontiers in Ecology and the Environment*.

Sudden oak death is a fungus-like disease that has felled hundreds of thousands of trees in California. Crowdsourcing the survey and sampling work allowed researchers to gather information that would otherwise be too impractical and cost-prohibitive to obtain. Researchers then used the data to create a model that predicts the presence of the sudden oak death pathogen, *Phytophthora ramorum*, based upon such variables as rainfall and density of host trees.

Study authors compared the model based upon crowdsourced data gathered from the 2008-2013 blitzes with models using “pre-Blitz” research observations collected from 2000 to 2007. They found the SOD Blitz model to be more powerful, correctly predicting the presence of the pathogen 74 percent of the time, compared with models based on other sources of data.
Citizen science generated the best predictive model for disease spread

The accuracy of the model improved with each year

Average maximum temp and population density are negatively correlated with spread, while rainfall, bay density, and infection of previous year are positively correlated
Fall trainings
(SOD Blitz results and)

• New Injection Label
• Soil amendments
• Scribing
• Silvicultural prescriptions
Sudden Oak Death

Exotic pathogen introduced in several areas on infested ornamental stock (late 80s)

Spreads by itself aerially by wind & rain during mild wet season (but only a few hundred yards)

Risk for oak infection only when pathogen is within 200 yards

Need to have a fine-scale map of pathogen distribution
SOD Blitzes

- Yearly volunteer-based survey to track expansion and contraction of the pathogen’s range
- Volunteers collect over a weekend
- UC Berkeley tests all samples
- Early Fall, results of yearly blitz are available
- Mid Fall, Blitz results added to SODmap
- SODmap mobile accesses data from SODmap:
  - App allows to identify sampled trees in the field
  - App calculates risk for oak infection at any location
Infectious hosts in CA forests

- CA Bay Laurel
  Only leaves, highly infectious

- Tanoaks
  Leaves, petioles, twigs = infectious
  (Branches, trunks = not infectious)
  Trunk not infectious
Bay/Oak association

Yearly, in spring

Wave years

Coast Live Oak (no sporulation)

Canker margin in phloem

Bleeding canker

Soil/Water
Symptoms occur where water collects on the leaf.

SOD lesions may appear on the edge or even the base of the stem depending on how the leaf is carried by the plant.

Brown, black, or gray leaf tips and/or blotches

May have an irregular black line or border

Yellowish discoloration towards the healthy portion of the leaf

SOD Lesions
More on bay laurel symptoms

• Not all leaves will display symptoms (as few as one leaf may have them)

• Usually in lower canopy (thank god!)

• Look at each side of tree for 20 seconds before making your decision

• Mark on large envelope how many healthy and symptomatic trees you look at, as you are doing it
SOD Symptoms on Tanoak

- Blackened petiole and midvein
- Yellow or brown leaf tissue

Asymptomatic Tanoak

- Leaf blotches on tanoak that are not SOD

UC Berkeley  Forest Pathology and Mycology Laboratory -  http://www.matteolab.org
1-Collect Leaves

2-Put Leaves in small envelope

3-Flag Tree

4-GPS: to identify location
SODmap Mobile:

SODMAP Mobile

U.C. Berkeley
Forest Pathology
and Mycology
Laboratory
We recommend using the free app SODmap Mobile to map your trees with your iPhone or Android device!

Available on iTunes and Google Play

Tapping the Risk button will give you the Lat, Long, and Risk of your current location

Moderate Risk Level

1 Positive trees between 200m - 1km
39 Negative trees within 1km, 37

Current Location:
37.868105° x -122.270557°
If a GPS/smartphone is not available:

• On the small collecting envelope or datasheet, write down as much as you can to help you remember where each sample was collected (address, side of street, landmarks)

• At home, download and turn on Google Earth

• Redo your collecting walk on the computer

• Put the mouse on the estimated location of a tree you sampled

• At the bottom of the page, you will see Lat. and Long.
Record GPS coordinates.
If field GPS/smartphone and Google Earth are not available:

- Estimate direction and distance of your first sampled tree from a driveway with address
  - For example: define the location of your first tree (#1) as “100 m Southeast of driveway at 123 Park Lane, Saratoga”
- Estimate the location of your second tree with direction and distance away from your first tree, and so on
  - For example: tree #2 = “100 m East of tree #1”
Two major strategies for sampling:

Sampling scheme 1
- To identify new infestations: sample symptomatic plants, sampling distance can be variable but 50-100 yards optimal

Sampling scheme 2
- Determine also disease intensity. Sample at closer intervals 5-10 yards. Ideal if SOD outbreak already confirmed
To identify new infestations
(Sampling Scheme 1)

• Sample any area you are curious about, or care about

• Areas with little information based on SODmap, sampling interval between trees about 100 m

• Use SODmap Mobile
Four different risk levels

- High priority for sampling:
  - Insufficient Sampling Data
  - Low or No Risk Level
    - 0 Trees within 1km, no positives
    - 4 Trees sampled post-drought

- Low priority for sampling:
  - Moderate Risk Level
    - 1 Positive trees between 200m
    - 35 Negative trees within 1km, 33 trees sampled post-drought
  - High Risk Level
    - 1 Positive trees within 200m
    - 8 Positive trees within 1km, 33 trees sampled post-drought

Current Location:
- 37.9117° x -122.308°
- 37.9146° x -122.301°
- 37.9181° x -122.294°
SOD map (DROUGHT)

HIGH PRIORITY
Determine disease intensity

Sampling Scheme 2

• Find trees that were positive in 2014 or 2013 on Sodmap Mobile or on computer (www.sodblitz.org) and sample the same bay laurel and other bay laurels at distances of at least 5 m

• Tag and GPS each tree
If bays abound

If bays scarce
Installation of Tree Tags (recommended for intensive sampling)

Install on north side of tree, 1.5 m above ground

Leave room for tree growth
Use White Labels for Trees with SOD Symptoms
Use White Labels for Trees with SOD Symptoms
10 per packet

Use for Trees WITH SOD Symptoms

<table>
<thead>
<tr>
<th>Directions: 1) Put 6-10 leaves from one tree into the small sample envelope, one envelope per tree. 2) Tie the colored tape onto a tree branch. 3) Complete datasheet in pencil, seal it in the sample envelope with the leaves, and put sample envelopes in the large collection packet. 4) Return the collection packet to the meeting site.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Collector:</th>
<th>Tree#:</th>
<th>Date:</th>
</tr>
</thead>
</table>

<table>
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<tr>
<th>Bay</th>
<th>Tanoak</th>
<th>Metal Tree Tag # (optional):</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Private land</th>
<th>Public land</th>
<th>Park/Open space</th>
<th>Symptomatic oak nearby?</th>
</tr>
</thead>
</table>

<table>
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<th>Location:</th>
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<th>Lat:</th>
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<table>
<thead>
<tr>
<th>Did you use Google Earth or Google Maps to GPS this location?</th>
</tr>
</thead>
</table>
Look for symptoms on oaks (tanoaks) near bay trees

Viscous
Good smell
Black to amber
No wounds
(Lower trunk)
Use **Pink** Labels for Trees without SOD Symptoms
**Use Pink Labels for Trees without SOD Symptoms**

### Use for Trees WITHOUT SOD Symptoms

**Directions:** 1) Do not collect leaves from trees without SOD symptoms, just fill out this datasheet. 2) Tie the colored tape onto the tree branch. 3) Complete this datasheet in pencil and seal in the large collection packet. 4) Return the collection packet to the meeting site.

<table>
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<th>Collector:</th>
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</table>

**Location:**

**Lat:**

**Long:**

| Did you use Google Earth or Google Maps to GPS this location? |
SOD Blitz 2013 Collection Packet
Collection Materials and Instructions Inside

Collector: ____________________________________________

Estimated Number of Healthy Trees you Looked at to Make This Collection: __________

Estimated Number of Symptomatic Trees you Looked at to Make This Collection: __________

Lab Use Only

P_____________   SB_____________
Complete Collection Packet Label

Return Samples to Collection Site
Important notes when collecting:

• Keep samples in cool, shady spots

• Do not expose to sunlight or heat (do not leave in cars!)

• Do not put in freezer (fridge also not recommended)

• Return packets to the collection box by the deadline
After collecting:

- Do not bring any plant material home with you besides what you collected for the BLITZ once it has been placed in the collecting envelopes inside the large manila envelope.

- Clean all mud from shoes; if possible use brush on site.

- If very muddy, change shoes as you get to car and then wash in tub or sink at home. Do NOT scrub in your yard.
THANK YOU!

Program funded by USFS State & Private Forestry, NSF, and the PG & E Foundation

Your Local Blitz Organizer(s)

Doug Schmidt and Toni Mohr at UCB + dedicated undergrads
SOD Blitzes 2015

Useful urls:

www.matteolab.org
www.thanqs.org
www.sodblitz.org
www.sodmap.org
www.sodmapmobile.org
THANQs – FAQ

Tree Health Answers & Questions

Ask the experts any questions about tree health, diseases, or management.

Forest Health

Can the Garbelotto lab analyze wood chips for pathogens?

Armillaria is slowly killing my Thuja hedge. What is a comparable replacement hedge that will give me the same amount of privacy and be resistant to this fungus?

If the stump of a felled tree is left in place, can the roots to continue to grow?

Can coast live oak be used in a large-scale Bay Area tree planting project without exacerbating SOD?

General Tree Care

When should I remove a tree?

What is the Critical Root Zone around a tree?

Will fresh wood chip mulch injure the general health of a tamarack tree?

Can the Garbelotto lab analyze wood chips for pathogens?

Armillaria is slowly killing my Thuja hedge. What is a comparable replacement hedge that will give me the same amount of privacy and be resistant to this fungus?

If the stump of a felled tree is left in place, can the roots to continue to grow?
Question Submission Form

Would you like to register as one of our experts? Click Here!

Ask a Question or Leave a Comment

- Name *
- Email *
- Website

Submit for Review