Forest Health Dynamics Laboratory Update

Jessica Baldwin and Dr. Lori Eckhardt

Forest Health Dynamics Laboratory, School of Forestry and Wildlife Sciences, Auburn University, Auburn AL

About

Forest Health Coop Diagnostic Laboratory Services - Overview

History

Laboratory Sample Analysis

Results

History

Forest Health Cooperative began in 2008

Bring together parties interested in maintaining forest health, productivity, and sustainability

Membership for those managing for or purchasing forest products, wildlife and endangered species

Address important and current forest health issues with real world management as a focus

http://www.auburn.edu/academic/forestry_wildlife/foresthealthcooperative


FOREST HEALTH COOPERATIVE
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Member Reports
Meetings
Publications & Documents
Diagnostics Clinic
Quantifying Pine Decline
Weather Data
Decline Distribution Map
Loblolly Pine Decline Hazard Map Files
Pupal Chamber
Galleries
Forest Health Cooperative | 3301 Forestry and Wildlife Sciences Building
Auburn University, Alabama 36849-5418 | Phone: (334) 844-1012 | E-mail: bowerep@auburn.edu
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Diagnostics Clinic

Members Only page – Diagnostics Clinic

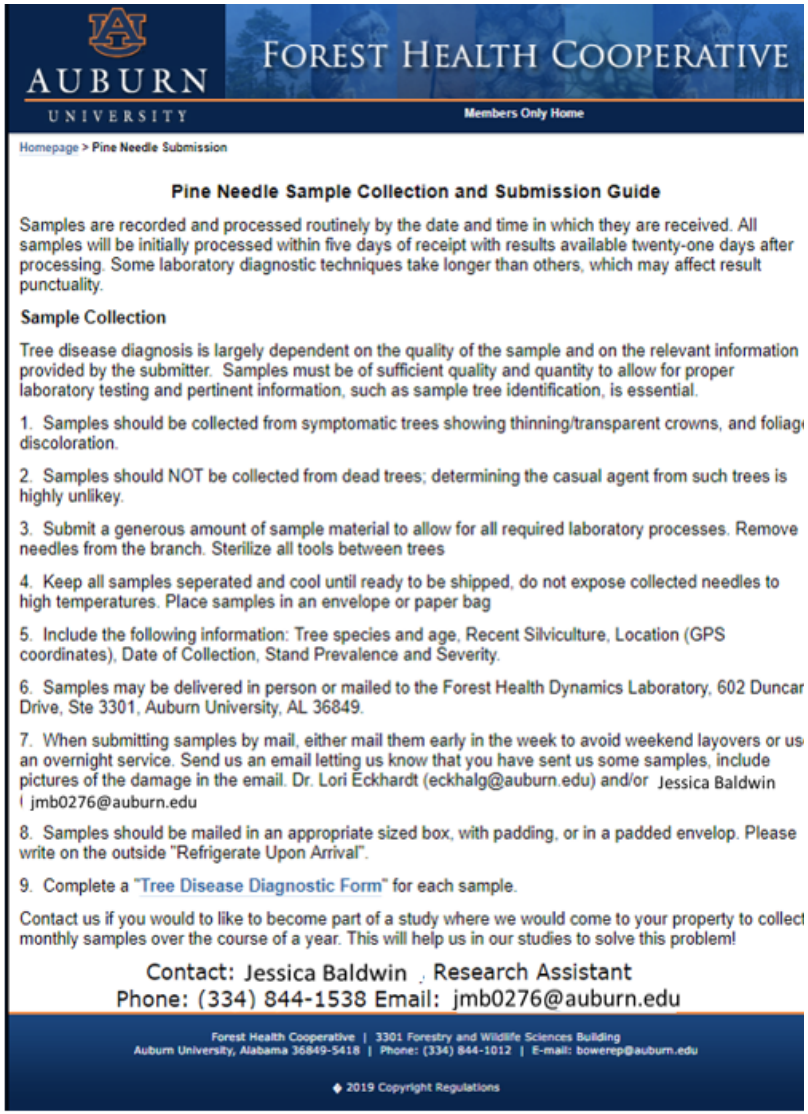
Sample Collection and Submission Guide

- Provide an instruction set for collecting “good” samples for laboratory analysis

Tree Diagnostics Form

- Provide a detailed sample/site history to aid in diagnosis accuracy

Needle Samples



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FOREST HEALTH COOPERATIVE

Members Only Home

Homepage > Pine Needle Submission

Pine Needle Sample Collection and Submission Guide

Samples are recorded and processed routinely by the date and time in which they are received. All samples will be initially processed within five days of receipt with results available twenty-one days after processing. Some laboratory diagnostic techniques take longer than others, which may affect result punctuality.

Sample Collection

Tree disease diagnosis is largely dependent on the quality of the sample and on the relevant information provided by the submitter. Samples must be of sufficient quality and quantity to allow for proper laboratory testing and pertinent information, such as sample tree identification, is essential.

1. Samples should be collected from symptomatic trees showing thinning/transparent crowns, and foliag discoloration.

2. Samples should NOT be collected from dead trees; determining the casual agent from such trees is highly unlikey.

3. Submit a generous amount of sample material to allow for all required laboratory processes. Remove needles from the branch. Sterilize all tools between trees

4. Keep all samples seperated and cool until ready to be shipped, do not expose collected needles to high temperatures. Place samples in an envelope or paper bag

5. Include the following information: Tree species and age, Recent Silviculture, Location (GPS coordinates), Date of Collection, Stand Prevalence and Severity.

6. Samples may be delivered in person or mailed to the Forest Health Dynamics Laboratory, 602 Duncar Drive, Ste 3301, Auburn University, AL 36849.

7. When submitting samples by mail, either mail them early in the week to avoid weekend layovers or us an overnight service. Send us an email letting us know that you have sent us some samples, include pictures of the damage in the email. Dr. Lori Eckhardt (eckhalg@auburn.edu) and/or Jessica Baldwin (jmb0276@auburn.edu

8. Samples should be mailed in an appropriate sized box, with padding, or in a padded envelop. Please write on the outside "Refrigerate Upon Arrival".

9. Complete a "Tree Disease Diagnostic Form" for each sample.

Contact us if you would to like to become part of a study where we would come to your property to collect monthly samples over the course of a year. This will help us in our studies to solve this problem!

Contact: Jessica Baldwin , Research Assistant
Phone: (334) 844-1538 Email: jmb0276@auburn.edu

Forest Health Cooperative | 3301 Forestry and Wildlife Sciences Building
Auburn University, Alabama 36849-5418 | Phone: (334) 844-1012 | E-mail: bowerep@auburn.edu

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Root Samples

Members Only Homepage > Diagnostics Clinic

Sample Collection and Submission Guide

Samples are recorded and processed routinely by the date and time in which they are received. All samples will be initially processed within five days of receipt with results available twenty-one days after processing. Some laboratory diagnostic techniques take longer than others, which may affect result punctuality.

Sample Collection

Tree disease diagnosis is largely dependent on the quality of the sample and on the relevant information provided by the submitter. Samples must be of sufficient quality and quantity to allow for proper laboratory testing and pertinent information, such as sample tree identification, is essential.

1. Collect samples before the application of pesticides in order to increase the probability of recovering the causal pathogens.

2. Samples should be collected from symptomatic trees showing thinning/transparent crowns, foliage discoloration, and/or excessive cone production.

3. Samples should not be collected from dead trees; determining the causal agent from such trees is highly unlikely. Samples should not be collected from dead roots for the same reason.

4. Submit a generous amount of sample material to allow for all required laboratory processes. Collect 12 to 18 inches of first order lateral roots that are 3/4 to 4 inches in diameter. Be sure to include insect damaged and stained roots.

5. Carefully excavate to avoid unnecessary damage to the sample.

6. Excess soil should be removed from root samples. Samples should retain just enough soil to maintain moisture levels.

7. Wrap samples in dry paper towel and seal in a zip-top bag and place on ice. Do not add water or pack a sample in water.

8. Keep samples refrigerated from collection to submission and do not expose them to high heat situations, such as baking in the sun or in the back of a vehicle.

9. Keep all samples in separate bags and label appropriately.

10. Clean and sterilize all sampling tools between the collection of different samples to prevent spreading the pathogen from one tree to another.

11. Complete a "Tree Disease Diagnostic Form" for each sample.

Sample Submission

Samples may be delivered in person or mailed to the Tessa Bauman, Forest Health Dynamics Laboratory, 602 Duncan Drive, Ste 3301, Auburn University, AL 36849-5418.

1. All samples MUST be submitted with a completed "Tree Disease Diagnostics Form."

2. When submitting samples by mail, either mail them early in the week to avoid weekend layovers or use an overnight service. You may also deliver them in person.

3. Samples should be mailed in an appropriate sized box, with padding, or in a padded envelope. Please write on the outside of the package "Refrigerate Upon Arrival."

4. If sample is a suspected high-risk pathogen, please contact Forest Health Dynamics Laboratory personnel for appropriate packaging and mailing instructions.

Needle Samples

Forest Health Cooperative
Forest Health Dynamics Laboratory
602 Duncan Drive, Suite 3301
Forestry and Wildlife Sciences Building
Auburn University, Auburn, AL 36849-5418
Jessica Baldwin (jmb0276@auburn.edu)
334-844-1538
https://fp.auburn.edu/ForestHealthCooperative/default.htm

Diagnostic Laboratory Use Only:
Date Received: _____
Received by: _____

Tree Disease Diagnostic Form

Please include ALL relevant data; maintain an office copy; submit original copy with specimen

Date Sample Collected: _____ Date Sample Shipped: _____ No. of Samples: _____

Sample Location - County, State: _____ Sample ID: _____

	Submitter Information	Results Recipient (If different than submitter)
Name:		
Company:		
Address:		
City/Zip:		
Phone No:		
Fax No:		
Email:		

Tree and Site Information

Select ALL that apply

Tree Species:	___ Loblolly	___ Longleaf	___ Shortleaf	___ Slash	___ Other: _____
Site Location:	___ Forest	___ Nursery	___ Greenhouse		
Aspect:	___ N ___ NE	___ E ___ SE	___ S ___ SW	___ W ___ NW	
Slope %:	___ 0 - 5%	___ 5 - 10%	___ 10 - 15%	___ > 15%	
Soil Type:	___ Sand	___ Silt	___ Clay	___ Loam	
Age of Planting:	___ 0 - 10	___ 11 - 20	___ 21 - 30	___ 31 - 40	___ > 40
Foliage Symptoms:	___ Flagging	___ Thin	___ Wilted	___ Yellowed	___ Other: _____
Root Symptoms:	___ Insect Signs	___ Resinous	___ Rotted	___ Stained	___ Other: _____
Insect Attack:	___ BTB	___ Hylastes	___ Ips	___ SPB	___ Termites ___ Weevils
Insect Damage:	___ Boles	___ Branches	___ Foliage	___ Roots	
Stand Prevalence:	___ Entire	___ Localized	___ Scattered	___ % Affected	
Severity of Damage:	___ Low	___ Medium	___ High	___ Severe	
Recent Silviculture:	___ Fertilizer	___ Fire	___ Herbicide	___ Insecticide	___ Thin/Harvest

Problem Description: _____

_____

_____

http://www.auburn.edu/academic/forestry_wildlife/foresthealthcooperative/

Field Consulting

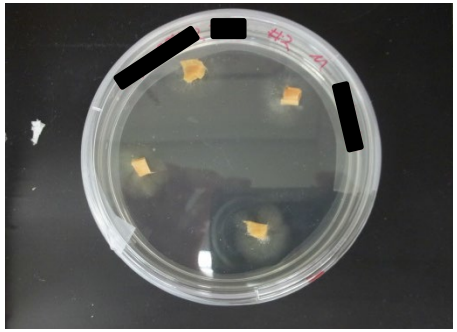
Travel to member's location

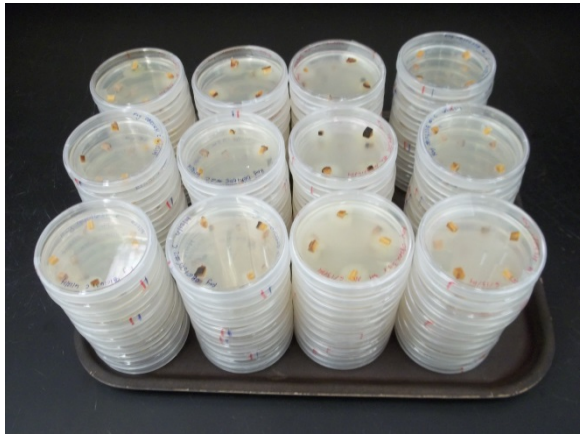
Provide onsite diagnostic information

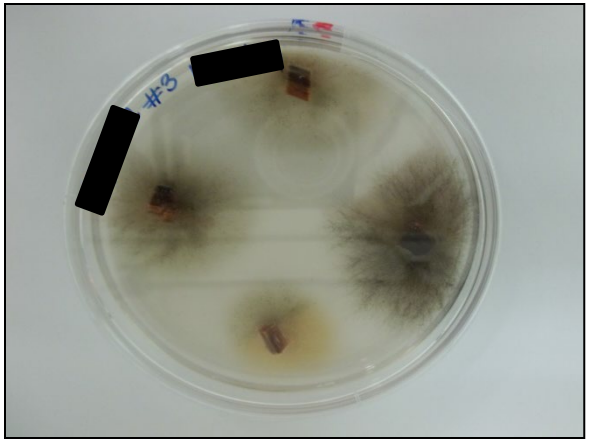
Collect samples for laboratory analysis

Photos: FHDL

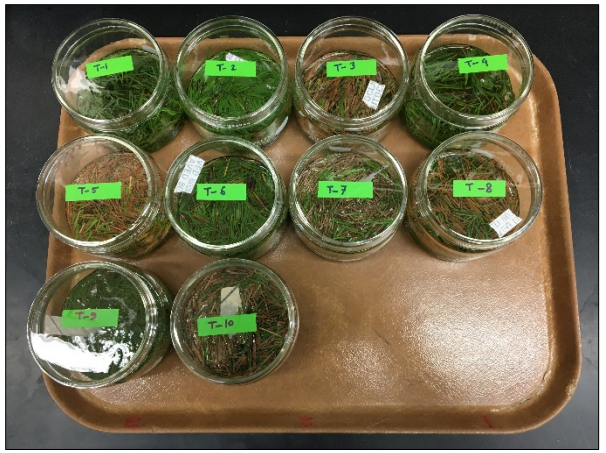
Laboratory Sample Analysis

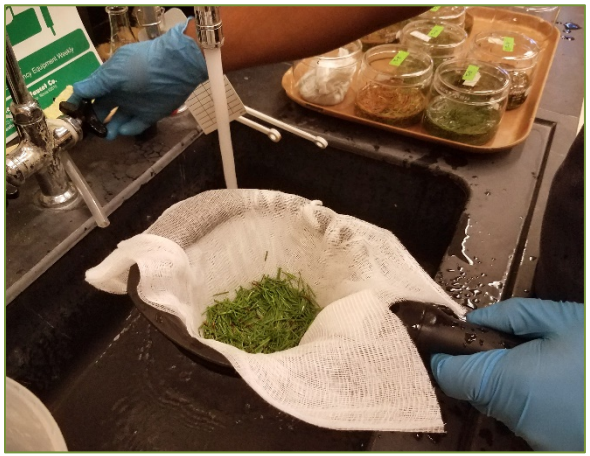


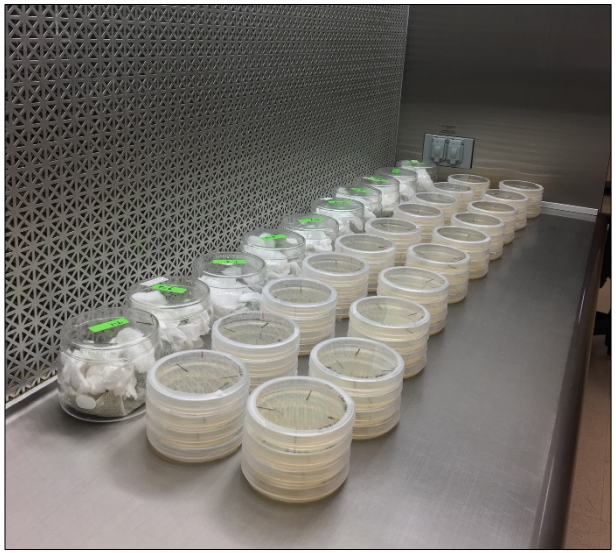




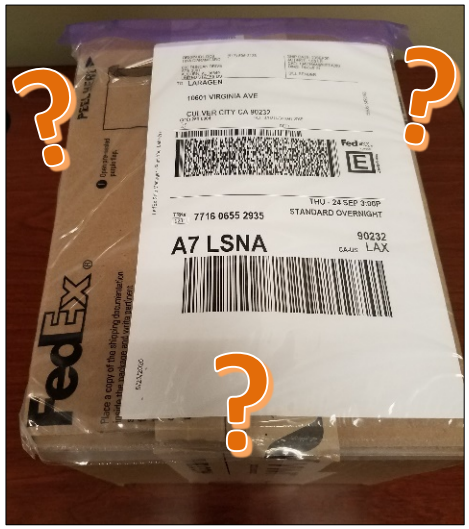
Laboratory Sample Analysis

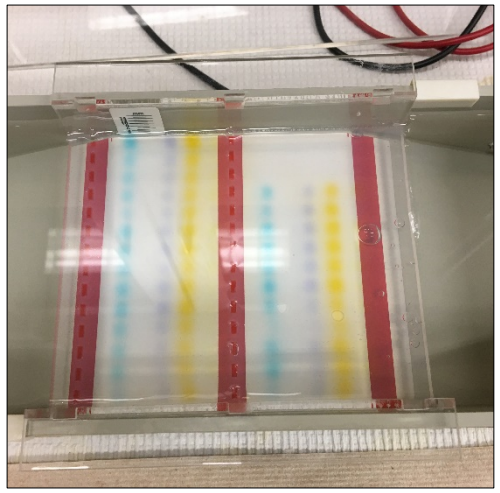


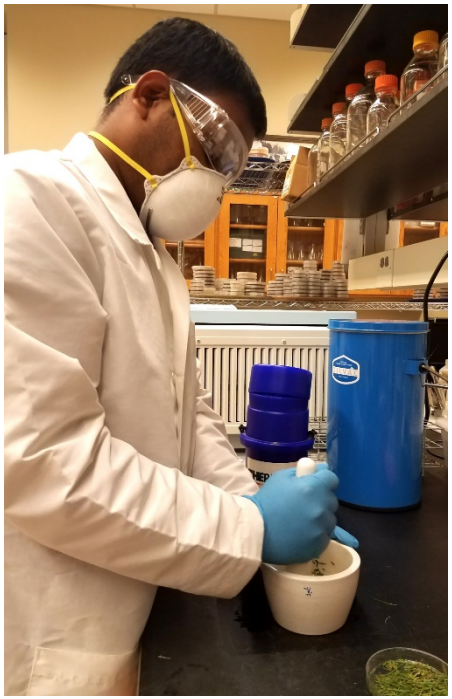


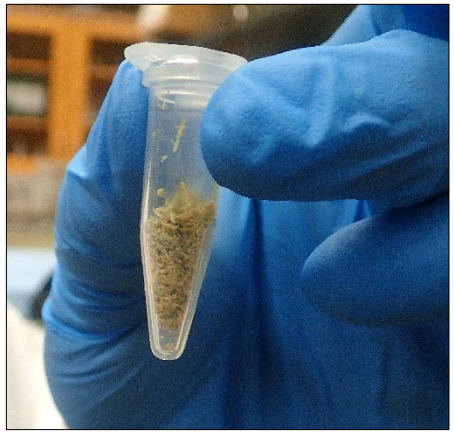


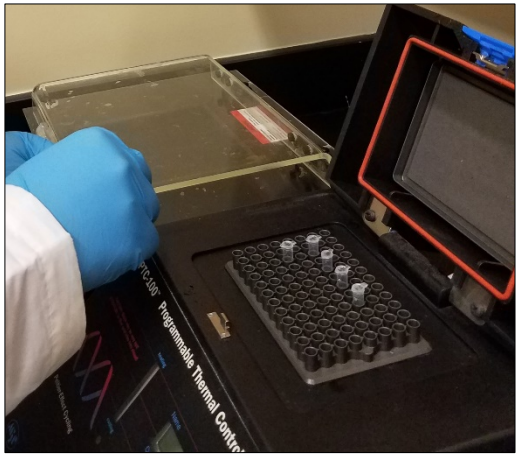
Molecular Analysis











Laboratory Sample Analysis

Results

Results

- Roots: 3-4 weeks
- Needles: 4-6 weeks

Results letter sent to member with description and relevant species information

Emerging Forest Pests and Sudden Oak Death Review

Jessica Baldwin and Dr. Lori Eckhardt

Forest Health Dynamics Laboratory, School of Forestry and Wildlife Sciences, Auburn University, Auburn AL

2020-2021 pest issues in Alabama

Hemlock woolly adelgid

Pine Tip moth

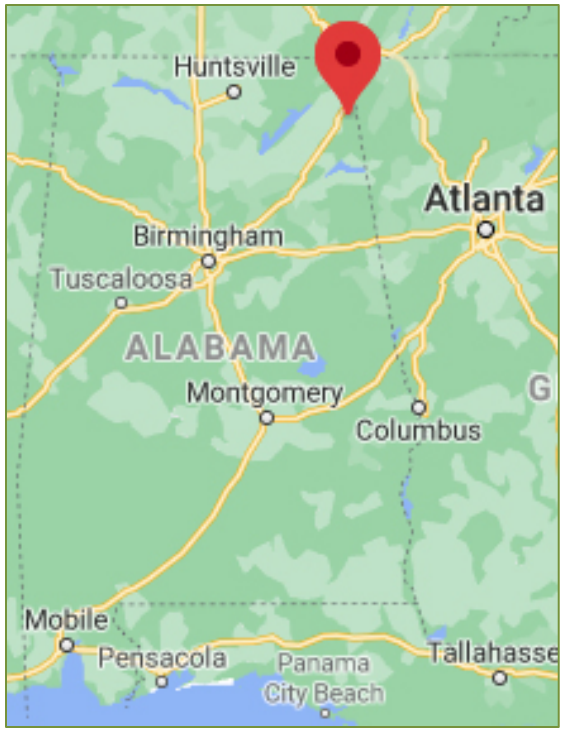
Pine sawfly

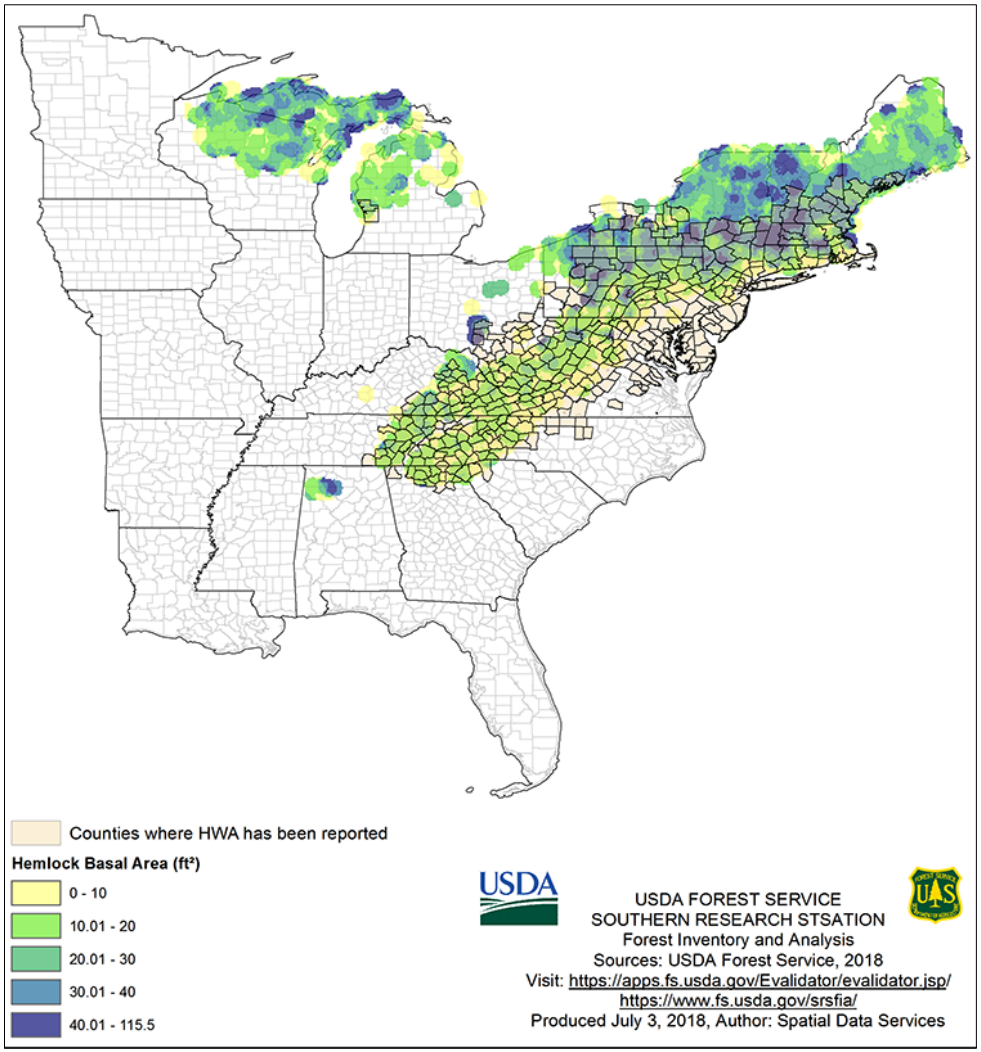
Asian Longhorned Beetle

Sudden Oak Death (SOD)

Hemlock Woolly Adelgid

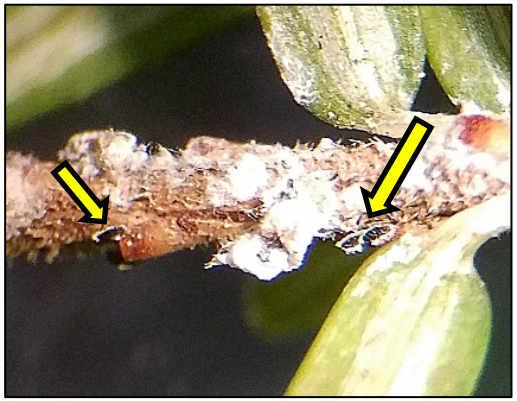
- *Adelges tsugae*
- Native to East Asia
- Found in eastern US in 1951 in Virginia
- Threat to AL: Bankhead National Forest





Hemlock Woolly Adelgid

- Site visit in July 2020 to Mentone, AL – landscape trees
- HWA is related to aphids
- Distinct waxy coating develops for protection
- Young instar nymphs were collected at the site



Photos: FHDL

Pine Tip Moth

Photo: James A. Richmond, USDA Forest Service, Bugwood.org

- *Rhyacionia frustrana*
- Larvae feed on new growth and then bore into shoot
- Severe and repeated attacks may cause stunted, deformed trees

Photo: Eric R. Day, Virginia Polytechnic Institute and State University, Bugwood.org

Photo: Darrell Ross, Oregon State University, Bugwood.org

Photo: A. Steven Munson, USDA Forest Service, Bugwood.org

Pine Sawfly

Photo: Brian Bradley, NRCS Forester

- Redheaded pine sawfly, *Neodiprion lecontei*
- Large outbreak in Lauderdale County, AL in October 2020
- Over 90% of saplings defoliated over 130 acres

Photo: Brian Bradley, NRCS Forester

Photo: James McGraw, North Carolina State University

Asian Longhorned Beetle

- *Anoplophora glabripennis*
- Native to East China
- First established population discovered in New York City, 1996
- Birch, willow, elm, maples, ash, popular
- New York, Illinois, New Jersey, Massachusetts, Ohio, and South Carolina

Photo by: Joe Boggs, Ohio State University

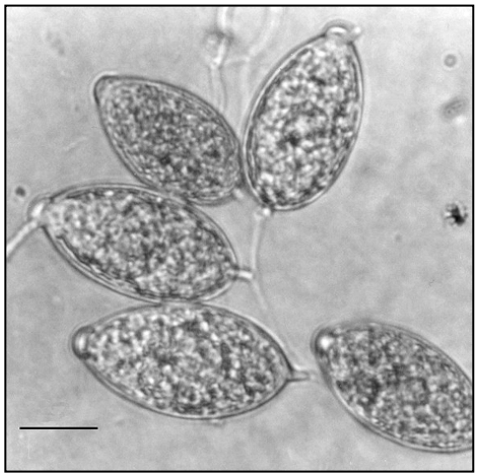
Photo by: Oregon Department of Agriculture

Sudden Oak Death

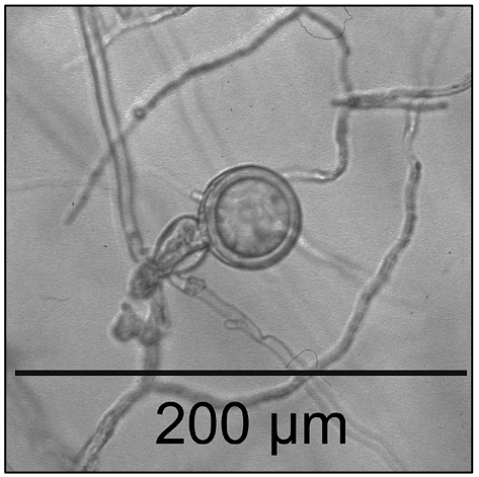
- First reported 1995 coastal region of central California with *Phytophthora ramorum* positively linked to the disease in 2001
- Fungus-like water mold (Oomycete)
- Spreads aerially and aquatically
- Pathogen has a wide host range
- Three expressions of the disease

Phytophthora ramorum

Chlamydospores



Sporangia



Oospore

- *P. ramorum* thrives in wet conditions
- Chlamydospores can persist in soil and leaf litter
- Sporangia contain flagellated zoospores
- Oospores are resistant to damage

Source: Steve Oak - USDA Forest Service Forest Health Protection

Risk To Our Forests

- *Phytophthora ramorum* persists in infected nurseries even after eradication measures.
- Inoculum is leaving infected nurseries via waste water
- A pathway from the water into terrestrial ecosystems is plausible
- Southeastern US climate is at least seasonally suitable for infection
- Eastern woody plants are susceptible

SOD Risk Map

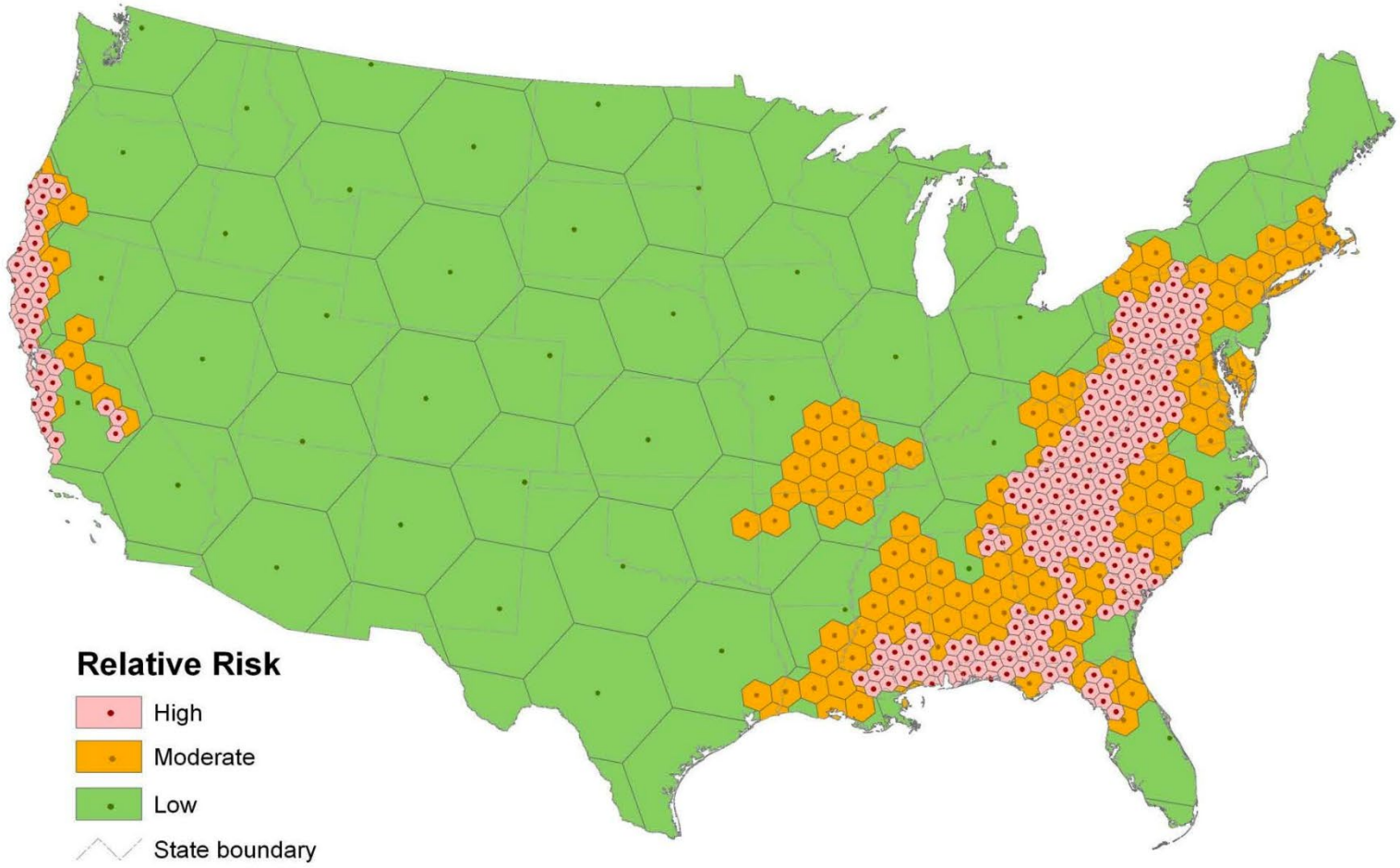


Figure 7.7 – New national risk map for sudden oak death (*Phytophthora ramorum*). State boundaries are included for reference.

Phytophthora ramorum symptoms

Source: Steve Oak - USDA Forest Service FHP

Field Sampling

- Six sampling periods per year
- Optimum water temperature is 10-22°C
- Bottle of Bait method: rhododendron leaves and pieces are incubated in bottles of nursery runoff water

Photos: FHDL

Field Sampling

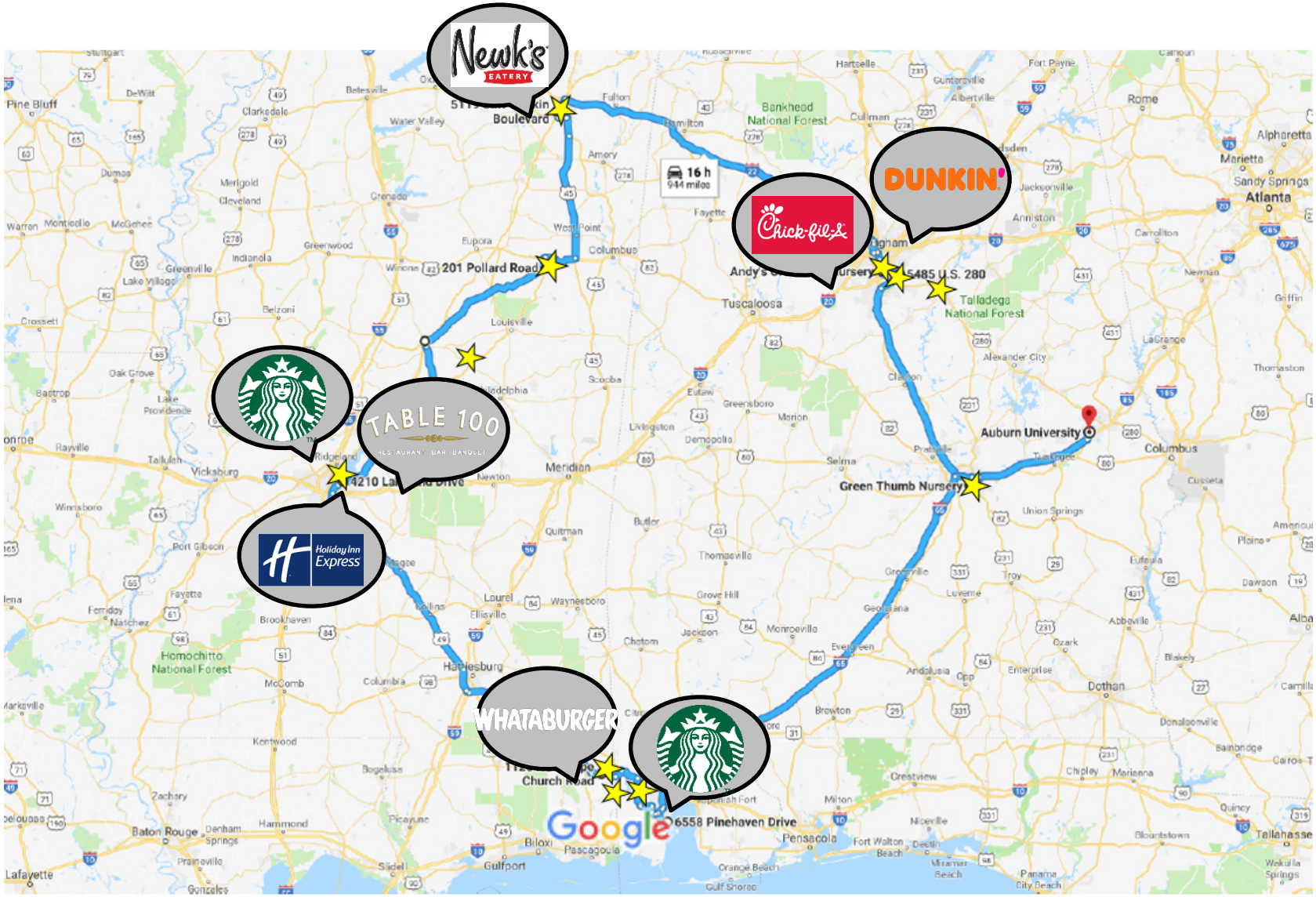
Photos: FHDL

Field Sampling

Photos: FHDL

April 23, 2020

May 7, 2020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Boulevard
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944 miles
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Chick-fil-A
201 Pollard Road
485 U.S. 280
Talladega National Forest
Tuscaloosa
Auburn University
Green Thumb Nursery
TABLE 100
Holiday Inn Express
WHATABURGER
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Google
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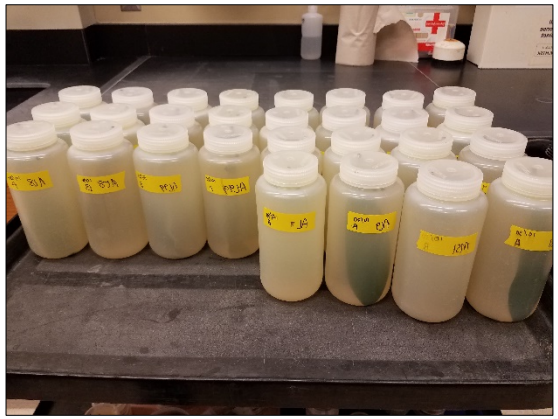
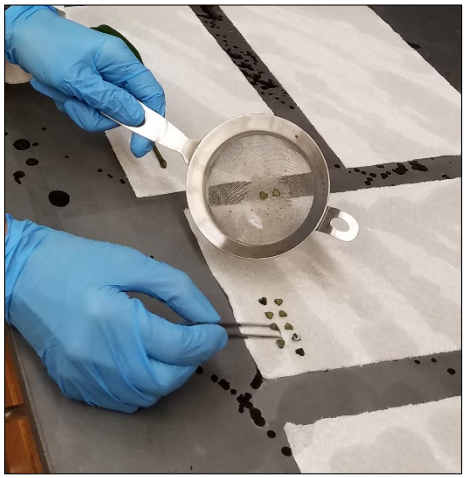
Lab processing

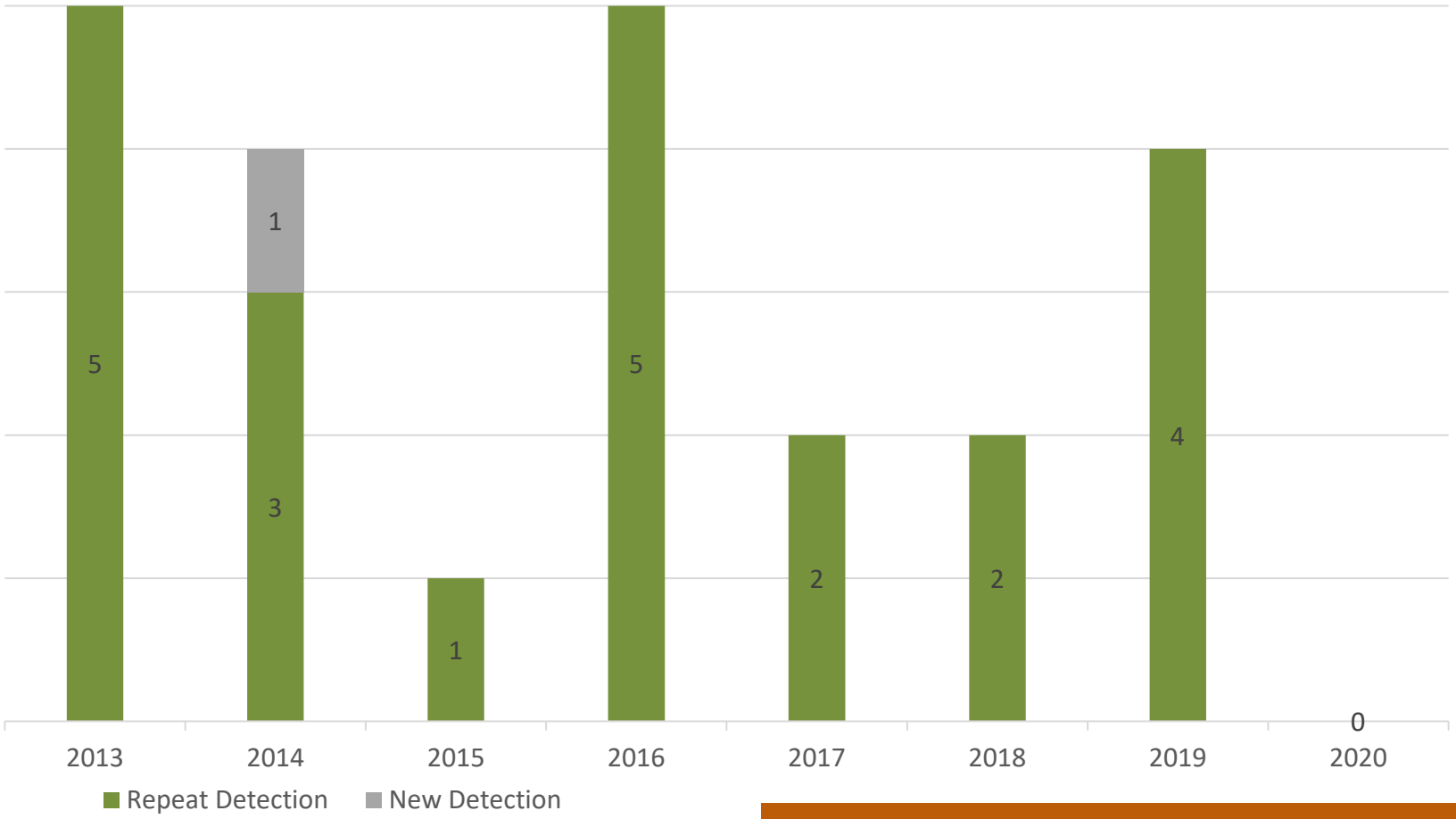




PennState

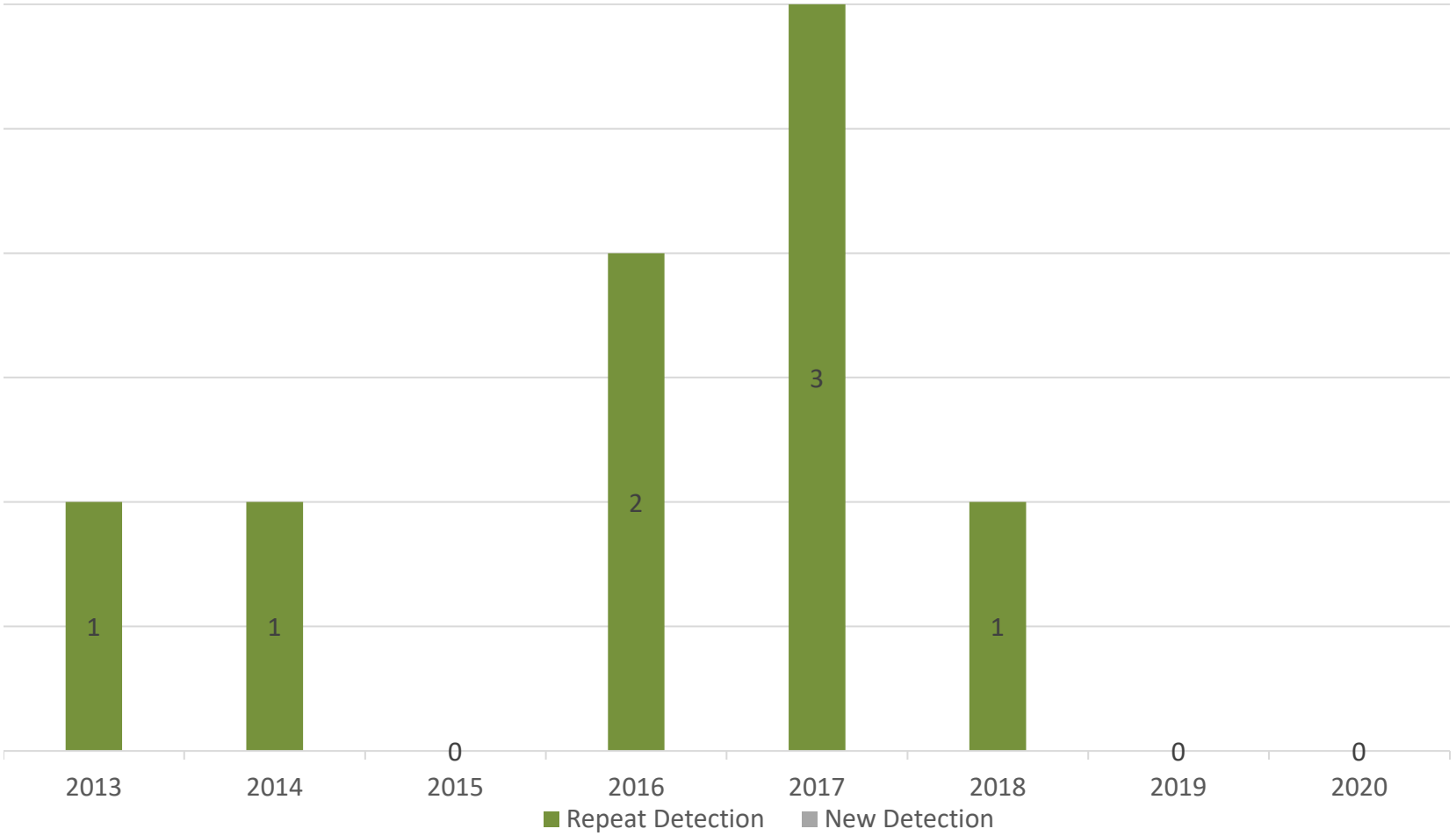
Photos: FHDL

Bottle of Bait Survey
P. ramorum Detection by Year in Alabama



Bottle of Bait Survey

P. ramorum Detection by Year in Mississippi



Acknowledgements

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Dr. Carl Schlagnhaufer - Penn State
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