Forest Health Dynamics Laboratory Update

Luis Mendez and Dr. Lori Eckhardt

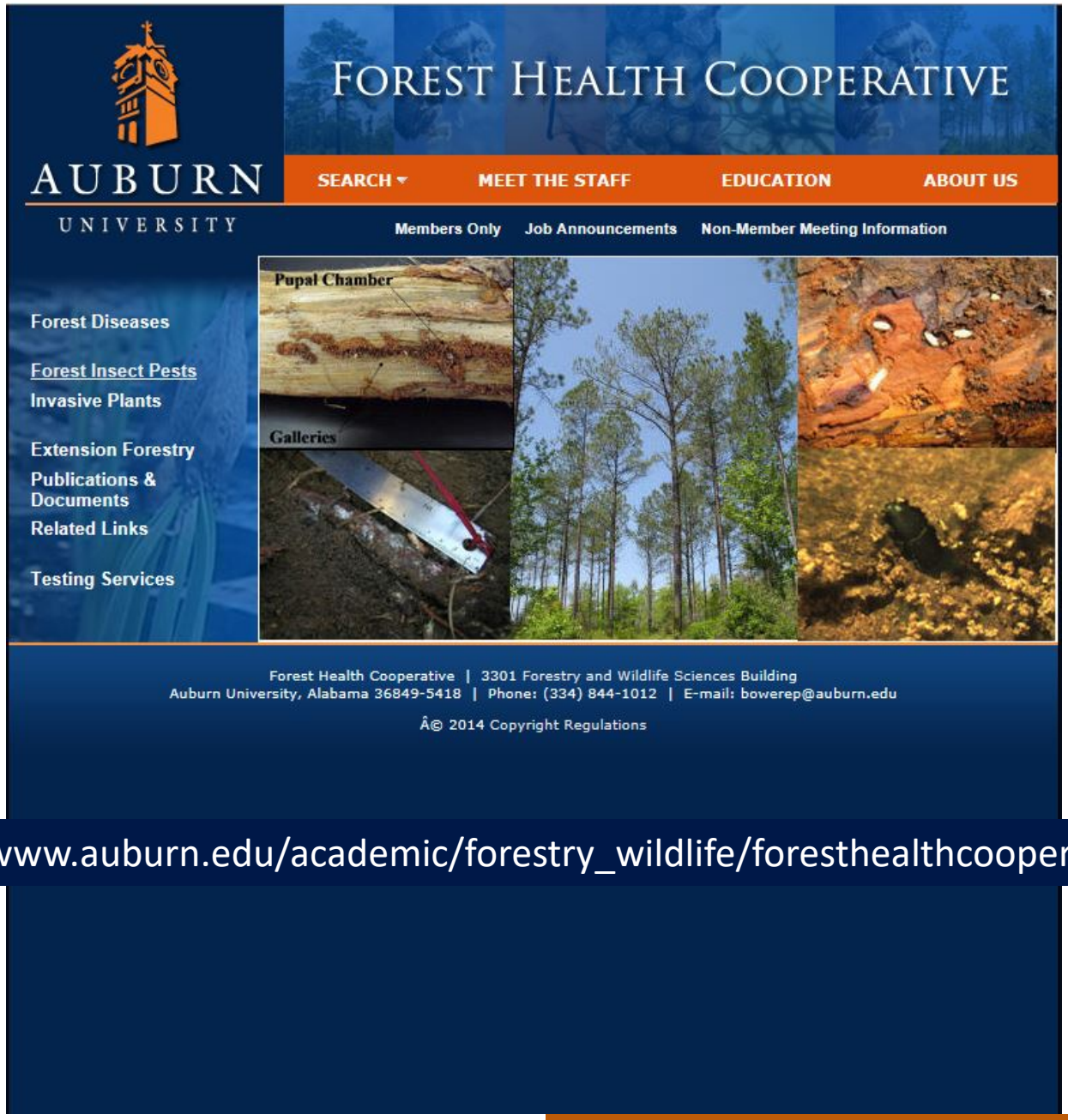
Forest Health Dynamics Laboratory, School of Forestry and Wildlife Sciences, Auburn University, Auburn AL

Forest Health Coop Diagnostic Laboratory Services - Overview

- History
- Weather Data
- Laboratory Sample Analysis
- Results

History

- Forest Health Cooperative began in 2008
- To 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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Home
Member Reports
Meetings
Publications & Documents
Diagnostics Clinic
Quantifying Pine Decline
Weather Data
Decline Distribution Map
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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FOREST HEALTH COOPERATIVE
Members Only Home
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2015
December
2016
January
February
March
April
May
June
July
August
September
October
November
December
Cumulative
2017
January
February
March
April
May
June
July
August
September
October
November
December
Cumulative
2018
January
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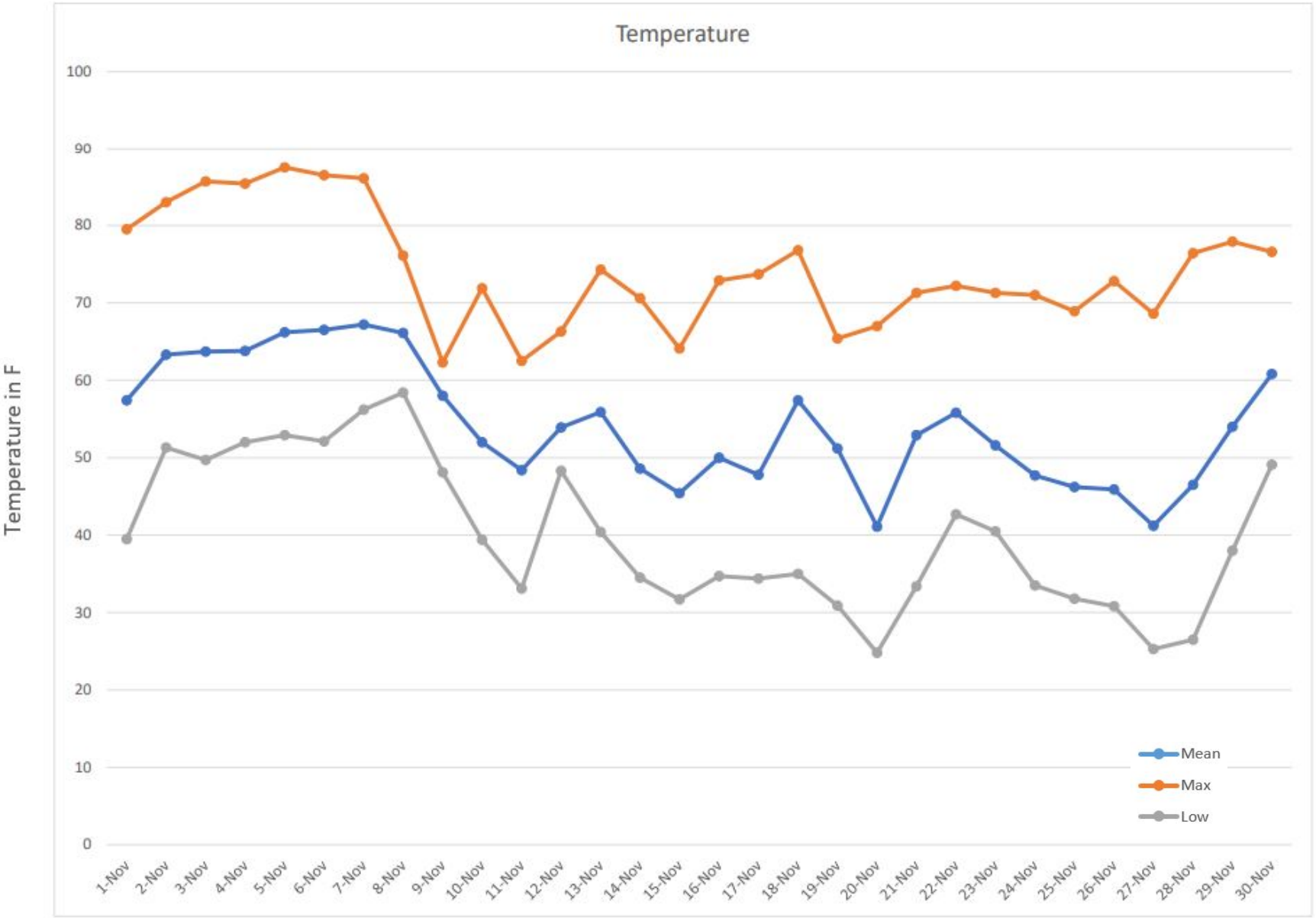
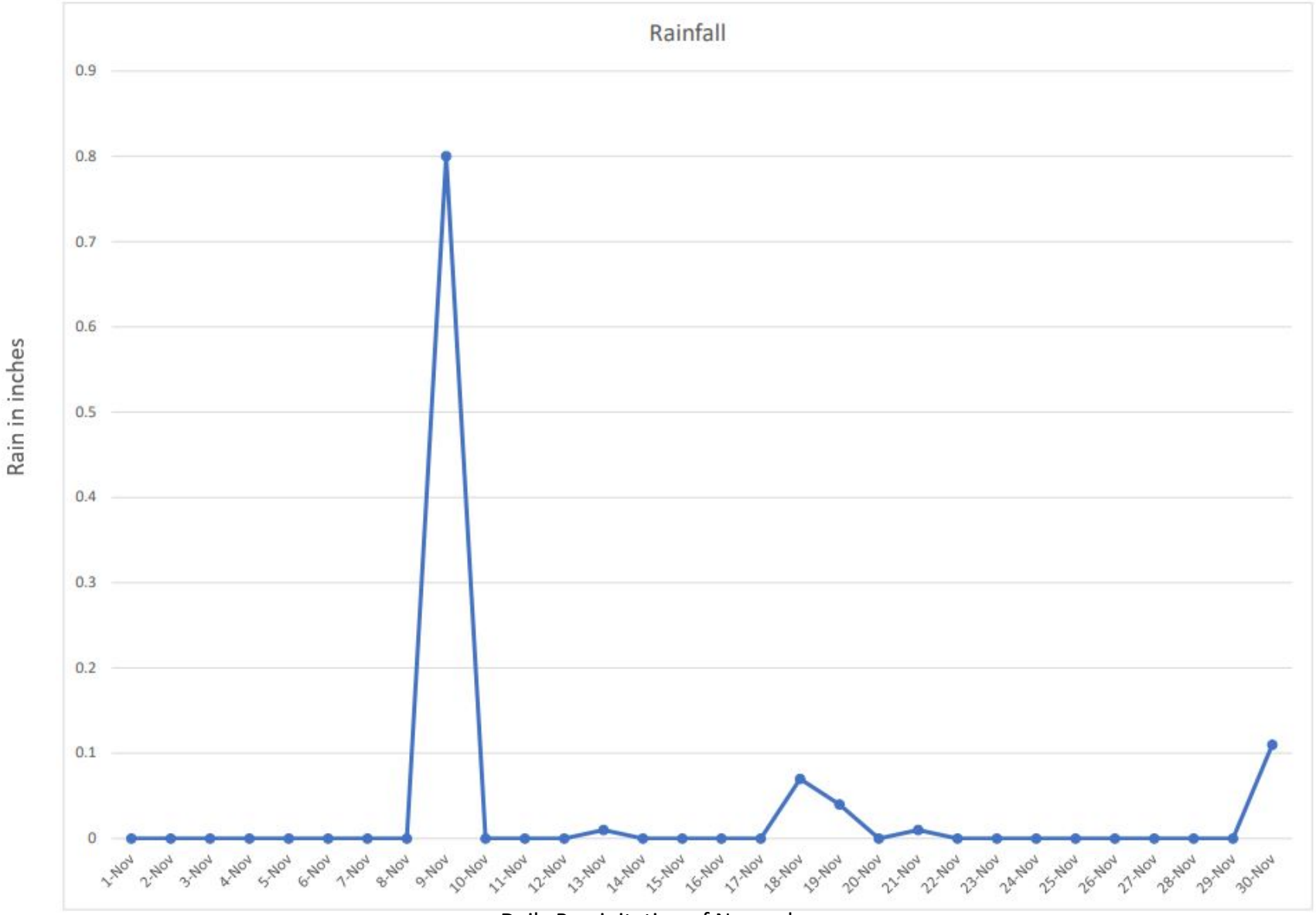
QPD site NOAA month report November 2017

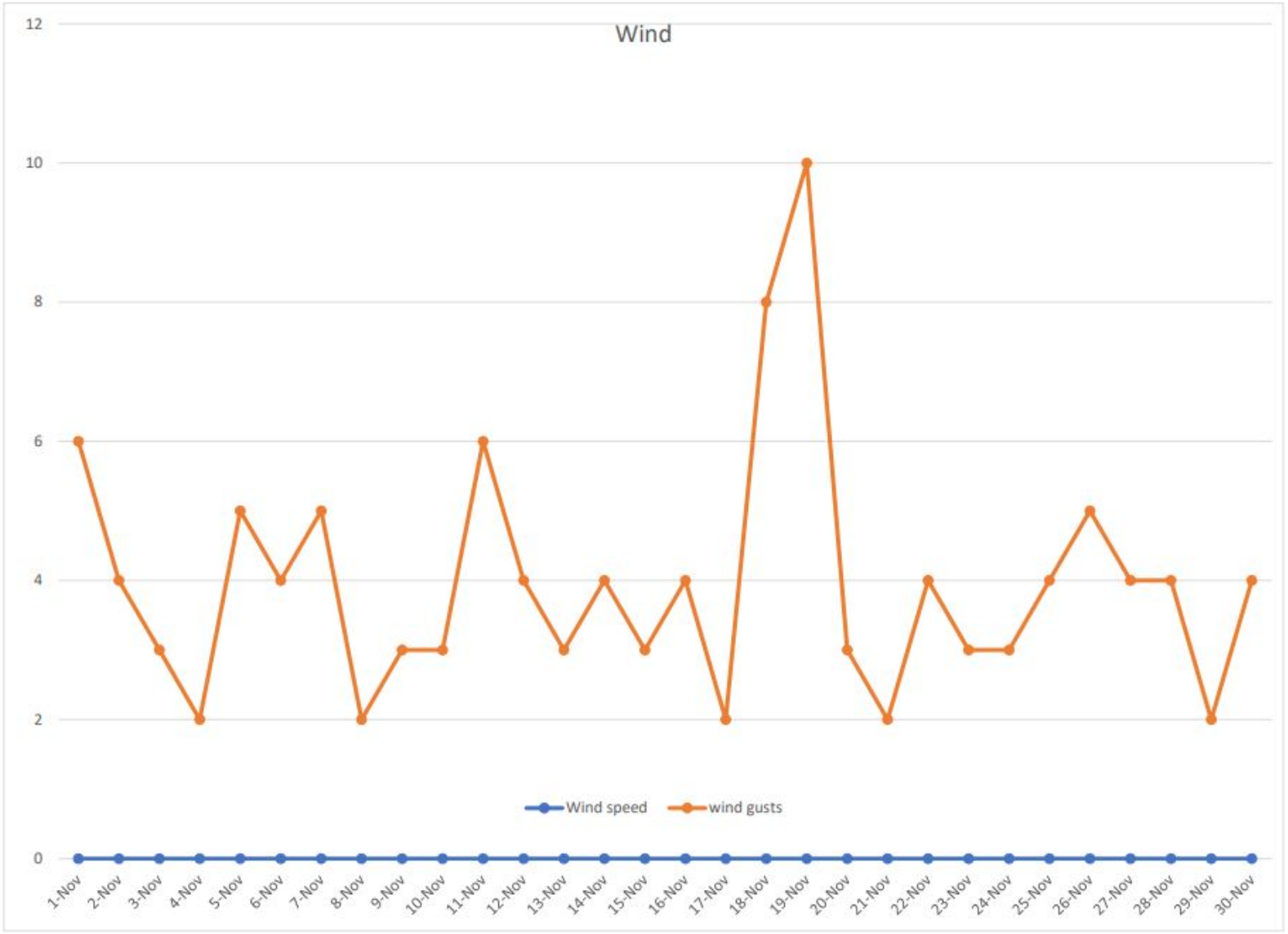
	Temperature					Degree	Solar	RH	Rain	Wind	
Date	Mean	High	Time	Low	Time	Days	Rad	Mean	Fall	Speed	Gust
1-Nov	57.4	79.5	02:45p	39.5	04:45a	10.6	161.9	81	0	0	6
2-Nov	63.3	83	03:00p	51.3	07:30a	13.3	138.5	82	0	0	4
3-Nov	63.7	85.7	03:00p	49.7	06:45a	13.7	171.7	83	0	0	3
4-Nov	63.8	85.4	02:45p	52	07:30a	13.8	121.7	86	0	0	2
5-Nov	66.2	87.5	03:00p	52.9	04:45a	16.2	165.1	84	0	0	5
6-Nov	66.5	86.5	02:45p	52.1	06:45a	16.5	164.8	85	0	0	4
7-Nov	67.2	86.1	02:00p	56.2	05:00a	17.2	145.1	87	0	0	5
8-Nov	66.1	76.1	12:30p	58.4	04:45a	16.1	50.6	91	0	0	2
9-Nov	58	62.3	12:15a	48.1	12:00a	8	36.2	96	0.8	0	3
10-Nov	52	71.9	03:00p	39.4	07:00a	5.7	171.1	86	0	0	3
11-Nov	48.4	62.5	11:45a	33.1	07:30a	3.3	101.1	89	0	0	6
12-Nov	53.9	66.3	02:30p	48.3	07:15a	4.2	93.7	83	0	0	4
13-Nov	55.9	74.3	03:00p	40.4	12:00a	7.1	164.3	84	0.01	0	3
14-Nov	48.6	70.6	02:30p	34.5	07:30a	5.3	165.8	84	0	0	4
15-Nov	45.4	64.1	03:00p	31.7	07:15a	3.4	142.2	84	0	0	3
16-Nov	50	72.9	03:15p	34.7	07:30a	6.2	150.8	85	0	0	4
17-Nov	47.8	73.7	02:45p	34.4	07:45a	5.3	158.1	82	0	0	2
18-Nov	57.4	76.8	01:45p	35	03:00a	12.5	120.2	81	0.07	0	8
19-Nov	51.2	65.4	12:15a	30.9	12:00a	4.9	155.9	71	0.04	0	10
20-Nov	41.1	67	02:30p	24.8	07:30a	2.9	147.3	80	0	0	3
21-Nov	52.9	71.3	02:15p	33.4	12:15a	6.9	85.5	90	0.01	0	2
22-Nov	55.8	72.2	01:00p	42.7	12:00a	6.6	130.6	80	0	0	4
23-Nov	51.6	71.3	01:45p	40.5	07:15a	4.9	96.2	86	0	0	3
24-Nov	47.7	71	02:30p	33.5	07:30a	4.9	140.9	83	0	0	3
25-Nov	46.2	68.9	12:45p	31.8	06:30a	3.9	81.5	87	0	0	4
26-Nov	45.9	72.8	03:00p	30.8	12:00a	5.3	144.6	76	0	0	5
27-Nov	41.2	68.6	03:00p	25.3	07:30a	3.7	137.3	78	0	0	4
28-Nov	46.5	76.4	03:15p	26.5	07:30a	6.2	135	82	0	0	4
29-Nov	54	77.9	02:15p	38	04:30a	7.3	97.2	91	0	0	2
30-Nov	60.8	76.6	11:45a	49.1	01:00a	10.8	82.1	90	0.11	0	4



Daily Temperature of November



Daily Precipitation of November



Daily Wind of November

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
- Members only page – Diagnostics Clinic
- Project Updates in process

Forest Health Cooperative
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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

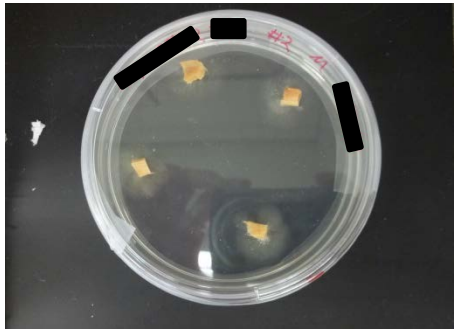
Tree Species:	___ Loblolly	___ Longleaf	___ Shortleaf	___ Slash	
Site Location:	___ Forest	___ Nursery	___ Greenhouse		___ Other:
Aspect:	___ N ___ NE	___ E ___ SE	___ S ___ SW ___ W ___ NW		
Slope %:	___ 0 - 5%	___ 5 - 10%	___ 10 - 15%	___ > 15%	
Soil Type:	___ Sand	___ Silt	___ Clay	___ Loam	
Age of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

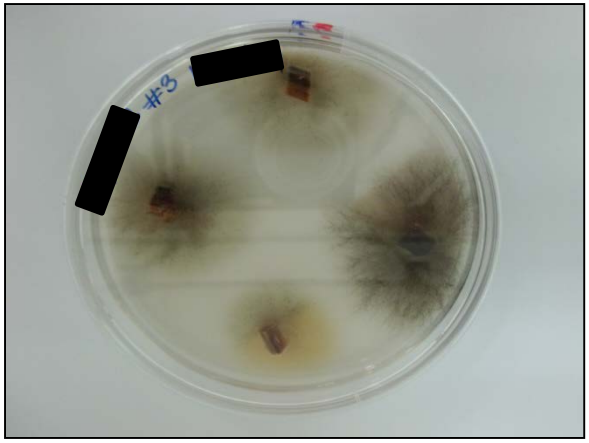
http://www.auburn.edu/academic/forestry_wildlife/foresthealthcooperative/

Field Consulting

- Travel to member's location
- Provide onsite diagnostic information
- Collect samples for laboratory analysis

Laboratory Sample Analysis





Results

- Results available after a minimum of twenty-one days after sample is received
- Results letter sent to member with description and relevant species information

Emerging Forest Pests and Sudden Oak Death Review

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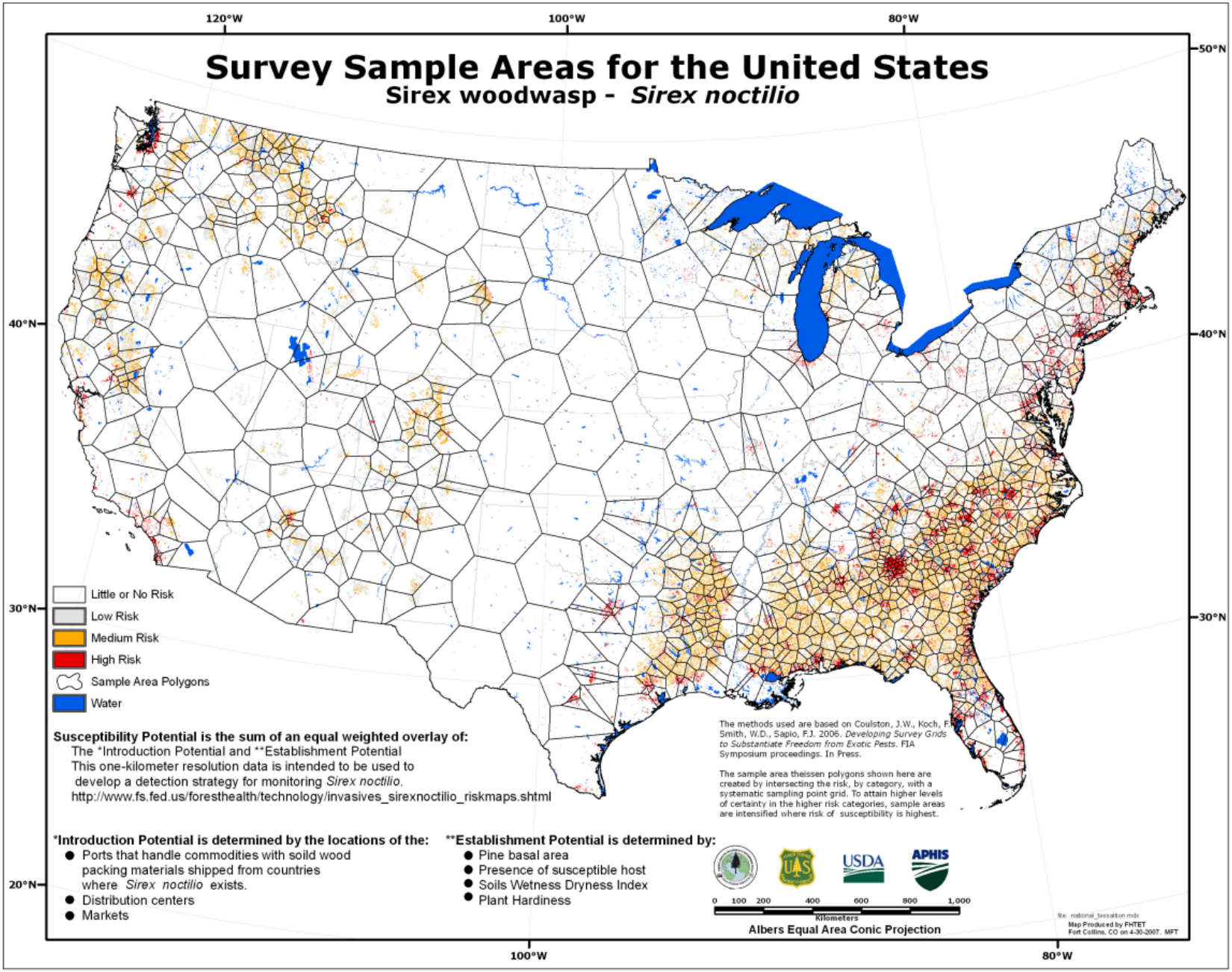
Sirex spp.

- *Sirex noctillio* not native to U.S.
- Vectors *Amylostereum areolatum*
- *A. areolatum* v.s. Ophiostomatoid fungi
- Damage caused by larvae and fungus
- Wasp needs healthy wood
- *Sirex nigricornis* native to southeastern U.S.


UGA1393022


NEDPN


H. Dumas


Survey Sample Areas for the United States
Sirex woodwasp - Sirex noctilio
120°W
100°W
80°W
50°N
40°N
30°N
20°N
Little or No Risk
Low Risk
Medium Risk
High Risk
Sample Area Polygons
Water
Susceptibility Potential is the sum of an equal weighted overlay of:
The *Introduction Potential and **Establishment Potential
This one-kilometer resolution data is intended to be used to develop a detection strategy for monitoring Sirex noctilio.
http://www.fs.fed.us/foresthealth/technology/invasives_sirexnoctilio_riskmaps.shtml
The methods used are based on Coulston, J.W., Koch, F.H., Smith, W.D., Sapio, F.J. 2006. Developing Survey Grids to Substantiate Freedom from Exotic Pests. FIA Symposium proceedings. In Press.
The sample area theissen polygons shown here are created by intersecting the risk, by category, with a systematic sampling point grid. To attain higher levels of certainty in the higher risk categories, sample areas are intensified where risk of susceptibility is highest.
*Introduction Potential is determined by the locations of the:
Ports that handle commodities with soild wood packing materials shipped from countries where Sirex noctilio exists.
Distribution centers
Markets
**Establishment Potential is determined by:
Pine basal area
Presence of susceptible host
Soils Wetness Dryness Index
Plant Hardiness
USDA
APHIS
0 100 200 400 600 800 1,000
Kilometers
Albers Equal Area Conic Projection
Map Produced by FHTET
Fort Collins, CO on 4-30-2007. MFT

Needle Diseases

- *Lophodermium spp.*
- *Phytophthora spp.*
- *Coleosporium spp.*
- *Dothistroma spp.*
- *Lecanosticta spp.*
- Mycosphaerellaceae family
- *Pestaltiopsis spp.*


Scott Enebak


Cornell University


Photo: J. Stone


Ralph S. Byther

Emerald Ash Borer

- Family-Buprestidae (jewel beetles)
- First detected in Michigan 2002
- Damage caused by larvae
- Ash tree mortality in the millions
- Now in 33 states
- Confirmed in Calhoun County, AL

Don’t Move Firewood

- Limiting the movement of infested firewood could help control the spread
- Infested trees can be treated with insecticides, quarantined, or destroyed onsite

Larvae

S-Shaped Gallery

D-Shaped Exit Hole

Adult

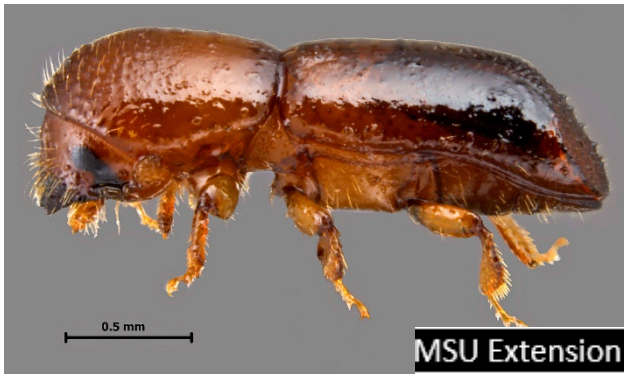

WI DNR

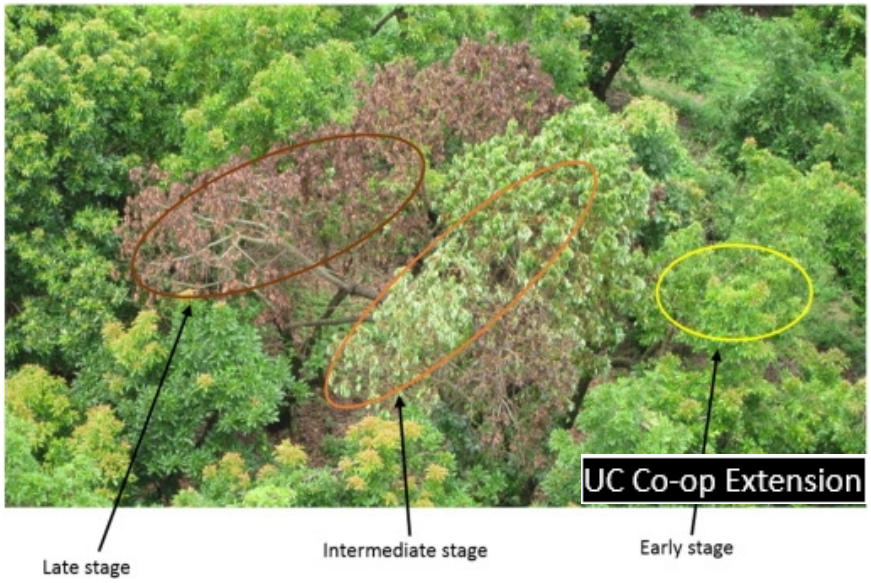

This ash tree is at risk from
Emerald Ash Borer
Get the facts at eabcolorado.com
CSU

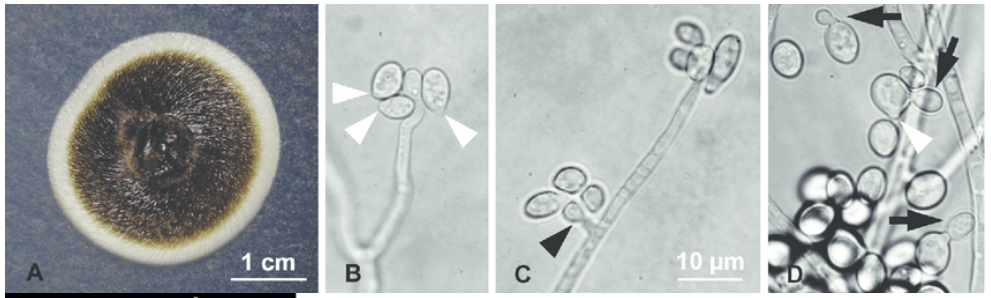

Flickr

Laurel Wilt

- Caused by *Raffaelea lauricola*
- Family-Ophiostomatacea
- Vectored by Red Bay ambrosia beetle, *Xyleborus glabratus*
- Spread via natural flight and firewood movement
- Kills many species in the Lauraceae family
- Symptom-green leaves wilting then turning red-brown
- Has impacted Avocado industry in Florida





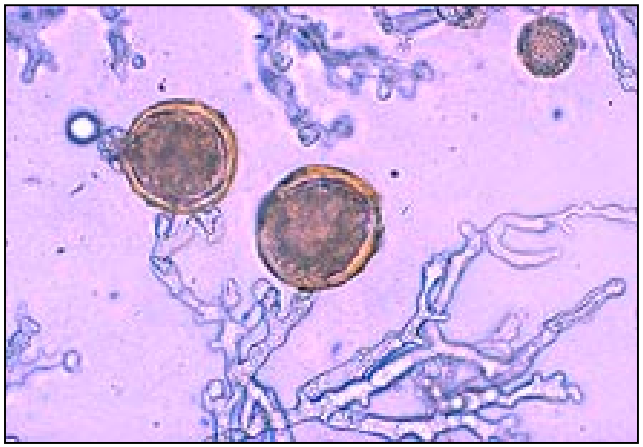


Simmons et al. 2016.

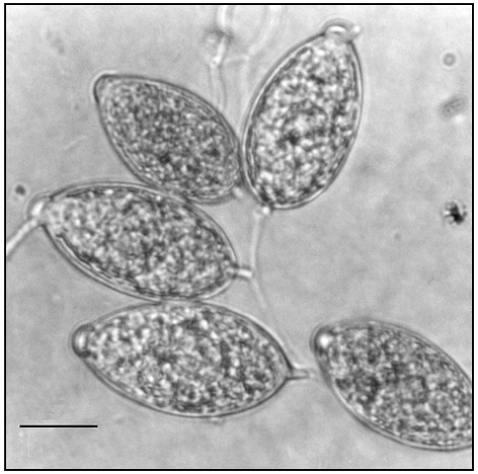
Sudden Oak Death

- 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

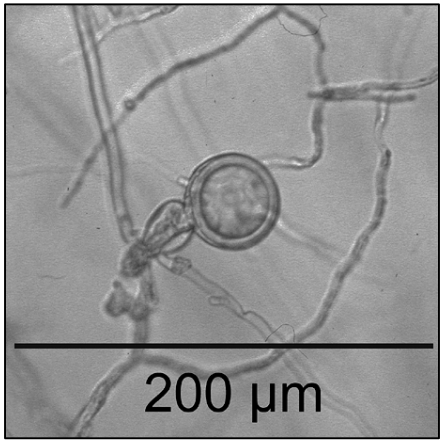


Chlamydospores



Sporangia

Oospore

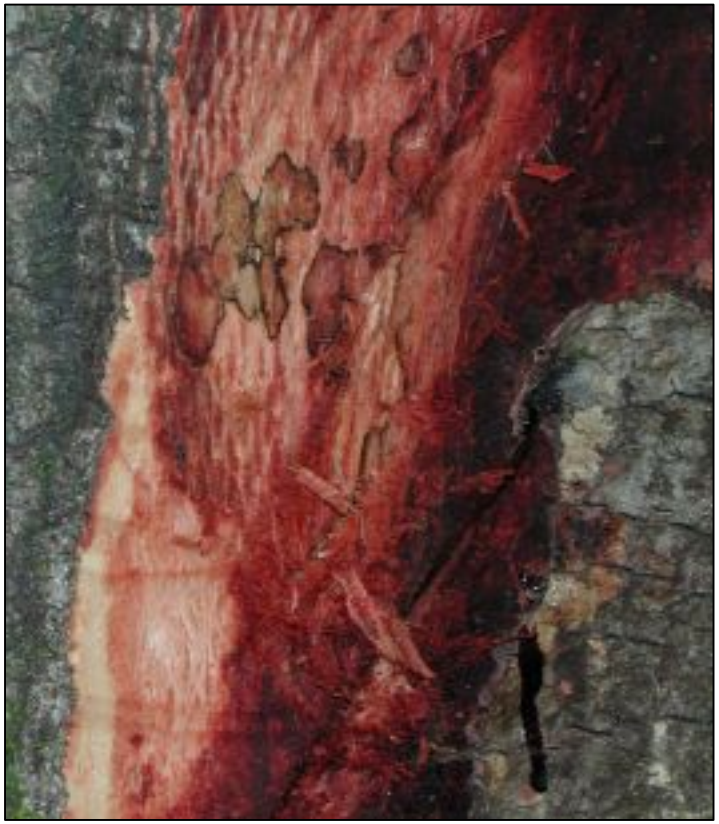


Source: Steve Oak - USDA Forest Service Forest Health Protection

Risk To Our Forests

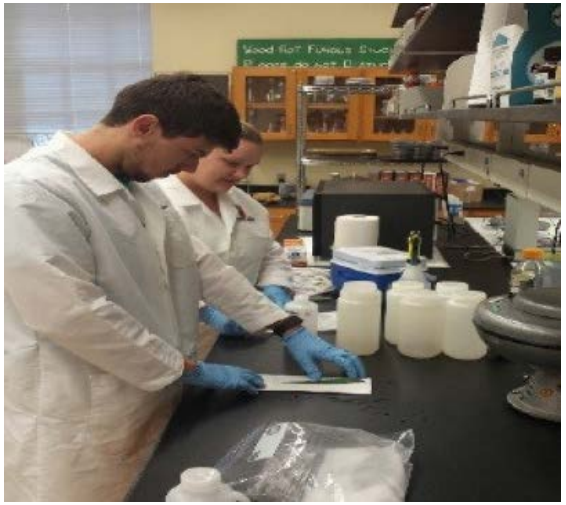
- *Phytophthora ramorum* persists in infected nurseries even after eradication measures.
- Inoculum is leaving infected nurseries via waste water
- A pathway from the water into terrestrial ecosystems is plausible
- Southeastern US climate is at least seasonally suitable for infection
- Eastern woody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

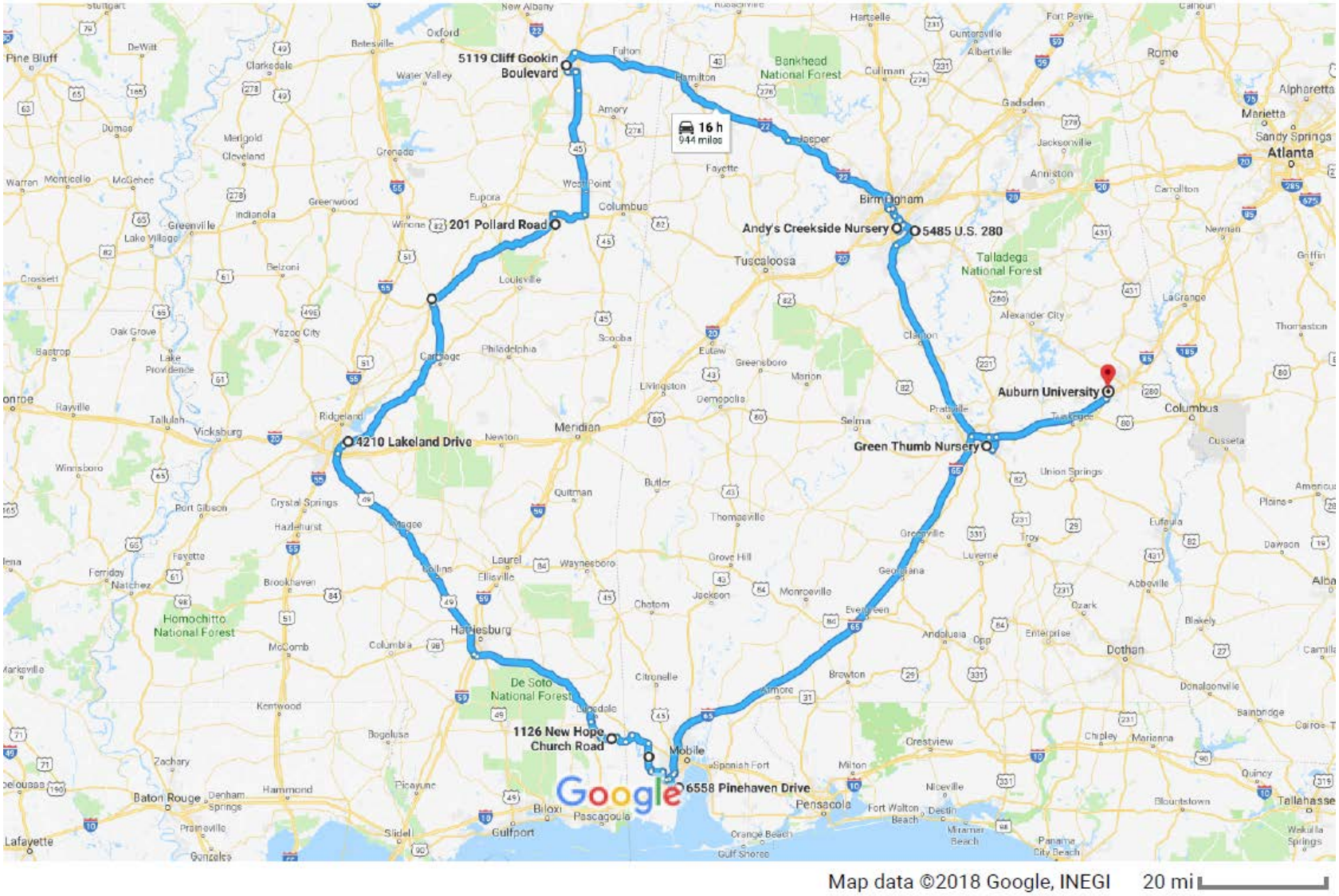
Phytophthora ramorum symptoms



Source: Steve Oak - USDA Forest Service FHP

Field Sampling




5119 Cliff Gookin Boulevard
201 Pollard Road
4210 Lakeland Drive
1126 New Hope Church Road
6558 Pinehaven Drive
Andy's Creekside Nursery
5485 U.S. 280
Auburn University
Green Thumb Nursery
16 h
944 miles
Map data ©2018 Google, INEGI
20 mi

Results

- 2013: 7 Alabama sites, 2 confirmed positive; 6 Mississippi sites, 1 positive
- All sites negative for 2014 and 2015 sampling
- 2016 Spring: 7 AL sites, 3 confirmed positive; 6 MS sites, 1 confirmed positive
- 2016 Fall: 7 AL sites, 1 confirmed positive; 6 MS sites, all negative
- 2017 Spring: 7 AL sites, 1 confirmed positive; 6 MS sites, 1 confirmed positive
- Awaiting Fall 2017, Spring 2018 Results

Acknowledgements

Dr. Ryan Nadel
Dana Stone
Shrijana Duwadi
Undergrad Student Workers