

RESTORATION OF THE AMERICAN CHESTNUT



SARA FITZSIMMONS

PSU and TACF



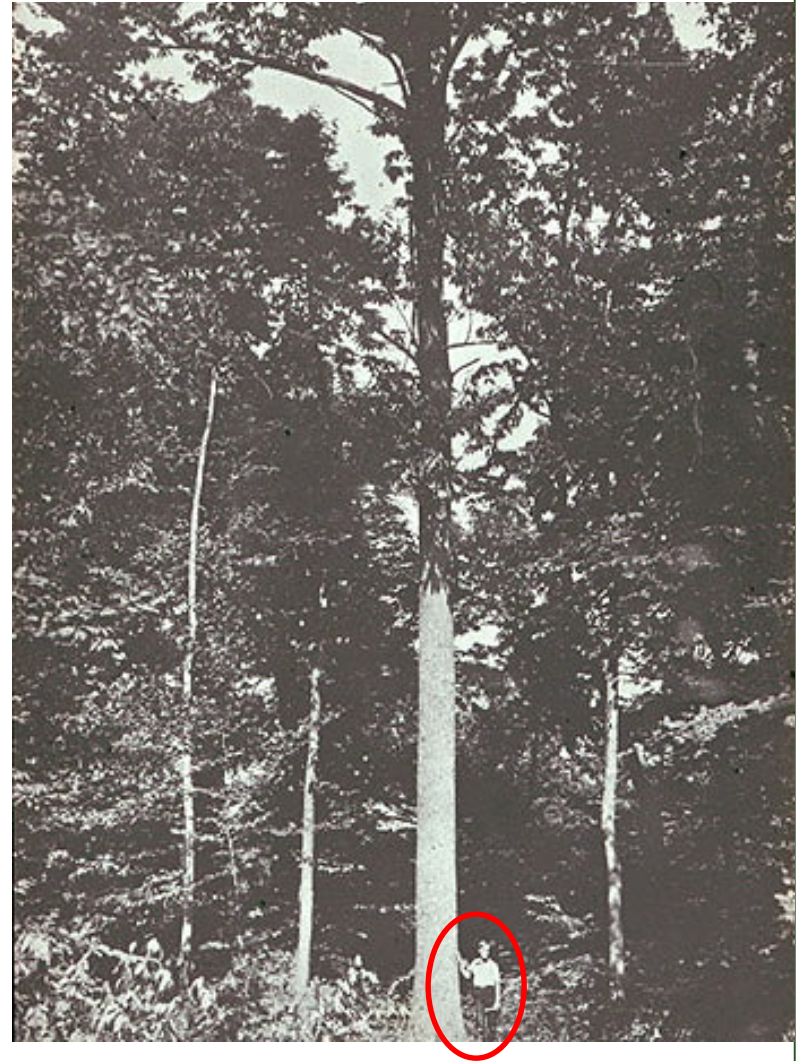
AMERICAN CHESTNUT



American Chestnut: The Tree



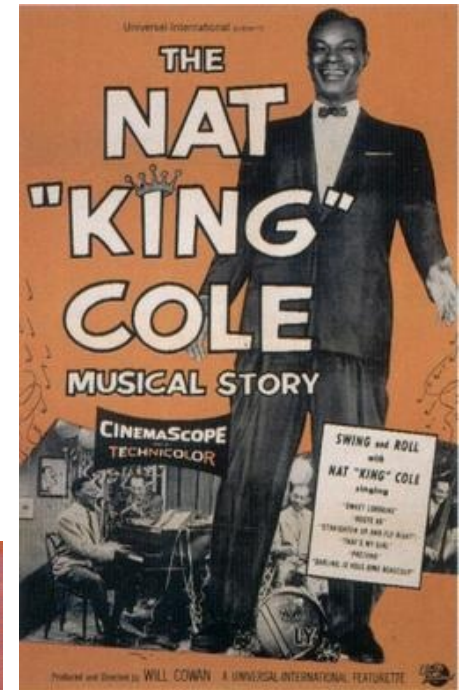
- High-value timber species
- Nuts valuable to wildlife
- Tannins used in tanning leather



American Chestnut: The Tree



- Nuts valuable to people and livestock
- Culturally significant





Chestnut Blight

First identified
NYC in 1904

Fungus -
Cryphonectria
parasitica

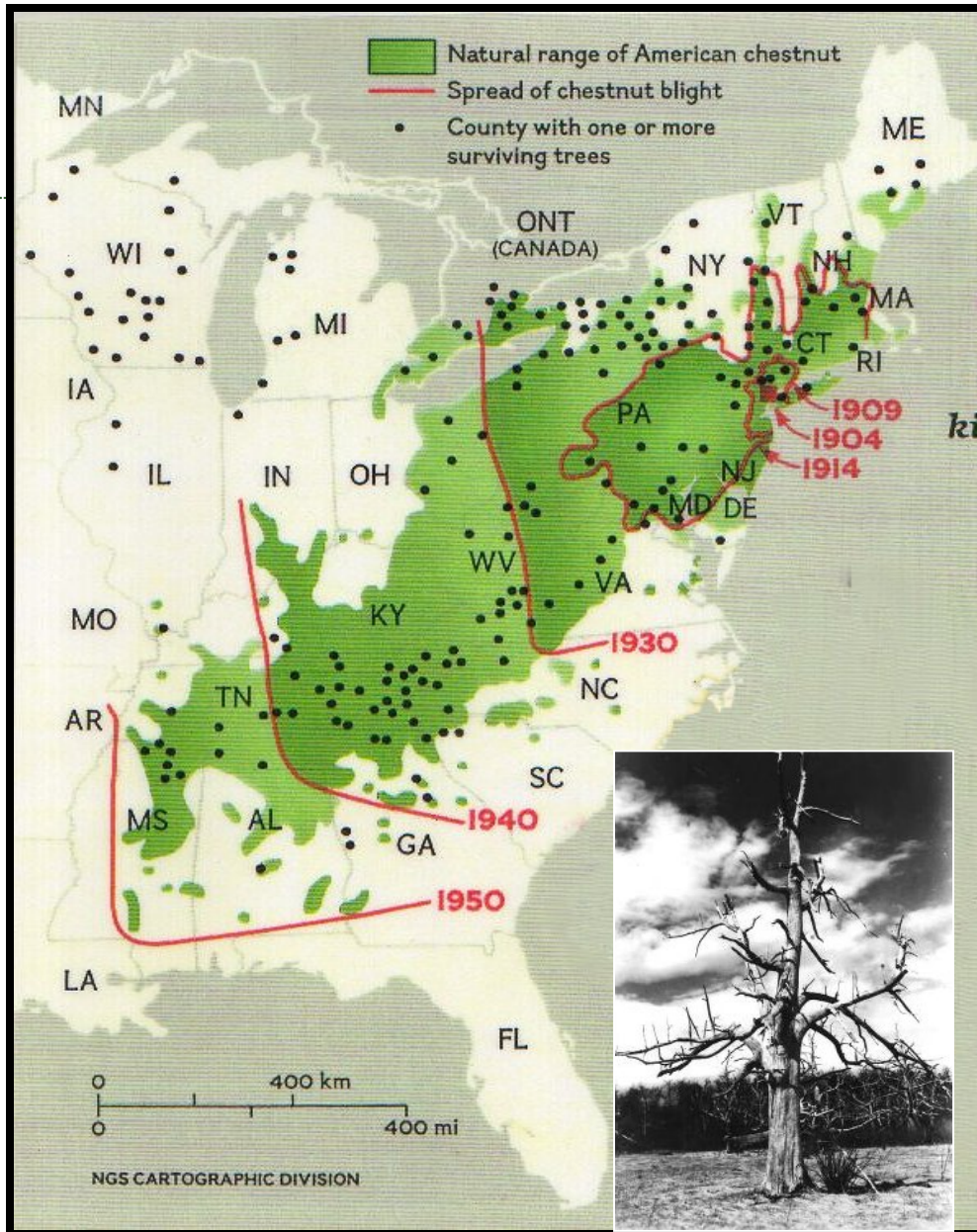
a girdling canker

Spread quickly,
functionally wiped
out chestnut as
overstory tree by
1950's

THE
AMERICAN
CHESTNUT
FOUNDATION®



Spread of the Chestnut Blight



Approximate movement of 20 to 50 miles per year because of American chestnut's density and almost complete susceptibility to the blight.





Early Restoration Attempts

Replace with Chinese
chestnut trees

Backcrossing to
Chinese

Cultural methods –

Tree surgery

Fungicide

Forest gap barriers



Sleeping Giant Plantation

Restore the American chestnut tree to its native range



How to Make a Disease-Resistant American Chestnut?



3BUR

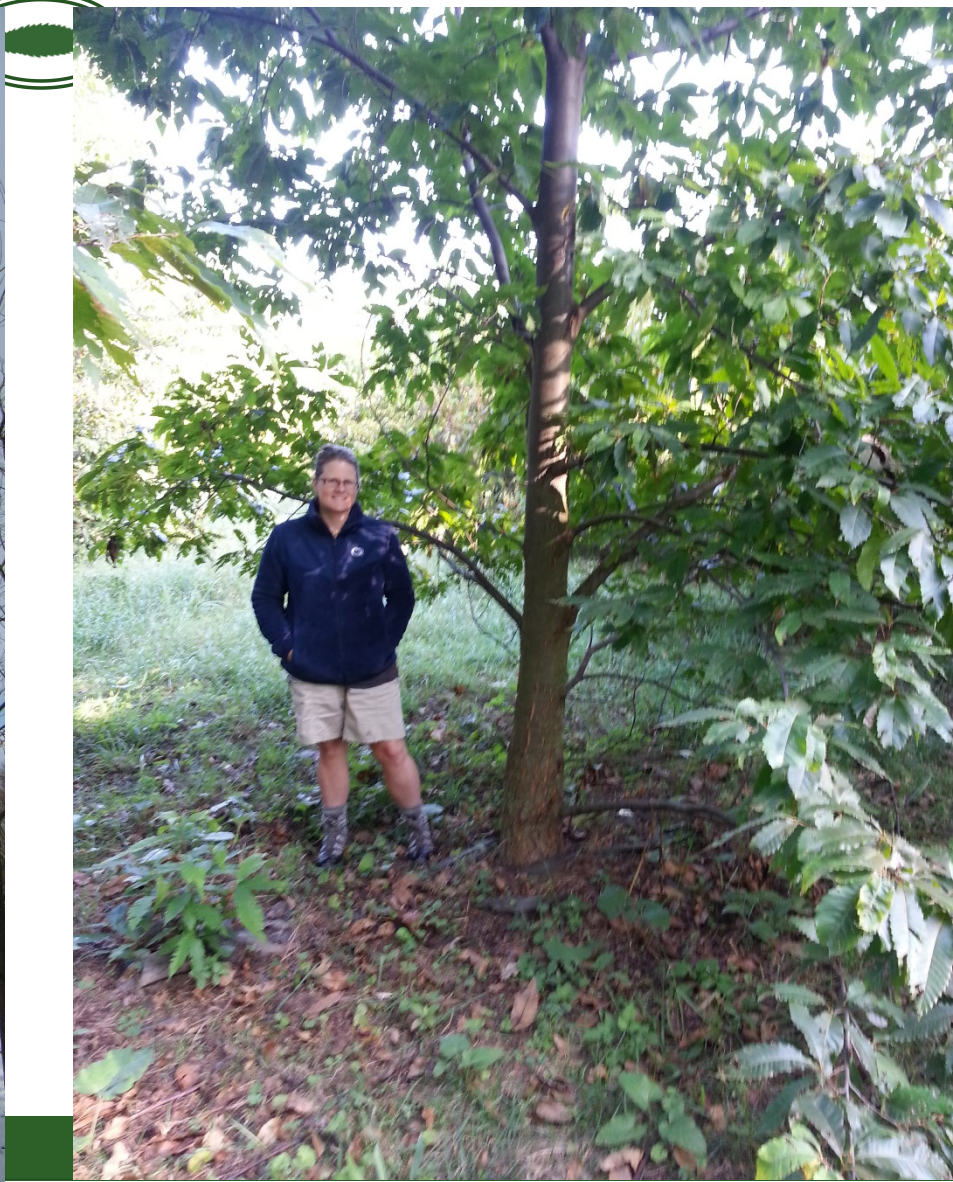
Breeding, Bio-control, and Biotechnology
United for Restoration



Breeding



American Type with Intermediate Blight Resistance



BioControl



Uninfected Bark



Non-lethal Canker

Infect the **Fungus** with a **Virus**



Virulent

no virus

Hypovirulent

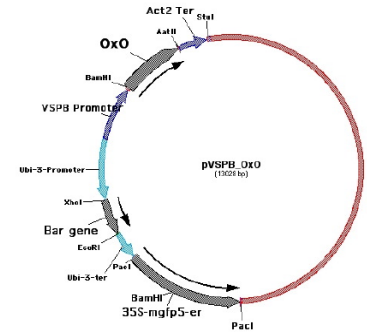
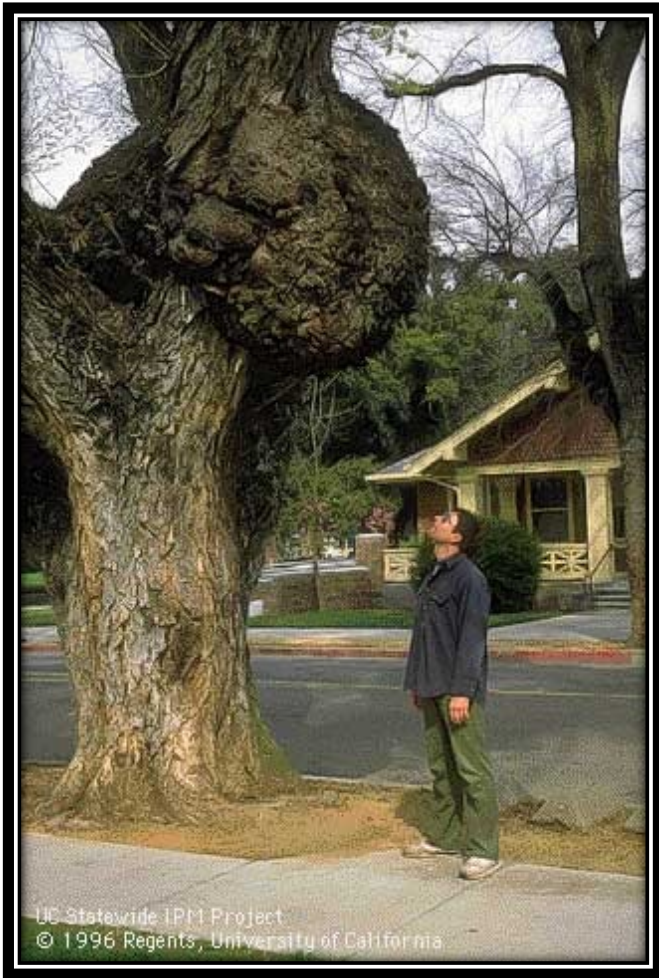
virulent virus

Hypovirulent

weak virus



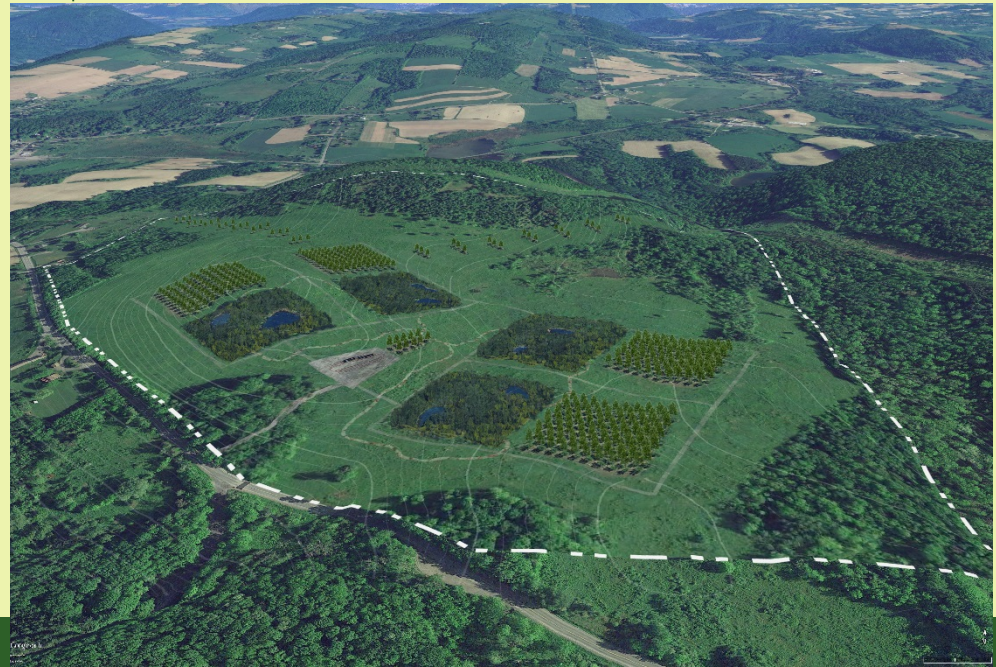
Biotechnology



Permitting



- Looking to deregulate in the next 2-5 years.
- Depends on regulatory approval by EPA, USDA, and FDA



STRATEGIES FOR *CASTANEA DENTATA* (CADE) CONSERVATION



- RESISTANCE BREEDING STOCK
- IN SITU
- EX SITU



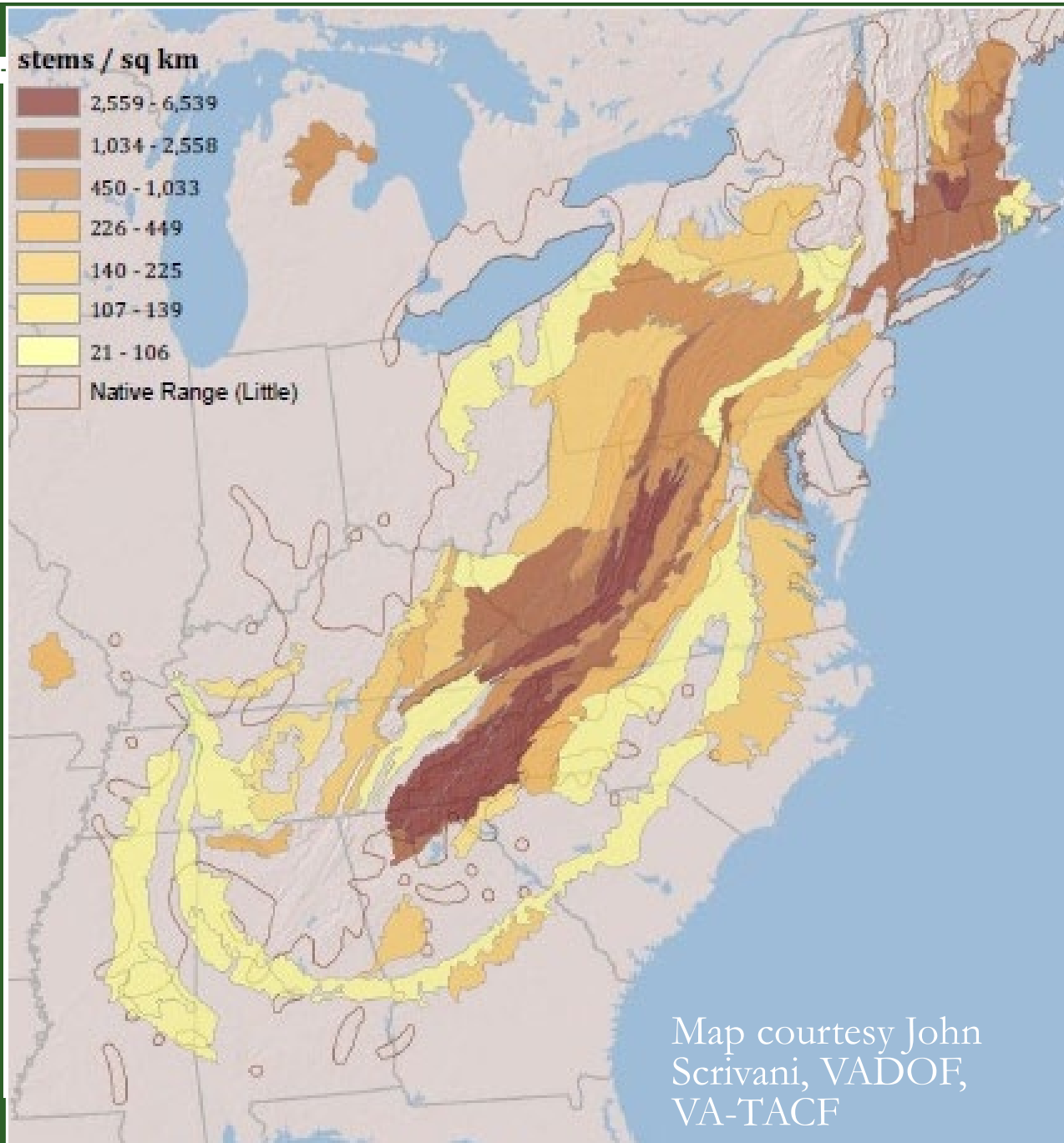
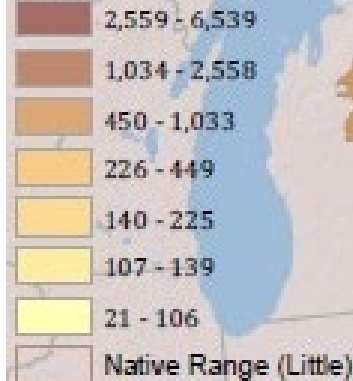


Current Status in the Wild

* Scrivani J. May-June
2011. Forest Inventory
and Analysis. The
Journal of the
American Chestnut
Foundation. 25(3): 17-
18.



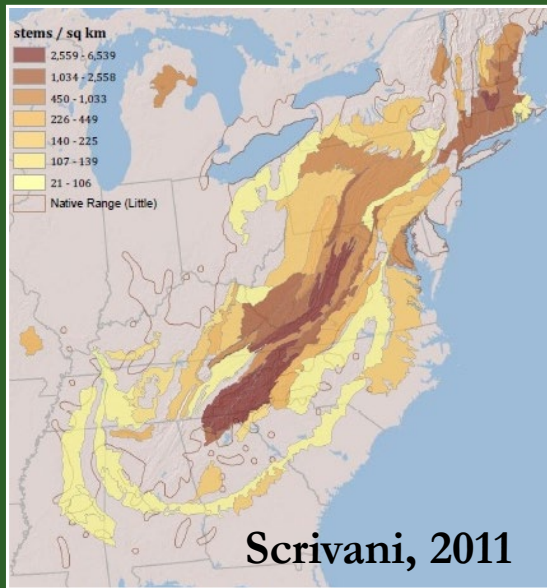
stems / sq km



Map courtesy John
Scrivani, VADOF,
VA-TACF



Current Status of Wild CADE



- Dalglish et al. *Forests* **2016**, 7, 4
 - 430 Million Trees
 - ~84% sprouts < 1” dbh
- Appalachian Trail Mega-Transect Data,
<http://ecosystems.psu.edu/research/chestnut/reports/mega-transect>
 - 18,376 trees counted
 - Only 107 were > 4” dbh (0.5%)

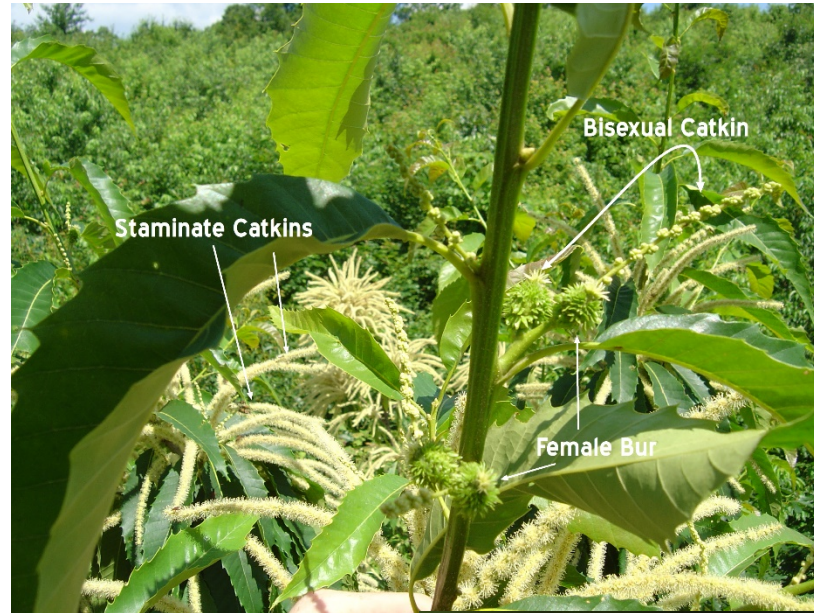


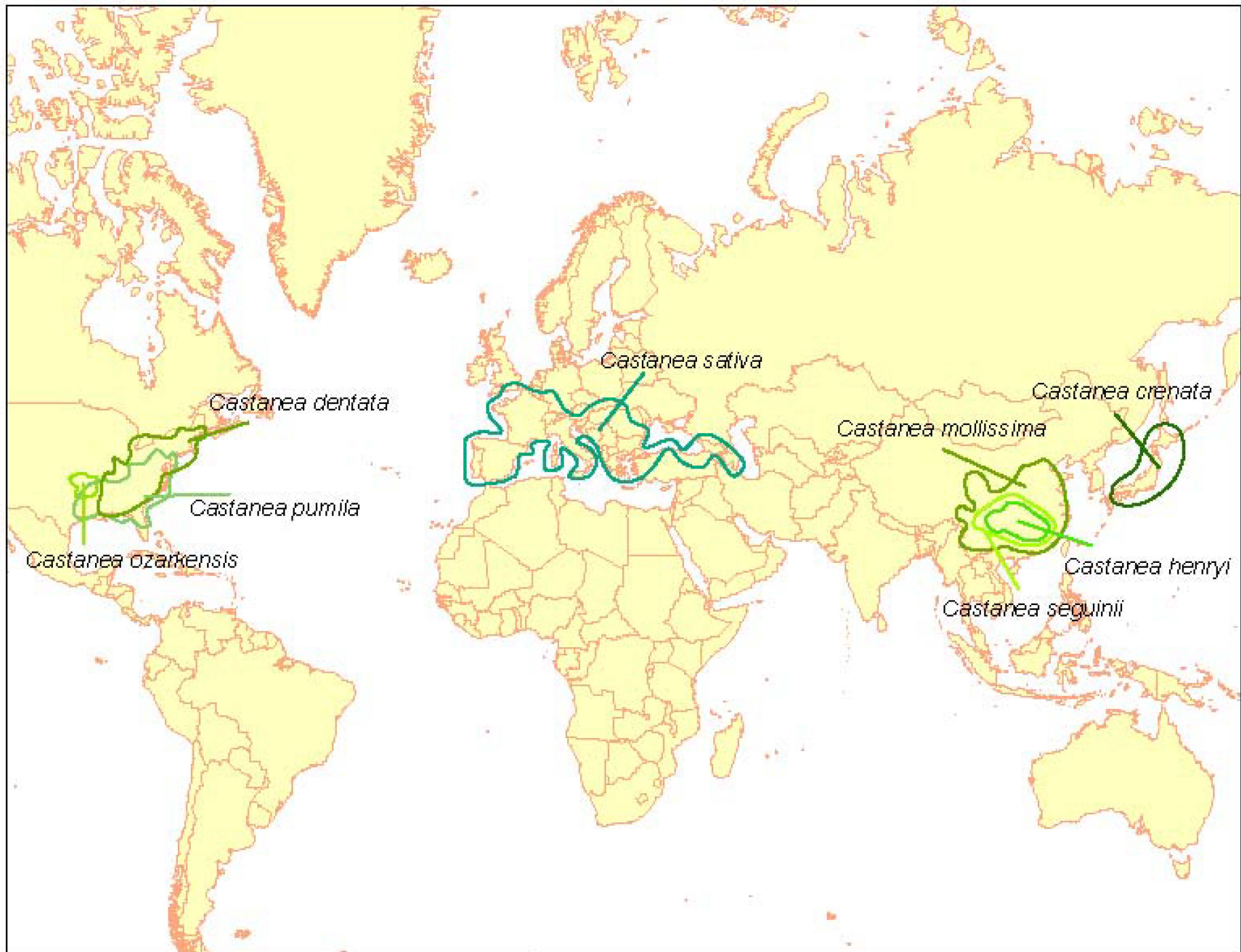
Finding Flowering Trees

0.5% of 430M
~2M

Need two flowering
trees together

Need full sunlight





Species Comparisson



Top side of leaves:

Underside of leaves:



Top row: Allegheny chinquapin



Bottom row: American, Chinese, European and Japanese chestnuts

In Situ Conservation



- Habitat Management
 - Clearcuts for perpetual sprouting



In Situ Conservation



- Habitat Management
 - Clearcuts for perpetual sprouting
- No planting and observation of a large area e.g. National Parks

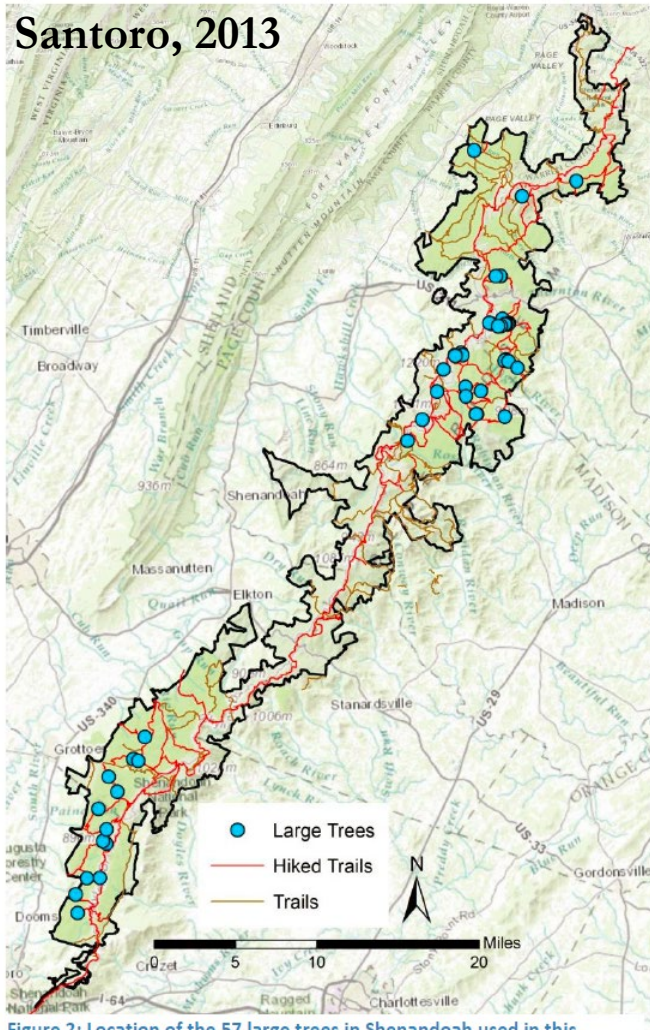


Figure 2: Location of the 57 large trees in Shenandoah used in this analysis and trails hiked to find them.

Ex Situ Conservation



- Challenges of vegetative propagation
 - Doesn't readily root
 - Delayed graft incompatibility and blight infection
 - Tissue Culture on embryos
- Challenges of seed storage
 - Viability drops significantly after first 6 months.
 - 2 years, max



Purdue University Duke Energy Grafted Orchard





- Find the trees



Tree Locator Form



TreeSnap

- Verify species
- Staff and trained volunteers



Purpose: This form is to help TACF[®] record, map, and analyze chestnut trees across their native range.

Result: An analysis of the macro and microscopic characteristics of the leaf and twig sample will be completed by a TACF identification expert and the results will be sent to the submitter in 4-8 weeks.

LEAF and TWIG SAMPLE

- 6-12" of twig and *attached, mature, green* leaves growing in the full sun.
- Press sample *flat* between sheets of cardboard and place in an envelope.
- Use a single paper towel between the sample and cardboard to cushion and absorb moisture.
- Do *not* wrap in plastic, as samples will mold in the mail.
- Do *not* ship overnight. It's *not* necessary and we won't ID your sample right away.

Tree Locator Form



THE
AMERICAN
CHESTNUT
FOUNDATION[®]

Location:

County: _____

Town: _____ State: _____

Latitude (N): _____ Longitude (W): _____

Location information is crucial. The closer you can get us to a tree with your directions, the better. Lat/Long measures are the best.

- You may obtain location information from Google Maps (<http://maps.google.com>). Right-click and select "What's here".
- If you can't obtain Lat/Long measurements, then please attach a map and/or directions to the tree from the nearest road.

Tree Information:

SIZE: Diameter (inches @ 4.5ft): _____ Height (feet): _____

HOW MANY: [] Isolated Tree [] Clump of Trees (number): _____

[] Clear-cut w/ many sprouts/trees _____ (~acres)

NUTS: Burs: [] None [] Few [] Many [] Unknown

CATKINS: [] Present [] Absent [] Unknown

SURROUNDINGS: [] Full Sun [] Partial Shade [] Full shade

[] Sunken Canker

BLIGHT: [] Not Visible [] Visible [] Swollen Canker

Could we reach the tree with a large truck? [] Yes [] No

Comments _____

Owner of Property Information

Name: _____ Phone: _____

Address: _____

City: _____ State: _____ Zip: _____

E-mail: _____

Are there restrictions to viewing the tree? [] Yes [] No
Is permission of the owner suggested before viewing? [] Yes [] No

Form Submitted By:

Name: _____ Date: _____

Address: _____

City: _____ State: _____ Zip: _____

Phone: _____ E-mail: _____

Submission address - please choose the office closest to the tree located.

Tom Saielli, The American Chestnut Foundation, 50 N. Merrimon Ave, Suite 115, Asheville, NC 28804

Matt Brinckman, VA DOF, 900 Natural Resources Drive, Charlottesville, VA 22903

Sara Fitzsimmons, Pennsylvania State University, 206 Forest Resources Lab, University Park, PA 16802

Kendra Collins, USFS Northern Research Station, 705 Spear St, South Burlington, VT 05403



- Find the trees

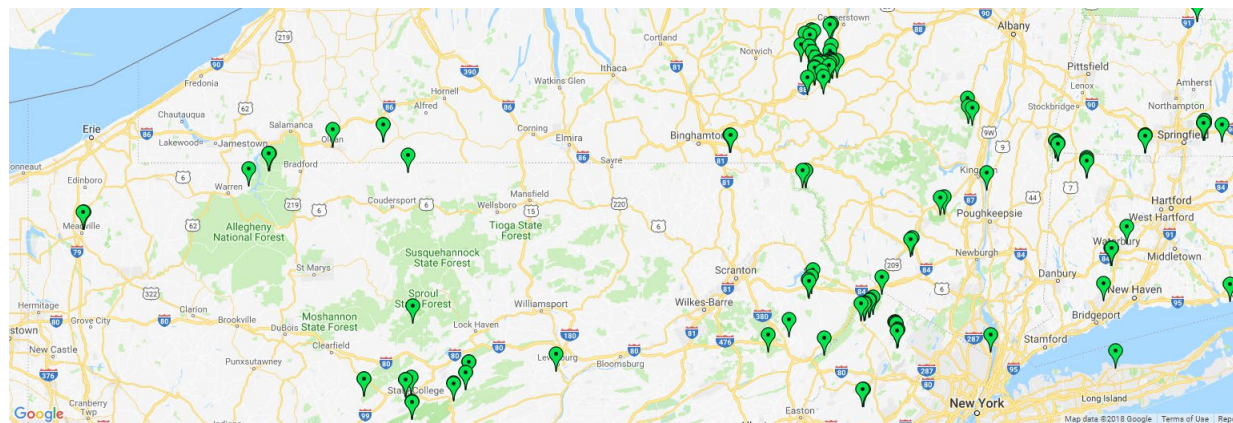


Tree
Locator
Form



TreeSnap

- Verify species
 - Staff and trained volunteers



Observations by State

[View All](#)

State	Number of Observations Reported
Kentucky	696
North Carolina	328
Virginia	278
Tennessee	126
New York	89
Ohio	77
Pennsylvania	71
Massachusetts	68



Finding Flowering Trees



Training and Identification



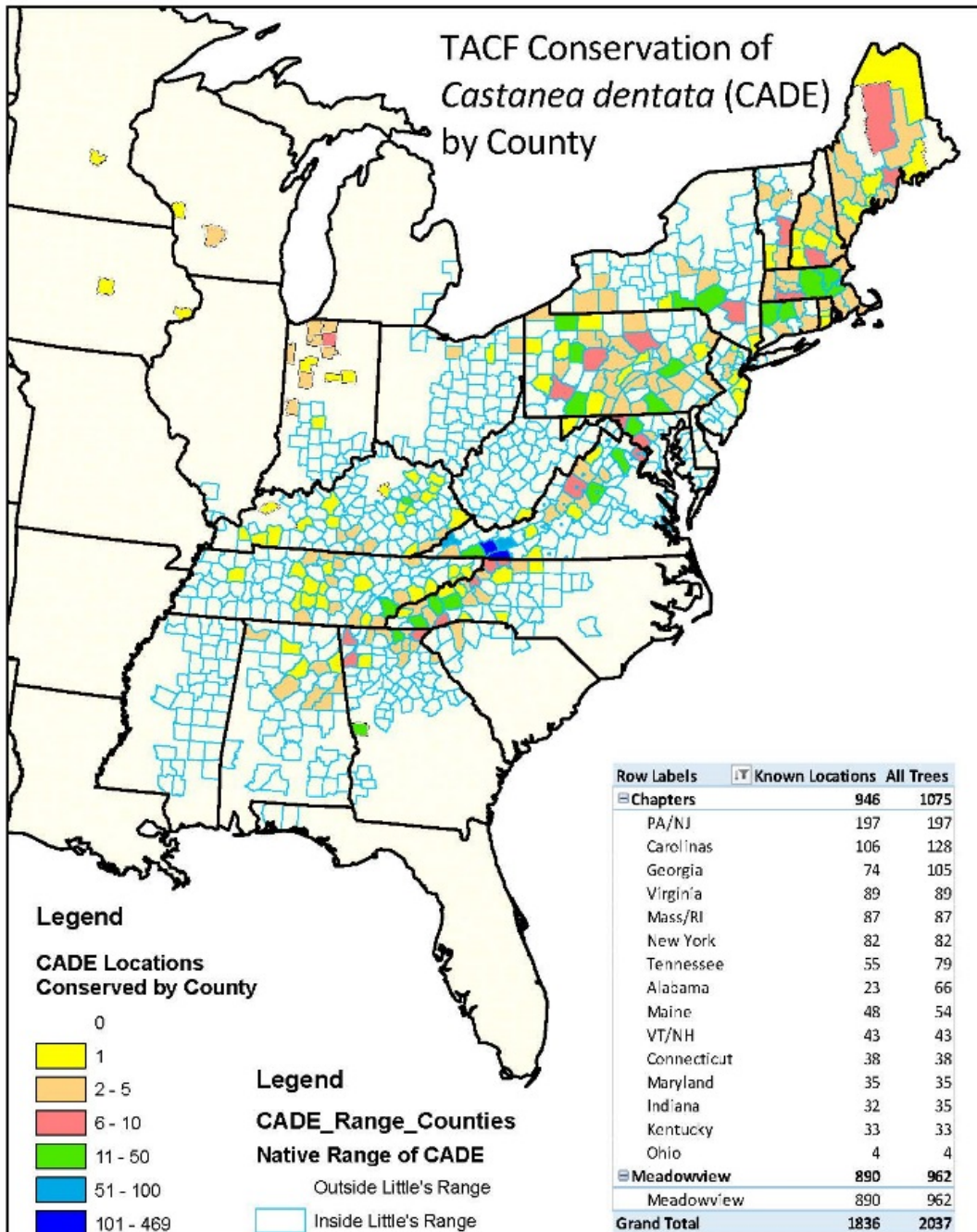
Harvest



Storage



TACF Conservation of *Castanea dentata* (CADE) by County

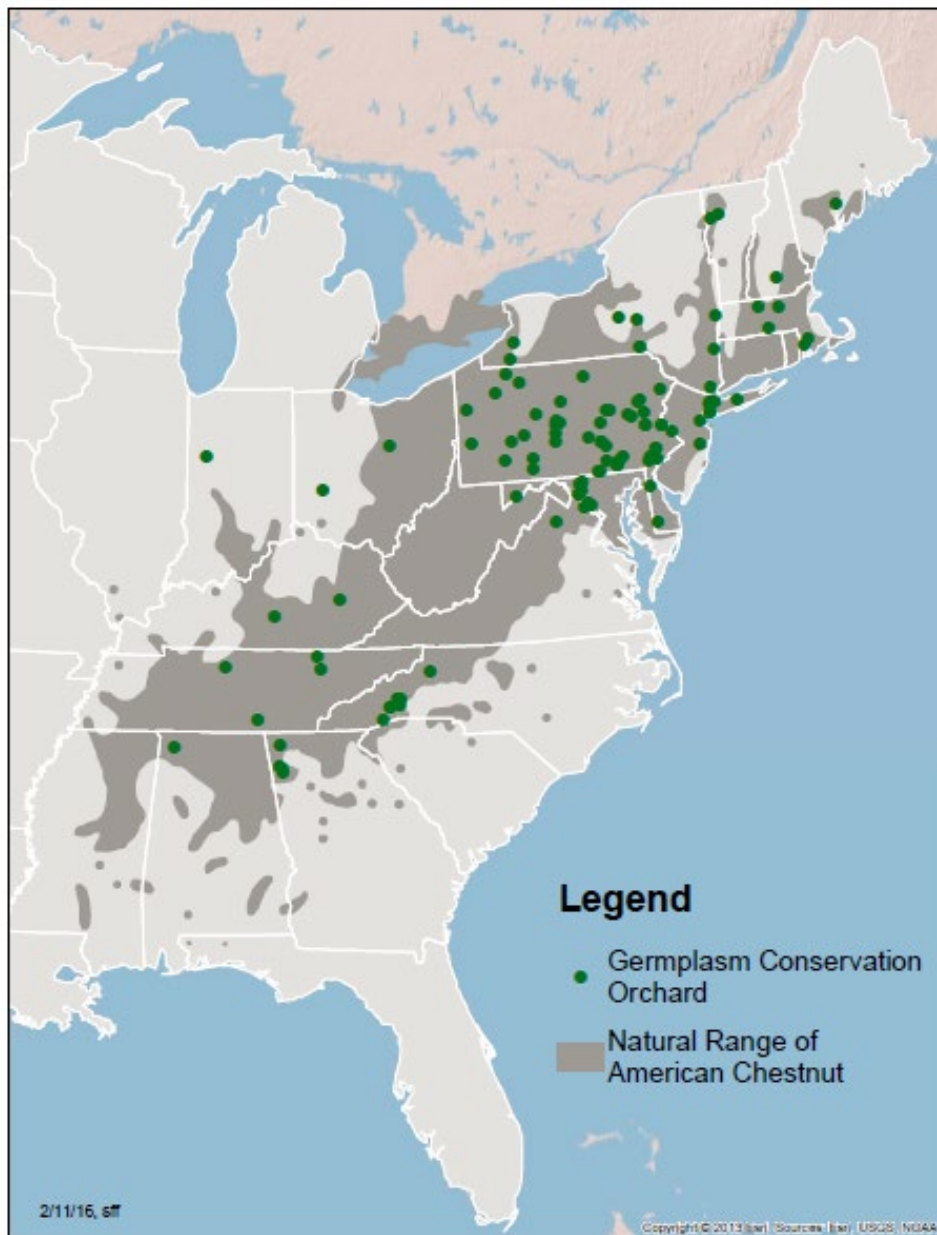


- Locations, not trees
 - Clearcuts, etc.
- Locations known vs. Unknown
- ~50% around Meadowview



Plantings

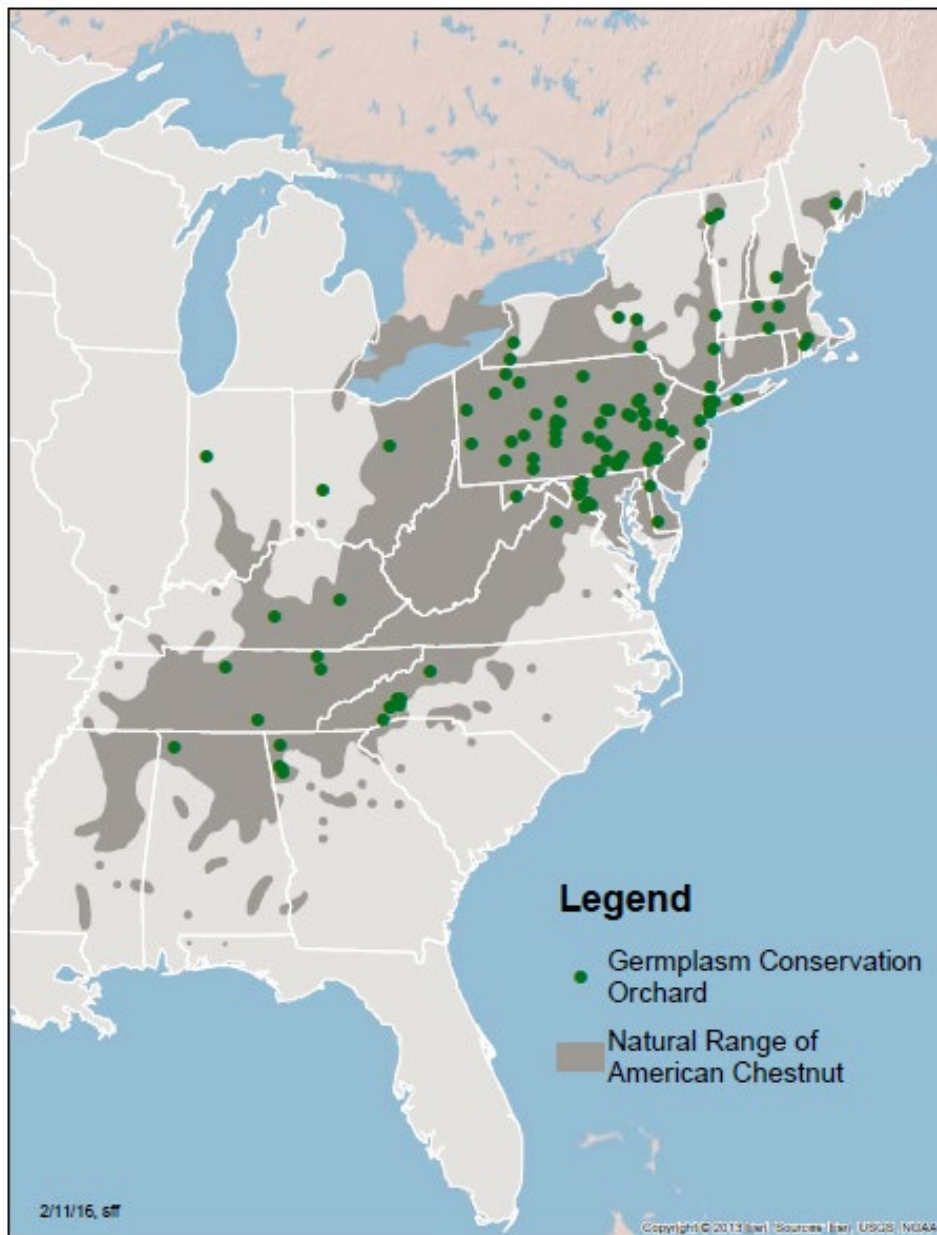
- Public / Private Partnerships
- Over 100 locations
- 1983-present





Plantings

- Public / Private Partnerships
- Over 100 locations
- 1983-present







Haun American Chestnut Orchard

Sandy Lake, PA

planted 1983



Haun Chestnut Harvest





**Commercial Production
Intercropping Raspberries and
Chestnuts**

Volunteers and Citizen Scientists are Key




- Record over 25,000 volunteer hrs / year

What Can You Do To Help?



- **Join The American Chestnut Foundation**
- **Speaking events** – spread the word of our work.
- **Set up a display at events and answer questions**
- **Write an article for your local paper.**
- **Administrative/ Office assistance** – help with newsletter mailings, research information, data entry.
- **Join the listserv** to become aware of upcoming events.
- **Report a Tree** – fill out and send us a tree locator form and sample.
- **Plant trees as part of our research work**
- **Serve on the Board and one of these committees.**



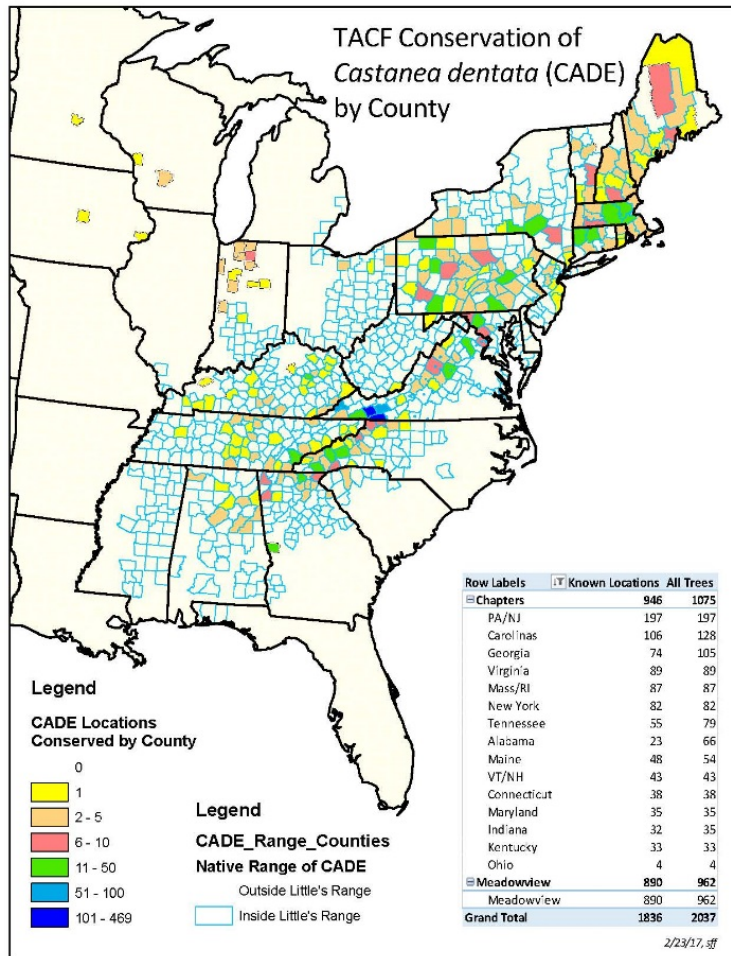


Questions?

Email: sff3@psu.edu

Phone: 814-863-7192

dentataBase and Citizen Science



- Documenting over 35 years of breeding work
 - Founder American chestnut trees
 - Plantings and the results
 - ✦ Observations such as height, diameter, resistance
 - Personnel
- Available to the public for outreach and education purpose
- Ongoing improvement for data stability and usability