

Restoring Mountain Longleaf Pine and American Chestnut in Georgia

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Martin L. Cipollini, PhD.
Dana Professor of Biology
Berry College



Regional mountains harbor “Montane” Longleaf Pine



Most longleaf is in the
Coastal Plain



Longleaf Pine on Berry's
Lavender Mountain

Berry College Longleaf Pine Project

- Student Roger Birkhead's independent study in 1995 showed trees > 200 years old on Berry College's Lavender Mountain



Why develop a management plan?

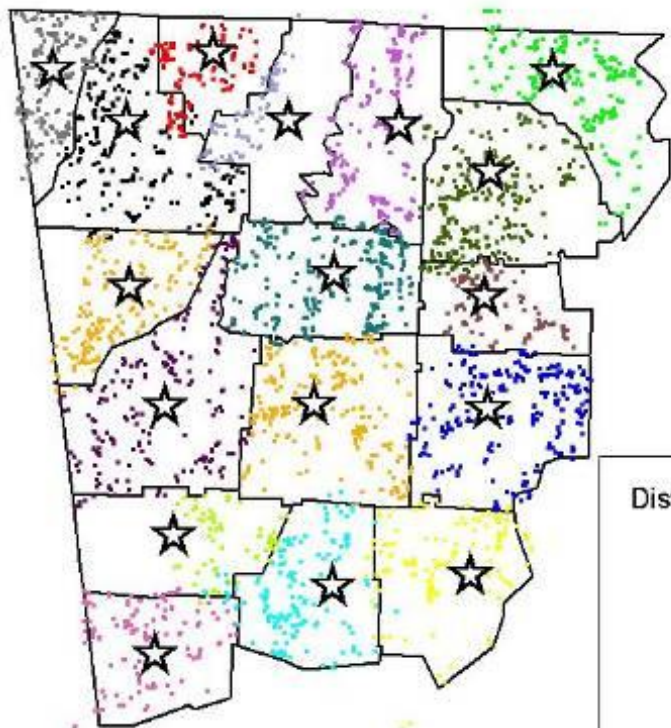
- Longleaf pine is an ICUN Red List Endangered Species, occupying only about 2% of their original 92 million acre range.
- Old trees and late 1800's maps suggested widespread longleaf pine community on Lavender Mountain.
- Few new trees since 1920s-1930s – local population was in decline.
- Burning had been restricted for 60-70 yrs, resulting in hardwood encroachment, fuel buildup, and near total loss of understory plants.
- Most of mountain was never plowed, suggesting that recovery of understory plants might be possible (seed bank).
- Southern Pine Beetle (SPB) and wildfires are common problems with loblolly and shortleaf pine forests on campus.
- *Most importantly, the college campus context gave an excellent opportunity to engage in a variety of service-learning opportunities.*



Southern Pine Beetle Survey

August 2002

Rome District



District 1 GFC SPBS 2002

- Gilmer Co. 318 spots
- Murray Co. 212 spots
- Paulding Co. 180 spots
- Gatoosa Co. 127 spots
- Fannin Co. 204 spots
- Cherokee Co. 286 spots
- Cobb Co. 81 spots
- Chattooga Co. 107 spots
- Whitfield Co. 225 spots
- Walker Co. 206 spots
- Polk Co. 238 spots
- Pickens Co. 143 spots
- Haralson Co. 151 spots
- Gordon Co. 321 spots
- Floyd Co. 258 spots
- Dade Co. 206 spots
- Bartow Co. 205 spots

★ denotes species W. An epidemic is defined as one spot per 1,000 acres of pine types

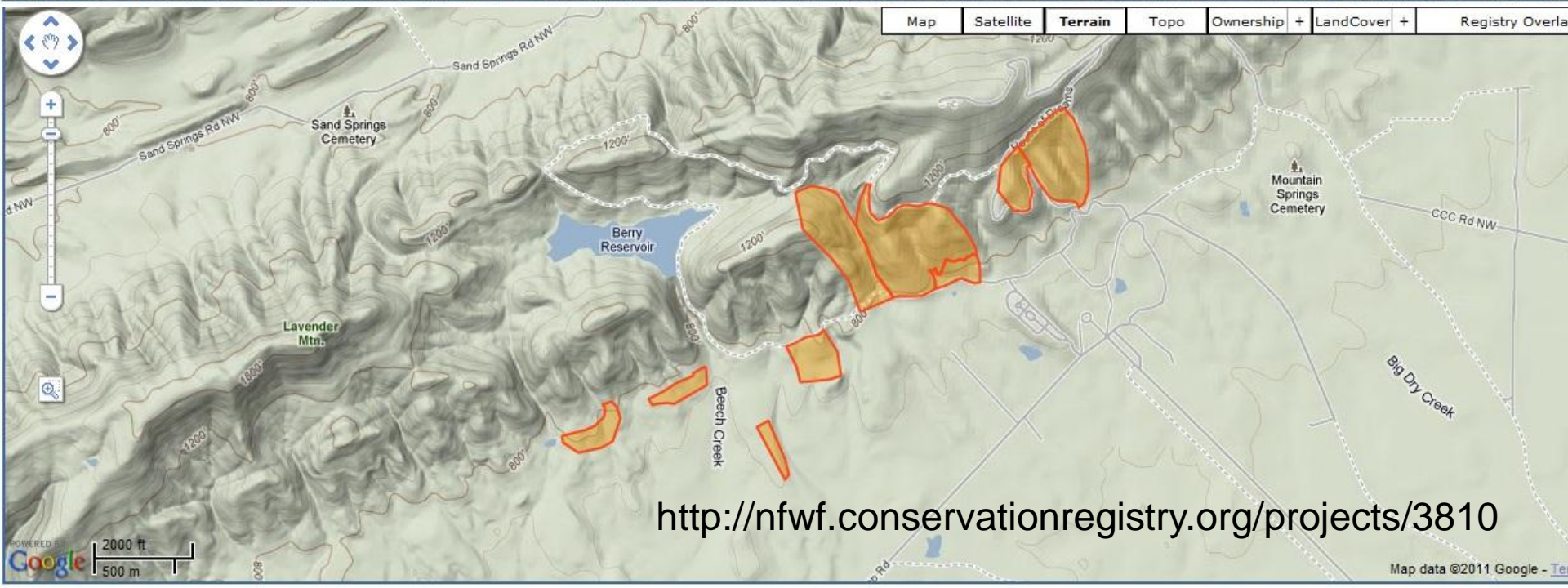
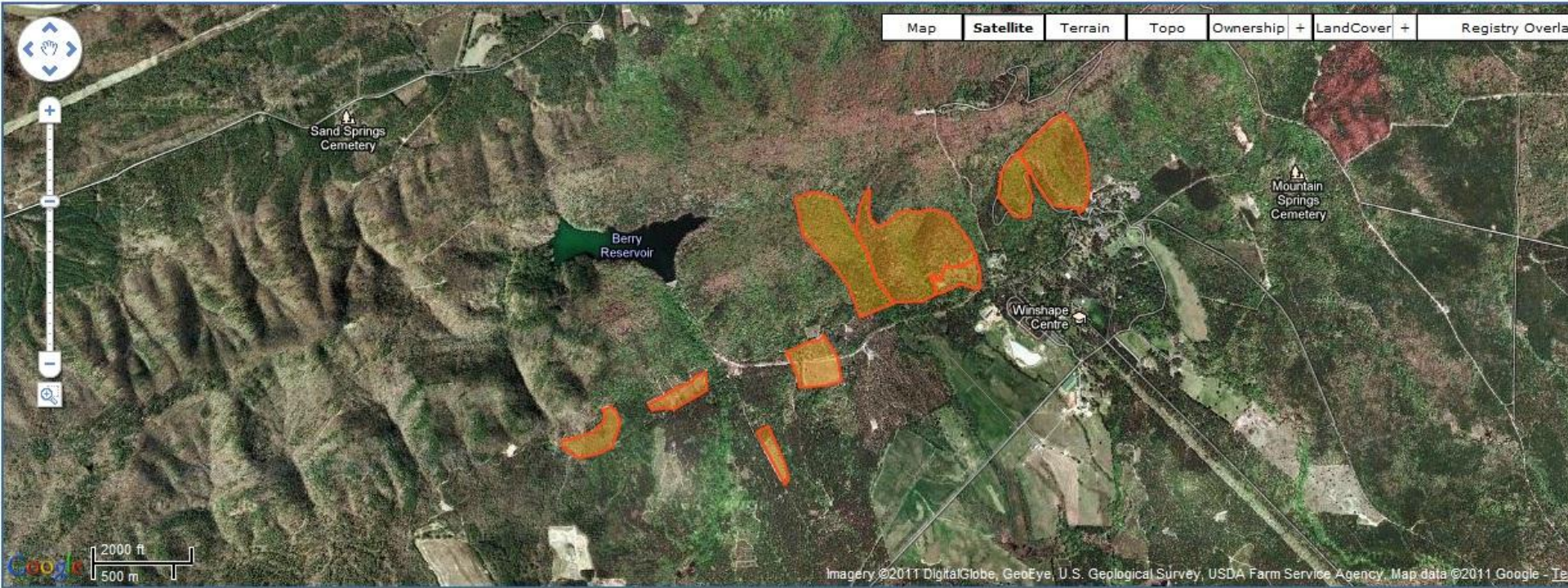


Management goals

- Open, pine-dominated canopy; longleaf pine highest in importance.
- Natural regeneration of longleaf pine population.
- Reduction of duff, litter, and woody fuels to safe levels.
- Increase in abundance and diversity of understory herbs and grasses.
- Overall vegetation composition similar to the only known frequently burned old-growth mountain longleaf pine forest at the Mountain Longleaf Pine National Refuge in AL.
- Ancillary positive impacts on faunal diversity (e.g., increase in abundance of animals adapted to relatively dry, open, sunny, grassy habitats).

Management plan overview

- 1999 Plant Ecology class initiated long-term census work
- 2001 SAVE club responded to logging with a tree planting event
- 2002 management plan developed by Karen Vaughn as an extension of a Plant Ecology project
- 2003 – began restoring burning regime on 3-5 year frequency
- 2005 – began controlling hardwoods and invasive species via removal and herbicide application
- 2005 – began establishing local seed sources via cone collection and seed orchard development
- Along the way - *research, education, and outreach*
- Help from Berry's Land Resources, Student Work, Volunteer Services, Berry Longleaf Network, Interagency Burn Team, and various internal and external grants.



<http://nfwf.conservationregistry.org/projects/3810>



Management: Planting

- Most planting done in SPB clear- and selective-cuts, followed by burning every 3-5 years.
- Some in areas with hardwood canopy reduced via herbicide injection and burning
- Focus is on low density “conservation” plantings.
- Everybody loves to plant trees!





Management: Burning

- Fuel reduction/restoration burns done in “old growth” areas – some areas burned four times since 2003.
- Raking around bases of old growth trees was necessary to control effects of duff smoldering.
- Most planted areas have been burned at least three times since planting.



Management: Student Burn Team

- Trained to meet USFS guidelines.
- S130/S190 Fire Behavior and Safety
- Southern Company/NFWF grants provided needed equipment
- Necessary support provided by Berry's Land Resources Dept.





Management: Herbicides

- Direct injection for hardwood control in core management area.
- Directed spray for hardwoods and blackberry in planted areas.
- Cut-stump and basal bark spray for hardwoods and competing shrubs in logged areas.
- Use of prescribed burning makes further use of herbicides unnecessary. Grasses and herbaceous plants flourish afterwards.







Management: seed orchards

- Two types: grafted vs. seedling-based seed orchard
- In our 2.5 acre grafted orchard, offsite source longleaf pine rootstock planted spring 2003.
- Grafting work initiated winter 2005 using scions from Berry's trees.
- About 100 trees successfully grafted started bearing cones in 2011; orchard now used in agroforestry project (sheep)





Management: Seedling-based seed orchards

- Two seedling-based seed orchards.
- 5 acres with 530 seedlings from ~50 maternal trees planted in 2008 – 2009. First cones in 2017 on a few individuals.
- New orchard established in 2018 on 10 acres using 1560 seedlings from ~50 maternal trees at Berry College, MLLP Wildlife Refuge, Talladega National Forest, and Paulding/Sheffield WMAs.





For more information:
www.berrylongleaf.com

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Contact Us

Martin L. Cipollini
Dana Professor of Biology
Berry College
364B McAllister Hall
2277 Martha Berry Highway NW
P.O. Box 430
Mount Berry, GA 30149
Phone: 706-346-7956

Longleaf Information

- General Presentation
- Management Plan
- Trail Map

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BERRY COLLEGE LONGLEAF PINE PROJECT

This project seeks to re-establish a fire-maintained Mountain Longleaf ecosystem on Lavender Mountain, just north of Rome, GA. The mountain is part of the Berry College campus, and is home to one of the few remaining relict stands of Mountain Longleaf Pine. Aside from conservation of biodiversity, two main reasons argue for the restoration of the longleaf pine ecosystem. First, in comparison with other pines, Longleaf Pines are less susceptible to regional diseases and pests, including the Southern Pine Beetle. Second, healthy stands must be maintained by frequent controlled (prescribed) burns, which reduces the likelihood of devastating wildfires in managed areas.

In addition to re-establishing the longleaf ecosystem on the Berry College campus, our project seeks to involve students and other community members actively in the conservation process, and to educate the public on the advantages of Longleaf Pines and proper fire management.



Restoration of American Chestnut in Georgia

The Georgia Chapter of the American Chestnut Foundation's Blight Resistance Breeding Program



GROW with us

The Forests

Early in the 20th century, eastern deciduous forests were full of giant American chestnuts. Chestnuts accounted for 25% of all hardwoods along the spine of the Appalachian Mountains.

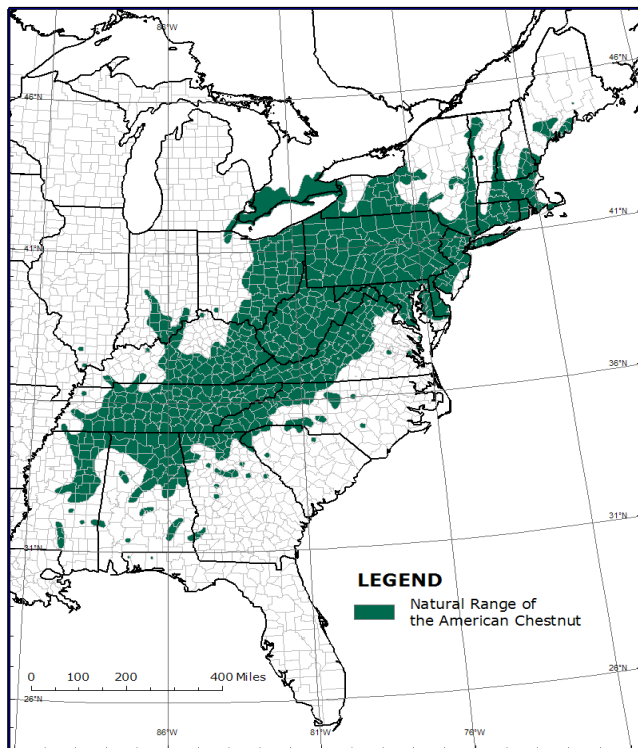
Grew tall and straight - making them ideal timber trees. Tree diameters were often 8 to 10 ft.

Profuse annual nut production. Enormous ecological, economic, and cultural value.



The Original Range

The original range extended well into the south, but *Phytophthora* root rot had already eliminated trees from much of the Piedmont and Coastal Plain prior to the introduction of the blight.

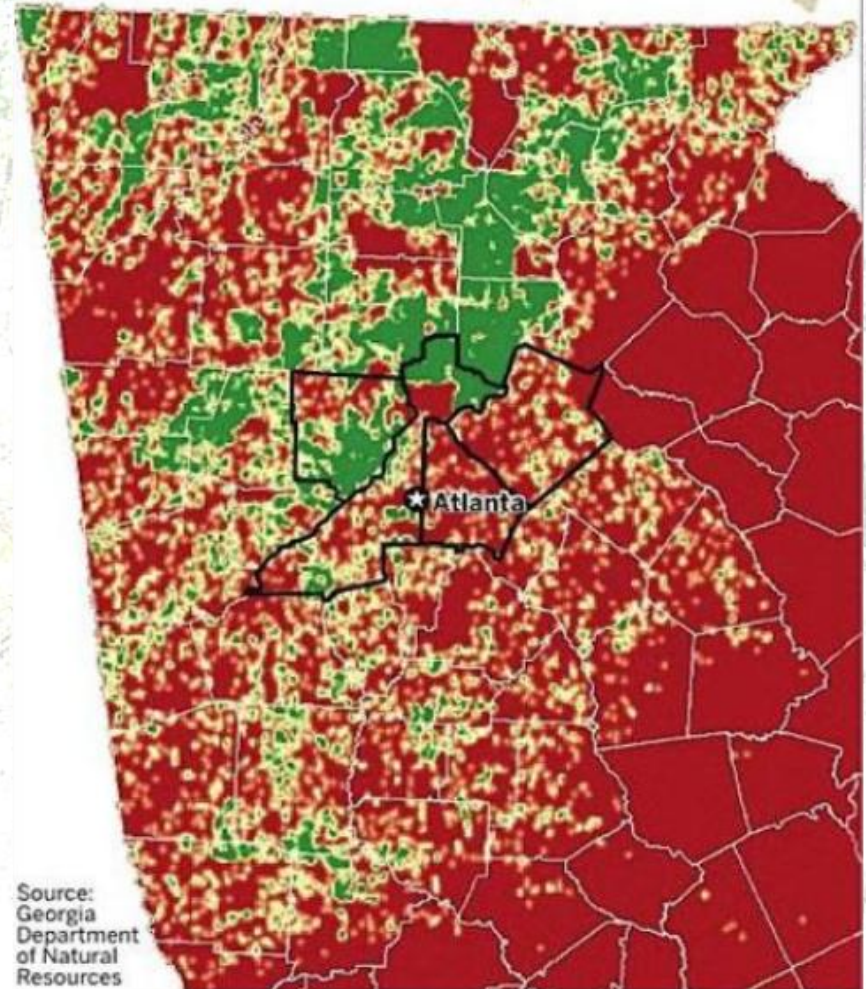


CHESTNUT TREES IN GEORGIA

More than 200 years ago, chestnut trees flourished across the state. A state biologist has compiled a map showing where they grew, hoping to re-establish the species in Georgia.

Chestnut trees level

- High density
- Medium density
- Low density or none



Chestnut Blight

By the 1950's, chestnut was eliminated as a dominant forest tree throughout its entire range -- an enormous ecological and cultural disaster.



One Solution: Backcross Breeding

Introduces blight resistance from naturally resistant Asian chestnuts. This “classical” approach uses controlled (hand) pollination and raises trees in “backcross orchards”.

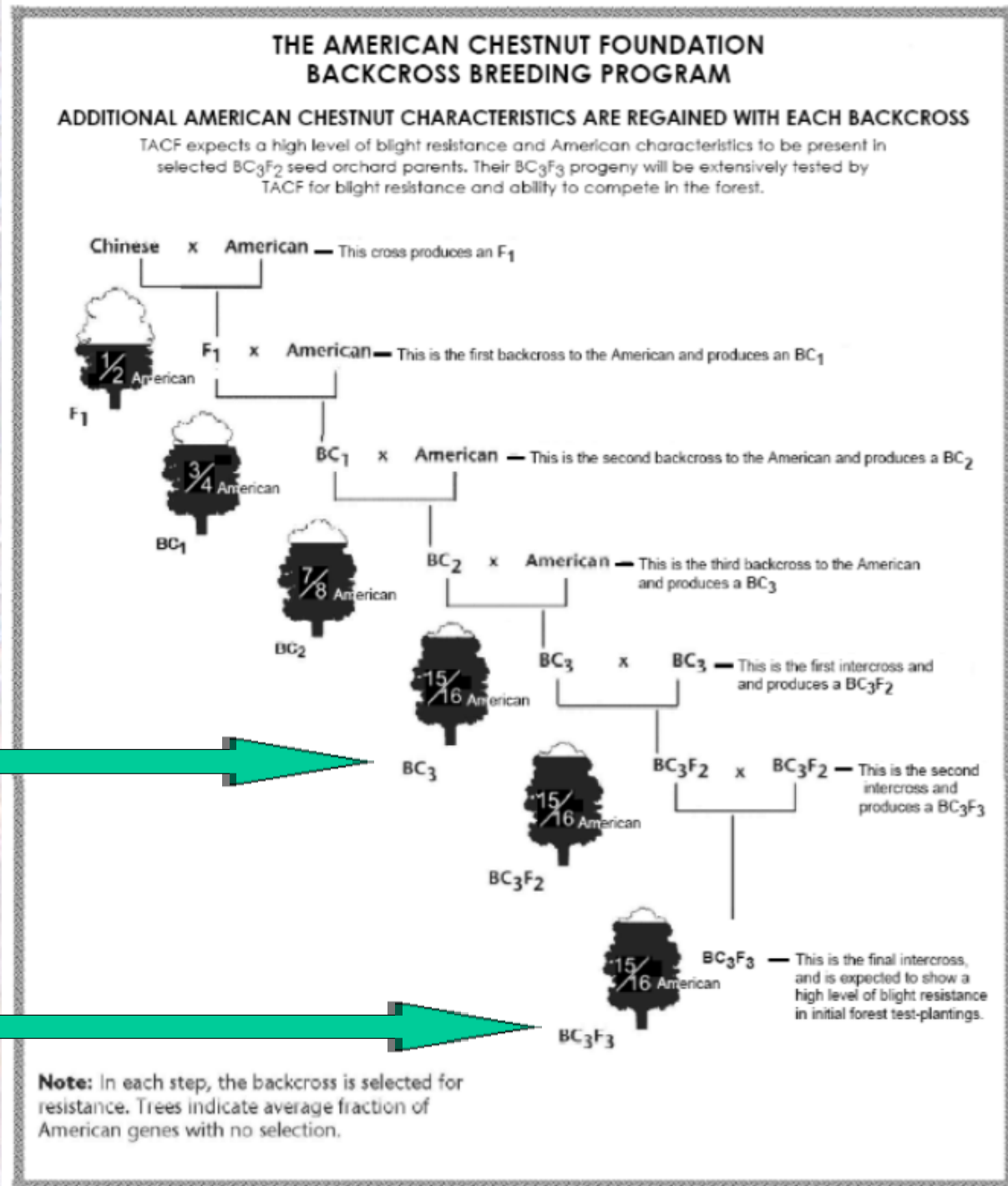


Breeding in GA

Overall goal: capture as much genetic diversity from GA as possible. Create regional lines for restoration.

Most GA trees enter breeding program as 15/16th (BC_3) trees that are 94% “American” and 50% “Georgian”

Initial “products” are potentially blight resistant BC_3F_3 trees.



Georgia Chapter Breeding Program

- Locate flowering American chestnut survivors.
- Verify ID and secure rights to use the trees.
- Protect and maintain these trees.
- Collect pollen and cross pollinate trees.



Georgia Chapter Breeding Program

- Harvest and store the nuts.
- Plant nuts or seedlings in orchards and care for them.
- Inoculate trees to select for blight resistance
- Select resistant trees for American chestnut traits and growth habit









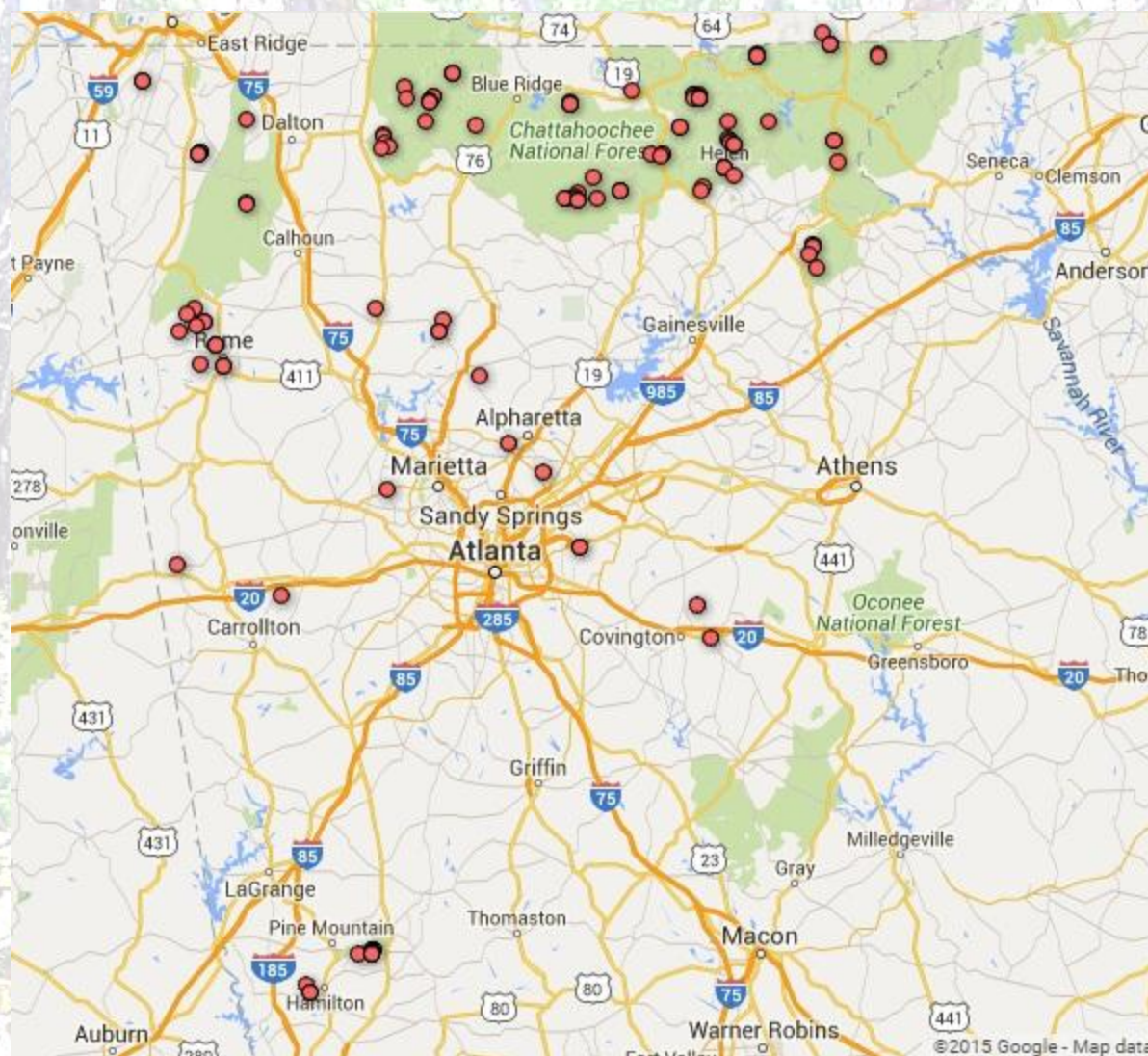


Progress in GA (after 10 seasons)

- About 200 wild “mother” trees have been found.
- Dozens of cross-pollinations have been made.
- About 200 orchard sites have been established.
- *100s of students and members of the public have helped and learned.*



Map of “Mother” Trees* Used in the GATACF Breeding Program



* Wild American chestnuts or those transferred from the wild to orchards, as well as cultivated Chinese chestnuts.

Progress in GA

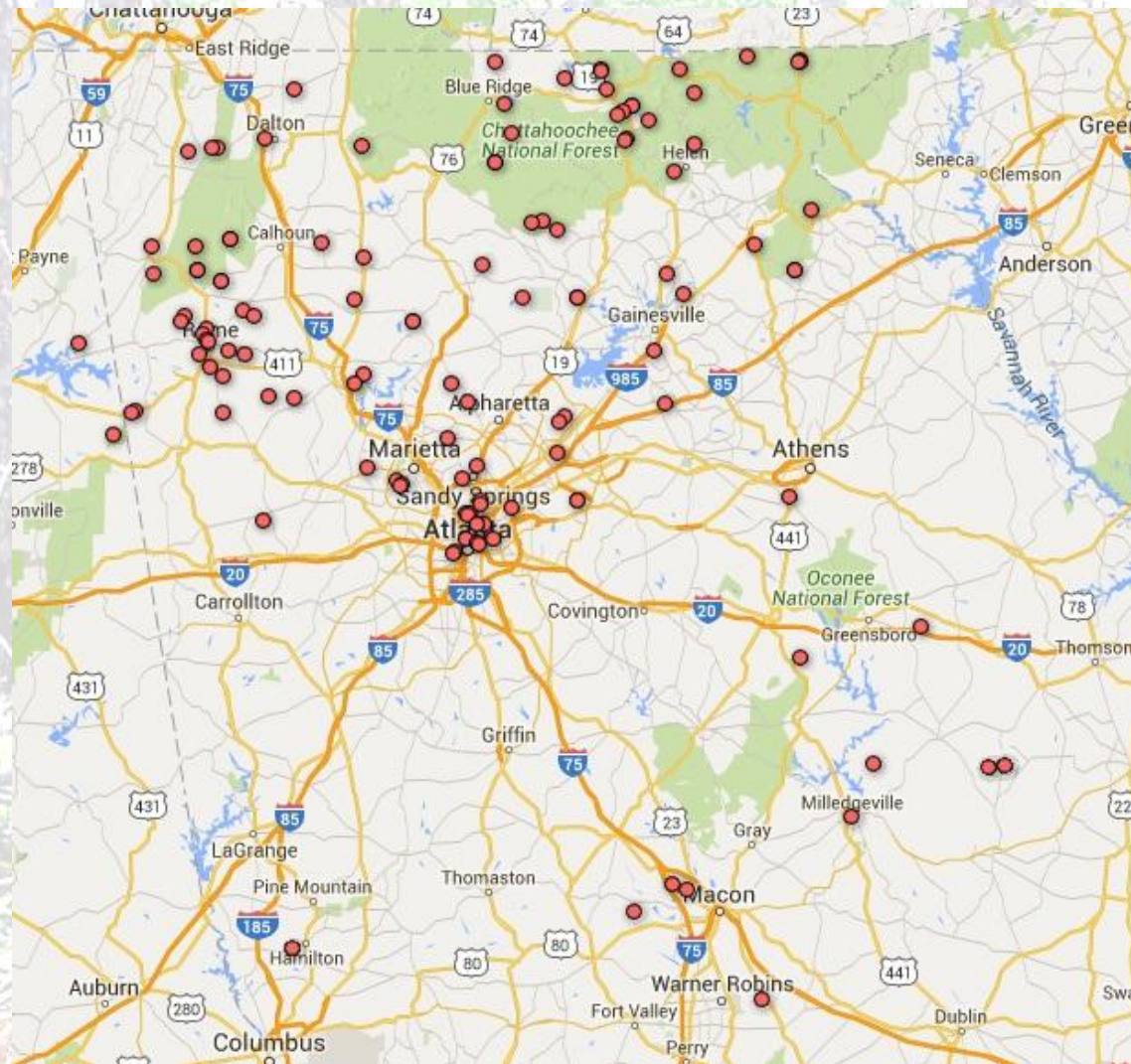
Trees Planted in Orchards

2018

Backcross (BC3, BC4)	11384
American	1265
Chinese	498
F1	317
Other	81
Total	13545
Trees still alive	9044 (75%)



Map of GATACF Chestnut Orchards*



*Includes “test”, “demo/educational”, “backcross”, “seed”, and “progeny test” types.

Current “big” needs:

- Resources and stewards for +/- 1 acre “seed orchard” blocks (up to 3000 trees each). We have five blocks started so far: Eastern KY University (3 blocks), Flint (1 block), Richards (1 block). Only 1-2 % of trees will remain in these orchards, which will supply seed for restoration.
- Support, including orchard sites, for our breeding program targeted at *Phytophthora* root rot and for the establishment of more gene conservation (mother tree) orchards.
- Resources and expertise to apply genetic techniques to assist breeding and selection process (e.g., use of transgenic trees and genetic marker-assisted selection).



For more information:

www.acf.org/ga/
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Conclusions

Both projects involve trust in relatively inexperienced students and public volunteers.

Private citizens may:

- 1) engage in “citizen science” by assisting professional researchers in their efforts
- 2) make their own private properties available for restoration purposes
- 3) via backyard demonstration plantings and via other avenues, help educate the general public about these projects.

