Welcome to Watershed Moments!

October 18, 2018

Citizen science

Projects in which volunteers partner with scientists to answer real-world questions

Cornell University

Scientific work undertaken by members of the general public, often in collaboration with or under the direction of professional scientists and scientific institutions.

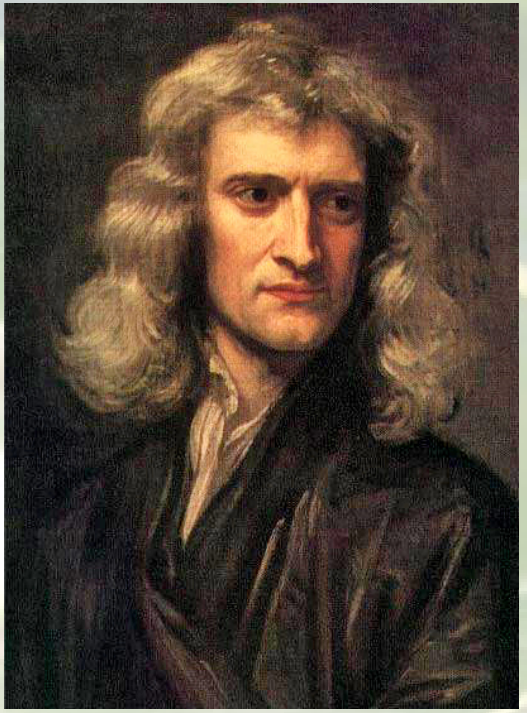
Oxford English Dictionary, June 2014

Science at universities

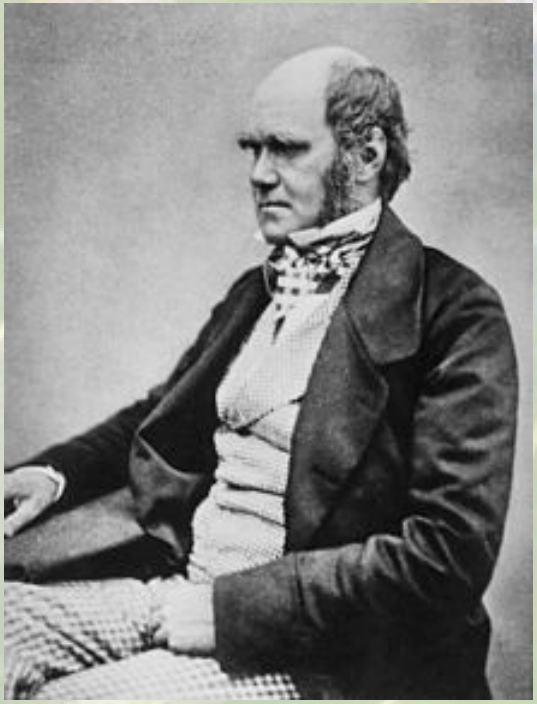
“democratization of science”

Paul Feyerabend

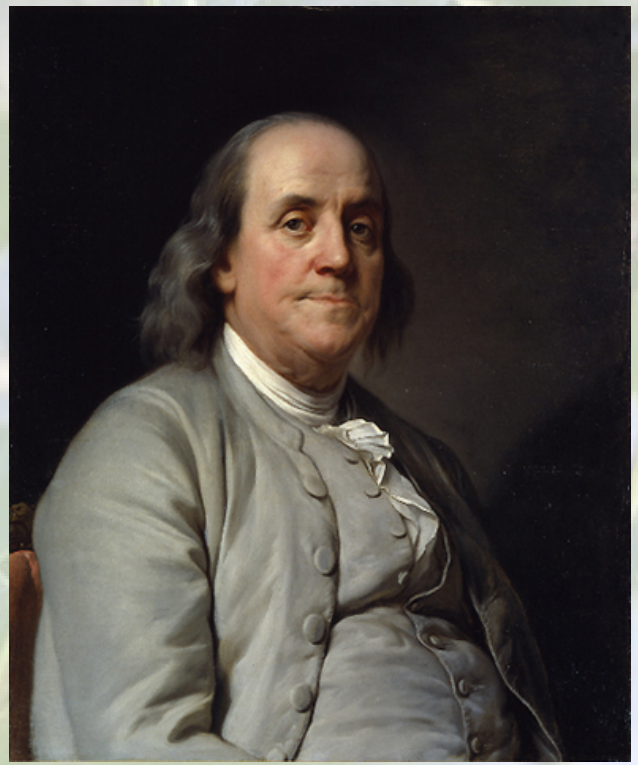
Prominent citizen scientists



Sir Isaac Newton

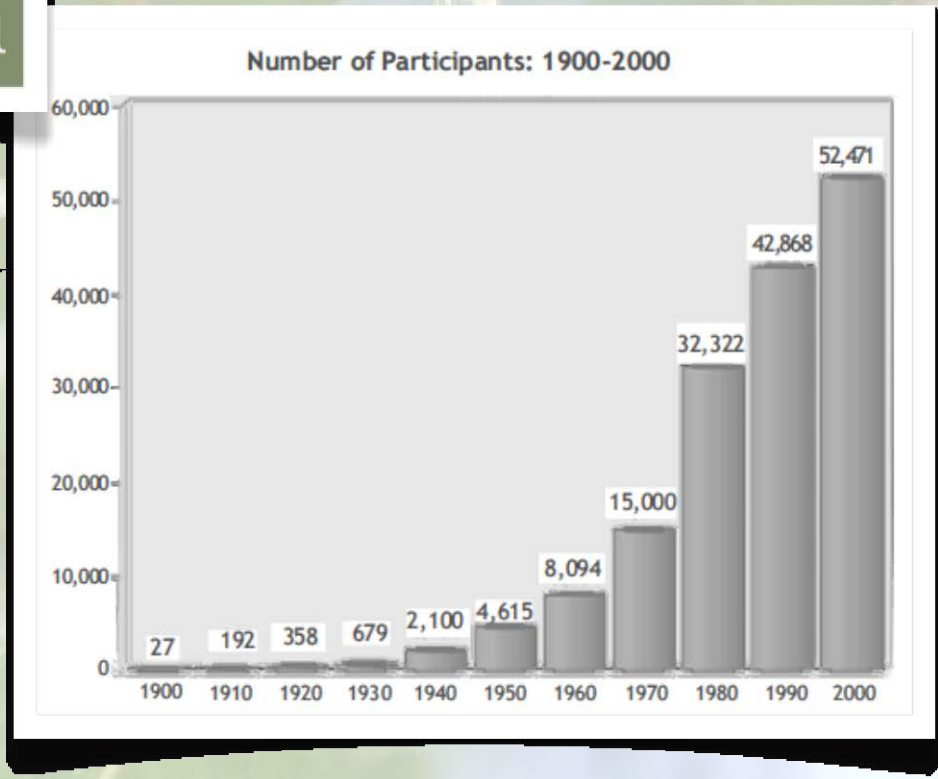


Charles Darwin



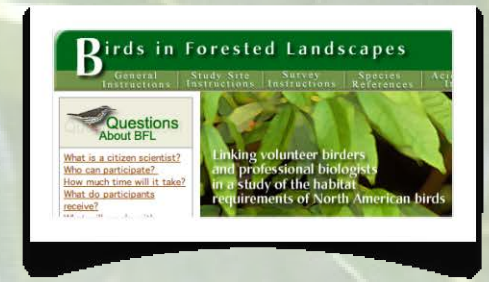
Benjamin Franklin

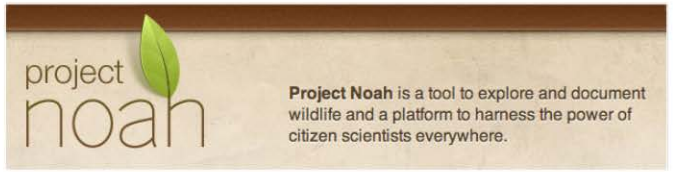
Christmas Bird Count



FrogWatch USA™

USA npn National Phenology Network
Taking the Pulse of Our Planet



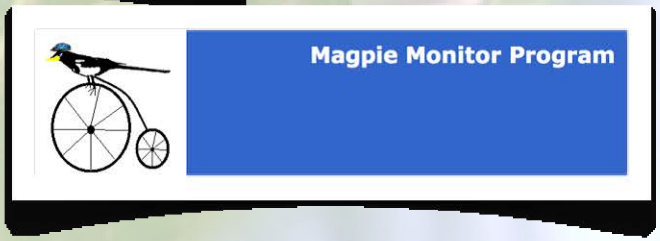


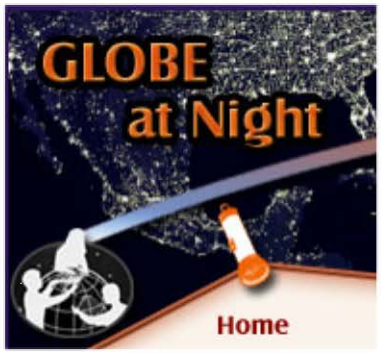
Washington NatureMapping Program

iSpot your place to share nature

COASST COASTAL OBSERVATION AND SEABIRD SURVEY TEAM

BTO Looking out for birds




GLOBE
at Night
Home


Rank: 17
Score: 9092
48: Pro Peptide
Group Competition
Player Competition
Chat


fold it
BETA
Solve Puzzles
for Science


OpenStreetMap
The Free Wiki World Map


CoCoRaHS
Community Collaborative Rain, Hail & Snow Network
"Because every drop counts"
Home | States | View Data | Maps
My Data Entry | Login
Welcome to CoCoRaHS! "Volunteers working together to measure precipitation across the nation."


Find Local Gas Prices
GasBuddy.com


wikimapia
Edit map
Map type
Categories
Login
Mcguckin Hardware
Marriott Hotel


GALAXY ZOO


IOWATER
Volunteer Water Quality Monitoring


a student's guide to
GLOBAL CLIMATE CHANGE
Learn the Basics
See the Impacts
Think Like a Scientist
Be Part of the Solution!
Play the video to learn more.
SHARE
TAKE A CLIMATE CHANGE EXPEDITION!
Join us!
CALCULATE YOUR EMISSIONS
start

What all these projects have in common:

- Tap into people power – a few scientists can not accomplish what 10s, 100s, or even 1000s of guided people can do.

- The interested public can contribute to science and thereby learn something new and meaningful.

- Benefits society through an improved environment, revised policy, or improved social linkages.

Citizens Restoring American Chestnuts

….8 years later

Native Old Growth Giant

Historic Forest Resource

Chestnuts Are Good Food

The importance of healthy forest ecosystems

Filter air pollutants

Habitat for plants and animals

Prevent run-off and erosion

Recreation and tourism

Improve water quality through shade and nutrient uptake

1904: Disease Pandemic – Identification of Chestnut Blight from Asia

"Parasitic" fungus - *Cryphonectria parasitica*

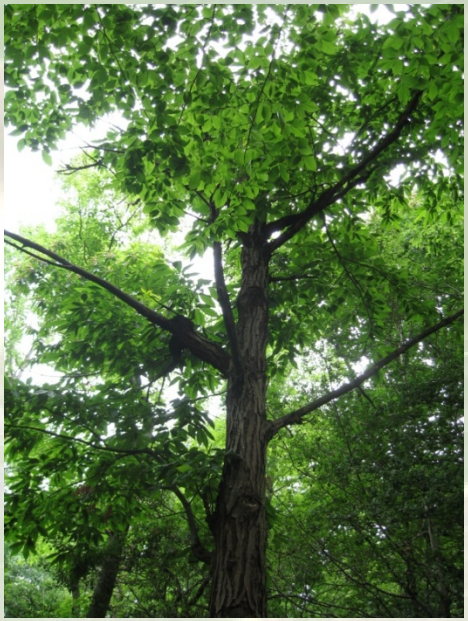
- Enters bark and infects cambium, not roots
- Rapid and uncontrollable dispersal

American Chestnut Today

Approach 1: backcross breeding

American

Not resistant



x

Chinese

Blight resistant

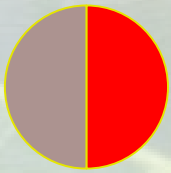
F1

50% American

Moderate resistance

THE AMERICAN CHESTNUT FOUNDATION

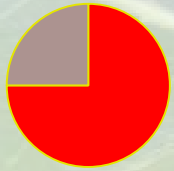
Three backcross generations



F1 x **American**

50% American
Moderate Resistance

100% American
No Resistance



B1 x **American**

75% American
Moderate Resistance

100% American
No Resistance

B2 x **American**

87.75% American
Moderate Resistance

100% American
No Resistance

% Chinese
% American

B3

93.75% American
Moderate Resistance

Approach 2: Biotechnology

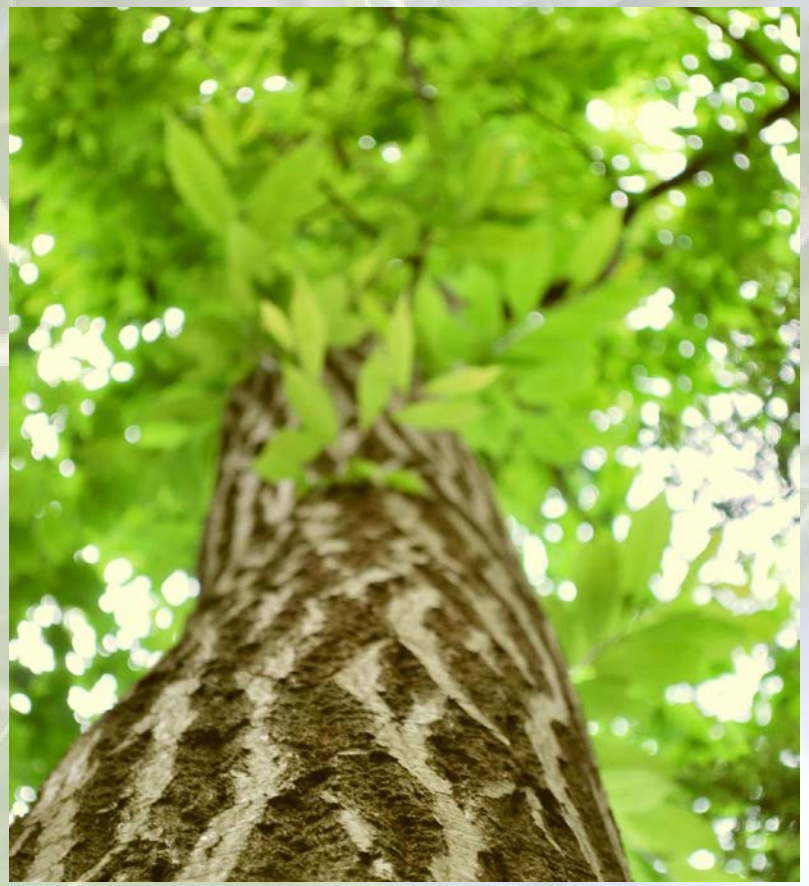
THEWORLDPOST
BERGGRUEN INSTITUTE The Washington Post

By **Andrew Newhouse**
May 29, 2018

Andrew Newhouse is a former research technician and current PhD student at the State University of New York College of Environmental Science and Forestry.

SYRACUSE — American chestnuts used to be unique and beautiful trees, providing sustenance and shelter for wildlife and a healthy and profitable nut crop for humans. These trees were huge, majestic and very long-lived compared to other species in America's eastern forests. But tragically, American chestnuts were almost entirely wiped out when an invasive blight fungus was accidentally introduced to the United States in the late 1800s. Without human intervention, populations of pure American chestnut will likely continue to decline until they are all but gone.

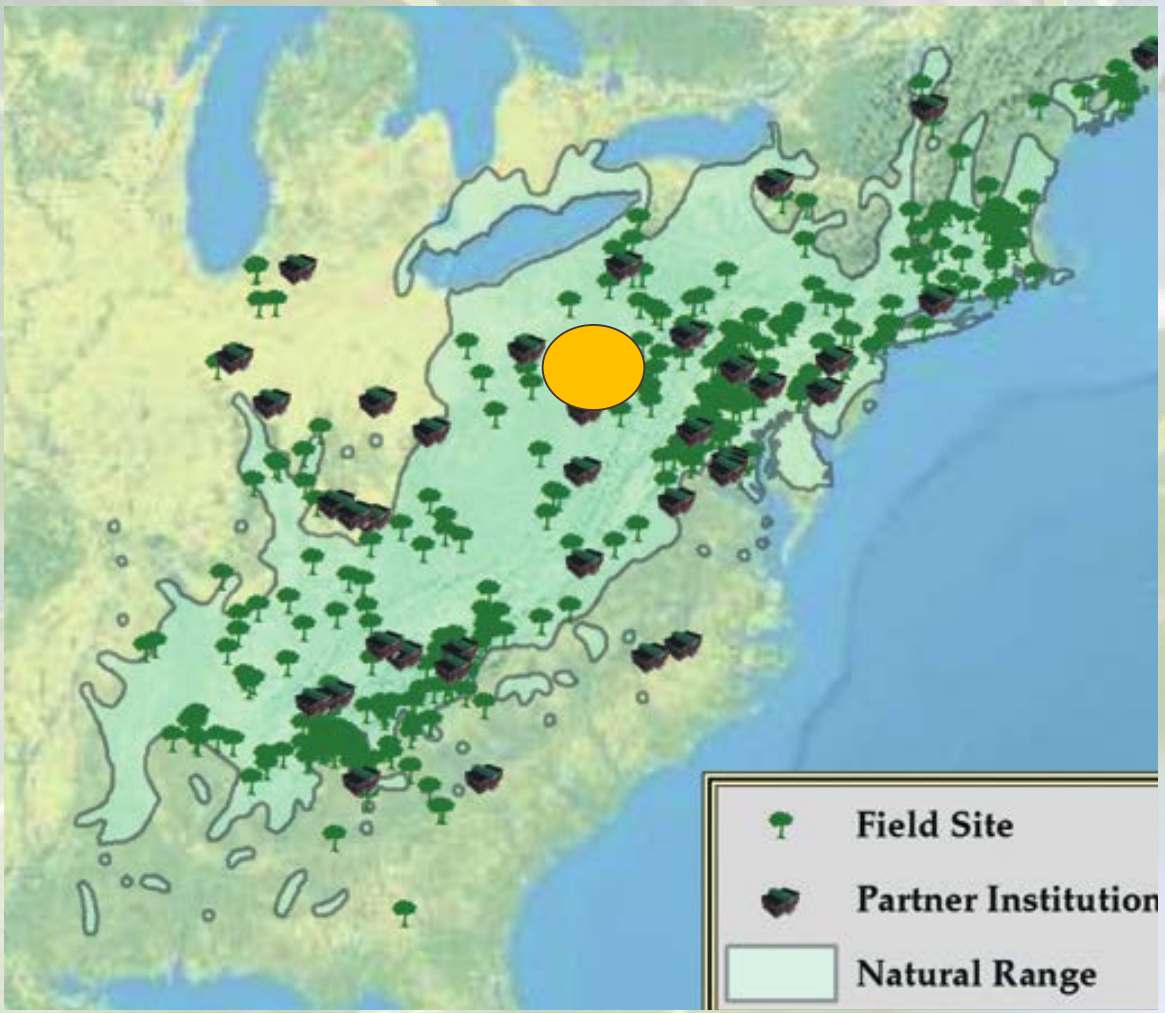
Approach 3: Identify local large trees and pollinate them



Garrett County Forestry Board
WOOD WATER WILDLIFE RECREATION BEAUTY

University of Maryland
CENTER FOR ENVIRONMENTAL SCIENCE
APPALACHIAN LABORATORY

Use this effort to develop locally adapted trees



From Sara Fitzsimmons

Our approach

Citizens Restoring American Chestnuts

- Meet with community groups
- Plant seeds and seedlings from different sources of American chestnuts throughout western MD
- Record their survival, growth, and blight
- Identify the sources best adapted to the Allegany Mountains of western MD

Participants

- 1060 seedlings
- 1258 seeds
- Most planted 4 seedlings and 4 seeds
- Most volunteers male born before 1970
- Most with graduate and/or bachelor degree

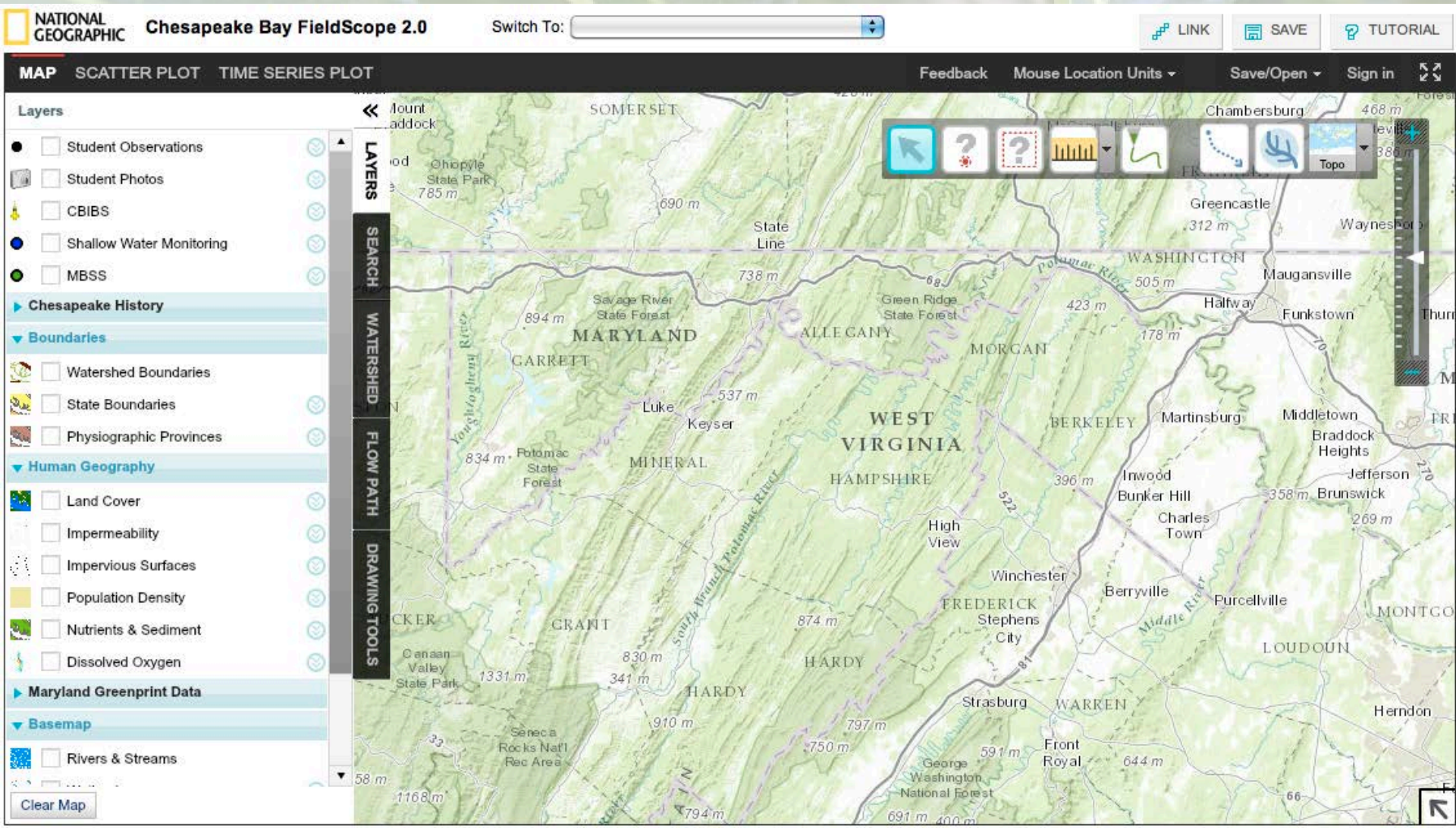
Participants reported

- improved understanding
- improved confidence
- most plan on continuing because participation is enjoyable

Participant comments

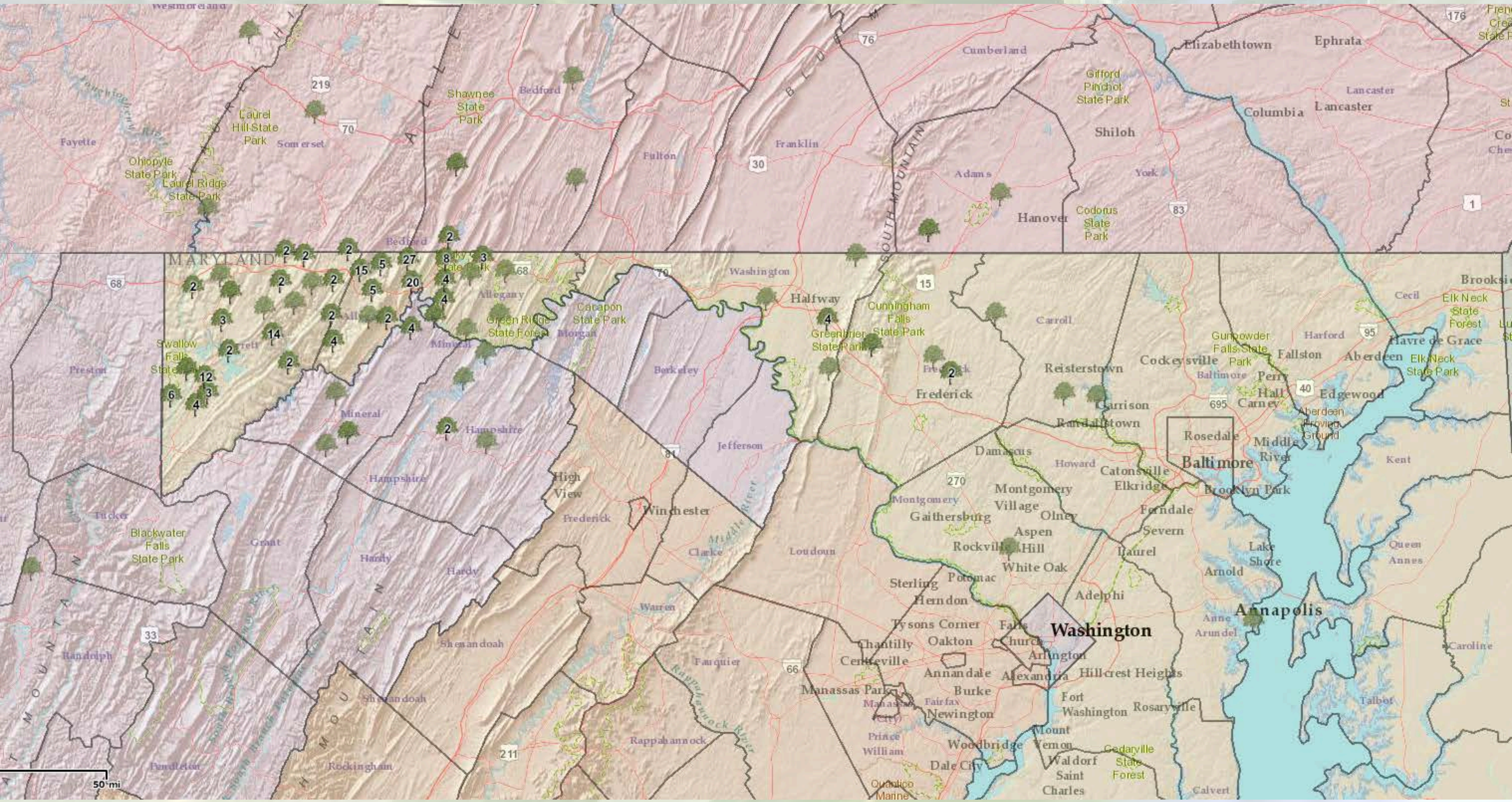
- We are so excited to be trying to help restore these beautiful "American" trees.
- The only thing I know about online is what I hang my clothes on. I can get help.
- I wish I wouldn't have dug my holes before the workshop, because I learned that "they don't like to get their feet wet." I guess there is nothing to be done about over enthusiasm.
- I am very glad this opportunity to be a part of this research. I am very excited to participate.

Participants submit updates using a National Geographic mapping tool called FieldScope.



FieldScope documented seedlings

- 643 entered into FieldScope
- from 8 sources of trees
- 125 participants
- 157 stations
- In 14 counties in 3 states (MD, PA, and WV)


MARYLAND
Westmoreland
Shawnee State Park
Bedford
Laurel Hill State Park
Somerset
Fayette
Ohiopyle State Park
Laurel Ridge State Park
Cumberland
Gifford Pinchot State Park
Elizabethtown
Ephrata
Lancaster
Columbia
Shiloh
Fulton
Franklin
Adams
York
Hanover
Codorus State Park
SOUTH MOUNTAIN
Washington
Halfway
Cunningham Falls State Park
Greenbrier State Park
Carroll
Allegany
Green Ridge State Forest
Cacapon State Park
Morgan
Mineral
Berkeley
Preston
Swallow Falls State Park
Frederick
Reisterstown
Cockeysville
Gunpowder Falls State Park
Fallston
Harford
Havre de Grace
Aberdeen
Elk Neck State Forest
Elk Neck State Park
Cecil
Perry Hall
Carney
Edgewood
Aberdeen Proving Ground
Garrison
Randallstown
Rosedale
Baltimore
Middle River
Kent
Damascus
Howard
Catonsville
Elkridge
Brooklyn Park
Montgomery Village
Gaithersburg
Olney
Aspen Hill
Rockville
White Oak
Ferndale
Severn
Laurel
Arnold
Lake Shore
Queen Annes
Hampshire
Jefferson
High View
Winchester
Frederick
Tucker
Blackwater Falls State Park
Grant
Hardy
Clarke
Loudoun
Middle River
Sterling
Herndon
Potomac
Adelphi
Annapolis
Anne Arundel
Washington
Tysons Corner
Falls Church
Oakton
Chantilly
Centreville
Arlington
Annandale
Alexandria
Hillcrest Heights
Caroline
Manassas Park
Burke
Manassas
Fairfax
Newington
Fort Washington
Rosaryville
Talbot
Warren
Shenandoah
Fauquier
Rappahannock
Rappahannock River
Randolph
Pendleton
Rockingham
Prince William
Woodbridge
Mount Vernon
Waldorf
Dale City
Saint Charles
Cedarville State Forest
Calvert
Quantico Marine
50 mi

Survival:

- Less seasonality
- Sources other than Scrivener
- Seeds (as opposed to seedlings)

Summer growth:

- Warmer and drier sites
- Aspects other than easterly
- Sloped
- Fields
- Seeds

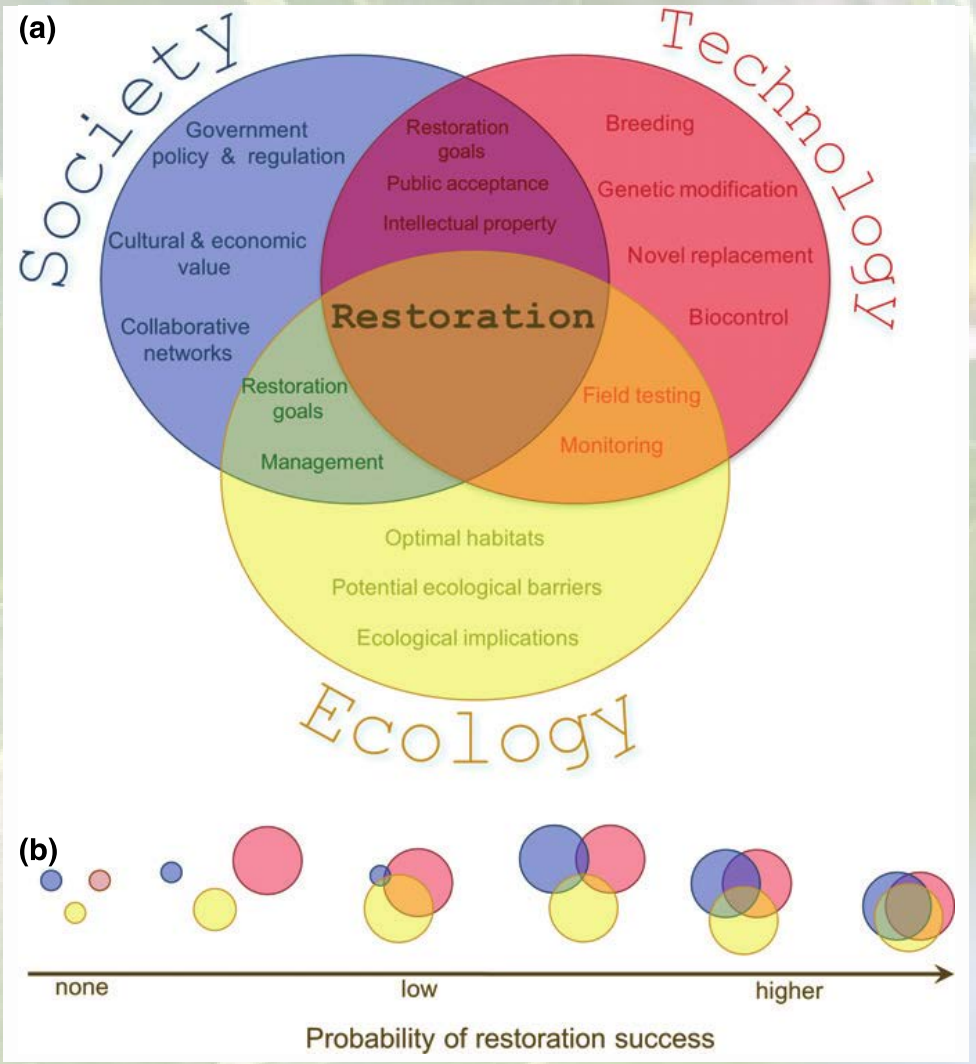
Winter growth:

- Northerly aspects
- Sloped
- Sunny sites
- Forested

Why should you continue to send in data? (even if you killed your tree)

- Long-term data are rare but invaluable!
- Eight years after planting, your trees should start to mature. We want to hear when that happens.
- If you are lucky enough that your tree(s) continue to thrive, we want to hear about that (and also if and when your trees get the blight).

Successful restoration integrates Society, Technology, and Ecology



Wishes for the future

- Continue to pollinate local American chestnuts in collaboration with local foresters
- Continue to provide chestnut seeds to citizen scientists and expand Citizens Restoring American Chestnuts
- Develop local seed orchards in collaboration with The American Chestnut Foundation, citizen scientists, and local foresters
- Expand research to include genomics