

THE AMERICAN CHESTNUT FOUNDATION ANNUAL REPORT

JULY 1, 2017 – JUNE 30, 2018



OUR VISION is a robust eastern forest restored to its splendor.

OUR MISSION is to return the iconic American chestnut to its native range.





# THE AMERICAN CHESTNUT FOUNDATION (TACF)

is an organization which relies tremendously on the efforts of its volunteers. While many other charitable organizations may depend more heavily on staff involvement, TACF, with its limited resources, has chosen to utilize knowledgeable volunteers to accomplish and

monitor numerous chestnut plantings, as well as to educate the public about our mission. We also have continually collaborated with numerous educational and scientific institutions to research key scientific questions. As a result, the impact we have been able to achieve to advance our mission is many times what would be apparent from the level of our budget.

Volunteer driven organizations like TACF must have a strong working Board and Executive Committee to function effectively. The Board must not only always keep its eye on marshaling the organization's finite financial resources, but lead its staff and volunteers – in this case members and staff who are spread out over a large geographical area – in spending those resources wisely. In other words, the Board and its committees must think strategically about the impact of our actions. That means projecting how the organization can best accomplish its mission and vision over an extended period of time based on what we know to be the best science today. It involves determining a sequence of steps or interim goals, based upon our first understanding, and then attempting to remove the constraints to achieving those goals, whether they be financial, regulatory, organizational, educational, political, or governing – understanding all along that those interim goals may change with new information and developments.

Finally, it is up to the Board not just to effectively communicate that strategy to its members and the public, but to diligently work to resolve differences and achieve consensus among members on our next actions. For example, if we say that TACF wishes to undertake chestnut restoration at a certain time, the idea of "restoration" will often have multiple meanings to those with different goals, knowledge, or aspirations. That difference in perspectives when ignored can lead to conflict, but when discussed among our members, may bring a greater understanding of restoration and a stronger, more resolute organization.

It is with great gratitude and thanks to our Board, our volunteers and members, and to our President and CEO Lisa Thomson and her dedicated staff, that I present this annual report.

Sincerely,

Michael D. Doochin

Michael Oool

Chairman, Board of Directors

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# The Year in Science





This year, TACF and its partners sequenced the genome of American chestnut. We accelerated selection within our Meadowview Research Farms seed orchards with genomic selection and small stem assays. We initiated a study of genetic diversity across the range of *Castanea dentata* that will guide our germplasm conservation efforts. We screened thousands of backcross seedlings for resistance to the root pathogen *Phytophthora cinnamomi*. We advanced new sources of backcross resistance to chestnut blight. The steps taken this year are helping us to reach our ultimate goal of creating restoration populations of American chestnut that are disease resistant and resilient to climate change.

# AMERICAN CHESTNUT REFERENCE GENOME PROJECT:

Our partners at HudsonAlpha Institute for Biotechnology used cutting edge DNA sequencing technology to generate a high-quality reference genome for American chestnut in which 99.4% of the genome has been assembled into chestnut's 12 chromosomes. This reference genome is foundational for future research to map regions of backcross genomes underlying disease resistance and for studying genetic diversity and adaptation within chestnut populations.

# GENOMIC SELECTION IN BACKCROSS SEED ORCHARDS:

In partnership with Virginia Tech, we developed accurate genomic selection for blight tolerance among  $BC_3F_2$  trees remaining in Meadowview seed orchards. Within the context of chestnut restoration, genomic selection is DNA-based prediction of long-term survival and blight canker severity among progeny of specific parents in seed orchards. Genomic selection enabled us to simultaneously rank 1,230 trees of mixed ages for blight tolerance, some of which are not old enough to have

flowered or assess long-term survival. With genomic selection, we plan to finish culling all but a few hundred of the most blight-tolerant trees (of over 60,000 planted) from Meadowview seed orchards between 2019 and 2022.

# UNDERSTANDING THE GENOMIC BASIS FOR CLIMATE ADAPTATION:

In 2018, we initiated a project with collaborators at Virginia Tech and HudsonAlpha to study geographic patterns in genetic diversity across the range of Castanea dentata. Regional coordinators and volunteers from TACF collected leaf samples from 700 American chestnut trees ranging from Maine to Alabama. Next year, the whole genomes of these trees will be sequenced at HudsonAlpha to study the genomic basis for climate adaptation. We will use the results to delineate management zones of locally-adapted subpopulations. We plan to conserve 1,000 additional wild trees from across the species range in germplasm conservation orchards over the next five years. The number of trees to conserve within each management zone will be proportional to adaptive genetic diversity and geographic extent of each management zone.



# SCREENING FOR RESISTANCE TO PHYTOPHTHORA CINNAMOMI:

TACF inoculated 3,343 seedlings from 77 backcross families with *Phytophthora cinnamomi* to evaluate their resistance to Phytophthora root rot (PRR) at the U.S. Forest Service Resistance Screening Center in Asheville, NC. The seedlings included a mixture of  $BC_3F_3$  families from Meadowview and  $BC_3F_2$  families from chapters. A total of 220 backcross seedlings (6.6% of trees inoculated) had healthy root systems four months after inoculation with *P. cinnamomi*. TACF and partners have planted these PRR-resistant seedlings in two locations in NC and GA, where *P. cinnamomi* is present in the soil. Eventually, we hope to breed these PRR-resistant selections with blight-tolerant backcross and transgenic trees.

### SMALL STEM ASSAYS:

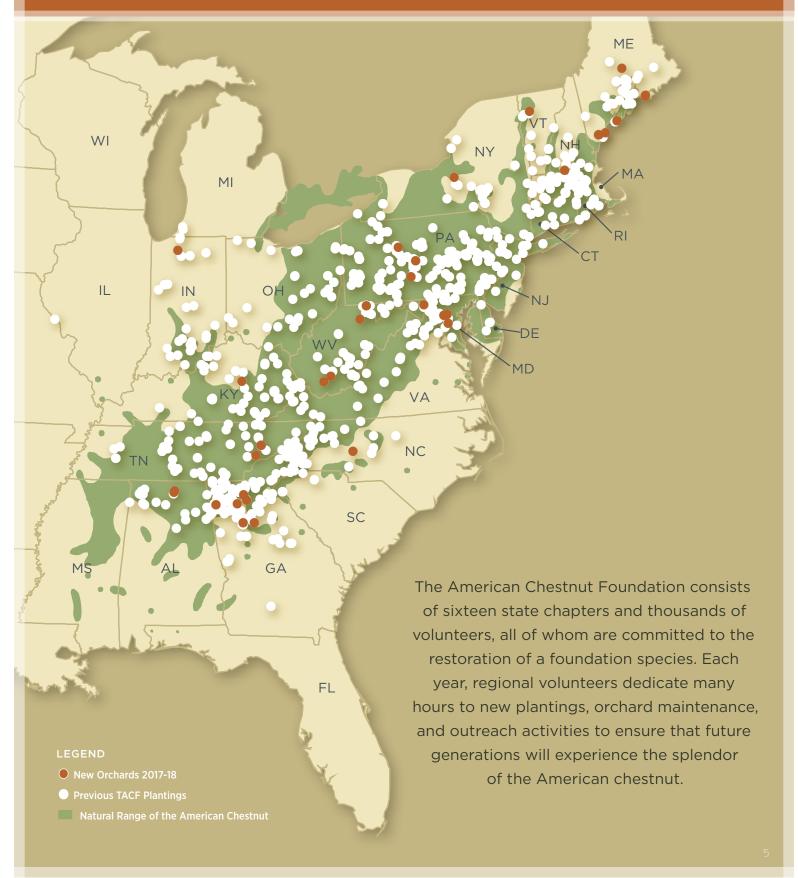
In the new Richard S. Will greenhouses at Meadowview Research Farms, TACF staff and volunteers inoculated 2,686 BC<sub>3</sub>F<sub>3</sub> seedlings from 107 families with Cryphonectria parasitica. The purpose of this experiment, called the small stem assay, was to evaluate the parent trees' tolerance to chestnut blight based on the survival rates of their progeny. We also evaluated the reproducibility of family survival rankings by inoculating 32 of the same families in an independent experiment conducted at Penn State. Family variation in survival was correlated at Meadowview and Penn State, demonstrating blight tolerance can be reliably assessed at the seedling stage. We identified 10 potential parents to select whose progeny survival was greater than or equal to that of American chestnut × Chinese chestnut F, hybrids. We plan to use small stem assay results plus DNA data from the parent trees to improve the accuracy of genomic selection.

# ADVANCING NEW SOURCES OF BLIGHT TOLERANCE:

During breeding season at Meadowview, we performed 25 controlled pollinations to advance eight Chinese chestnut sources of blight tolerance to the second backcross with American chestnut. We are advancing new breeding lines to potentially introduce new genes from new sources of blight tolerance into the breeding program. We are taking these new lines through two rather than three or four backcross generations to avoid diluting out genes for blight tolerance in each backcross generation. We are also using large surviving American chestnuts (i.e., trees whose main stem survived the blight pandemic) as American chestnut parents in these crosses in hopes that they will also contribute to the blight tolerance of the backcross progeny.

Every year, we grow closer to reaching our goal of bringing this iconic tree back to its native range. We thank the members and volunteers that have tirelessly supported the American chestnut restoration effort for the past 35 years. TACF would like to thank the Colcom Foundation for funding the American chestnut reference genome, as well as for additional funding for the genetic diversity study. Funding for genomic selection work was generously provided by the USDA National Institute for Food and Agriculture, the Allegheny Foundation, and an anonymous foundation.

# 2018 Regional Accomplishments



### **NEW ENGLAND REGION**

State Chapters: Connecticut, Massachusetts/Rhode Island, Maine, Vermont/New Hampshire

#### **Regional Stats:**

- 1,418 chestnuts planted
- 18 educational events with 9,619 attendees
- 247 volunteers
- 117 new members enrolled

#### **Notable Accomplishments:**

**The CT Chapter** held activities this year as first steps in bringing back outreach and volunteer opportunities to the chapter.

The VT/NH Chapter celebrated 10 years as a TACF chapter. A new seed orchard was established in Essex Junction, VT in collaboration with the VT Department of Forests, Parks and Recreation, VT/NH Chapter Board of Directors, volunteers, and the Essex High School Technical Center. The chapter developed an electronic newsletter to share with its members. They also developed a policy statement on transgenics that mirrors the 3-BUR program. Doug McLane, chapter nursery manager in Plymouth, NH, developed a garden nursery for growing potentially blight-tolerant chestnut and wild American stock; developing expertise in moving seedlings, root pruning and growing larger seedlings for demonstration, education and possible use in Germplasm Conservation Orchards.

#### NORTH CENTRAL REGION

State Chapters: Indiana, New York, Ohio, Pennsylvania/New Jersey

### **Regional Stats:**

- 15,101 chestnuts planted
- 35 educational events with 129,149 attendees
- 583 volunteers
- 295 new members enrolled

# **Notable Accomplishments:**

The NY Chapter provides wild American chestnut seeds to its members to plant mother tree orchards with the goal to cross them with the blight-tolerant transgenic tree once it's approved for distribution.

### MID-ATLANTIC REGION

State Chapters: Kentucky, Maryland, Virginia, West Virginia

### **Regional Stats:**

- 10,364 chestnuts planted
- 53 educational events with 10,048 attendees
- 1.724 volunteers
- 179 new members enrolled

# **Notable Accomplishments:**

The KY Chapter began searching for and identifying trees using the TreeSnap app as part of TACF's Germplasm Conservation Program. Funding from George S. Gibbs III Foundation will allow the chapter to hire several interns to help with this project. The chapter established a Chestnut Festival Committee to plan four events scheduled in 2019. Led by chapter board member, Terri Sanders, the team created KY Chapter Facebook, Twitter, and Instagram accounts. Thanks to members Amos Stone, Ken Darnell, Paul Finke. Rex Mann, and the Eastern Kentucky University (EKU) Facilities Maintenance Team, the EKU orchard has great seedling survival, along with a new deer fence.

The MD Chapter runs smoothly because of Ron Kuipers, Gary Carver, Dave Gill, Larry Grossman, Jim Curtis and Bruce Levine. Dennis Bittinger gives talks to high school students about the American chestnut and involves them in growing seedlings. He also does this work with inmates.

The VA Chapter performed lateral branch inoculations in Warrenton, VA. They also participated in a study to determine if lateral branch inoculations correlated well with standard inoculations. In winter, 2018 the chapter experimented with easy, affordable ways to kill stump sprouts. Takeaway: burning stumps is not effective, but treating with Triclopyr is.

The WV Chapter hopes to attract new members through the establishment of a newsletter that is being sent four times a year. The chapter was featured in a number of newspaper articles for plantings, and for the Annual Rowlesburg Chestnut Festival. Five Generations, a video by member Sam Muncy about his family history involving American chestnut, was published on TACF's website. Mark Double, chapter president, would like to recognize Robert Sypolt for the countless hours he dedicates to the WV Chapter.

#### **SOUTHERN REGION**

State Chapters: Alabama, Carolinas, Georgia, Tennessee

# **Regional Stats:**

- 13,031 chestnuts planted
- 23 educational events with
   1.788 attendees
- 491 volunteers
- 149 new members enrolled

# **Notable Accomplishments:**

The GA Chapter Annual Meeting in May, 2018 was held on the property of Dr. Austin Flint, who partnered with the chapter to establish the first blight-tolerant seed orchard in GA. Chapter members John French and Martin Cipollini collaborated with Caterina Villari and Scott Merkle, University of Georgia; Dr. Joe James, Chestnut Return Farm in SC; Dr. Steve Jeffers, Clemson University; Ben Jarrett and Jared Westbrook, TACF; and Hill Craddock, University of Tennessee-Chattanooga on a screening program for Phytophthora root rot resistance in chestnuts. Dr. French worked with State University of New York College of Environmental Science & Forestry (SUNY-ESF) by providing regulatory advice to Dr. Bill Powell, and his team who are researching the development of a blight-tolerant tree with genetic engineering. Also this year, a sign dedication at the Carter Center highlighted American chestnut work. Martin Cipollini and Kathy Patrick created a video on an American chestnut cabin in PA that was moved to GA and restored. Video available on YouTube: https://youtu.be/u24LeEMSsW0

# 2018 ANNUAL REPORT



# Thank You

# TO ALL OUR VOLUNTEERS AND SUPPORTERS

The American Chestnut Foundation deeply appreciates the hard work of its chapter volunteers and committed supporters. Our mission is long-range, and your charitable contributions allow this conservation success story to continue. We are truly grateful for your help in restoring this iconic species.



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# A Legacy Tree

# THE PROMISE OF A HUNDRED FUTURE FORESTS

In 2018, The American Chestnut Foundation established a new Legacy Tree orchard at the Glenn C. Price Research Farm in Meadowview, VA. This new orchard reflects advances in the breeding program to produce blight-resistant American chestnuts. The legacy tree orchard will be composed of a progeny of controlled crosses between  $BC_3F_2$  parents that have been identified as having among the highest blight resistance in the population. The progeny of these blight-resistant parents will be planted away from other susceptible trees. In 5 – 10 years, when the trees in this new Legacy Tree orchard flower, they will intercross with each other to produce seed with improved blight resistance as compared with the previous generation.

Legacy Trees are approximately 15/16 American chestnut and 1/16 Chinese chestnut. Each tree is sponsored by an individual(s) – either in their own name, the name of a company or organization, or in honor of a friend or relative. The sponsorship is acknowledged by an individual plaque placed by the named tree.

The Foundation's Legacy Tree sponsors have made a significant contribution to help fund the scientific research of this foundation species. The seeds produced in the orchard contain the greatest level of American chestnut characteristics and the most blight resistance to date.

Legacy Trees are truly a living legacy of TACF's scientists, staff, state chapters, and volunteers. This orchard is only the beginning of the Foundation's restoration efforts. Scientific rigor, diligent support, and ongoing patience will bring our breeding strategy to fruition over the next 100 years.



# OUR LEGACY TREE SPONSORS AS OF JUNE 30, 2018

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Dr. Gary Roop Family

Emily Rutherford in honor of children and grandchildren of the Rutherford, Smykal, and Cookerly families

William T. Smith in honor of the Myers and Smith families of Pennsylvania

**Edwin Smoots** 

Brad Stanback and Shelli Lodge-Stanback in honor of William D. Nelson

Brad Stanback and Shelli Lodge-Stanback in honor of Fred J. Stanback, Jr. Donald and Mary Stout Foundation

The Sudbury Foundation in honor of John Taft

**Timothy Sweeney** 

The Tobias Family, New Freedom, PA

Rufin Van Bossuyt

Virginia Chapter of TACF

Duane W. Waddell

West Virginia Chapter of TACF in memory of Garold W. Thumm

WestWind Foundation

Richard Will Family

Richard Will in honor of:

TACF Volunteers

Dr. Norman Borlaug

Marshal Case

Dr. Al Ellingboe

Dr. Fred Hebard

Dr. William MacDonald

Rex Mann Phil Rutter

Dr. Paul Sisco Brad Stanback and

Shelli Lodge-Stanback

James Ulring

Daphne Van Schaick

Donald C. Willeke, Esq.

Alan and Marilyn Youel

In Memory of Arthur Williams, (1872-1961) Great Bend, PA

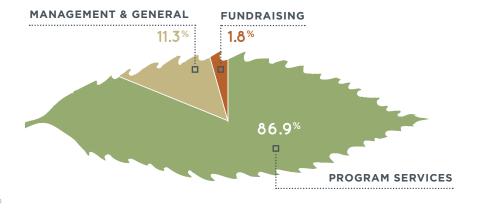
In Memory of Norman H. Williams, (1913-2000) New Milford, PA

Alan and Marilyn Youel

Stephen and Suzan Zoukis in honor of Cashiers Village

# 2018 Financial Overview

PUBLIC SUPPORT AND OTHER REVENUES		% of Income
Contributions	\$1,693,384	73.2%
Membership	380,915	16.5%
Federal Grants	162,755	7.0%
Investment Income	202,119	8.7%
Merchandise Sales	12,056	0.5%
Realized losses on investments	(171,192)	-7.4%
Other Income	31,777	1.4%
TOTAL REVENUE	\$2,311,814	
EXPENSES		% of expense
Program Services		
External Research	\$430,769	15.5%
National Office Operations	434,948	15.7%
Marketing & Communications	75,329	2.7%
Regional Science	798,055	28.8%
Chapter & Membership	221,140	8.0%
Research Farm Operations	418,139	15.1%
Forestry & Mine Land	32,591	1.2%
TOTAL PROGRAM SERVICES	\$2,410,971	86.9%
Supporting Services		
Management & General	\$312,962	11.3%
Fundraising	\$51,230	1.8%
TOTAL SUPPORTING SERVICES	\$364,192	13.1%
TOTAL EXPENSES	\$2,775,163	





# The American Chestnut Foundation



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