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OUR VISION is a robust eastern forest restored to its splendor.
Chairman’s Letter

The American Chestnut Foundation (TACF) is a dynamic, science-driven organization with an unparalleled level of dedicated volunteers, staff, and board of directors. I have encountered few conservation-based organizations with such an enthusiastic, committed, goal-oriented membership. TACF is totally focused on a singular grand mission – to restore a once dominant tree species back to its native range as a fully functional ecological component of the forested ecosystem. Unquestionably, this is a task of monumental proportion, and one that requires great vision and optimism. This organization is truly blessed to have all of the right people, doing all the right things, at just the right time.

This has been an exciting year for TACF with some very significant milestones. With the support and encouragement of the New York Chapter, researchers at State University of New York’s College of Environmental Science and Forestry (SUNY-ESF) have developed a genetically engineered chestnut that is nearly 100% American, blight-tolerant, and is undergoing regulatory approval for subsequent release. TACF’s leadership views this development with great optimism and awaits final approval. Integrating this tree with existing backcross bred trees holds great promise for the future in accelerating our mission. At TACF’s 2019 Spring Board Meeting, Director of Science, Jared Westbrook, presented some new and organizationally shifting data on the genetics of blight resistance in chestnut. In partnership with HudsonAlpha Institute for Biotechnology, cutting edge DNA sequencing technology has generated high-quality reference genomes and led to the realization that blight resistance is likely controlled by multiple genes located on multiple chromosomes. Rapid genomic technologies are paving a new and exciting direction for TACF, helping us make accurate selections of the best trees in our program. While much remains to be done, pathways to future blight-resistant restoration are becoming increasingly clear.

In my many years as a member of TACF, I can remember no time where we have been stronger and more focused. Our President and CEO, Lisa Thomson, has provided skilled leadership and assembled a team of office staff, farm staff, and regional science coordinators that would rival organizations far greater in size than our own. Our scientists, partners, and volunteers are of exceptional skill, character, and diligence. The depth of expertise and experience represented on our Board of Directors is phenomenal. To all, I owe a great debt of thanks. With profound gratefulness to all who make this organization work, I present this annual report for the past year. As always, eyes to the future!

Sincerely,

Brian C. McCarthy
Chairman, Board of Directors
Continued culling of Meadowview seed orchards

Since 2002, over 60,000 American chestnut backcross hybrids have been planted in two seed orchards at TACF’s research farms in Meadowview, Virginia. To maximize blight resistance of the seed coming from these orchards, our final goal is to cull all but 600 (1%) of the most blight-resistant trees. We recently developed genomic prediction models for blight resistance to increase the speed and accuracy of making the final selections. TACF’s collaborator Jason Holliday at Virginia Tech has genotyped over 2,000 selection candidates in Meadowview seed orchards. TACF used the genomic models to cull 1,500 blight-susceptible trees in 2019. Currently, 3,500 selection candidates remain in Meadowview seed orchards. We anticipate completing selection of the 600 most blight-resistant trees at Meadowview in 2021.

Recognizing the complexity of blight resistance

In 2019, genomics research revealed that as we use backcross breeding to generate hybrids that inherited more of their genome from American chestnut, resistance to chestnut blight is also partially diluted. The tradeoff between blight resistance and American chestnut ancestry implies that more genomic regions underlie blight resistance than previously assumed. On average, the backcross trees in Meadowview seed orchards that we have selected with genomics inherited an average of 83% of their genome from American chestnut. The selections are less blight-resistant than 50/50 hybrids of Chinese chestnut and American chestnut, but more resistant than wild-type American chestnuts (Figure 1). Once selection is complete, we plan to plant restoration trials with seed from selected trees to determine if this level of blight resistance is adequate for hybrid trees to compete and reproduce in the forest. We are also planning on improving resistance in the Meadowview program by performing additional generation(s) of selection for blight resistance and American chestnut characteristics.
Finding a balance between blight resistance and American chestnut ancestry

Despite the overall tradeoff between blight resistance and American chestnut ancestry, hybrids with a specific percentage of American chestnut ancestry can vary significantly in their blight resistance (Figure 2). We are taking advantage of this variation to continue to improve blight resistance while also selecting hybrid trees that grow like American chestnut. In 2019, the staff at Meadowview Research Farms conducted 37 controlled pollinations between hybrid trees with varying American chestnut ancestry that have survived for a decade or more with chestnut blight. In 2020, we will screen some of the seedling progeny from these crosses for resistance to blight and plant the most resistant trees at Meadowview Research Farms. As the trees grow in the ensuing years, we will perform further selection timber-type form, American chestnut leaf characteristics, and American chestnut ancestry.

FIGURE 2: Relationship between blight resistance and percentage of hybrid genomes inherited from American chestnut (Castanea dentata). Black dots are trees with inferior blight resistance that were removed, red triangles are hybrid trees that were selected, and purple diamonds are F₁ (50% American chestnut) hybrids. The green bracket depicts the wide range of variation in blight resistance in hybrids that inherited approximately 80% of their genome from American chestnut.

FIGURE 1: Comparison of stem forms. Pure American chestnut (left), a selected BC₂-F₂ hybrid (85% American chestnut ancestry) from Meadowview Research Farms (center), and an F₁ hybrid of American chestnut and Chinese chestnut (50% American chestnut ancestry) (right).
Diversifying transgenic blight-tolerant populations

In 2019, researchers at SUNY-ESF submitted their petition to the U.S. Department of Agriculture to freely distribute transgenic American chestnut pollen, seeds, and seedlings that contain a wheat gene (oxalate oxidase) that enhances blight tolerance. TACF is working closely with SUNY-ESF on preparations to breed the transgenic tree with a diverse population of American chestnut in the event that it is deregulated.

We are taking the following steps to prepare for transgenic deregulation and diversification:

1. With funding from the USDA, we are partnering with Virginia Tech and the HudsonAlpha Institute for Biotechnology to sequence the genomes of approximately 500 wild American chestnuts from across the species range. The aim of this research is to understand the link between genetic diversity and climate adaptation in remnant populations of American chestnut.
2. We will use the results of genome sequencing to develop targets for the number of trees to conserve within locally-adapted subpopulations of American chestnut. We aim to propagate and conserve 1,000 wild-type American chestnuts in orchards so that these wild trees will be readily available for breeding with transgenic American chestnuts.
3. Under permit from the USDA, we have started outcrossing transgenic trees with backcross hybrids and wild-type American chestnuts. We will screen progeny from these crosses for blight resistance in 2020 to determine if breeding the wheat gene into backcross populations enhances blight resistance beyond the resistance observed in outcrosses to wild-type trees.

If deregulated, SUNY-ESF and TACF plan on releasing transgenic trees in two phases. First, we will release early generations of transgenic trees with limited genetic diversity for restoration trials and demonstration plantings. The second phase entails outcrossing transgenic trees to wild-type trees over multiple generations to generate a genetically diverse population that is adapted to the wide range of climates in which American chestnut grows.

Screening for resistance to *Phytophthora cinnamomi*

In collaboration with the U.S. Forest Service Resistance Screening Center and Clemson University, we inoculated 2,500 American chestnut backcross seedlings with *Phytophthora cinnamomi*, the pathogen that causes phytophthora root rot. This disease is lethal to American chestnut and is most prevalent south of Pennsylvania. The range of *P. cinnamomi* is limited by cold winter temperatures, and it is moving north due to climate warming. In 2019, TACF’s state chapters, ranging from Maine to Alabama, contributed seed from 84 backcross parents to increase the genetic diversity of trees selected for resistance to phytophthora root rot. Approximately 5% of the trees we inoculated with *P. cinnamomi* survived infection. Survivors will be planted in an orchard where *P. cinnamomi* is present in the soil. We plan to breed trees that survive this additional orchard exposure to *P. cinnamomi* with backcross trees or transgenic trees with resistance to chestnut blight to combine resistance to these diseases.
The American Chestnut Foundation consists of sixteen state chapters and thousands of volunteers, all of whom are committed to the restoration of the American chestnut. Each year, regional volunteers dedicate many hours to new plantings, orchard maintenance, and outreach activities to ensure that future generations will experience the splendor of this iconic tree.

Regional Stats

**New England**
- 9,736 chestnuts planted
- 59 educational events with 48,297 attendees
- 2,033 volunteers

**North Central**
- 5,740 chestnuts planted
- 26 educational events with 9,413 attendees
- 489 volunteers

**Mid-Atlantic**
- 19,278 chestnuts planted
- 66 educational events with 12,265 attendees
- 1,102 volunteers

**Southern**
- 4,605 chestnuts planted
- 34 educational events with 14,214 attendees
- 454 volunteers
The Connecticut Chapter resurrected a new and improved annual newsletter in electronic and print format named The New Leaf. It included articles on a recently planted orchard, a patch of large American chestnut trees found in Plainfield, CT and chapter events from the previous growing season. The chapter also expanded its outreach program by adding an exhibit at the Durham Fair in September. Members harvested American and hybrid chestnut trees in the fall and shucked the burs at their exhibit, showing fair participants how to extract the precious nuts. The CT Flower and Garden Show draws a large crowd every year and chapter members table a booth to share the story of the American chestnut with visitors at the show. TACF volunteer patches were purchased by the chapter to give to active volunteers who help with orchard work and other projects. Discussions are currently underway with officials in a CT town to plant a chestnut seed orchard during their Earth Day celebration.

The Massachusetts/Rhode Island Chapter has put much effort into maintaining their Facebook page, realizing that social media is a quick and easy way to educate and network with like-minded groups. Posting events is also an efficient way to track activities and gain exposure to potential collaborators and volunteers. This year the chapter added the Norfolk County Agricultural School Seed Orchard and students at Bristol County Agricultural School continue to pot seeds in their greenhouses. Collaborations between chapter board, volunteers, teachers and students has been very successful. The Tantasqua Chestnut Project has continued to blossom. Initially starting with a 7th grade science teacher adding American chestnut to his curriculum, there is now an afterschool Chestnut Club and a community-wide restoration project. The Replanting Monson Tree Committee has joined forces and is now collaborating to improve the ecological, historical and recreational value to a tornado ravaged stretch of public forest land on the slopes of Mt. Ella. Due to the generosity of two anonymous donors, the chapter now owns two zero turn mowers in which to maintain the MassWildlife Seed Orchard and the Robert J. Presutti Seed Orchard. University of Rhode Island Master Gardeners, South Kingstown Land Trust volunteers and others, have donated invaluable time and funds to maintain chapter orchards.

The Vermont/New Hampshire Chapter installed five small plantings with signage in New Hampshire between July 2018 and July 2019 in Easton, Grey Rocks Conservation Area in Hebron, and Plymouth. Maintenance visits were conducted at five existing educational planting locations. In February 2019, chapter volunteers tabled a display booth at the New Hampshire Farm & Forest EXPO. Thousands attend this annual event and hundreds have visited the chapter’s booth. The chapter gave five PowerPoint presentations about American chestnut restoration between July 2018 and July 2019. They were attended by a total of 96 people.
North Central Region
State Chapters: Indiana, New York, Ohio, Pennsylvania/New Jersey

Ohio Chapter leaders are working to incorporate American chestnut conservation and restoration into the new Wayne National Forest strategic plan. Plans for a new Germplasm Conservation Orchard (GCO) are being discussed with Dawes Arboretum in Columbus. The chapter provided a small grants program to Ohio organizations/partners that wish to plant chestnuts in the state. Two external grants were awarded in Ohio; one at Ohio University to study the effects of drought on blight resistance, and another at Ohio State University, looking at the dispersal of chestnuts by blue jays.

The Pennsylvania/New Jersey Chapter continues to provide integral research support by replicating small-stem assay tests (SSA) on 3,000+ seedlings a year. In addition, to further promote TACF’s initiative of conserving unique lines of wild American chestnuts, the chapter is gearing up to collect and graft a minimum of 10 new, unique American chestnut sources. Finally, through the early efforts of Dave Armstrong and Dr. Bob Leffel, the chapter will assist with inoculation, selection, and phenotyping at the Codorus Recurrent Selection Timber Orchard next summer. Those F2-generation trees may provide data to help further unlock the complicated mechanisms of blight resistance.

New Regional Planting Locations

**New England**
Hamden, CT
Walpole, MA
Chelsea, ME
Deering, NH
Plymouth, NH

**Mid-Atlantic**
Grantsville, MD
Chevy Chase, MD
Clarksville, MD
New Castle, VA
Warrenton, VA
Wayne, WV
Beckley, WV
Parsons, WV
Randolph County, WV
Fayetteville, WV
West Liberty, WV

**Southern**
Rome, GA
Snellville, GA
Athens, GA
Hagan Mountain, GA
Bahama, NC
Swannanoa, NC
Little River, NC

**North Central**
Guys Mills, PA
Pittsburgh, PA
State College, PA
Ligonier, PA

**LEGEND**
- Research Affiliate
- New Orchards 2018-19
- Previously Established Orchards
- Little’s Range of American Chestnut
Mid-Atlantic Region
State Chapters: Kentucky, Maryland, Virginia, West Virginia

The Kentucky Chapter joined social media by creating their own Facebook, Twitter, and Instagram accounts. The chapter also expanded media exposure to include TEDx Talks and radio talk shows. A Chestnut Festival Committee was created to focus on festivals taking place in KY and how the chapter might partner with and participate in these events to help generate interest in American chestnut restoration and attract new members.

The Maryland Chapter's partnership with the Baltimore County Greenhouse was initiated and has become the centerpiece of this year’s efforts. In this project alone, nearly 5,000 seeds were planted and many, now saplings, were tested to determine which are most resistant to chestnut blight – a process called small stem assays. The chapter plans to use the greenhouse to screen all seeds intended for their breeding orchards next spring. If successful, it’s anticipated the chapter will be able to significantly reduce the efforts required to grow and maintain plants in the orchard, while at the same time have the ability to screen much larger numbers for resistance in the seedling stage. An article was published in the Baltimore Sun about the initial planting: http://bit.ly/2PfOqRc

The Virginia Chapter experienced many successes at this year’s Virginia Highlands Festival, one of the largest outdoor arts, crafts, music, and outdoor festivals in the state. Members in the southwest branch of the chapter offered a tour at TACF’s Meadowview Research Farms in Meadowview, VA. Stan Tucker discussed the historic significance of the tree, how it was nearly wiped out by chestnut blight, and efforts being made to restore and return the tree to its native range. Gail Olson, another VA Chapter member, led participants to the native garden surrounding the office at Meadowview. The garden was a collaborative effort between VA Chapter members and the Washington County Master Gardeners, a continuing partnership that benefits both organizations. Finally, former TACF Horticulture and Pathology Specialist Laura Barth gave visitors a tour of the new greenhouses at the farm, explaining the breeding process, the small stem assay project underway at the time, and answering many good questions! Chapter members value and enjoy working with staff at Meadowview Research Farms, and would like to especially thank them for helping prepare the facilities for the visiting public and for supervising volunteer efforts.

The West Virginia Chapter continues to look for new activities and opportunities to attract new membership. Robert Sypolt, president of the chapter, received the Volunteer Service Award in October at TACF’s 2019 Annual Fall Meeting in Gettysburg, PA.
Carolinas Chapter member Jon Taylor has continued hiking the Appalachian Trail, one section at a time, collecting data on large American chestnut trees he finds near the trail. Several chapter members have written articles that were published in TACF’s Chestnut magazine. Chapter President Doug Gillis is the Pacific Northwest contact for members and others interested in American chestnut trees in California, Oregon, and Washington State, because of his connections in those states.

The Georgia Chapter, in association with Reinhardt University, helped initiate the Austin Flint Internship in spring 2019 to support work at The Flint Seed Orchard in Waleska, GA. Research on vegetative propagation, alternative small stem assays, and collection of material for DNA analysis was completed with help from chapter member Ana Metaxas and three Berry College interns. Soil samples were taken from active and potential orchard sites by member John French, for *P. cinnamomi* assays by Steve Jeffers. Progeny from Chestnut Return Farms in SC was propagated for use in GA orchard sites, including University of Georgia Agricultural Experiment Station. Chapter member Martin Cipollini co-authored two papers; *First report of Meloidogyne javanica infecting American chestnut trees (Castanea dentata) in Georgia*, and *Identifying host resistance to Phytophthora cinnamomi in hybrid progeny of Castanea dentata and Castanea mollissima*. The chapter was awarded $6,500 in June 2019 by the Lumpkin Coalition from HemlockFest funds, for a three year total of $41,500.
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.

THANK YOU to all our volunteers and supporters.

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We regret any omissions or errors and encourage you to bring them to our attention.
In 2018, The American Chestnut Foundation established a new Legacy Tree Orchard at the Glenn C. Price Research Farm in Meadowview, VA. This 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$_3$F$_2$ 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 orchard flower, they will intercross to produce seed with improved blight resistance as compared with the previous generation.

Each tree is sponsored by an individual – either in their own name, the name of a company or organization, or in honor/memory of a friend or loved one. The sponsorship is acknowledged by an individual plaque placed by the named tree.

All funding received through the Legacy Tree Sponsorship Program is used to support TACF’s scientific research to rescue this ecologically significant keystone tree species.
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Dr. Thomas Gray Curtis, Jr.
Stevan S. Dietz in honor of Dr. Albert Dietz
Vevie and Lawrence Dimmitt in memory of Lawrence Dimmitt IV (9/29/1984 - 8/24/2017)
Michael and Linda Doochin and Family
Robert H. Dunlap Mennen Environmental Foundation dedicated to Gary and Lynn Anderson
John Evangelakos Family
Georgia Chapter of TACF
The J. Michel Guite Family Foundation, Greenwich, CT
Peggy and Dwight Harley, Sr. in honor of Harley and Ringer Families
In memory of Robert C. Hempel
The Hoy Family
The Janice Michelle Foundation
Betty Johnson in honor of Marshal Case
Kentucky Chapter of TACF
The Knebel Family
Randolph and Grace Knight
The LaRoche Family, Ted, Gloria, Ashley and David, their spouses and children
Lewis and Kate Lobdell in honor of Kale Partners and The Chestnut Ridge, Pennsylvania Partners in Conservation
Mark Mayer in honor of Richard Will
Paul McArthur in honor of Richard Will
WestRock Foundation
Peter Mennen
Northern Virginia Community Foundation in memory of Henry B.R. Brown
Robert I. Owens
Alan and Yvonne Palmer
Debby Pearsall, Mt. Bethel, PA
In Memory of Auden Orion Rafert, Forever in our Hearts
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
W. Duane 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
### Public Support and Other Revenues

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
<th>% of Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contributions</td>
<td>$2,370,092</td>
<td>75.4%</td>
</tr>
<tr>
<td>Membership</td>
<td>434,771</td>
<td>13.8%</td>
</tr>
<tr>
<td>Federal Grants</td>
<td>75,000</td>
<td>2.4%</td>
</tr>
<tr>
<td>Investment Income</td>
<td>192,045</td>
<td>6.1%</td>
</tr>
<tr>
<td>Merchandise Sales</td>
<td>24,284</td>
<td>0.8%</td>
</tr>
<tr>
<td>All Other Income</td>
<td>47,083</td>
<td>1.5%</td>
</tr>
<tr>
<td><strong>TOTAL REVENUE</strong></td>
<td><strong>$3,143,275</strong></td>
<td></td>
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</tbody>
</table>

### Expenses

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
<th>% of Expense</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program Services</td>
<td></td>
<td></td>
</tr>
<tr>
<td>External Research</td>
<td>$376,352</td>
<td>15.2%</td>
</tr>
<tr>
<td>National Office Operations</td>
<td>430,298</td>
<td>17.3%</td>
</tr>
<tr>
<td>Marketing &amp; Communications</td>
<td>80,690</td>
<td>3.3%</td>
</tr>
<tr>
<td>Science &amp; Research</td>
<td>590,869</td>
<td>23.8%</td>
</tr>
<tr>
<td>Chapter &amp; Membership</td>
<td>225,595</td>
<td>9.1%</td>
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<tr>
<td>Research Farm Operations</td>
<td>451,049</td>
<td>18.2%</td>
</tr>
<tr>
<td>Forestry &amp; Mine Land</td>
<td>13,194</td>
<td>0.5%</td>
</tr>
<tr>
<td><strong>TOTAL PROGRAM SERVICES</strong></td>
<td><strong>$2,168,047</strong></td>
<td>87.4%</td>
</tr>
<tr>
<td>Supporting Services</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Management &amp; General</td>
<td>$270,832</td>
<td>10.9%</td>
</tr>
<tr>
<td>Fundraising</td>
<td>$41,615</td>
<td>1.7%</td>
</tr>
<tr>
<td><strong>TOTAL SUPPORTING SERVICES</strong></td>
<td><strong>$312,447</strong></td>
<td>12.6%</td>
</tr>
<tr>
<td><strong>TOTAL EXPENSES</strong></td>
<td><strong>$2,480,494</strong></td>
<td></td>
</tr>
</tbody>
</table>

TACF is extremely proud of its 2018 4-Star Rating from Charity Navigator for six straight years.
2018-19 ANNUAL REPORT

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