SPRING 2016 ~ ISSUE 2 VOL. 30

Chestnut

THE JOURNAL OF THE AMERICAN CHESTNUT FOUNDATION

A BENEFIT TO MEMBERS

THE AMERICAN CHESTNUT FOUNDATION®

Grafting Restoration Chestnut ~ Mapping Chestnut Habitat in Maine ~ Citizen Science ~ Storefront Artists

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1
PRESIDENT'S MESSAGE
from Lisa Thomson

3
NEWS FROM TACF
Fern Creek Planting
TACF and ArbNet
USDA Grant
TACF and VDOF Partner
New Grants Manager

8
VOLUNTEER SPOTLIGHT
Dr. Joseph Nassif
West Virginia Chapter

10
NEWS FROM TACF
Highland Rim Branch
Volunteer Record Keeping

12
MEADOWVIEW FARM
Grafting Restoration Chestnut

14
SCIENCE
Mapping Habitat in Maine
Restoration of a Foundation Forest Tree
Insect Residents
Realistic Restoration Targets

30
STOREFRONT ARTISTS
Walter Jacobus and Barbara Greenberg

32
RSC COLUMN
Citizen Science

36
PIONEERS
The Legacy of Dick Will

39
REFLECTIONS
By Scott Shalaway

40
RECIPE
Brown Butter Chestnut Waffles

41
IN MEMORY AND IN HONOR

A BENEFIT TO MEMBERS

THE AMERICAN CHESTNUT FOUNDATION®

Lisa Thomson

President and CEO

DEAR CHESTNUT ENTHUSIASTS,

As spring approaches, I am excited to welcome some warmer weather. Everything around Asheville is coming to life. The days growing longer, and that means it's planting season. Now the real work begins!

As you can imagine, Meadowview Research Farms is bustling during the spring season. This essential facility in Southwest Virginia provides the seed, pollen and other breeding materials on which all of our 16 chapters depend. It is also the focus of this year's Spring Appeal, as our needs at Meadowview are far reaching and our plans are ambitious. Please give as generously as your circumstances allow to help increase the scale of chestnut restoration in all of our chapters.

This issue of *Chestnut* includes a wide variety of science topics I hope you enjoy. An interesting and timely article by Giuseppe Tumminello, a SUNY graduate student, describes research which investigates the potential of insects to contribute to American chestnut pollination. In addition, check out the articles about grafting techniques, American chestnut habitat mapping in Maine, shifts in abundance and distribution of American chestnut, and realistic restoration targets for American chestnut.

Also featured are the latest chapter activities and volunteer accomplishments. Feedback indicates our members enjoy reading about volunteer efforts, and *Chestnut* is a terrific way to share local event information, provide helpful field tips, and specific chapter activities. This issue also features our volunteer spotlight on Joe Nassif and the West Virginia Chestnut Festival, ways to get involved with our growing ArbNet program, tips for volunteer record keeping, the Highland Rim branch event in Alabama, as well as the inspiring story of environmental leaders at Fern Creek High School.

I would also like to highlight the wonderful article about a TACF treasure and former chairman, Dick Will. The establishment of the Legacy Tree Orchard program at Meadowview Research Farms is just one example of Dick's vision for The American Chestnut Foundation. It is an honor to recognize him for his tremendous contributions throughout the years.

In recognition of Dick, I would like to dedicate this issue of *Chestnut* to the members and volunteers who devote themselves each and every day to the restoration of this species. Your enthusiasm is a powerful force within all of us, and we are truly grateful for your contributions.

Wishing you warm and prosperous spring season,

Lisa Thomson, President and CEO
The American Chestnut Foundation

Follow me on Twitter (@MadameChestnut).

Whitetail fawn by a chestnut seedling near Bangor, WI.

Photo by Wayne Helming.

THE AMERICAN CHESTNUT FOUNDATION®

WHAT WE DO

The mission of The American Chestnut Foundation is to restore the American chestnut tree to our eastern woodlands to benefit our environment, our wildlife, and our society.

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Fern Creek Planting

INSPIRES NEXT GENERATION OF ENVIRONMENTAL LEADERS

By Joe Franzen, Environmental Education, Fern Creek High School

The American Chestnut Foundation's Kentucky Chapter partnered with The Nature Conservancy and Louisville's Fern Creek Middle and High Schools to plant three iconic American Restoration 1.0 chestnut trees in November. Sixty 5th graders, 20 high schoolers, two middle-aged educators, and a few wise dendrophiles gathered at the chain link fence that separates Fern Creek High School's baseball diamond from the sloping field that leads to the small creek for which the school is named. Spoken from a cut stump, the story of the American chestnut spilled onto the students, armed with spades, steel posts, watering cans, and bags of soil brought from home. The task that morning was to plant three 96% genetically true American chestnut trees donated by the The American Chestnut Foundation via The Nature Conservancy to the community of Fern Creek High School. These trees, although definitely expanding the campus orchard, took on more meaning than mast as the students dug carefully, spread their soil, and together smiled, laughed, and shared the experience. As the last steel post was pounded in the hope of protecting the skinny leafless trees, the 5th graders were given a very important task. They were charged to watch, care for, and enjoy these trees throughout their middle school years, come back as high schoolers, and continue to visit the trees as aging dendrophile alumni.

Christopher Chandler of the The Nature Conservancy works with students from Louisville's Fern Creek Middle and High schools to plant Restoration 1.0 chestnuts Photos by Terri Sanders (KYTACF).

TACF and ArbNet:

A GROWING PARTNERSHIP

When your goal is something as important as restoring the American chestnut to the eastern United States, you can't go it alone. The American Chestnut Foundation knows this, which is why we have a network of amazing chapters, volunteers, scientists, and also, partner organizations.

One such organization is ArbNet, an interactive, collaborative, international community of arboreta sponsored and coordinated by The Morton Arboretum in Illinois. Through ArbNet, arboreta from around the globe can work collaboratively as part of a broad network with the common goal of encouraging the planting and conservation of trees.

ArbNet, which is celebrating its fifth anniversary this Arbor Day, April 29th, and TACF have begun a partnership to help provide arboreta access to chestnut seeds that are resistant to the blight that wiped out almost all of the native chestnut trees in America during the past century. "ArbNet had only just been established when the relationship began," said Sue Paist, ArbNet coordinator. "The arboretum community is very aware of the important story of the American chestnut and it was a natural focal point for the developing ArbNet program. By teaming up with TACF, we knew that ArbNet could help make a substantial impact on the recovery of the American chestnut."

Head of Collections and Curator Matt Lobdell cultivates hybrid American chestnut trees at Morton Arboretum, preparing the trees for a spring planting.

While the program is still in its own seedling stage, TACF is excited about the potential of this partnership to grow chestnuts in different arboreta across the eastern United States. TACF offers three kinds of seeds: 1) TACF's Restoration Chestnut 1.0, a sixth generation hybrid of pure American Chestnut, *Castanea dentata*, and Chinese Chestnut, *Castanea mollissima*, with approximately 94% American genes. Most offspring may have moderate to good blight resistance; 2) Pure American Chestnut, the chestnut tree native to the eastern United States, with low blight resistance; 3) Chinese Chestnut, which is native to China, typically shorter and stouter, with strong blight resistance.

Ben Finegan, president of the Indiana chapter of TACF, and Kathy Marmet, Chair of TACF's Education Committee, a cohort she calls a "diverse group of chestnut volunteers," were instrumental in creating this partnership. Marmet credits Finegan with doing a lot of the work on behalf of TACF to get the partnership going and continuing to nurture the initiative.

"We got together with these folks and launched a pilot project and it went well the first year," Marmet said. "We had a conversation with the ArbNet coordinator and decided to approach 12 target arboreta from the ArbNet community. Nine of them asked for chestnut packages.

ArbNet has played a significant role in inviting arboreta to participate in the chestnut restoration program."

The packages offered to arboreta through TACF and ArbNet contain four of each kind of seed, plus signs and informational brochures. Depending on which package an arboretum chooses, they get either one or three signs, and it costs either $280 or $680. In addition, all packages include a one-year organizational membership to TACF. A germplasm agreement is required for any arboretum planting Restoration Chestnut 1.0 trees, and TACF requests that participating arboreta fill out a survey at one, three, five, and 10 year intervals.

Because TACF naturally wants to support all arboreta involved, failed seedlings will be replaced. There is also a TACF growers listserv maintained by Penn State University, which supports an open forum where questions can be freely asked and answered by an active community of chestnut growers in the United States.

The chestnut restoration program application process is simple, straightforward, and free, and the application can be found on ArbNet's website (see box below). Participating arboreta don't have to be large, famous institutions. They can even be city green spaces or senior living centers that have nice tree collections.

The most important factor for being a qualifying arboretum is having a well-drained, somewhat acidic site, similar to good growing conditions for blueberries or azaleas. A soil test can be done with a local university, extension agent or environmental laboratory.

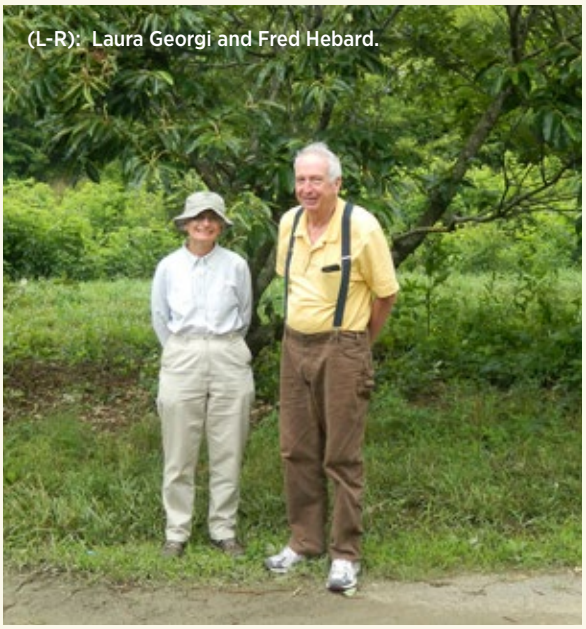
In addition to supporting the chestnut restoration program, ArbNet also offers an Arboretum Accreditation Program, which recognizes four different levels of accreditation based on professionalism, institutional capacity, tree collections, and education and research programs. While an institution does not have to be accredited by ArbNet to apply for the chestnut restoration program, they ask that arboreta become accredited during this process through the ArbNet Arboretum Accreditation Program.

"Becoming accredited through ArbNet helps us to know the capacity of the arboretum that we are working with," Paist says. "The accreditation process is very simple. Most arboreta participating in the chestnut program are accredited at levels one and two. The application review process only takes a couple of weeks and it costs nothing. The application can be found at www.arbnet.org/accreditation and institutions can become accredited through ArbNet at the same time as they are applying for the chestnut restoration program."

TACF encourages all institutions that are interested in adding chestnuts to their collection of plants to visit ArbNet's website and contact ArbNet to begin the application process. Through ArbNet, arboreta from around the globe can work together as part of a broad network with the common goal of planting and conserving chestnut trees.

"ArbNet will continue to raise awareness throughout our arboretum community and encourage scientific and research involvement in this project," Paist says. "The ultimate goal of this program is to encourage the planting of American chestnuts while educating the public about its story of past devastation and hope for restoration."

USDA National Institute of Food and Agriculture Grant


(L-R): Laura Georgi and Fred Hebard.

The American Chestnut Foundation (TACF) has received a $150,000 Agriculture and Food Research Initiative (AFRI) grant from the National Institute of Food and Agriculture (NIFA) for "Identification of Alleles and Genes for Blight Resistance in Castanea spp." This two-year project (2015-2017) will be a collaborative effort involving scientists John Carlson at the Pennsylvania State University, Jason Holliday at Virginia Polytechnic Institute and State University, Margaret Staton at the University of Tennessee, and C. Dana Nelson of the US Forest Service's Southern Institute of Forest Genetics, in partnership with TACF scientists Laura Georgi, Jared Westbrook, and Chief Scientist Emeritus Fred Hebard.

The funding will enable TACF to obtain partial DNA sequences of hundreds of the Wagner (Graves) seed orchard trees and improve the quality of the Chinese chestnut reference sequence, which together will enable identification of sequence variants and genes associated with resistance to blight. These results will have immediate practical application for predicting blight resistance and assisting selection of trees within TACF's breeding program.

TACF and VDOF Partner

IN CHESTNUT RESTORATION

By Jeff Donahue and Matt Brinckman

TACF has established a new partnership with two important Virginia organizations: the Mount Rogers Area Christmas Tree Growers Association (MRCTGA) and the Virginia Department of Forestry (VDOF). This new collaboration involves progeny testing at a high-elevation site located on the Old Flat State Forest, near White Top, VA. VDOF is providing the land and the MRCTGA has generously offered to assist with site prep, test establishment, and maintenance.

The MRCTGA is a group of growers formed to promote production and sale of Frasier Fir Christmas trees. The group is composed of approximately 50 members who provide access to seeds, transplants, and technical information as well as marketing assistance. They are establishing a grafted Frasier Fir seed orchard on the same site as the proposed progeny test which is scheduled to be installed in late April, 2016.


Second generation frasier fir Christmas tree seed orchard located on the Old Flat State Forest. (L-R): Zak Olinger with VDOF; MRCTGA Vice President Charlie Conner; MRCTGA Board Member Rodney Richardson; and MRCTGA President Jackie Davis. The work in this orchard has been accomplished with the help of Dr. John Frampton of the NCSU Christmas Tree Genetics program.

Samantha Bowers (left) participated in an Alliance for Community Trees event for NeighborWoods Month in Asheville, N.C.

TACF WELCOMES

Samantha Bowers

"If you asked me to describe the perfect job for myself, TACF is spot on," states Samantha Bowers who joined TACF in February this year. Working as TACF's Grants Manager combines her passion for science and her professional experience with nonprofits and government agencies.

Samantha first discovered TACF through her role as chair with the environmental nonprofit Asheville GreenWorks. Samantha coordinated the plantings of more than 600 trees in low-income neighborhoods through collaborative efforts with Asheville GreenWorks and her past employer, Asheville Housing Authority. Preparing for her job interview, she took her mom up to the Blue Ridge Parkway Visitor Center to check out the American chestnut historical display and hiked Bent Creek Experimental Forest's chestnut grove.

Samantha grew up on Camp Lejeune Marine Corps Base in North Carolina. "At an early age, my dad taught me how to tell the difference between trees, which sparked my never-ending curiosity for what nature has to offer," says Samantha. "My mom loves camping and from that I took up backpacking and seeing remote areas few will see," she continued. She took her younger brother backpacking in Glacier National Park in Montana last year. Samantha lives in Asheville with her husband, Peter, whose stonescaping company PeterRocks.com was voted No. 1 last year in the local *Mountain Xpress*.

She majored in biology at UNC at Asheville followed by an internship at the WNC Nature Center. Upon graduating she landed a position within the social service sector at the local housing authority and found her niche helping those in need. She spearheaded a new permanent housing program for disabled and homeless clients, proving when people first have housing they then obtain normalcy in other areas of life. She led a team to certify the Asheville Housing Authority as one of only 24 housing authority's nationwide as Green Accredited with a five-year sustainability plan including reduced heat island effect through shade tree plantings and launching recycling and used oil recycling services for 3,000 residents.

One of Samantha's prized accomplishments during her 11-year career at the housing authority includes a $5 million dollar renovation of a historical African American elementary school into a training center for disadvantaged residents. She managed the construction team where LEED standards resulted in waste reduction by preserving existing materials, a high efficiency geothermal HVAC system, a 3,000-gallon rain harvesting system for the community garden and more. The building was renamed after the last principal to serve before school integration in 1969- Arthur R. Edington Education and Career Center. It doesn't take long for her to offer to take you to lunch served up by the culinary students there.

Outside of work, Samantha volunteers with living wage advocacy group Just Economics and Asheville GreenWorks. Currently, she is continuing her professional development through Leadership Asheville which enhances community leadership by connecting and mobilizing citizens throughout the region. In 2009, she received the '10 Women You Should Know' award from Asheville's Women's Expo highlighting her ability to find balance and diversity in life.

As Grants Manager, she wants to highlight collaborative efforts bringing like-minded partners together for holistic approaches to our mission. "There are numerous organizations out there that need to link arms for the bigger picture. Competition is healthy, but unifying is what funders want to see. That is my goal," Samantha said.

A Great Tradition

BEING MADE

Joe Nassif, Dr. Darrell Dean (Former WV Festival, "Mr. Chestnut"), and Lee Waybright (Chestnut Festival Park Committee).

Joe Nassif and TACF President Lisa Thomson

As a volunteer with The American Chestnut Foundation, Dr. Joseph Nassif has been able to combine two of his passions, the great American chestnut tree and his hometown of Rowlesburg, WV, to create a unique festival that's both fun and educational: the West Virginia Chestnut Festival.

Nassif's love of chestnut trees goes back to his father, also named Joseph Nassif.

"I witnessed first-hand the attempt to promote the planting of European and Asian chestnut seedlings," Nassif says. "My father was approached by the local bank president to assist in the effort of planting European and Asian chestnut trees in the community, since they had fond memories of when American chestnuts occupied the landscape. My father not only planted and grew chestnut trees in his spare time, but also distributed seedlings to others."

Nassif and his father also spent hundreds of hours outside, hunting, fishing, and hiking. "We always wanted to support the effort to support biodiversity," he says. "You just can't improve upon nature."

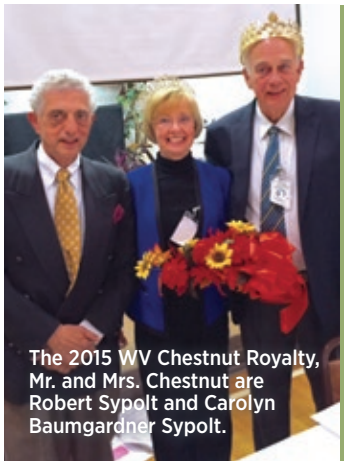
Nassif joined TACF in the early 2000s after seeing an ad about the Foundation in the local newspaper. In 2006, he and his wife were living in Alexandria, VA and were involved during the formation of the Virginia chapter. Nassif's wife joined the West Virginia chapter when it formed in 2009, while he stayed with Virginia. He still keeps up with both chapters.

Along with the American chestnut, Nassif is also deeply invested in his hometown of Rowlesburg, WV. Built on the main line of the Baltimore railroad, it was once a very important small town.

"It was like many little towns throughout the nation," Nassif explains, "where economic activity has dwindled because of changes in how business is done and what is required to maintain a society."

So Nassif and other members of the community formed the Rowlesburg Revitalization Committee (RRC) to promote tourism, economic growth, and cultural activities.

One idea was to launch a festival celebrating the American chestnut. "In 2007, we proposed that the chestnut world used to be centered in West Virginia," Nassif says, "so why don't we have a chestnut festival?"



The 2015 WV Chestnut Royalty, Mr. and Mrs. Chestnut are Robert Sypolt and Carolyn Baumgardner Sypolt.

There were no other chestnut festivals in any of the other 16 Appalachian states, so Nassif and the rest of the RRC were reinventing the wheel, so to speak.

"It was a challenge to develop, innovate, and create a plan for successfully hosting a one-day festival of interest to both the public-at-large and the scientific community."

But the group pulled it off, and the annual West Virginia Chestnut Festival is now in its ninth year. It has become an annual mainstay for the town, not only by generating revenue, but also by bringing hundreds of people together to celebrate the chestnut.

The festival has evolved throughout the years by establishing and strengthening all of its original components including scientific presentations, TACF West Virginia chapter meetings, vendors, displays, a dinner gala, and overall, showcasing the town of Rowlesburg while serving delicious, roasted chestnuts.

In addition, each year the festival crowns a Mr. and Mrs. Chestnut, honoring a man and a woman who are important in the chestnut world. Last year, they also added a junior Chestnut Prince and Princess with students from the secondary school.

"We want to bring people together to meet chestnut aficionados, or as some called them – the rock stars of the chestnut world," Nassif explains. "We've had a lot of very prominent researchers and promoters of the American chestnut at the festival."

When he's not helping to spearhead the West Virginia Chestnut Festival, Nassif teaches prosthodontics at the Howard University Dental School in Washington, DC. He also has a part time dental practice in Alexandria, VA.

"My students really keep me in my toes," Nassif laughs. "I really enjoy interacting and making a contribution with them. I learn something new every day, it builds new brain cells!"

He began his career as a dental officer in the United States Air Force (USAF). He spent 25 years in the USAF Dental Corps, serving as a consultant in prosthodontics to the USAF Surgeon General. After retiring as a Colonel from the USAF, he taught at Georgetown University's College of Dentistry for nine years before spending seven years in Riyadh, Saudi Arabia, as a faculty member at the Dental College of King Saud University.

WE NEED YOU!

The West Virginia Chestnut Festival always need volunteers! If you're interested in volunteering or spreading the word for the next festival, on Sunday, October 9, 2016, please contact Joe Nassif at njn3@msn.com or Shirley Hartley at shirley.hartley@yahoo.com.

He enjoys spending time with his five children and their spouses, and his 14 grandchildren. He also golfs, swims, reads, gardens, every year he travels abroad with his wife, Beate. And, of course, every year, he looks forward to planning and attending the West Virginia Chestnut Festival.

Nassif makes sure to emphasize that this is hardly a solo act. He counts on the help of his co-chairs and volunteers to make the festival possible year after year.

"Having a successful festival really involves a host of people, like our chestnut festival committee," Nassif says. "I couldn't do it without them." He adds, "we're always looking for fresh blood and people to help."

For Nassif, the greatest accomplishment has been just realizing that they've pulled it off and started this great tradition of an annual chestnut festival.

"One of the proudest moments was in the very beginning for the very first festival," he says, "not really having guidelines for how to put the festival together, the researchers, and the people involved in the chestnut world, they came to this first festival and it really brought tears to my eyes because I never thought that little old Rowlesburg could be the center of the chestnut world. It was very humbling to think that they thought this would be the start of something that really needed to be done."

Show Your Love

FOR THE AMERICAN CHESTNUT TREE

By Carmen Burkhalter and Betsy Heckert, Highland Rim Branch, Alabama State Chapter

On February 13, 2016, Alabama showed its love for the American chestnut tree. The state's northwest region recently formed a sub-unit of the Alabama state chapter called the Highland Rim Branch (HRB).

Regional Science Coordinator Tom Saielli spoke to attendees of the HRB event in February. Photos by HRB member Mike Burkhalter.

Work day at the 4-acre breeding orchard in Muscle Shoals. (L-R): AL-TACF Chapter President Dave Swinford; HRB members Carmen Burkhalter, Matthew Harrison, and Tabb Sanford; Regional Science Coordinator Tom Saielli; AL-TACF Secretary Will Calhoun; HRB member Justin Hodges; and AL-TACF Vice President Jack Agricola.

Members central to developing this branch believe in the spirit of ecology, sustainability potential, culinary applications, wildlife management, and science behind the renewal of the American chestnut tree. The HRB team feels its region, more commonly referred to as "The Shoals", is a perfect location to garner additional memberships for TACF and generate enthusiasm for its mission.

The day began as a workday at the four acre Tennessee Valley Authority orchard, located in Muscle Shoals, AL. Ten volunteers logged more than 36 hours of collective work removing sick trees and clearing areas for planting new breeds. Although the grandfather of the orchard, Dr. Jimmy Maddox, was unable to join the effort, the HRB team was under the careful direction of Tom Saielli, TACF southern regional science coordinator.

The pinnacle of the "show your love" day culminated in a public mixer at Singin' River Brewing Company in Florence, AL. Breaking bread over local beers and a presentation by Saielli speaking to the science behind TACF's mission, allowed for the Shoals community to learn more about the American Chestnut tree, it's rehabilitation, and how the HRB is working to support TACF's goals. Throughout the 2.5 hour event, nearly 100 community members enjoyed roasted chestnuts while mingling with fellow botanists, master gardeners, Wildflower Society members, foresters, historians, scientists of all backgrounds, Saielli, the HRB team, and Alabama state board representatives, amongst others. One of the highlights of the afternoon was when Billie Joe Johnson, president of the Alabama Treasure Forest Association, announced that for every Alabama Treasure Forest license plate sold, a donation of $25 will be made to the HRB.

Prior to the event, the HRB team had developed and implemented a strategic communications and outreach plan, disseminating details about the event to specific local clubs, professional organizations, individuals, food suppliers for farm-to-fork restaurants, and the University of North Alabama's relevant programs and faculty in areas like earth sciences and public history. In addition, in the weeks before the event, local newspapers featured articles on the event, highlighting specifics and inviting the general public to attend. Event discussions included historical ruminations about family memories of trees, where to put a seed orchard in the Shoals region, how to identify the American versus Asian species, what role genome mapping will play in the future, when seedlings will be available for the public to plant, and how chestnuts can be used in recipes. Several TACF memberships resulted from the event directly, along with donations, and many more membership applications and information were taken home by attendees.

More information about this great day and the communication efforts of the HRB team can be obtained by contacting the Highland Rim Branch at TACF.HRB@gmail.com.

Record Keeping

FOR VOLUNTEER ACTIVITIES

By Vice President Clark Beebe, PA/NJ Chapter

Most of us have been there. At the end of the year, you scramble to log your volunteer hours for the year. Why is it so important to maintain a volunteer log? Well, for tax purposes, obviously, but TACF and its chapters have a lot at stake too.

Funding is often based on something called 'program effectiveness' which is determined by the number of hours invested by volunteers. You've already put in the effort, now it is important that TACF and your local chapter get the benefit of your generous contributions.

Aye, there's the rub – how many hours did you actually put in? You vaguely remember planting some trees in the spring, you helped staff the chapter booth at the Farm Show and again at the County 4H Fair – and you are sure there were one or two other outings/work sessions, but exactly when and how many hours, who knows?

Maybe you can fake it but come April 15 when you file your taxes, faking it has potentially severe consequences. And you do want to be able to list all your activities on your tax return because all those miles driven, tolls paid, and even meals eaten during such excursions are tax deductible as charitable contributions. So by having good records, you not only help TACF, but you also help yourself in the form of reduced income taxes.

I used to keep a hard copy agenda. I wrote down all of my activities in it. So two years ago when PA/NJ Chapter Administrator Jean Najjar asked for my hours, I did as I had done in previous years; I went to the agenda and recreated all my activities. Then, I went to my E-Z pass records to correlate those trips with tolls paid. I also tried to remember meals and other expenditures. It took hours and was only maybe 80% accurate. On top of the mind-numbing tedium of such effort, my accountant was not that enthralled with the result. She wanted more specifics and a better method to my record keeping.

So last year I got smart(er) (or, more accurately, a little less stupid). Throughout the entire year and after every activity, I recorded it in an Excel spreadsheet. I labeled columns for date, event, miles, tolls, hours, meals and "other". If I failed to record my miles during the event, I just went to Mapquest and plugged in the starting point and end point and used that number—no one can argue with that.

And, remember, when you record your hours, they are door-to-door, not just at the event. Travel time is part of your volunteer time. And don't forget other volunteer efforts such as writing an article for a newsletter; researching

Volunteers from Penn State University's College of Agricultural Sciences include: Erikka Runkle, Crystal Switalski, and Jenny Price.

a topic for a talk; making phone calls to arrange an event; reading and responding to emails – it all counts! Whatever you do, record it on your spreadsheet. Don't worry that you do not fill every column with every activity. Writing this article involved no miles or tolls or meals but it did take time and I just put it in my spread sheet!

So now when Jean asks for hours, I just total one column. When the accountant wants miles, tolls and expenses, she just totals a few columns. It is accurate because it is done at the time when the event is fresh in your mind. It also takes essentially no time because you just call up the spreadsheet and enter a few keystrokes after each event. It is easy to email to Jean and the accountant when they ask for it. And I get paid for doing it in the form of lower taxes! It is truly a win-win-win!

So, start now: open a spreadsheet, label a few columns, and be prepared for the year of volunteering that lies ahead. When your chapter or national requests volunteer hours this coming December, TACF will be a winner. And you will be a winner come April, 2017!

Grafting

Restoration Chestnut

By Laura Georgi

As previously reported[1], we have been using a method of budding onto seedlings to propagate clones of chestnut. This permits relocation and replication of valued individuals. Over the last two years, we have included a few B_3–F_3 chestnuts in our grafting activities.

www.acf.org/newsletter5.21.13grafting.php, http://www.acf.org/pdfs/board/Journals/Volume%20XXVIII%20No.1%20Jan-Feb_2014.pdf

In 2014, we made five grafts each of four different B_3-F_3 trees onto seedling American chestnut; seven grew **(Table 1)**. The successful grafts were set out in the orchard. Slight differences in growth between scion and rootstock produce openings for the blight fungus, making a graft union something of a "blight magnet," and the American chestnut seedlings we used for rootstocks were expected to be susceptible to blight. To provide some protection, we buried the unions, relying on the inability of the fungus to invade below-ground parts of the tree. One downside to this solution is that it makes it more difficult to detect replacement of the scion by a rootstock sprout, as shown in **Figure 1**. The red triangle indicates the margin of a blight canker at the base of the rootstock sucker.

Last year, we budded five different B_3-F_3 trees onto Chinese seedlings **(Table 1)**. Budwood from NX620 and PS1708 was collected in February and stored in the freezer (-20°C) until use. Budwood from WW351, WW359, and WW1355 were collected in March and refrigerated at 0-4°C. While the frozen buds took longer to show growth than did the refrigerated buds, all nonetheless produced successful grafts at similar frequencies (Table 1). The successful grafts were potted up and grown in containers during the summer. Grafts of PS1708 and WW1355 displayed a high frequency of delayed incompatibility with the rootstock, as shown by overgrowth and breakage at the union **(Figure 2)**. NX620 displayed good compatibility with the Chinese seedling rootstock, as evidenced by perfect survival over the summer **(Table 1)**. However, the undersides of the leaves had dense stellate hairs between the veins, so it probably is an outcross to Chinese chestnut rather than a B_3-F_3.

On the bright side, the problems we encountered with incompatibility may be another indication we are recovering American type! A standard grafting practice to minimize risk of incompatibility is to graft a scion onto its own seedlings. As we achieve a more consistent level of blight resistance in our Restoration chestnuts, we will be able to utilize them as rootstocks for grafting.

Table1. B_3-F_3 trees grafted at Meadowview in 2014 and 2015

TREE	NUMBER OF GRAFTS	NUMBER THAT GREW	NUMBER THAT SURVIVED FIRST SUMMER
2014			
NV102	5	4	4
NV284	5	3	2
NV520	5	0	--
NX620	5	0	--
2015			
NX620	30	18	18
PS1708	30	27	13
WW351	12	11	10
WW359	30	13	11
WW1355	30	26	16

Figure 1

Replacement of the scion by a rootstock sucker. White arrow indicates margin of blight canker on the sucker.

Figure 2

Delayed incompatibility between scion and rootstock. White arrows mark the graft union.

Mapping American Chestnut Habitat in Maine

DISCOVERY OF THE TALLEST AMERICAN CHESTNUT TREE IN NORTH AMERICA

By Brian Roth and Elizabeth Farrell

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The American chestnut was once an important component of forests in the eastern U.S., but it has been relegated to a minor understory species, having been decimated by the invasive chestnut blight (*Cryphonectria parasitica)* in the early 20th century. The American Chestnut Foundation (TACF) has been working to restore the species through a backcross breeding program, which transfers genes containing disease resistance from Asian chestnut species to the American chestnut. The success of the restoration effort depends on knowing what sites and soils are most suitable for establishing resistant American chestnut trees. There are a few large surviving trees scattered throughout the range of the species that are susceptible to blight, but have thus far escaped disease. Therefore, there is some urgency to locate these trees to preserve their DNA in gene banks and learn more about the habitat they are growing on.

Figure 2: This American chestnut tree in Maine, located from the air while it was in bloom in July last year, is 115 feet tall, the tallest known American chestnut in North America. Photo by Dr. Jared Westbrook, Quantitative Geneticist, The American Chestnut Foundation.

To this end, the Maine Chapter of The American Chestnut Foundation (METACF) has partnered with the University of Maine's School of Forest Resources and the Barbara Wheatland Geospatial Analysis Laboratory to produce American chestnut habitat suitability maps for the state of Maine. Elizabeth Farrell, now a forester with American Forest Management in Farmington, ME, took on the mapping project as a senior forestry student for credit in a GIS and remote sensing course at the University of Maine. Elizabeth used habitat suitability indicators published by the U.S. Forest Service (Wang et al., 2013), and USDA plant hardiness zones for Maine (www.planthardiness.ars.usda.gov) to generate maps that ranked suitability into three classes (moderate, good, and excellent). GIS models that incorporated variables such as pH, slope, soil texture, depth to the water table, mean annual temperature, and frost-free days were tested and improved using known locations of large surviving trees in Maine. Important suitability factors were used to rank soils in the 2015 Soil Survey and Tabular Dataset (SSURGO 2.2; available from the Geospatial Data Gateway by county). Finally, a single GIS layer with the suitability classes was converted to georeferenced Google Earth .kmz and Adobe .pdf files (**Figure 1**).

These files were then loaded onto a smartphone and tablet and displayed alongside the device's real-time location during a series of chestnut discovery flights. Software used included PDF Maps by Avenza (avenza.com/pdf-maps) and the Google Earth mobile app (tinyurl.com/2369oyu). These maps were used to navigate a small plane flown by University of Maine graduate student Elias Ayrey, with Dr. Brian Roth as a spotter, during the second week in July 2015. Mature American chestnut trees reach full bloom in mid-July, displaying many large white flowers that are visible from the air. This allowed the team to find many unknown large surviving American chestnut trees. Waypoints for potential trees were then recorded on the maps in real-time. Later, landowners were contacted for permission to ground-truth the locations and confirm the presence of American chestnut trees. The method proved to be successful, with dozens of previously unknown trees located in just one small portion of Maine.

As luck would have it, one of the trees discovered turned out to be the tallest American chestnut in North America, measuring 115 feet (**Figure 2, previous page**). The finding of the tree, which happened to be on land owned by the University of Maine Foundation, generated national media attention (Public Broadcasting Story: tinyurl.com/plfv252). TACF President Lisa Thomson and Quantitative Geneticist Jared Westbrook were present for the official tree measurement by the Maine Forest Service. This summer, buds from branches of this tree will be grafted onto smaller chestnut trees in living gene banks in order to preserve this tree's genetics for future studies and breeding. More flights are planned for July 2016.

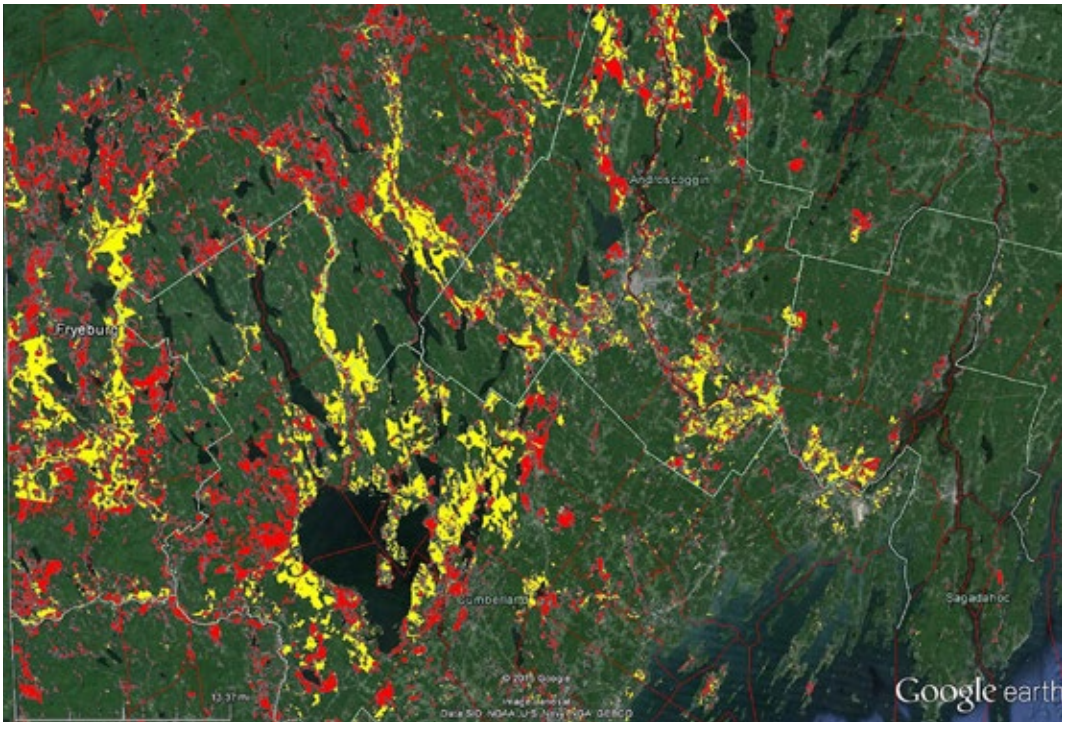

Figure 1. A Google Earth image showing areas of Maine that are suitable for American chestnut. Red denotes moderate suitability, yellow indicates good suitability. Image courtesy of Brian Roth.

Observers in fixed-wing aircraft used Google Earth and other apps on smartphones to mark the locations of American chestnut trees in Maine.

A map similar to the one shown (left) can be made by using the Maine Forest Spatial Viewer tool. This tool is available online through the University of Maine's Center for Research on Sustainable Forestry at: http://mfst.acg.maine.edu/.

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CONSEQUENCES OF SHIFTS IN ABUNDANCE AND DISTRIBUTION OF AMERICAN CHESTNUT FOR Restoration of a Foundation Forest Tree

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ABSTRACT: Restoration of foundation species, such as the American chestnut (*Castanea dentata*) that was devastated by an introduced fungus, can restore ecosystem function. Understanding both the current distribution as well as biogeographic patterns is important for restoration planning. We used United States Department of Agriculture Forest Service Forest Inventory and Analysis data to quantify the current density and distribution of *C. dentata*. We then review the literature concerning biogeographic patterns in *C. dentata*. Currently, 431 ± 30.2 million stems remain. The vast majority (360 ± 22 million) are sprouts <2.5 cm dbh. Although this number is approximately 10% of the estimated pre-blight population, blight has caused a major shift in the size structure. The current population has a larger range, particularly west and north, likely due to human translocation. While climate change could facilitate northward expansion, limited seed reproduction makes this unlikely without assisted migration. Previous research demonstrates that the current, smaller population contains slightly higher genetic diversity than expected, although little information exists on biogeographic patterns in the genetics of adaptive traits. Our research provides a baseline characterization of the contemporary population of *C. dentata*, to enable monitoring stem densities and range limits to support restoration efforts.

Keywords: *Castanea dentata*; chestnut blight; FIA; forest inventory and analysis; tree distribution

1. INTRODUCTION

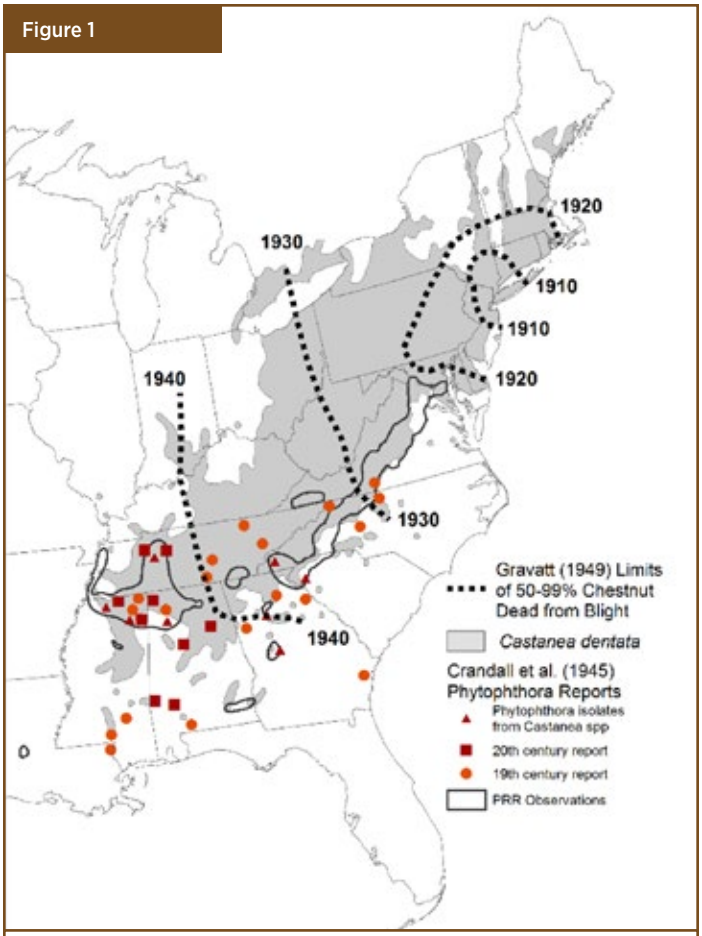
Due to the rapid pace of human alterations of ecosystems, restoration is becoming an increasingly important tool in conservation biology [1,2]. In forests, foundation tree species are recognized as those that control population and community dynamics as well as ecosystem processes such as productivity and decomposition [3]. Restorations of foundation species can thus serve to both rejuvenate populations of these plants while simultaneously restoring ecosystem function.

The American chestnut (*Castanea dentata*) is considered a foundation species in eastern North American forests because of its influence over seed consuming populations [4] and its impact on nutrient cycling [3]. The dominance of *C. dentata* ended with the accidental introduction of the chestnut blight fungus (*Cryphonectria parasitica* (=*Endothia parasitica*)), which spread rapidly throughout the range (**Figure 1**) [5]. The filamentous ascomycete fungus colonizes wounded cambium, causing a canker that eventually results in death of the aboveground stem [6]. The blight does not attack root systems that are protected in the soil, however, allowing trees to form root-collar sprouts. The asexual cycle of sprouting, infection with blight, and stem dieback can persist for decades, but sexual reproduction in natural forests is rare [7]. While it is fortunate that the blight did not cause the extinction of *C. dentata*, it did effectively extirpate it from the canopy, causing it to be functionally extinct in modern forests.

Since blight was discovered, many groups have attempted to create a blight resistant *C. dentata*. Jacobs et al. [8] review the three main approaches that have been pursued to develop blight resistance including biocontrol with hypovirulence, inter- and intra-species breeding programs, and, most recently, genetic engineering. Because of these efforts, restoration of *C. dentata* has become a viable possibility, which could have profound impacts on eastern forests through its effect on plant community composition, carbon cycling, and food web dynamics [8]. Breeding and biotechnology efforts are coming to fruition and, thus, researchers have begun to consider the ecology of *C. dentata* related to restoration efforts [8,9].

Castanea dentata is a well-known case of a native species decline due to an imported species in North America, but it is unfortunately not the final case (e.g., emerald

Figure 1



Pre-blight geographic range of *Castanea dentata* (Little 1977). Dotted lines indicate approximate blight progression (trees dead from blight) from Gravatt (1949). *Phytophthora* root rot (PRR) observations in the 19th and 20th centuries are from Crandall et al., (1945).

ash borer (*Agrilus planipennis*) on ash (*Fraxinus spp.*); hemlock woolly adelgid (*Adelges tsugae*) on eastern and Carolina hemlock (*Tsuga canadensis, T. caroliniana*). Because of the rapid pace of habitat destruction and climate change, discussions of species translocations and reintroductions have come to the forefront in conservation and restoration biology. *Castanea dentata* informs this dialogue and provides a case study for reintroduction biology of a foundation forest tree [8].

Our first aim in this paper is to characterize both the current distribution and abundance of *C. dentata* to create a new baseline to support restoration efforts. We use new United States Department of Agriculture Forest Service Forest Inventory and Analysis (FIA) program data to document the current abundance and distribution of *C. dentata*. Our second aim is to review what is known about biogeographic patterns in *C. dentata* with particular attention to climate change and genetic considerations, both of which will be important for restoration efforts.

2. METHODS

Previous researchers have noted the limitations for using FIA data to assess *C. dentata* populations including the nature of the FIA sample, the rarity of *C. dentata*, inconsistency in the sampling of seedlings across states and inventory years, and species misidentifications [10]. In response to some of these limitations, the FIA program has implemented during the past two decades a nationally consistent sampling protocol and database system [11]. Data for seedling-sized trees are now available, along with approximate geographic locations and information by ecological regions, sections and subsections. *Castanea dentata* is still relatively rare and species misidentifications could occur, which may produce anomalies despite rigorous quality control procedures. Nevertheless, the FIA data are now significantly more useful for assessing contemporary *C. dentata* populations.

The current FIA sampling design consists of three phases. The first phase uses remote sensing to produce a stratification of land area to reduce estimation variance. In the second phase, field crews visit permanent ground plots to measure tree and stand variables. The ground plots are located at a density of approximately one plot per 2428 ha, one plot within a hexagon of a national array of hexagons covering the land area of the conterminous United States. The third phase is a 1/16th subset of the Phase 2 plots. Phase 3 plots are measured for additional variables related to forest ecosystem health. The estimates reported in this paper are derived from the Phase 1 stratification and the field measurements from Phase 2. The Phase 2 ground plot consists of a cluster of four subplot centers located 36.6 m apart. At each subplot center a 7.3 m radius subplot is used to measure all trees within that are 12.7 cm in diameter at breast height (dbh) or greater. Each subplot contains a 2.1-m radius microplot, which is used to sample all saplings (trees 2.5 cm–12.4 cm dbh) and seedlings (trees <2.5 cm dbh). The total area of the four subplots is 0.03 ha.

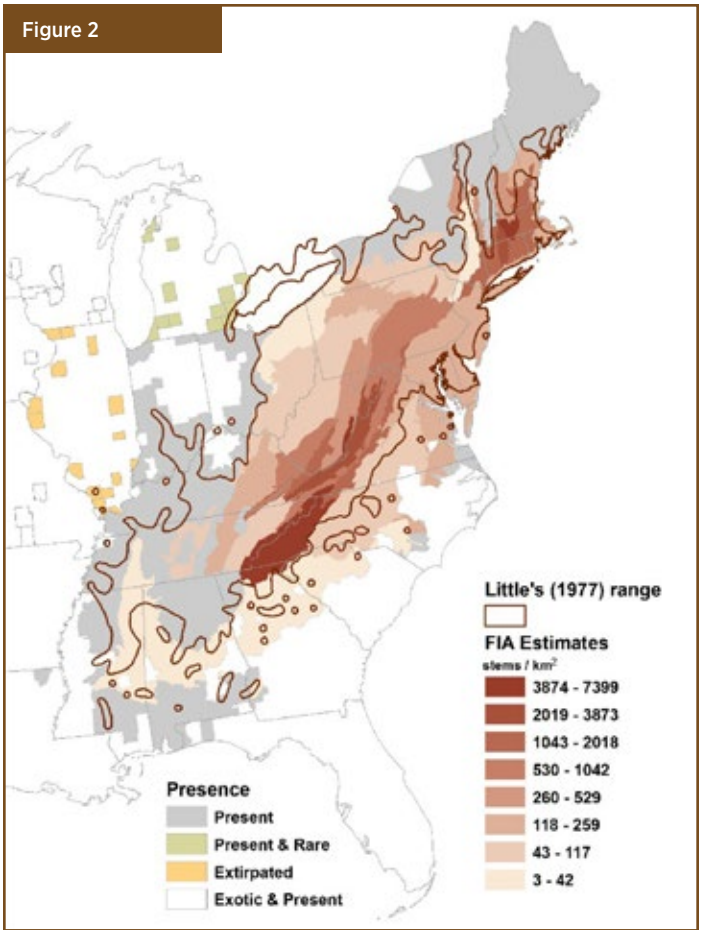
We used FIA data (Phase 1 and Phase 2) collected between 2002 and 2012 to develop an updated map of *C. dentata*'s distribution in the eastern United States. We included FIA inventories from 30 states (those with listings in the Biota of North America database [12] with native or naturalized occurrences of *C. dentata*). All 30 states had data meeting the new standards in 2013 [11]. We accessed the FIA database via a web tool, EVALIDator (VERSION 1.5.1.04) (http://fiatools.fs.fed.us/Evalidator401/tmattribute.jsp) on 1 March 2013. The query tool uses the methods of [13] regarding sampling protocols, estimation methods, methods for combining annual data for multi-year estimates, and estimation of sampling errors. *Castanea dentata* was observed in 16 of the 30 states in the FIA database, which covers most of the historical range (**Table 1**). Four states outside of Little's range, but with historical records of introduction, did not turn up any observations in the FIA sample, nor did 10 states on the periphery of Little's range.

Table 1

STATE	EVALUATION GROUP
Alabama	2006–2012
Arkansas	2006–2012
Connecticut	2007–2011
Delaware	2007–2011
Florida	2002–2010
Georgia	2005–2011
Illinois	2007–2011
Indiana	2007–2011
Kentucky	2005–2011
Louisiana	2001–2009
Maine	2007–2011
Maryland	2007–2011
Massachusetts	2007–2011
Michigan	2007–2011
Minnesota	2009–2012
Mississippi	2006–2012
Missouri	2007–2011
New Hampshire	2007–2011
New Jersey	2007–2011
New York	2007–2011
North Carolina	2003–2010
Ohio	2007–2011
Pennsylvania	2007–2011
Rhode Island	2007–2011
South Carolina	2007–2011
Tennessee	2005–2011
Vermont	2007–2011
Virginia	2008–2011
West Virginia	2007–2011
Wisconsin	2008–2012

Geographic distribution of surviving Castanea dentata populations, with presence data taken from the Biota of North America (Kartesz 2013) and stem densities estimated from the Forest Inventory and Analysis (FIA) data.

Figure 2



Geographic distribution of surviving Castanea dentata populations, with presence data taken from the Biota of North America (Kartesz 2013) and stem densities estimated from the Forest Inventory and Analysis (FIA) data.

The geographic distribution of the surviving population was mapped by summarizing estimates by Bailey's ecological subsections [14] (**Figure 2**). Ecological subsections with densities of 1000 stems km−2 were mapped individually. Subsections with lower densities were combined at the section level in an effort to reduce noise from high estimation errors for these subsections. Ecological units were clipped to the counties with *C. dentata* listings in the Biota of North America Plant Atlas [12].

3. RESULTS

The estimated number of live seedling-sized stems (diameter at breast height <2.5 cm) was 360 million with sampling error of 6.13% (22 million). The estimated number of live trees with diameter at breast height ≥2.5 cm was 70.9 million with sampling error of 11.56% (8.2 million). Combining the estimates gives a population total of 431 million stems with sampling error of 7.1% (30.2 million). *Castanea dentata* densities were highest in the Blue Ridge Mountains, the Allegheny Mountains, Lower New England, the Northern Ridge and Valley, and the Northern Cumberland Mountains (Figure 2). The Biota of North America [12] noted the species as present in each state included in Little's [15] range map (**Figure 2**). In addition, *C. dentata* was found outside the historic range in Louisiana, Missouri, Iowa, Wisconsin, Michigan, and Florida, apparently due to human translocation (Figure 2).

Our estimate of 431 million *C. dentata* stems remaining in eastern North America can be contrasted with a historic population estimate of 4.2 billion trees [16]. This suggests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RESOURCES NEEDED:

- Construction of a new greenhouse for increased seedling production;
- Expanded outdoor seedling preparation area; and
- Critical upgrades to farm equipment.

that 10% of the pre-blight *C. dentata* population remains. It is unclear whether the historical estimate includes seedlings or only canopy trees. If the population size is only for canopy trees, then our estimates of the remaining population size are high. Despite this uncertainly, it is clear that the current population of *C. dentata* is significantly smaller in numbers, but also spread over a larger range than the historical population (**Figure 2**). In addition, the size distribution is greatly skewed, with 84% of the population in the seedling-size class and only 16% of trees being larger than 2.5 cm dbh.

4. DISCUSSION

4.1. Density and Distribution of *Castanea Dentata*

Previous analysis of FIA data designed to quantify extant *C. dentata* populations was limited by the lack of quality seedling (<2.5 cm dbh) data [10]. However, McWilliams et al. [10] were able to estimate that 1.13 million ha of forest contain *C. dentata* stems at least 2.54 cm in dbh. The states with the highest frequency of *C. dentata* included Pennsylvania, Virginia, North Carolina, West Virginia, Massachusetts, and New York [10]. The frequency measure of abundance used by McWilliams et al. [10] aligns well with our current analysis based upon density of *C. dentata* stems.

Long-lived trees, such as *C. dentata*, that are relatively shade tolerant [17,18] and rely upon advanced regeneration for successful reproduction, would be expected to have a large proportion of their population in seeding size classes. We observed 84% of the population in the seedling size classes for contemporary *C. dentata* populations. This proportion is larger than the 73% of the population reported in the seedling class for mature stands of American chestnut in Michigan [19]. Indeed, our number is much closer to the 81% reported by Davleos and Jarosz [19] for populations in Michigan that were experiencing an epidemic of blight. This comparison indicates that *C. dentata* is still experiencing the blight epidemic throughout its range and that the proportion of trees in the seedling size class is likely much higher than in historical populations.

Interestingly, the range of *C. dentata* seems to have expanded from the pre-blight distribution reported by Little [15] (Figure 1). Frost sensitivity may have limited its proliferation at higher latitudes in some northern forests [20]. An outbreak of the introduced soil borne oomycete pathogen, *Phytophthora cinnamomi* Rands, during approximately 1825–1875 (Figure 1) may have been responsible for permanently retracting the southern portion of the range of *C. dentata* from the southeastern Piedmont, the Atlantic and Gulf Coastal Plains and western Tennessee [21,22]. In the late 1800's most *C. dentata* in the Piedmont region of North Carolina had disappeared, while its natural range was still expanding before the introduction of the blight in other areas [20]. For example, *C. dentata* was still spreading northwestward into Michigan at the time of blight introduction [23]. Many of the populations we document to the west of the original range, particularly those in Wisconsin and Michigan, are known translocations [23,24]. These populations were often initially started through plantings that spread through natural reproduction, though some populations in Michigan may also have been initiated without human assistance [19].

Understanding the current density and distribution of *C. dentata* in contemporary forests can provide fundamental knowledge to aid in future *C. dentata* restoration. Major landscape-level changes have occurred since introduction of blight that may influence which specific regions and site types should be ideally targeted for restoration. Climate change is among the most prominent examples and FIA data are currently being used to examine potential range shifts in response to this phenomenon [25,26]. Our data can serve as a baseline for similar studies in *C. dentata*. In addition, the population we describe provides an indication of the potential genetic reserve of *C. dentata*, which is a basis for breeding and genetic engineering efforts aimed at developing blight resistance for restoration efforts [8,27]. Below we review what is known in the literature about biogeographic patterns in climate and genetic diversity relevant to *C. dentata* in light of our new results.

4.2. Climate

The historical distribution of *C. dentata* encompasses a slightly smaller climatic space compared to other species in the genus, particularly relative to *C. mollissima* [28]. Average annual precipitation across the entire range is between 100 and 120 cm, ranging from a low of about 81 cm in western

New York to a high of 200 cm in the southern Appalachians [29]. Snowfall in the northern portions of the range can be significant and exceed 2.5 m annually [29]. Along with *C. crenata*, *C. dentata* inhabits some of the coldest conditions compared to other *Castanea* species worldwide [28].

Over the past decade, the northern areas of *C. dentata*'s range have experienced increases in mean annual temperature while the southern portions of the range have seen no net change in mean annual temperatures, due to increased cooling in the winter months combined with increased warming in the summer months [26]. Such changes in temperatures are expected to shift range distributions of species, including forest trees. FIA data have been used to examine indirect evidence for tree range shifts in response to climate change [25,26]. Woodall et al. [25] present evidence that 70% of the 15 northern species they examined are shifting northward, while the 15 southern species' ranges remain mostly unchanged. In an updated analysis using the most recent seedling FIA datasets, Zhu et al. [26] argue that 58% of the 92 species examined showed evidence of range contraction while only 20% display the expected pattern for northward range expansion.

The limited seed production that occurs in current-day *C. dentata* populations [7] means that range shifts northward in response to climate change will be extremely unlikely. However, contraction of sprout-based populations is entirely possible if temperatures become unfavorable or interact with other climate factors such as an increase in the frequency of late spring frosts or decreases in winter snowpack [30].

All of the areas with the highest current density of *C. dentata* occur within the historical range (Figure 2). In addition, our data show that *C. dentata* is currently present in areas that are north of the historical range (Figure 2); it is less clear whether this is due to natural northward expansion or human-assisted planting. Although the mechanism is unclear, the presence of *C. dentata* north of its historical range indicates that these areas may be climatically suitable for restoration. Although climate change may not be as problematic in the southern portion of *C. dentata*'s range, the prevalence of *Phytophthora* root rot disease is a persistent threat to *C. dentata*'s viability in this region [21]. Indeed, the observation that *Phytophthora* is expanding northward due to warming temperatures is a major threat posed by climate change [31]. Our results illustrate very low stem densities in the southwest portion of the historical range. This is most likely caused by high rates of chestnut mortality due to *Phytophthora*, which underscores the strong threat that *Phytophthora* poses to restoration (**Figure 2**).

4.3. Genetic Diversity

The post-blight extant stems that we describe here are the basis for breeding and genetic engineering efforts aimed at developing blight resistance for restoration. As such, understanding biogeographic patterns in genetic diversity will be important for breeding locally adapted sources for restoration. Studies have estimated genetic diversity in contemporary populations of *C. dentata* using protein (isozymes) and non-coding (i.e., neutral) DNA markers (reviewed in [8]). Isozyme diversity is higher in the southern parts of the *C. dentata* range. An exception to this general pattern is that less diversity is found in some lower and intermediate latitude populations of *C. dentata* [32]. Additional neutral DNA markers and population sampling strongly support the southwest to northeast clinal trend in decreasing genetic diversity with no or very limited indication of regional boundaries [33,34]. Kubisiak and Roberds [33] also found low but positive correlations between genetic and geographic distances, suggesting that *C. dentata* was a single metapopulation established by high gene flow with some genetic drift and is apparently maintained by persistence (through root collar sprouting) of a large sample of pre-blight genotypes. Although we calculate that only 7% to 11% of the pre-blight population remains, significant genetic diversity has been retained [33]. Further, our data indicate an area of high stem density in the southern Appalachians, which coincides with areas of greatest genetic diversity (**Figure 2**) and areas that contain hybridized (with *C. pumila* var. *pumila*) individuals [34,35,36].

Although gene diversity studies, using neutral allele frequencies, over large areas of the *C. dentata* native range have found low levels of genetic differentiation with little to no regional pattern [32,33,37], essentially no information is available on geographic variation for adaptive traits such as bud flushing date, thermal and moisture tolerances, or growth rate. While data from a close relative with a similar wide-range (such as European chestnut, *C. sativa*, [38,39]) can be helpful as an initial guide, the lack of this critical information on these traits in *C. dentata* limits our ability to create optimally adapted genotypes for re-introduction and restoration programs for this species.

5. CONCLUSIONS

In the United States, 431 ± 30.2 million *C. dentata* stems remain with the vast majority of these stems (360 ± 22 million, 84%) having a dbh of <2.5 cm. Both the southern and northern portions of the range have lower density of stems than the central portion comprising the Appalachians and southern New England. Analyses of FIA data collected with improved methods provide an important baseline for tree monitoring that will enable further examination of future changes in stem densities and range limits. Furthermore these data indicate expansion of the range north and west, most likely due to human-assisted translocation. Although expansion of the range through natural seed dispersal is extremely unlikely given the persistence of blight, contraction of sprout populations is a possibility in the face of climate change. Previous genetic research indicates that the southern portion of the range contains the highest genetic diversity, which coincides with areas of high stem density reported in our data. Further research into biogeographic patterns of genetic traits is needed, particularly those associated with adaptive traits such as bud flush and cold tolerance.

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AUTHOR CONTRIBUTIONS

Harmony J. Dalgleish, C. Dana Nelson, John A. Scrivani, and Douglass F. Jacobs conceived and designed the study; John A. Scrivani collected and analyzed the data; Harmony J. Dalgleish, C. Dana Nelson, and Douglass F. Jacobs wrote the paper.

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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Insect Residents

OF THE CHESTNUT CANOPY

By Giuseppe Tumminello

A long-horned beetle of the family Cerambycidae, foraging.
Photos by Giuseppe Tumminello.

This past June I was awarded the task to characterize the flower-visiting insect community on American chestnut. Prior to my first visit to the chestnut canopy, I was not certain of what to expect. On June 20th I arrived to the site, aerial net in hand, prepared to catch and identify. Upon my arrival, I immediately took note of the numerous ripe chestnut catkins proliferating throughout the trees – a bountiful feast for countless insects.

Specimens of more than 25 genera were collected from the five most speciose insect orders: Coleoptera (Beetles), Diptera (Flies), Hemiptera (True Bugs), Hymenoptera (Ants, Bees and Wasps), and Lepidoptera (Butterflies and Moths). Diptera and Hymenoptera showed the greatest diversity of floral visitors. This was not much of a surprise given that bees and groups of flies, notably Syrphidae (Hover Flies), are well-known pollen foragers. Another group of interest that showed prominent abundance was Cerambycidae (Long-Horned Beetles).

From my observations it seems that members of *Bombus*, bumble bees, have high potential for contributing to American chestnut pollination. The other flower-visiting insects foraged at various paces ranging from slow to moderate. Bumble bees foraged from one end of the catkin to the other, quickly propelling from catkin to catkin with remarkable tenacity. Unfortunately, I was unable to witness any insects actively visiting the chestnut burs. However, if the tenacity of bumblebees is any indication of their pollination activity, their presence could turn out to be vital for the repopulation of American chestnut. Further understanding of these associations merits scientific research.

A collected insect visitor is *Judolia cordifera*, a flower long-horned beetle. American chestnut, as well as chinquapin, *Castanea pumila*, are two of the few known hosts of its larvae. The majority of my sampling occurred throughout the canopy of an American chestnut roughly 15 years old. While grand and majestic, it is unfortunately afflicted by blight and is inevitably nearing death. After this tree falls, who's to say what will happen to the local *Judolia cordifera* population, let alone any other foraging insects that once benefitted from the chestnut's presence. It would also be beneficial to observe insects associated with American chestnut in geographic locations, as there are likely to be different populations (and perhaps additional rare or threatened species) elsewhere in the American chestnut's range.

I am optimistic that American chestnut restoration will curtail related and undesired declines of beneficial insects. Moving forward, it would be of interest to systematically characterize the insects that utilize American chestnut pollen and nectar. Furthermore, it would be insightful to qualify and quantify the benefits between chestnut and its insect visitors – determining what roles they serve for each other. This past June, American chestnut trees in New York were abuzz with insects. After the catkins wilted I bid the insects farewell, hoping that they had forage to return this time next year.

Apis mellifera – The Western Honey Bee

Strangalepta abbreviata

Bombus impatiens –
The Common Eastern Bumble Bee

AN AERIAL NETTING SURVEY OF FORAGING INSECTS ON AMERICAN CHESTNUT

By Giuseppe Tumminello[1]

Methods: Aerial netting was conducted on *Castanea dentata* (American chestnut) inflorescences in Syracuse, NY 13210 from June 20 to July 10, 2015. Sampling was carried out at inflorescences ranging from 1 - 10 meters above the ground. Sampling occurred over 6 dates throughout American chestnut flowering, for roughly three-hour periods. There was a total sampling effort of 16 hours. All sampling periods occurred during the day (9:00-14:00). The aerial net sampling solely targeted insects that visited American chestnut inflorescences. This survey was intended to catalogue a representation of the insect diversity that visits American chestnut flowers, as such, only unique species were collected.

Results: The identifications of collected specimen are listed below in **Appendix 1**. Diptera and Hymenoptera showed the greatest diversity of floral visitors. There was also notable representation of Cerambycidae, one of which is *Judolia cordifera*. While not determinately rare, there may be some conservation concerns for *J. cordifera* as their larvae feed mostly on *Castanea*. No active foraging was observed on the female burs, all insects were caught from male catkins. This survey provides a representation of the insects visiting American chestnut flowers in Syracuse, NY.

Discussion: This representation is indicative of the insect diversity likely to also visit transgenic American chestnut in this geographical location. No insects were observed to actively visit female burs. Nevertheless, insect foraging on catkins may lead to incidental transfer of pollen from insects to burs. Bumble bees had exhibited erratic foraging, with high potential for incidental pollen transfer. These mutualistic relationships could demonstrate to be vital for the repopulation of American chestnut. Further understanding of these beneficial associations merits scientific research.

Appendix 1: List of invertebrate taxa caught by aerial netting on *Castanea dentata* (American Chestnut) inflorescence in Syracuse, NY, during June 20 – July 10, 2015.

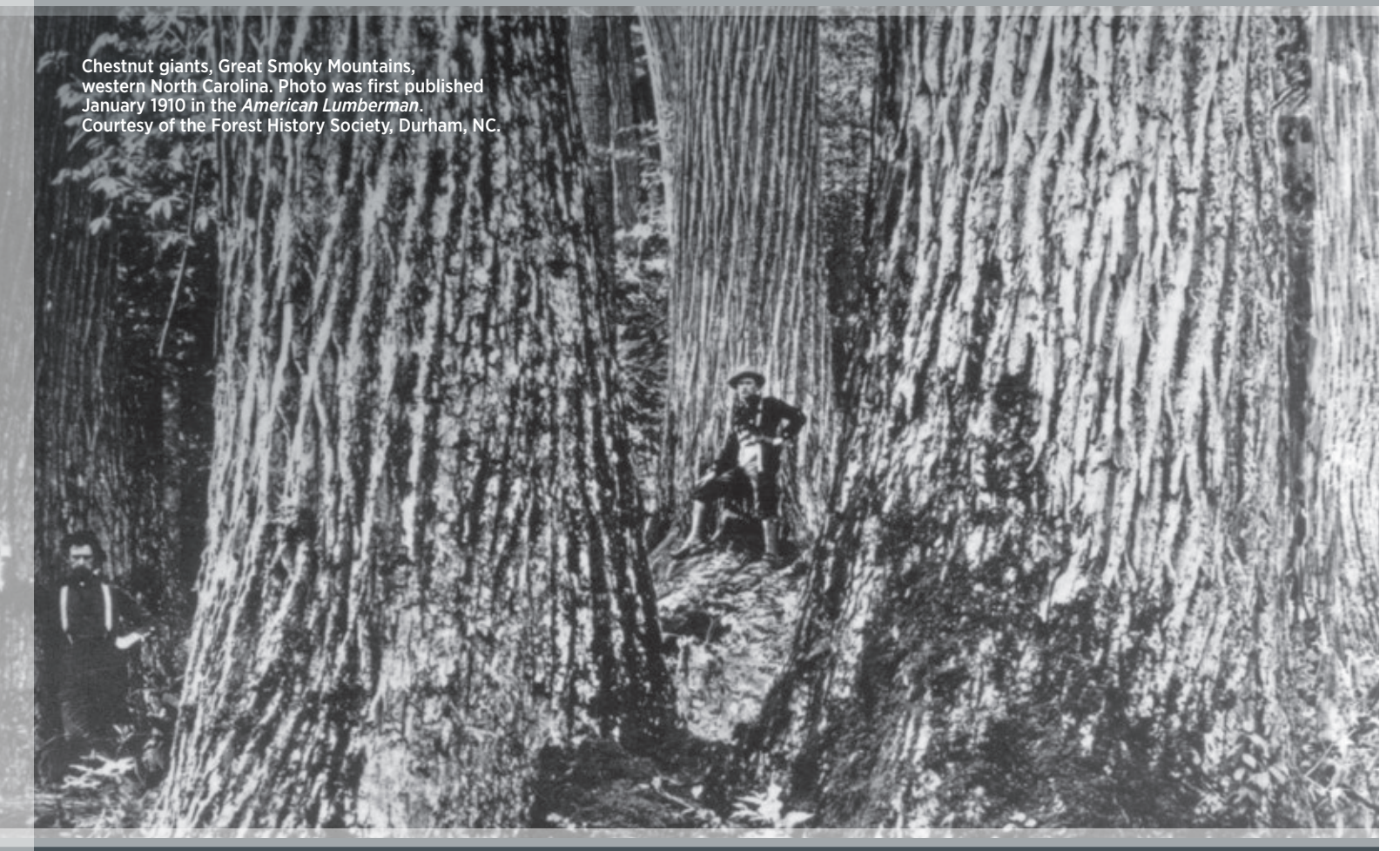
ORDER	FAMILY	
Coleoptera	Cerambycidae	*Brachyleptura* *Judolia cordifera* *Strangalepta abbreviata*
	Phalacridae	*Phalacrus*
Diptera	Anthomyiidae	
	Calliphoridae	*Calliphora* *Lucilia*
	Muscidae	*Musca*
	Syrphidae	*Eristalis* *Sphaerophoria* *Spilomyia*
Hemiptera	Membracidae	*Ceresa*
	Miridae	*Lygus*
Hymenoptera	Andrenidae	*Andrena* *Nomia*
	Apidae	*Apis mellifera* *Bombus*
	Formicidae	*Formica*
	Halictidae	*Agopostemon* *Augochlorella aurata* *Halictus* *Lasioglossum*
Lepidoptera	Erebidae	*Ctenucha virginica*
	Lycaenidae	*Satyrium*
	Noctuidae	*Alypia octomaculata*
	Pterophoridae	*Geina*

[1] The American Chestnut Research & Restoration Project, Dr. Maynard and Dr. Powell co-Directors, State University of New York - College of Environmental Science and Forestry, Syracuse, NY 13210.

[2] This project is supported by Biotechnology Risk Assessment Grant Program competitive grant no. 2012-33522-19863 from the USDA National Institute of Food and Agriculture and the Agricultural Research Service.

Realistic Restoration Targets

Melissa Thomas-Van Gundy, Research Forester, USDA Forest Service, Northern Research Station, Parsons, WV
Robert Whetsell, Historian, USDA Forest Service, Monongahela National Forest, Elkins, WV



Chestnut giants, Great Smoky Mountains, western North Carolina. Photo was first published January 1910 in the *American Lumberman*. Courtesy of the Forest History Society, Durham, NC.

THE MISSION OF THE AMERICAN CHESTNUT FOUNDATION is "to restore the American chestnut tree to our eastern woodlands to benefit our environment, our wildlife, and our society." An important part of the process of restoration is setting realistic goals and often these are set with knowledge of past conditions. Reference ecosystems may also be used for evaluation of progress in restoration with the reference systems representing the range of historic variation (Society for Ecological Restoration 2004).

Figure 1

Image used to illustrate the size of American chestnut in the pre-blight forests of the eastern United States.

Figure 2

Image from the Humboldt County Historical Society archives of loggers and a redwood for comparison with images assumed to be of American chestnut in eastern forests.

Figure 3

A 7-foot chestnut tree in Laurel Fork of Cheat River (Suck Lick) Monongahela National Forest, WV, in 1923. Photo courtesy of the Forest History Society, Durham, NC (image ID# FHS3796, photographer W.E. Hedges).

These reference ecosystems and historic range of variability may be hard to define or determine, but accepted methods can include cultural evidence such as written descriptions, oral histories, maps and photographs, and survey records (Egan and Howell 2001). Another tactic is to focus on restoring species composition (such as returning the American chestnut) and ecological processes (such as prescribed fire).

Old photos can tell us much about the past, however, as the Russian proverb goes – trust, but verify. We have found that at least two photographs used to illustrate the old growth, pre-European settlement forests of West Virginia are really photographs of California redwoods (Thomas-Van Gundy and Whetsell, in press). A comparable photograph has been used by TACF and others to illustrate old growth or pre-blight American chestnut in the eastern forests of the United States (**Figure 1**). This image is like those we found in the archives of Humboldt State University illustrating logging the redwood forest of California in the early 1910s (http://library.humboldt.edu/humco/). Also, much the same photos are found in the book Logging the Redwoods (Carranco and Labbe 1975). The similar poses of the loggers, striking white sapwood, bark thickness, and the use of spring boards all suggests that Figure 1 is of a California redwood and not an American chestnut.

In an attempt to find the original source of Figure 1, we used TinEye reverse image search. The image in Figure 1 appears on the home page of the Mendocino Coast Model Railroad and Historical Society (http://www.mendorailhistory.org/), but unfortunately their contact person did not know the original source for the photograph. We also contacted the Humboldt County Historical Society, in Eureka, CA. A search of their photography archives did not return a match to Figure 1, however, their collections archivist stated they have thousands of photographs similar to Figure 1 and all are of redwoods (**Figure 2**; personal communication, Jim Garrison, Collections Archivist, Humboldt County Historical Society). There are well-documented photographs of pre-blight American chestnuts in the eastern forest, including this one from West Virginia (**Figure 3**).

To use photographs like Figure 1, to illustrate what has been lost from our eastern forests is setting us up for failure. In the digital age, the sources for many historical images are becoming easier and easier to obtain.

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From Rails to Rare Crafts

If you're reading this magazine, you probably already know about the American chestnut's many wonderful qualities, including its unique, and now rare, wood. Walter Jacobus and Barbara Greenberg, owners of Walnut Hill Crafts in the northwestern mountains of North Carolina, are craftspeople who appreciate the value of this special material.

"We have been recycling American chestnut split rail fences into vases, clocks, candle holders and more since 1978. We have recycled more than 50,000 rails," Greenburg says.

Jacobus and Greenberg craft vases, wooden trees, birdhouses, candle holders, and more from downed trees or recycled beams available in their community. They also make their own versions of several traditional folk toys, along with creating other toys, games, puzzles and swings.

"Walt grew up helping his father and grandfather who were both contractors," Greenberg explains. "Upon moving to North Carolina, where we met, we both took a few woodworking classes at a community college and proceeded to purchase equipment as funds would allow. Becoming self taught by trial and error was the real teacher!" They established Walnut Hill Crafts in 1976.

The majority of the trees were long gone when they moved to the area in the early 1970s, but they were told stories about the great American chestnut by farmers, landlords, and other elders who had personal connections with the tree. "The respect and knowledge of the chestnut tree was huge," Greenberg says. "We too, immediately fell in love with the chestnut tree."

They love the warm color and grain of chestnut wood, and the preservation aspect of using this rare material is important to them as well. The American Chestnut Foundation got in touch with Jacobus and Greenberg in 1996. The couple began the partnership by supplying one of the New England chapters with an American chestnut split rail fence for educational purposes, and then they began selling their work to TACF for gifts. In 2003, they began to sell their crafts on the TACF website, with a portion of the proceeds going to the Foundation.

"Preserving this rare wood for future generations to appreciate has been very rewarding," Greenberg says. "And we also must recognize the hard work many local farmers in our area put into splitting these rails so many years ago."

Purchase a Beautiful Piece of Art from Reclaimed Chestnut

If you are interested in purchasing some of their work, you can see their crafts on TACF's website, acf.donorshops.com/products/merchandise.php, or you can email them at walnuthill@skybest.com.

POWER TO THE PEOPLE:

Citizen Science Moves TACF's Mission Forward

By Kendra Collins, New England Regional Science Coordinator

Citizen science is the practice of involving the public in legitimate scientific projects. This collaboration between professional scientists and interested amateurs has been growing in popularity and scope during the past several years. The ability of the Internet to reach wide audiences, and the growing availability of apps for smartphone users, has made wide-scale participation in many projects more feasible. Examples of successful citizen science projects can be found in astronomy, medicine, and even biochemistry, though a large portion of current citizen science projects are in natural resource-related fields.

MD chapter volunteer Robb Newman prepares tree shelters at the Washington Suburban Sanitary Commission seed orchard on March 1. Approximately 2,400 stakes, tree shelter tubes, and holes were installed for the spring planting. Photo by Bruce Levine.

These projects span everything from observing the timing of bud break or flowering of local vegetation; tracking sightings of bees, butterflies, and other insects (even ticks); monitoring water quality, invasive plants (terrestrial and aquatic) and exotic forest pests and pathogens; even tracking wildlife and bird sightings.

The American Chestnut Foundation (TACF) was founded by a handful of scientists with a plan to save the species. We began with a very small staff and volunteers often provided much of the labor at our Meadowview Research Farms. One of the great advantages of citizen science is the ability to cover a much larger geographic area than a small research team could alone. The native range of the American chestnut covers much of the eastern US and involving the public allowed us to find and incorporate a wide diversity of trees at the start of our breeding program. Over time, TACF members began organizing all-volunteer state chapters across the species' native range, in order to help with the project in a more focused, and local, manner.

Currently, the most obvious examples of citizen science within TACF are the backcross breeding programs carried out by most state chapters. While the breeding program itself was developed by scientists, the ways in which the state chapters have taken this work on are impressive in their level of involvement, innovation, and scope. State chapter members and volunteers learn to identify and inventory wild American chestnut trees, hand-pollinate native mother trees, collect pollen from native father trees, and plant and manage orchards. TACF's Regional Science Coordinators work to help guide local programs, offer training, and introduce best management practices, but are also in a position to witness innovation and new ideas, and help share them widely.

TACF members come from a variety of backgrounds and this range in perspective has allowed for the development of several successful programs. The state chapter breeding programs are often the initial hook for members and volunteers looking to contribute, but those programs can also act as a springboard for new ideas and initiatives. Some great examples of innovative projects, spearheaded by TACF members, are the Appalachian Trail MEGA-Transect Chestnut Project, the Chestnut Learning Box, and the *Phytophthora* Root Rot (PRR) breeding program.

Appalachian Trail MEGA-Transect Chestnut Project

The Appalachian Trail MEGA-Transect Chestnut Project was launched

Volunteers with the Appalachian Trail MEGA-Transect Chestnut Project collect data on an American chestnut north of Sunfish Pond in New Jersey. Photo by Kathy Marmet.

HOW CAN **YOU** GET INVOLVED?

TACF's programs offer many ways for our members and supporters to get involved. Here are the details for connecting with featured programs.

- **GET INVOLVED WITH YOUR LOCAL STATE CHAPTER! You can find contact information for each TACF chapter on our website: http://www.acf.org/Chapters.php.**
- **THE APPALACHIAN TRAIL MEGA-TRANSECT CHESTNUT PROJECT is on-going, and trainings for hikers are offered each spring along the Appalachian Trail corridor. For more information about upcoming trainings please visit: http://www.acf.org/mega-transect.php.**
- **THE CHESTNUT LEARNING BOX is currently coordinated by the SW branch of the Virginia chapter. If you'd like to help locally, or from afar, please contact Tommie Waters: tkpratt47@gmail.com or 252-717-7137 (cell).**
- **THE *PHYTOPHTHORA* ROOT ROT SCREENING PROGRAM at Chestnut Returns Farm in Seneca, SC often needs crews of volunteers to help with big work days. For more information about how you could help please contact Dr. Joe James at: s4e4j4@bellsouth.net.**

in 2008 to help celebrate TACF's 25th Anniversary. The project aims to collect chestnut inventory data, using the Appalachian Trail as a study corridor, to help better characterize existing chestnut populations and identify flowering trees. Volunteer hikers are trained on what to look for, how to collect and report data, and then turned loose to hike and hunt for chestnuts. The creation of this project was led by TACF board member and current Chair of the Education Committee, Kathy Marmet (VA), in collaboration with Bob Pickett of the Potomac Appalachian Trail Club (PATC), and Carline Dufour of the Appalachian Trail Conservancy (ATC). To date, several projects have utilized AT MEGA-Transect chestnut data, including a master's thesis project by then-Duke graduate student Jennifer Santoro (M.S. 2013), who developed spatial prediction models for where to find and eventually reintroduce American chestnut within Shenandoah National Park (Santoro, 2013).

Dr. Joe James (right) works with volunteer Jim Sevic (left) to plant B_3F_3 chestnuts for PRR screening at his Chestnut Returns Farm in Seneca, SC. Photo by Paul Sisco.

Chestnut Learning Box

The story of the American chestnut is one that lends itself well to hands-on artifacts. A chestnut bur can be described as a "spiky green ball", but showing one to someone has a much more lasting impression. What we now call the Chestnut Learning Box (CLB) was developed and refined over time with the help of many TACF members and collaborators, and much of the impetus came from the desire to show people the American chestnut. The NY chapter developed a learning box along with their "Charlie Chestnut" curriculum. Independently, TACF member Gary Carver (MD) developed his own collection of artifacts and fact sheets for explaining the chestnut story. Carver's prototype made it onto the radar of Marmet and TACF's Education Committee, and they worked to refine the design and provide one to every TACF Chapter. The CLB, now in its 2nd edition, is marketed on the TACF website, and staff assists as requested. But the major effort to create and send out the CLBs, as well as improve the model over time, is currently led by Tommie Waters (VA) and dedicated volunteers with the Southwest branch of the Virginia chapter, in collaboration with Marmet and Carver. This critical process involves coordination of a great many steps and the work they do is extremely important, and appreciated.

Phytophthora Root Rot (PRR) Breeding Program

The *Phytophthora* Root Rot (PRR) screening and breeding program came about in a slightly different fashion. In 2001, Dr. Joe James, a retired orthopedic surgeon and longtime TACF and Carolinas chapter member, planted some chestnut trees on his farm in Seneca, SC. Within three years they all died. James investigated his dying trees and was connected with Dr. Steve

Jeffers at Clemson University, who confirmed the pathogen responsible was Phytophthora cinnamomi, which causes PRR. *P. cinnamomi* was introduced to the US from Asia and Chinese chestnuts are resistant to PRR. James hoped some of TACF's breeding lines had retained that resistance. He ultimately spearheaded a program to test trees in the breeding program for PRR resistance and, in partnership with Jeffers and Clemson University, began screening families for PRR resistance in 2004 at his Chestnut Returns Farm. The program has since expanded to include additional partners and collaborators, and there are plans in place to complete PRR screening of our current breeding stock, as well as for incorporating PRR resistance into more of our breeding population. There is no denying that James' perseverance is what led to the development of this important effort.

The participation of citizen scientists with TACF has led to innovation within our breeding program, as well as the creation of several new programs that have helped expand our scientific knowledge base, advance our breeding work, and reach new audiences. If you are interested in getting involved with one of our programs or projects, see sidebar for more information. And, if you are one of those citizen scientists already helping to move our mission forward, thank you! We couldn't do it without you.

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2016 CHESTNUT-THEMED PHOTO CONTEST

Photo by 2015 contest winner Chris Dover.

SEND US YOUR CHESTNUT-THEMED PHOTOS FOR A CHANCE TO WIN!

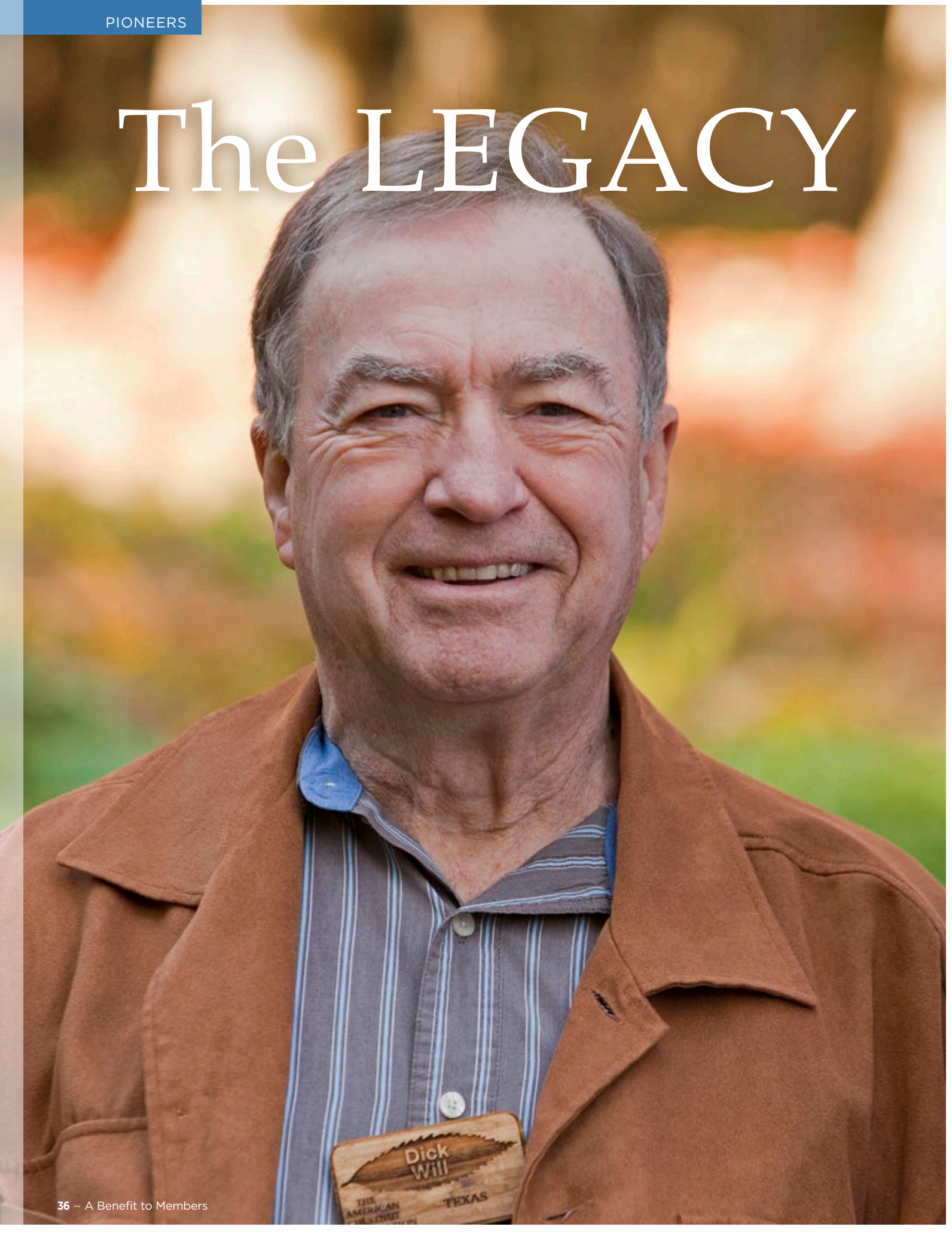
RULES:

- All entries must be submitted digitally via e-mail or a link to a cloud drive by September 1, 2016;
- Entries must include name of photographer and contact information;
- Entries must include a full caption including names of subject(s), location, and title;
- Entries must be at least 2500 x 3430 pixels and submitted in a jpeg or tiff file format;
- All entries must relate in some way to the American chestnut;
- Participants are limited to 5 entries per person;
- Entries must be previously unpublished and cannot be entered into another contest.

EMAIL ADDRESS FOR SUBMISSIONS:
ruth.goodridge@acf.org

Visit
acf.org/photocontest.php
for rules and details.

The LEGACY



# of a LIFETIME

Dick Will, chairman emeritus of The American Chestnut Foundation, originally hails from a place where a tall tree is hard to find.

"I was born and raised in central Kansas," Will explains, "where trees don't grow unless you baby them, and then if they do grow very tall, they blow down."

Will was introduced to big trees, and one in particular, the American chestnut, when in 1971 he hiked 450 miles of the Appalachian Trail.

"The first day I saw these long-leafed sprouts that I'd never seen before," he says, "and I asked some people and they told me that these were old surviving sprouts from the American chestnut."

While he hiked through the rolling peaks of the Appalachian Mountains, Will looked out for surviving, grown American chestnut trees but, "of course everyone else has been doing that for 100 years and didn't find any."

A man of many interests and talents – in college, where his advisor called him "a wandering generality," he had four majors: English, History, Psychology, Education plus a Geology minor - Will spent time after his hike as a high school teacher before eventually becoming a stockbroker in Gaithersburg, MD. However, the plight of the American chestnut was never far from his mind.

On a rainy day at Medowview, Dick Will proudly shows off one of the Legacy Trees named in honor of him and his wife Carol.

"I kept thinking about them, and I moved to the Washington D.C. suburbs, and I saw all these big trees, but I knew that the grandest of all was not there."

In 1990, Will saw an article in National Geographic magazine about The American Chestnut Foundation and its attempt to bring back the American chestnut. Inspired, he looked up the foundation's phone number, called, and joined. He began with a $1,000 contribution. The next year he gave the same. However, he never got a response from the foundation, so he told himself he wouldn't send anything the following year. But he did anyway.

"That year, I got a call back from the new director, Marshall Case, and he told me he really appreciated the contribution and please keep sending the money and come to our meetings," Will laughs.

So in 1996 he went to a meeting where, he says with affection, he met "a lot of academics and treehuggers." He decided to use his skills and practical knowledge to help the foundation with its finances and operations.

And help he did. When he began going to meetings, he felt as though the organization needed more structure and control in order to achieve its potential. His work raising money for his chapter and the foundation was so successful that he got elected to a number of positions before eventually being elected to chairman of the board, where he served for three years.

"Probably the best thing I did was establish the Legacy Tree Orchard at Meadowview, VA," he says of his accomplishments.

Will is currently a chairman emeritus, a position he that he jokes "gives me a little prestige and the old grey eminence, with no power and influence."

(L-R): Steve Barilovits, Jeff Donahue and Dick Will tour Meadowview's Legacy Tree Orchard in 2015. Photo by Lisa Thomson.

Now 80 years old, Will is focused on restoring the American chestnut and planting chestnut trees. "I'm planting trees at my second home location in West Virginia," he says, "and these are sixth generation trees, mathematically 94% American, 6% Chinese, and I'm nursing them along. My biggest and best are 17-18 feet tall now."

He lives most of the year in Texas with his wife, a native Texan. "I didn't realize when I married her that the fine print was eventually, you have to bring your wife back to Texas," he laughs.

But he does still spend about four months of each year in West Virginia, where he's a member of TACF's West Virginia chapter and involved in new plantings there.

When he's not working on restoring the American chestnut, he spends a lot of time reading publications such as *Scientific American*, *Discover* magazine, *National Geographic*, and the *New England Journal of Medicine*. He is also an active member of the Rotary Club and every week he mentors two third graders.

He loves adventure travel, a passion that has been with him throughout his life. He was the first person to ride a bicycle to the top of Pikes Peak in Colorado and a major financer of the first model airplane to fly from North America to Europe.

> "Probably the best thing I did was establish the Legacy Tree orchard at Meadowview, VA," he says of his accomplishments.

Last year he went to Ushuaia, an Argentinean town on the southernmost tip of of South America, nicknamed the "End of the World," where he saw high peaks and impressive glaciers. When forced to pick the most interesting trip he's been on, a tall order considering all that he's done and seen, he chooses his trip to Egypt.

"Seeing paintings and inscriptions and artwork that's 8,000 years old and imagining what life was like for these people at that time," he says, was fascinating for him. "We took a boat on the Nile from Aswan to Luxor, and along the shore we're seeing a farmer with a donkey and a cart, and we just knew that that scene would've been the same 8,000 years ago."

It is that same love of history and heritage that makes it so important to him that the American chestnut is eventually restored to its rightful habitat.

"Each year we have a stronger crop of seeds and seedlings and within 50-100 years, we will have gone a long way towards restoring the American chestnut to the eastern forest," he explains. "But it'll be after my lifetime. This is my legacy."

My First and Last Chestnut Tree

By Scott Shalaway

When I was a boy, my father and I hiked country roads on autumn afternoons collecting hickory nuts, a favorite snack. One memorable fall day, my dad hopped into our '57 Chevy and said, "Let's take a ride." It was 1959. I was 7 years old.

As we drove, my dad explained, "I'm taking you to the woods where I collected nuts when I was your age. There were still a few chestnut trees, and I'd pull the dark brown nuts from their prickly burs."

The fungus responsible for the chestnut blight was introduced in 1904 from China and had already killed off most of the chestnuts in the eastern forests, so Pop doubted we'd find any living chestnuts. "If we do," he said, "the ground below will be covered with spiny husks. We called them porcupine eggs."

Though the blight devastated chestnut populations, the tree is not extinct. In the 1800s, chestnuts dominated the eastern deciduous forest. The Asheville, N.C.-based American Chestnut Foundation (TACF, www.acf.org) estimates that before the blight, 4 billion chestnuts grew on more than 200 million acres of eastern woods from Maine to Georgia and west to the Ohio Valley. At its peak, the chestnut represented about one-quarter of all hardwoods growing across its range.

The chestnut was a near perfect tree. It grew straight, tall, wide and fast. The wood was lightweight, rot resistant, and easy to work. Chestnut lumber was used for railroad ties, fence posts and beams for barn and home construction.

Aesthetically, the grain of chestnut boards was gorgeous. And its nuts were favorite foods of squirrels, bears, deer, mice, turkeys and people. A forester could not have imagined a better tree.

Today, chestnuts sprout from the remains of once healthy trees, but these sprouts are stunted and essentially worthless. Functionally, oaks and their acorns have filled the niche vacated by chestnuts in eastern woods.

Fortunately, the future of American chestnuts is bright. Founded in 1983, the ACF has been working for more than 30 years to develop a blight resistant tree. The goal is to restore blight-resistant American chestnuts to eastern deciduous forests.

Chinese chestnuts are naturally resistant to the blight, so scientists have been crossing and backcrossing American chestnuts with Chinese chestnuts at farms in Meadowview, Va. It's obviously a time-consuming process. To date, the selective breeding program has produced blight-resistant trees that are 15/16 American.

Of course, when I was 7, I knew nothing of the chestnut blight, but my father knew that healthy chestnuts were rare. I thought we were just looking for a nut we hadn't seen before. Finally, after about an hour of searching, we stumbled upon a carpet of chestnuts.

"I can't believe it," my dad exclaimed. "It's been almost 25 years since I collected chestnuts here."

Thanks to hungry squirrels, many of the husks were empty. We filled our pockets and headed home.

Later that evening, Pop threw some firewood on the burn pile, and we soon had "chestnuts roasting on an open fire."

He told me how much his mother had enjoyed freshly roasted chestnuts around Thanksgiving.

The following year, we returned to the same spot, but there were no chestnuts on the ground. Maybe we were in the wrong spot, I suggested. "No, this is the right spot," my dad said. "See the stump."

The nut-bearing chestnut tree was gone. Someone had cut it down. It was the first and last chestnut tree I had ever seen. For purely selfish reasons, I felt cheated.

My dad sat down next to the stump, pulled me in, and put his arm around me. A tear ran down his grizzled, unshaved cheek. I was only 8 years old, so I didn't understand how a missing tree could make my dad cry.

Now I do.

Brown-Butter Chestnut Waffles

WITH POACHED PEARS AND WHIPPED MASCARPONE

By Katie at the Kitchen Door
Waffles adapted from The Chef's Collaborative

Serves 5

Ingredients

1 c. red wine
1 c. sugar
1 c. water
2 inches fresh ginger, peeled and sliced
1 cinnamon stick
3 ripe but firm pears, peeled
3 TBS salted butter
1 1/4 c. AP flour
1 TBS baking powder
3/4 c. chestnut flour (store-bought or homemade)
1/4 tsp salt
3 eggs, separated
1/4 c. light brown sugar
1 3/4 c. whole milk
1 c. heavy cream
3 oz. mascarpone
1 TBS maple syrup

Instructions

1. **To poach the pears:** Combine wine, sugar, water, ginger, and cinnamon in a large saucepan. Bring to a simmer over medium heat, then add the whole pears to the mixture. Simmer gently, turning the pears occasionally, until pears are tender all the way through when poked with a knife. This can take anywhere from 15-35 minutes, depending on your pears. When the pears are tender, remove with a slotted spoon and place in a bowl. Leave whole or slice according to your taste. Continue simmering the syrup until it is thick, then pour over the pears. Set aside.
2. **To make the waffles:** In a small saucepan, melt the butter over medium heat. Continue cooking, stirring, as the butter foams up and begins to brown. Once the foam has subsided and the butter has turned a deep golden brown, remove from the heat. Let cool slightly. In a large bowl, whisk together the flour, chestnut flour, baking powder, and salt until well combined. In a separate bowl, whisk egg yolks until creamy, then add brown sugar and whisk to combine. Whisk cooled brown butter into yolks and sugar. Stir in milk. Add the liquid ingredients to the dry ingredients and whisk until smooth. In a separate bowl, beat egg whites on high until stiff peaks form. Fold egg whites gently into batter. Preheat your waffle iron and coat with non-stick spray, then cook waffles until golden brown. Keep warm in a 200°F oven if not serving immediately.
3. **For the whipped mascarpone:** In a large bowl, beat heavy cream until soft peaks form. Spoon mascarpone in to whipped cream in small pieces and whisk until smooth. Whisk in maple syrup and set aside.
4. **To serve:** Top each waffle with pears, poaching syrup, and whipped mascarpone. Serve immediately.

IN MEMORY AND IN HONOR OF OUR TACF MEMBERS

DECEMBER 1, 2015 – FEBRUARY 29, 2016

IN MEMORY

"Pete" Eugene Charles Christoph from:
Cynthia Christoph
Cristina Moran
Jody Verrengia

George Grover Cole from:
The Virginia Chapter of The American Chestnut Foundation

Hamilton Hadley from:
Karen Howat

Edward L. Nicholson from:
Shirley Nicholson

Auden Orion Rafert From:
Margaret Shillingford

HONORARIUM (in honor of)

Matt Brinckman from:
Virginia Trees

Craig Falls from:
Kay Cromwell

We regret any errors or omissions and hope you will bring them to our attention.

THE
AMERICAN
CHESTNUT
FOUNDATION®

50 N. Merrimon Avenue
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Asheville, NC 28804

Support Meadowview Research Farms

This year's Spring Appeal is dedicated to the critical needs at Meadowview to ensure we can increase the scale of chestnut restoration in all of our chapters, and support the dedicated citizen scientists who manage each orchard.

RESOURCES NEEDED:

- Construction of a new greenhouse for increased seedling production;
- Expanded outdoor seedling preparation area; and
- Critical upgrades to farm equipment.

JOIN OUR 2016 SPRING APPEAL AND LEAVE THIS WORLD A BETTER PLACE THAN WE FOUND IT.