American chestnut restoration on reclaimed mine land and the creation of an online trees database

Conservation Innovation Grant Final Report

USDA

THE AMERICAN CHESTNUT FOUNDATION®

Cover photo: The CIG progeny test and reforestation area in Coshocton County, Ohio. Seedlings were protected by an 8' fence and 2' shelters, with weed mats installed to control vegetative competition. (*photo by T. Brannon*)

Project Deliverables:

1. Develop a state-and-transition model with the Appalachian Regional Reforestation Initiative (ARRI) and NRCS partners and professionals to assist natural resource professionals to evaluate sites for future plantings. This will be in conjunction with an integrated pest management protocol and best management practices for dealing with the pests and pathogens that plague a stand of American chestnuts.
2. Establish mixed chestnut/hardwood plantings on twelve reclaimed mine sites over three years at selected sites throughout five different states (PA, OH, WV, VA, KY).
3. Provide technical assistance to five or more private landowners to help them determine chestnut feasibility on their property.
4. Develop an online relational database to allow natural resource professionals and participating landowners to enter detailed information on tree plantings.
5. Create a technical manual for landowners planning to grow American chestnut. The manual will include protocols to allow standardized method of recording, monitoring and training chestnut growers as well as the ecology of the chestnut, forest stewardship and land management.
6. Provide twelve, 8-hour workshops for NRCS partners and volunteers on how to grow American chestnut trees and methods to monitor the stands' success and survival in each of the five states where we will focus.
7. We will provide NRCS with the following as requested: semi-annual reports, supplemental narratives to support payment requests, a final report, performance items specific to the project that indicate progress, and a new technology and innovative approach fact sheet. We will also participate in at least one NRCS CIG showcase during the grant period.

1. Development of the state and transition models

A workshop was held during the spring of 2012 with Green Forests Work (GFW) and Appalachian Regional Reforestation Initiative (ARRI) collaborators to discuss the creation of the models. Due to the complexities of mined land reforestation and the variability of states, both between and within mined areas, two state and transition models were developed to guide landowners and land managers in understanding, describing, and implementing conservation practices when forestland is desired on mined lands. One model describes potential vegetation dynamics following the implementation of a modified version of the Forestry Reclamation Approach (FRA) on legacy mines. The second model describes the application of the FRA to active mined land reclamation. These models have been reviewed by ARRI, GFW, and NRCS and are available for distribution by TACF, ARRI, GFW, and NRCS.

2. Establishment of the mixed hardwood/American chestnut plantings

This CIG called for the creation of 360 acres of mixed hardwood/American chestnut forest type on 12 reforestation projects in 5 states (KY, OH, PA, VA, and WV). All plantings were to be established on mined lands that implemented the FRA. The CIG project description required the planting of a 1-acre progeny test of TACF's "Restoration Chestnuts 1.0" for each of these projects. The progeny

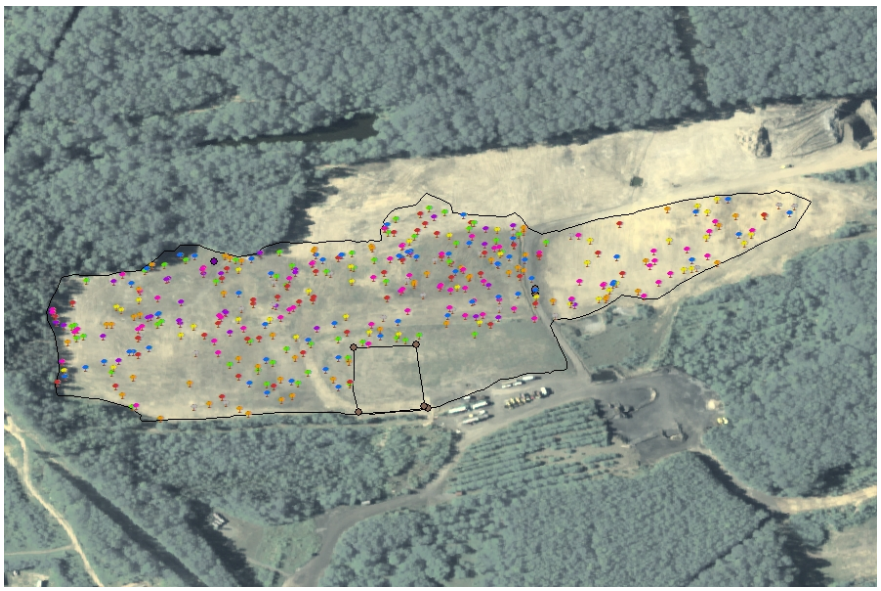
tests were designed to include pure American chestnuts, pure Chinese chestnuts, and early backcross chestnuts as controls. These progeny tests will demonstrate the American chestnut characteristics as well as the level of blight resistance derived from Chinese chestnut ancestors in TACF's "Restoration Chestnut 1.0" population. The progeny tests will also help TACF determine which families to keep, to improve the level of blight resistance in our population of chestnuts. The surrounding 29 acres for each planting were to be planted with high-value hardwoods as well as wildlife shrubs and trees with the chestnuts planted at a density of 20 chestnuts/acre (total seedlings at approximately 680/acre). These larger areas will demonstrate how TACF's chestnuts are able to compete against other native species that are commonly planted for mine reclamation projects in a mixed hardwood reforestation setting.

As called for in the project description, a total of twelve plantings have been established on coal surface mines in Kentucky (2), Ohio (2), Pennsylvania (4), Virginia (2), and West Virginia (2). TACF and numerous partnering organizations helped reforest approximately 425 acres, including the planting of nearly 300,000 trees. As called for in the project description, a 1-acre progeny test of TACF's "Restoration Chestnuts 1.0" was planted for each of these projects. The progeny tests were planted as seed, so each seed was protected by a 2' tree shelter, and the locations were recorded. Since the vast majority of reforestation projects use bareroot seedlings, the larger, mixed hardwood areas were planted as bareroot seedlings. The project description called for the planting of a total of 8,100 Restoration Chestnuts, and a total of 2,400 each of pure American chestnuts, pure Chinese chestnuts, and early backcross chestnuts. Due to conflicting information in the project description and progeny test design, only 600 each of the pure American chestnuts, pure Chinese chestnuts, and early backcross chestnuts were used. However, we made up the difference in value by planting 12,952 Restoration Chestnuts 1.0 in CIG projects.

In addition to the usual benefits that forests provide (e.g. clean air and water, timber and fiber production, improved wildlife habitat, aesthetics, etc.), these CIG projects were often selected to meet other objectives, such as the creation of habitat for imperiled species and/or reducing sedimentation and pollutant loading in impaired watersheds. A few of the projects were also selected to get mine operators implementing these innovative reclamation techniques for the first time. A short summary of each of the 12 reforestation projects is provided below.

Schuylkill County, Pennsylvania – 2012
Acres: 22
Trees planted: 20,468

This 22-acre site was established on an active coal mine within the Chesapeake Bay Watershed. Residents downstream from the site were attributing flash flooding and sedimentation issues to the mining operation, which had been reclaiming the land in a conventional manner by compacting it, seeding it with grasses, and planting trees. Although the area had already been reclaimed and planted with trees, the mine operator was willing to work with TACF, ARRI, Schuylkill Headwaters Association, PA-DEP, NRCS, the local Soil and Water Conservation District, and Schuylkill County Municipal Authority to implement the Forestry Reclamation Approach. To do so, the mine operator ripped the compacted ground in rips spaced 8' apart, running up- and downhill with a 3-foot long ripping shank mounted on the back of a large bulldozer. He then ripped the ground perpendicular to the first rips (known as cross-ripping) across the slopes to slow water as it moved downhill. Cross-ripping loosens the ground and allows rainfall to better infiltrate the soil and to release water more slowly, rather than quickly running off of the compacted surface. The loose ground also fosters higher survival and faster growth of planted trees by allowing roots to extend more quickly and into the soil. Cross-ripping also disturbs and exposes soil, providing native seeds with a place to germinate and take root as they land on the site from surrounding areas. A mix of trees including white oak, chestnut oak, black cherry, sugar maple, Restoration Chestnuts, hazelnut, eastern redbud, and others were then re-planted. Survival of planted seedlings across the site has been very good and native species such as aspen and birch have been colonizing the site. The operator cross-ripped and reforested an additional 11 acres at this site in 2014, and plans to implement the FRA on future mining projects.



The Schuylkill County, PA CIG project. The 1-acre progeny test is represented by the square. Individual chestnuts within the mixed hardwood planting were tied with color-coded ribbons that represented different families and they were GPSed after planting.

(l to r) District Conservationist Dennis DiOrio, Public Affairs Specialist Molly McDonough, State Biologist Barry Isaacs, and State Conservationist Denise Coleman help to plant the first CIG progeny test in Schuylkill County, PA. (*all photos by M. French unless otherwise noted*)

Dickenson County, Virginia – 2013

Acres: 22.5

Trees planted: 12,555

This site in southwestern Virginia had been compacted and seeded with grasses and legumes as called for in the mining permit as part of the revegetation plan that required hay/pastureland. The landowners were not interested in grazing cattle or harvesting hay on the properties and they were quickly being overrun with autumn olive (*Elaeagnus umbellata*) and other exotic, invasive species. TACF, ARRI, and Green Forests Work worked with the Virginia Department of Forestry and the landowners to implement the FRA on the site. During the summer of 2012, the exotic shrubs and trees were cut down, and the cut stumps were treated with herbicide to prevent re-sprouting. Afterwards, Virginia Department of Forestry staff used a small bulldozer to push the brush into windrows and piles for wildlife habitat. Then, in the fall of 2012, herbicide was applied across the site to control the aggressive grasses and legumes that would otherwise out-compete the planted seedlings. Once the herbicide had taken effect, the site was cross-ripped to loosen the compacted ground. In the spring of 2013, seedlings were planted by a professional contractor and the progeny test was direct-seeded by volunteers. After two growing seasons, survival in the progeny test planting was 71.7% and seedlings averaged 30 inches tall. Survival in the mixed hardwood area was estimated to be approximately 92% after two growing seasons. Although one of the landowners was at first hesitant to perform these conservation practices, he was thrilled with the outcome and is now reforesting other mined lands that he owns with EQIP financial assistance.

Clockwise from upper left: a) The Dickenson County site before conservation practices. b) Bill Miller, Senior Area Forester of the Virginia Department of Forestry cuts autumn olive. c) VDOF pushing brush into piles and windrows. d) The site after herbicide application and cross-ripping.

The CIG reforestation area in Dickenson County, VA. The 1-acre, square progeny test is visible from the grading that was done to construct the 8' deer exclusion fence (*8' fences were constructed for 9 of the 12 progeny tests*). Autumn olive establishment can be seen in the untreated, compacted areas to the north, south and west.

Wise County, Virginia – 2013

Acres: 70
Trees planted 39,316

This site was located on an active mining operation that was in the process of reclaiming the land in a conventional manner for hay/pastureland as the designated post-mining land use. However, the landowner was not interested in cutting hay or grazing livestock after reclamation, so TACF and ARRI worked with the landowner, local inspectors, and the mine operator to change the post-mining land use on the increment to forestry. It was the operator's first attempt to apply the FRA in practice and they were willing to follow implementation recommendations and to incur the additional expense of planting trees on other areas that had already been reclaimed. The operator placed the recommended material on the surface as the growing medium and reduced the amount of grading to minimize compaction as is called for in the FRA. A forestry seed mix was used to establish ground cover and still comply with permit requirements regarding revegetation. Survival in the progeny test was 70.7% and seedling height averaged 21 inches after two growing seasons.

Volunteers planting, sheltering, recording locations, and installing weed-mats for the chestnut progeny test in Wise County, Virginia.

Kanawha County, West Virginia – 2013

Acres: 37.7
Tress planted: 26,941

This site in south-central West Virginia is located in close proximity to several other large mining operations and will serve as an indicator of how chestnuts may perform on other nearby reclamation projects in the future. The mining operator was thrilled to assist in this grant and use the reforestation efforts for education as well. The mining operator hosted a lunch and an Arbor Day tree planting event for mining inspectors, forestry professionals, and 75 elementary school children to teach them about mining reclamation, reforestation practices, the FRA, the value of forest products to society, American chestnut restoration, and NRCS programs. Students, teachers, TACF staff, and other cooperators worked with the children to plant, shelter and record the locations of the progeny test.

Loosely-graded slopes and reduced ground cover in Kanawha County, WV

Nicholas County, West Virginia - 2013

Acres: 45

Trees planted: 31,964

The progeny test on this site in eastern Nicholas County did not fare well, even though the operator properly implemented all 5 steps of the FRA. Survival in the progeny test after 2 growing seasons was around 26%. We think that the failure was due to a cold, wet spring in the region which caused a germination failure, because survival at the Kanawha County site was below normal as well (58% after two seasons). This informs us that chestnut restoration projects in the future may be better served when planting seedlings, rather than seed. The progeny tests were planted as seed and sheltered. The larger, mixed hardwood/American chestnut reforestation areas used 1 year-old bare-root seedlings that were not sheltered (as is most common in large-scale mine reclamation tree plantings). For both the Nicholas and Kanawha County plantings, the bare-root seedlings of all species showed excellent survival and growth.

Chestnuts planted as bareroot seedlings in Nicholas County, WV growing vigorously during their second growing season (*note the reduced grading and non-competitive groundcover*).

Elk County, Pennsylvania – 2013
Acres: 30
Trees planted: 20,806

This project in central Pennsylvania also lies within the Chesapeake Bay Watershed. The Western Pennsylvania Conservancy owns the property and desired to have this parcel reforested as a part of their overall management plan for improving water quality in the watershed. The property had been compacted and seeded in grasses during reclamation in the early 1990's and very little natural regeneration of tree seedlings was occurring. Taking into consideration the native wildflowers and plants that were present, herbicide was not used. The reforestation site was cross-ripped and TACF, ARRI, and GFW worked with WPC staff, Pennsylvania Wildlife Habitat Unlimited and other volunteers to plant 11 of the 30 acres with volunteers. The remainder was planted by professionals and 14 native tree and shrub species were planted. Survival in the progeny test was nearly 75% after two growing seasons and survival in the mixed hardwood planting was greater than 90% after two growing seasons. As with many of these projects, an immediate increase in the number and percentage of total cover of native plants and wildflowers was noticed. This is likely due to the release of the seedbank that occurs when the soil is exposed during ripping.

Clockwise from top left: a) A bulldozer cross-rips slopes while the progeny test area is being laid out. b) The diamond-pattern that results from cross-ripping on slopes. c) Volunteers distribute tree shelters before planting the progeny test. d) Seedlings emerging from shelters, two years after planting.

Bell County, Kentucky – 2014

Acres: 36.6
Trees planted: 25,553

This site in southern Kentucky was the mine operator's first attempt at implementing the FRA. Many areas on this mine had been reclaimed as hay/pastureland or wildlife habitat. The equipment operators were accustomed to conventional reclamation techniques and had excessively graded areas that called for tree planting, so the operator agreed to cross-rip a 36.6 acre area for the CIG, as well as some other compacted areas. The ripping also disturbed the ground cover and allowed native wind-blown seeds to germinate and establish on-site. The operator liked the FRA approach and planned to implement it on tree planting areas in the future. Much like the Kanawha County site, the operator agreed to use this opportunity to host an Arbor Day event on the mine for elementary students, mining inspectors, and forestry professionals to promote these innovative reclamation and NRCS conservation practices. Changing market conditions have since forced the mine to cease production, but it is our hope that they will use the FRA while reclaiming already disturbed areas.

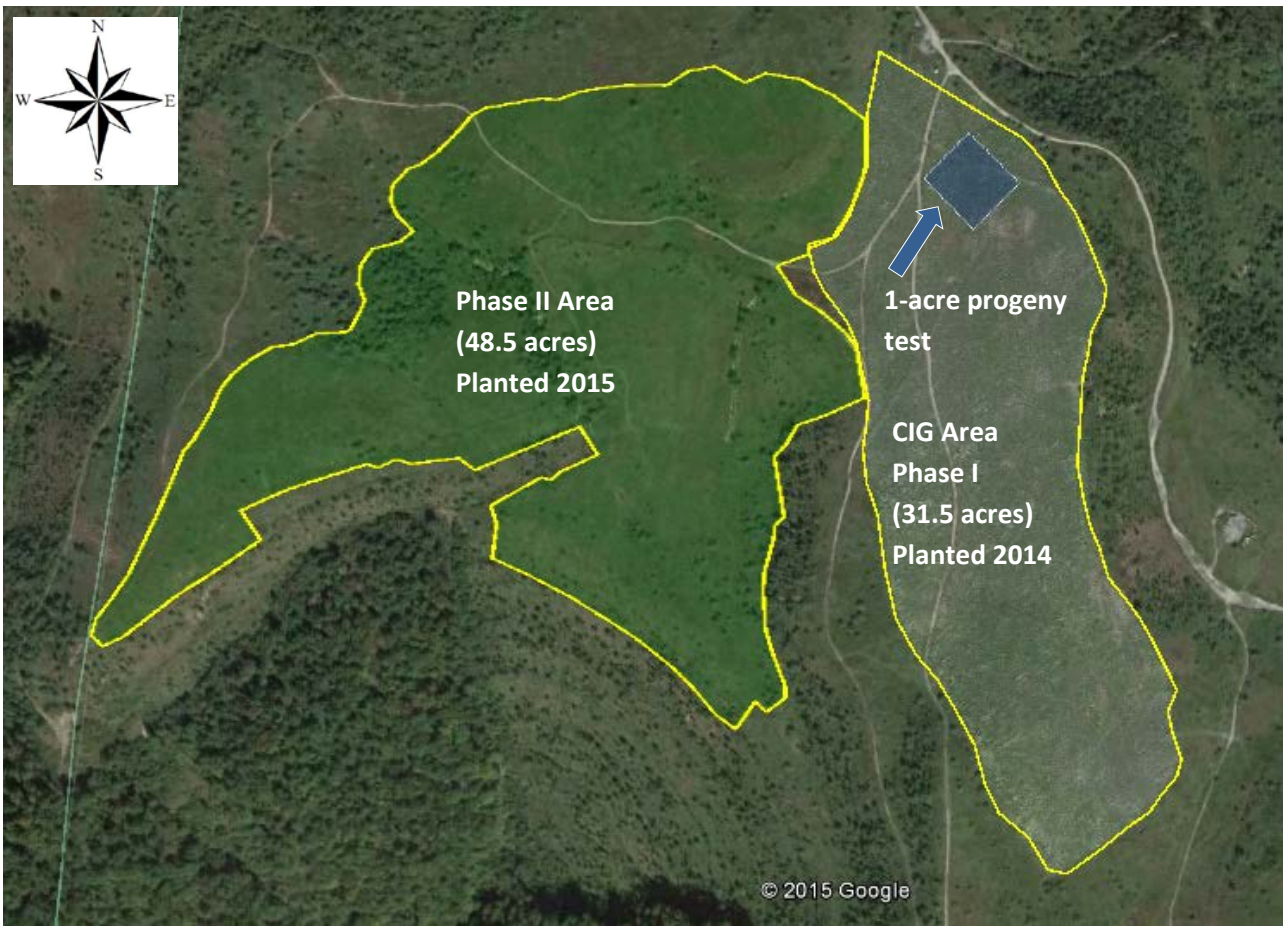
Mining inspectors, forestry professionals, and students learn about the FRA and reforestation practices in Bell County, Kentucky before planting the progeny test.

Pike County, Kentucky – 2014

Acres: 31.5
Trees planted: 21,624

This site is part of a large mountain-top mining complex that reclaimed much of the area as wildlife habitat in the late 1990's. Reclamation practices that were commonly used during that time had left much of the area unsuitable for tree establishment and growth due to the excessive compaction and seeding of non-compatible grasses and legumes. Autumn olive and other invasive exotic species were establishing across the site. The landowner is improving pasture and grazing cattle on other areas, but desired forest on this area. The area was cross-ripped and used for nine volunteer tree planting events involving students and faculty from 12 colleges and universities in 2014. Before planting, volunteers were presented with the history of mining reclamation, the FRA, American chestnut restoration, and NRCS programs. Local, underemployed citizens were hired to complete the planting project in some small areas. A post-planting spot herbicide treatment was applied

around trees in some areas and survival of planted seedlings was approximately 90% after one growing season. The landowner also agreed to allow TACF, GFW, and ARRI reforest an additional 48.5 acres adjoining the CIG project in the spring of 2015. The 2015 planting was paid for by GFW through settlement funding that was allocated to GFW from the Sierra Club. The 2015 planting was not included in the CIG acreage.



Aerial view of the 2014 and 2015 Pike County, KY reforestation areas.

a) The CIG area in Pike County, KY before ripping. b) Volunteers from Warren Wilson College, pose for a group photo after planting, sheltering, and recording the progeny test.

Coshocton County, Ohio – 2014
Acres: 30
Trees planted: 21,018

This reforestation project occurred on a property that had been conventionally reclaimed as hay/pastureland in the 1980's and 1990's. The landowner had been cutting hay on portions of the property and mowing other areas to keep invasive species under control, while performing selective harvests and TSI work in the forested portions of the property. The landowner had also been reforesting some of the reclaimed areas with the help of his family, with mixed success. The site was cross-ripped to mitigate the compacted ground and to break up the grasses. TACF, ARRI, and GFW worked with the local NRCS staff and volunteers to plant the progeny test and a professional tree planting company was contracted to plant the surrounding 29 acres. The entire area was planted with more than 21,000 trees including 20 different native species. After one growing season, survival in the progeny test was 86.1%. This site has been used for outreach to demonstrate FRA techniques on previously reclaimed mines to other landowners who wish to have forestland on the mined portions of their properties. The landowner is currently pursuing EQIP financial assistance to remove invasive species and to reforest the remaining reclaimed areas of the property using the FRA techniques.

Clockwise from top left: a) Coshocton County site after ripping. Residual native trees were not disturbed during ripping. b) Bob Brannon and District Conservationist Chuck Reynolds plant, shelter, and record locations for the progeny test planting. c) a "Restoration Chestnut 1.0" emerging from a shelter 3 months after planting. d) Butterfly weed (*Asclepias tuberosa*) and many other native wildflowers returned after 1 year.

Harrison County, Ohio - 2014

Acres: 18
Trees planted: 14,080

This active mining operation had never implemented the FRA and was accustomed to conventional reclamation techniques and establishing pastureland. The landowner raises cattle and produces hay but he desired forest on the upper slopes. The state mine inspector advised that conventional reclamation practices would have excessive seedling mortality, so ARRI and TACF worked with the mine operator, state and federal inspectors, and the landowner to implement the FRA. Due to regulations regarding surface material, it was decided that ripping along the contour after re-distributing topsoil would be the best course of action to minimize erosion and maintain a loose rooting zone. The site was not seeded, which allowed native plants to establish across the site. The mine operator was very pleased with the results and intends to use this and other FRA techniques on future permits that call for tree planting as part of the revegetation plan. The mine operator is also a large landowner in the area and he is willing to provide previously reclaimed lands for additional reforestation projects, should funding become available.

The CIG progeny test in Harrison County, OH. This project was not seeded to allow non-competitive groundcovers to establish naturally. Survival was 82.2% after one growing season.

Clinton County, Pennsylvania – 2014

Acres: 28.5
Trees planted: 21,038

This site in north-central Pennsylvania lies within the Chesapeake Bay Watershed and it is also within a focal area for golden-winged warbler conservation. This surface mine, and others to the west, created fairly large openings in a predominately forested area. Our hope is that the young forest habitat created by this planting will benefit golden-winged warblers in the short term, and, as the canopy closes and the forest matures, that it will benefit forest interior dependent species such as cerulean warblers in the long term by closing the forest openings and by providing differing age-classes of forest. This site had been reclaimed as pastureland in the late 1990's. During reclamation, a layer of biosolids was applied and chiseled into the mine spoil to improve fertility. The site was cross-ripped to mitigate the compaction and more than 21,000 seedlings composed of 17 native species were planted. TACF and GFW worked with NRCS and local volunteers to install the progeny test and a professional contractor was hired to plant the mixed hardwood area.

The landowner and the bulldozer operator inspect the reforestation area after cross-ripping in Clinton County, Pennsylvania. (*photo by N. Hall*)

Centre County, PA - 2015

Acres: 56

Trees planted: 39,225

This site is an Abandoned Mine Land that had been left un-reclaimed since at least the 1950's and possibly as early as the 1930's or before. Records could not be found for the mining that had occurred in the area. Acid-producing material had been left on the surface and a highwall was present. The area had also been used as an illegal dump by local residents. The Pennsylvania Department of Environmental Protection – Bureau of Abandoned Mine Reclamation (BAMR) worked with the landowner to develop a plan to reclaim the area to forest. TACF, ARRI, and GFW worked with BAMR, the landowner, and the heavy equipment operators to implement the FRA on the site. Reclamation included the removal and proper disposal of the illegally dumped garbage and windrowing of established vegetation at the bottom of the hill to create wildlife habitat and to limit un-authorized vehicular access to the site. The highwall was eliminated by pushing material upslope to re-establish the contour and alkaline additions were made to counteract the acid-producing material. Techniques to implement the FRA included and both ripping and pushing up loose piles of spoil with a bulldozer to blend lime into the growing medium. Once the final grading was completed, a tree-compatible seed mix was lightly seeded across the site to reduce erosion while allowing native vegetation and planted seedlings to establish. Professional tree planters were contracted to plant the mixed hardwood area and the progeny test was then planted by volunteers. An initial inventory by BAMR employees showed a germination and survival rate of 75% at three months after planting.

Clockwise from top left: a) Illegal dump below the highwall before removal and proper disposal. b)Acid-producing material on the surface was draining into the watershed and contributing to acid and metal loading (Al, Fe, Mg, et al.). c) Windrows of brush and FRA-grading. Tree shelters for the progeny test can be seen in the upper left. d) A Restoration Chestnut emerging from a shelter, 3 months after being planted as seed. (*photo in d. by R. Oshaben*)

3. Provide technical assistance to 5 or more private landowners to help them determine chestnut feasibility on their property.

Throughout this CIG, TACF, ARRI, and GFW consulted with dozens of landowners, of both private and public lands, to help them determine the feasibility of establishing chestnuts on their properties. The CIG projects themselves required consultation with 15 private landowners (3 projects transected adjoining properties). However, through our outreach to locate and evaluate potential project locations, more than 2 dozen other private landowners were consulted. Although their lands were not suitable for the CIG due to size, location, EQIP eligibility, or the restriction to 12 total CIG sites, many additional sites were reforested using FRA techniques through financial and/or technical assistance provided by TACF, GFW, and ARRI.

Additionally, the training workshops held throughout the region were open to the public. Through the workshops we presented hundreds of private landowners with information regarding mined land reclamation for reforestation, American chestnut restoration, and NRCS programs (*see section 6 – Training workshops below*).

4. Develop an online relational database to allow natural resource professionals and participating landowners to enter detailed information on tree plantings.

This CIG enabled TACF to make significant progress toward the development of the Trees Database, an innovative online relational database that will store, share, and track data on American chestnut plantings. TACF staff and volunteers are in the process of inputting historic and current data, so that the database can be used going forward to track and evaluate the progress of the breeding program. Data from progeny tests installed for the CIG plantings has already been uploaded, as well as significant amounts of data from TACF's Meadowview Research Farms and State Chapter breeding programs. The Trees Database will be a crucial tool going forward for TACF's scientists, staff, and cooperators to track the vast amount of data necessary to monitor all aspects of a this long-term project to restore the American chestnut.

Although CIG funding for this project has been expended, TACF has secured additional funding to continue the development of the Trees Database. Over the past year, a new firm has taken over the project, increasing the efficiency and productivity of development. Significant improvements have been added to the database such as: new modules that handle wild tree data and nut distribution and improvements to how traits are entered and defined, including the ability to enforce data type constraints on traits. The security model of the database system has been improved to protect personally identifiable information for planting sites and wild trees on private property. Several improvements have been made to the administrative tools within the system, including the ability to now present to users the terms and conditions for use of the system and the data therein. All of this has been possible by building upon the system foundation developed with funds from CIG.

The database can be found at: http://acf.herokuapp.com/users/sign_in. A user account is required for this tiered-access site.

5. Create a technical manual for landowners planning to grow American chestnut.

TACF staff have developed a technical manual that describes American chestnut's history, ecology, demise, and current restoration efforts. The manual also covers forest stewardship and management and provides recommendations for landowners who wish to grow chestnuts. The manual was composed in the format of an NRCS Technical Note and will be available to landowners if NRCS determines that it meets the guidelines for an NRCS National Technical Note.

6. Provide twelve, 8-hour workshops for NRCS partners and volunteers on how to grow American chestnut trees and methods to monitor the stands' success and survival in each of the five states where we will focus.

During the course of this grant, TACF, ARRI, and GFW hosted a total of 25 training workshops throughout the 5-state region encompassed by this CIG. These workshops informed participants

about the Forestry Reclamation Approach on both active and previously reclaimed surface mines, American chestnut restoration and monitoring, and NRCS programs. 14 workshops that were open to the public were widely advertised through outreach by TACF, NRCS, Extension agencies, and media outlets such as newspapers and local radio stations in close proximity to the workshops and project sites. When workshops were held before volunteer planting events, attendees were invited to join the volunteer event. Field trips to see the sites and perform hands-on instruction of methods for monitoring and measuring trees were a part of many of these workshops. Total attendance, including professionals and members of the public at these workshops was 594. Eleven additional 8-hour workshops specifically targeted state regulatory professionals and land managers. Through these workshops, we reached an additional 299 professionals.

In addition to the training workshops, various presentations describing the CIG implementation and results, the FRA and mined land reforestation, and chestnut restoration were given at numerous conferences throughout the region. These conference presentations reached approximately 500 additional individuals.

7. We will provide NRCS with the following as requested: semi-annual reports, supplemental narratives to support payment requests, a final report, performance items specific to the project that indicate progress, and a new technology and innovative approach fact sheet. We will also participate in at least one NRCS CIG showcase during the grant period.

Semi-annual reports and payment requests have been submitted throughout the course of the grant period. The new technology and innovative approach fact sheet has been drafted and will be submitted with the final performance report. On August 15, 2013, Michael French participated in an NRCS CIG webinar that was conducted at Ag Progress Days, which is held annually by Pennsylvania State University near State College, PA. This webinar showcased numerous CIG projects that had been awarded in recent years.

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