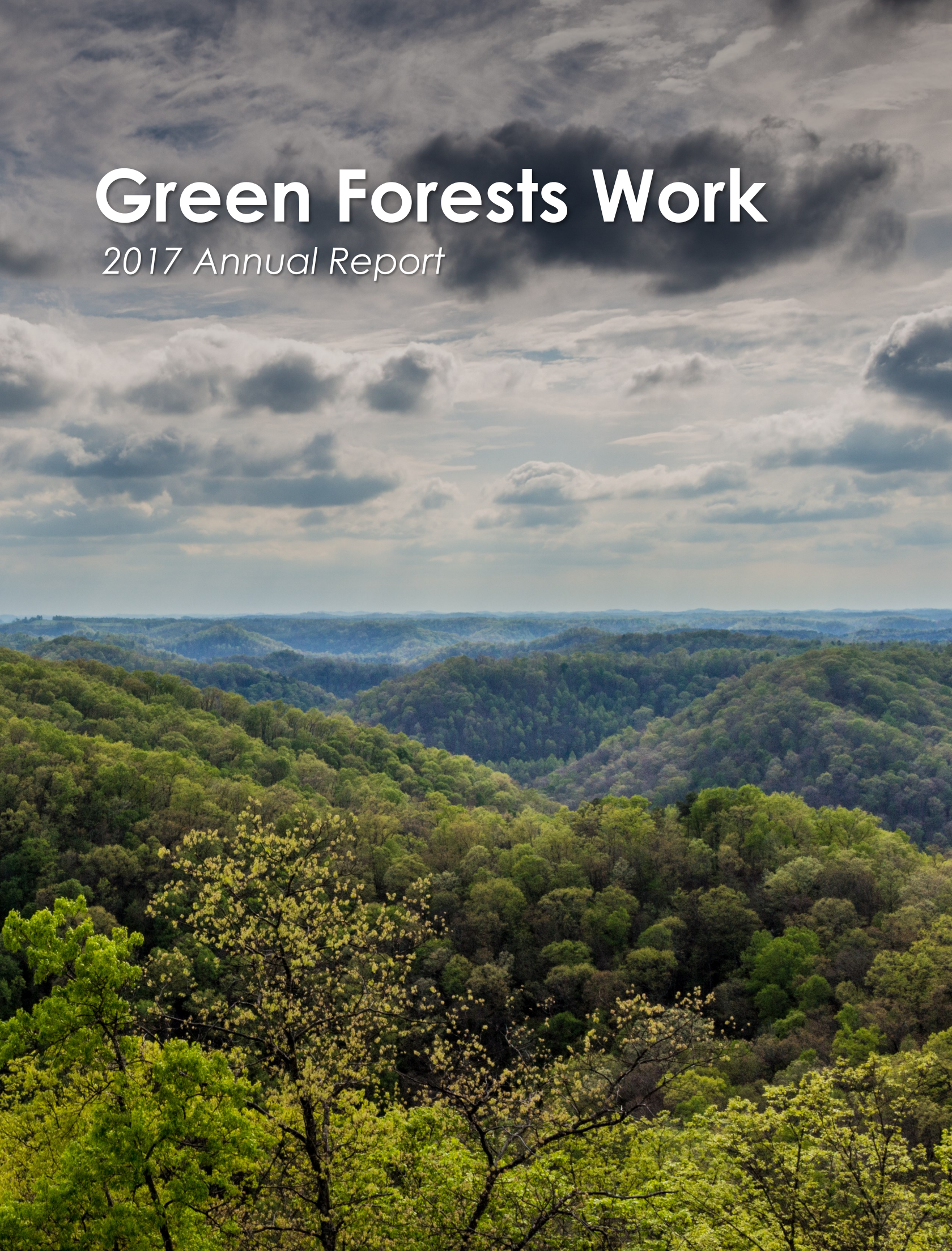
Green Forests Work

2017 Annual Report



Twenty year old research plots on a surface mine in Breathitt County Kentucky show how the Forestry Reclamation Approach allows native forests to be re-established after reclamation.

Front Cover: The view from the fire tower at the University of Kentucky's Robinson Forest provides a 360 degree view of the Appalachian mountains.

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A LETTER FROM THE PRESIDENT

On Saturday, April 22, 2017, Green Forests Work in cooperation with the Appalachian Regional Reforestation Initiative, the Arbor Day Foundation, The American Chestnut Foundation, the University of Kentucky Appalachian Center, the Robinson Center for Appalachian Resource Sustainability and Kentucky Writers and Artists for Reforestation hosed a volunteer tree planting event in Breathitt County, Kentucky in support of Earth Day and the Plant for the Planet: Billion Tree Campaign. This event involved local writers, artists and other volunteers who planted thousands of indigenous hardwood trees and wildlife shrubs to restore forest habitat in an area that was previously mined for coal. Not only was the event a day to celebrate our planet, but it also coincided with the planting of our two-millionth tree!

The Earth Day event demonstrated how Green Forests Work has grown over the years with our numerous partners and multi-faceted objectives for tree planting and volunteerism. Inspired by 2004 Nobel Peace Prize Laureate Wangari Maathai who believed that, "When we plant trees, we plant the seeds of peace and seeds of hope", Green Forests Work continues to fulfill its commitment to plant for the planet's present and future generations.

Since 2009, Green Forests Work has supported the reforestation of thousands of acres of surface mined land in nine states – Alabama, Kentucky, Maryland, Ohio, Pennsylvania, Tennessee, Texas, Virginia and West Virginia. Moreover, our work has led to new reforestation initiatives in other parts of the US and abroad. These reforestation projects not only benefit the environment through the creation of wildlife habitat, they also provide clean air and water and help mitigate climate change. Many of the trees and shrubs we have planted will benefit pollinators and other imperiled species, such as neo-tropical songbirds and bats. These projects have also provided economic opportunities for the Appalachian region through site preparation, seedling production, forest management, and will continue to do so in the future through harvesting of timber and non-timber forest products. Rehabilitation of these mines provides new opportunities for lands that are often considered marginal and contributes significantly to the development of a sustainable and economically viable future.

The inspiration provided by Wangari Maathai is encapsulated in her belief that "… the act of planting a tree reconnects the human spirit to the beauty and importance of the natural world – the basis for all life on Earth". This belief is also at the heart of the nearly 15,000 volunteers who have come together to plant trees in an important part of the United States. As we move into 2018, we look forward to developing new and varied partnerships and will continue our mission to bring back the forest in Appalachia.

-Dr. Chris Barton

BACKGROUND

WHO WE ARE

Green Forests Work (GFW) is a non-profit organization whose mission is to reforest coal surface mine lands in Appalachia that were previously reclaimed using practices that prevent effective reforestation. A conversation among Appalachian Regional Reforestation Initiative (ARRI) collaborators about the need for economic development and environmental improvement in the Appalachian region laid the groundwork for the foundation of GFW. Green Forests Work staff work with landowners and land managers, contractors, and natural resources professionals to develop and implement reforestation projects that will benefit society through cleaner air and water, improved wildlife habitat, and economic opportunities.

MISSION

Green Forests Work exists to re-establish healthy and productive forests on formerly mined lands in Appalachia.

VISION

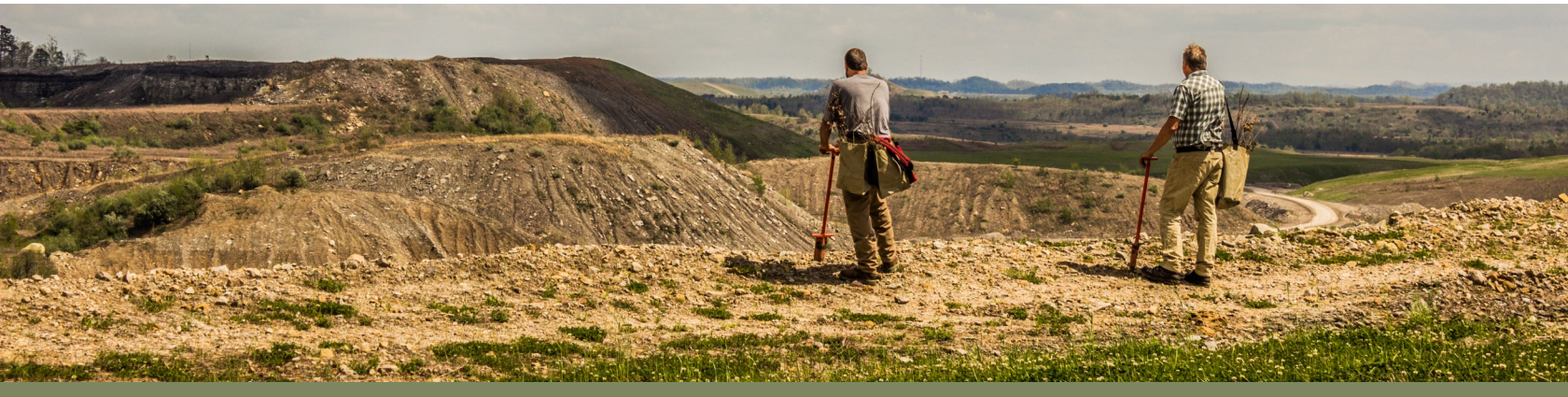
Our vision is to create a renewable and sustainable multi-use resource that will provide economic opportunities while enhancing the local and global environment by converting reclaimed, non-native grasslands and scrublands into healthy, productive forestland. Our reforestation projects provide jobs for equipment operators, nursery workers, and tree planters, and improve the environment by eradicating exotic species and restoring ecosystem services. With the help of our partners and volunteers, this vision is quickly becoming a reality—since 2009, we have planted more than two million trees on more than 3,200 acres, but there are nearly one million acres left to reforest.

CORE GOALS

- Create employment opportunities and advance sustainable economic development
- Increase biodiversity and provide wildlife habitat, especially for threatened, endangered, or sensitive species and pollinators
- Improve water and air quality
- Mitigate climate change through carbon sequestration
- Foster a sense of community and pride in natural and cultural heritage through opportunities for volunteerism

THE NEED FOR REFORESTATION

Surface mining in Appalachia has replaced approximately one million acres of eastern deciduous forest, one the most diverse and valuable forests in the world, with primarily non-native grasses and shrubs. The limiting factor in natural, native recolonization of mined lands is excessive soil compaction caused by reclamation practices prior to the introduction of the Forestry Reclamation Approach, which led to many reforestation failures following mining. In addition, reclamation for pastureland and wildlife habitat post-mining land uses often consisted of planting aggressive and primarily non-native grass and shrub species that could survive in the compacted soils. However, many of the created pasturelands are seldom grazed, so they are quickly invaded by additional invasive, exotic species that can tolerate the soil conditions. These pasture- and scrub-lands also pose a threat to the surrounding native vegetation by acting as a nursery for invasive, exotic species whose bountiful seed stock is easily spread by wildlife such as birds and deer. While native hardwood species may naturally recolonize reclaimed sites, the timeframe for that to occur is in the order of decades or centuries. The ecological and social benefits Appalachian forests provide are too vast to postpone for this long, which is why GFW must facilitate the healing process.



APPROACH

Green Forests Work uses a modified version of ARRI's Forestry Reclamation Approach (FRA). By following the steps, below, GFW is converting compromised lands back into healthy and productive native forests that will provide sustainable economic development.

1. Securing Planting Sites

GFW seeks bond-released surface mine sites on public or private lands where pre-FRA reclamation practices were used and successful reforestation is unlikely to occur in a reasonable timeframe.

2. Site Preparation

When necessary, local contractors are hired to control exotic vegetation by mechanical removal and/or targeted herbicide and to mitigate soil compaction by deep ripping the ground with a 3-5 foot long ripping shank pulled by a large bulldozer or excavator.

3. Tree Planting

A mix of native, early successional tree and shrub species are selected for wildlife benefits and to create a commercially valuable future crop, including The American Chestnut Foundation's potentially blight-resistant American chestnuts. Bareroot seedlings are purchased from state or local commercial nurseries, and occasionally mature, containerized plants are used to provide immediate wildlife benefits. Seedlings are planted on an 8'x8' spacing to initially provide approximately 680 trees per acre. Volunteer groups or professional tree planters perform the tree plantings. Volunteer events are used as an education and outreach opportunity.

4. Monitoring

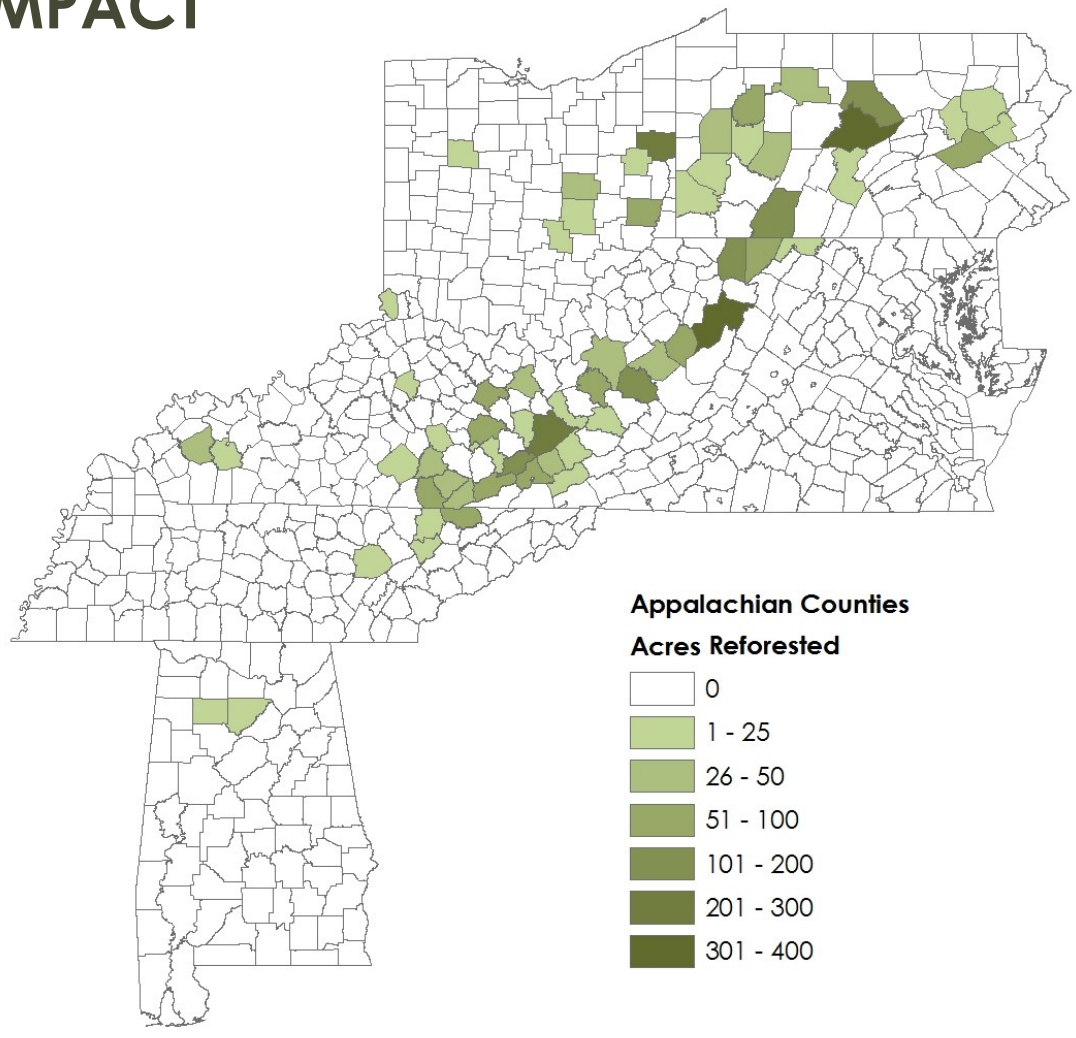
Site visits are conducted on a yearly basis to assess tree survival and growth. Follow-up maintenance and plantings are performed when necessary.

REFORESTATION PROCEDURE HISTORY

The Surface Mining Control and Reclamation Act (SMCRA) of 1977 was created by the U. S. Office of Surface Mining Reclamation and Enforcement (OSMRE), whose mission was to enforce a new set of reclamation guidelines that would standardize reclamation practices for the mining industry. Prior to SMCRA, some mining operations practiced "shoot 'n shove" mining, where overburden was "shot" off the coal seam and "shoved" downhill. Revegetation requirements were minimal and varied from state to state, as there was no national standard. The loose piles of overburden could support tree growth, but they were also highly unstable. As a result, large landslides occurred and created a hazard to public safety. SMCRA addressed this issue by requiring more intense grading. The overburden was used to backfill the mined area to achieve the approximate original contour, but the grading led to severe soil compaction. Native hardwood trees could not tolerate the compaction and competition from aggressive groundcovers, so mining operations moved away from forestry reclamation (i.e. planting trees) to establishing hayland/pasture to meet revegetation requirements. Without management, the pastures were quickly (within 10 years) overcome with invasive, exotic species and resided in a state of arrested succession. Researchers foresaw the unintended consequences of SMCRA and began developing a method of reclamation in the 1980s that would allow both stability and tree growth. By 2004, there were numerous scientific studies supporting what became known as the Forestry Reclamation Approach (FRA).

The OSMRE created the Appalachian Regional Reforestation Initiative (ARRI) in 2004 to coordinate the implementation of the FRA. After making progress with the active mining industry, ARRI members began to look back at the sites reclaimed under SMCRA that led to their establishment, so called "legacy" mines. Experimental re-reclamation of legacy mines by ARRI members revealed the need for increased scale to stimulate the economic development and environmental improvement Appalachia needed, thus the idea of Green Forests Work was born. Further research laid the groundwork for the modified version of the FRA that we use today.

OUR IMPACT



GFW has undertaken reforestation projects on coal mined land in eight Appalachian states (AL, KY, MD, OH, PA, TN, VA, and WV). The legacy of coal mining is not consistent across the coal field and the number of trees planted per state are representative of this trend.

State	Acres Reforested	Trees Planted	Volunteers
AL	16	10,633	54
KY	909	587,842	4,625
MD	87	57,460	532
OH	384	267,707	1,052
PA	888	568,028	4,497
TN	75	47,858	741
TX	0.3	163	86
VA	130	73,645	2,353
WV	824	445,757	1,225
TOTAL	**3,313**	**2,059,093**	**15,165**

** Includes interplantings*

Year Planted	Acres Reforested	Trees Planted	Volunteers
2009	37	35,155	558
2010	204	145,285	931
2011	670	352,516	1,663
2012	321	228,249	2,577
2013	381	256,182	1,949
2014	362	200,181	1,941
2015	629	374,038	2,082
2016	386	239,720	2,140
2017	279	195,501	1,132
TOTALS	**3,269**	**2,026,827**	**14,973**

** Excludes interplantings*

2017 marked the planting of our two millionth tree! Although two million trees is significant, there are still one million acres left to reforest.

An army of passionate volunteers have helped GFW realize their goals. In 2017, more than 1,000 individuals, including K-12 and college students, environmental and conservation groups, private corporations, government organizations, and public citizens, helped reforest Appalachia.

2017 PROJECT HIGHLIGHTS

APPALACHIAN FOREST RENEWAL INITATIVE

In 2015, GFW was awarded funds from the US Forest Service—State and Private Forestry through the National Fish and Wildlife Foundation to support the Appalachian Forest Renewal Initiative (AFRI). The goal of the AFRI is to support forest restoration projects in the Appalachian coal region that improve habitat for species of conservation concern such as Cerulean and Golden-winged warblers. In 2017, two surface mine reforestation projects, one in Tennessee and one in Kentucky, were completed to support this initiative.

In cooperation with ARRI, the University of Tennessee, and the University of Kentucky, GFW reforested 32 acres at a site owned by Molpus Woodlands Group in Claiborne County, Tennessee (Figure 1). Approximately 21,700 bare root seedlings were planted, including shortleaf pine and The American Chestnut Foundation's (TACF) most advanced generation of potentially blight-resistant American chestnuts. The species planted were selected to mimic a shortleaf pine-oak forest type. The restoration work will benefit numerous wildlife species including populations of bobwhite quail and prairie warbler. Quail have been observed in the area adjacent to the restoration site. Thus, our work and proposed prescribed burns support the Bobwhite Conservation Initiative and will lead to population improvements in an area where restoration has a high probability of success. Our efforts to restore native upland forests and associated historic fire regimes will also benefit prairie warbler populations, which have declined by an average of 2.1% over the last 50 years.

The Kentucky site (2,700 ft) is located in southern Pike County near the town of Dorton and is currently owned by the Big Sandy Company (Figure 2). Approximately 11,050 bare root seedlings were planted, including TACF's most advanced generation of potentially blight-resistant American chestnuts. The species planted were chosen to mimic a mixed mesophytic hardwood forest typical of eastern Kentucky and the Cumberland Plateau. The Kentucky project site is ideally suited for Golden-winged warblers due to its elevation and its proximity to existing second-growth forest. The tree and shrub species selected for this site are those that would favor Golden-winged warblers in the short-term and Cerulean warblers in the long term. Exfoliating bark species such as oaks and hickories will also provide roost sites for bats as the trees mature and other fruit-producing trees and shrubs such as black cherry, sassafras, and dogwoods will benefit other native songbirds as well. The benefit of this project is already being realized by northern bobwhites. After the exotic, invasive shrubs and stunted trees were cleared from the site, a mix of herbaceous vegetation returned, including milkweeds, asters, ragweeds, and clovers. Scott Freidhof, a wildlife biologist with the Kentucky Department of Fish and Wildlife Resources, flushed a covey of quail near the edge of the project while conducting a survey for Golden-winged warblers in June 2016 after the site was cleared. It was the first sign of quail that he had documented there since 2009.

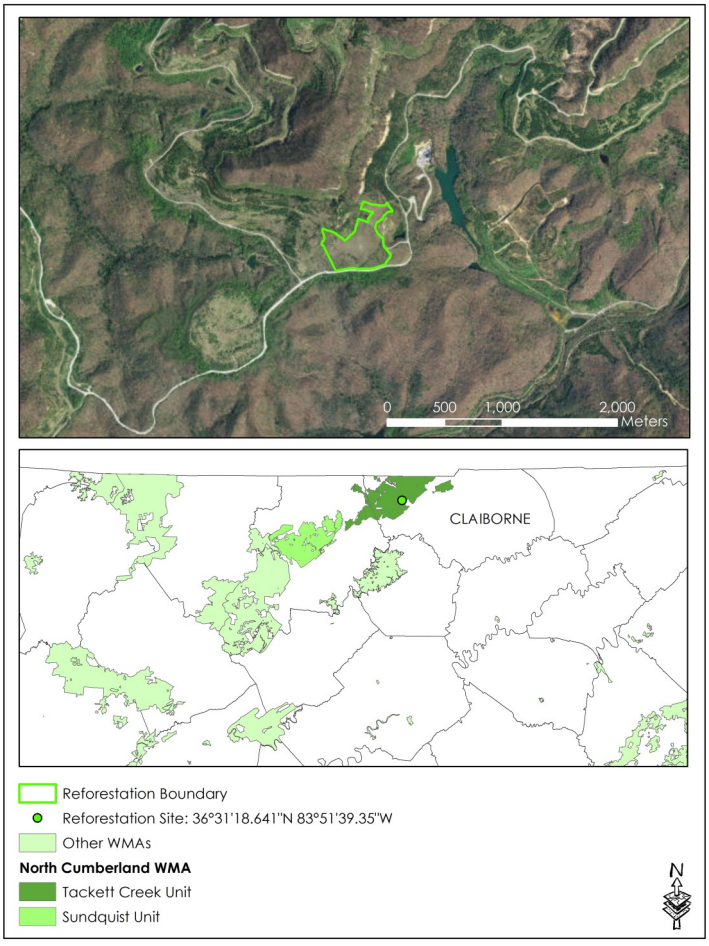


Figure 1. Aerial imagery and locator map of TN reforestation site.

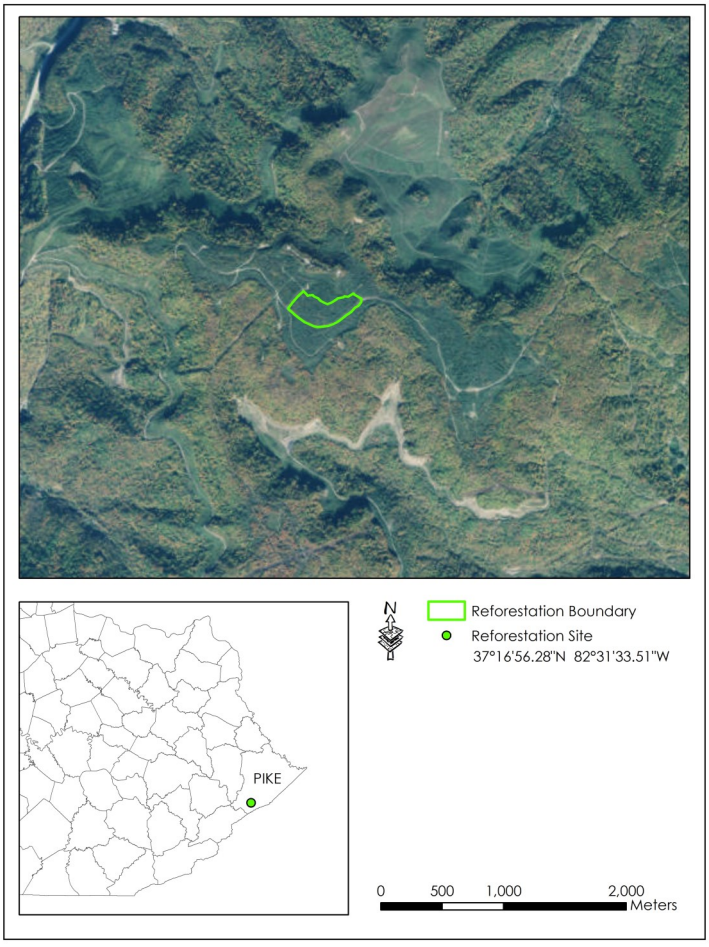


Figure 2. Aerial imagery and locator map of KY reforestation site.

A professional planter reforests the KY site, which offers a beautiful vista of Appalachia.

DANIEL BOONE NATIONAL FOREST

In 2016, GFW partnered with the United States Forest Service—Daniel Boone National Forest (USFS-DBNF) and others to reforest approximately 29 acres of surface mined land in the London District of the DBNF. This partnership led to a second reforestation project in the London District on nearly 14 acres in 2017 (Figure 3).

The 2017 project site was once forested, but was reclaimed to hay/pastureland following mining. Since the site was not managed for its intended use, it quickly transformed to an early successional habitat dominated by exotic plant species and remained as such for approximately 30 years due to the excessive soil compaction that was required by reclamation regulations at that time. Without intervention, the site was likely to stay in this state of arrested natural successional for decades if not centuries. The goal of this project was to improve ecosystem services by restoring native forest cover to benefit wildlife and improve soil health and water quality.

Although the majority of GFW's planting labor is performed by professionals, volunteer tree planting events provide a great opportunity for education and outreach. Volunteers are taught tree planting techniques, the history of reclamation, methods used to implement the reforestation project, as well as the benefits of reforestation. These events help raise awareness of environmental issues and empower people to take action. The DBNF site served as the primary volunteer tree planting site in 2017, catering to groups such as Angel's Envy, Appalachian State University, Berea College, Drew University, Radford University, and Xavier University just to name a few (Figure 4). Volunteers planted all but two acres of the project site, so local professional landscapers were hired to complete the site. More than 6,500 one-year-old bare root seedlings were planted, including shortleaf pine and TACF's most advanced generation of potentially blight-resistant American chestnuts.

Conducting mined land reforestation projects on public lands could arguably be one of the best locations for these efforts, as large, contiguous forests provide more and better quality ecosystem services. Replacing invasive species with native trees and shrubs will protect the surrounding forest's health while creating an early successional habitat that will provide numerous wildlife benefits in the short term and help close canopy gaps in the long term to better service habitat specialists such as the Cerulean Warbler. Public land reforestation projects also provide great opportunities for research, education, and outreach. The 2016 reforestation site has already been utilized by the USFS-DBNF for such purposes.

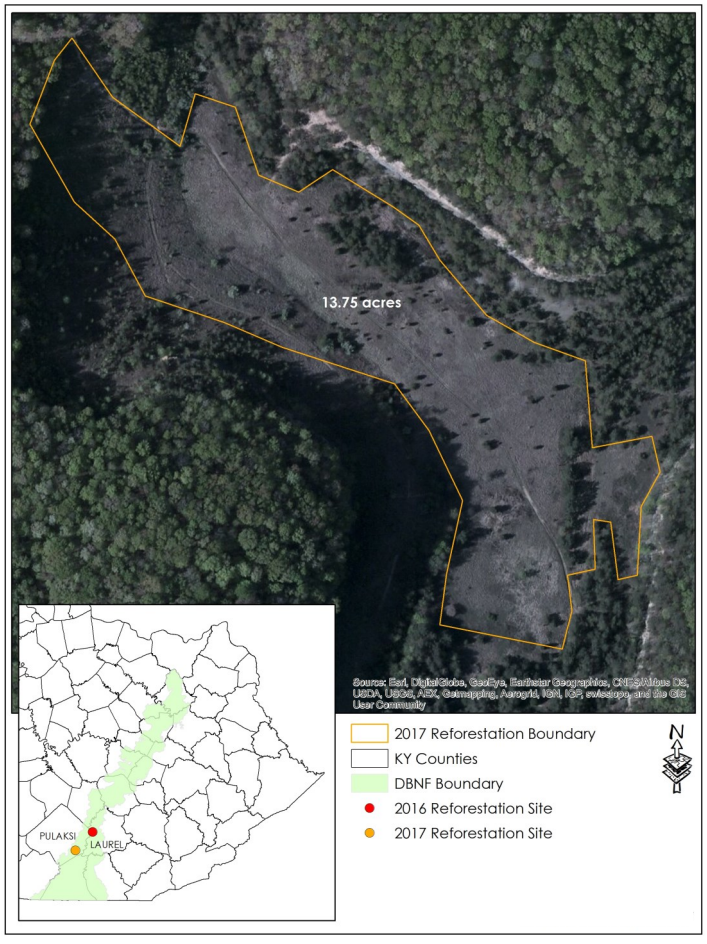


Figure 3. Locations of 2016 and 2017 sites and reforestation boundary of 2017 site.

Angels Envy's Toast the Trees campaign provides funds for white oak reforestation. Throughout the month of September, for every picture posted to social media of people enjoying Angels Envy with the hashtag #AE4theTrees, Angels Envy provides funds for a white oak seedling. The campaign, which is administered by the Arbor Day Foundation, supported the planting of nearly 7,000 white oaks in 2017.

Figure 4. Volunteers with Angel's Envy pose next to a white oak.

Highwalls, the exposed rock in the background, on both sides of the project site are remnants of the site's mining history. Current regulations require that highwalls be backfilled and landscape be restored to the approximate original contour.

MONONGAHELA NATIONAL FOREST

The Mower Tract (40,000 acres) of the Monongahela National Forest was purchased from the Mower Land and Lumber Company in the early 1980s. It is located on Cheat Mountain (4,848 ft) in Randolph and Pocahontas Counties, West Virginia (Figure 5). The Mower Tract and the surrounding high elevation areas were historically dominated by old-growth red spruce and red spruce-northern hardwood forests; but after the industrial logging era of the late 19th and early 20th centuries, the red spruce ecosystem was reduced from 1.4 million acres to approximately 50,000 acres in the West Virginia highlands. Areas where red spruce once existed were often replaced by even-aged hardwood dominant forests, after unnaturally hot wildfires caused by clear-cut slash eliminated the red spruce seed source. Extensive logging was linked to regional flooding and was key to the establishment of the Monongahela National Forest. In addition to logging, coal mining further reduced and prevented the re-establishment of red spruce communities in West Virginia. In the Mower Tract, approximately 2,000 acres were surface mined for coal. Starting in 2010, the United States Forest Service - Monongahela National Forest began a partnership with GFW and the ARRI to conduct a suite of restoration activities, including non-native species removal, organic matter loading, soil de-compaction, mined land reforestation, and wetland creation. In the short term, the goal is to create an early successional habitat, with the ultimate goal being to establish a forest that is at least 30% red spruce.

In total, 471 acres, including approximately 900 created wetlands (Figure 6), have been restored with more than 210,000 plants of nearly 40 different species with the help of more than 400 volunteers. Depending on the species, plants were established through directing seeding, bareroot seedlings, containerized/potted plants, and seedling plugs. Red spruce was largest component of every planting, comprising 48 percent of the total species planted. Other native species were selected based on their benefit to wildlife, their association with red spruce forests and wetlands in the High Alleghenies, and how they compete with red spruce.

Aerial photograph of the 2013-2014 restoration site following non-native species removal.

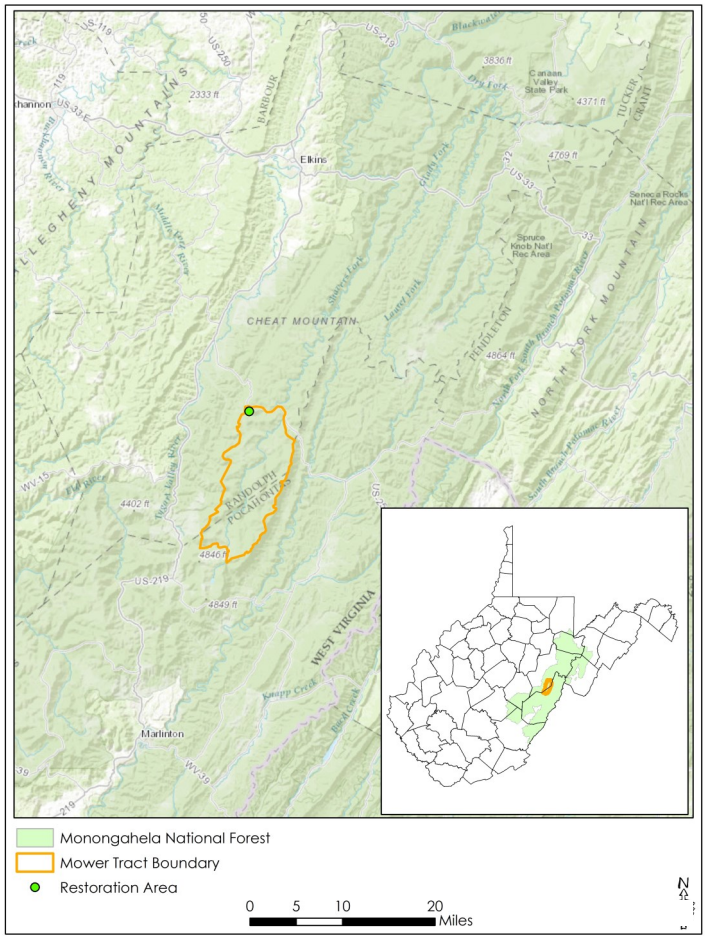


Figure 5. Locations of 2016 and 2017 sites and reforestation boundary of 2017 site.

Figure 6. One of the 900 wetlands created in the Mower Tract. The wetlands were created to intercept and retain precipitation and groundwater and trap sediment. They also provide habitat for amphibians and other wildlife species, and they provide suitable conditions for 145 state rare plant species known to be associated with wetlands in the High Alleghenies, including 60 critically imperiled (S1) species, 56 imperiled (S2) species, and 29 vulnerable (S3) species.

Volunteer tree planter are primarily students from local schools (elementary through vocational) and colleges. The planting events were used as an opportunity to teach the students about the importance of red spruce to the ecosystem, why wetlands matter, and the role that restoration plays in protecting ecosystems from climate change

Flight 93 National Memorial

The Flight 93 National Memorial was created to commemorate the 40 passengers and crew members of United Airlines Flight 93, who courageously gave their lives to save others during the terrorist attacks on September 11, 2001. Passengers and the crew of Flight 93 forced the terrorists to crash the plane on a reclaimed surface mine near Shanksville, Pennsylvania, thwarting an attack on our nation's capital. In 2011, the National Park Service asked ARRI to assist with reforesting the reclaimed mine land surrounding what is now the Flight 93 National Memorial. Since then, ARRI and GFW have provided technical and financial assistance to annual reforestation projects and have helped organize volunteer tree planting events each spring.

In 2015, GFW was awarded a grant provided by the OSMRE that was administered by the National Fish and Wildlife Foundation. The grant supported the Secretary of the Department of the Interior's 'Engaging the Next Generation Youth Initiative' and the spirit of volunteerism across the US. The grant from OSMRE provided hands-on, educational field experiences for college students to be involved in the planting events from 2015-2017 and to establish permanent monitoring plots and perform an initial assessment of seedlings planted from 2012-2015. From 2015-2017, 105 students, representing five different universities, participated in planting event preparations and the tree planting events as part of the grant. The majority of the student groups were from Pennsylvania, and three of the five Universities attended multiple years. By participating in these activities, students are introduced to ecological restoration and the many entities that are involved in the work. We believe this is an invaluable networking and leadership opportunity for students, as well as an educational and meaningful experience. To date, reforestation has occurred on nearly 140 acres across six different sites (Figure 7). Approximately 3,000 volunteers have planted more than 102,000 seedlings, including TACF's potentially blight-resistant American chestnuts and the Forest Service's Dutch Elm Disease-resistant American elms. Other tree species planted mimic the white pine—red oak—red maple cover type that would naturally occur at this site. More than 30 native species of tree seedlings have been used so far, all common to this cover type.

Students from Pennsylvania sort seedlings for 2016 planting event.

University of Kentucky student plants a seedling with GFW's Director of Operations.

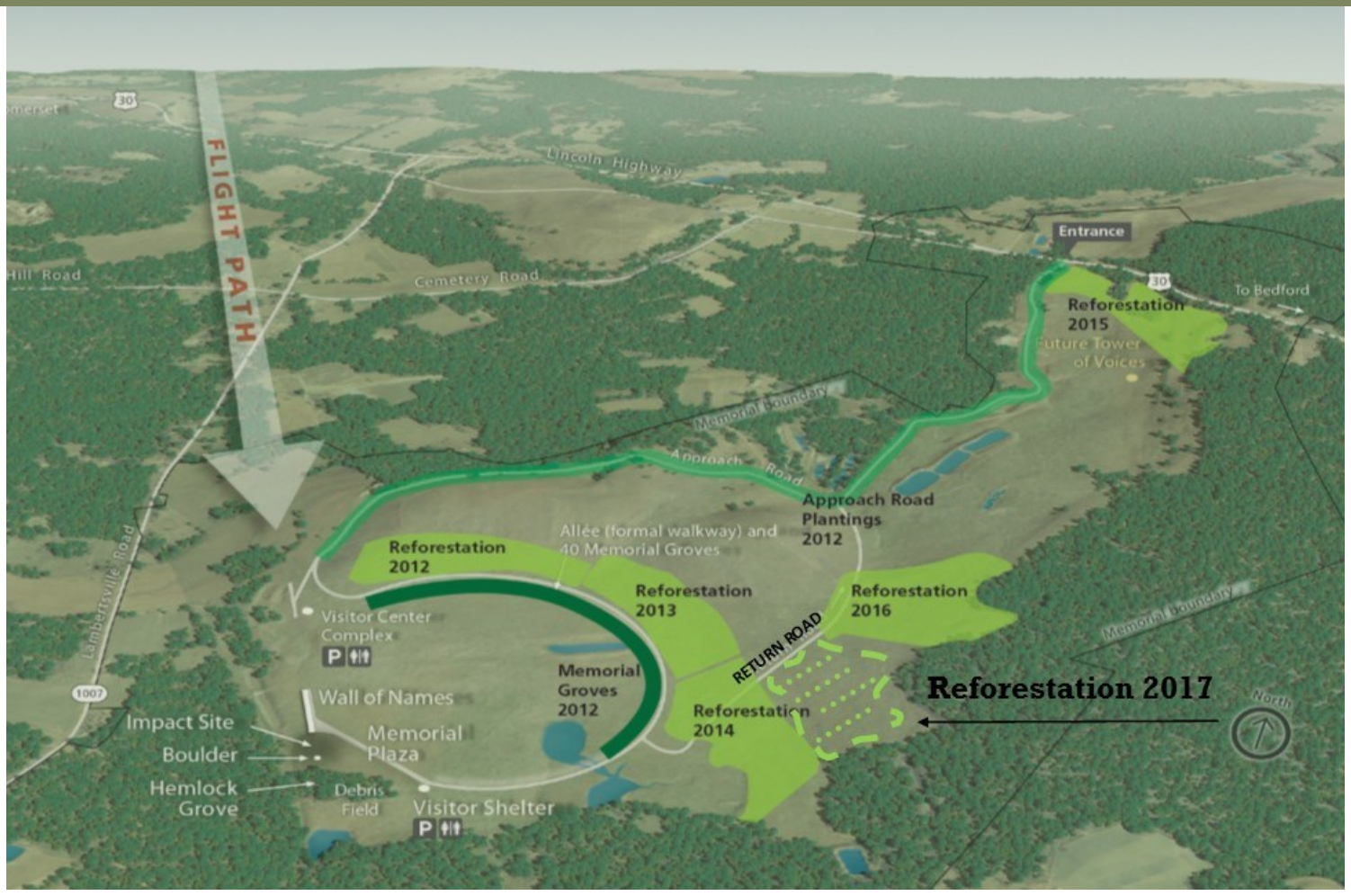


Figure 7. Map of the Flight 93 National Memorial reforestation sites. Figure Source: National Park Service: https://www.nps.gov/flni/planyourvisit/planttreesflni.htm

Biology students from Indiana University of Pennsylvania collecting monitoring data. Photo from http://www.iup.edu/news-item.aspx?id=201760

University of Kentucky's Robinson Forest

Robinson Forest is the University of Kentucky's experimental forest that is used for research, extension, and education. It is comprised of two main tracts: 1) The main block contains second-growth forest and is the largest contiguous forest in the area (4,200 ha); 2) The Paul Van Booven Wildlife Management Area (PVB-WMA) tract (1,900 ha) contains previously mined land that was reclaimed to pasture/hayland and wildlife habitat. To restore the original forest composition and the many ecosystem services it provided, Green Forests Work has been conducting mined land reforestation projects and other restoration work in Robinson Forest since 2015.

In 2017, three sites in the PVB-WMA and two sites on Revelation Energy's property were reforested (Figure 8), totaling nearly 43 newly reforested acres with more than 34,000 seedlings planted. Sites 9-12 were reforested as part of a University of Kentucky, Department of Forestry study on the impacts of mammal herbivory on Kentucky surface mine reforestation efforts. The areas surrounding the study plots at Sites 9-10 were primarily planted by approximately 106 volunteers, including participants from the Dimensions of Political Ecology conference (multiple states and countries represented), Christian Theological Seminary (IN), Sierra Club (KY), and from Eastern Kentucky University (KY), Hazard Community and Technical College (KY), and a newly formed initiative, Kentucky Writers and Artists for Reforestation. Site 13 was planted as an American chestnut orchard using TACF's most advanced generation of potentially blight-resistant seedlings. Volunteers from Hazard High School planted the seedlings and placed a tree protector and weed mat around each tree (Figure 9).

Robinson Forest is a top priority for mined land reforestation efforts in the state. Since the main block of Robinson Forest supports numerous species of concern and services many others, protecting the forest's health is critical so the many ecosystem services it provides can continue to function optimally. In addition to the many ecological reasons for conducting restoration in and around Robinson Forest, it is also a prime location because of the unique opportunities for research, education, and outreach it provides, as it is one of few public lands in Kentucky that contains surface mined land and healthy native forests.

A professional planter installs a tree protector around a seedling in one of the study plots.

Volunteers at the 2017 Earth Day event learned about the need for reforestation.

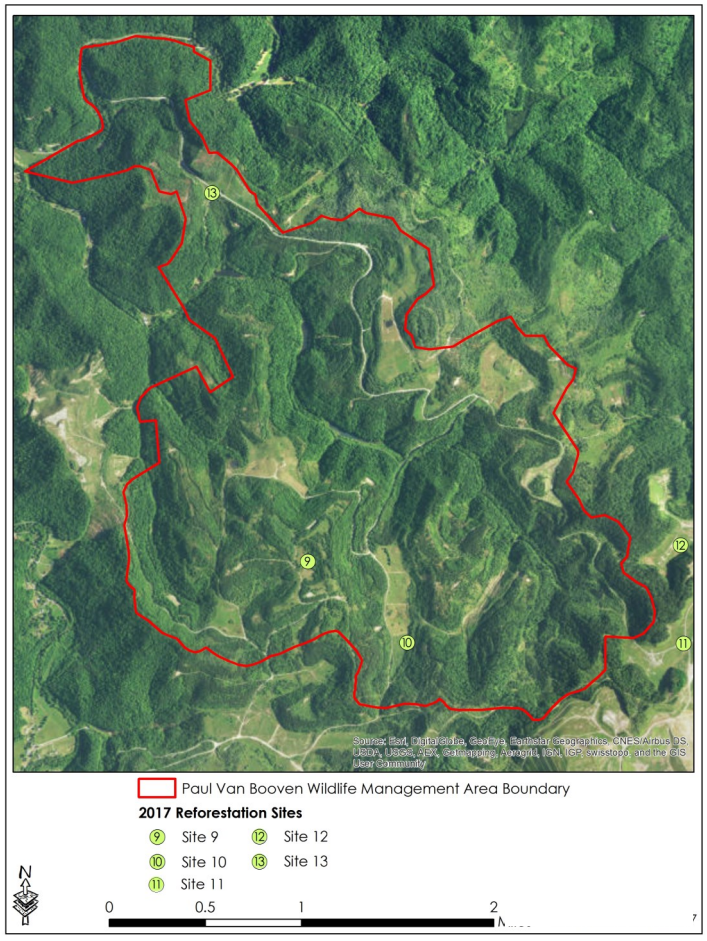


Figure 8. Locations of 2016 and 2017 sites and reforestation boundary of 2017 site.

Figure 9. An American chestnut is protected from herbivory and competition with a shelter and weed mat in a chestnut orchard established by students from Hazard High School.

Kentucky Writers and Artists celebrated our two-millionth tree planted in an area surrounding the study plots at Site 9. Photo © Michael Garland.

Pollinator Education & Habitat Creation

This project was a collaborative effort between Coal Country Beeworks, GFW, the University of Kentucky, ARRI, and Monsanto to conduct various pollinator workshops, displays, and presentations, primarily for youth in Kentucky. Many trees in the Appalachian region are good nectar and pollen producers, providing much needed support for pollinators. However, in the past many surface mines were reclaimed in a way that resulted in a loss of pollinator habitat. Green Forests Work and ARRI have been working together to return the native forest, and thus pollinator habitat, to these formerly mined, grass– and shrub-lands in Appalachia. As many active surface mines are being reclaimed to pollinator habitat and as reforestation is occurring on previously mined lands, forest-based beekeeping has become an increasingly viable option for a region that is struggling economically and looking for more sustainable solutions. Forest-based beekeeping could help to restore the cultural heritage of the region by re-connecting people to their landscape and helping them realize their dependence on a healthy, productive ecosystem. The introduction of forest-based beekeeping could also help promote healthier eating and lifestyle habits by educating the community on how honey can be used to replace refined sugars and how other bee products are healthier alternatives to many traditional products.

As part of this project, four different workshops were conducted throughout Kentucky: 1) Honey Cookery, 2) Soap Making, 3) Candle Making, and 4) Pollinator Habitat Creation (Figures 10-11). Workshops introduced participants to Appalachian forest-based beekeeping while teaching skills and conservation techniques related to forest fragmentation, pollinator health, pollinator habitat, and hive maintenance. The workshops began with educational activities concerning the local environment and ecology, particularly the trees, and then immersed students in bee-keeping and associated skills in the bee-arts in a variety of ways (cooking, wax classes, soap-making, salves, balms, etc.). These workshops were tailored to the age of the audience and were meant to instill an interest in pollinator protection and support.

A total of 25 workshops were conducted, reaching nearly 2,500 students and adults in 14 different Kentucky counties. Of the 14 Kentucky counties reached, nine of which are in the Appalachian Region, and eight of the nine Appalachian counties are economically distressed or at-risk, based on a designation from the Appalachian Regional Commission.

Figure 10. Mary Sheldon of Coal Country Bee-works fields a question from an elementary student following her presentation.

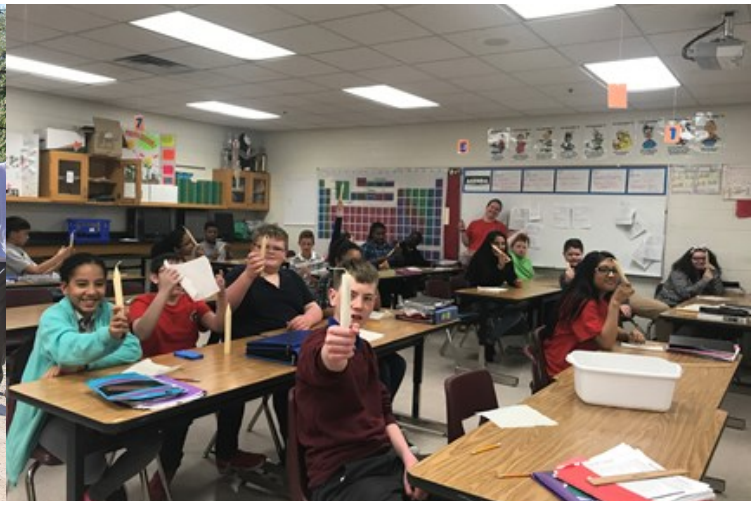


Figure 11. The 7th graders at Southern Middle School in Lexington, KY proudly show-off their handmade beeswax candles.

Students planted pollinator-friendly plants along a tributary of the Cane Run Creek on the University of Kentucky's Spindletop Farm. Photo Credit: Steve Patton, UK College of Agriculture.

Regional Conservation Partnership Program

Approximately 30 acres of private land in Knox County, Kentucky were reforested as part of the Cerulean Warbler Appalachian Forestland Enhancement Project being administered by the Natural Resources Conservation Service. The goal of the project is to enhance and re-establish forestland in Appalachia for Cerulean Warbler habitat. The property was surface mined for coal approximately 15 years ago and was subjected to conventional reclamation characterized by compacted mine soils. The property has been unmanaged and unused for its intended post-mining land use of hay and pasture and herbaceous plants and woody shrubs, including non-native and invasive species, dominate the property. The high mine soil bulk densities and competition from exotic plant species have caused the property to de-grade into a state of arrested or substantially slowed natural forest succession, rendering the site unable to return to a healthy, productive forest for many decades. The site was planted with 20,400 seedlings following brush removal and cross-ripping (Figure 12), including TACF's most advanced generation of potentially blight-resistant American chestnuts.

Figure 12. A dozer rips the soil in a direction periductular to the first rips to create a cross-hatch pattern that maximizes soil fracturing to alleviate compaction.

GFW STAFF & PARTNERS

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Art For Trees

Big Sandy Coal

Cherep's Excavating LLC

Dropseed Nursery

Monsanto

Mountain Ridge, LLC

Telenations, Inc. - TreeMedia

Treecycler

United Affiliates Corporation

Educational Groups

Appalachian School of Law

Appalachian State University

Belfry High School, Belfry, KY

Berea College

Buchanan County School District

Buckhorn High School, Buckhorn, KY

Dorton KY Elementary School

Drew University

Eastern Kentucky University

Emory University

Green Bank Middle School

Hazard Community College

Hazard High School, Hazard, KY

Indiana University of Pennsylvania

Keene State College

Leestown Middle School, Lexington, KY

Missouri Institute of Science & Technology

Pennsylvania State University-Altoona

Pennsylvania State University-Dubois

Pocahontas County High School (PCHS)

Radford University

Stephen F. Austin State University-Arthur Temple College of Forestry & Agriculture

Tracy Farmer Institute

University of Kentucky (UK)

UK Sustainability

UK, Appalachian Center

UK, College of Agriculture, Food & Environment

UK, Cooperative Extension Service - Perry County

UK, Department of Biosystems & Agricultural Engineering

UK, Department of Forestry

UK, Department of Mining Engineering

UK, Robinson Center for Appalachian Resource Sustainability

University of Massachusetts Boston

University of North Carolina-Chapel Hill

University of Tennessee

Viper Elementary, Viper, KY

Xavier University

Government Groups

AmeriCorps

Appalachian Regional Commission

Appalachian Regional Reforestation Initiative

Kentucky Department for Natural Resources

Kentucky Department of Fish & Wildlife Resources

Kentucky Division of Abandoned Mine Lands

Kentucky Division of Forestry

Kentucky Division of Mining Reclamation Enforcement

Kentucky Writers & Artists for Reforestation

Ohio Department of Natural Resources, Division of Wildlife

Pennsylvania Department of Conservation & Natural Resources

Pennsylvania Department of Environmental Protection, Bureau of Abandoned Mine Reclamation

United States Department of Agriculture (USDA), Forest Service-Daniel Boone National Forest

USDA, Forest Service-Monongahela National Forest

USDA, Forest Service-State & Private Forestry

USDA, Natural Resources Conservation Service

USDA, Natural Resources Conservation Service, Appalachian Plant Materials Center

United States Department of Interior (USDI), Fish & Wildlife Service

USDI, National Park Service, Flight 93 National Memorial

USDI, Office of Surface Mining Reclamation & Enforcement

United States Environmental Protection Agency

Virginia Department of Mines, Minerals, & Energy

Non-government Organizations

American Rivers

American Bird Conservancy

American Forests

American Rivers

Appalachian Headwaters

Appalachian Mountains Joint Venture

Appalachian Stewardship Foundation

Arbor Day Foundation

Be In The Water

Bluegrass Community Foundation

Canaan Valley Institute

Central Appalachian Spruce Restoration Initiative

Christian Theological Seminary (Disciples of Christ), Indianapolis, Indiana

Coal Country Beeworks

Dimensions of Political Ecology

Explore Kentucky Initiative

Foundation for the Carolinas

Friends of Decker's Creek

Friends of Flight 93 National Memorial

Jackson County Beekeepers Association

Just Transition Fund

Keep Nacogdoches Beautiful

Kentuckiana Beekeepers Association

Mennen Environmental Foundation

National Fish & Wildlife Foundation

National Park Foundation

Norfolk Southern Foundation

Sierra Club – Bluegrass Chapter

The American Chestnut Foundation

The Nature Conservancy

The Wilds

Foundation for Pennsylvania Watersheds

Pennsylvania Environmental Council

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