Transforming Formerly Mined Land Back to a Native Forest

2018-2019 Harrison County, OH

green forests work

BACKGROUND

A private landowner (shown on front cover) in Harrison County, Ohio—a county/region riddled with grasslands from surface mining—decided it was time to transform his 600+ acre property back to it's former glory as a native forest. Prior to the project, the landowner was leasing the property for hay and pasture land uses. He decided to forego this income because he believed it was the right thing to do:

"I want to make a place for wildlife. I want birds to have a place to nest, and I want deer and turkeys to have acorns to feed on. I want my grandkids to grow up and remember that I did this. I want to help improve the water and air. I can't think of a reason not to plant trees. I just think it's all good, period. Everybody wins—nobody loses."

- John Anderson, property owner

The first phase of the project began in 2018, where 140 acres were prepped and planted thanks to funding and services from Art for Trees, Green Forests Work, the United States Department of Agriculture, Luburgh, Inc., John Anderson (landowner), and the Arbor Day Foundation. This project was part of a multi-year, multi-state, Regional Conservation Partnership Program grant that was awarded to the American Bird Conservancy, the Appalachian Mountains Joint Venture, Green Forests Work, and other partners by the USDA – Natural Resources Conservation Service in 2015. This grant is intended to improve and create forest habitat for Cerulean warblers (*Setophaga cerulea*), an at-risk songbird, and other songbirds in Kentucky, Maryland, Ohio, Pennsylvania, and West Virginia.

The success of the 2018 project led to another project in 2019, planting an additional 181 acres. This project was funded by the Electric Power Research Institute, Art for Trees, Green Forests Work, and the Arbor Day Foundation.

Year Planted	Number of Acres	Project Funding Sources
2018	140	Art for Trees, Green Forests Work, United States Department of Agriculture, Luburgh, Inc., John Anderson, and the Arbor Day Foundation.
2019	181	Electric Power Research Institute, Art for Trees, Green Forests Work, and the Arbor Day Foundation.
TOTAL	**321**	

Table 1. Annual reforestation project acreage and funding sources.

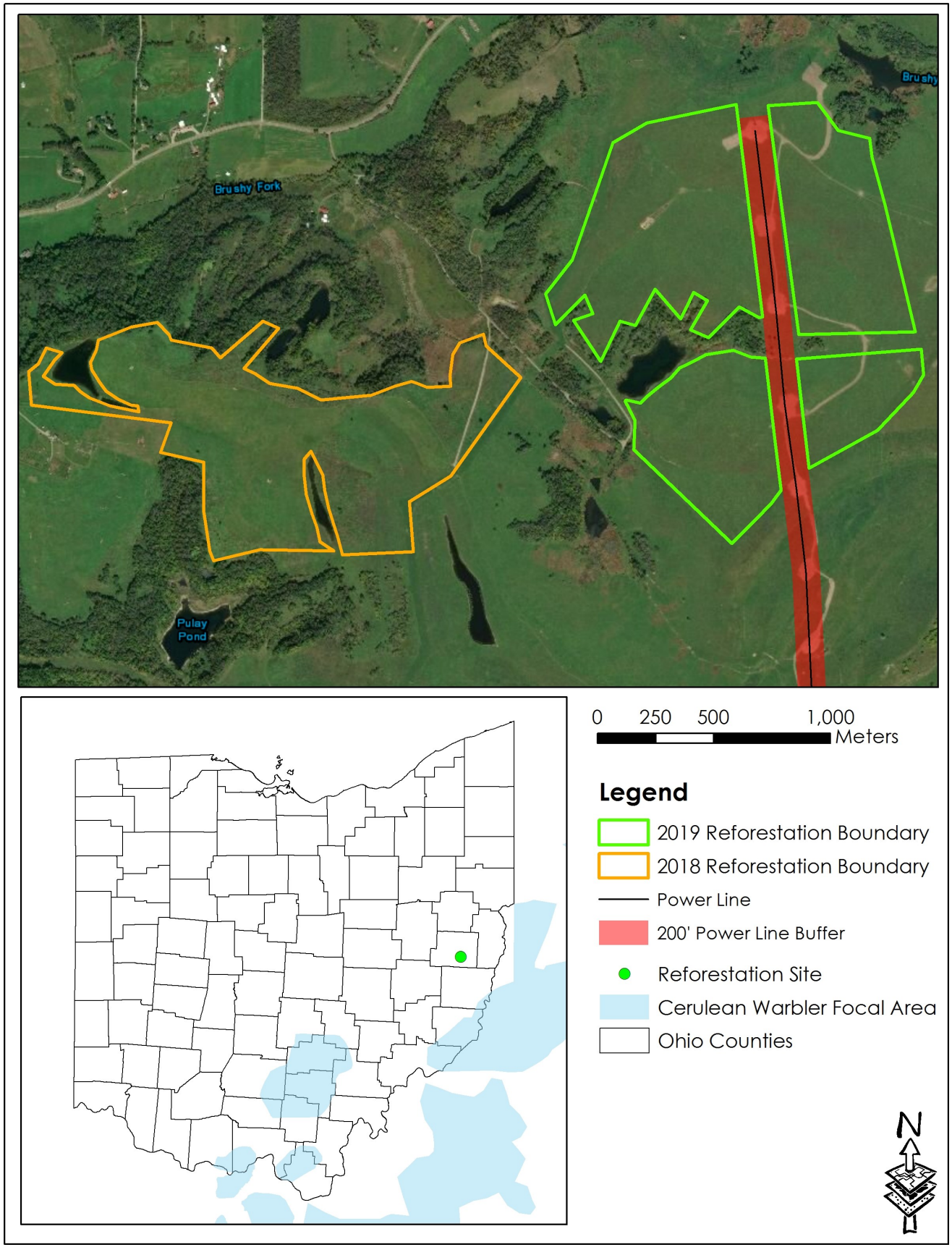

Figure 1. Reforestation areas (2018-2019)at the Harrison county project site.

SITE PREPARATION

GFW uses a modified version of the Appalachian Regional Reforestation Initiative's Forestry Reclamation Approach to re-establish forests on formerly mined lands where the site has already been reclaimed and the bond has been released. Further details on each step of this process are provided below.

Unwanted Vegetation Removal

Since the limiting factor to natural tree regeneration on many formerly mined sites is the soil compaction, the existing vegetation must be controlled so deep ripping can occur. The project area was dominated by aggressive forages so applying herbicide was necessary to eliminate future competition with the tree seedlings. The 2018 and 2019 sites were sprayed in summer by a boom sprayer and the hard-to-reach areas were hand-sprayed. Care was taken to leave a buffer between the sprayed areas and water bodies (Figure 2).

Soil Decompaction

To mitigate soil compaction, the ground was cross-ripped in the winter using a D-9 bulldozer equipped with two, 4-foot long ripping shanks mounted behind each track in the fall of 2018 (Figure 3). The rips were spaced approximately eight feet apart, creating an 8-foot by 8-foot grid after cross-ripping. Because the upland reforestation sites feed into ponds and streams, buffers were left along waterways, to prevent soil erosion and stream sedimentation.

Figure 2. Green grass along a waterway provides a buffer between the treated areas and the water.

Figure 3. The snow-covered ground highlights the rips after one or the two dozer passes.

THE APPALACHIAN REGIONAL REFORESTATION INITIATIVE: THE BEGINNING OF GREEN FORESTS WORK

Surface mining in Appalachia has replaced approximately one million acres of deciduous forest, some of the most diverse and valuable temperate forests in the world, with primarily non-native grasses and shrubs. Understanding the reasons behind this requires a brief history of mine reclamation, starting with the Surface Mining Control and Reclamation Act (SMCRA) of 1977. This act created 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. After SMRCA was implemented, mining companies began intensely grading sites. 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).

OSMRE created 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 GFW implements on formerly mined lands.

TREE ESTABLISHMENT

The sites were planted in the spring of 2018 and 2019 by professional contractors (Figures 4-5; Table 2). The native species planted were chosen based on what would have likely been on the site prior to mining and input from the Ohio Division of Forestry.

The following species were planted at the sites:

- American chestnut (provided by The American Chestnut Foundation)
- Chinkapin oak
- Black oak
- Shumard oak
- White oak
- Northern red oak
- Bur oak
- Black cherry
- Yellow poplar
- Persimmon
- Sugar maple
- Red Maple
- Black Locust
- Silky and roughleaf dogwood
- Sweetgum
- Eastern redbud
- Sycamore
- Bigtooth aspen
- Hazelnut

Year Planted	Acres Planted	Trees Planted
2018	140	95,400
2019	181	123,100
TOTAL	**321**	**218,500**

Table 2. Annual planting summary.

Figure 4. A professional plater plants along a rip.

Figure 5. This freshly planting seedling may look dead, but it is just dormant from being in cold storage (mimicking winter). Come warmer weather, these seedlings will leaf-out to a lively green color.

Species Selection

The native species planted were chosen based on which species are not as likely to naturally invade the site, will help build the soil quickly, will have a future timber value, and other variables. Some of the species planted, such as the white oak and American chestnut, also support larger conservation objectives.

White Oak

White oak (*Quercus alba*) is a dominant species of many eastern forests, but it is especially prevalent in the central, northern, and Appalachian hardwood regions of the mid-south and mid-west. Its acorns provide food to more than 180 different types of wildlife, including deer, turkey, racoons, and red-headed woodpeckers to name a few. White oaks are one of the most sought-after lumber trees, and it plays a critical role in the distilling industry, as white oaks are the preferred species for barrels used to age spirits. Thus, maintaining enough white oak stock is critical for the health of our forest ecosystems and the people who depend on the economies they support. While there is currently enough stock to meet demand, research and long-term growth projections show that there will likely be a shortage of large, high-quality white oaks in the future. Some of the suspected reasons for this future shortage include fire suppression, lack of forest management, and unsustainable timber harvesting.

The White Oak Initiative is attempting to address this concern by uniting industries, agencies, universities, and non-profits by developing a strategic plan for monitoring, research, and education. These reforestation projects supported the Initiative by planting a large percentage of white oaks.

American Chestnut

This project also included The American Chestnut Foundation's (TACF) most advanced generation of potentially blight-resistant American Chestnuts (*Castanea dentata*). The American Chestnut used to be a major component of Appalachian forests and was also one of the most valuable species. A fungal disease that was brought to North America on Asian chestnut trees in the early 1900s eradicated American Chestnut from the eastern United States by the 1950s. Asian chestnuts evolved with the fungus and developed a resistance to the disease. Over the last three decades, TACF has been backcrossing the Chinese Chestnut (*Castanea mollissima*) with the American Chestnut to produce trees that are approximately 15/16 American Chestnut in character, but retain resistance to the blight fungus from Chinese Chestnut ancestors.

The former range of the American Chestnut directly overlaps with the Appalachian coal region, making mined lands a great place re-introduction. Furthermore, chestnuts were once a dominant component of upper slopes and ridge top positions, where it is economically feasible to surface mine for coal, so by including chestnuts in the species mix, we are attempting to recreate the forest type that would have been present before the mining.

DISCUSSION

Creating 321 acres of new forest habitat in the same location is a significant restoration accomplishment. In the short term, the reforestation area will provide early successional habitat to wildlife that depend on new forest habitat, such as golden winged warblers (*Vermivora chrysoptera*) and northern bobwhite quail (*Colinus virginianus*). Over time as the site matures, it will start to benefit a different suite of wildlife, all while helping to clean our air and water. Eventually the site will blend with the surrounding patches of forest, creating a larger block of forest that will help to maintain all of the components of a forest ecosystem. As it matures, the forest will suppress invasive, exotic species and will benefit more types of wildlife than small forest patches. The intact block of forest in a mosaic of forest patches and fields will also help provide a corridor for animal migrations.

GFW Director, Michael French, stands next to sycamore at a 14-year-old reforestation site.

PARTNERS

Appalachian Regional Reforestation Initiative

Arbor Day Foundation

Art for Trees

Electric Power Research Institute

Green Forests Work

John Anderson

Luburgh, Inc.

Ohio Department of Natural Resources

The American Chestnut Foundation

United States Department of Agriculture