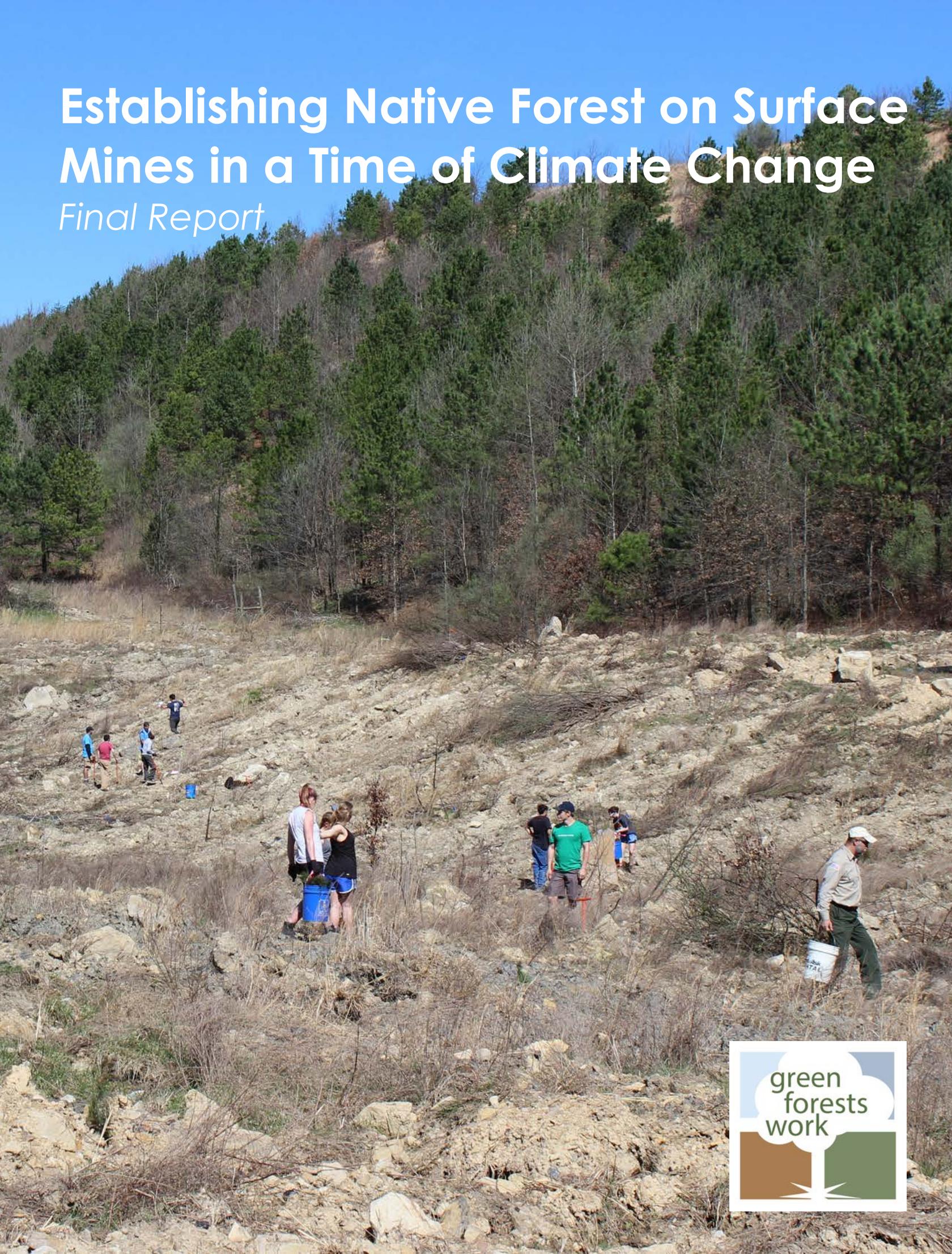


Establishing Native Forest on Surface Mines in a Time of Climate Change

Final Report



Mission

Green Forests Work's (GFW) mission is to re-establish healthy and productive forests on formerly mined lands in Appalachia.

Vision

GFW's 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, GFW is effectively addressing two needs of the region.

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 1.83 million trees
on more than 2,900 acres,
but there are nearly one million acres left to reforest.**

**Green Forests Work
T.P. Cooper Building
730 Rose Street
Lexington, KY 40546**

Michael French
Director of Operations

812.447.3285

michael.french@greenforestswork.org

Kylie Schmidt
Reforestation Coordinator

859.421.9222

kylie.schmidt@greenforestswork.org



Table of Contents

Background.....	3
Milestones.....	5
Results.....	11

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: Students planting trees at site one.

Image Credits

All photos © Green Forests Work

BACKGROUND

This project established shortleaf pine (*Pinus echinata*) on portions of the surface mined tract of Robinson Forest (Figure 1). Shortleaf pine is a species of concern across the Southeast; the species has declined due to a combination of poor management, overharvesting, pests, and pathogens. On reclaimed surface mines, native forest establishment is hindered by adaptability and colonization of non-native species. Migration and establishment of southern pine species in this region due to climate change is of particular concern on these disturbed sites.

This project helped to restore this species as well as provide habitat for bird, bat, and invertebrate species of concern that rely on shortleaf pine. Reforestation also provides an opportunity to sequester carbon. To understand the carbon sequestration benefits of shortleaf pine, the baseline carbon levels in aboveground biomass and soil were assessed and compared to that of loblolly pine (*Pinus taeda*) and grass/shrubland. The ability of a native pine to compete with migratory and non-native southern pine species was also examined. This project was a partnership among the UK Appalachian Center, UK Department of Forestry, the University of North Carolina at Chapel Hill, and Green Forests Work.



MILESTONES

January 12, 2016: Site visit with contractors and NRCS personnel

The site visit with the contractors was leveraged to provide an educational opportunity to Natural Resources Conservation Service (NRCS) personnel on Green Forests Work's methods (Figure 2).



Figure 2. NRCS personnel are trained on Green Forests Work's methods.

March 9, 2016: Planting Event 1

Volunteers from Appalachian State University (NC), Drew University (NJ), Xavier University (OH), and Radford University (VA), participating in an Alternative Spring Break program, planted seedlings at Site 1 (Figures 4-6).



Figure 4. Appalachian Regional Reforestation Initiative partner, Patrick Angel, reminds volunteers of proper planting techniques one last time before planting.

March 1, 2016: Site preparation completed

To prepare the sites for reforestation, the invasive species were removed and the soil was deep-ripped using a D9 dozer with a four-foot ripping shank (Figure 3).



Figure 3. Deep-ripping at site one.



Figure 5. Students from Volunteer Event 1 work together to plant seedlings.

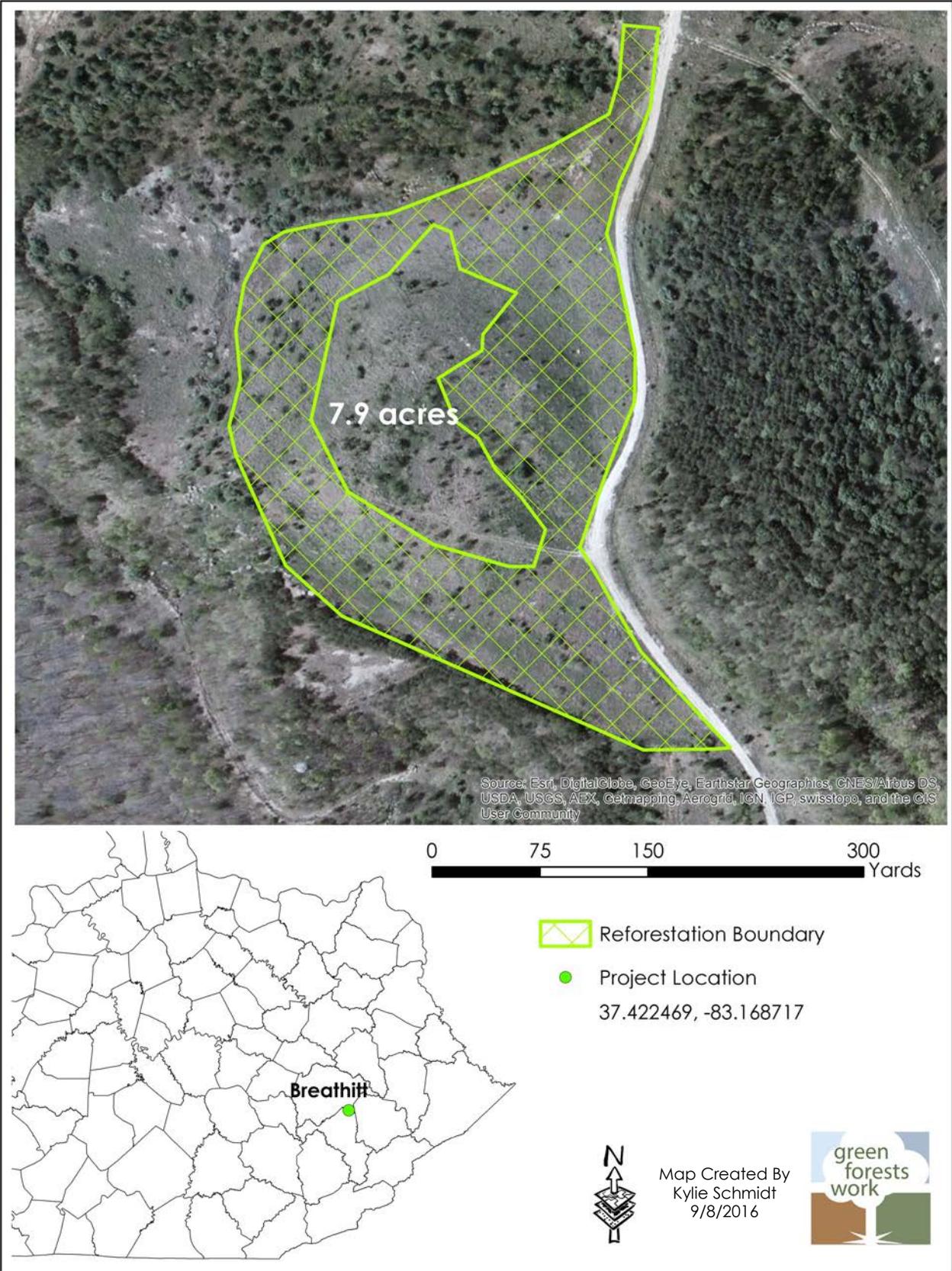


Figure 6. Site 1 project area.

MILESTONES

March 14-18: UNC trip to Robinson Forest

Students from the University of North Carolina (UNC) designed and conducted the project experiment for their capstone project in an environmental science class. During March, they traveled to Robinson Forest to layout and plant their research plots at Site 2 (Figure 7). The planted seedlings were then measured and soil samples were collected and analyzed.



Figure 7. Students from UNC review their plot layout before hitting the field to plant.

March 16, 2016: Planting Event 2

Volunteers from Keene State College (NH), the University of Massachusetts (MA), and the UNC students planted seedlings at the experimental project site, Site 2 (Figures 8-9).



Figure 8. Planting team and leader working on a short leaf plot.



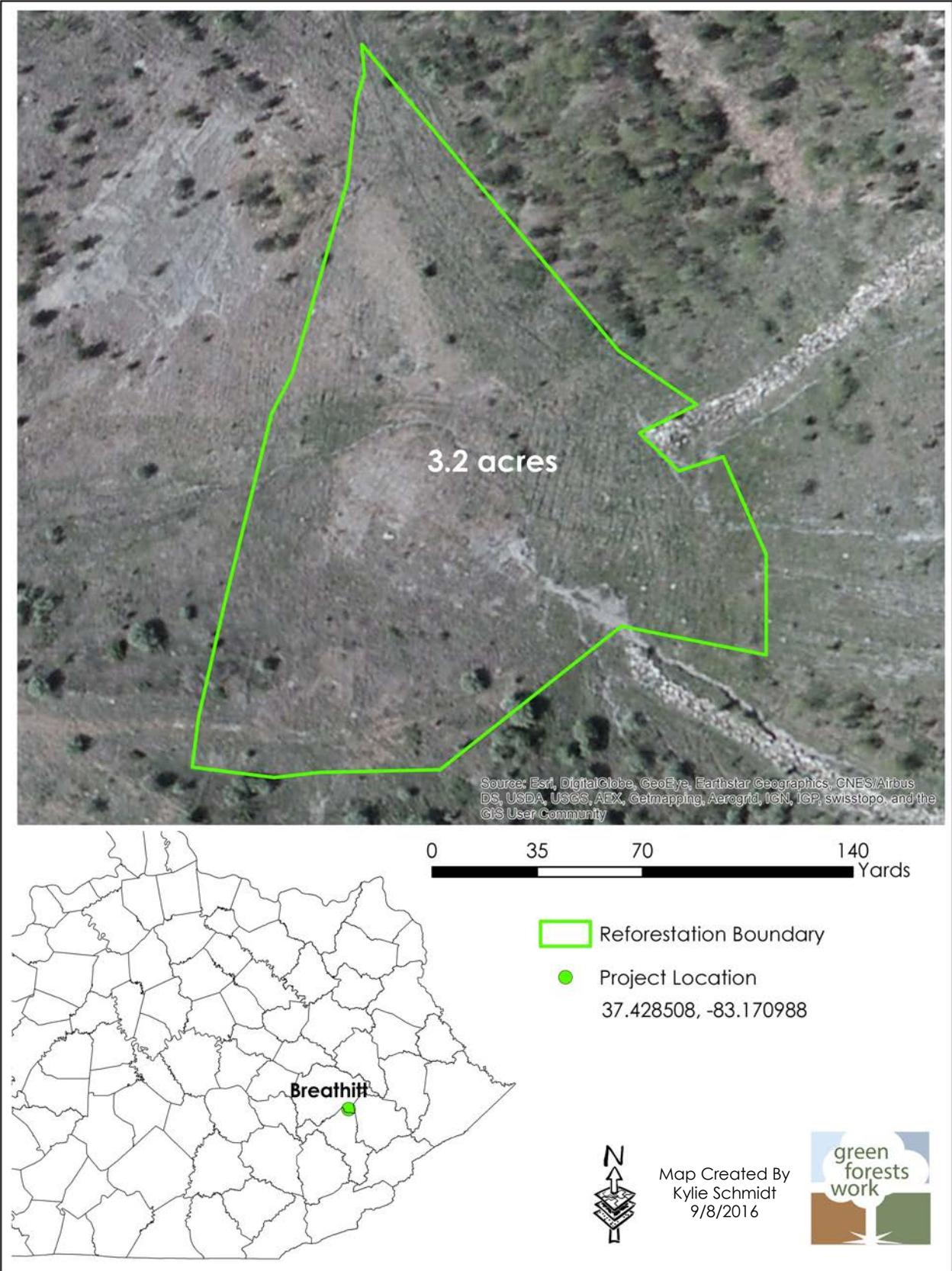


Figure 9. Site 2 project area.

MILESTONES

April 15, 2016: Planting Event 3

Volunteers from Viper Elementary (KY), Hazard High School (KY), Buckhorn High School (KY), and Indianapolis Christian Theological Seminary (IN) planted seedlings at Site 3 (Figures 10-12). The students were also educated on the importance of pollinators and how reforestation benefits pollinators prior to the event and given a seedling to take home and plant (Figure 13).



Figure 10. Elementary students paired with High School students to reforest the site.



Figure 11. GFW's Director of Operations (background), Michael French, plants a ceremonial American Chestnut with the pastor from the Seminary (foreground).

April 30 - May 2, 2016: Planting Event 4

Professional tree planters from New Forest Services planted the remaining acreage that was not covered by volunteers.

May 15, 2016: Technicians Hired

Two temporary technicians were hired to establish permanent monitoring plots, perform inventories, collect soil samples, and install a kiosk at the site.



Figure 13. Students are educated on pollinators prior to the planting event.

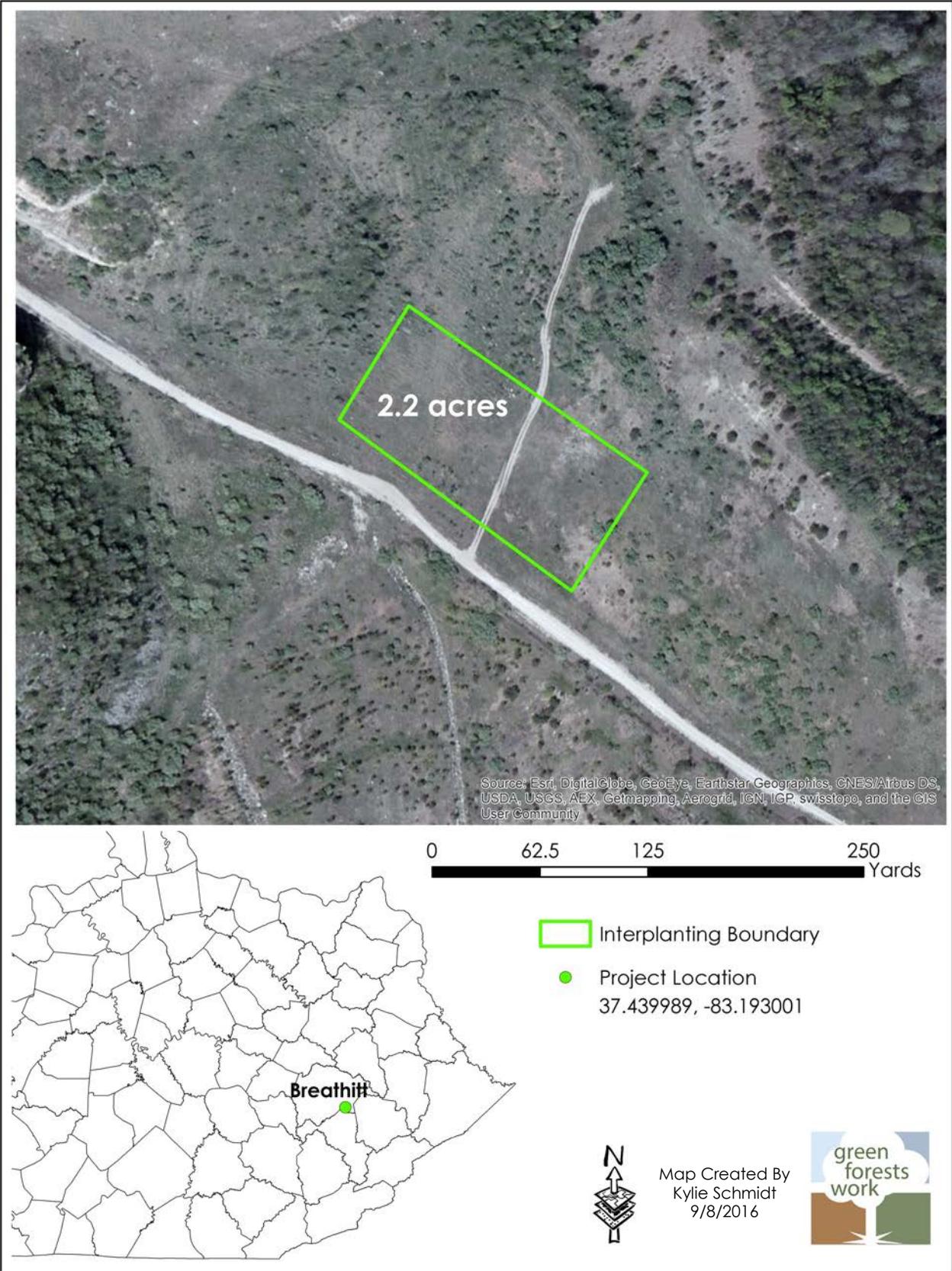


Figure 12. Site 3 project area.

RESULTS

The volunteer groups (Table 1) and the professional planters planted a total of 9,107 seedlings on 13.3 acres (Table 2) across three different reclaimed sites at Robinson Forest. The results of the study performed by the UNC students can be found in Appendix A. These sites now provide an additional educational opportunity at Robinson Forest. In fact, the sites have already been utilized for this purpose, as a tour was given in July to a group of eight people.

Volunteer Groups
Appalachian State University
Buckhorn High School
Drew University
Hazard High School
Indianapolis Christian Theological Seminary
Keene State College
Radford University
University of Massachusetts
University of North Carolina
Viper Elementary
Xavier University

Table 1. Volunteer groups from all planting

Event	Event Date	Event Type	Acres Planted	Trees Planted	Volunteer Participants
1	3/09/2016	Volunteer	2.6	1,800	39
2	3/16/2016	Volunteer	2.8	1,900	22
3	4/15/2016	Volunteer	2.2	1,500	85
4	4/30/2016 - 5/2/2016	Professional	5.7	3,907	0
Total			13.3	9,107	146

Table 2. Planting events summary.

PARTNERS



THE UNIVERSITY
of NORTH CAROLINA
at CHAPEL HILL

