ECOLOGICAL RESTORATION OF PUBLIC LANDS IN WEST VIRGINIA: NEW RIVER GORGE NATIONAL PARK 2026



NEW RIVER GORGE NATIONAL PARK (NRG) AND PRESERVE AREA 2026

War Ridge II

Down the road from a 2024 project area, the War Ridge II site expands north and west, following old roads, highwalls, and landings that still mark the landscape from the coal mining operations that wrapped around the mountains. The soil compaction on the roads not only prevented tree growth and allowed invasive species to flourish, but it also caused water to pool on the ground rather than infiltrate the soil. Ponds, created by the hillslope and bermed material next to the haul road, also occur frequently. Some of the landing areas were overwhelmed with invasive honeysuckle and autumn olive while others contained stunted sycamore, black locust, and red maple trees amongst blackberry, St. John's Wort, and goldenrod. Despite the native vegetation, the goal for the site is a healthy oak-hickory forest, which cannot be achieved without restoration measures.

NRG is known to host federally endangered bat species; therefore, felling timber is prohibited from April to November, when bats are utilizing trees for rest. In winter, bats are either hibernating in caves or have flown south. Subsequently, site preparation did not begin until mid-February.

Site preparation started mid-February. Initially, one bulldozer cleared the unwanted vegetation while an excavator decompacted the ground by scooping soil into the bucket and dumping it back in the hole. The excavator also spread woody debris when possible. After 2.75 miles, and 7.5 miles still to work, the bucket on the excavator was replaced with a claw that had three tooth attachments. The claw was raked through the soil in multiple directions to accomplish the ripping, which was more efficient than the bucket. A second excavator was brought on site to improve the site's hydrological features. Channels with small pools were created to guide water flow to drainages. Three of the largest ponds were drained and made smaller to form wetland complexes, while remaining ponds had rocks and woody debris added. 110 depressional wetlands were also created. Woody debris was spread in the areas where this hydrology work was performed. Site preparation was completed on 66 acres at the end of March.

The professional planting started as site preparations were finishing. Planters planted 45,840 seedlings across 63.5 acres. The majority species were oaks (47.5%), shagbark and pignut hickory (16.8%), and Virginia pine (7.9%). The planters spread 100 lbs of native warm season grass and wildflower seed on the larger, open areas. Additionally, 2,400 seedlings were planted at the nearby War Ridge Campground. Along with trees planted by volunteers (see page 4 for details), the 2026 site was planted with 46,790 trees and War Ridge Campground was planted with 3,150 trees.

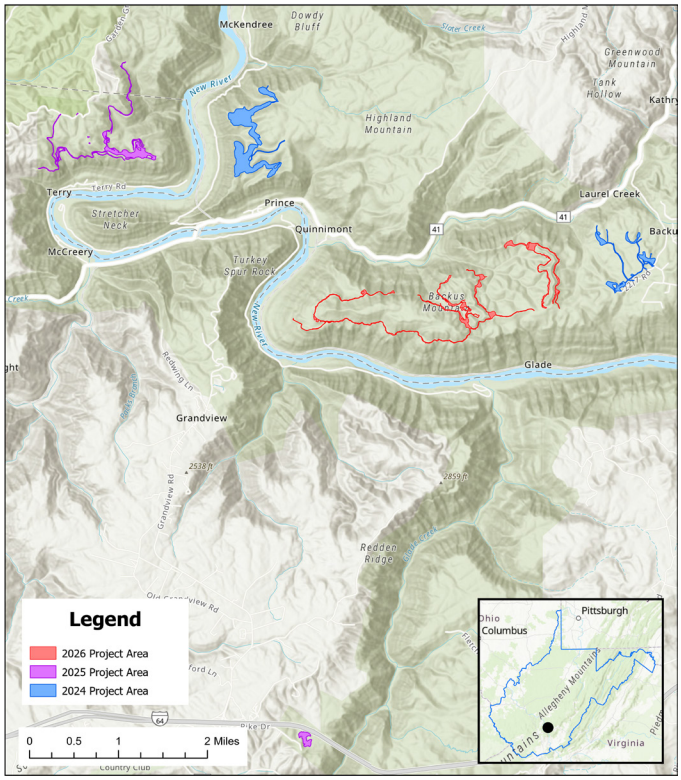

Figure 1: New River Gorge National Park and Preserve Project Areas.





Top photo: An open expanse left over from the mining operations was growing sericea lespedeza, golden rod, and autumn olive before site preparation activities began. Above: An excavator drains a pond to form a wetland complex.

WAR RIDGE II

SITE PREP
Mid-February — March 2026

PLANTING DATES
March 2026

TREES PLANTED
46,790

ACRES PLANTED
66

VERNAL POOLS/ WETLANDS CREATED
113

GRASSES & SEED SPREAD
100 lbs Spread



Professional planters plant among the woody debris. Woody debris helps the soil retain moisture, adds nutrients to the soil as the wood decomposes, and provides habitat for reptiles, small mammals, and ground nesting birds.

Table 1. Species, number of species, and percentage of planting mix of each species for the War Ridge II site and War Ridge Campground.

Species	Scientific Name	Planted in War Ridge II	% of Total	Planted at War Ridge Campground	Total Planted
White Oak	*Quercus alba*	8,620	18.4	880	9,500
Shagbark Hickory	*Carya ovata*	6,010	12.8	260	6,270
N. Red Oak	*Quercus rubra*	5,090	10.9	580	5,670
Virginia Pine	*Pinus virginiana*	3,680	7.9	216	3,896
Scarlet Oak	*Quercus coccinea*	3,530	7.5	216	3,746
Black Oak	*Quercus velutina*	3,460	7.4	40	3,500
Black Cherry	*Prunus serotina*	2,960	6.3	40	3,000
Black locust	*Robinia pseudoacacia*	2,180	4.7	96	2,276
Pignut Hickory	*Carya tomentosa*	1,850	4.0	180	2,030
Black Gum	*Nyssa sylvatica*	1,960	4.2	40	2,000
Red Maple	*Acer rubrum*	1,660	3.5	116	1,776
Chestnut Oak	*Quercus montana*	1,530	3.3	216	1,746
Sugar Maple	*Acer saccharum*	1,100	2.4	0	1,100
Downy Serviceberry	*Amelanchier arborea*	1,000	2.1	0	1,000
Pawpaw	*Asimina triloba*	1,000	2.1	0	1,000
American Persimmon	*Diospyros virginiana*	980	2.1	20	1,000
Tulip Poplar	*Liriodendron tulipifera*	180	0.4	0	180
American Chestnut	*Castanea dentata*	0	0	250	250
TOTAL		**46,790**	**100.0**	**3,150**	**49,940**

Table 2. Species and rates of native grasses and forbs that were broadcast across the site.

Species	lbs
Bottlebrush Grass	30
Deertongue	20
Indiangrass	10
Partridge Pea	6
Staghorn sumac	6
Common Milkweed	5
Wild Senna	4
Browneyed Susan	4
Blue Vervian	3
Oxeye Sunflower	3
Calico Aster	2
Indianhemp	1
Boneset	1
White Goldenrod	1
Heath Aster	1
Narrowleaf Mountainmint	1
Marsh Blazing Star	1
Butterfly Milkweed	1
Total	**100**

VOLUNTEER EVENT

Two school groups planted the remaining 2.5 acres in the 2026 project site. On March 7th, 15 Radford University students and 2 staff members planted 500 trees in War Ridge II. On March 19th, 8 students and 1 faculty member from the University of North Carolina at Chapel Hill planted an additional 450 trees. War Ridge Campground was also planted by volunteers. The Radford University group also planted 500 trees at the campground during their volunteer planting day. GFW acquired American Chestnut trees at the beginning of April. 250 stems were given to New River Gorge National Park staff to plant at the campground on April 10th.



ARC OF APPALACHIA PURCHASE

In June, GFW partnered with ARC of Appalachia, the WV Land Trust, Beckley Area Foundation, Appalachian Headwaters and many individual donors to purchase five tracts (4 – 8, Figure 2) of land that were up for auction adjacent to the New River Gorge National Park and Preserve. With this purchase nearly 2,000 acres of the New River Wilderness are now permanently protected.

About purchased properties:

Piney Creek Gorge (parcels 6 & 7) is a roaring white-water trout stream that races through a 1000-ft deep, nearly vertical-walled canyon as it sinews its way to its confluence with the New River inside the NRG. The Piney Creek parcels are of exceptional interest to the citizens of Beckley as well as to outdoor recreationists because it will connect nearby Beckley with the National Park - not only by land - but via a twelve-mile-long public hiking and mountain bike trail. West Virginia Land Trust already owns six miles of the west bank of the Piney right outside the city, and this section of the trail is already nearly completed. Parcels 6 & 7 will fill in the missing four-mile gap that exists between WV Land Trust and the National Park.

Stretcher Neck Bluffs (parcels 4 & 5) include forested lands with biologically-rich wetlands, swamp forests, and masses of rhododendrons and mountain laurel. Several high-elevation overlooks offer dramatic views of the oxbow of Stretcher Neck in the New River.

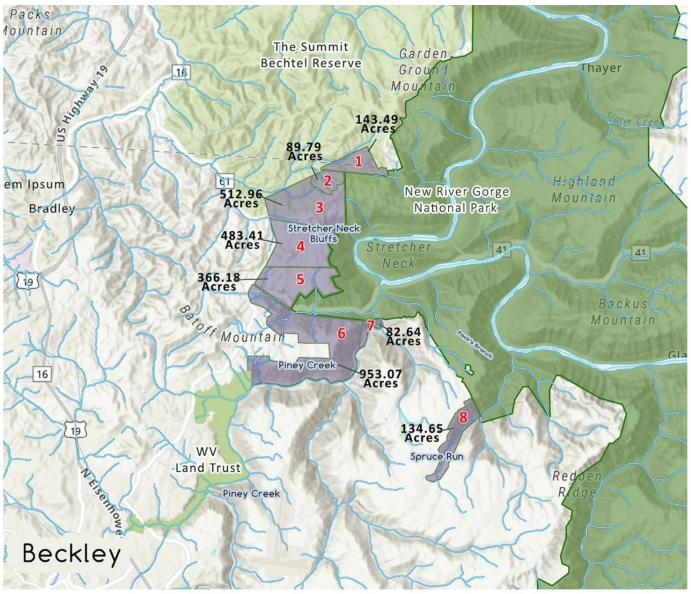

Figure 2. Parcels (in red) sold adjacent to the NRG National Park and Preserve.

Spruce Run (parcel 8) is a sparkling, rock-walled mountain stream that drains into the National Park as part of Mill Creek. This tributary is filled with hemlocks and rhododendrons, and is considered the most remote and likely the most biologically significant of all the acquired parcels.

We look forward to working with ARC, the WV Land Trust, Appalachian Headwaters, and the National Park Service to enhance these lands in the coming years and provide more natural areas for the public to enjoy.

UNC CHAPEL HILL STUDENTS CONTINUE STUDY

Since 2015, GFW has worked with students from the University of North Carolina at Chapel Hill to provide a hands-on experiential education and research opportunity in Appalachia. The Environment and Ecology Program at UNC offers a capstone course for students who are interested in careers in ecology, conservation and natural resource management. Each year, GFW meets with the class at the beginning of the semester and develop a project that will help advance ecological restoration practices. The class takes it from there and develops a research project that they subsequently implement during spring break. In 2025, the class developed a project to examine differences in reforestation success in reforested coal mines versus afforested agriculture lands (old-fields).

Two sites were selected for the study: the Terry Top mine at the New River Gorge National Park and Preserve and a former cattle pasture in Lewisburg, WV. At each site, twelve 15 m x 15 m plots were established.

In March 2025, each plot was planted with 100 seedlings, of which 50 were white pine (*Pinus strobus*) and 50 were white oak (*Quercus alba*).



UNC students measuring seedlings at the old-field site in Lewisburg, WV.

Seedlings were randomly assigned to positions in each row of 10 so that every row had five individuals of each species. Each tree was spaced approximately 1.5 m apart. After planting, each tree's height and ground-line diameter were measured.

In Mach 2026, another class from UNC returned to evaluate 1-year survival and growth. Overall, tree survival averaged 46.8% across all trees and sites, with the lowest survival in a single plot being 18% and the highest at 91%. At the Terry Top mine site, no statistically significant differences between the survival of white oaks and white pines were detected, with white oak at 69% and white pine at 63% survival. However, a very different pattern was observed at the pasture site, where white oaks had a survival rate almost 7 times higher than the pines, at 48% and 7% survival, respectively. (Figure 3). Thus, both species had high survival at the mine site compared to the pasture site.

Both white oak and white pine seedlings demonstrated positive growth in terms of height, diameter, and volume one year after planting. Across sites, white pines were 43.1 cm tall with a basal diameter of 0.82 cm. On average, white oaks were 22.7 cm tall, with a basal diameter of 0.43 cm.

To assess browsing, a Seedling Herbivory Index (SHI) was used (score 1–4) based on the proportion of branches demonstrating any evidence of browsing. An SHI score of 1 represented minimal browsing ; a score of 2 indicated moderate damage, while a score of 3 reflected heavy herbivory. A score of 4 denoted severe browsing (>75% branches with bud removal).

Browsing was found to be significantly different across sites, with seedlings at the pasture site demonstrating overall higher average indices of herbivory (2.8 ± 0.2) than the mine site (1.3 ± 0.3; $p < 0.0001$), as seen in Figure 4. At the mine site, white oaks had 1.3 times higher SHI values than white pines. Similarly, at the pasture site, white oaks demonstrated 1.3 times more browsing than white pines (Figure 4).

Thus far, survival and growth of white oak and white pine appear to be good at the Terry Top mine, but significant herbivory affected seedlings at the old-field site. In many cases, white pine on the former pasture were missing. We speculate that they were likely eaten by a large white-tailed deer population at the site. Monitoring will continue at both sites.

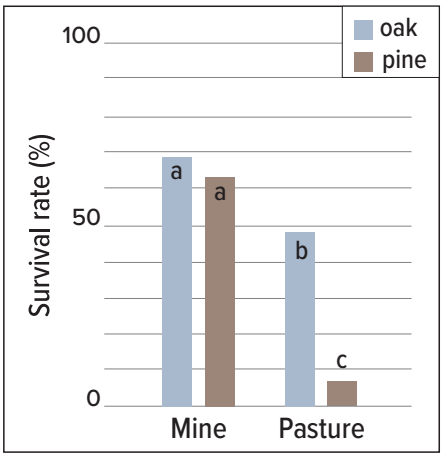

Figure 3. Comparison of mean white oak (blue) and white pine (brown) survival rate between the mine site (left) and pasture site (right). Different letter codes (a-d) indicate statistical difference.

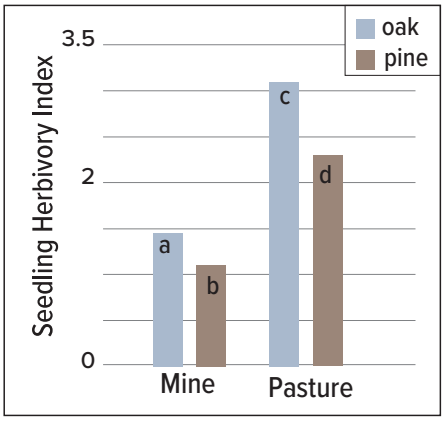

Figure 4. Comparison of mean Seedling Herbivory Index (SHI) values for white oaks (blue) and white pines (brown) on the mine site (left) versus the pasture site (right). Different letter codes (a-d) indicate statistical difference.

PARTNERS

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