

MINED LAND RECLAMATION

USING THE FORESTRY RECLAMATION APPROACH

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ARRI Core Team Leader



APPALACHIAN REGIONAL REFORESTATION INITIATIVE (ARRI)

**ARRI is a broad-based group
working to re-establish forest
habitat on active and abandoned
mine lands.**



ARRI'S GOALS:

- PLANT MORE HIGH-VALUE NATIVE TREE SPECIES (GENERALLY HARDWOODS)**
- INCREASE THE SURVIVAL RATES AND GROWTH RATES OF PLANTED TREES**
- EXPEDITE THE ESTABLISHMENT OF FOREST HABITAT THROUGH NATURAL SUCCESSION**



ARRI STARTED AS A JOINT EFFORT BETWEEN OSM AND THE APPALACHIAN COAL STATES



ARRI PARTNERSHIPS




ARRI CORE TEAM

- Made up of both state and federal regulatory and permitting staff
- All of the Appalachian coal states are represented
- Work with operators and landowners to find projects and bring them to completion
- Work with the Science Team to develop Forestry Reclamation Advisories that help guide project partners to special practices that enable successful reforestation



ARRI'S SCIENCE TEAM

- OHIO UNIVERSITY
 - OHIO STATE UNIVERSITY
 - PENN STATE UNIVERSITY
 - PURDUE UNIVERSITY
 - SOUTHERN ILLINOIS UNIVERSITY
 - UNIVERSITY OF KENTUCKY
 - UNIVERSITY OF MARYLAND
 - UNIVERSITY OF TENNESSEE
 - VIRGINIA POLYTECHNIC INSTITUTE
 - WEST VIRGINIA UNIVERSITY
 - WEST VIRGINIA STATE UNIVERSITY
 - US FOREST SERVICE
 - US GEOLOGICAL SURVEY
 - TACF
 - OSM
 - INDIANA UNIVERSITY OF PA
 - AMERICAN BIRD CONSERVANCY
 - GREEN FORESTS WORK
 - S. F. AUSTIN STATE UNIVERSITY
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THE FIVE MAJOR COMPONENTS FOR THE FRA

- 1. Reduce Compaction
 - Grading or Ripping Techniques
- 2. Reduce Competition
 - Tree Compatible Ground Cover
- 3. Proper Species Selection
- 4. Proper Planting Techniques
- 5. Create the Best Possible Growth Medium
 - With Materials Available On the Site

GROWTH MEDIUM:

- 4 feet thick
- As much topsoil as possible
- Some subsoil
- Sandstone
 - Weathered, near surface
 - Unweathered, nutrients
- Organics
- Paste pH 5.0-7.5
- Low soluble salts

MINIMIZE COMPACTION OF GROWTH MEDIUM

- **Innovative methods of placement**
- **End dumping on flatter slopes with strike off**
- **Minimal passes pushing material downslope**
- **Push up method**
- **Ripping of over-compacted slopes**









MOSHANNON STATE FOREST

2018-2019



MOSHANNON STATE FOREST

- DCNR was sole property owner
 - Approx. 55 total acres that were reclaimed in the early 2000's by DEP BAMR
 - Silviculture permit exemption, E&S plan to Elk and Clearfield County
 - E&S controls used: Veg Filter Strips, Furrows, Forested Filter Strips, Silt sock, Seeding and Mulching
 - Cross ripped in June 2018 with single shank D-8 dozer
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- Planted in May 2019 by combination of volunteer and professional planters
 - White pine, Aspen, Red Oak, American Chestnut, American Elm along with wildlife shrubs planted
 - Funding/support from PEC, DCNR, and DEP used to complete the project
 - Species of concern: Golden Winged Warbler, Bats, and various game species



FIRST PASS- PERPENDICULAR TO SLOPE



FIRST PASS- PERPENDICULAR TO SLOPE

A photograph showing a steep, rocky hillside. The ground is covered with loose rocks and soil, with several distinct, parallel furrows or gullies running down the slope, indicating erosion or the path of a ripper. The background is a dense forest of tall, thin trees with green foliage. A dark, semi-transparent banner is overlaid at the bottom of the image, containing white text.

FURROWS CREATED AFTER RIPPING ON
CONTOUR



AERIAL PHOTO OF RIPPED VS
NOT RIPPED AREAS

ROUND KNOB BOND FORFEITURE PROJECT

2019



ROUND KNOB BOND FORFEITURE

- Private landowner
- Approx. 36 acres that were regraded by a contractor.
- NPDES permit and controls for the mining activities remained.
- Cross ripped in April 2019 with dual shank D-10 dozer
- Planted in May 2019 by professional planters
- White pine, Aspen, Red Oak, American Chestnut, Sycamore, Black Cherry, Black Willow, and Red Spruce along with wildlife shrubs and species planted
- Funding/support from PEC, SRBC, and DEP used to complete the project
- Species of concern: Golden Winged Warbler, Bats, and various game species
- Biosolid application prior to tree planting.






AFTER GRADING, PRIOR TO RIPPING



AFTER FIRST PASS RIPPING WITH DUAL
SHANK DOZER



2 MONTHS AFTER PLANTING



4.5 MONTHS – NO SEED SPREAD AT THE
SITE, HERBACEOUS VEG IS ALL
VOLUNTEER





MAY 2021



MAY 2021

PINCHOT STATE FOREST

2017-2018



PINCHOT STATE FOREST- AVONDALE

- DCNR was sole property owner
 - E&S plan approved by Luzerne County
 - Required 36" silt sock installed up slope of collection ditch, (approx. \$40K added to the cost of the project)
 - Cross ripped single shank Komatsu dozer
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- Planted in April 2017 and April 2018 by volunteer planters
 - White pine, Aspen, Red Oak, American Chestnut, along with wildlife shrubs planted
 - Funding/support from PEC, DCNR, and DEP used to complete the projects
 - 11 acres done in 2017 and about 6 acres done in 2018



CROSSED RIPPED AND READY TO PLANT-
NOTE AMOUNT OF VEGETATION REMAINING



VERNAL POOL CREATED BY THE
RIPPING



AERIAL VIEW OF THE RIPPED AREA-
NOTE THE ON-CONTOUR FURROWS



36" SILT SOCK REQUIRED BY CD TO BE
PLACED UP SLOPE OF THE ROCK LINED
DIVERSION DITCH

LAUREL RUN AML PROJECT

2019

LAUREL RUN AML PROJECT

- 2 private landowners
- Approx. 12 acres planted over 3 years
- E&S plan approved and implemented by PA DEP BAMR for the regrading
 - Super Silt fence and brush windrows included
- Ripped on contour only with a triple shank dozer

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- Planted in May 2019 by DEP staff and guests, May 2020 w Pros, April 2021 w MCWA and Boy Scout Troop 57
 - Maples, Red Oak, American Chestnut, American Elm, Cherry, Crabapple along with other species and wildlife shrubs planted
 - Funding/support from GFW, CBF and DEP used to complete the projects



AFTER REGRADING THE HIGHWALLS
AND SPOIL PILES



TRIPLE SHANK RIPPER USED ON
CONTOUR



TREE PLANTING- NOTE ROUGHNESS IN
SCALE TO PLANTERS



SEPTEMBER
2021





SEPTEMBER
2021

TIME FOR QUESTIONS?

FOR ADDITIONAL INFORMATION:

<http://arri.osmre.gov>

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