

Reforestation of Legacy Surface Mines Using the Modified Forestry Reclamation Approach

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June 8, 2015



USDA is and Equal Opportunity
Provider and Employer



Where once were forests...



750,000 - 1,000,000 acres converted





Green Forests Work



- 501(c)(3) offshoot of ARRI; active since 2009
- Mission: To re-establish healthy and productive forests on formerly mined lands in Appalachia
- Implements a “Modified” Forestry Reclamation Approach (FRA) on Legacy mines
- Legacy mines – post-SMCRA, reclaimed to land uses other than forest

Green Forests Work

(Investing in America)



...to restore forest habitat

...to improve water and air quality

...to mitigate climate change

...to create economic opportunities

...to empower Appalachian citizens



Modified FRA



- 1) Control unwanted vegetation
 - Mechanical
 - Chemical
- 2) Mitigate compacted ground
- 3) Plant a variety of trees
- 4) Use proper tree planting techniques

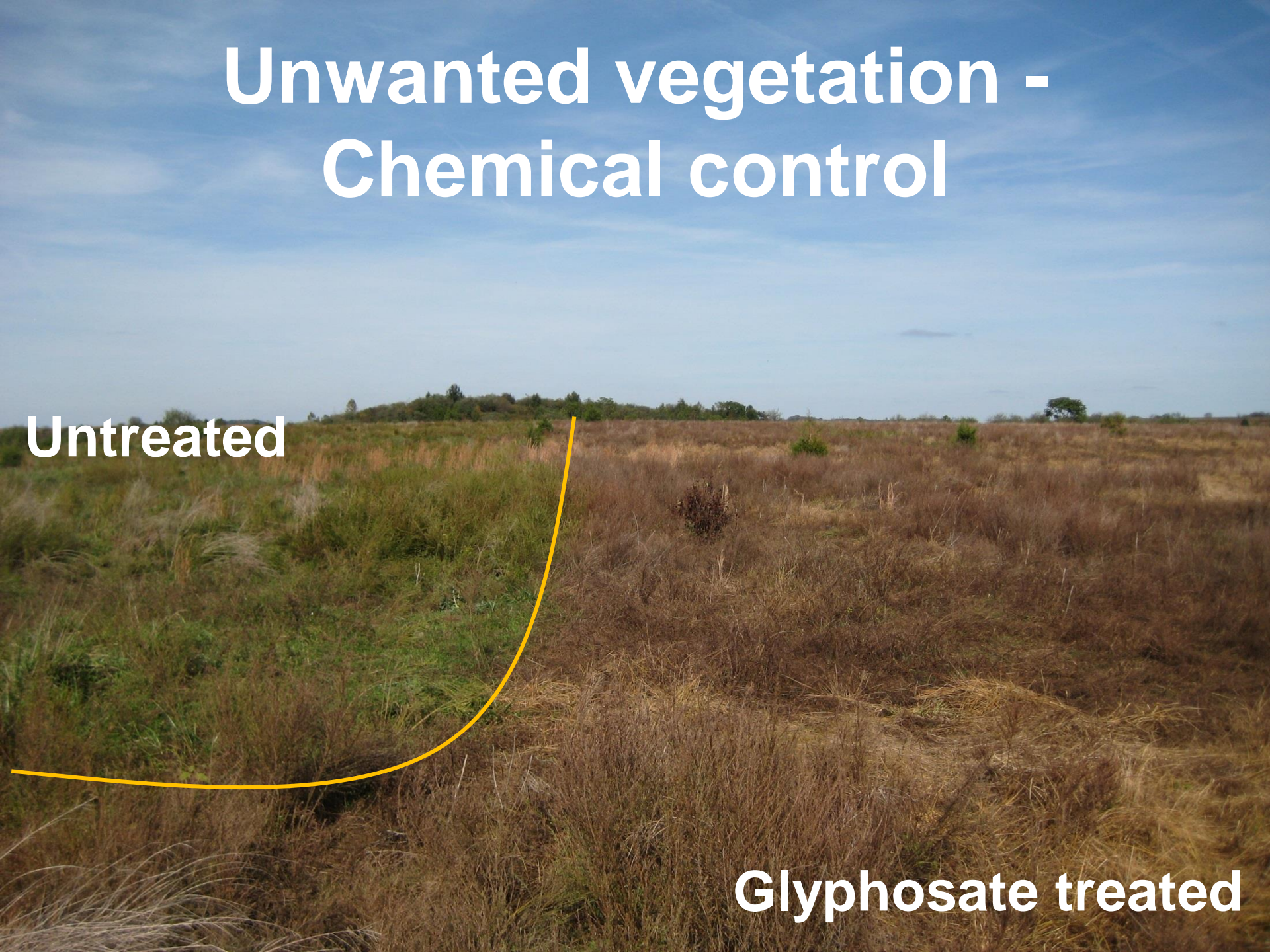
Unwanted vegetation - Chemical control



Unwanted vegetation - Chemical control

Untreated

Glyphosate treated



Unwanted vegetation - Chemical & Mechanical control





**Unwanted vegetation -
Mechanical control**



Mitigate compaction



Mitigate compaction



Ripping a compacted site



Cross-ripping on slopes



**Cross-ripping on slopes
Diamond pattern**

Mitigate compaction “Flipping” Technique









A yellow excavator is shown in a construction or demolition site. The excavator's arm and bucket are visible, with the bucket currently holding a large, curved metal piece. The ground is uneven, covered with dirt and small rocks. In the background, there is a structure with a corrugated metal roof and a concrete wall. The excavator's arm is yellow with black hydraulic cylinders. The bucket is yellow and has a single, large, curved metal tooth attached to it. The tooth is currently holding a large, curved metal piece, possibly a piece of a building or a large pipe. The ground is uneven, covered with dirt and small rocks. In the background, there is a structure with a corrugated metal roof and a concrete wall.

**Mitigate compaction
Single Tooth Excavator**



KOMATSU

b Brandeis

GALEO

b Brandeis UNIT 336

01/18/2008



01/18/2008

“Push up” method





“Push up” method

Plant a variety of trees and shrubs

Species:

Percentage of mix:

■ White oak (<i>Quercus alba</i>)	20%
■ Northern red oak (<i>Quercus rubra</i>)	10%
■ Black oak (<i>Quercus velutina</i>)	8%
■ Chestnut oak (<i>Quercus prinus</i>)	8%
■ Black locust (<i>Robinia pseudoacacia</i>)	5%
■ Black cherry (<i>Prunus serotina</i>)	10%
■ Sugar maple (<i>Acer saccharum</i>)	6%
■ Red maple (<i>Acer rubrum</i>)	5%
■ American chestnut (<i>Castanea dentata</i>)	3%
■ Hickory (<i>Carya</i> sp.)	5%
■ Virginia pine (<i>Pinus virginiana</i>)	5%
■ Eastern white pine (<i>Pinus strobus</i>)	5%
■ Serviceberry (<i>Amelanchier arborea</i>)	2%
■ American plum (<i>Prunus americana</i>)	2%
■ Red mulberry (<i>Morus rubra</i>)	2%
■ Black chokeberry (<i>Aronia melanocarpa</i>)	2%
■ American hazelnut (<i>Corylus americana</i>)	2%



Use proper tree planting techniques



Use proper tree planting techniques

Green Forests Work

(Gaining Momentum)

2009:

- 40 acres on 10 sites
- 28,000 trees
- 500 volunteers+ no funding

2012:

- 321 acres on 17 sites
- 228,000 trees
- 2,500 volunteers

2015:

- 532 acres
- 303,000 trees
- 1,400 volunteers



Past and Current Projects

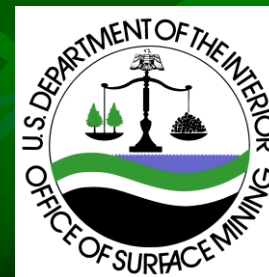
- **8 States – AL, TN, VA, KY, WV, MD, OH & PA**
- **Conservation Innovation Grant – NRCS**
 - 360+ acres in KY, OH, PA, VA, and WV
 - Creation of a mixed hardwood/American chestnut forest type using the Forestry Reclamation Approach
 - 1.0 acres progeny test to determine which Restoration Chestnut 1.0 families will contribute to future generations
- **Appalachian Forest Renewal Initiative – USFS**
 - Watershed improvement in KY, MD, OH, TN, VA, and WV
 - All include a mined land reforestation component
- **Flight 93 National Memorial – NPS**

Planting Events 2012-2015*

- 147 tree planting events
- 7,897 volunteers
- 1,596 acres reforested
- 987,612 trees planted



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Dickenson County, VA CIG





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71.7% Survival after 2 years
30" Average Height

Ecosystem Restoration









Acknowledgements

- Green Forests Work
- Appalachian Regional Reforestation Initiative
- USDI – Office of Surface Mining Reclamation and Enforcement
- The American Chestnut Foundation
- USDA – Natural Resources Conservation Service
- USDA – Forest Service
- Kentucky Department for Natural Resources – Division of Mine Reclamation and Enforcement
- Virginia Department of Mines, Minerals, and Energy
- Virginia Department of Forestry
- Ohio Department of Natural Resources – Division of Mineral Resources Management
- PA DCNR – Bureau of Forestry
- Pennsylvania Department of Environmental Protection
- Pennsylvania Wildlife Habitat Unlimited
- West Virginia Department of Environmental Protection
- Western Pennsylvania Conservancy

Acknowledgements

- Southwest Virginia Restoration Branch of TACF
- University of Kentucky
- Penn State University – Dubois



Questions and Comments?

A close-up photograph of a bumblebee on a purple flower. The bee is positioned on the right side of the flower, facing left. It has a fuzzy, brown and black body and is actively working on the yellow center of the flower. The flower has long, thin purple petals. The background is a soft-focus green, suggesting foliage.

www.greenforestswork.org

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