

# Appalachian Regional Reforestation Initiative



Trees for Appalachia's Future







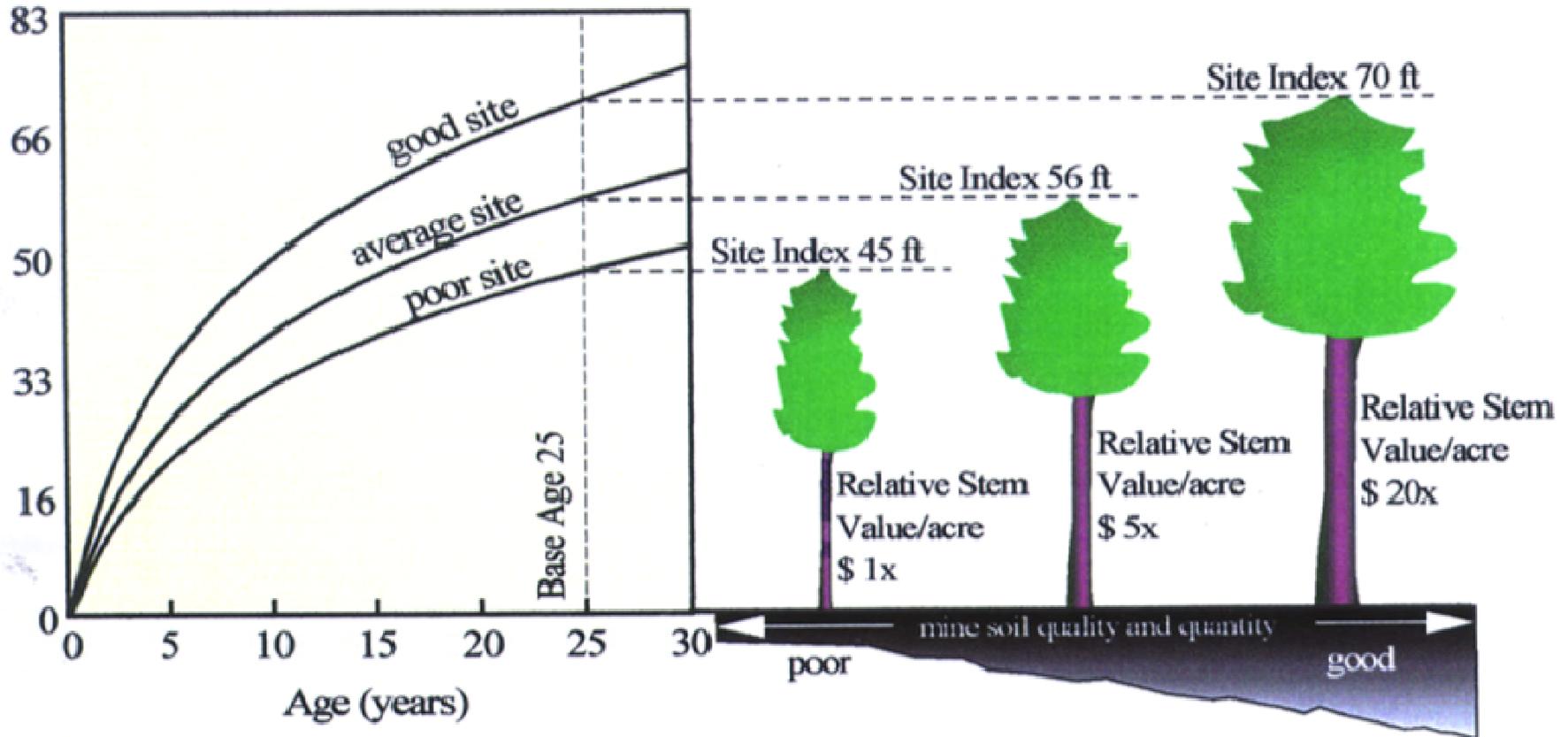






# Powell River Project Site Index

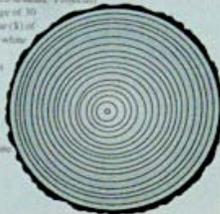
Tree Height (ft)



Study conducted by Jim Burger, Virginia Tech

**Forestry Reclamation**

17-year-old white pine cross section exhibiting an enhanced 12 inch diameter (50-110) on a slightly-oxid, brown, weathered sandstone fractured, 3 to 4 feet deep, unconsolidated, and moderately-well drained. Proven to a rotation age of 30 years, the value (K) of timber from a white pine stand growing at this rate would be approximately 25 times greater than that of a stand growing on a site with 30-year



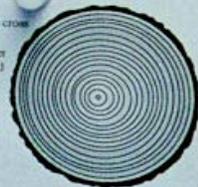
**Agromic Reclamation**

17-year-old white pine cross section exhibiting a reduced 6 inch diameter (51-60) on typical post-SMCRA mine soils selected, compacted, and otherwise prepared for revegetation.



**Undisturbed Soils**

17-year-old white pine cross section exhibiting an average 8 inch diameter (58-80) on undisturbed soils in the Central Appalachians.



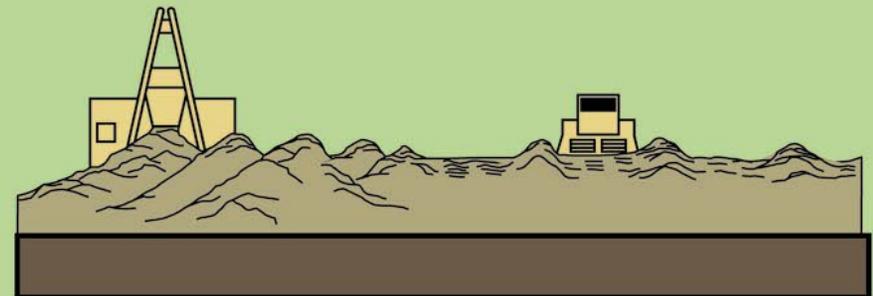
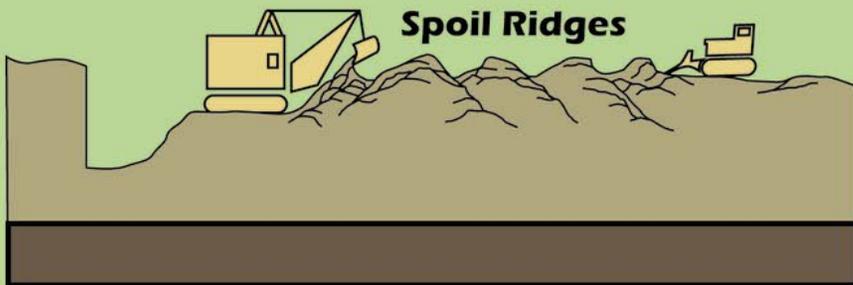
# DIAGRAM 1. AREA MINING OR MOUNTAINTOP REMOVAL METHODS



ARRI CFoldBroDiag1F.eps

Illustrations not to scale

# DIAGRAM 2. AREA MINING OR MOUNTAINTOP REMOVAL BY DRAGLINE METHOD.



ARRI CFoldBroDiag2F.eps

Illustrations not to scale

# Mineland Reforestation- Starfire Mine, KY



1 yr



3 yr



7 yr



Non-compacted Site



Compacted Site

# **ARRI is:**

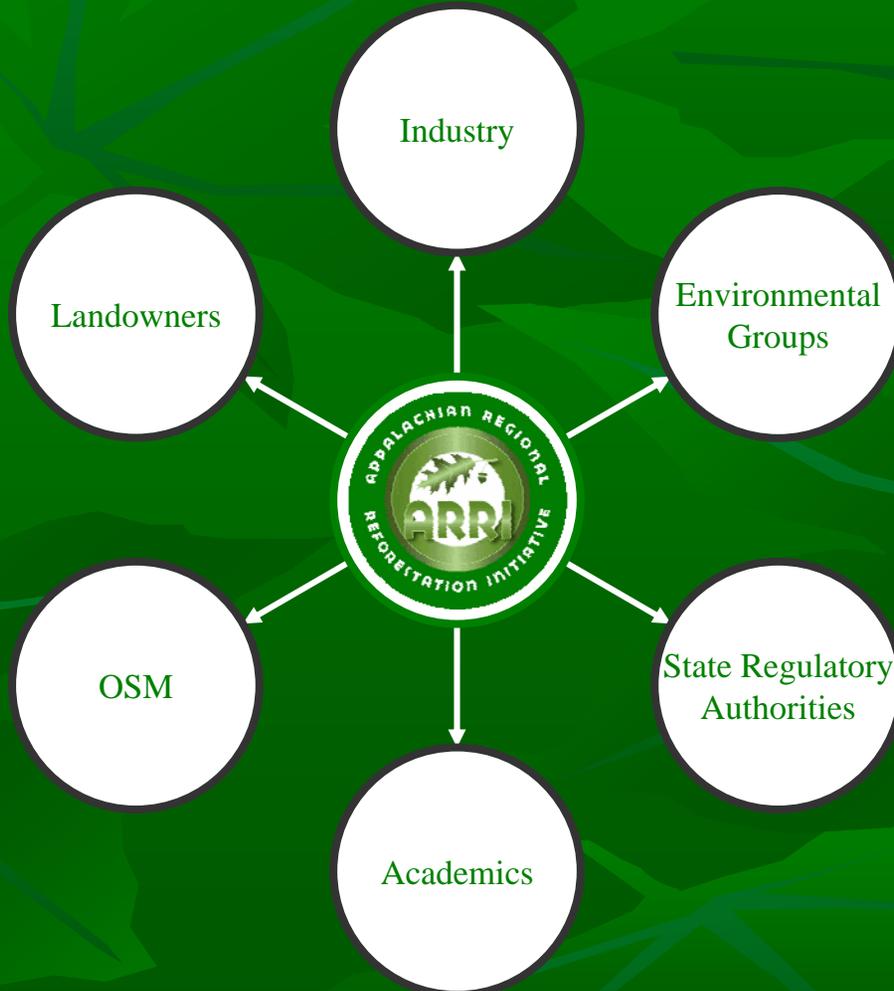
**Cooperative conservation - promoting establishment of high quality forests on mined land**

**A joint effort between OSM and the Appalachian coal states**

# GOALS OF THE INITIATIVE

- Plant more high-value hardwood trees on reclaimed surface mined lands in Appalachia
- Increase the survival rate of the planted trees
- Increase growth rates and productivity from the surviving trees
- Expedite the establishment of forest habitat through natural succession

# ARRI is a Partnership



# ARRI's Core Team

- The Core Team is made up of representatives from:

- OSM

- 7 Appalachian coal states

# Academic Team

- 23 reforestation researchers and experts representing 10 universities and the USFS
- Academic co-team leaders:
  - Dr. James Burger, Virginia Tech
  - Dr. Donald Graves, University of Kentucky

**THE APPALACHIAN REGIONAL REFORESTATION INITIATIVE**Jim Burger<sup>1</sup>, Don Graves<sup>2</sup>, Patrick Angel<sup>3</sup>, Vic Davis<sup>4</sup>, Carl Zipper<sup>5</sup>

The Forestry Reclamation Approach (FRA) is a method for reclaiming coal-mined land to forest under the Surface Mining Control and Reclamation Act (SMCRA). The FRA is based on knowledge gained from both scientific research and experience (Photo 1). The FRA can achieve cost-effective regulatory compliance for coal operators while creating productive forests that generate value for their owners and provide watershed protection, wildlife habitat, and other environmental services.

The purpose of this Advisory is to describe the FRA, which is considered by state mining agencies and US Office of Surface Mining to be an appropriate and desirable method for reclaiming coal-mined land to support forested land uses under SMCRA (Angel and others, 2005). The FRA is also supported by members of the ARRI's academic team, which is drawn from Universities in nine states, and by other groups and agencies.

**The FRA's Five Steps**

The FRA can be summarized in five steps:

1. Create a suitable rooting medium for good tree growth that is no less than 4 feet deep and comprised of topsoil, weathered sandstone and/or the best available material.
2. Loosely grade the topsoil or topsoil substitute established in step one to create a non-compacted growth medium.
3. Use ground covers that are compatible with growing trees.
4. Plant two types of trees—early successional species for wildlife and soil stability, and commercially valuable crop trees.
5. Use proper tree planting techniques.

**Step 1. Create a suitable rooting medium.**

Tree survival and growth can be hindered by highly alkaline or acidic soils. During mining and reclamation, all highly alkaline materials with excessive soluble salts and all highly acidic or toxic material should be covered with a suitable rooting medium that will support trees. The best available growth medium

Photo 1. A white oak stand that grew on a pre-SMCRA surface mine in Southern Illinois. Observations by reclamation scientists and practitioners of soil and site conditions on reclaimed mines such as this, where reforestation was successful, have contributed to development of the Forestry Reclamation Approach.



should be placed on the surface to a depth of at least four feet to accommodate the needs of deeply rooted trees.

Growth media with low to moderate levels of soluble salts, equilibrium pH of 5.0 to 7.0, low pyritic sulfur content, and textures conducive to proper drainage are preferred. However, where such materials are not available, an equilibrium pH as low as 4.5 or as high as 7.5 is acceptable if tree species tolerant of those conditions are used.

# Forestry Reclamation Approach (FRA)

- 1. Create a suitable rooting medium for good tree growth that is no less than 4 feet deep and comprised of topsoil, weathered sandstone, and/or the best available material**







# Forestry Reclamation Approach

- 2. Loosely grade the topsoil or topsoil substitutes established in step one to create a non-compacted soil growth medium**













# Forestry Reclamation Approach

3. Use native and noncompetative ground covers that are compatible with growing trees





# Forestry Reclamation Approach

4. Plant two types of trees – early succession species for wildlife and soil stability, and commercially valuable crop trees



# Forestry Reclamation Approach

**5. Use proper tree planting techniques**



# Removing Barriers

- Cultural
- Technical
- Regulatory

# Statement of Mutual Intent

- The 213 signatories collected to date represent 118 different organizations:
  - 27 Government Agencies
  - 20 Environmental Groups
  - 16 Industry Organizations
  - 9 Academic Institutions
  - 5 Citizen Groups



- Kentucky Governor Ernie Fletcher signed on 8/17/05
- The National Mining Association signed on 9/20/05

# American Chestnut and Mineland Reforestation?

“Chestnut will thrive on a variety of soils, from almost pure sand to coarse gravels and shales.... In general it prefers the dry, well-drained rocky land of the glacial drift to the richer, more compact alluvial soil of the lowland”.

From: Gifford Pinchot, 1907,  
Forest Service –Circular 71.  
Forest Planting Leaflet. *Chestnut*

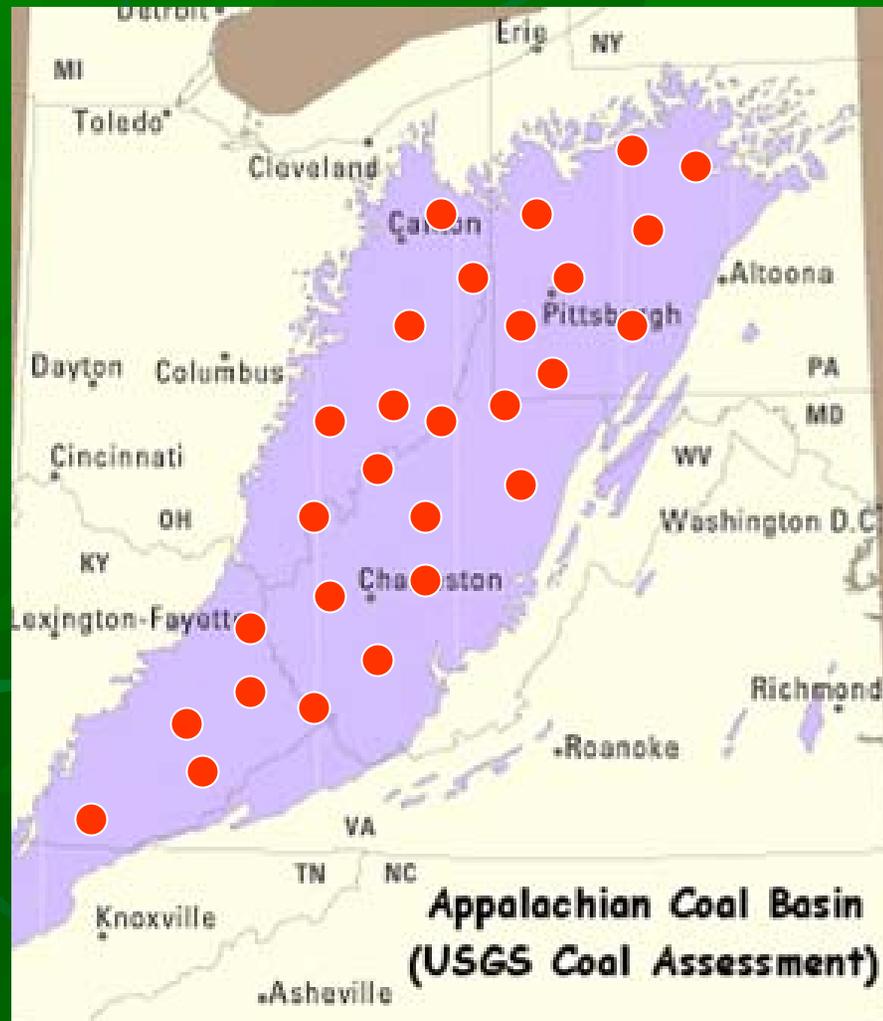


# American Chestnut and Mineland Reforestation?



Loose Dumped Spoil

# American Chestnut and Mineland Reforestation?



**Vectors for Dispersal**

**In 2005, 9.4 million trees on over 15,000 acres**

**REFORESTATION CHAMPIONS**

