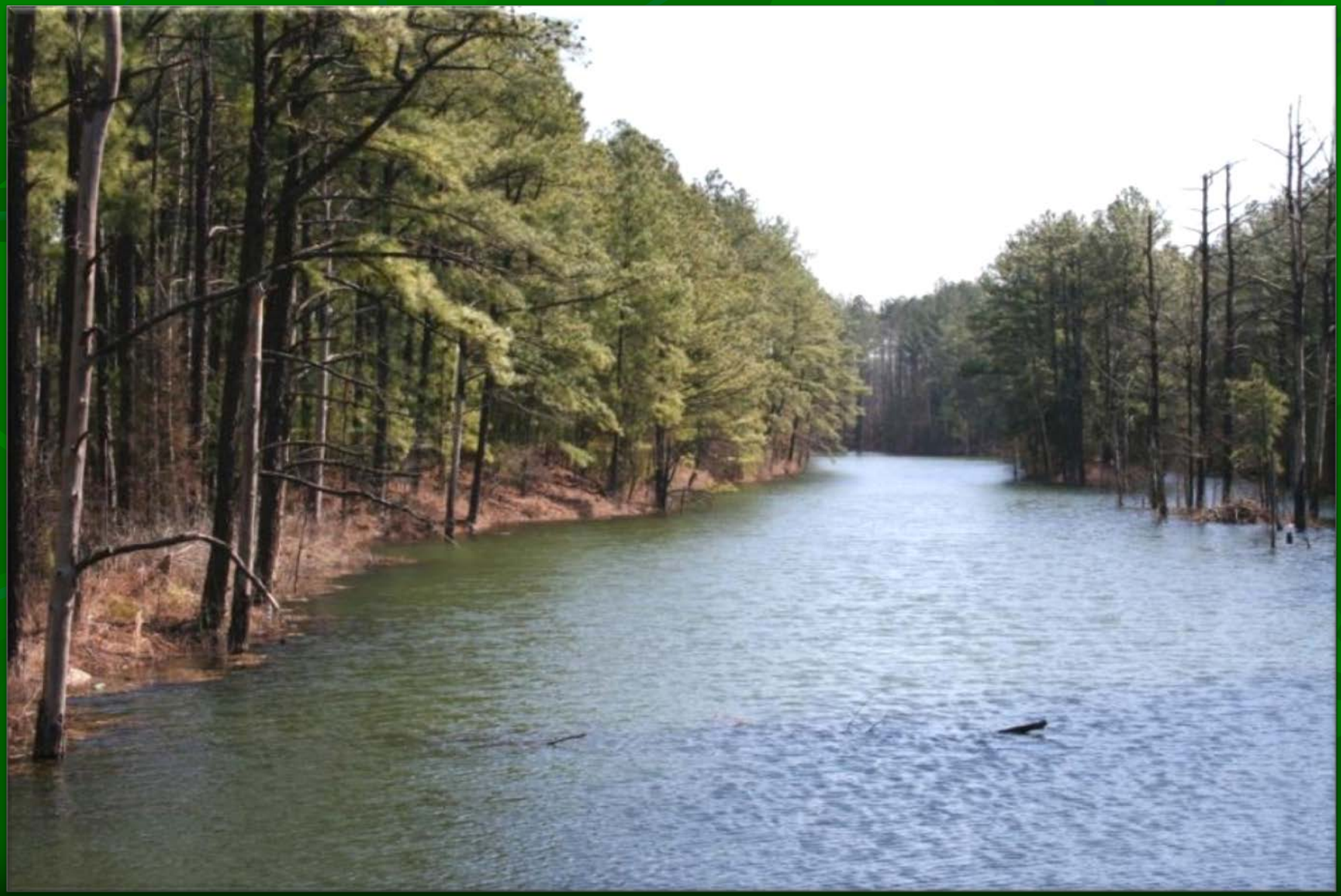
Mined Land Reclamation for Reforestation and TACF's Conservation Innovation Grant

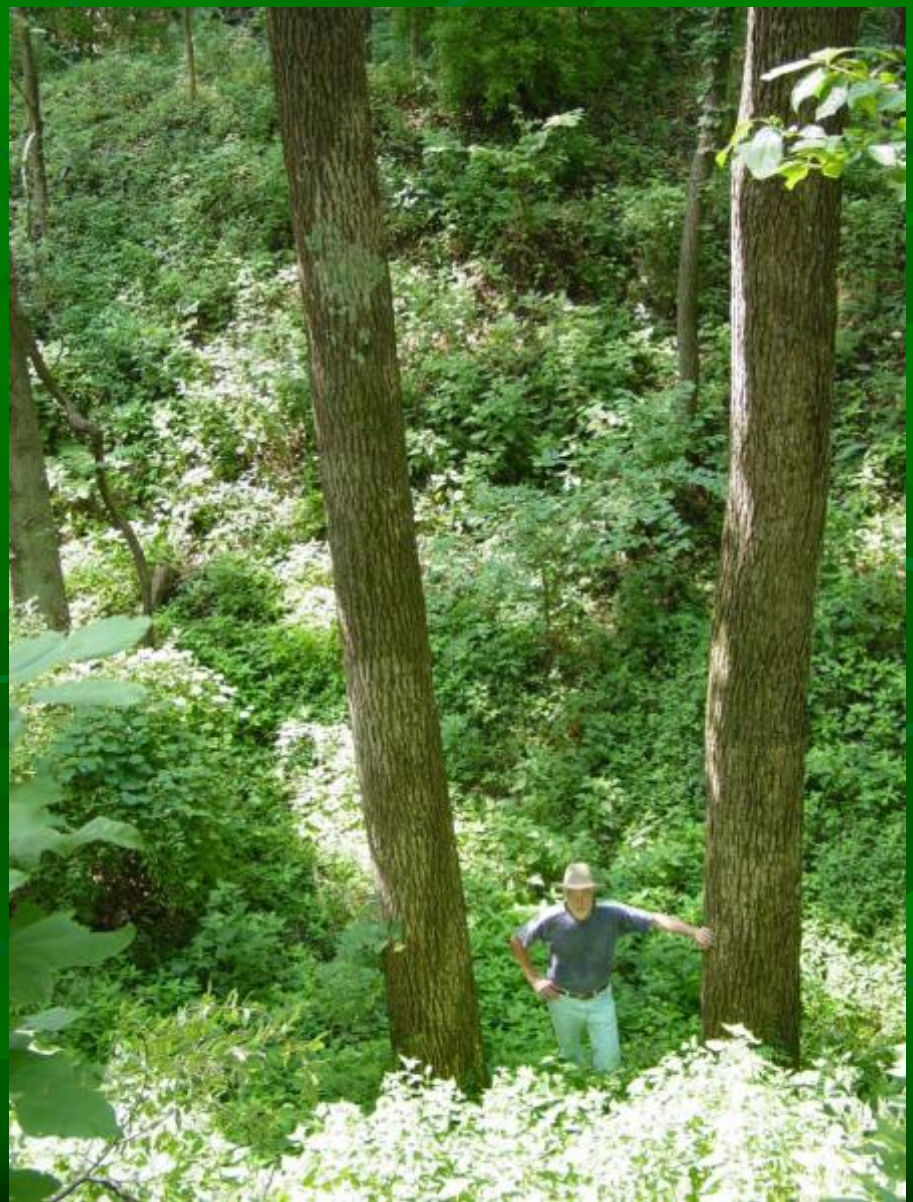
Pre-SMCRA
Loblolly Pine, West Kentucky



Pre-SMCRA
Mixed Hardwood, East Tennessee

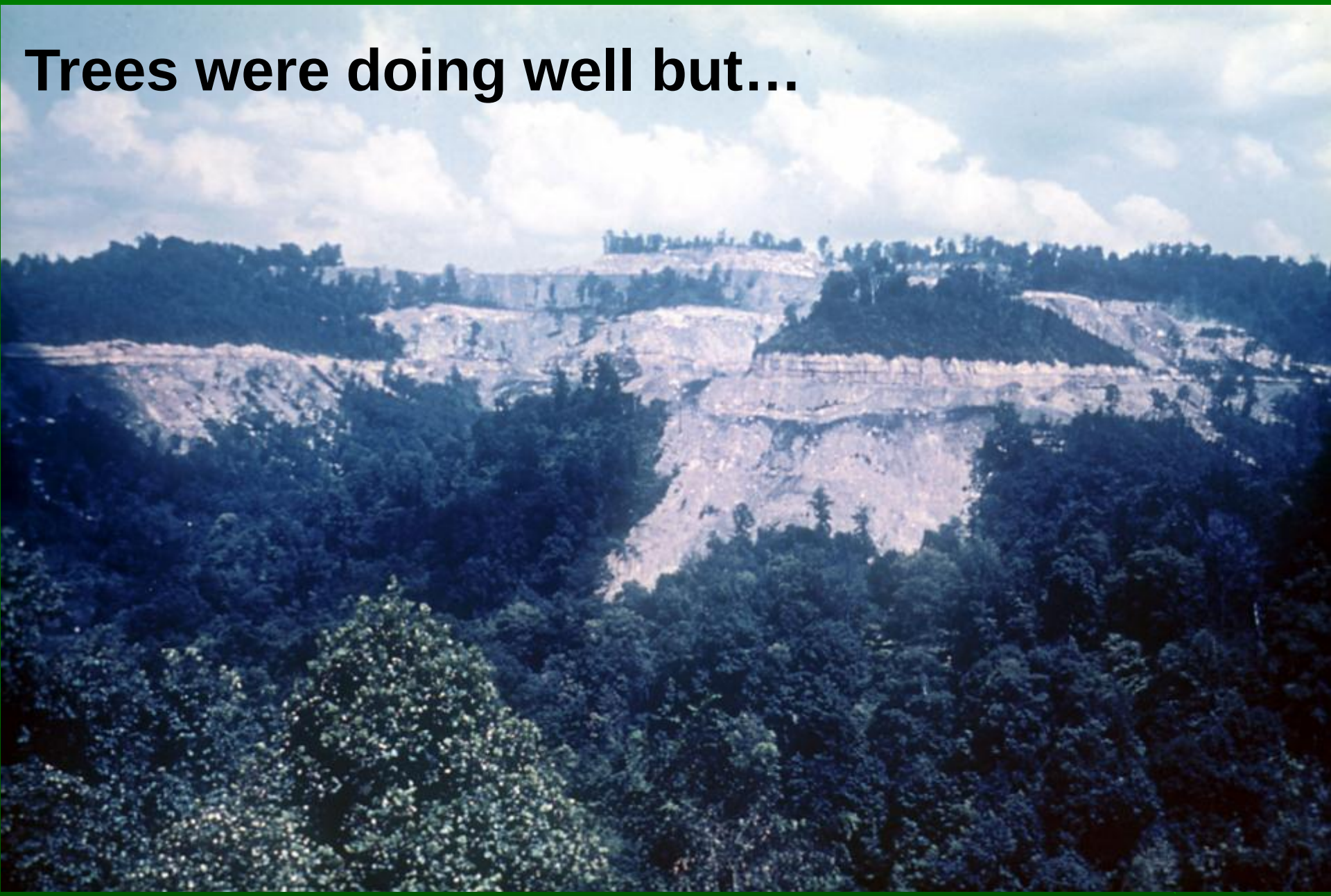
Pre-SMCRA
White Oak, Southern Illinois

Pre-SMCRA
Black Walnut, Southern Indiana



Pre-SMCRA
Cottonwood, Southern Indiana

Trees were doing well but…



Surface Mine Control and Reclamation Act of 1977 (SMCRA)

- Standardized reclamation practices
  - Focused on slope stability, eliminating landslides, and reducing sediment runoff
  - Approximate Original Contour (AOC)
  - Required that mining companies put up a monetary bond before mining commenced
    - Disincentives for reforestation
      - Time to prove seedling establishment
      - Extra cost associated with planting trees

Pre SMCRA Meets Post SMCRA


Post SMCRA Reclamation

Post-SMCRA Reforestation

What Happened?

- In an effort to achieve stability and prevent landslides, spoils were repeatedly graded which created a highly compacted surface.

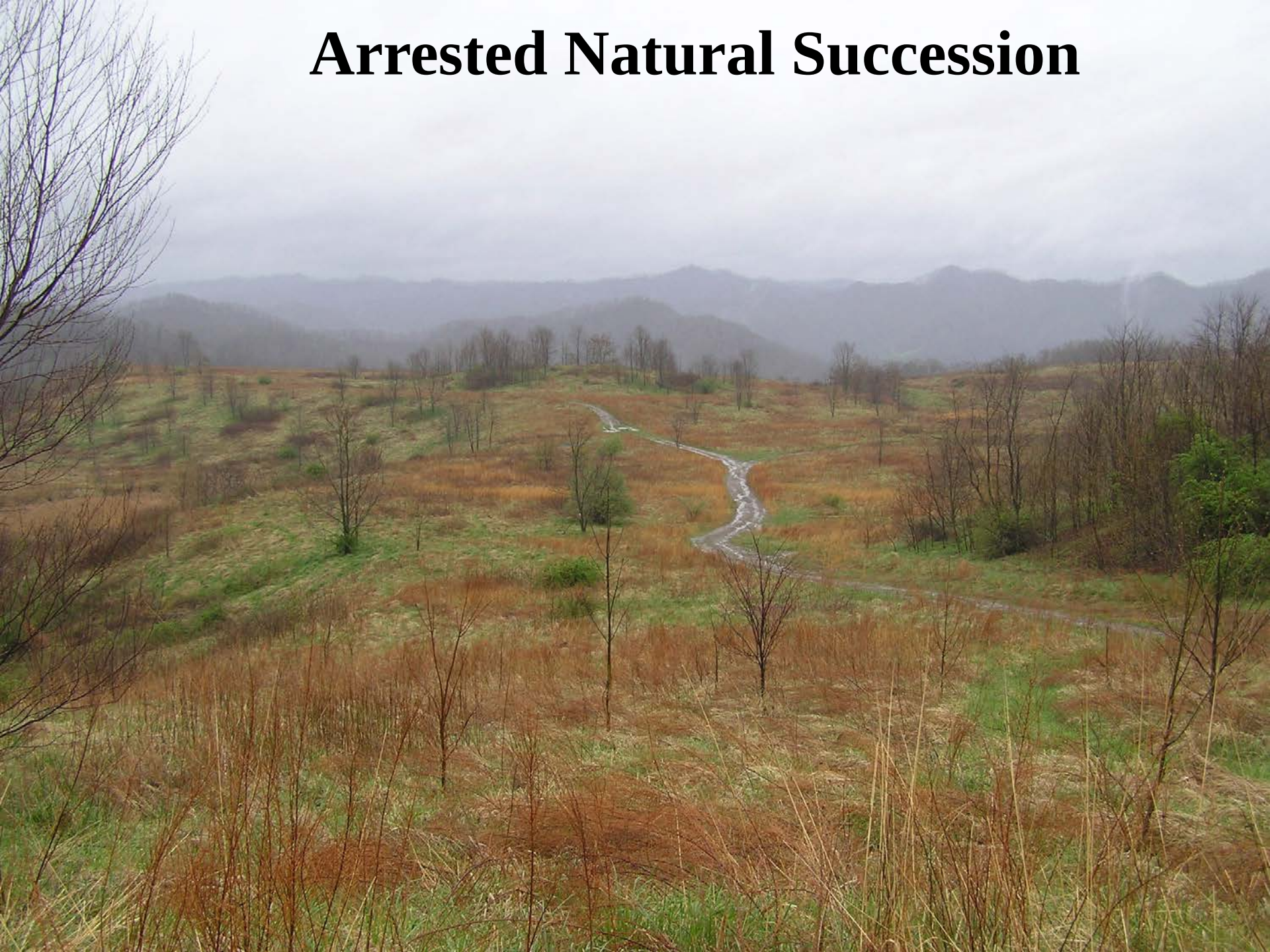
- Compacted spoils inhibit root penetration, gas exchange and water infiltration which resulted in high seedling mortality, increased runoff and poor water quality.

- This led to a widespread failure of tree planting projects.

- Mining firms and reclamationists became very skilled at creating grasslands: efficient, cheap, successful in achieving bond release.


Hayland/Pasture became the PMLU of choice

Arrested Natural Succession



Where once were forests…

Approximately 1,000,000 acres of pastureland


2007 8 22


How do we get back to this?

The Appalachian Regional Reforestation Initiative

- A joint venture based on science
  - Office of Surface Mining
  - Universities and Colleges
  - State regulatory agencies
  - Environmental Groups
  - Mining Industry
  - Citizen’s groups
  - Inspectors

The Appalachian Regional Reforestation Initiative

- ARRI's goals:
  - Plant more high value native hardwoods
  - Increase seedling survival
  - Expedite the establishment of forest habitat and speed up natural succession

Forestry Reclamation Approach (FRA)

- Leave 4 feet suitable growth medium on the surface
- Avoid compaction
- Use tree compatible groundcovers
- Plant a variety of trees
  - Early successional trees
  - High-value hardwoods
- Use proper tree planting techniques

End-Dumping of Suitable Material

End-Dumping of Suitable Material

Strike-off Procedure


Push up method

STEEP SLOPE FRA

Results of the FRA

Year 1

Year 3

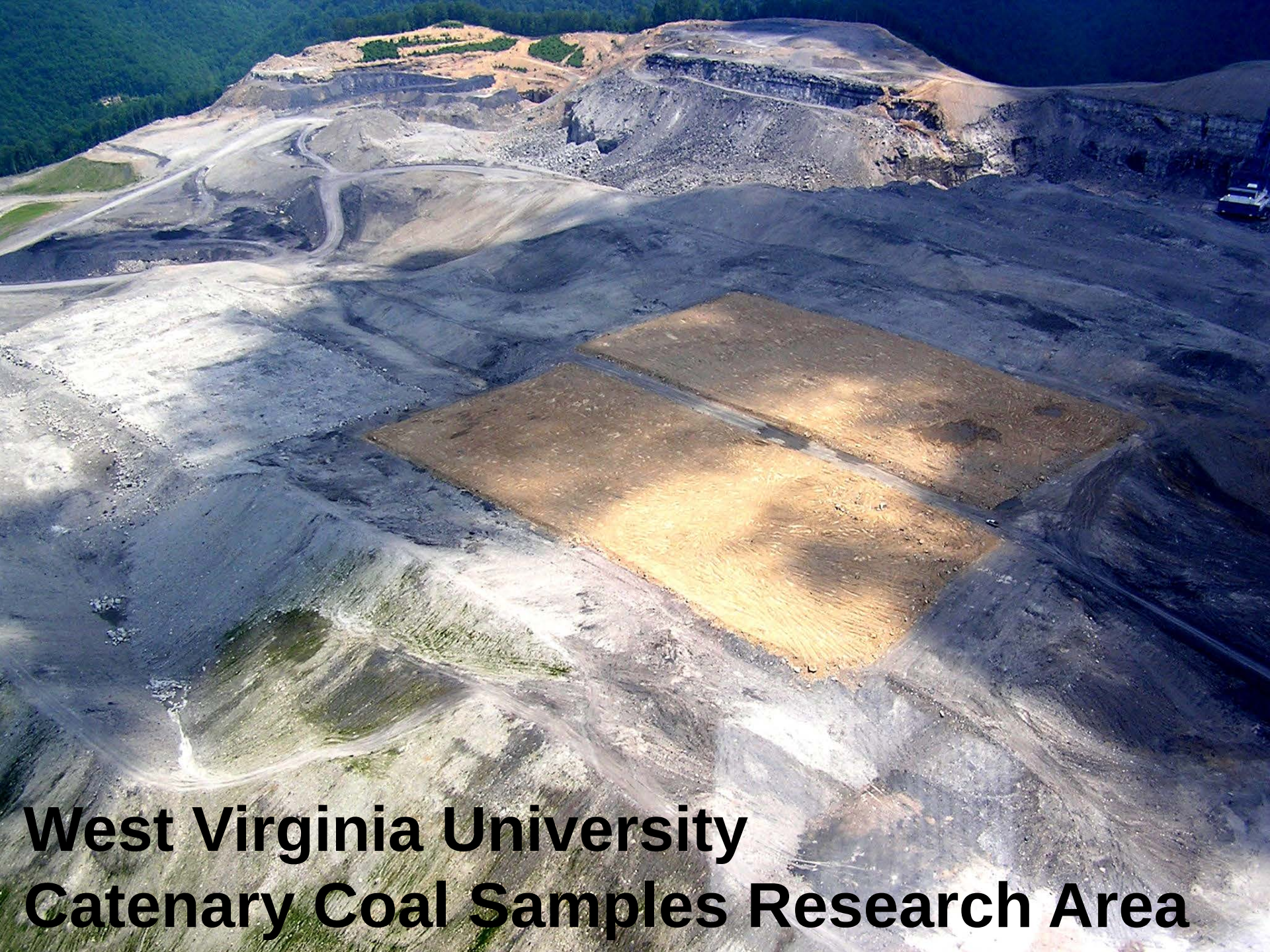
Year 11

Conventional Reclamation vs. FRA

2,541 trees/cell

- 7 year old trees on a conventional site
- 20% survival
- Tree growth well below regenerating forest of same age

- 7 year old trees on low compaction site
- 75% survival
- Tree growth similar to regenerating forest of same age


West Virginia University
Catenary Coal Samples Research Area

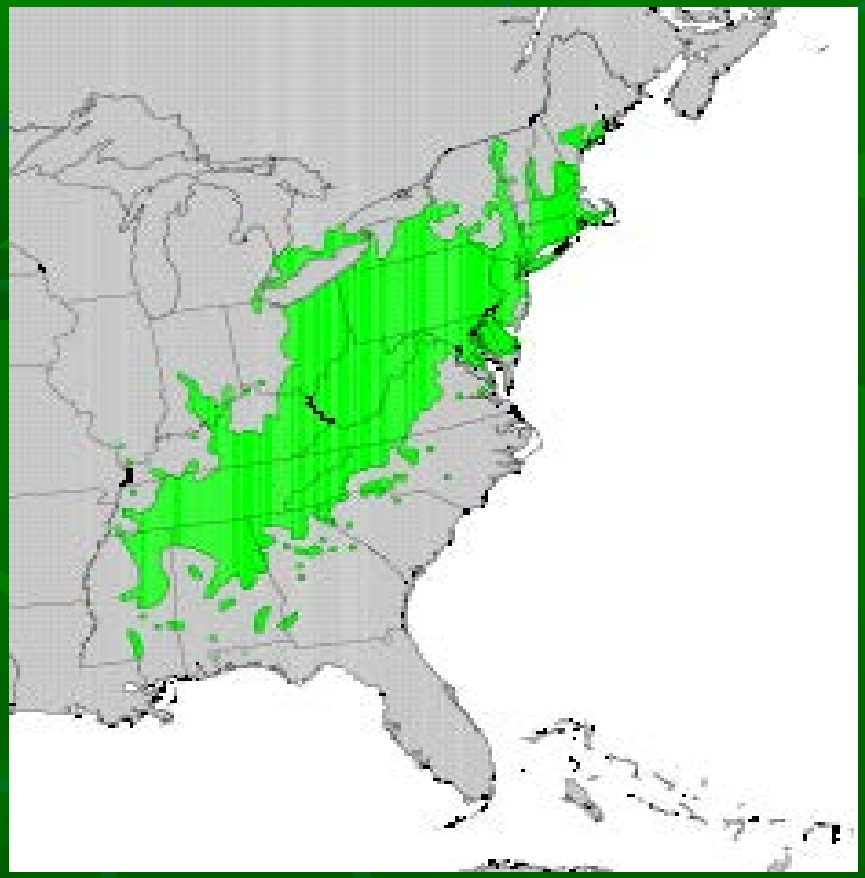

University of Kentucky
Bent Mountain Research Complex

Ohio University
Jockey Hollow Research Complex

Yes, we can grow trees on mines… why are we using American chestnut?

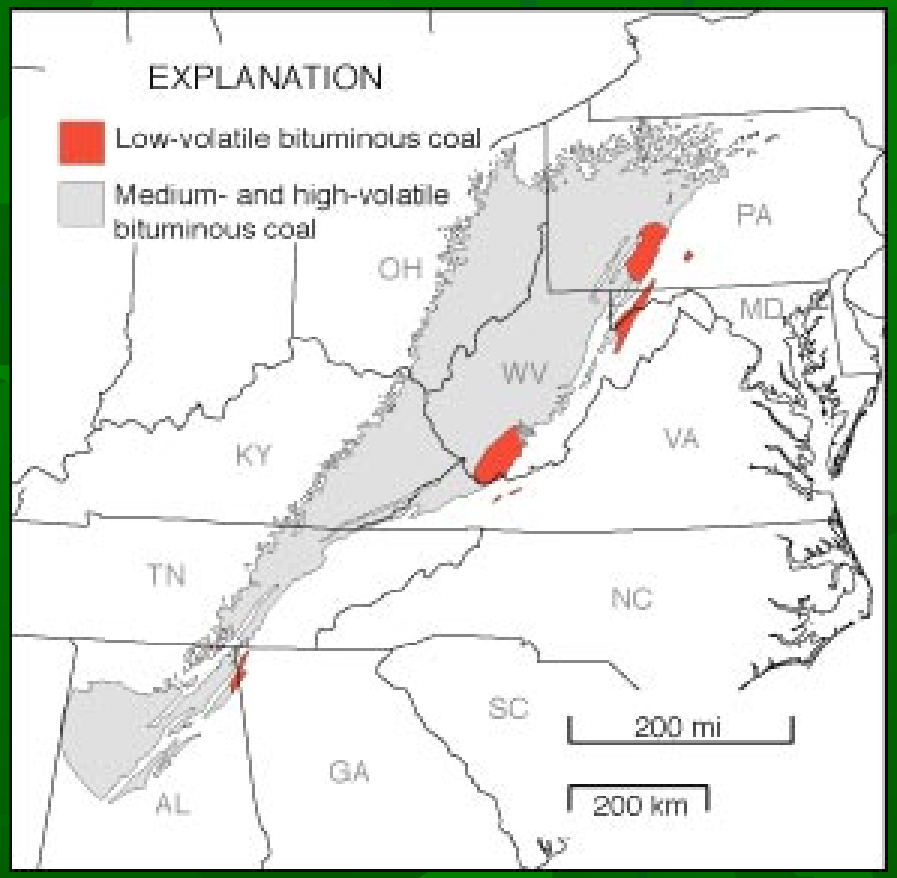
- Not enough work linking chestnut restoration with mine reclamation
- Mine soils can be very productive
- Lack of initial vegetative competition
- Avoidance of *Phytothphora* root rot
- Surface mines may aid chestnut dispersal into existing forests
- Many surface mines are at higher elevations where chestnuts were once the dominant species
- And…

Natural range of the American chestnut



Native range of American chestnut. From Little, E.L., Jr., 1977, Atlas of United States trees, volume 4, Minor Eastern Hardwoods: U.S. Department of Agriculture Miscellaneous Publication 1342, 17 p., 230 maps.

Extent of coal fields in Appalachian region



www.pubs.usgs.gov/fs/fs115-99/

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*

Chestnut Mortality on Mine Sites

- Thus far attributable to blight, drought

Swollen blight canker

Healthy root system

Survival so far…

Ranges from 41% to 89% for research seedlings after 2 years

100% survival through the first year of germinated seed from a special line

A direct-seeded chestnut after 1 ½ years on mine spoil


What can be done about this?
750,000 – 1,000,000 acres in need of restoration


CATERPILLAR

Green Forests Work

- Started as a program to stimulate the local economy by creating jobs
- Was not funded
- Continued anyway with no funding
- Garnered support and attention
- Appalachian Regional Commission
- A new 501(c)3 non-profit

Green Forests Work

- After 5 years:
  - Plant 125 million trees on 175,000 acres
  - Create 2,000 jobs associated with reforestation
  - Sequester 11.7 million tons of carbon
- After 50 years:
  - Plant more than 1 billion trees on more than 1 million acres
  - Create 17,000 permanent jobs
  - Produce $2.2 billion in timber value
  - Sequester 100 million tons of carbon

Green Forests Work

(Gaining Momentum)

2009:

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

2010:

- 200 acres on 17 sites
- 140,000 trees
- 2,000 volunteers + little funding

2011:

- 680 acres on 18 sites
- 500,000 trees
- 1,700 volunteers + more funding

USDA NRCS
United States Department of Agriculture
Natural Resources Conservation Service

Conservation Innovation Grant (CIG)

- 3 Goals:
  - Establish mixed hardwood/American chestnut plantings to demonstrate successful reforestation of mined lands
  - Create tools for evaluating reforestation sites
    - Training workshops
    - Technical Note
    - State and transition model
  - Support TACF's online Trees Database

CIG Reclamation Plantings

- Utilize ARRI's Forestry Reclamation Approach (FRA) and TACF's Restoration Chestnuts 1.0
- Each of the 12 plantings will be approx. 30 acres on reclaimed mines
- Est. 2012-2014 in Kentucky, Ohio, Pennsylvania, Virginia, West Virginia
- Planting density of 700 seedlings/ac. with chestnuts at 20/ac. (approx. 29 acres)
- 1-acre progeny test/founder population of Restoration Chestnuts

CIG Reclamation Plantings Schuylkill County 2012

Silvicultural demonstration

Progeny test/Founder population

Online Trees Database

- Will allow TACF staff, volunteers, researchers, and natural resource professionals to store, share, and track data on American chestnut plantings
- Useful for future land management recommendations
- Tiered access model

Tools for Restoration

- State and transition model
  - Shows different potential “states” as the site crosses thresholds or “transitions” to a new state (e.g. grass dominated field to shrub habitat)
  - Aid land managers in developing reforestation plans
- Training Workshops
  - 1 for each planting (generate local involvement)
  - Chestnut biology, ecology, pests and pathogens, methods for monitoring sites
- Technical Note
  - A manual describing BMPs for planning, growing, and managing chestnuts

Questions and Comments?

www.acf.org
www.arri.osmre.gov
www.greenforestswork.com

Photo courtesy of T.G. Barnes