Green Forests Work

Restoring Ecosystem Services and Creating Economic Opportunities on Surface Mines across Appalachia

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Environmental and Energy Study Institute Webinar
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Pre-SMCRA
Black Walnut, Southern Indiana

Pre-SMCRA
White Oak, Southern Illinois

Pre-SMCRA
Loblolly Pine, Western Kentucky


Reforestation was commonplace but…
so were human safety and environmental issues…


Water quality problems


Hazardous landforms

Toxic or acid-producing material on the surface

Surface Mining Control and Reclamation Act of 1977 (SMCRA – Public Law 95-87)

- Standardized reclamation practices
- Provided oversight to state agencies
  - Focused on slope stability, eliminating landslides, and reducing sediment runoff
  - Approximate Original Contour (AOC)
  - Post-mining land use (PMLU)
  - Required that mining companies put up a monetary bond before mining commenced


Pre-SMCRA Meets Post-SMCRA

Post-SMCRA Reforestation

What Happened?

- In an effort to achieve landform 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 results in high seedling mortality, increased runoff and poor water quality.
- Thick covers of aggressive grasses and legumes also competed with trees for nutrients, water, and sunlight.
- This led to a widespread failure of tree planting projects and disincentives for reforestation. Mining firms became very skilled at creating grasslands: efficient, cheap, successful in achieving bond release.


Tree planting failures became commonplace


7 year-old red oak

Where once were forests…

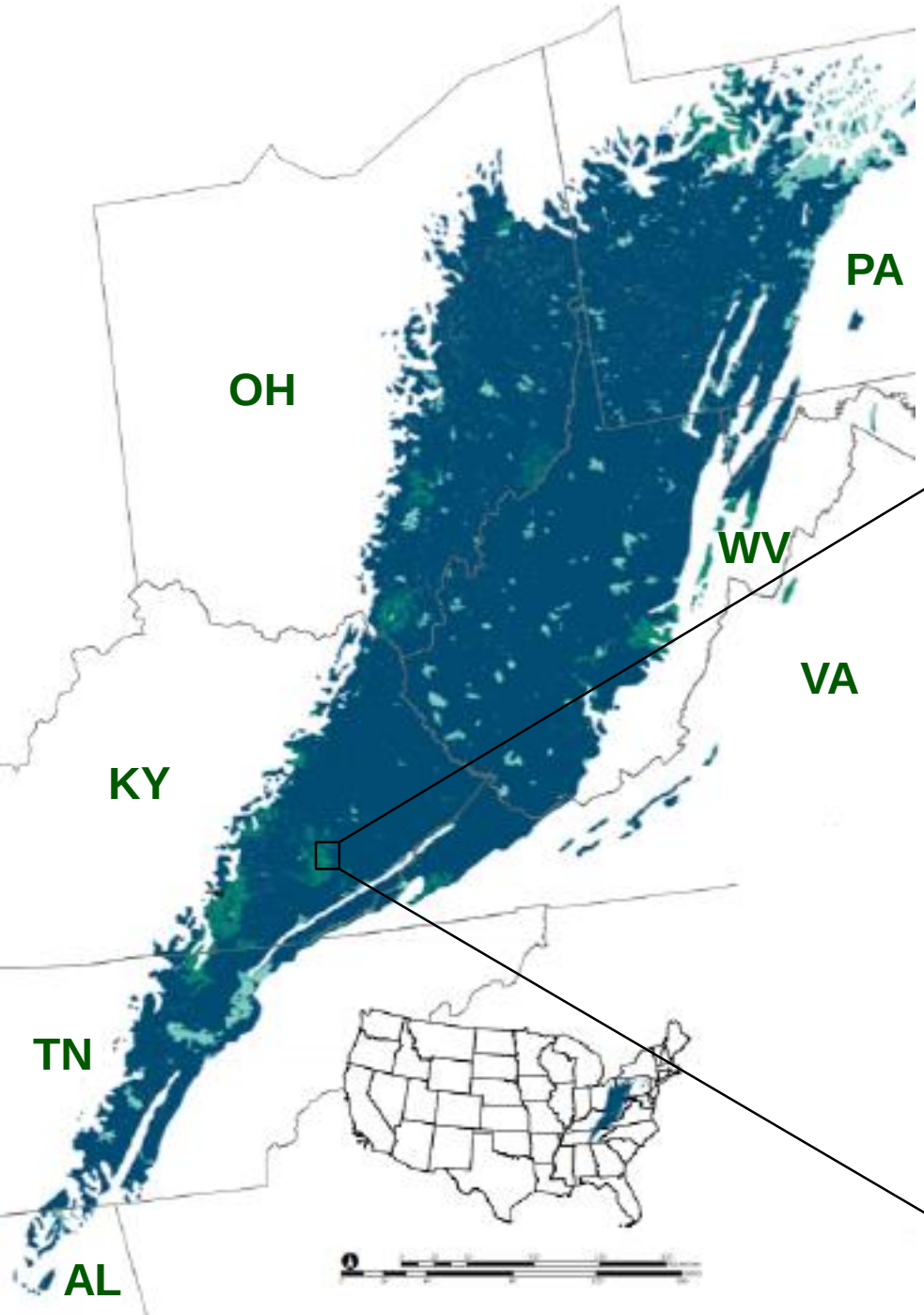
Hay/Pastureland PMLU became widespread

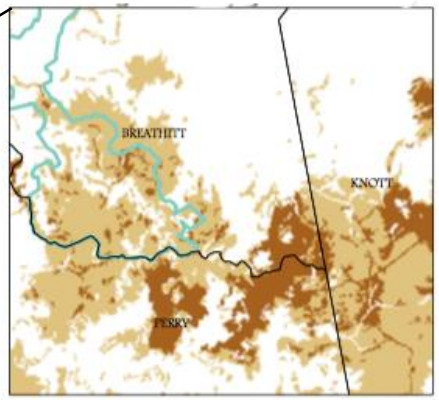
Where once were forests…

750,000 - 1,000,000 acres across Appalachia were converted from forest to other land uses

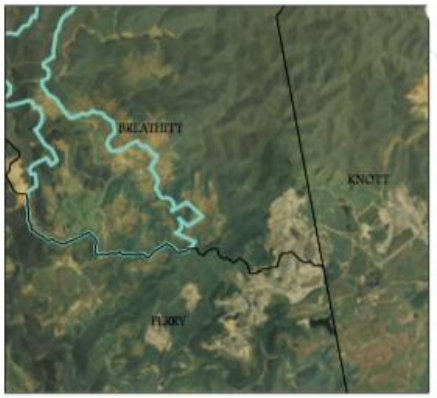
Land-Use Change

- **1,700,000 acres bond released**
- **700,000 acres currently permitted**

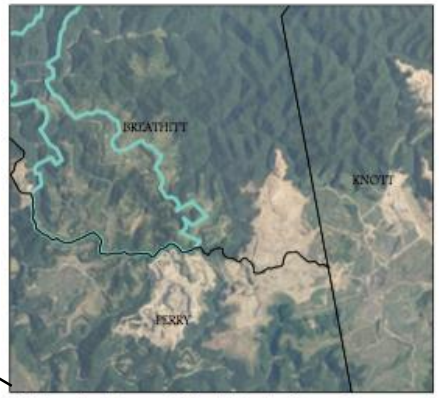




2006 National Land Cover Data



2006 Farm Service Agency - National Agricultural Imagery Program



2010 Farm Service Agency - National Agricultural Imagery Program

2008 Farm Service Agency - National Agricultural Imagery Program


These unmanaged grasslands often become colonized by invasive, exotic species

The Appalachian Regional Reforestation Initiative

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

- Created by OSMRE, ARRI works with the active mining industry, state regulatory agencies, academics, citizen's groups, et al.

The Forestry Reclamation Approach (FRA)

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


17 year-old FRA Planting - KY
YELLOW POPLAR

2007 FRA Planting - WV

7 year-old oak and poplar on an FRA site


Guy Cove site 2009 - before planting


Guy Cove site in 2017


Guy Cove site in 2019

What can be done about this?

750,000 – 1,000,000 acres in need of restoration

Green Forests Work

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

Green Forests Work

- Started as a petition to WH to stimulate the economy in Appalachia by creating jobs
- Continued anyway with no funding
- Appalachian Regional Commission
- 501(c)(3) est. in 2013
- Relies on grants, donations, and partnerships to implement projects on public and private lands

Modified FRA

- Control unwanted vegetation
  - Mechanical
  - Chemical
- Mitigate compacted ground
- Plant a variety of trees
- Use proper tree planting techniques

Unwanted vegetation - Mechanical control

Mitigate Compaction: Ripping a compacted site

Plant a variety of trees

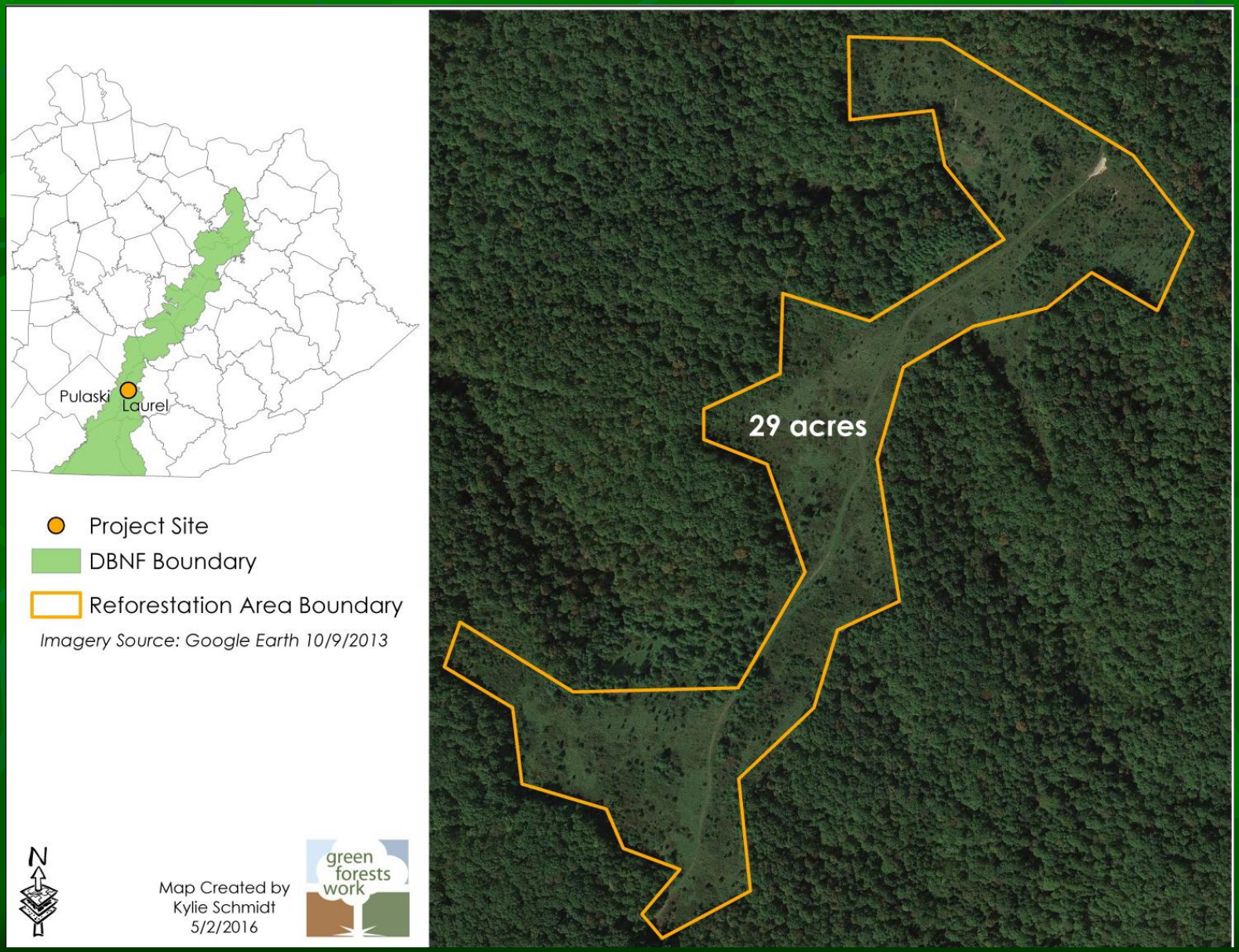
Green Forests Work

- Focused on improving two aspects of Appalachia
  - "Environmental Infrastructure"
    - Restoring ecosystem processes and services that native forests provide
  - Creating Employment and Economic Opportunities
    - Immediate creation of local jobs
    - Future opportunities by restoring a forest-based economy

Green Forests Work

- Restoration of Ecosystem Services
  - Forest habitat restoration
    - Terrestrial, avian, and aquatic benefits
    - Pollinator benefits
  - Improved hydrology and water quality
    - Ripping increases infiltration, reducing runoff and buffering watersheds from storm events
    - Tree cover increases ET, reducing loading
  - Improved air quality
    - Increased particulate interception
    - Climate change mitigation through C-sequestration

Reducing Forest Fragmentation



Improving Hydrology

Improving Hydrology

Habitat Creation

Pollinator Benefits

GFW-ARRI Projects 2009-2020

- 390 projects/events
- 10 States
- >17,000 volunteers
- 100s of partners
- 4,985 acres reforested
- 3,139,647 trees planted

green forests work

ARRI

University of Kentucky

Green Forests Work

- Job creation for seed collectors, equipment operators, nursery workers, tree planters, et al.
- Secondary industries (hospitality, retail, transportation, service)
- Future economic opportunities
  - Forest management
  - Timber production
  - Non-timber forest products
  - Eco-asset credits (carbon, N & P, et al.)
  - Tourism and recreation

Green Forests Work

Seed collectors and tree nursery workers

Green Forests Work

Equipment operators

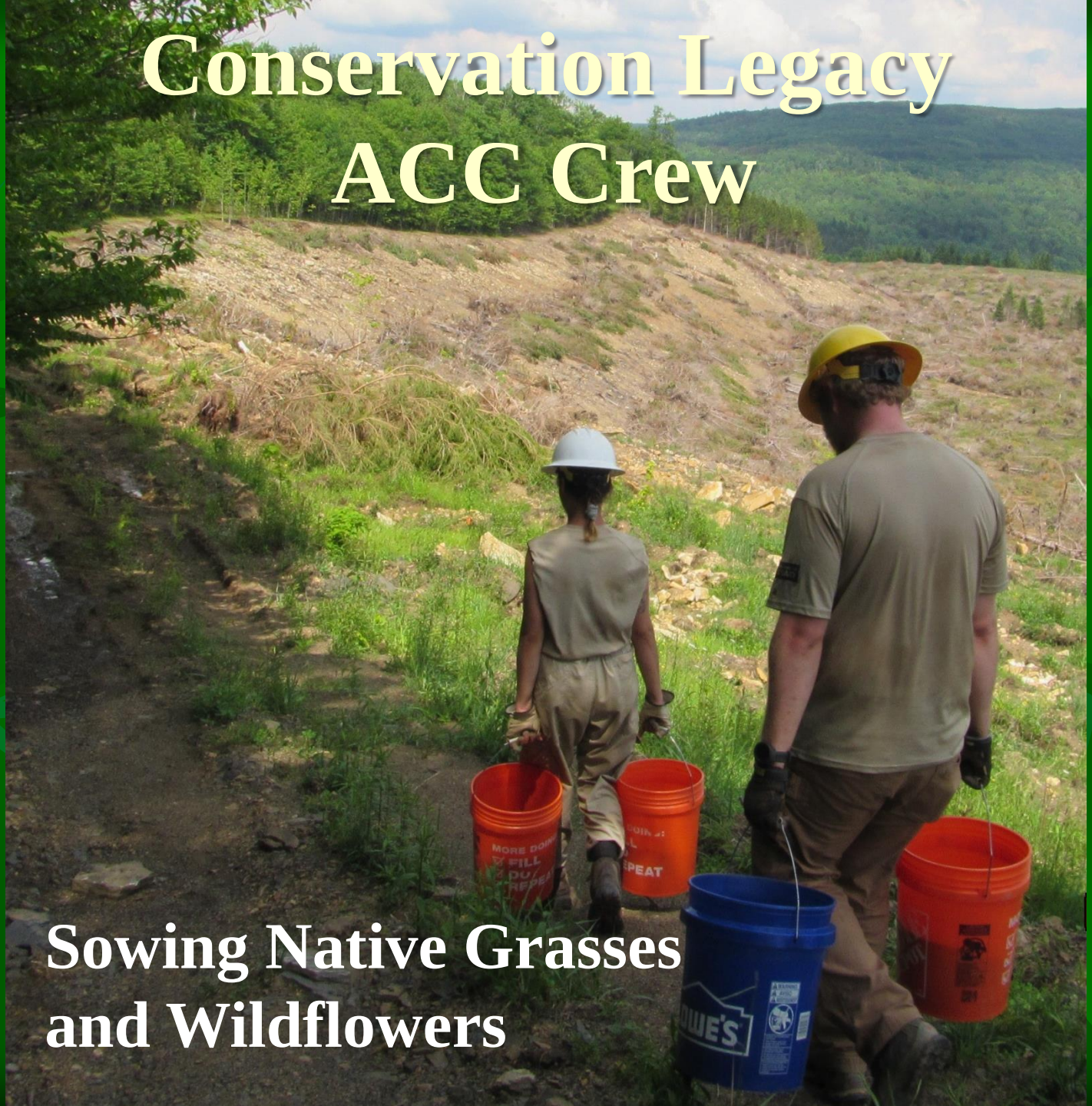
Green Forests Work

Professional tree planters

Conservation Legacy
ACC Crew

Planting Wetlands

Conservation Legacy
ACC Crew

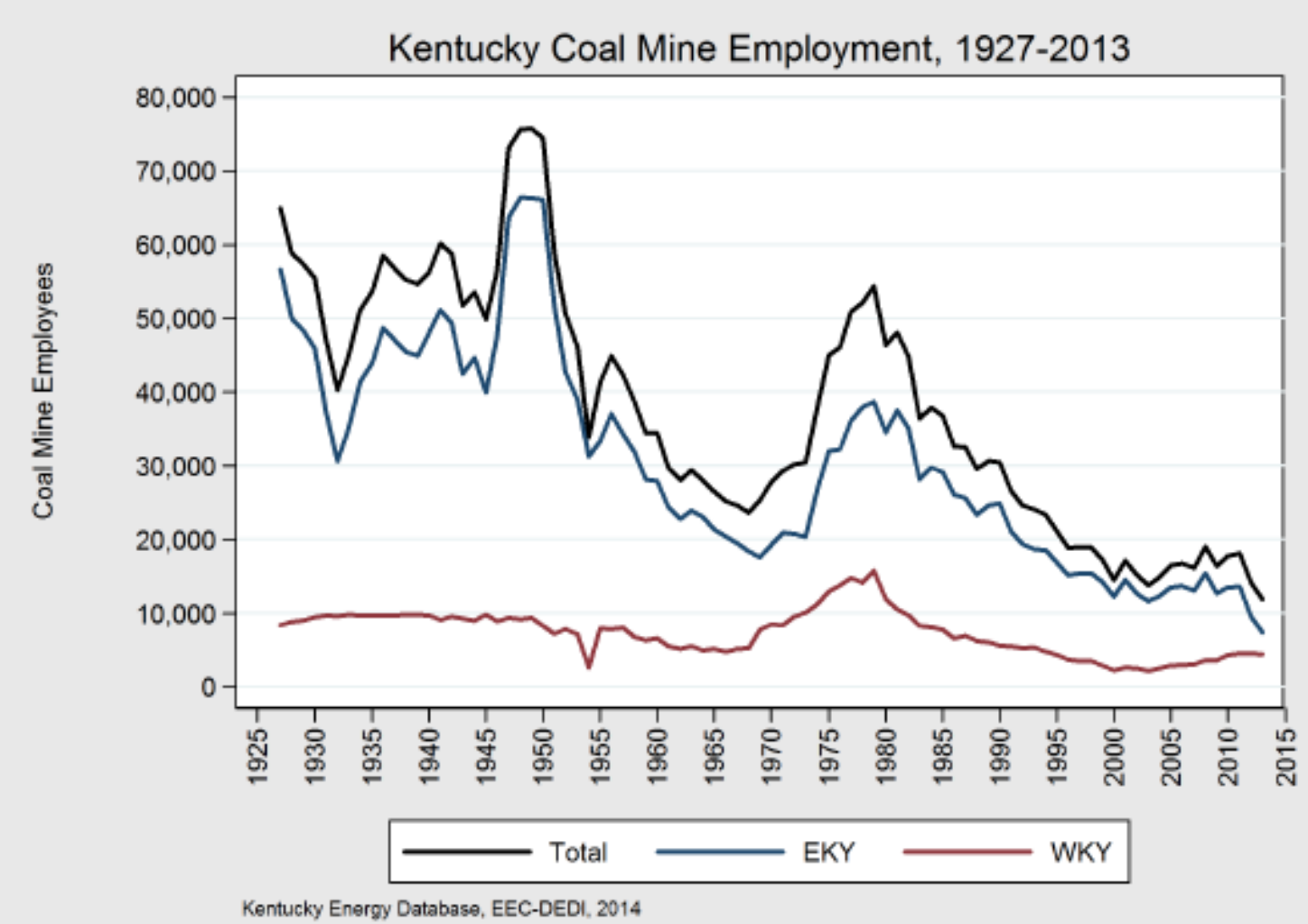


Sowing Native Grasses and Wildflowers

Why Forests?

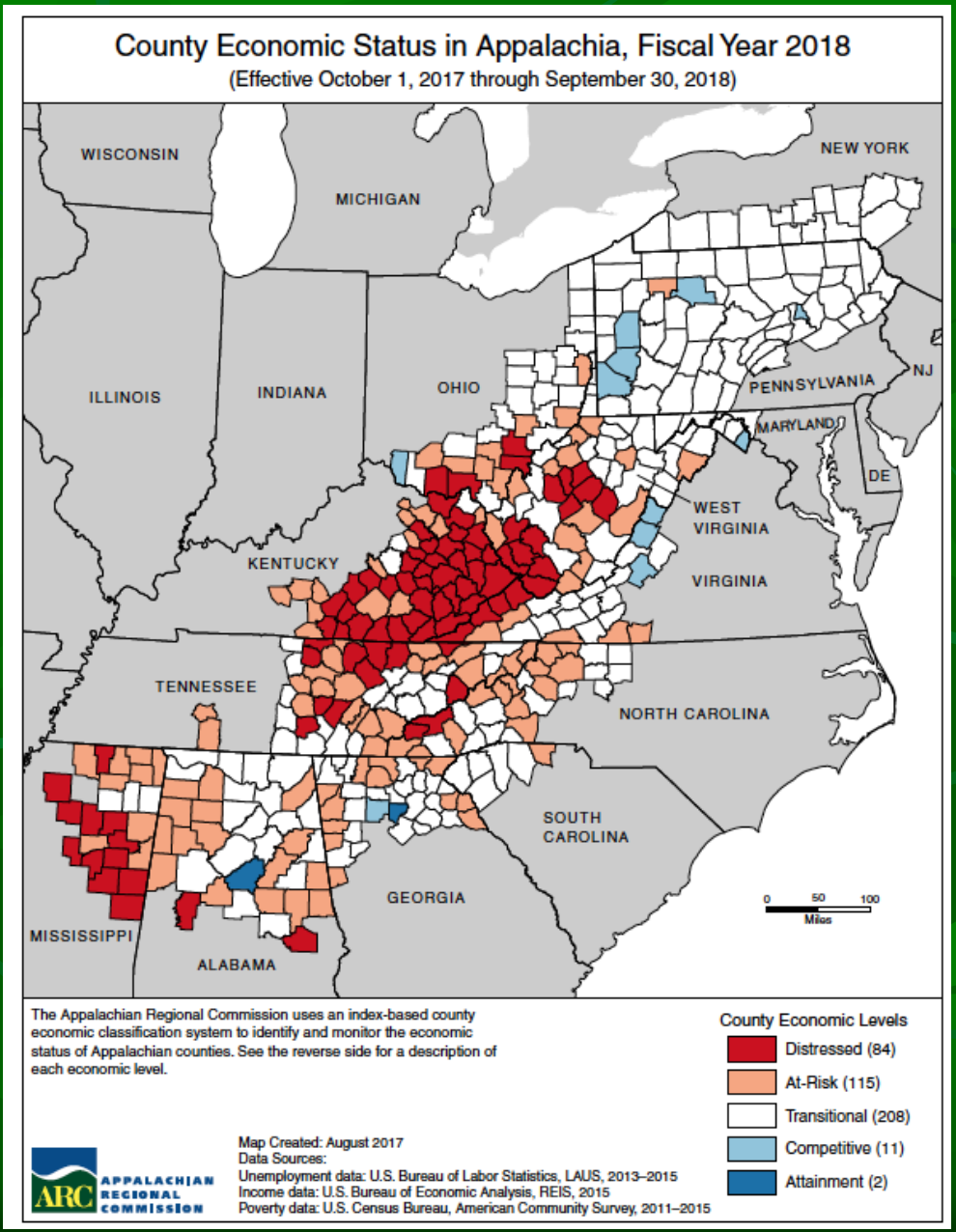
- $9.1 billion in direct economic contribution.
- 28,408 jobs in the forest industry and an estimated 57,750 jobs overall.
- EKY – opportunities for 14,000 additional jobs with $2.4 billion value added.
- ***Regenerative economy!***

Coal Mine Employment - KY



< 4,000 - The estimated number of coal jobs in Kentucky as of April 2017. It is the lowest number since 1898.

Why Now?


County Economic Status in Appalachia, Fiscal Year 2018
(Effective October 1, 2017 through September 30, 2018)
WISCONSIN
MICHIGAN
NEW YORK
ILLINOIS
INDIANA
OHIO
PENNSYLVANIA
NJ
MARYLAND
DE
WEST VIRGINIA
KENTUCKY
VIRGINIA
TENNESSEE
NORTH CAROLINA
SOUTH CAROLINA
GEORGIA
MISSISSIPPI
ALABAMA
0 50 100
Miles
The Appalachian Regional Commission uses an index-based county economic classification system to identify and monitor the economic status of Appalachian counties. See the reverse side for a description of each economic level.
County Economic Levels
Distressed (84)
At-Risk (115)
Transitional (208)
Competitive (11)
Attainment (2)
ARC APPALACHIAN REGIONAL COMMISSION
Map Created: August 2017
Data Sources:
Unemployment data: U.S. Bureau of Labor Statistics, LAUS, 2013–2015
Income data: U.S. Bureau of Economic Analysis, REIS, 2015
Poverty data: U.S. Census Bureau, American Community Survey, 2011–2015

“… the act of planting a tree reconnects the human spirit to the beauty and importance of the natural world – the basis for all life on Earth”.

2004 Nobel Peace Prize Laureate Wangari Maathai