

The Magnitude of the AMD Problem: AMD 101

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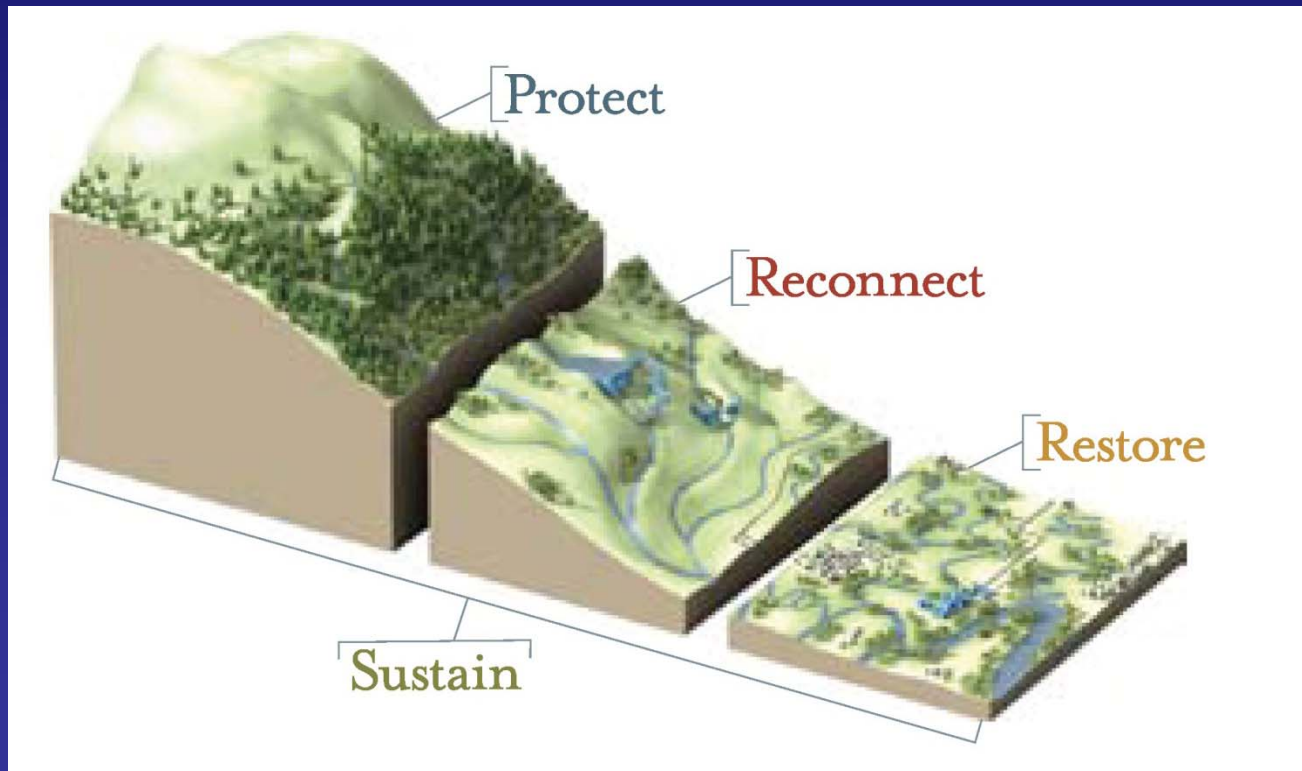


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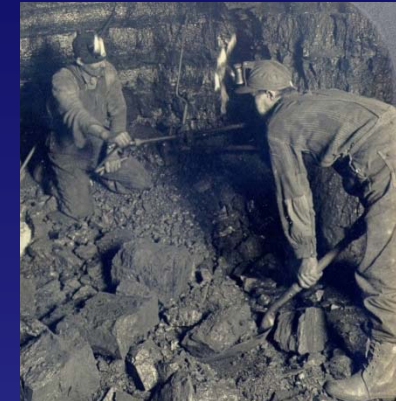
Trout Unlimited

Mission

To conserve, protect, and restore North America's coldwater fisheries and their watersheds.



Historical Coal Mining in Appalachia – Critical to Building Our Nation’s Success



Abandoned Mine Drainage (AMD)

A result of unregulated coal mining prior to Congressional enactment of the Surface Mining Control and Reclamation Act (SMCRA) in 1977.



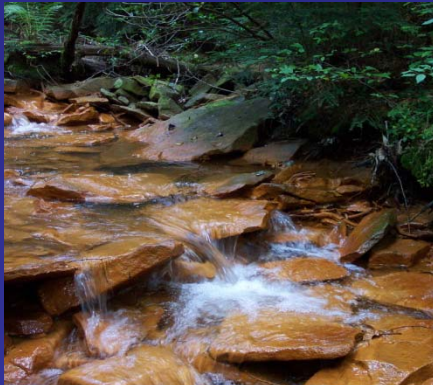
AMD 101 - Chemistry

Pyrite + Oxygen + Water



Ferric Hydroxide + Sulfuric Acid

Common AMD Characteristics



- High acidity, low pH
- High metal concentrations
- High sulfate levels



Ecological Impacts of AMD



- Dissolved metals are lethal to aquatic insects and fish

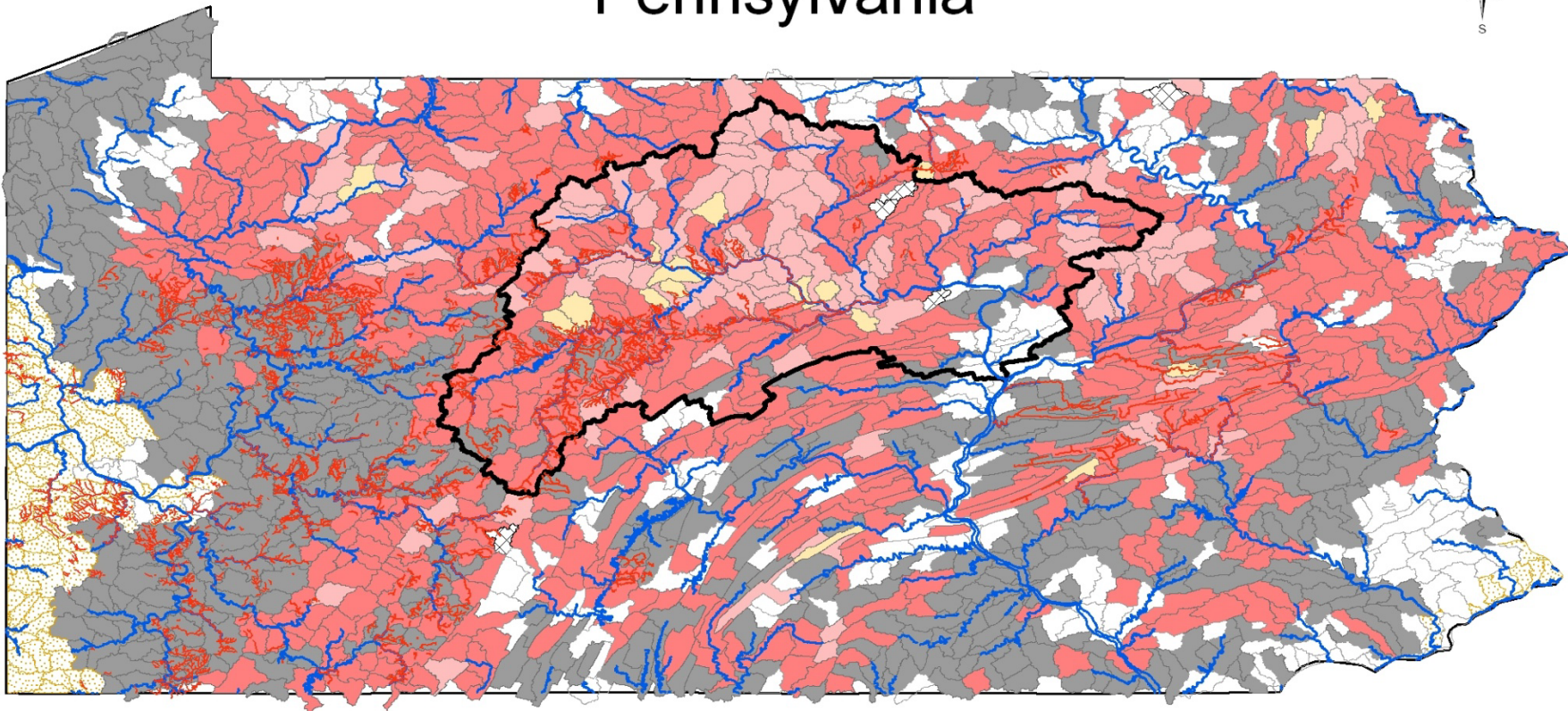
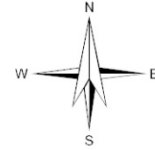


- Precipitated metals impair stream habitat for aquatic insects and fish

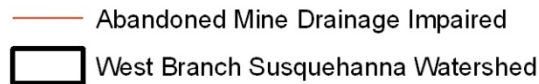
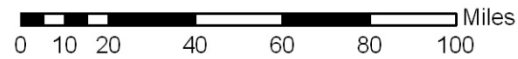
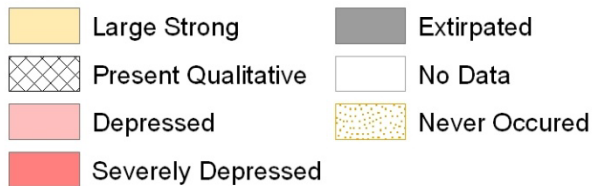


- pH lower than 5.5 in combination with Aluminum higher than 0.5 mg/L is a lethal combination

Eastern Brook Trout Status Pennsylvania



Population Status



Economic Benefits of AMD Cleanup



- Increase fishing opportunities and related business opportunities
- Create jobs
- Increase property values
- Restore sense of well-being to local communities

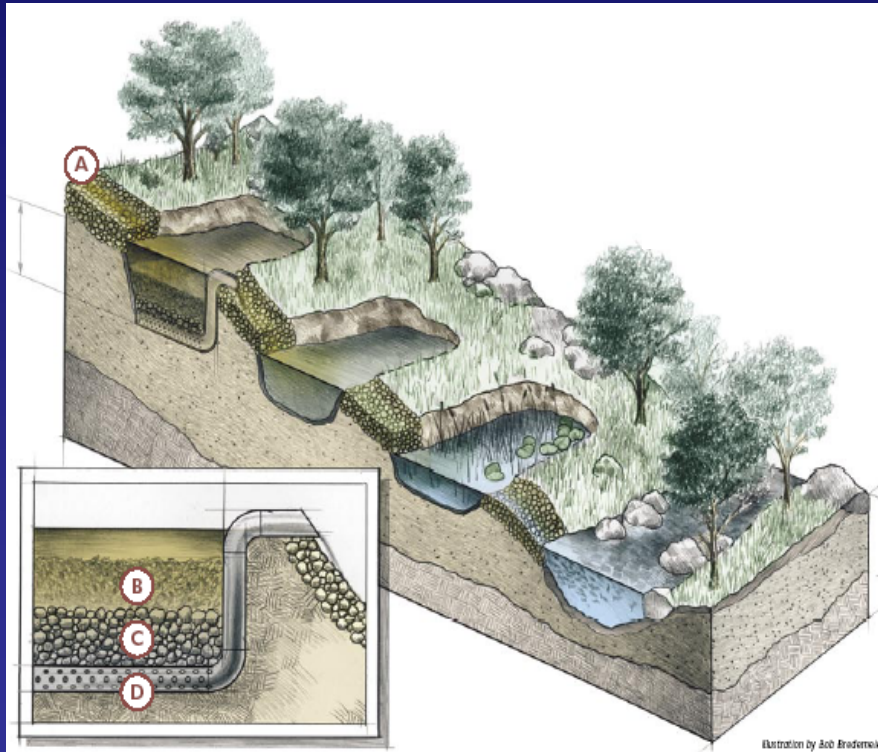
Economic Benefits of AMD Cleanup

Economic Benefits Study in West Branch Susquehanna

- Capital investments of more than \$110 million will generate local benefits of up to \$616 million and up to 5800 jobs statewide
- Full recovery will generate additional \$22.3 million in sport fishing revenues for region
- Clean streams will increase adjacent property values (~\$1,500 loss per parcel if within 200 ft of AMD stream)
- Clean streams will open up more plentiful and cheaper source water options for private and public drinking water supplies
- Willingness-to-pay survey shows that PA residents would pay \$73.6 million to restore the West Branch watershed

AMD 101 - Treatment Methods

Passive Treatment



AMD 101 - Treatment Methods

Active Treatment



AMD 101 - Land Reclamation

Remining may also be done in conjunction with reclamation to make the project economically feasible.



AMD Cleanup Success Highlight

Babb Creek Watershed, Tioga County



- ~14 miles of Babb Creek and 5 miles of Pine Creek removed from the state's impaired streams list
- Babb Creek reclassified as a Wild Trout Stream
- First example where AMD will be treated for use by gas industry

Sampling of AMD Cleanup Successes



- Middle Branch (Kettle Creek), Clinton County

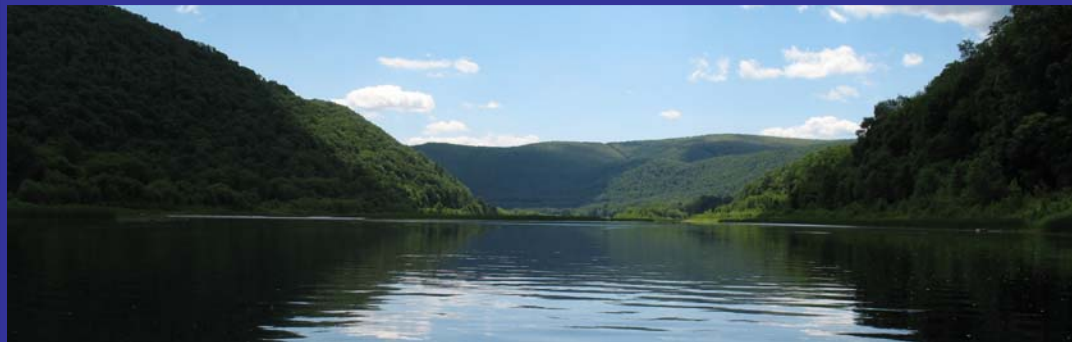
- Tangascootack Creek, Clinton County

- Sterling Run, Centre County

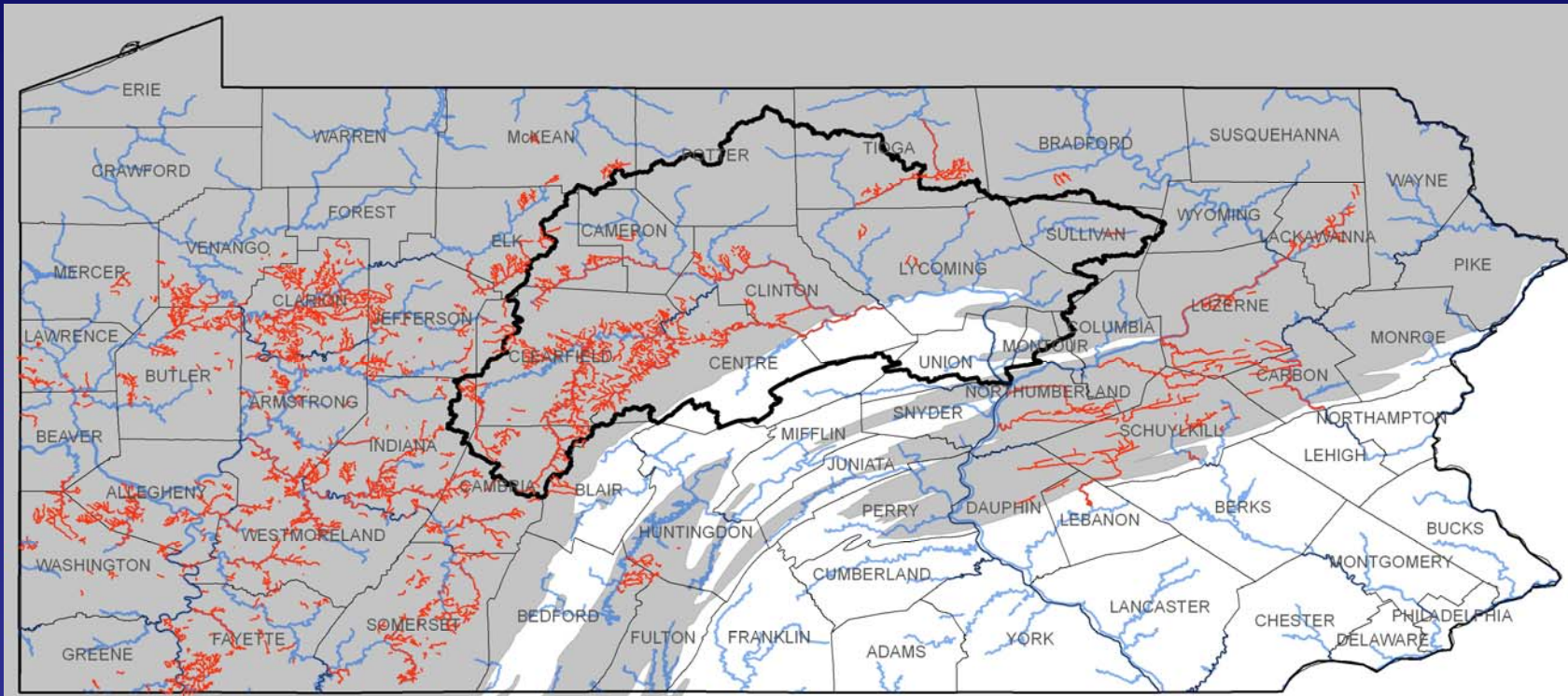
- Johnson Run, Clarion County

- Miller Run, Huntingdon County

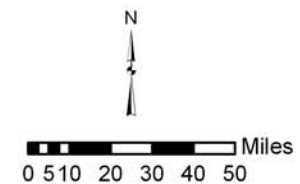
- West Branch Susquehanna River



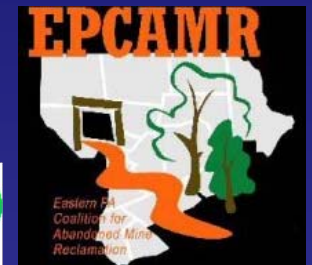
Overlap between AMD pollution and Marcellus shale gas reserves



- AMD Impaired Streams
- ▭ West Branch Susquehanna Watershed
- ▭ Marcellus Shale



Partnerships are Key Elements to Success



PA Senior Environment Corps of Clearfield County

Kettle Creek Watershed Association

Thank You

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