

Monongahela National Forest: Soil Survey Updates in the Red Spruce Ecosystem - New Interpretations

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Location: The Monongahela NF



- Approximately 1 million acres
- High elevation
- Steep slopes
- Rain shadow effect
- Hydrologically shallow soils
- Sedimentary geology
- Acidic environments
- Biodiversity hotspot

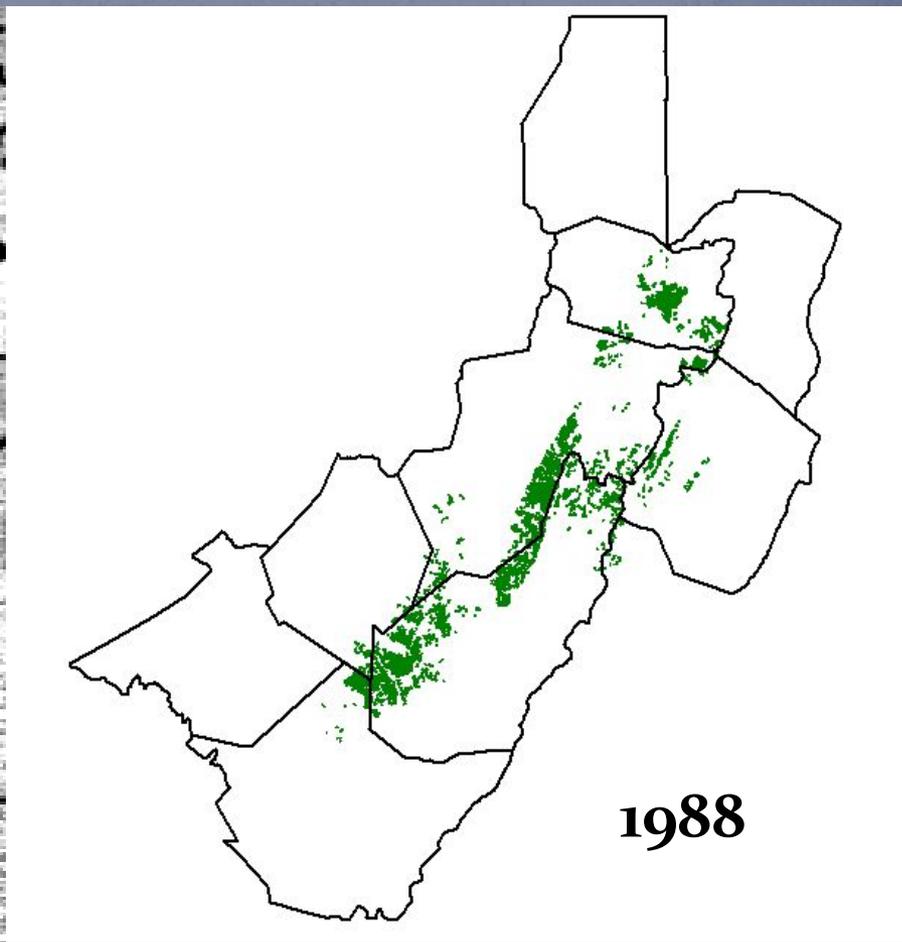


High Elevation Soils (3,000-4,863 FT)

- Red Spruce Ecosystem
- Wildlife -Threatened and Endangered Species
- Management Prescription 4.1 provide Forest Plan Direction and Guidance
- NRCS National effort to conduct and Ecological Resource Inventory (ESI) and develop Ecological Site Descriptions



Red spruce coverage was reduced to 10% of what once existed





Cheat Mountain, Pocahontas County on lands of the
West Virginia Pulp and Paper Co., 1910. © McClain
Printing Company





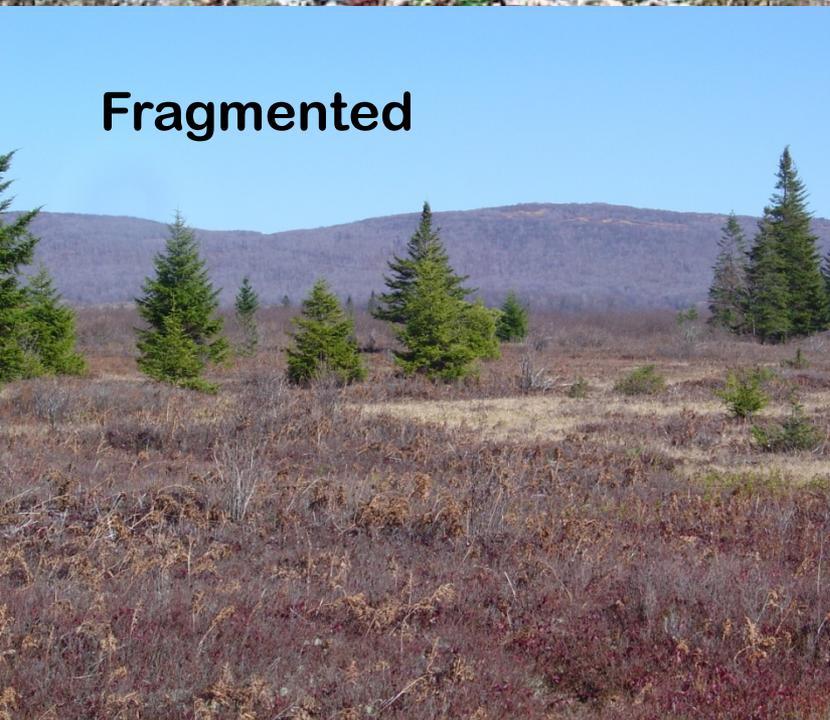
Much of the red spruce ecosystem looked like this post logging era resulting in a severe change in soil forming factors.



High Ridges



Fragmented



Understory



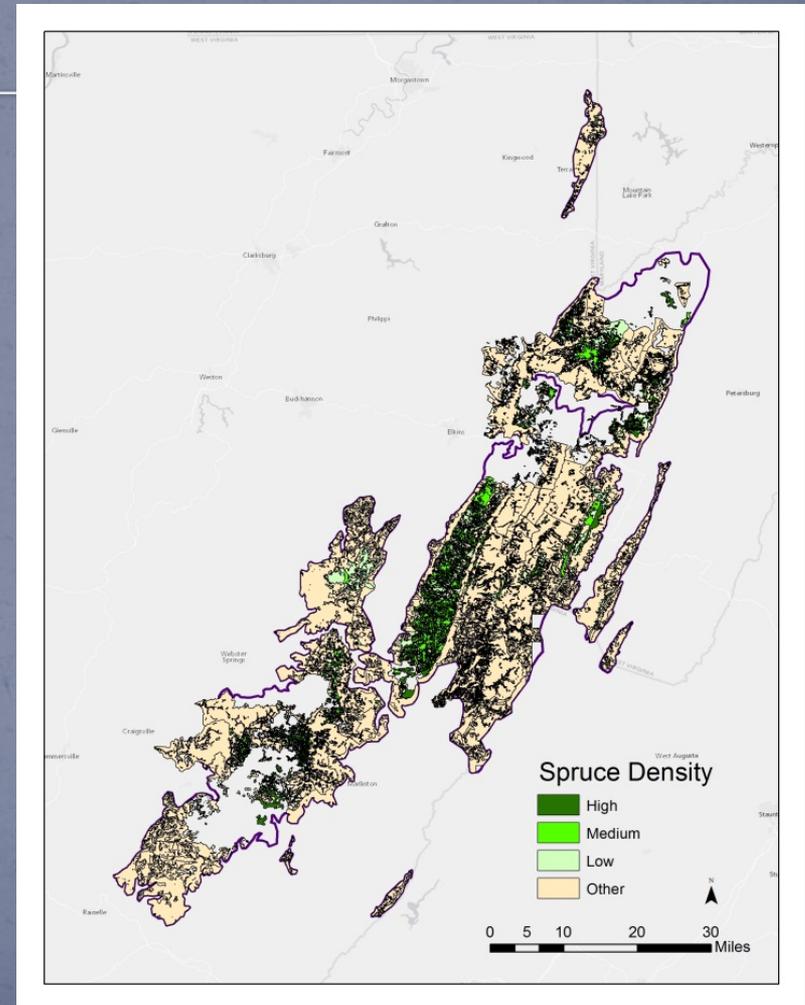
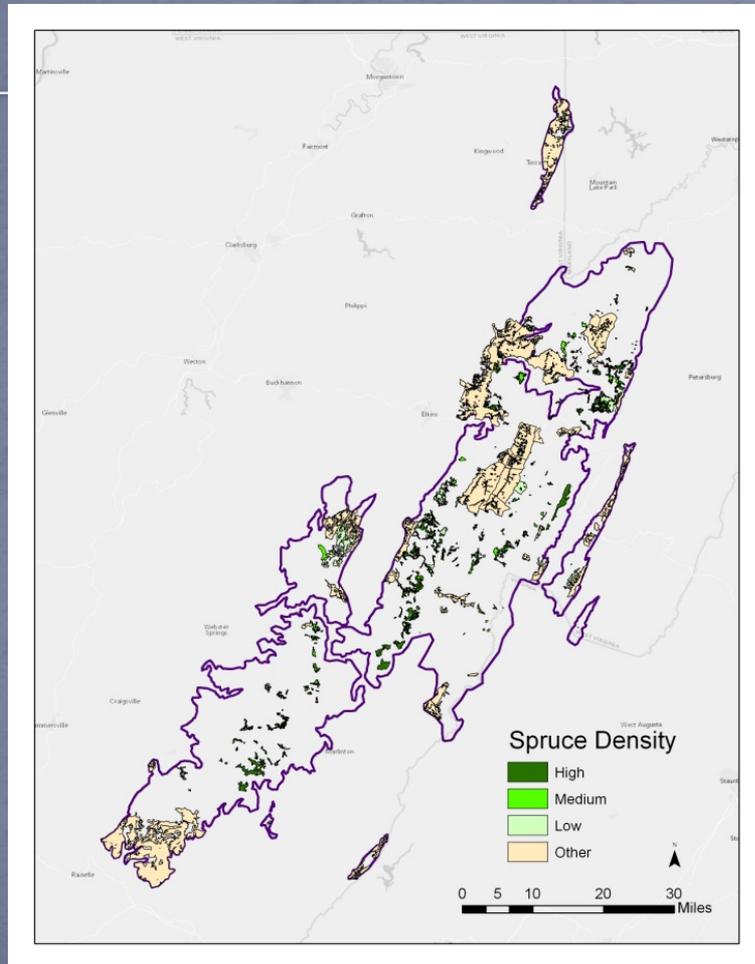
Slide Source: Love, KC. USFWS Spruce Mapping Project Collaborative 2012

Red Spruce Mapping Progress



November 04, 2011

August 16, 2012



Red Spruce Ecosystem Management

- 2007 – the MNF starts planning projects in the Upper Greenbrier Watershed
 - Watershed Restoration / Road Decommissioning
 - Timber Stand Improvement and Wildlife Habitat Improvement for T&E species (WV Northern Flying Squirrel)
 - Commercial Timber Removal
 - Red Spruce plantings
- Concerns about carbon management and timber harvest on landscapes that support current and historic red spruce
- 2009 – Initiative starts to have a better understanding and soil survey update of soils in this high elevation ecosystem
- 2011 – Ecological Site Inventory work begins in partnership with NRCS

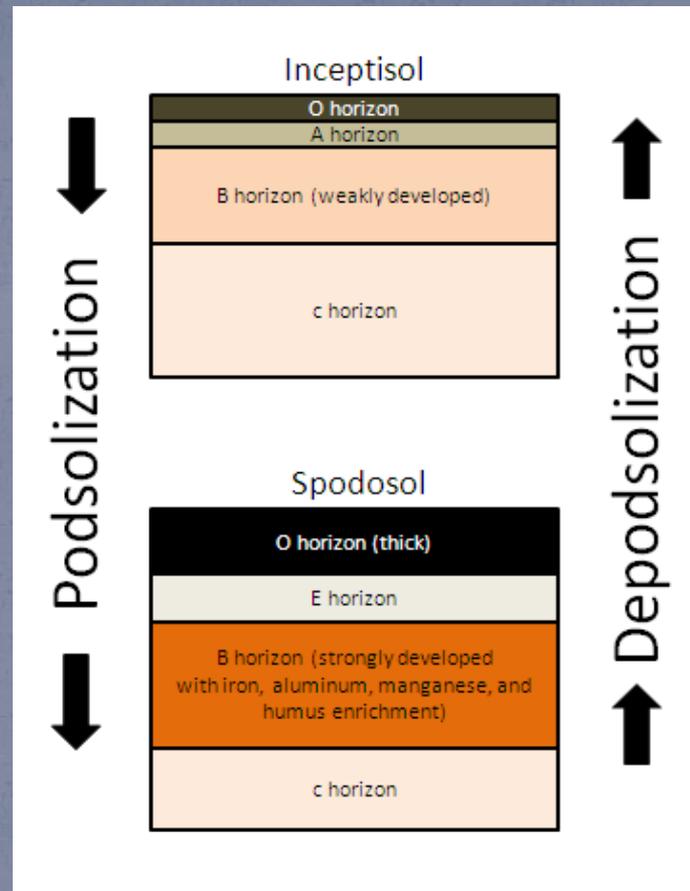


The Soils:



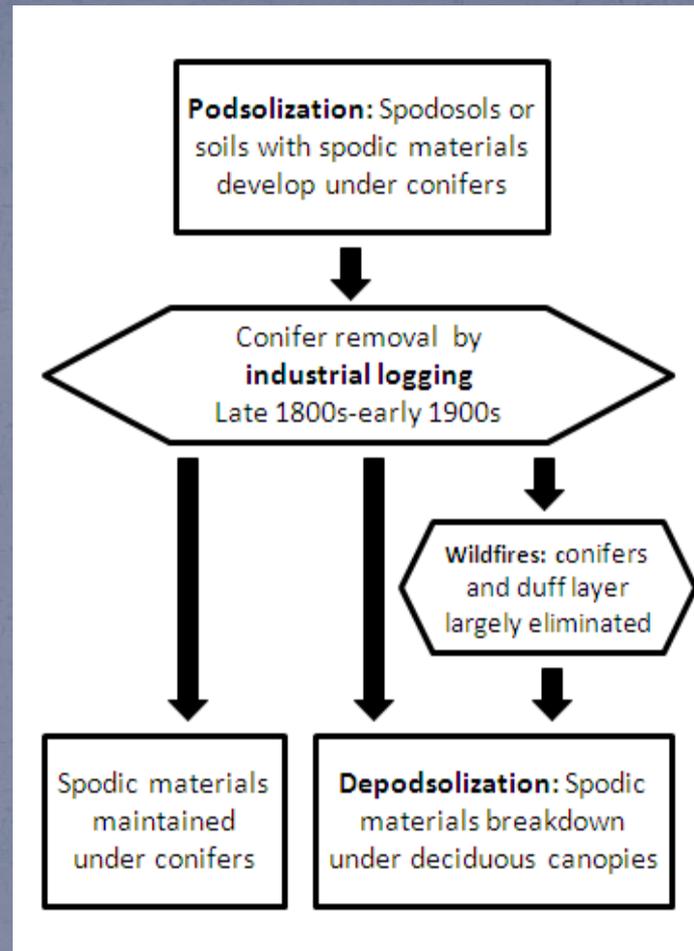
SPODOSOLS AND INCEPTISOLS...





Schematic showing general soil property changes with podsolization and depodsolization.





Schematic showing vegetation-induced changes to spodosols or soils with spodic materials.



SPODOSOLS ON THE SOIL SURVEY LEGENDS?

Spodosols in the Appalachian Mountains have been described since the 1930s, but have been historically under-mapped according to recent investigations by the United States Forest Service (USFS) and the Natural Resources Conservation Service (NRCS).



National Cooperative Soil Survey

collaborative: Spodosols vs Inceptisols

- Spodosols: soils that form as a result of eluviation and the accumulation of organic matter and aluminum and iron sesquioxides
- Gauley and Leetonia (11,500 ac) are the two Spodosols currently mapped in West Virginia
- Spodic Dystrudepts, weakly forming or developed soils with spodic morphology, have not been mapped in the United States
 - Chemung Formation (Devonian): gray and brown siltstone & sandstone with shale and conglomeratic interbeds; sparingly fossiliferous (USGS, 2012)
 - Price Group (Mississippian): hard gray massive sandstones with some shale (USGS, 2012)
 - Pottsville Group (Kanawha Formation) (Pennsylvanian): sandstone, shale, siltstone, and coal (USGS, 2012)



National Cooperative Soil Survey collaborative: Spodosols vs Inceptisols

- Recent investigations by the USFS and NRCS suggest a correlation between the historic *Picea rubens* (red spruce) extent and spodic development on multiple geologic formations in the Monongahela National Forest – (Travis Nauman, PhD candidate)
- Future research should focus on analyzing soil samples for Al + $\frac{1}{2}$ Fe from a statistical sampling design that encompasses multiple geologies, elevations, land covers, aspects, and hillslope profile positions in the Monongahela National Forest.



New Soil Interpretations

- Incorporate recommendations for wildlife habitat
 - Foraging areas for T&E species
 - Habitat for Salamanders
- Recommendations for planting red spruce
- Traditional interpretations
 - Harvesting
 - Road building
 - Recreation



Future Monitoring

- What should the Forest monitor when conducting active management in these ecosystems for the first time in a century?
 - Carbon
 - Mercury in stream chemistry
 - Soil quality changes
 - Soil temperature and soil moisture
- Climate change and resiliency



Central Appalachian Red Spruce Initiative: CASRI

- Collaborative group of all interests
- Actively working to restore the red spruce ecosystem in the central Appalachian region

www.restoreredspruce.org





Questions?

