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Enhancing Climate Adaptation of Central Appalachian Spruce Ecosystems

Iconic Red Spruce Ecosystems



© Brandi Rollins

Iconic Red Spruce Ecosystems



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Former Spruce Glory



VIRGIN SPRUCE FOREST NEAR HEAD OF NORTH FORK OF CHERRY RIVER. *Photo by W. E. Rumsey.*

The Great Cutover

250,000 ha of red spruce forest and
250,000+ ha of northern hardwood forest
with red spruce component



20,000 – 24,000 ha of red spruce forest and
unknown amount of northern hardwood forest
with red spruce component

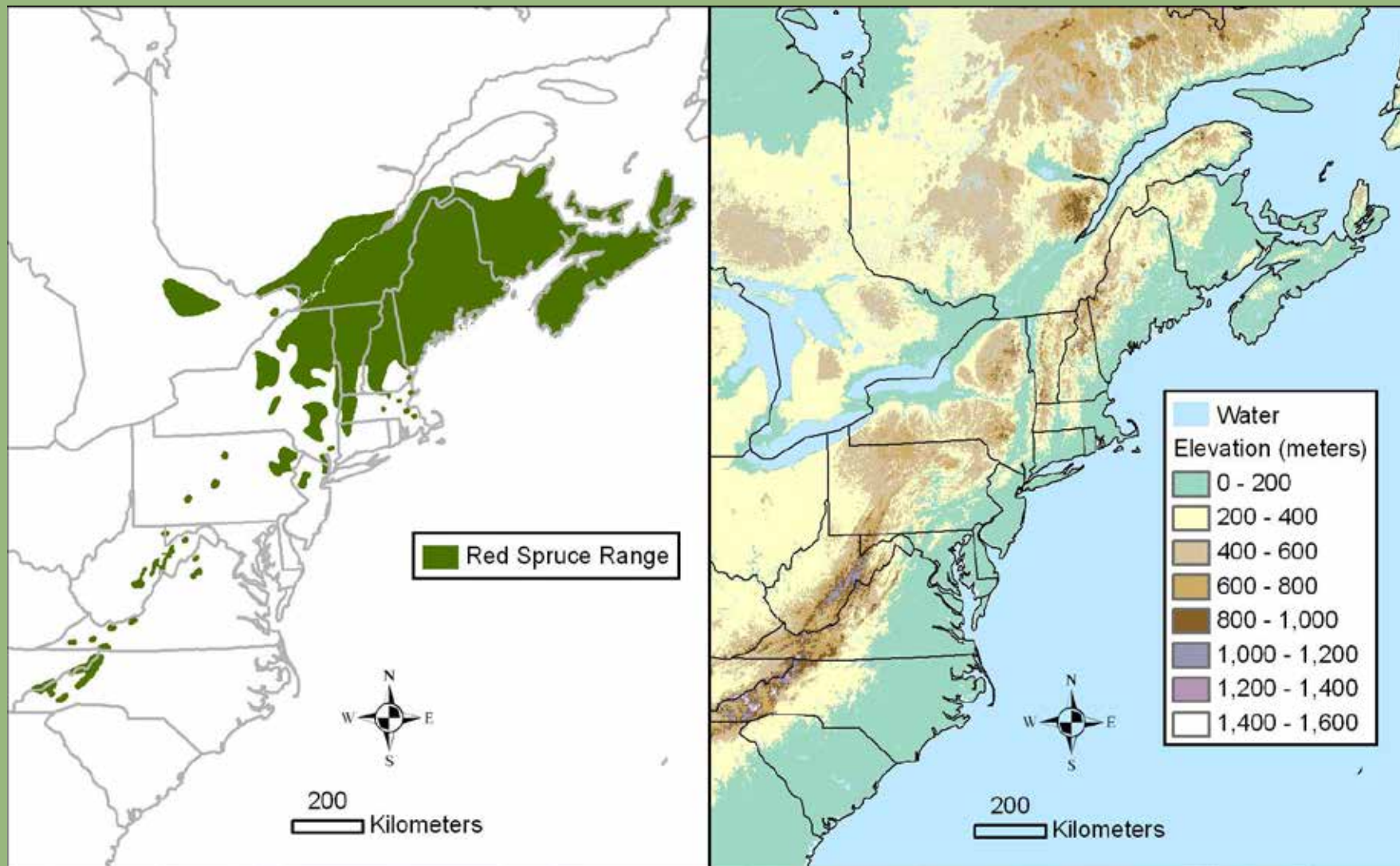
The Great Cutover



Fig. 2—Red spruce trees dwarf the lumberjacks who are soon to cut them. Cheat Mountain, Pocahontas County on lands of the West Virginia Pulp and Paper Co., 1910. Courtesy Mrs. Emory P. Shaffer.



Red Spruce Range



Red Spruce Planting History 1996-2019

Cranesville Swamp



38,000 seedlings

The Glades



26,000 seedlings

Finzel Swamp



2,500 seedlings

Vulnerability to Climate Change

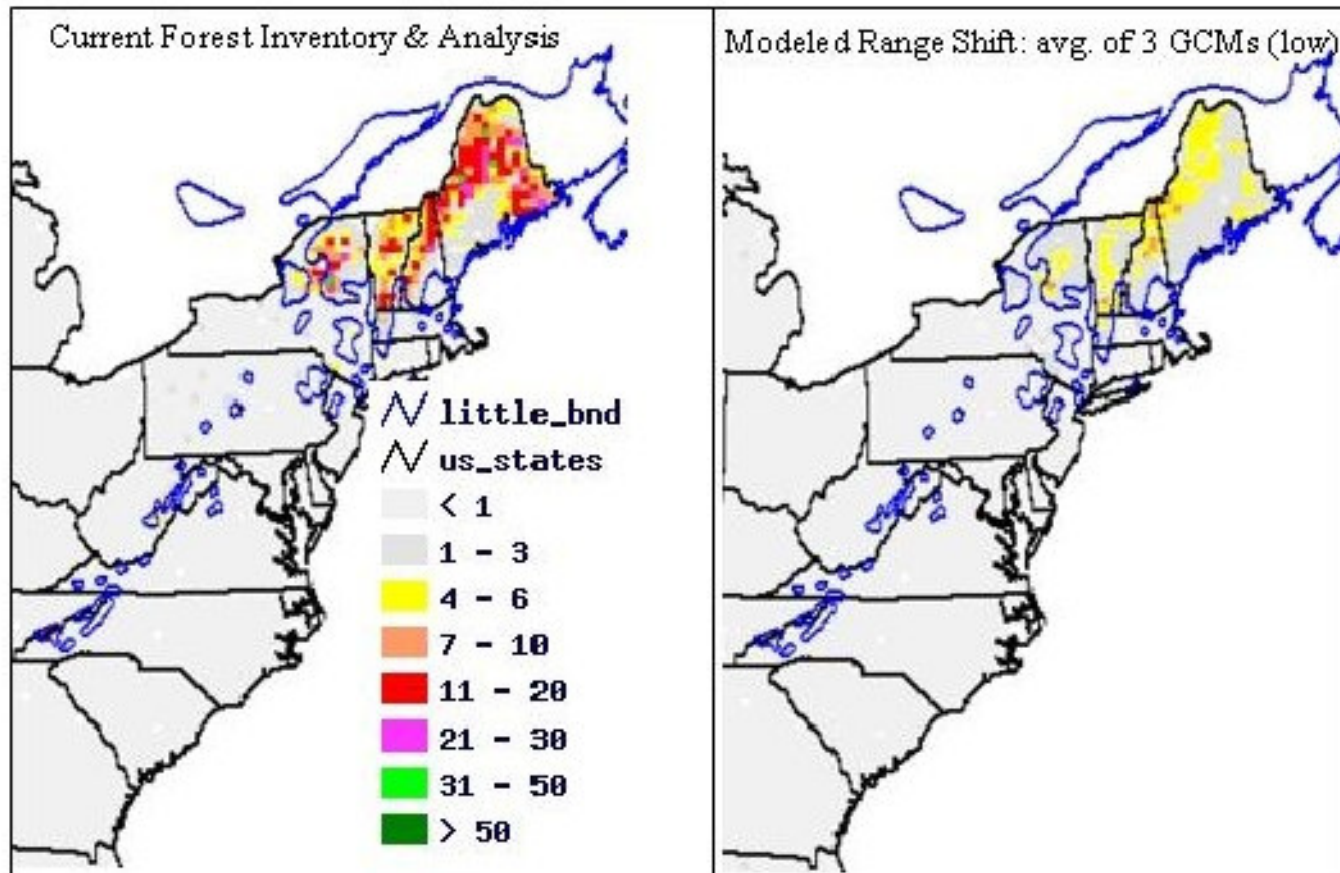
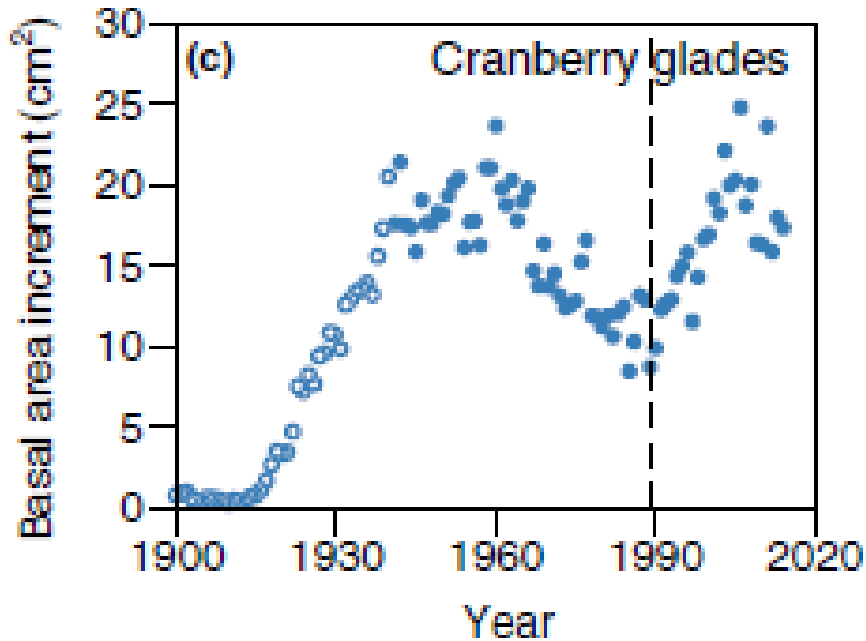


Figure 11. Red spruce range contraction under climate change (USDA 2007)

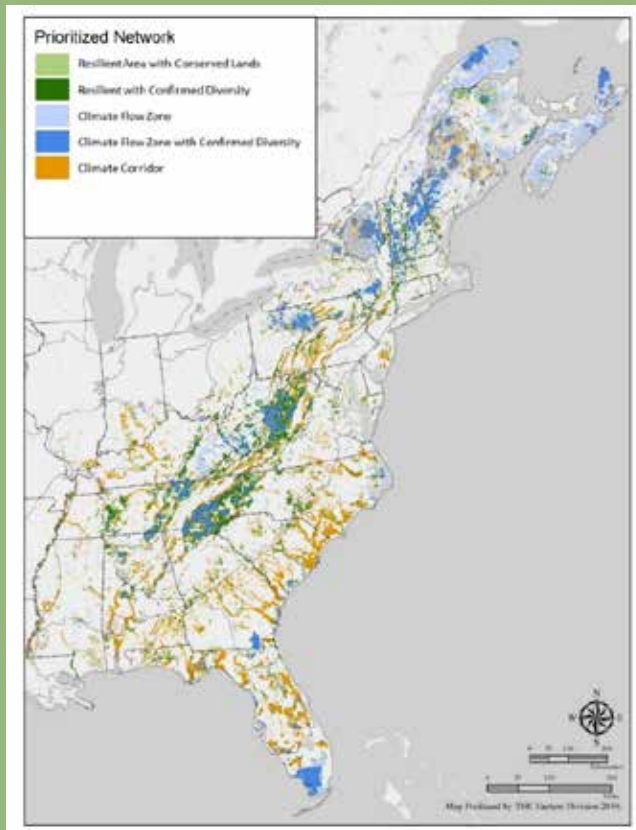


Clean Air Act

- Reduced acidic air pollutants (S)
- Decrease in No_x

Disentangling the effects of acidic air pollution, atmospheric CO_2 , and climate change on recent growth of red spruce trees in the Central Appalachian Mountains

Resilient Strongholds and Landscape Connectivity



Adaptation Tools





Partnering with an ecological genomics lab at UVM to enhance adaptive capacity through population genetics



Source Tree to Restoration Site

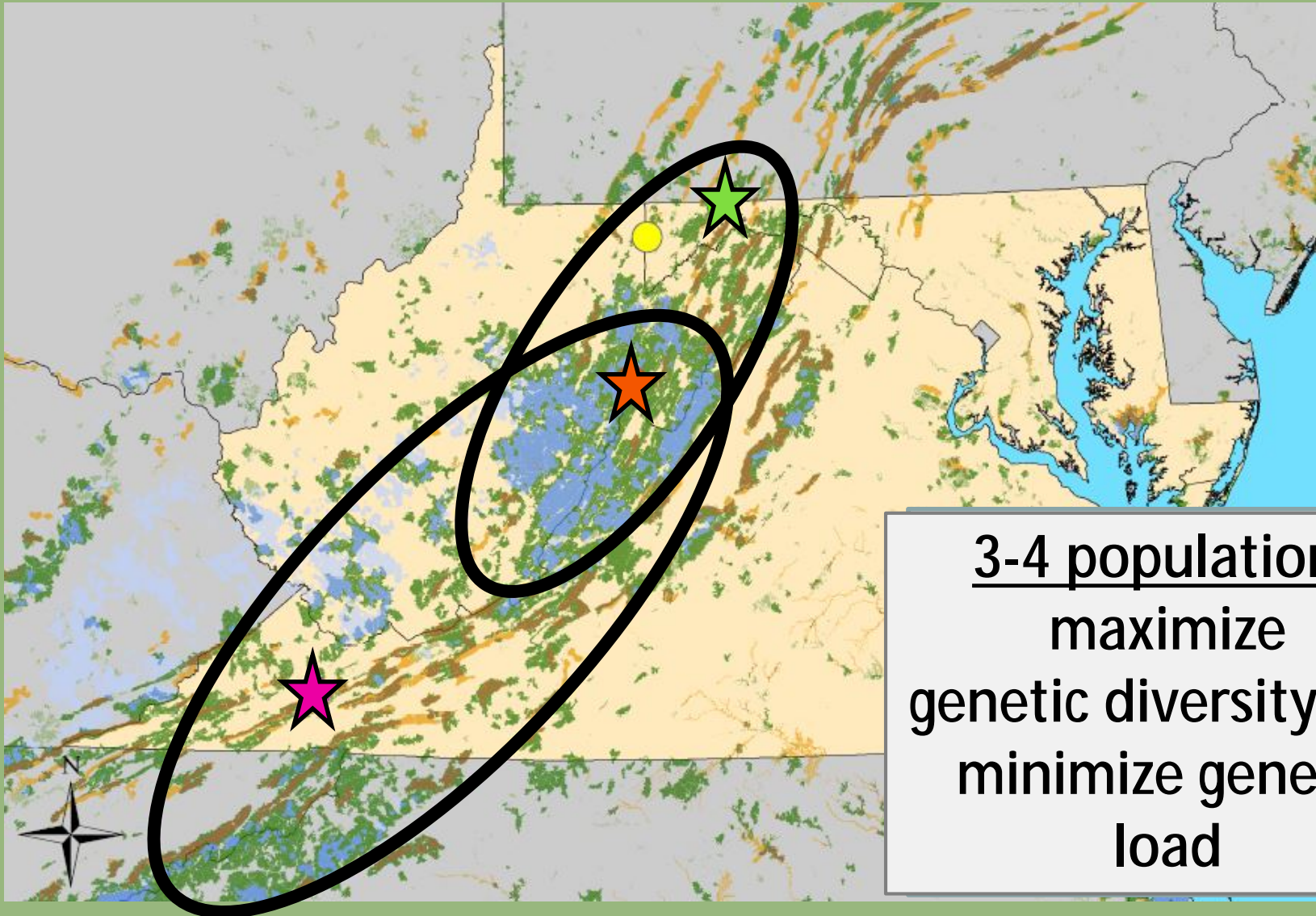
Past plantings

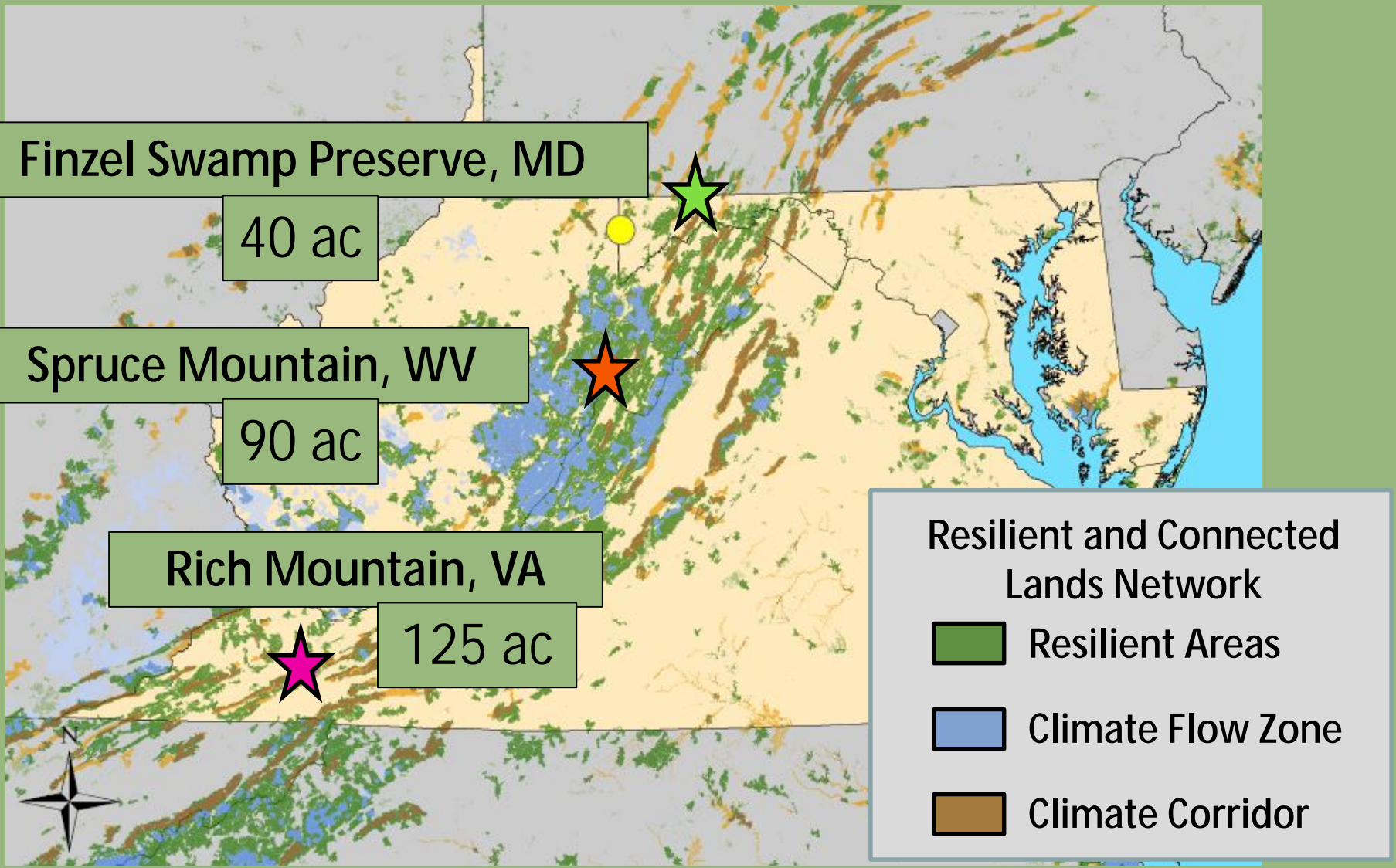
Cones/seedlings sourced from only a few locations
Limited understanding of genetic diversity from those populations



www.coniferousforest.com/red-spruce.htm







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- **Restoration Plantings 2021**
 - Cones collected and seedlings growing
 - **Outreach**
 - Film and infographics
 - Workshop for land managers
 - **Monitoring**
 - Survival and growth