



Red Spruce (*Picea rubens*) Restoration ***A Forest Service Perspective***

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Introduction

- **Why is the Forest Service (FS) interested?**
- **National forests > current land base occupied by red spruce**
- **Field experiences to share**
- **Seed, seedlings, nurseries**
- **Funding potential (cone collections, seed orchards)**
- **Partnerships**
- **Restoration goals**

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Why are we interested?

- Forest Plans (Southern Appalachian national forests)
- Public interest
- Maintain biodiversity of tree species on the national forests
- ForGRAS (forest tree genetic risk assessment related to climate change)



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- *Genetically robust*
- *Survivors on the edge of the range*

Valuable to “mine” the genome to understand adaptation

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- *...extent of red spruce forests in the southern Appalachians have dramatically declined from an estimated 1.5 million acres in 1865 to less than 30,000 acres today because of widespread logging and forest fires during the late 1800s and early 1900s....*
- *...a variety of insects (spruce budworm, sawflies, eastern spruce beetle, and infrequently the southern pine beetle) can damage or kill red spruce. Mice and voles have been found to consume and store significant amounts of spruce seeds in preference to those of balsam fir, suggesting one reason for the low ratio of spruce to fir seedlings commonly found in naturally regenerated stands....*

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Land base on the southern national forests:

- Updated field reconnaissance needed
- Database updates
- Most likely several thousand acres > VA, TN, NC
- Forest Service Forest Inventory Analysis (FIA) will assist with updates
- To discern more locations:
 - Remote Sensing & GIS tools
 - FloraMap software



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Field perspective/experience

- **NFs NC – Dave Casey**
- **Experience with lifting “wildlings”**
 - Very labor intensive
 - 18-30” height
 - Maintain “pancake” rootball
 - Transplanted to natural gaps
 - Carolina flying squirrel habitat
 - Survival excellent, 299/300 !!



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- Preferred options for restoration:
 - Seed collections
 - Establish seed orchards
 - Nursery grown seedlings
 - Outplant seedlings
- QUESTION?
 - do we understand the silvicultural requirements needed for restoration?



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Seed, seedlings, nurseries

- Seed collection challenging because cone crop every 5-8 years, ~ 5000 cones/bu = 1 lb of seed (139,000 seed)
- Red spruce starts to produce cones at age 25+ years
- Seed predation by animals & birds
- No southern nurseries grow red spruce
- Seedlings need adequate moisture & a organic layer to survive



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- Seed orchard conservation bank design written (Southern Research Station Southern Institute Forest Genetics)
- Sustainable seed supply > but many years down the road
- Need partners, e.g. state seed orchard facilities – because of elevation and habitat requirements

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Funding Potential

- **FS Washington Office, Forest Health & Protection**
- **Three-year project, \$ 138,000**
- **Field work w/ tree conservation partner Camcore**
 - Locations and cone collections
 - Build seed bank
- **FS National Forest Genetics Lab (NFGEL) to do genetic analysis work**

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Partners:

- **NGO's, universities, state, public**
- **Camcore (NCSU)**
- **FS Eastern Forest Environmental Threat Assessment Center (EFETAC)**
 - **climate change and range maps**
- **FS NFGEL and Southern Institute Forest Genetics**
- **And others...**



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FS Restoration Goals

- **Land management decisions**
- **Forest Plan direction**
- **Habitat availability**
- **Silviculturists – your thoughts....**



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Resources:

- http://www.na.fs.fed.us/spfo/pubs/silvics_manual/Volume_1/picea/rubens.htm
http://www.nsl.fs.fed.us/nsl_wpsm.html
- http://wvhighlands.org/wv_voice/?p=334
- <http://www.wonderfulwv.com/>, article *Return of the Red Spruce*, 2010
- www.iucnredlist.org
- <http://www.nrcan-rncan.gc.ca/com/index-eng.php> West Virginia Highlands Conservancy
- Southern Blue Ridge Spruce restoration call (July 2012), w/ CNFLRI

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Thanks !

Questions ?

Open discussion to follow...

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