Southern Appalachian Spruce Restoration Initiative

Meeting Notes

November 8, 2018

Training Center at Bent Creek Experimental Forest
1577 Brevard Road
Asheville, NC 28806

10:00 – 10:15   Welcome, introductions, and background

Please see sign-in sheet listed below for list of participants.

10:15 – 10:45   Flat Laurel Creek restoration and other planting updates (Chris Kelly)

- Process and tools to develop project – id candidate site + id forestry rx + logistics and extras
- How to restore? Release existing or plant new – need to assess understory conditions to determine best method
- Site selection – assess problem and need (e.g., improve quality, connect isolated areas) and appropriateness (look at spatial layers, SASRI plan criteria, rare species models, field trips)
- Logistics
    - For project planning - aiming for 300 seedlings/acre
    - Don't forget to figure out access – roads, trails, parking, etc.
    - Coordination – property owners, funding, permissions, NEPA, outreach (get help!)
    - Can knock out 1000 seedlings in 4 days with a team of students
- Management – reassess for release, knock down comp. vegetation
- To get history of site - NC collections library in basement of Pack Memorial Library has railroad history books, which can help
- Funding for FLC – can use Pittman Robeson on federal lands
- When assessing understory - drop waypoints with notes about understory seedling component or use Mark Endries app
- Monitoring highly encouraged - using Carolina veg survey level 1 protocol for this project
- Seeing good growth in trees even though they haven't been released yet
- Pisgah Conservancy trail restoration project – want a dispersal/gene flow corridor for CNFS; need about 2000 seedlings

10:45 - 11:05   Southern Highlands Reserve propagation, projects on the horizon, and partnerships (Kelly Holdbrooks)

- Have been growing red spruce for 10+ years
- Each seedling tracked by origin
- Lots of trial and error has led to high quality, fast-growing seedlings
    - Germination in 14-21 days; to the greenhouse and transplanted in late winter

- o Use custom mix to help mimic real mineral soil; includes mycorrhizae fungi (endo and ecto)
  - o Use root maker pot – allows root mass to get really strong and then allows for quicker top growth b/c roots so good
- 800-1200 repotted every spring
- Planning on having 2500 seedlings ready over next 3 years
- Working on growing for Graveyard Fields and Grayson Highlands

11:05 – 11:15   **Update from Pisgah/Nantahala Forest Plan Revision as relates to spruce-fir (Jason Rodrigue)**

- Still in final editing stage
- Wanted to increase discussion of spruce in the forest plan; spruce mentioned just 9 times in old plan and 53 times in new plan
- For ranger to make a decision about spruce restoration, need to have a connection with the Plan
- ~16000 acres within ecozone (Steve Simons model) – 4, 800 feet and above (Roan, Blacks, Balsams)
- Restore 50 acres of spruce fir ecozone per year in order to restore 500 acres (per decade) – so how many years would take to restore all we want to restore?
- Plan also has objectives regarding composition and structure
- Management Approaches – category in Forest Plan – want to prioritize ecozone restoration and this includes sprue-fir
- Spruce restoration mentioned in 7 geographic areas of Nantahala/Pisgah
- Management Areas - two that mention spruce-fir restoration: Roan and scenic byways
- A question was asked about the objective of 50 acres/yr – how are these prioritized? Any statement of how done? It would be good to point to criteria like those in SASRI Plan
- The 50 acres won't be all planting…will be a lot of release work – challenge is figuring out where release work is needed – need a good method to assess that
- Mike Schafale – early stages do exist in small gaps

11:15 – 11:35   **Mapping update: available data layers and spruce sleuthing (Mark Endries)**
- Walked thru all of the existing data layers
- Pre-digital – Mark digitized Holmes 1909 (shows logging and forest response; very general), Pyle and Schafale 1985 (forest disturbance history for Blacks and Mt. Rogers), and Dull et al. 1988 (evaluation of mortality of spruce-fir)
- Digital – SAMAB 1996 Southern App assessment (extent info); USFS Ecozones (mathematical model, 3 approximations with third completed in 2011); GAP Landcover (NC 1991 & 92, SE 1999 & 2001, National 2011); SASRI Spruce Units (spruce patches and points estimating spruce in overstory, understory, and other conifers, 11,000+ polygons and 7,000+ point locations); SASRI Prioritization Map (priorities for restoration using rule based model)
- National Gap 2011 probably best data layer for current spruce outside of the SASRI spruce units that Nick did
- The real benefit of the current spruce unit maps is give move information – overstory class

- SASRI prioritization model – elevation, aspect, history, areas with less than 25% spruce density
- Spruce unity accuracy assessment – Mark/citizen scientists/partners assessed 350 polygons so far using Mark's field app to collect data; Nick's assessment looking good – most categories on target or off by one; spruce in the understory is where there are more discrepancies; Nick might be able to correct layer in future

11:35 - 11:45   SASRI website (Gary Peeples)

- Southernspruce.org
- Set up in WordPress – If someone else wants to maintain, great, otherwise Gary can do
- Has some content, but info needs to be added
- Last year's CASRI/SASRI meeting presentations are on website

11:45 – 12:45   *Lunch break (bring your own)*

12:45 – 1:00   Election

- Change to the Charter re: consecutive terms – YAY
- New steering committee members – all new members excepted

1:00 – 1:20   Carolina northern flying squirrel research updates and plans for improving on prioritization for spruce restoration (Cordie Diggins)

- Preferentially selecting spruce/fir for foraging and also for denning (82% of dens in conifer dominated forests)
- Call library paper by Cordie, Michelle Gilley, Scott Pearson, and Troy Best submitted
- Acoustics best tool for detecting CNFS; have 11 distinct calls and have syntax
- Spring best time of year to survey using acoustics
- Have higher detection in better habitat
- How long to leave detectors out? Depends on quality of the habitat; in high quality habitat - 4 nights; medium quality - closer to 10 nights; low quality habitat – 20+ nights at a minimum
- Chris and Cordie also did microphone height study – still working up that data
- Next steps – improve/unbias CNFS model by including acoustic data; new model can help guide spruce restoration efforts
- Talked about importance of having monitoring program for wildlife that occurs in these forests
- Also need automated software for identifying CNFS

1:20 – 1:40   Spruce genetics research update and upcoming research on red spruce response to air pollution along elevational gradients (Kurt Johnsen)

- Genecology – study relationships between seed sources and their source environment; done a lot out west, but not in the east

- NSF w/ Keller – teamed up for range-wide red spruce study; included in larger study is more intensive look at seed sources from Southern Apps
- Example from fir forests in Mexico used by Monarchs; lower elevation genetics have higher growth duration than higher elevation, so looking to plant those genes higher
- Can set up these studies in "common gardens" where can mimic elevation ranges; Vermont, Maryland and North Carolina included in common garden study; NC site at Bent Creek; collected from Mt. Mitchell (not sure where these seed source from when replanted in 1920s after big cut) and Clingman's Dome; seeds being grown in VT and shipped out to locations in the spring; will then do molecular genetics at Keller's lab – can pin down to area for trait for certain gene – this can help figure out where to plant
- Used a modified pole pruner that went really high to get seeds; can also use a big slingshot; can take hours to get seed from a tree
- Relationship between bud set and elevation at Clingman's Dome, but don't see this relationship at Mt. Mitchell – what does this mean?
- Genetics work - Hypothesis is we will have much more genetic variation here, which makes our trees very important for conservation
- New study – rebound in growth of red spruce; it was severely impacted by acid rain (can deplete calcium in soil); when did growth rebound and why?; doing cores in areas and looking at when have lots of growth; corresponds with Clean Air Act
- Next question to answer - does growth, photosynthesis and stomatal conductance change with elevation?
- Will be taking core samples at Clingman's to look at some of this

1:40 – 2:00   Work planned at Mt. Rogers (Carol Croy)

- Wilson Creek Watershed Restoration Mt Rogers – spruce is part of larger watershed project
- Grayson Highlands SP is adjacent to Wilson Creek and is a partner; also Trout Unlimited and Eastern Brook Trout Joint Venture
- Focus is on water quality and improving conditions for trout
- Active grazing allotment in this area
- VA Highland Horse Trail has ford crossings – proposed armor crossings
- Reduce erosion on hiking trails – water diversion and stabilization
- Fencing will be a big component of this project – fencing around seeps and high elevation bogs, but keep grazing in open areas
- Spruce restoration component – release and cone collection – 20 acres and 2,000 seedlings
- Where will plantings happen? Plantings associated with riparian areas and adjacent open areas
- Have lots of partners that add up to about $120,000
- Rusty patched bumblebee confirmed on Monongahela NF next to Canaan Valley NWR in spruce ecosystem; 30 found in VA to date

2:00 – 2:15   *Break*

2:15 – 3:30   Open discussion/brain storming session on next steps for SASRI

- Two parts to brainstorming
    1. Asked members to list and prioritize what they think is needed to advance spruce restoration goals and who is interested in helping
    2. Gauge interest in having Sky Island Teams and identify people who might be interested in being part a team; teams would work together to move through all steps of restoration from planning to implementation (steps described in Chris Kelly's presentation)
- Discussion from session 1
    - Reference conditions needed (logging and fire history, soil information, etc.); collect pieces of puzzle to get at what you're restoring to; in absence of logging and fire information, maybe that's where soil info will help; might need a combination of both
    - Genetics – can we find adapted populations for climate change – maybe can move those adapted population further north
    - Develop new planting zones for future given climate change
    - JJ Apodaca's point – don't know what genetically appropriate is – need a pop genetic study to show what's genetically appropriate and what's inbred; best thing is to have most genetic diversity in a population as possible; we think we know what's genetically appropriate, but we don't
    - Katherine Medlock – NEPA needed for Forest Service lands; difficult to do and we're doing for restoration for 6 acres at a time; programmatic NEPA for spruce restoration across forests; now that we have this spruce plan and have an idea of where spruce is and where we want to put it…good basis for programmatic NEPA; thinks important for SASRI to help with this effort;
    - Carol says this will take regional buy in; if organization comes to region with that request…will be listened to more closely; for a lot of small projects can use Categorical Exclusion process and these can be quick especially if not using chemicals; but if do need chemicals, need larger scale
    - Liesl Erb – we need a better handle on where spruce was historically; where are the refugia that might withstand the test of time and expand/connect these; where do we want to put our dollars; build in climate resilience to where we deem appropriate (some of what TNC did)
    - Cordie – how do we want to restore? do we want to expand patch or make corridor? learning what old extent is will also help figure out what you want to do; also keep species in mind – what's best way to increase their habitat
    - Amy Renfranz – committee of experts that could go to sites to help look at restorations zones and techniques
    - Need a strategy for where going to restore spruce – need a strategic approach for how to implement where have priorities; need people to take lead on projects
    - Johnny Wills – need money for these projects and USFS doesn't have funds for this type of work unless tied to a timber harvest – talked about two units on Nantahala that will be cut and converted to spruce; Carol mentioned concept of stewardship sales that could help

- o Katherine - World Wildlife Foundation Funds – CASRI applied for and got a huge grant from outside source and a lot of those trees were planted on the Monongahela; our group could go after funding like this
- o JJ – could also get stewardship funds through Trout Unlimited and any time a project is ready to go, can use those funds
- o Cordie - Shane Jones would be good person to talk to about funding
- o USFS – can use timber sale receipts outside the timber harvest area to fund restoration…this is pretty new; a line officer can prioritize using those funds
- o Barb Crane – map showing where we have collected seed so we can fill in the blanks where we haven't collected; perhaps we can use the website to share this information
- o Once we pick sites…do field surveys to see if seedlings to determine if need to plant or release
- o Chris – start identifying some project areas and who will do these projects; Carol recommended having a workshop to hash this out
- o Danika Mosher suggested more outreach to universities; ETSU has great geospatial program
- o Fir question - monitoring in Smokies and Roan and finding some adelgid resistant trees
- o Mike Schafale – worth thinking about fir as well – lots of rare species associated with fir – big question is Balsam wooly adelgid – might be useful to plant fir at the highest elevations in blackberry thickets
- o Cordie - create heterogeneity in dog hair fir stands; fir establishes much faster than spruce
- o JJ – would be great to have a decision tree tool; used NRCS example – wildlife habitat evaluation tool; use app in field; app takes decision tree and creates a plan for restoration
- o Amy – more outreach; need to be able to tell people why red spruce…good to put page on website
- o Kendrick Weeks – having priority map based on what technique is needed - planting, thinning, or release
- o Cordie – need defined methodology for spruce release; guidelines…how big canopy gap, focusing on certain size spruce seedlings; how many times will do releases
- o Chris – need document describing the release work (using Rench paper and Ben Rhodes work); BMPs for each technique (planting, release) and for monitoring
- o Barb – coordination of cone collection during bumper crop years and develop simple MOU to share the seed
- o Carol – where are the areas where plantings from further north occur and those need to be avoided; Chris K. has that information
- o Kurt – develop seed orchards for restoration at the proper elevation; if too low, they won't reproduce (NCFS high elevation)
- o Some discussion about need to use seed from distinct mountain ranges – many argued don't need to worry about this in the face of climate change b/c we don't know what will survive….mix it up…lots of genetic diversity good
- Also see attached notes from brain storming session
- Steering team will have a call to discuss brain storming session and next steps

3:30 – 4:00   *Wrap up and adjourn*

Brainstorming Session 1- Identify/prioritize next steps in advancing spruce restoration using restoration goals and identify members willing to help

Goal 1 - Restore spruce to natural abundance in ecologically-appropriate locations where canopy density has been reduced.

Develop guidance for release, planting, thinning, and treatment designs. (five dots)

- Chris Kelly
- Cordie Diggins
- Jason Rodrigue
- Kelly Holdbrooks
- Rachael Dickson

Need site champions. (four dots)

- Sue Cameron

Develop a strategic approach to implementing restoration at prioritized sites, including identifying funding. (three dots)

- Jason Rodrigue

Programmatic spruce restoration NEPA - across forests (make it a SASRI ask of the Forest Service regions?). (two dots, plus "!")

- Chris Kelly
- Jason Rodrigue
- Sue Cameron

Website story/leverage non-traditional partnerships to tell story and gain support. (two dots)

- Anna Norton
- Rachael Dickson
- Kelly Holdbrooks

Field surveys to assess the need to plant - "blitz". (two dots)

- Chris Kelly
- Sue Cameron

- Kelly Holdbrooks

Identify specific project areas, maybe developing a decision tree tool (look to NRCS working lands example). (One dot)

- Chris Kelly
- Mark Endries

Identify and develop outreach opportunities and materials. (One dot)

- Amy Renfranz

Develop team to visit sites and provide input. (One dot)

More university and other school engagement

- Liesl Erb
- Danika Mosher

Build resilience layers into modeling

- Liesl Erb
- Danika Mosher

Define ecologically appropriate- get a deep idea of historic extent (Delacourt @ UT) and canopy density

- Liesl Erb

Identify categorical exclusion opportunities

Explore stewardship sales and other funding sources (including timber sales)

Explore multispecies collaborations, e.g. piggyback onto other planting efforts

Goal 2 - Develop capacity to store seed and grow genetically-appropriate spruce seedlings to support resilient restoration projects in the face of climate change.

Cone crop coordination (e.g. for harvesting and seed sharing). (five dots)

- Kurt Johnson
- Barb Crane
- Andy Whittier
- Jason Rodrigue

Assisted migration. (three dots)

- Kurt Johnson

Develop seed orchards at proper elevation. (three dots)

Maintain genetic diversity. (two dots)

- Kurt Johnson

Define reference conditions (genetics) geography and climate change. (two dots)

Look at how climate change affects historic range. (one dot)

- Danika Mosher

ID where NOT to collect seed

- Kurt Johnson

Population genetics study to identify genetically-appropriate areas

- Barb Crane

Goal 3. Continue to refine mapping and field criteria to determine appropriate restoration sites, with new research and continued assessment of existing data

Map out priority areas for thinning, planting, etc. (five dots)

- Chris Kelly
- Mark Endries
- Danika Mosher

Share collection information via website. (four dots)

- Mark Endries

- Danika Mosher

Define reference conditions (soils, historic records, etc.) (three dots)

- Cordie Diggins
- Liesl Erb
- Marilyn Westphal
- Mark Simpson

Research site histories, including logging, fire, and species targeted in logging. (three dots)

- Liesl Erb
- Mark Endries
- Jason Rodrigue

Apply climate change modeling. (two dots)

- Liesl Erb
- Danika Mosher

Plug seed collection data into mapping. (one dot)

Brainstorming Session #2 – Sky Island Teams

Grayson

- Jay Martin, Blue Ridge Discovery Center
- Tom Blevins, U.S. Forest Service
- Brittany Phillips, U.S. Forest Service
- Conner McBane, Appalachian Trail Conservancy
- Carol Croy, U.S. Forest Service

Grandfather

- Sue McBean, N.C. State Parks
- Sharon Bischof, N.C. State Parks
- John Caveny, Grandfather Mountain Stewardship Foundation
- Amy Renfro, Grandfather Mountain Stewardship Foundation
- Danika Mosher, East Tennessee State University

Roan

- Joe McGuiness, U.S. Forest Service
- Matt Drury, Appalachian Trail Conservancy
- Danika Mosher, East Tennessee State University
- JJ Apodaca, Tangled Bank Conservation
- Andy Whittier, North Carolina State University
- Marquette Crockett, SAHC

Unaka

- Joe McGuinnes, U.S. Forest Service
- Matt Drury, Appalachian Trail Conservancy
- Mark Endries, U.S. Fish and Wildlife Service
- Katherine Medlock, TNC

Black Mountains

- Kevin Bischof, N.C. State Parks
- Sharon Bischof, N.C. State Parks
- Sue Cameron, U.S. Fish and Wildlife Service
- JJ Apodaca, Tangled Bank Conservation
- Liesl Erb, Warren Wilson College
- Marilyn Westphal (or Great Balsams), private citizen
- Mark Simpson (or Great Balsams), private citizen

Great Balsams

- Warren Wilson College, Shawn Swartz, Liesl Erb
- Kelly and Eric, Southern Highlands Reserve
- Chris Kelly, N.C. Wildlife Resources Commission
- Shannon Rabby
- Rachael Dickson, U.S. Forest Service
- Marilyn Westphal (or Black Mountains), private citizen
- Mark Simpson (or Black Mountains), private citizen

Plott Balsams

- Kelly Holdbrooks, Southern Highlands Reserve
- Eric Kimbrel, Southern Highlands Reserve
- Sue Cameron, U.S. Fish and Wildlife Service
- Chris Kelly, N.C. Wildlife Resources Commission
- Mark Endries, U.S. Fish and Wildlife Service
- Jonathan McCall, N.C. Wildlife Resources Commission