

2019 Accomplishments Report

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Participants in the 2019 CASRI Conifer Health Symposium had the opportunity to take a field trip around Blackwater Falls and Canaan Valley National Wildlife Refuge to see how Hemlock Wooly Adelgid is being treated. Picture courtesy of Hannah Wroton.

INTRODUCTION

The Central Appalachian Spruce Restoration Initiative (CASRI) is a group of partners with the common goal of restoring the red spruce-northern hardwood ecosystem in the central Appalachian region. The group was formed in the early 2000's, when concerned individuals came together to address and take action against the issue of spruce habitat decline. The work of CASRI partners helps to protect the red spruce ecosystem and the rare and endangered species that live with in.

Restoration is performed in many ways including planting spruce seedlings, spruce release, habitat restoration, and non-native invasive species removal. CASRI also participates in public education and research to promote the continuation of red spruce ecosystem restoration. The restoration actions and public involvement performed by the partnership are guided by CASRI's Vision which is defined by the strategic action plan.

The highlighted stories in this report give a small taste of the work done in the last

Central Appalachian Spruce Restoration Initiative 2019 Accomplishments Report

2019 was another successful year for CASRI partners. In the Central Appalachians, over 38,600 red spruce seedlings were planted in 2019. Along with the red spruce, over 38,000 seedlings of other native plants associated with red spruce were planted.

CASRI partners collected seed from native plants in 2019 and these seeds will be used in 2020 and 2021 to promote local genetics in red spruce ecosystem restoration. Spruce release was performed on 670 acres in 2019 and over 250 additional acres of land have been put on the path to restoration this year alone.

Below is a list of the CASRI partners, who are responsible for making the spruce habitat restoration happen in Central Appalachia.

Compiled by Hannah Wroton, AFNHA AmeriCorps with U.S. Forest Service.

CASRI is proud to include the following partners:

- Appalachian Forest National Heritage Area (AFNHA)
- Appalachian Mountain Joint Venture (AMJV)
- Appalachian Regional Reforestation Initiative (ARRI)
- Appalachian Landscape Conservation Cooperative (APPLCC)
- Canaan Valley Institute (CVI)
- Canaan Valley National Wildlife Refuge (CVNWR)
- Environmental Protection Agency (EPA)
- Green Forests Work (GFW)
- Natural Resources Conservation Service (NRCS)
- National Wildlife Refuge System
- The Mountain Institute (TMI)
- The Nature Conservancy (TNC)

- Trout Unlimited (TU)
- U.S. Fish and Wildlife Service (USFWS)
- U.S. Forest Service Northern Research Station (NRS)
- U.S. Forest Service Monongahela National Forest (USFS-MOF)
- U.S. Forest Service George Washington-Jefferson National Forest (USFS-GWF)
- West Virginia Division of Natural Resources (WVDNR)
- West Virginia Division of Forestry (WVDOF)
- West Virginia Highlands Conservancy (WVHC)
- West Virginia State Parks
- West Virginia University (WVU)



CASRI 2019 Conifer Health Symposium

BLACKWATER FALLS, WEST VIRGINIA — The 2019 CASRI Symposium kicked-off with a time of sharing Spring 2020 planting locations and tree counts on a large map to spark collaborative engagement among participants. The day-long meeting began with the CASRI Steering Committee session which included James Leonard's ESD Field Week update and a presentation by the NASA DEVELOP project for Monongahela NF Restoration Planning. Following the full group meeting sub-committees had time to focus on discussing current and future projects and then report out to the full group. Shawn Cochran, forest supervisor at Monongahela National Forest attended the sub-committee report out and shared his input on the CASRI partnership's objectives.

The rest of Day 1 was dedicated to the Conifer Health Colloquium which included presentations on Hemlock Forest Health Monitoring, Treatment and Ecology led by John Perez (Biologist at New River Gorge National River and Gauley River National Recreation Area), Balsam Fir Woolly Adelgid Resistance and Management by Ben Smith (Research scientist for the Forest Restoration Alliance), and Balsam/Canaan Fir Research Updates by WVU's Hessl Labs. Forest Stewardship Coordinator, Amv Hill also provided participants with an update on Hemlock Health and Treatment in the Central Appalachians, and was later followed by an entire Speaker Panel discussion regarding conifer conservation in the Central Appalachian Highlands.

Day 2 commenced with a number of field tours in Blackwater Falls State Park focused on Hemlock Woolly Adelgid research and treatment plots. After lunch in Davis, participants were guided to various balsam (Canaan) fir research and restoration sites across the Canaan Valley.

By Jessica Wohlrob, The Nature Conservancy

Ecological Site Description Field Week

During the week of August 5-9, 2019, members from WVU, USFS, NRCS, and FWS converged on Canaan Valley, WV, to participate in a red spruce field week. Vegetation and soils at 24 locations were described and sampled to aid in the creation of an ecological site description for red spruce on soils formed from sandstone bedrock, as well as contribute to the future update of soil maps in and around Canaan Valley. An initial ecological analysis identified similar communities contained in red spruce ecological site CASRI partners dig soil pits for ESD field week

descriptions occurring on soils formed from shale



bedrock elsewhere in the state, but also described communities that are unique to the Canaan Valley area. Soils described during the field week showed strong presence of Spodosols - often indicative of conifer vegetation - currently absent in soil maps for the area. The 2019 field week represents a further step towards obtaining ecological site descriptions for red spruce ecosystems throughout the state, and the future implementation of management and conservation practices tailored to these unique ecosystems.

By James Leonard, West Virginia University Graduate Program

2019 Highlighted Projects

Connections Through Conifers

In 1970 a young Forestry Professor, Dr. Jim Brown, left WVU to take a job at Ohio State University. He was interested in Christmas Trees. His research spanned several decades. He is best known for his work on West Virginia's Balsam Fir, which has come to be known as Canaan Fir. When the Highlands Conservancy began its conservation efforts, in the face of an exotic insect pest, the Balsam Woolly Adelgid, which is impacting the trees, one of the first actions we took was to hold a meeting of the best and brightest minds on the subject. In 1999, with Refuge Biologist Ken Sturm, we organized this meeting, which took place at the newly established Canaan Valley National Wildlife Refuge. With an attendee list which now looks like a who's who of WV Conservation-ists, among the many who accepted our invitation was Jim Brown. It was at this meeting that our conservation strategy was developed. Dr Brown was one of the most knowledgeable people on the subject at the time.



Canaan Fir needles. Photo courtesy of Joseph OBrien, USDA Forest Service, Bugwood.org

In 1981 (pre-adelgid), with his Assistant, Chuck Vrotney, they came to West Virginia and spent weeks collecting seed from hundreds of trees from every location the fir was known to exist. They grew seedlings and conducted research on the progeny for decades to come. The seed was cleaned and stored in Quart Mason Jars, each jar containing the seed from one tree. The cones were collected from 2 places in Canaan Valley, one on Dolly Sods, Blister Run, and Blister Swamp.

Numerous papers have been published on the matter since then. Dr Brown has since retired, interest in Christmas Tree production

at OSU has waned, we recently got a call from Chuck Vrotney, also retired, who wanted to know if we would be interested in the seed, which has been stored in those mason jars, at 20 degrees F for all these years. Of course I couldn't resist, so yesterday I drove to Wooster, Ohio, where the seed has been stored in the Ohio Agricultural Research & Development Center (OARDC) Seedbank all these years. I spent the day with Chuck, and we loaded all the seed into my truck.

Our Balsam Fir restoration work has been taking place in 3 of the 4 locations Dr. Brown originally studied. Canaan Valley, Blister Swamp and Blister Run (Cheat Mountain). We have collected seed several times over the ensuing 20 years, and have grown tens of thousands of trees we have planted back. Each source carefully grown from seeds collected at that source where we planted them in restoration projects. We currently have 5,000 trees being grown from Blister Run seed for Planting on Cheat Mountain in 2021, and another 5,000 for 2022. Every year we plant thousands of fir trees in Canaan Valley, where we have also built several large deer exclosures to encourage regeneration.

While our own collections have provided us with plenty of seed for our balsam restoration work in Canaan Valley, and also on Cheat Mountain, Our work at Blister Swamp has stalled due to the lack of seed, due to the mortality of all the seed producing trees there from the Ad-

A stand of mature Canaan Fir. Photo courtesy of T. Davis Sydnor, The Ohio State University, Bugwood.org

elgids. We are excited to get this seed from Blister Swamp in hopes we can re-start our restoration work there. It was wonderful to hear the stories from Chuck about traipsing around in the West Virginia wilderness searching for balsam trees, carrying climbing equipment miles to the fir stands to collect the cones. Not unlike many of our own escapades.

We will bring all this seed into our own seed lab, do some testing on it, open all the jars so they can get some air to the seed. Eventually the seed will be sent to the USFS Seed testing laboratory in Georgia for germination testing. Hopefully we will be able to put some of the Blister Swamp seed into production asap. All the seed will be repackaged and returned to a seed bank for continued long-term storage.

By Dave Saville, West Virginia Highlands Conservancy

How do Observations Lead to Restoration Techniques? Experimenting with Direct Seeding of Spruce on Disturbed Sites

Two different observations, by those who frequent the highland forests, are leading us to try a new spruce regeneration technique for restoring spruce forests on the formerly mined lands on Cheat Mountain.

Many have observed how red spruce seem to germinate and grow well on disturbed sites, and mineral soils. Working in the high elevation forests of West Virginia, it is difficult not to notice how, with the presence of seed producing trees, spruce recruitment is robust along skid roads, old forest roads, and railroad grades. Indeed, even the red spruce seedlings planted on reclaimed mine sites thrive.

The other observation, that is really just common sense, is that for there to be seedlings, there must first be seed. While we often work to release understory Red Spruce seedlings and saplings, and in many

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Direct seeding has been effective with native herbaceous plants in disturbed areas. Picture of Mower Tract fall 2019, courtesy of Hannah Wroton (USFS and AFNHA)

areas there is a dense understory of spruce trees, in almost all cases, you can look up, into the overstory, and find the seed producing tree(s) that provided the seed for this regeneration. No seed, no regeneration. Seed rains down from the cones, in the tops of the trees, and is limited primarily to dispersal by wind. Spruce forests are slow to recover in areas with no mature seed producing spruce trees.

Applying these two observations to the restoration taking place Cheat Mountain, the Forest Service, with CASRI Partners, is experimenting with the direct seeding on some of the formerly surface mined lands being restored. Test plots, in areas that were deep-ripped as recently as October, were broadcast seeded In December of 2019. Eight one-acre plots were seeded at a rate of one viable seed per square foot. Seed was collected at Spruce Knob, West Virginia, and tested by the US Forest Service Seed Testing Laboratory. It has a germination rate of 83% with 124,287 seeds per pound. This calculates to approximately 190 grams/acre. The plots will be monitored to track germination and recruitment.

By Dave Saville, West Virginia Highlands Conservancy

2019 CASRI Accomplishments

The following represents a summary of accomplishments for 2019 as reported by the CASRI partners.

Tree Plantings

- MOWER TRACT, Mower 18 PLANTING—The U. S. Forest Service (USFS), in partnership with American Forests, Green Forests Work (GFW), and Natural Resource Conservation Service (NRCS), planted 25,000 red spruce and 26,108 native hardwood seedlings and wetland shrubs on 100 acres of reclaimed mine land that was deep ripped in 2018.
- SHARP'S KNOB— Four volunteers from the Greenbrier Academy for Girls planted 100 red spruce trees at Sharp's Knob.
- CVNWR Spring Planting Canaan Valley National Wildlife Refuge, with the help of over 50 volunteers, planted 3,000 red spruce seedlings on 17 acres along a tributary to Sand Run. (I.B.4, II.A.2, II.C.1., II.E.3
- CVNWR Aspen Planting- Canaan Valley National Wildlife Refuge planted around 500 quaking aspen and enclosed them in cages on 1 acre east of the Refuge office where the Refuge is managing for early successional habitat. (I.B.4, II.A.2)
- CVNWR Canaan Fir Planting—Canaan Valley National Wildlife Refuge and volunteers
 planted 900 Canaan Fir (thanks to a generous donation from TNC) on a few different
 areas of the Refuge including the Freeland Boardwalk. Many were caged or planted in
 already constructed deer exclosures. Others were planted in small cages that are long
 and narrow to keep the deer out.
- TNC staff and volunteers Planted 5,500 red spruce seedlings at Canaan Valley State Park and Mt Porte Crayon. Roughly 45 volunteers attended those plantings.
- TNC Maryland Planted 4,000 red spruce seedlings at Cranesville Swamp with the help of volunteers.
- TNC Maryland distributed 1,000 red spruce seedlings to Mt. Nebo Wildlife Management Area, Alpine Village, and neighboring land owners

Native Seed Collection & Propagation

- NRCS AND U.S.F.S. NATIVE SEED COLLECTION AND PROPAGATION— The U.S. Forest Service and the Natural Resource Conservation Service (NRCS) collected, cleaned and propagated seeds for use in restoration activities. The species included: speckled alder, mountain ash, serviceberry, red and common elderberry, wild raisin, milkweed, winterberry holly, hawthorn, summer grapes, chokeberry, and mountain holly.
- A total of 697 native wetland plants grown by the Appalachian Plant Materials Center were planted in a vernal wetland at Sharp Knob.

Spruce Release

- NON-COMMERCIAL SPRUCE RELEASE The Nature Conservancy non-commercially released 480 acres of red spruce on the Greenbrier Ranger District. This comes out to roughly 125,000 individual spruce trees released from hardwood competition.
- COMMERCIAL SPRUCE RELEASE—The Nature Conservancy commercially released 116 acres of red spruce through our Clubhouse Ridge Stewardship Agreement on the Greenbrier Ranger District. This equates to around 30,000 individual spruce trees released.
- GEORGE WASHINGTON-JEFFERSON NF—Released advanced regeneration of red spruce on 30 acres by girdling the existing red pine overstory as well as some competing hardwoods
- WVDOF implemented 40 acres of spruce release
- CVNWR Spruce Release—Canaan Valley National Wildlife Refuge continued noncommercial spruce release on 4 acres on Canaan Mountain near Black Bear Woods by girdling and applying herbicides to hardwoods (I.B.2, II.A.3).

Habitat Restoration

- MOWER TRACT, MOWER 20 DEEP RIPPING- 192 acres of mine land were deep ripped on the U.S.F.S. Greenbrier Ranger District, in partnership with Green Forests Work(GFW), in preparation for planting of red spruce and native hardwoods in the spring. (II.C.3, II.E.1, II.E.4)
- SHARP'S KNOB—21 acres of mined land at Sharp Knob was restored to native red spruce-north hardwood forest. Restoration activities included removal of the non-native red pine plantation (mulching and hand cutting), deep ripping, and tree planting. A total of 11,163 native hardwood and red spruce trees supplied by The Nature Conservancy (TNC) were planted.
- WVDOF prepared 50 acres were prepared for planting through mulching treatment

Monitoring

- WVNFS NESTBOX MONITORING—The U.S. Forest Service Greenbrier Ranger District checked West Virginia northern flying squirrel (WVNFS) nest box lines in the Upper Greenbrier North project area, Middle Mtn. Cabins, Burner Mtn., and Bennett Run (FR 112). Acoustic monitoring devices for detecting NFS presence were also used in the Beulah and Greenbrier Southeast project areas.
- WVDOF continued monitoring of previously planted areas
- CVNWR Cheat Mountain Salamander Surveys—Canaan Valley National Wildlife Refuge conducted annual Cheat Mountain Salamander surveys. This year's survey focused on the mark and recapture study for the 3-mile trail under pass as well as areas that have not been surveyed in a few years. (III.A.3, III.B.1).

Research

- Quantified microhabitat characteristics of Red Spruce restoration treatments to assess their habitat suitability for the Cheat Mountain Salamander – Donald Brown and Lacy Rucker, WVU
- Phenotypic Variation in Climate-Associated Traits of Red Spruce (Picea rubens Sarg.) along Elevation Gradients in the Southern Appalachian Mountains— Butnor, Verrico, Johnsen, Maier, Vankus, and Keller
- University of Kentucky graduate student, Anna Branduzzi, planted native wetland plants in vernal wetlands created on mined lands at Sharp Knob to study survival.
- USFS partnered with NASA Develop Program to identity red spruce restoration opportunities within the Sharp Knob project area.
- Ecological Site Description (ESD) for red spruce-dominated forests were conducted in an intensive 3-day soil sampling project led by WVU graduate student James Leonard
- Analysis of 30 years of data at Timberline Resort has been nearly completed by collaborators Lacy Rucker (WVU) and Donald Brown (WVU & USFSNRS)
- Michaela Lambert is working on an "Evaluation of artificial wetland effectiveness using amphibians as indicators of habitat quality on a reforested surface mine in the Monon-gahela NF". She recently presented her results at the Ecological Society of America's annual conference and won 1st place for student presentation in the Ecological Restoration section.
- WVU graduate student Anna Branduzzi is doing a study to examine methods for increasing native plant diversity on minelands. She is examining the role of the seedbank, woody debris additions and use of seed and transplant stock on plant success.
- Quantitative PCR assay for detecting Red spruce (Picea rubens). Prepared by: Daniel Mason, Caleb Dysthe, and Thomas W. Franklin 31 October 2019

Education and Media

- DISCOVER NATURE DAY— The U.S. Forest Service's Seneca Rocks Discovery Center played host to the 8th annual Discover Nature Day in 2019. The CASRI booth had educational activities based around red spruce.
- NNIS EDUCATION & OUTREACH—The Potomac Highlands and Rivers & Gorges Cooperative Weed & Pest Management Areas, which cover much of the red spruce ecosystem in WV and VA and includes many of CASRI's partners, organized garlic mustard and Japanese stiltgrass pulls, educational classes, and outreach programs in 2019. For more information go to <u>http://www.phcwpma.org/</u>.
- RED SRPUCE RELEASE—The Maryland and WV chapters of The Nature Conservancy collaborated to produce this spruce release educational video: <u>https://www.youtube.com/</u> <u>watch?v=ivKbs1Eq6_k&feature=youtu.be</u>
- <u>FACEBOOK</u>—CASRI has a very active Facebook page with 768 likes, 87 of which are from this year.