

CASRI 2020



Accomplishments Report

Central Appalachian Spruce Restoration Initiative 2020 Restoration Work

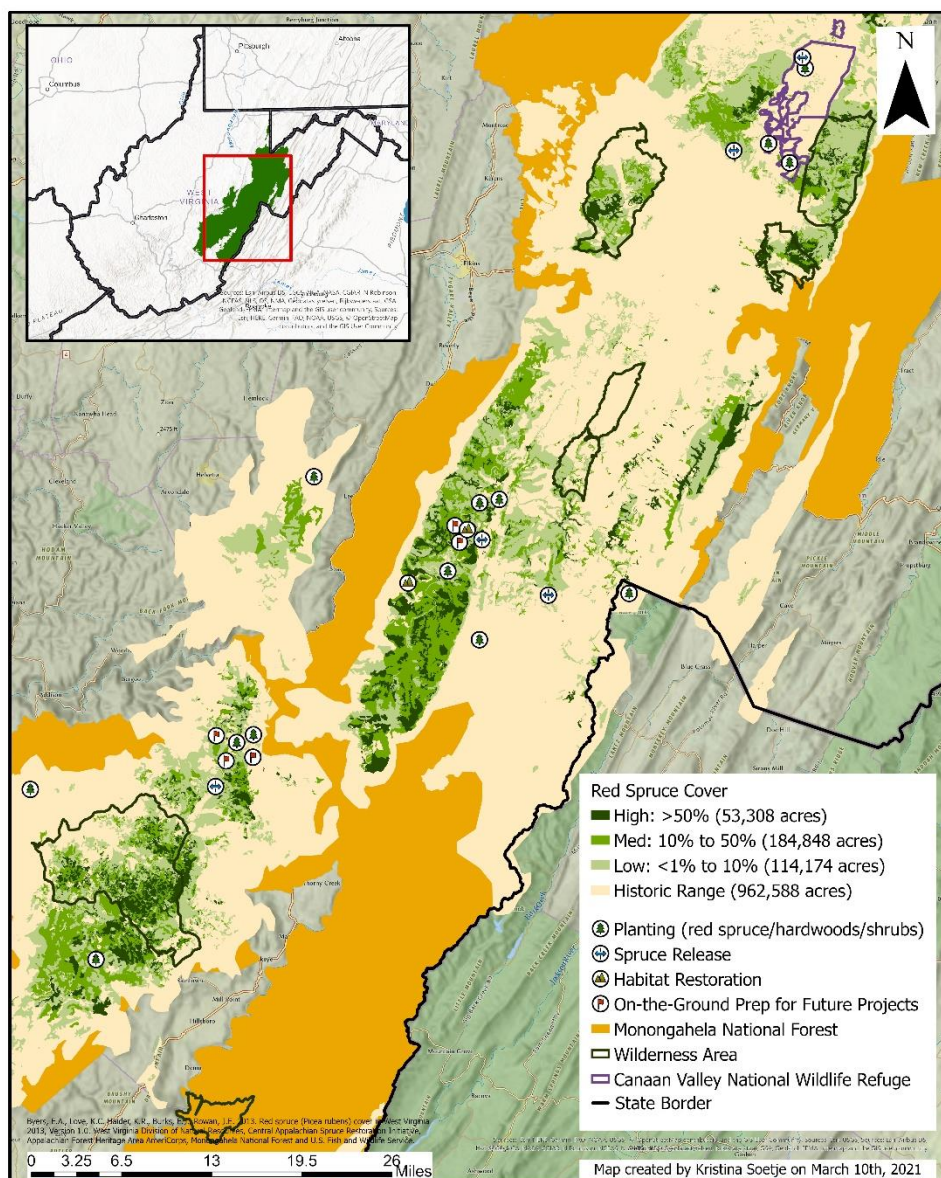


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*Soon to be planted red spruce at Mower 20.
Courtesy of USFS Greenbrier Ranger District.*

Introduction

The Central Appalachian Spruce Restoration Initiative (CASRI) is a robust partnership between 15+ federal and state agencies, and global to local non-profits dedicated to restoring red spruce (*Picea rubens*) ecosystems in the Central Appalachians. See page four for a full list of CASRI partners. Since its inception in the early 2000s, CASRI partners have restored thousands of acres of red spruce and worked with dozens of local communities to make progress on CASRI's ambitious mission to restore historic red spruce-northern hardwood ecosystems across the high elevation landscapes of Central Appalachia.

Red spruce was once abundant across the high-elevation habitats of Central Appalachia. After large-scale clear-cutting as a result of extensive logging in the early 1900s, these forests are now scattered patches at the very highest elevations. CASRI partners use multiple tactics such as tree plantings, red spruce release, habitat restoration of wetlands, and non-native invasive species removal to help reconnect and extend these isolated forest patches of red spruce. CASRI works on both public and private lands with a multitude of partners to coordinate restoration across the Central Appalachians.



Photo credit: Connor Liu

2020 CASRI Administrative Team

Kathryn (Katy) Barlow, kathryn.barlow@tnc.org

Katy Barlow received her PhD in Ecology at Penn State where she conducted research on the restoration challenges and opportunities resulting from unconventional gas development, and the rhetoric of environmental decision-making tied to reclamation regulations. Katy currently works for The Nature Conservancy's Central Appalachians Program as the Restoration Manager. *"Red spruce forests are magical. CASRI partners are dedicated and passionate. As I see it, there's no more inspiring forest and partnership to work with than CASRI."*



Julia Derringer, julia.derringer@usda.gov

Julia recently earned dual degrees from the University of Michigan in Ecology and Evolutionary Biology and Anthropology. She is currently an AmeriCorps member with the Appalachian Forest National Heritage Area and the US Forest Service engaged in ecological restoration and outreach. She chose to work with CASRI because she thinks West Virginia ecology is unique and wants to promote native plant restoration.



Kristina Soetje,

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Kristina is a recent graduate of the University of Maryland, Baltimore

County, where she received an Environmental Science and Geography B.S., a Visual Arts B.A., and a Dance Minor. She is currently serving as the 2020-2021 Chesapeake Conservation Corps Member for the MD/DC Chapter of The Nature Conservancy. Kristina is excited to serve as a member of the CASRI Admin Team and values how seamlessly CASRI unites diverse organizations to revitalize such a crucial ecosystem of the Central Appalachians.



Accomplishments Summary

Despite the unprecedented challenges due to the COVID-19 pandemic of 2020, CASRI partners stayed safe, productive and dedicated to the mission. In total, CASRI partners planted approximately **317,000 trees**, including red spruce and native hardwoods, conifers, and shrubs, on over approximately **1,046 acres** in Central Appalachia. Partners completed over **182 acres** of spruce release and deep-ripped **468 acres** of land for habitat restoration. The US Forest Service Greenbrier Ranger District implemented cutback borders on **139 acres** of land which help to make habitat transition areas healthier for plants and animals , and collected **11.567 kg** of native seeds for restoration activities on the Mon. In addition to the above, CASRI partners engaged in extensive research, monitoring, and outreach, including salamander surveys, journal publications, and newspaper articles. The stories and accomplishments below give a small glimpse of all that CASRI partners accomplished in 2020.

In addition to a donation by Free Folk Brewery, CASRI would like to extend a thank you to the many other donations we've received from individuals over the past year. CASRI has dedicated all donations to support the spruce restoration and educational program at Kumbrabow State Forest.

Partners

***Bolded partners** contributed information to the 2020 Accomplishments Report (Thank you!)*

Appalachian Forest National Heritage Area (AFNHA)	Natural Resources Conservation Service (NRCS)
Appalachian Mountain Joint Venture (AMJV)	National Wildlife Refuge System
Appalachian Regional Reforestation Initiative (ARRI)	The Mountain Institute (TMI)
Appalachian Landscape Conservation Cooperative (APPLCC)	The Nature Conservancy (TNC)
Canaan Valley Institute (CVI)	Trout Unlimited (TU)
Canaan Valley National Wildlife Refuge (CVNWR)	U.S. Fish and Wildlife Service (USFWS)
Environmental Protection Agency (EPA)	U.S. Forest Service George Washington-Jefferson National Forest (USFS-GWF)
Green Forests Work (GFW)	West Virginia Division of Natural Resources (WVDNR)
U.S. Forest Service Northern Research Station (NRS)	West Virginia Division of Forestry (WVDOF)
U.S. Forest Service Monongahela National Forest (USFS-MOF)	West Virginia Highlands Conservancy (WVHC)
	West Virginia State Parks
	West Virginia University (WVU)

A photograph of a winter forest. The ground is covered in a layer of snow, with patches of green moss visible on the rocks. Several tall, thin trees stand in the background, and a few evergreen trees are in the foreground. The scene is captured in a slightly desaturated, muted color palette.

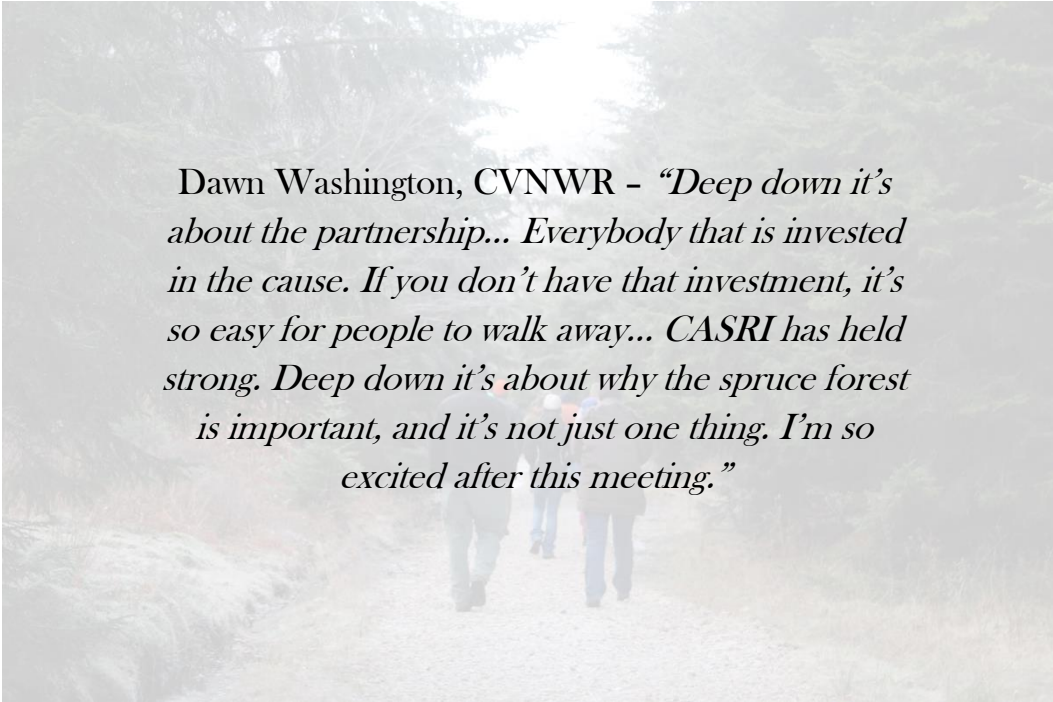
2020 Highlights

2020 CASRI Virtual Conference

This year's CASRI Conference took place virtually on November 4th and 5th, 2020. Although the COVID-19 pandemic prevented the networking and field day benefits of an in-person gathering, hosting the conference online allowed us to bring together more people than ever, including the public. This year's theme was *"Measuring Restoration Success"* and focused on exploring the quantifiable outcomes of restoration efforts. The conference had an exceptional turnout, with 60 people attending the conference on both days and 20 speakers presenting on a range of red spruce ecosystem related subjects from restoration benefits for the Cheat Mountain salamander to adapting to climate change.

The conference began with a keynote presentation by Jamie Schuler, Associate Professor of Silviculture at West Virginia University, titled *"Are we Hitting the Mark on Red Spruce Restoration?"*. Following were a total of seven topical sessions, and a panel discussion after each session. The session covered a variety of topics such as the success of the Blister Swamp conservation project, methods for increasing native plant diversity on restored mine lands, research on red spruce response to climate change, West Virginia Northern Flying Squirrel and Cheat Mountain salamander monitoring, and reflections on red spruce monitoring regimes. Presenting groups included Green Forests Work, West Virginia University, The University of Kentucky, and the US Forest Service. For the full conference agenda and to access recordings, please see www.restoredspruce.org.

CASRI sends an extended thank you to all of those who made this conference possible. Stay tuned for details on our 2021 conference!



Dawn Washington, CVNWR - "Deep down it's about the partnership... Everybody that is invested in the cause. If you don't have that investment, it's so easy for people to walk away... CASRI has held strong. Deep down it's about why the spruce forest is important, and it's not just one thing. I'm so excited after this meeting."

Photo credit: Connor Liu

Partner Profiles 2020

This section is dedicated to showcasing some of our dedicated CASRI partners. Thank you for your hard work!

Timberline Homeowners Association - Sherm Jarrett

One of the earliest supporters of what would become CASRI's work was Sherm Jarrett. In the late 1990s, Sherm and his wife Phyllis were newly retired to Canaan Valley. An enthusiastic plantsman, Sherm shared our concern with the arrival of the invasive balsam woolly adelgid insects that were infecting the Balsam Fir trees in the Valley. Sherm joined with us and helped collect cones and plant trees. As a member of the Timberline Home Owner's Association, he helped us protect and restore a large stand of Balsam Fir on the Association's "Conservancy" property by erecting a deer enclosure fence around it. For many years Sherm would promote spruce and fir planting to the other homeowners and members of the Association, and would facilitate a tree sale each year that Phyllis has continued to do for Spring 2021. Sherm passed away unexpectedly in 2020, but he has left a lasting legacy in the Spruce/Fir forests of Canaan Valley.



Southern Appalachian Highlands Conservancy - CASRI Collaboration

The Southern Appalachian Highlands Conservancy (SAHC) is a Land Trust based in Asheville, North Carolina. SAHC has protected more than 75,000 acres in the mountains and continues to conserve and restore rare habitats in their flagship "focal area", the Roan Mountain (6,286 ft.) region on the Tennessee/North Carolina border. In 2019, SAHC took advantage of the periodic cone crop of the Red Spruce in the area and collected seeds. CASRI partners were able to help them with the process of getting the seeds into production. In the Spring of 2021 they will be planting the first Red Spruce grown from those seeds. To learn more about their efforts contact Marquette Crockett - Highlands of Roan Stewardship Director. Phone: (828) 253-0095 ext. 210, www.appalachian.org

Both articles on page 8 by Dave Saville, Program Coordinator for West Virginia Highlands Conservancy Spruce Restoration Program and long-term dedicated CASRI partner.

Canaan Valley National Wildlife Refuge - Emily Langer & Hannah Studdard

Canaan Valley National Wildlife Refuge, located in Tucker County, WV, preserves unique high-elevation habitat that harbors red spruce and other rare species. CVNWR Biologist Dawn Washington is a dedicated member of CASRI, and routinely takes on AmeriCorps members to help further conservation efforts at the refuge. Below are profiles of her 2020 AmeriCorps members, who represent the diverse areas of interest that can come together around spruce habitats.

Emily Langer

My name is Emily Langer and I am the AFNHA AmeriCorps member currently serving with the U.S. Fish and Wildlife Service at Canaan Valley National Wildlife Refuge. Originally from New Jersey, but most recently Pittsburgh, I received my degree in Wildlife & Fisheries Resources from West Virginia University in 2016. Previously, I spent time in Texas working at a rescue center for exotic cats and in North Dakota as a range ecology technician. My educational and career interests are in global wildlife conservation, mammalian behavior, and human-wildlife conflict. I am excited for the opportunity to serve at Canaan Valley where I am gaining hand-on experience in my field of study and learning new skills from professionals of many disciplines. I will be participating in Cheat Mountain salamander surveys and red spruce plantings while at CVNWR, which help further CASRI's mission.



Hannah Studdard

Hannah Studdard is from Alabama and received a degree in Environmental Science from The University of Alabama in Tuscaloosa in May 2016. Since graduating she has worked in the whitewater and ski industries in Montana, Tennessee, Utah, and West Virginia. Her position at CVNWR has included work with Cheat Mountain Salamander surveys, red spruce plantings, spruce release, American woodcock tagging, temperature logger retrieval, data entry, informational panel development, and vernal pool research and prep for the upcoming field season. Hannah's interest in conservation stems from her involvement in outdoor recreation, as she believes it is important to preserve and protect at risk habitats and species to keep our forests resilient and diverse so they can thrive for decades to come, and in turn, outdoor enthusiasts can continue to responsibly enjoy the beauty and diversity that our accessible wilderness areas provide.

Anna Maria Branduzzi

Anna Branduzzi's story demonstrates how CASRI partners encourage collaboration and growth. First arriving in West Virginia as an AmeriCorps member for the US Forest Service in 2014, she is now the Reforestation Coordinator for West Virginia and Pennsylvania at Green Forests Work, a nonprofit tree planting organization that works extensively in the Monongahela National Forest. Her exploits fall under the unifying theme of ecological restoration in fragile ecosystems. CASRI is thrilled to watch a budding conservationist work with many of its partners.

Originally from Pittsburgh, PA, Anna Maria Branduzzi came to West Virginia in 2014 to serve as an AmeriCorps Wildlife Tech sponsored by the U.S. Forest Service Monongahela National Forest's (MNF) Greenbrier Ranger District (GRD). After her year of service she was hired by the GRD as a Biological Science Tech for a 1-4 year term. While working for the MNF she enjoyed native plant collection and propagation with NRCS, habitat restoration work, botany surveys, partnership projects, and wildlife monitoring. Her favorite project was the mine land restoration work on Cheat Mountain, which inspired a desire to learn more about ecological restoration. In 2018 she decided to go back to school. Anna received her Master at the University of Kentucky (UK) studying with the MNF's long-time mine land restoration partner, Dr. Chris Barton of Green Forests Work. While in school, Anna continued working part-time for the MNF through September of 2019. She was a Graduate Research Assistant at UK, focusing her research on native plant restoration on former mine lands in the red spruce ecosystem, and she did her fieldwork in WV on the Mower Tract and Sharp Knob mine lands. She graduated in December 2020 and was recently hired by Green Forests Work as Reforestation Coordinator for WV and PA. Anna is thrilled about this new opportunity and is looking forward to working with CASRI partners again.



The Blister Pines of Cheat Mountain

CASRI's mission is to promote the restoration of unique high-altitude tree habitats, of which Balsam Fir conservation is an important component. Balsam Fir is a relic of the ice age. Once found as far south as Alabama, these Fir have since retreated northward, and upward. In West Virginia, Balsam Fir is found only in a few mountain refuges. One of those refuges is Cheat Mountain. Named for the "Blister Pine" growing there, Blister Run of the Shaver's Fork River has often been described as the southernmost location for Balsam Fir on the continent. South of here, the Fir is called "Fraser."

Balsam Fir trees produce a cone crop about every 5 years. It was in 2017, using 40 foot ladders, that we were able to climb to the top of some Blister Pines, at Blister Run, and collect cones. Seeds were extracted and put into production. Seedlings were grown in a climate controlled environment for one year in a small container called a "plug." They were then extracted from the container and planted into a transplant bed to grow for another year. In the Spring of 2021, we'll plant our first Balsam Fir trees on Cheat Mountain from those seeds. We have three years of seedlings currently in production from the seeds we collected at Blister Run.

On the left is a Red Spruce, grown for two years in a 15 cubic inch plug from seed collected in the Spruce Knob, West Virginia area. In the center is a Balsam Fir grown from seed collected at Blister Run of Shaver's Fork on Cheat Mountain. It has been grown in a 7 cubic inch plug for one year. It was transplanted into a transplant bed for one more year and now looks like the plant on the right, called a Plug+1, or P1. This Balsam Fir was grown from seed collected in Canaan Valley.

Conserving these species is important for the critical role they serve in high elevation forests, and by improving growing techniques we are enhancing critical habitat.



By Dave Saville, Program Coordinator for West Virginia Highlands Conservancy Spruce Restoration Program

What's a Squirrel Got to Do with It?

Sarah Daugherty of Freefolk Brewery, on their Collaboration with CASRI

Beer and flying squirrels - although you need to be a certain age to enjoy the former, people of all ages enjoy the latter. Freefolk Brewery of Fayetteville, West Virginia took advantage of both the beverage and the cuddly creature to promote red spruce conservation in collaboration with CASRI. Julia Derringer of CASRI spoke with Sarah Daugherty of Freefolk, who spearheaded the development and branding of the Flying Squirrel Pale Ale, to see why they wanted to work with CASRI, why they chose the flying squirrel as the drink's mascot, and what red spruce means to Freefolk.

What is the process for making the Flying Squirrel beer? How is it connected to spruce?

"We decided to do this beer as a pale ale - this means it's lightly hopped. But as kind of a replacement for some of the hop and some of the bittering agents that hops typically provide, we decided to use actual spruce tips. I have some friends who have a bunch of spruce trees, so we collected ten pounds of spruce tips last June and used them as the primary flavoring in the boil. It was certainly a fun process, tasting it each time. We put the spruce tips in near the end of the production process, after we'd killed off any bacteria or fungi that could interfere with the fermentation process. It was so fun to start tasting it throughout the whole process because [the red spruce] just starts getting stronger and stronger. It was a really fun process to experiment with and in fact we're planning on doing it again this year, a little bit differently this time."



Why the flying squirrel?

"Right. I just kind of felt like it was perfect in so many ways. The flying squirrels are naturally charismatic and the spruce ecosystem holds a special place in my heart. I lived up on top of Cheat Mountain for a little while and it was just unbelievably beautiful. I understand the novelty of those ecosystems and they're just SO COOL! I love the work that you guys have been doing up on Mower Tract, so I'm very acquainted with what you guys are doing up there and the restoration efforts that you've been putting in. So it just felt natural to choose an endangered species that we have in that ecosystem and it doesn't hurt that they're cute and cuddly and it's an awesome name for a beer. My goal was to have a mascot for those ecosystems and the flying squirrel seemed like the perfect one."



What is Freefolk's connection to Central Appalachia?

“So to kind of use our tagline - the Freefolk brand - we want to be able to have the power to connect people with the community and nature, and have that connection that we have within our community as a grounding force to get people excited about West Virginia. That's why we decided to use what is native here, to use our native species - to use our endangered species - as a point. West Virginia is really special and our ecosystems here are unique and incredibly special and are a corridor for so many different species - and why don't we celebrate that? Why don't we highlight that and get people excited about the habitats that we have here and have that be the grounding force for social interactions?”

Does Freefolk do any other environmental outreach?

“Sure. So the Wild and Free series is specifically geared towards environmental outreach and raising public awareness of endangered species and specific types of habitats. I try to focus on the habitats the species need and how we can help preserve, conserve, and restore the habitats. That's been the main goal with the Wild and Free series - to raise awareness that we even have these species. One thing that we have been trying to do specifically, and the Wild and Free series has really tied this in, but we want to help support our West Virginia community and West Virginia business owners, artists, farmers; we want to support each other any way that we can. In this series specifically, whatever the specialty ingredient was we've been trying to source it as local as possible - foraged if that's what we need to do, but purchasing from different farms. The cerulean warbler [beer] we released last year, all of the blueberries and the lavender were from local farms here. And the big eared bat [beer used] 150 pounds of butternut squash from a farm maybe two miles up the street from where we were. We're a small brewery - if we can't monetarily support each other, we're gonna do everything we can to get the marketing out for them. We have [a goal] of trying to host space so people [and groups] can hold events and get excited about academia or red spruce or whatever the topic is.”



Freefolk will be re-releasing the Flying Squirrel Pale Ale in summer 2021, again in collaboration with CASRI. They also wish to eventually hold an environmental festival, using their extensive outdoor facilities, and encourage interested partners to use their space to bring communities together through the environment or otherwise.

Appalachian Conservation Corps crew members planted nannyberry and other native potted plants on Mower 20. Courtesy of Green Forests Work.



2020 CASRI Accomplishments in Photos



Excavator operator spreads large woody debris across Mower 21. Non-native conifer plantation trees on minelands are repurposed and provide benefits to soil development, wildlife habitat, and seedling survival. Courtesy of Green Forests Work.

2020 CASRI Accomplishments

Tree Plantings

Canaan Valley National Wildlife Refuge

- ***Spring Red Spruce Planting*** - Canaan Valley National Wildlife Refuge, with the help of TNC and a professional contractor, planted **2,000 red spruce seedlings** on **15 acres** in the Flat Run riparian buffer.
- ***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.
- ***Canaan Fir Planting*** - Canaan Valley National Wildlife Refuge, with the help of TNC and a professional contractor, planted **3,000 Canaan Fir** on a **19 acre** area east of the Freeland Boardwalk.

George Washington-Jefferson National Forest

- ***Red Spruce Planting*** - Through funding provided by TNC, **33 acres** of non-native red pine were girdled for spruce release and **10,000 red spruce** seedlings were planted in the Laurel Fork area of the Warm Springs Ranger District located on the GW Jeff. It is our hope to continue these restoration efforts and plant another **7,500 trees** in this area in 2021.

Green Forests Work

- ***Mower Tract, Mower 20***—The U. S. Forest Service, in partnership with Green Forests Work, Komatsu, Arbor Day Foundation, Mennen Environmental Foundation, and Appalachian Stewardship Foundation, planted **92,318 red spruce, native hardwood seedlings, and wetland shrubs of 26 species** on **200 acres of reclaimed mine land** that was deep ripped in 2019.
- ***Mower Tract, Appalachian Conservation Corps (ACC)***— 6-member ACC crew worked on Mower 20, in total planting **4,330 wetland shrubs** and spreading **160 pounds** of native grass and pollinator seed.
- ***Sharp's Knob*** - The U. S. Forest Service, in partnership with Green Forests Work, Appalachian Headwaters, Argosy Foundation, Arbor Day Foundation, and The Nature Conservancy, planted **37,082 red spruce, native hardwood seedlings, and wetland shrubs of 10 species** on **65 acres** of reclaimed mine land that was deep ripped in 2019.
- ***Mower Tract & Sharp's Knob***—**100,000 red spruce, hardwoods, and wetland shrubs** have been ordered for planting on decompacted mine lands in spring 2021.

USFS Greenbrier Ranger District of the Monongahela National Forest

- ***Red Spruce & Native Plants*** - The U.S. Forest Service, in partnership with Green Forests Work, USDA Natural Resource Conservation Service, and Conservation Legacy - Appalachian Conservation Corps,

planted more than **38,300 red spruce** and **54,300 native hardwood seedlings and wetland shrubs** on **178 acres** of deep-ripped reclaimed mine land.

- ***Riparian plantings*** - In 2020, we planted **348 acres** of red spruce and northern hardwood trees and shrubs in unforested riparian areas of the headwaters of the Greenbrier, Potomac, and Williams River watersheds.

USFS Marlinton - White Sulphur Ranger District of the Monongahela National Forest

- ***Sharp's Knob, Sharp 20*** - **65 acres** of compacted mine lands were deep ripped in early spring 2020 in preparation for restoration planting. Planting on de-compacted mineland occurred in spring 2020 and was done by professional contractors, who planted **11,250 red spruce** and **27,250 hardwoods**.
- ***Sharp's Knob, Sharp 21*** - **48 acres** of compacted mine lands were deep ripped in fall 2020 in preparation for restoration planting.

West Virginia Department of Forestry

- ***Red Spruce***- Planted **300 seedlings** in the Glade Run and Rich Mountain areas.
- ***Kumbrabow State Forest Red Spruce planting project***- Acquired funding through Secure Rural Schools Title II grant to hold a combination red spruce planting/ conservation education events for school aged children the springs of 2021, 2022, 2023, and 2024. We will plant at least a thousand seedlings at each year's events and educate youth on the importance of red spruce in the ecosystem. Permanent fixed monitoring plots will be set up on each planting site.

Spruce Release

Canaan Valley National Wildlife Refuge

- ***Spruce Release***—Canaan Valley National Wildlife Refuge continued non-commercial spruce release on **5 acres** on Canaan Mountain near Black Bear Woods and along the Blackwater River by girdling and applying herbicides to hardwoods.

Green Forests Work

- ***Mower Tract, Appalachian Conservation Corps*** — 6-member ACC crew released red spruce on nearly **25 acres** on the Mower Tract.

USFS Greenbrier Ranger District of the Monongahela National Forest

- ***Spruce Release*** - Released advanced regeneration of red spruce on approximately **4.5 acres** by removing a non-native red pine overstory.

West Virginia Department of Forestry

- ***Trout Run West*** **65 acres** of commercial timber harvest completed with spruce release.

- ***Buck Knob 22*** Commercial timber harvest under contract and slated for harvest this winter. Spruce release elements in approximately **50 acres** of this sale.

Habitat Restoration

Green Forests Work

- ***Mower Tract, Mower 21 Deep Ripping*** **158 acres** of mined land were deep ripped on the U. S. Forest Service Greenbrier Ranger District, in partnership with Green Forests Work, in preparation for planting of red spruce and native hardwoods in spring 2021. **84 wetlands** were created.
- ***Sharp's Knob***—**48 acres** of mined land were deep ripped on the U. S. Forest Service Marlinton Ranger District, in partnership with Green Forests Work and Appalachian Headwaters, in preparation for planting of red spruce and native hardwoods in spring 2021.

The Nature Conservancy - WV, MD, VA Chapters

- ***Red Spruce & Balsam Fir restoration***- TNC helped organize, and financially supported, approximately **105 acres** of red spruce ecosystem restoration in West Virginia and Virginia with public lands partners.
 - **14K red spruce** and **2K balsam fir** at the Canaan Valley State Park (**60 acres**)
 - **2K red spruce** and **3K balsam fir** at the Canaan Valley National Wildlife Refuge (**34 acres**)
 - **10K red spruce** at the Locust Spring area of the George Washington National Forest (**20 acres**)
- ***Purchases*** - **8,750 red spruce** for the Mon NF's Sharp's Knob project
 - **4,495 native trees and shrubs** for the Mon NF's Spruce Mtn Grouse Management Area project
 - **3,354 red spruce** for the Mon NF's Mower Tract project
 - **646 red spruce** that were planted by volunteers at the Yellow Creek Preserve owned by the WV Land Trust
- ***Conservation*** - TNC purchased **25 acres** at Mace Knob in the Cheat Mountain Range that is comprised of young/mid/ and older red spruce forest. This purchase expands conservation in a region critical to climate resilience, adjacent to conservation easements and the Snowshoe Ski Resort.

USFS Greenbrier Ranger District of the Monongahela National Forest

- ***Mower Tract, Mower 21 Deep Ripping*** - In partnership with Green Forests Work and with equipment rentals donated by Komatsu America Corp., the Greenbrier Ranger District of the Monongahela National Forest implemented restoration activities on **149 acres** of reclaimed surface mined land. Mower 21 was cleared of non-native red pine plantations then deep ripped to decompact fill slopes for subsequent planting of native red spruce ecosystem trees, shrubs, and pollinator species scheduled for spring 2021.
- ***Cutback borders*** - Cutback borders provide a feathered edge habitat transition between standing timber, harvest units, roads, and wildlife openings, providing benefits to wildlife such as cover and potential food

sources. Chainsaws are used to fell or girdle trees to allow sunlight to reach up to 75% of the forest floor to stimulate new growth. Residual trees, i.e. trees left behind following treatment, are chosen for their wildlife or diversity qualities. Through contract operations and in partnership with Green Forests Work and the Conservation Legacy – Appalachian Conservation Corps (AmeriCorps volunteers), the Greenbrier Ranger District of the Monongahela National Forest implemented **139 acres** of cutback border treatments in northern hardwood forests in the Cheat Mountain area.

Native Seed Collection and Propagation

USFS Greenbrier Ranger District

- ***Native seed propagation*** – The Natural Resource Conservation Service Appalachian Plant Materials Center (PMC) propagated seeds for use in restoration activities. Seeds were collected from the Monongahela National Forest prior to 2020. The species grown included nannyberry, speckled alder, wild raisin, chokeberry, chokecherry, swamp rose, and red spruce.

USFS Marlinton-White Sulphur Springs Ranger District

- ***Native seed collection*** – Chicago Land Management interns collected a total of **11.57 kg** of native seeds from the Monongahela National Forest. They collected from 27 different species, including virgin's bower, common milkweed, winterberry holly, scarlet beebalm, and American mountain ash. These seeds will be propagated for native plant restoration on the Monongahela National Forest.

Research, Surveying, and Monitoring

Canaan Valley National Wildlife Refuge

- ***Salamander Surveys*** - CVNWR conducted new Cheat Mountain Salamander surveys with a new protocol developed by USGS that focuses detection probability. All survey points were visited twice in the fall. In addition, genetic sampling was completed at the fourth and final location on the Refuge and were sent for analysis at WVU's wildlife genetics laboratory.

CASRI Research Committee

- ***Dr. Jamie Schuler, WVU*** - In 2020, we made progress on the commercial red spruce release project on the Kumbrabow State Forest. This long-term project involves assessing the effectiveness of expanding gap silviculture on the release and regeneration of red spruce and includes comparing expanding gap silviculture to traditional shelterwood practices in a red spruce-northern hardwoods forest. This year, Dr. Jamie Schuler, of West Virginia University, and his students completed marking of the expanding gap

harvest plots and will finish marking the shelterwood plots in early 2021. Once volumes have been tabulated, the marked timber will be put up for commercial bid by the WV Division of Forestry.

- ***Joe Gray, MS Student WVU*** - Spruce-dominated stands on the Kumbrabow were also part of a study conducted by Joe Gray, MS student West Virginia University, on the growth rates of understory red spruce. In 2020, Joe completed his field work, data analysis, and successfully defended his thesis titled Central Appalachian Understory Red Spruce (*Picea rubens* Sarg.) Growth Rates and Allometric Relationships. Joe also presented his findings at the 2020 CASRI Conference.
- ***James Leonard, MS Student WVU*** - James also had a productive year with 39 new soil profiles dug, described, and sampled within red spruce ecosystems. Some of these pits may be included in his work on expanding and updating the spodic intensity map. James is also working on finalizing a new Ecological Site Description (ESD) for Rubbly Upland Conifer Forest sites. James presented on the potential for ESDs to be used as framework and for predicting ecological services such as soil carbon storage at the 2020 CASRI Conference.

Green Forests Work

- ***Journal Publication*** - Branduzzi, A.M., Barton, C.D., & Lovell, A. (2020). First-Year Survival of Native Wetland Plants in Created Vernal Pools on an Appalachian Surface Mine. *Ecological Restoration* 38(2), 70-73. <https://www.muse.jhu.edu/article/755243>
- ***Masters Theses (Sharp's Knob & Mower Tract):***
 - Lambert, Michaela M., "EVALUATION OF CREATED WETLANDS AS AMPHIBIAN HABITAT ON A REFORESTED SURFACE MINE" (2020). Theses and Dissertations--Forestry and Natural Resources. 55. https://uknowledge.uky.edu/forestry_etds/55
 - Branduzzi, Anna Maria, "ENHANCING NATIVE PLANT DIVERSITY ON LEGACY MINELANDS" (2020). Theses and Dissertations--Forestry and Natural Resources. 59. https://uknowledge.uky.edu/forestry_etds/59

USFS Greenbrier Ranger District of the Monongahela National Forest

- ***West Virginia Northern Flying Squirrel Nest Box Monitoring*** - No nest box monitoring of WV northern flying squirrels was conducted in 2020 out of an abundance of caution due to the possibility of Covid-19 interspecies transmission.
- ***West Virginia Northern Flying Squirrel Acoustic Monitoring*** - In partnership with the WV Department of Natural Resources (WV DNR), northern flying squirrel habitat was acoustically monitored for approximately **500 detector nights** to determine presence.

West Virginia Department of Natural Resources Heritage Program

- **Rare plants** - West Virginia Natural Heritage Program ecologists sampled a vegetation plot and mapped occurrences of yellow birch boulder field forests on the upper east flank Spruce Mountain. This Central Appalachian High-Elevation Boulderfield Woodland is a globally rare (G2) vegetation association known only from Virginia and West Virginia. The forest is strongly dominated by yellow birch growing on steep slopes with bryophyte covered boulders. These sites have a unique air photo signature which led the WVNHP ecologists to their discovery. Two state rare plant species were also documented in these forests: *Gymnocarpium appalachianum* (Appalachian Oak Fern - G3 S2) and *Poa saltuensis* (Old-Pasture Bluegrass - G5 S1).

Outreach

The Nature Conservancy

- **Media** - TNC media hits for climate-informed red spruce ecosystem restoration
 - The Nature Conservancy's Nature magazine, Fall 2020, "[Seeds of Hope](#)"
 - Cumberland Times-News article, Oct 2, 2020, "[The Nature Conservancy, Allegany College of Maryland team to help red spruce](#)"
 - Northern Woodlands article, Winter 2020, "[A Boost for Red Spruce](#)"
- **Partnership** - TNC staff, along with several partners, organized and facilitated the CASRI 2020 Virtual Conference: Katy Barlow, Kristina Soetje, Deborah Landau, Mike Powell.
 - TNC staff participate on all the sub-committees, and lead the sub-committees for Strategy and Management & Monitoring.