STATEWIDE SEED COORDINATION & COLLECTION: BUILDING A NETWORK FOR RESTORATION

JESSICA COLBY (SHE/HER)
RIPARIAN LANDS PROGRAM COORDINATOR

NORTHWOODS STEWARDSHIP CENTER

Lake Champlain Basin Program

GREAT LAKES FISHERY COMMISSION — PROTECTING OUR FISHERY

VERMONT FISH & WILDLIFE

U.S. FISH & WILDLIFE SERVICE — DEPARTMENT OF THE INTERIOR

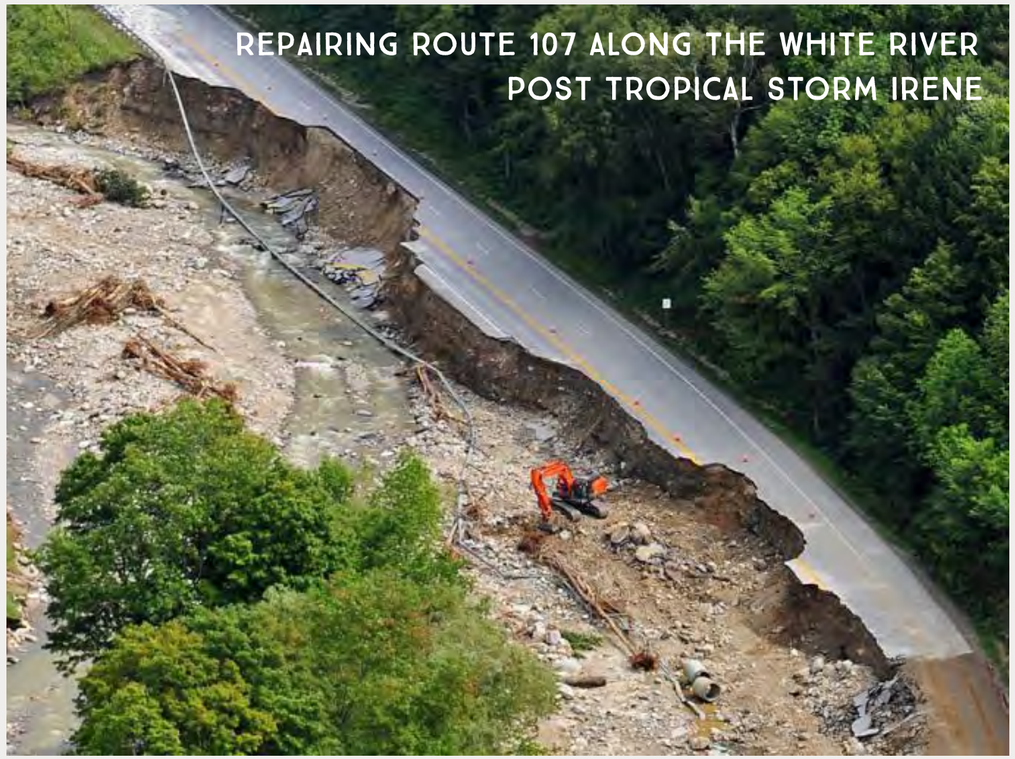
One Hive Foundation

Vermont Housing & Conservation Board

INTERVALE CENTER

ORIGIN OF THE SEED PROJECT

TROPICAL STORM IRENE (2011)
TROPICAL STORM SANDY (2012)



Similar destruction as seen caused by the 2023 & 2024 July floods.

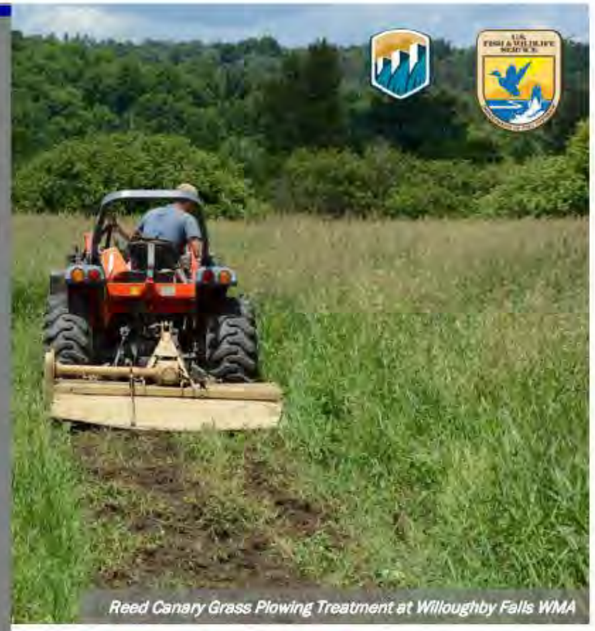
Following these massive disturbances, dense regeneration began naturally occurring on abandoned cornfields (seen above). This led Vermont Fish & Wildlife (and other partners) to begin their cornfield replication trials at Willoughby Falls WMA in 2016.

ACTIONABLE SCIENCE

Riparian Restoration Experiment for Native Species Conservation in Vermont

Connecticut River Conservancy

The Vermont Fish & Wildlife Department (VFWD), Connecticut River Conservancy (CRC), and their partners are working to restore riparian buffers to improve habitat for native fish and wildlife, stabilize streambanks, and mitigate agricultural runoff. In 2016, VFWD worked with the CRC at the Willoughby Falls Wildlife Management Area (WMA) and began research on different techniques for site preparation and invasive plant control that would improve the efficacy of riparian restoration efforts. The project aimed to determine the best methods to control invasive reed canary grass (*Phalaris arundinacea*) to promote recruitment of native woody species that provide ecosystem services.



Reed Canary Grass Plowing Treatment at Willoughby Falls WMA

KEY ISSUES ADDRESSED

In Vermont, riparian areas were cleared of native vegetation and re-planted with reed canary grass to support hay production and livestock grazing. Additional invasive plants, including field bindweed (*Convolvulus arvensis*) and wild parsnip (*Cicuta maculata*), have also become more prevalent. A decrease in woody plant cover leaves riparian areas susceptible to streambank erosion and promotes stream channelization, which decreases the function of riparian areas as agricultural buffers. Such degradation has also resulted in the loss of Vermont's most important wildlife corridors and decreased heterogeneity in fish populations.

PROJECT GOALS

- Conduct an experiment to determine best methods for re-establishing floodplain forests and restore ecosystem health and services in areas currently invaded by reed canary grass
- Remove non-native vegetation and create bare earth soils for native tree germination and establishment through plowing and herbicide treatments

CORNFIELD REPLICATION EXPERIMENT

The experiment attempted to mimic conditions in plowed cropland that allow germination of native riparian tree seeds.

Native Tree Seedlings in an Experimental Plot

PROJECT HIGHLIGHTS

Experimental Design: VFWD and CRC established plots at Willoughby Falls WMA in areas with dense reed canary grass. Twelve plots containing four 5m by 30m experimental plots were established in two former hay fields along the Barton River to test the effectiveness of experimental treatments on removing invasive grasses and regenerating woody plants. Plots received one of the following treatments: Control, Plow Only, Plow Then Herbicide, and Herbicide Then Plow.

Real-World Conditions: The VFWD and CRC conducted the experiment in a less-controlled environment to match natural stressors. To overwhelm competition from non-native plants and herbivory by deer and small mammals, treatments were implemented to encourage high-density seedling establishment.

Measuring Success: Using transects within each plot, VFWD and CRC scientists measured bare soil, plant cover, and woody plant regeneration. As of 2020, these data have been collected for three years.

Collaborators

- Connecticut River Conservancy
- Vermont Fish and Wildlife Department
- U.S. Fish and Wildlife Service Partners Program

Funding Partners

- Great Lakes Fisheries Commission
- Vermont Hunting License Sales and Pittman-Robertson Funds

LESSONS LEARNED

Plow Then Herbicide was the most effective method to remove dense thatch and eliminate competition from non-native grasses. This method provided the greatest percent cover of bare soil, highest density of seedlings (36,757 seedlings per hectare in June 2018), and highest growth rates.

Late summer and fall are the optimal times for reed canary grass control. This timing limits regrowth of invasive species during the growing season and provides bare earth conditions to allow germination of both fall and spring seedings. Farmers can also offer helpful input in the experimental design because they regularly control unwanted plants when planting row crops such as corn.

This project met some resistance due to the use of the Rodeo label glyphosate herbicide and due to the reforestation of agricultural land. Strong communication and data showing that herbicide amplifies the efficacy of mechanical treatments has alleviated criticism on glyphosate use. General acceptance of land use changes to mitigate sedimentation and nutrient loading have alleviated the criticism related to restoration of agricultural land.

NEXT STEPS

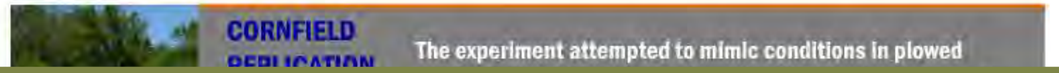
- Continue monitoring experimental sites at Willoughby Falls WMA
- Apply methods from this experiment to other sites in the Northeast
- Testing of additional restoration methods is currently underway, including direct seeding of native woody species following site preparation

For more information on this project, contact Fritz Gerhardt (fgerhardt@ctriver.org), Peter Emerson (peter.emerson@vermont.gov), or Annalise Carington (annalise_carington@fws.gov)

Native Riparian Forest in Northern Vermont

CCAST Authors: Madison Bigham and Nicole Williams, University of Arizona, March 2021.
Photos courtesy of Fritz Gerhardt/CRC
For more information on CCAST, contact Genevieve Johnson (gjohnson@usbr.gov) or Matt Grabau (matthew_grabau@fws.gov).

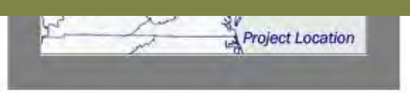
Visit CCAST:



KEY FINDINGS

- Plowing the site and then treating with herbicide was the most effective method of removing the dense thatch layer from reed canary grass (*Phalaris arundinacea*).

- Relying on natural seed fall on the site left results unpredictable and unable to be replicated.
  - Seed not available (i.e. male trees for dioecious species or masting cycles not in line with restoration work).
  - Desired species not on site.



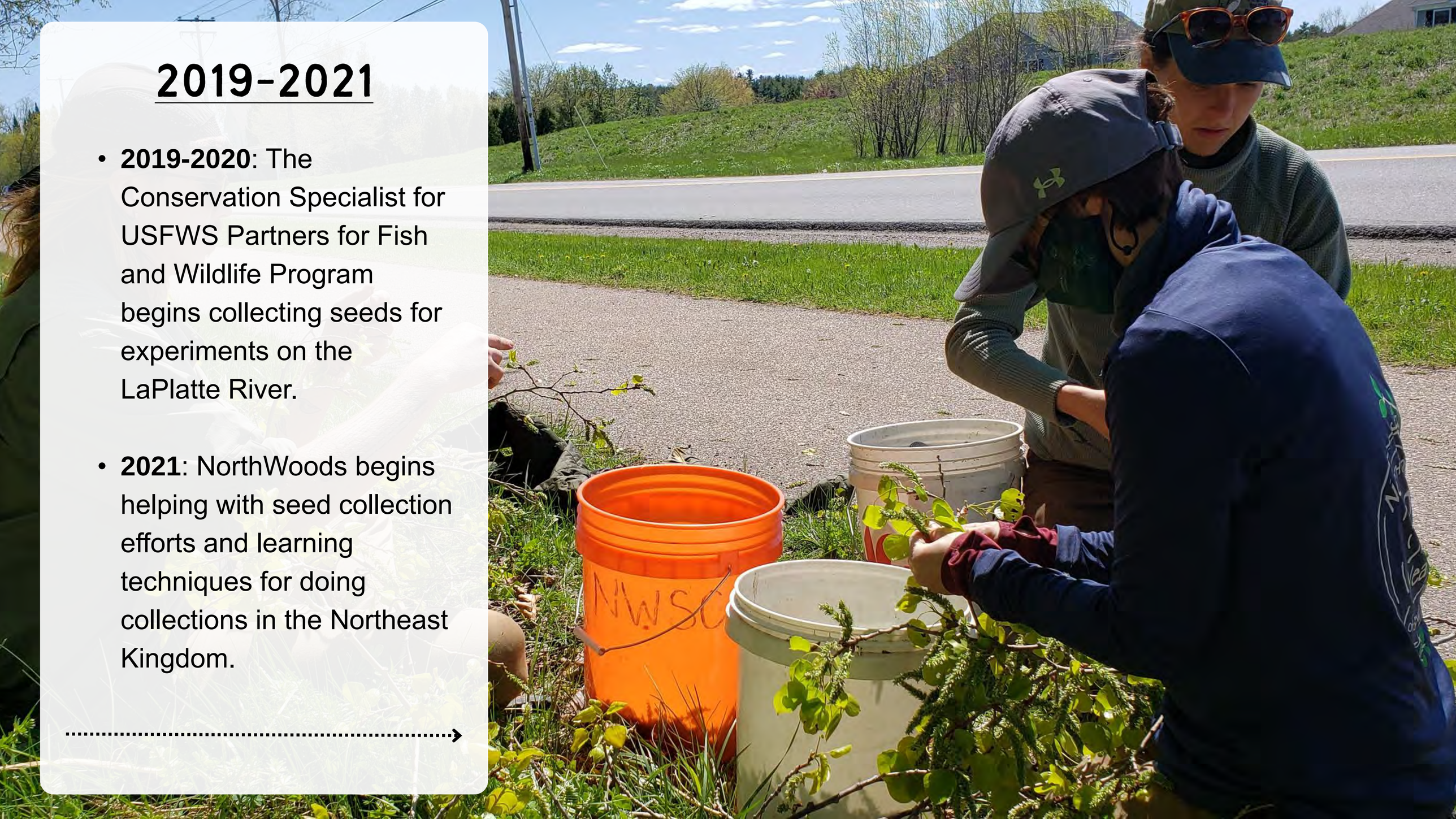
establishment through plowing and herbicide treatments

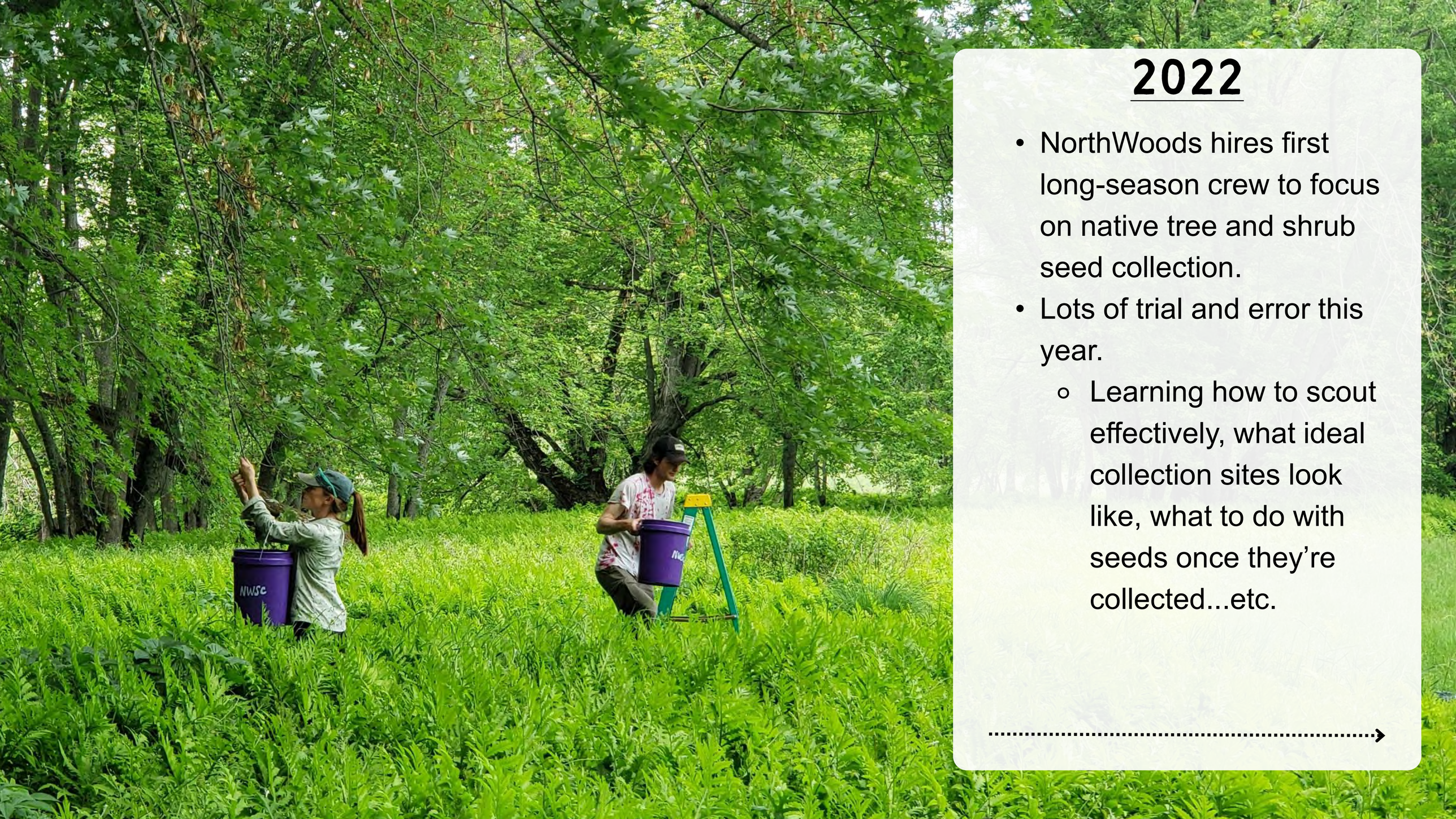
Genevieve Johnson (gjohnson@usbr.gov) or Matt Grabau (matthew_grabau@fws.gov).

2019-2021

- **2019-2020**: The Conservation Specialist for USFWS Partners for Fish and Wildlife Program begins collecting seeds for experiments on the LaPlatte River.

- **2021**: NorthWoods begins helping with seed collection efforts and learning techniques for doing collections in the Northeast Kingdom.





2022

- NorthWoods hires first long-season crew to focus on native tree and shrub seed collection.
- Lots of trial and error this year.
  - Learning how to scout effectively, what ideal collection sites look like, what to do with seeds once they're collected...etc.

2023

- NorthWoods hires second long-season crew focused on seed collection and is better prepared for the season ahead!
- Intervale Center hires a Statewide Seed Coordinator, Brooke Fleischman, to help build out a network of seed collectors in the state and help the nursery improve production with locally-sourced seeds.

DEVELOPING THE RIPARIAN LANDS NATIVE SEED PARTNERSHIP

- In January 2024, about 1 year after Brooke was hired, partners gathered in-person and virtually to discuss the challenges and opportunities of this work and brainstorm next steps.
    - During the meeting, this effort was more officially named the Riparian Lands Native Seed Partnership (RLNSP)

- Since identifying our focus areas in 2024, in 2025 we have been working on a “seed plan” that will help guide our work for the next 3 years or so.

CORE PARTNERS

VERMONT FISH & WILDLIFE

Pete Emerson | Fisheries Biologist

INTERVALE CENTER

Brooke Fleischman | Statewide Seed Coordinator

U.S. FISH & WILDLIFE SERVICE

Chris Smith | Supervisory Fish & Wildlife Biologist

Katie Kane | Fish & Wildlife Biologist

CONNECTICUT RIVER CONSERVANCY

Fritz Gerhardt | Conservation Scientist

THE NATURE CONSERVANCY

Land access for collections in Vermont

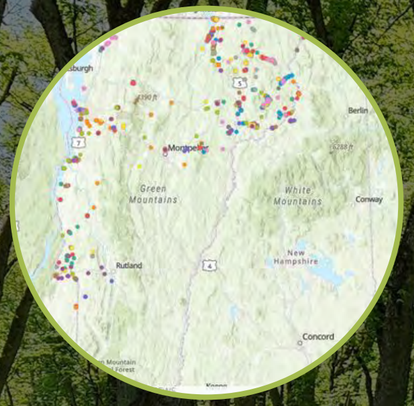
GREAT LAKES FISHERIES COMMISSION

MISSION

The purpose of the Riparian Lands Native Seed Partnership is to develop a statewide network of organizations that work together to meet the need for local native tree and shrub seeds for restoration projects that support climate mitigation, water quality, and healthy habitats.

HOW DO WE ACCOMPLISH OUR MISSION?

COLLECT, PROCESS, AND STORE NATIVE TREE AND SHRUB SEEDS



MAP SEED SOURCE LOCATIONS AND PHENOLOGY DATA

WORK CLOSELY WITH LOCAL CONSERVATION NURSERIES

DIRECT SEEDING TRIALS WITH VERMONT FISH & WILDLIFE AND OTHERS!

OUTREACH & EDUCATION

MEET THE 2025 SEED COLLECTION TEAM!

BROOKE FLEISCHMAN (SHE/HER)

Statewide Seed Coordinator
Intervale Center
brooke@intervale.org

REESE QUALLS (SHE/HER)

Spring Seed Crew Member (2024, 2025)
Intervale Center

MADDIE SMITH (SHE/HER)

Spring Seed Crew Member (2024, 2025)
Intervale Center

JESS COLBY (SHE/HER)

Riparian Lands Program Coordinator
NorthWoods Stewardship Center
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JAKE GALLINGER (THEY/THEM)

Riparian Lands Program Assistant
NorthWoods Stewardship Center
jake@northwoodscenter.org

GABI MARCHESANI (SHE/HER)

ECO AmeriCorps Member
NorthWoods Stewardship Center
gabriella@northwoodscenter.org

JO HENJES (SHE/HER)

Riparian Lands Intern
NorthWoods Stewardship Center

PARTNERSHIP

NURSERY ROUNDTABLES

- Beyond just the seed need, but the nursery industry as a whole and increasing our capacity as a restoration community
- Working with UVM watershed forestry coordinator to address these needs
- Recent surveys: 65-75% of plant materials for restoration projects are being sourced from out of state

COLLECTION

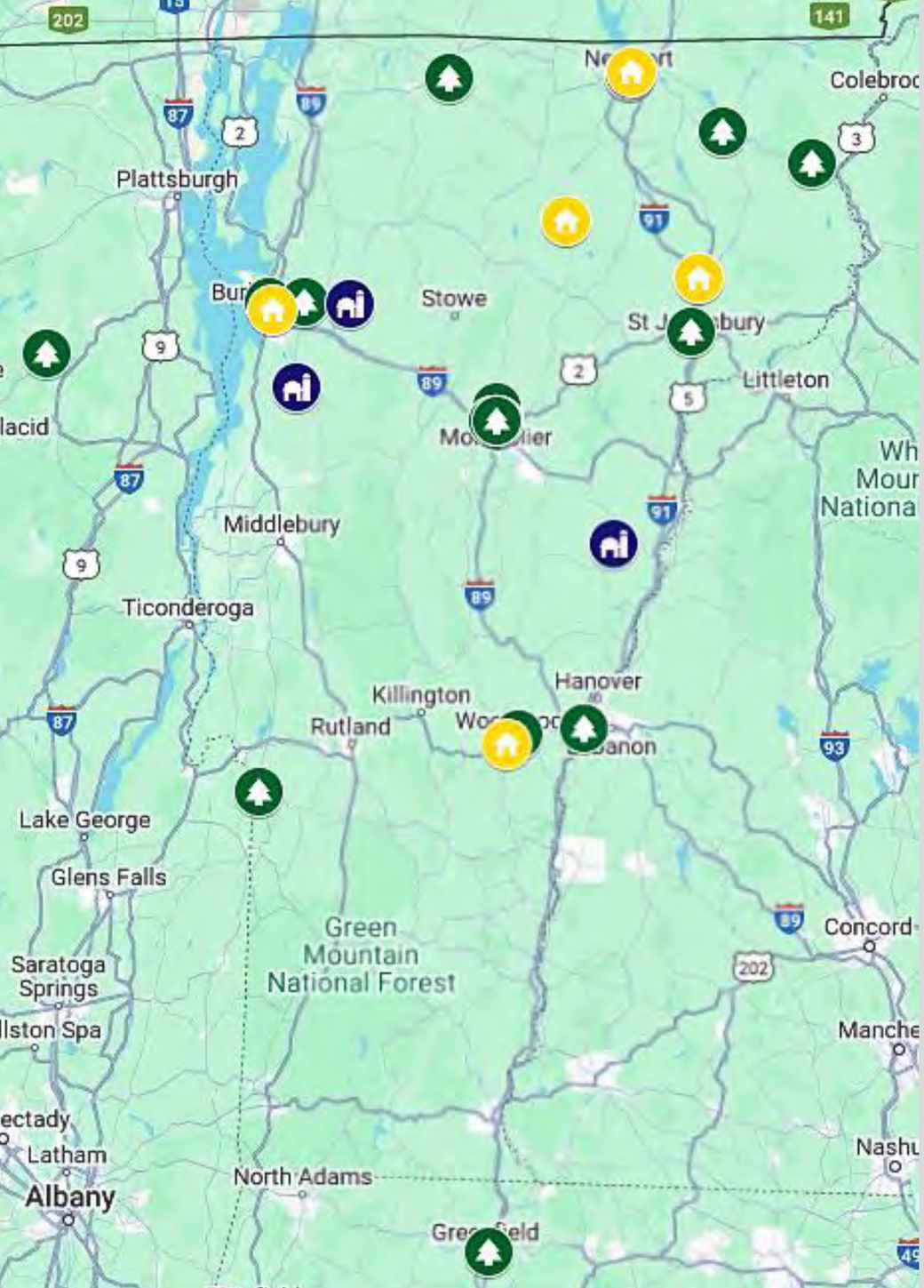
- Nurseries, universities, community members

LAND ACCESS

- State, town conservation commissions, land trusts, non-profits

OUTREACH

- Collaboration with other non-profits and nurseries to share seed handling best practices



WE HAVE GREATLY EXPANDED OUR PARTNERSHIP WITHIN THE REGION:

VERMONT FISH & WILDLIFE

U.S. FISH & WILDLIFE SERVICE

INTERVALE CENTER

NORTHWOODS STEWARDSHIP CENTER

Clean water. Healthy habitat. Thriving communities.
Connecticut River Conservancy

The Nature Conservancy

NORTH BRANCH NATURE CENTER

MWA MEMPHREMAGOG WATERSHED ASSOCIATION

MRBA

UPPER MISSISQUOI AND TROUT RIVERS (LAMOILLE) WILD & SCENIC COMMITTEE

FRIENDS OF THE Winooski

Ottauquechee Natural Resources Conservation District

DUCKS UNLIMITED

AUSABLE Freshwater Center

Lake Champlain Basin Program

FORESTS, PARKS & RECREATION VERMONT

Vermont River Conservancy

BILLINGS FARM & MUSEUM

Bird and Bee Native Plants

VERTERRA TREE & SHRUB NURSERY

Redstart Natural Resource Management

Vermont Housing & Conservation Board

THE FARM UPSTREAM JERICHO, VERMONT

LYNDON INSTITUTE CHARTERED 1867

VERMONT DEPARTMENT OF ENVIRONMENTAL CONSERVATION ECO AmeriCorps

WOODSTOCK UNION HIGH SCHOOL SINCE 1854

University of Vermont

Sterling ECOLOGICAL THINKING & ACTION

EXPANDING FOCUS: ESTABLISHING A NORTHERN APPALACHIAN - ATLANTIC MARITIME HUB

Northeast Seed Network

COASTAL MAINE BOTANICAL GARDENS

Wild Seed Project

INTERVALE CENTER

CURRENT PARTNERS

NICHE PURPOSE

The purpose of the Northern Appalachian-Atlantic Maritime Hub of the Northeast Seed Network to ensure a supply of ecoregionally-appropriate bulk seed, sourced from the Northeastern Highlands north of Massachusetts, the Acadian Plains and Hills, and the Atlantic Maritime Lowlands ecoregions for research or for small (<0.5 ac) to mid-sized ecological restoration projects within those ecoregions.

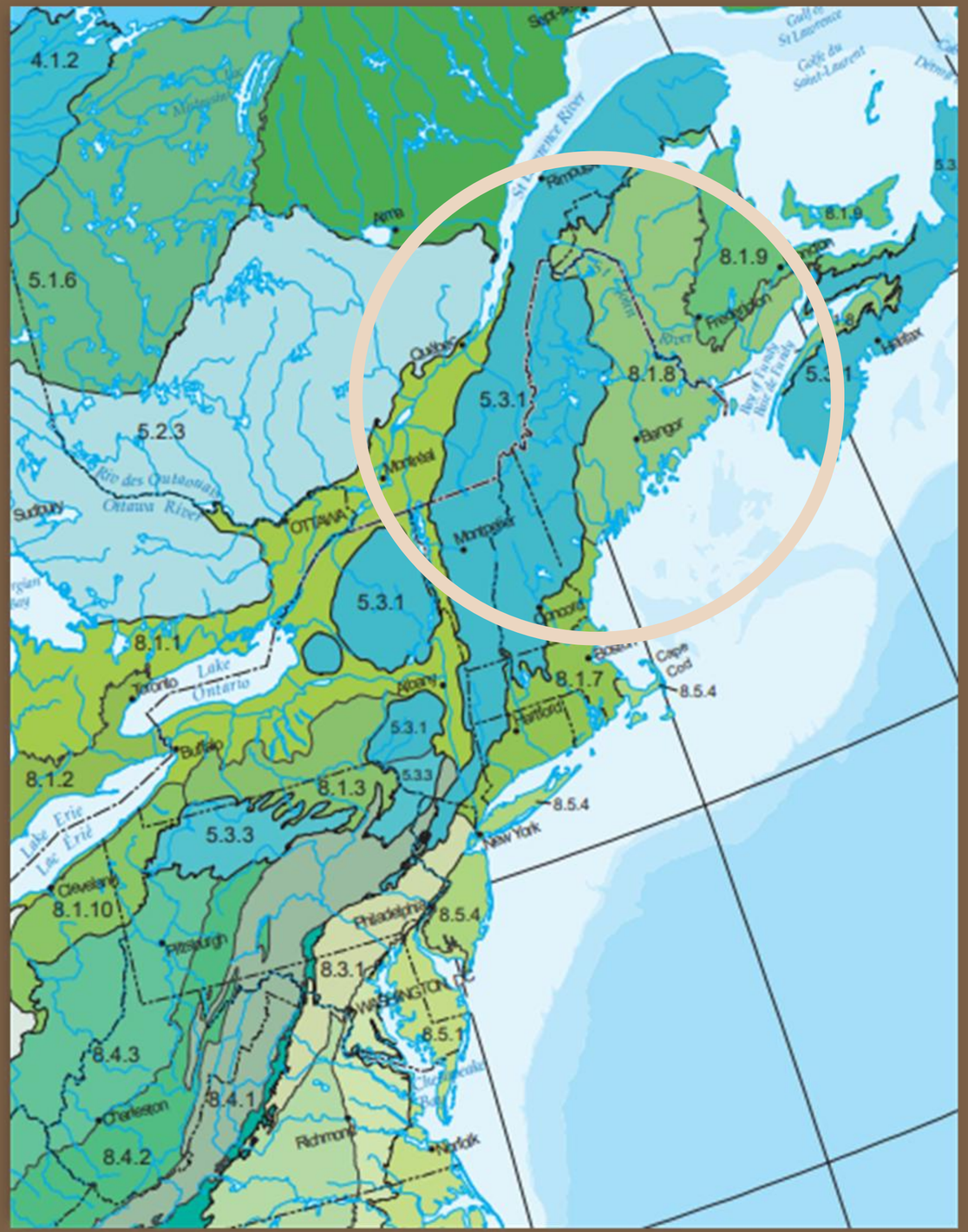
SCOPE

Geographic Area:

- Northeastern Highlands Level III Ecoregion north of the MA border
- Acadian Plains and Hills Level III Ecoregion
- Atlantic Maritime Lowlands Level III Ecoregion

Not-for-profit service model, complementing industry efforts, leveraging educational capacities

Users: Serving land stewards within land trusts and other land conservation organizations, tribes, municipalities, state and federal agencies



FOCUS

- Working to strengthen seed supply for research and restoration across the Eastern US/Canadian border
- Supporting viability of our dynamic, shifting northern flora in a changing climate
- Supporting best ecological function and resilience in the face of novel pathogens, predators, and competitors in our region


VT SEED COLLECTION

TARGET SPECIES

Red Maple - *Acer rubrum*
Silver Maple - *Acer saccharinum*
Speckled Alder - *Alnus incana*
Yellow Birch - *Betula alleghenienesis*
Gray Birch - *Betula populifolia*
Red-osier Dogwood - *Cornus sericea*
Tamarack - *Larix laricina*

Red Spruce - *Picea rubens*
Balsam Poplar - *Populus balsamifera*
Eastern Cottonwood - *Populus deltoides*
Quaking Aspen - *Populus tremuloides*
Black Cherry - *Prunus serotina*
Chokecherry - *Prunus virginiana*

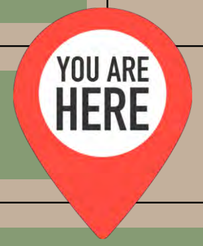
Northern Red Oak - *Quercus rubra*
Shrub Willow - *Salix* spp.
Black Willow - *Salix nigra*
Northern White Cedar - *Thuja occidentalis*
American Elm - *Ulmus americana*
Nannyberry - *Viburnum lentago*
Highbush Cranberry - *Viburnum opulus* var. *americanum*

OTHER SPECIES OF INTEREST

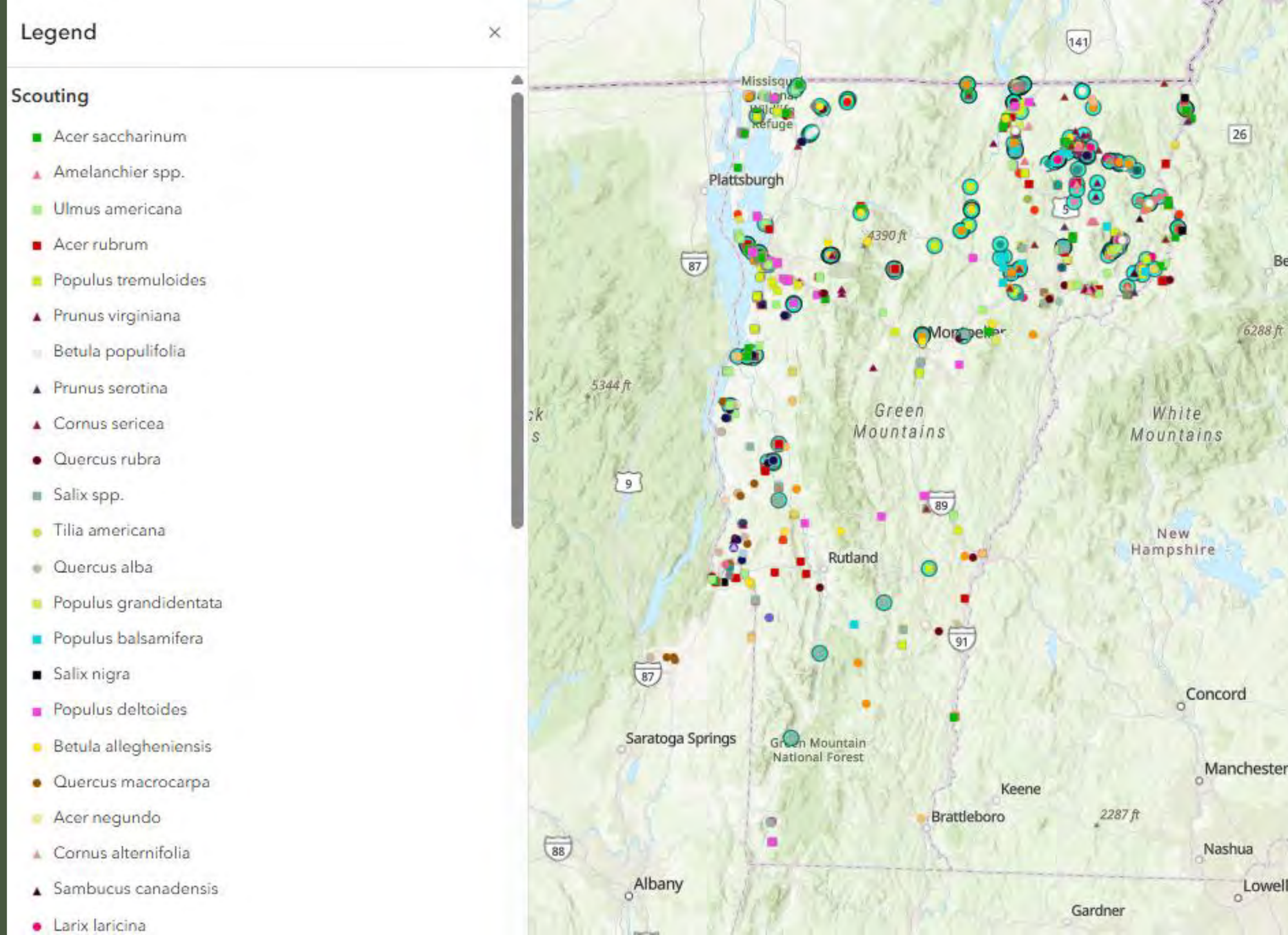
Paper Birch - *Betula papyrifera*
Silky Dogwood - Cornus amomum
Black Ash - *Fraxinus nigra*
Green Ash - *Fraxinus pennsylvanica*
Butternut - *Juglans cinerea*
White Oak - *Quercus alba*
Swamp White Oak - *Quercus bicolor*
Bur Oak - *Quercus macrocarpa*
Wild Raisin - *Viburnum nudum*

A PEEK AT WHERE WE ARE IN COLLECTION

SPECIES	APRIL	MAY	JUNE
QUAKING ASPEN	MALE & FEMALE FLOWERS	SEEDING	
AMERICAN ELM	FLOWERS	SEEDING	
SHRUB WILLOW	MALE & FEMALE FLOWERS	SEEDING	
SILVER MAPLE	MALE & FEMALE FLOWERS	SEEDING	
RED MAPLE	MALE & FEMALE FLOWERS	SEEDING	
EASTERN COTTONWOOD	MALE & FEMALE FLOWERS		SEEDING
BALSAM POPLAR	MALE & FEMALE FLOWERS		SEEDING



CURRENT STATEWIDE SEED SOURCE LOCATION MAP



HELP US SCOUT USING OUR SURVEY123 OR INATURALIST PAGE!

LOOKING BACK AT THE 2024 SEASON

~37.8 MILLION SEEDS COLLECTED

37 SPECIES

2 DIRECT SEEDING SITES
(JOHNSON FARMS WMA & WOLCOTT)

THOUSANDS OF PROPAGULES STARTED AT ICN

SEED CLEANING TECHNIQUES

DYBVIG SEED CLEANER

USED TO MACERATE FRUITS, SHATTER CONES, AND DEWING CONIFERS, ASH, ELM, AND MAPLES.

MAIN SPECIES:
dogwood, chokecherry, highbush cranberry, gray birch

“TORNADO” METHOD

FLUFFY SPRING SPECIES ARE BEST CLEANED USING THIS METHOD.

MAIN SPECIES:
quaking aspen, balsam poplar, eastern cottonwood, black willow, shrub willow

CLIPPER SEED CLEANER

IN 2023, ICN BOUGHT A CLIPPER SEED CLEANER TO HELP CLEAN DOWN OUR FALL SPECIES.

MAIN SPECIES:
birch, tamarack, balsam fir, speckled alder

OUTREACH & EDUCATION

LAST SPRING, THE RIPARIAN LANDS NATIVE SEED PARTNERSHIP HAD UVM RESTORATION ECOLOGY STUDENTS OUT TO HELP WITH SILVER MAPLE AND SHRUB WILLOW COLLECTIONS.

Sterling
ECOLOGICAL THINKING & ACTION

NORTHWOODS' RIPARIAN LANDS TEAM JOINED STUDENTS FROM STERLING COLLEGE FOR SEVERAL DAYS OF SEED COLLECTION LAST FALL.

THE RIPARIAN LANDS NATIVE PARTNERSHIP TEAMED UP WITH NR4060 STUDENTS LAST FALL TO IDENTIFY SOUTHERN VERMONT LOCATIONS THAT MAY BE IDEAL COLLECTION SITES.

University of Vermont

WINTER WEBINAR:
WOODY SEED SITE SELECTION IN THE SPRING

In January 2025, the RLNSP hosted a webinar that covered how to identify our spring dispersing species, their flowers, what a “good” seed collection site looks like, and how to use our Survey123 form.

WINTER SEED SOWING WORKSHOP

Brooke (IC) and Tobi Schulman from Bird & Bee Native Plant nursery co-hosted a winter seed sowing workshop at Cedar Circle Farm for community members in the area.

NWSC Seed Series: Riparian Woody Plant Phenology for Spring Collection

Vermont Housing & Conservation Board

The Riparian Lands team received funding from VHCB to host events in the Memphremagog watershed. This involves hosting several seed workshops, working with NorthWoods' education team to develop seed programming at NorthWoods, and working with local high school students!

We'll be hosting:

- ~~Spring Phenology~~ (4/30/25)
- Spring Collection (6/1/25)
- Summer Collection (TBD)
- Fall Phenology (TBD)
- Fall Collection (TBD)

WILLOW ID PRACTICE

In mid-May, the RLNSP along with North Branch Nature Center, their cohort of master naturalists, and The Farm Upstream joined together to practice identifying some of our most common shrub willow species by utilizing knowledge gained from State Botanist, Grace Glynn, and referencing resources by Jerry Jenkins.

University of Vermont

RIPARIAN LANDS INTERNSHIP WITH UVM FREC!

In 2025, the Riparian Lands team welcomed an intern from UVM's Fellowship for Restoration Ecologies and Culture for the summer. The FREC program was created in 2022 and has been visiting NorthWoods for their winter retreat annually for winter ecology walks with NorthWoods staff!

Sterling
ECOLOGICAL THINKING & ACTION

STERLING COLLEGE SUMMER INTERNSHIP

Following up on our work with students at Sterling College last fall, NorthWoods will be meeting with the college's summer interns at least once a week to scout and collect seeds in 2025.

UVM FALL INTERNSHIP

For the fall 2025 semester, Intervale will welcome interns from the University of Vermont to support seed collection and nursery tasks.

SPRING IS COMING!

RETURNING CREW MEMBERS & SCOUTING SOUTH


Jake Gallinger (they/them)
© NorthWoods Stewardship Center


Maddie Smith (she/her)
& Reese Qualls (she/her)
© Intervale Center

We are so excited for three crew members to return this spring! This will be Jake's fourth year with NorthWoods and their third year as part of NorthWoods' Riparian Lands team. Reese and Maddie will be returning to the Intervale seed crew for each of their second years. We are not only looking forward to all their knowledge and experience to return but the good times that they bring as well!

This coming spring we will be focusing on expanding our scouting efforts into southern Vermont. In our first two years as a formal partnership, we have identified many great sites north of Montpelier. In order to obtain greater genetic diversity, we want to have seed sources in the southern seed zones of Vermont. This will also have the added benefit of relieving some of the pressure on our current collection sites. Thanks again to the UVM NR4060 students who created a site suitability map this past fall. This will give us the chance to be much more targeted in our scouting efforts for the spring and beyond! We have already scheduled some spring scouting trips with some organizations found in southern Vermont to help bolster our collection sites.

If you work in natural areas of southern Vermont and are interested in helping, check out the recording of our webinar mentioned on the previous page and utilize our Survey123 form to add data to our seed source map!

ICN GREENHOUSE IS ON!

Northern Red Oak (*Quercus rubra*) | Serviceberry (*Amelanchier* spp.) | Chokecherry (*Prunus virginiana*) | Balsam Poplar (*Populus balsamifera*)

READ OUR MOST RECENT NEWSLETTER!

And keep an eye out for our upcoming newsletter in July!

WHAT'S NEXT?

- Formalize a "seed plan" for the next few years
- Continue to train and support skilled crew labor and young conservation professionals
- Evaluate / understand the demand for locally sourced native seeds
- Provide source identified seed to established and emerging local conservation nurseries at no cost
- Conduct outreach events for conservation organizations and community members
- Expand our infrastructure
- Explore innovative processes in seed collection, cleaning, storage, and propagation
- Continue to evaluate direct seeding as an alternative / additional approach to bareroot plantings
- Support the developments of the Northeast Seed Network's Northern Appalachian - Atlantic Maritime Hub

THANK YOU!

QUESTIONS?

Jessica Colby
Riparian Lands Program Coordinator
NorthWoods Stewardship Center
jess@northwoodscenter.org

NORTHWOODS
STEWARDSHIP CENTER