RONDOUT NEVERSINK STREAM PROGRAM

2022-2024 ACTION PLAN

2021 RESTORATION SITE: WEST BRANCH NEVERSINK AT LAKE COLE

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TO: *Mark Vian, Project Manager, NYC DEP Stream Management Program*
FROM: *Stacie Howell, Sullivan County Soil & Water Conservation District*
DATE: *April 15, 2022*
RE: *Rondout Neversink Stream Program 2022-2024 Action Plan*

The Rondout Neversink Stream Program (RNSP) in collaboration with Sullivan County Soil & Water Conservation District (SCSWCD) and NYC Department of Environmental Protection (DEP) have developed the following 2022-2024 Action Plan for your review. The purpose of the Action Plan is to identify the Rondout Neversink Stream Program's planned activities, goals to accomplish and next steps in support of recommendations derived from stream management plans and Committee/stakeholder input. The current plan was updated and reviewed by our staff team and Watershed Advisory Group including municipal stakeholders in April 2022.

The Action Plan is divided into key programmatic areas:

A. *Protecting and Enhancing Stream Stability and Water Quality*
B. *Floodplain Management and Planning*
C. *Highway and Infrastructure Management in Conjunction with Streams*
D. *Assisting Streamside Landowners (Public and Private)*
E. *Protecting and Enhancing Riparian and Aquatic Habitat*
F. *Stream Stewardship Education and Outreach*

This program does not address Enhancing Public Access to Streams as in other basin Action Plans because the watersheds are predominantly in the Catskill Forest Preserve with significant New York State DEC access points to the stream. Overuse issues are prevalent and RNSP and DEP staff teams coordinate with regional municipal and state partners to disseminate public information and raise awareness about conservation law and stream stewardship. This document lists the program's (RNSP staff-driven) and grant-driven Education and Outreach activities in Section F.

The Action Plan is updated annually. This proposed plan will be implemented from May 2022 through April 2024.

2022-2024 Action Plan

Rondout Neversink Stream Program

The Rondout Neversink Stream Program (RNSP) was established in a partnership among Ulster and Sullivan County Soil & Water Conservation Districts (UCSWCD & SCSWCD) and NYC Department of Environmental Protection (DEP) in 2009 as part of the Filtration Avoidance Determination (FAD) issue to DEP by the Environmental Protection Agency. For practical purposes, a field office was established in Grahamsville at Neversink Town Hall in 2010 when Sullivan County SWCD contracted with DEP to conduct Stream Management Planning in this unique area to serve the two remote towns in Rondout and Neversink basins: Town of Neversink (Sullivan County) and Town of Denning (Ulster County). Stream Management Plans (SMPs) were completed for the three major river corridors in the basin: Chestnut Creek, Rondout Creek and East and West Branches and Main Stem of Neversink River.

The SMPs provide a road map for improved stream and floodplain management. Initiatives include the Stream Management Implementation Program (SMIP), Catskill Streams Buffer Initiative (CSBI), stream and floodplain restoration projects, stream and bank erosion watershed assessments, flood hazard analysis and mitigation, and education and outreach programs.

The following Action Plan summarizes the programs and projects that SCSWCD will be leading within the Rondout and Neversink Basins between April 2022 and March 2024, and includes updates on program activity through March 2022. SCSWCD and its Watershed Advisory Group will lead the effort for each action item and work cooperatively with watershed partners including Denning, Neversink, Ulster and Sullivan Counties, NYC DEP, NYS DEC, and CWC. Funding sources for action items are provided by NYC DEP in contract CAT-495 through February 2025. This Action Plan identifies goals to address Stream Management Plan and Local Flood Analysis recommendations for implementation by Rondout Neversink Stream Program in the period 2022-2024. See the Projects tab at www.rondoutneversink.org for restoration activities by year from 2011-2022.

*<u>How to read this document:</u> The Action Plan is organized around key program areas. For each topic area there is a list of recommendations, derived from Stream Management Plans and Local Flood Hazard Mitigation Plans in conjunction with Program stakeholders, in italicized text. Under the list of recommendations, tables list planned projects to be carried out by the staff team and through the Stream Management Implementation Program (SMIP) grants. Within the tables, items and grants that are new or have been updated in 2022 are in **bolded** text. Summaries of new projects are found beneath each table.*

A. Protecting Stream Stability & Water Quality

These actions may include: stream corridor assessments, stream stabilization/restoration projects with a goal to restore stream stability and reduce targeted pollutants; monitoring and maintenance of stream projects; and outreach, education and technical assistance to encourage stream stewardship.

Stream Corridor Assessment and Monitoring Recommendations

1. *Complete a watershed assessment of tributaries in Rondout and Neversink watersheds that have yet to be assessed. Assessments identify and prioritize fine and coarse sediment sources, erosion hazards, and potential water quality impairments and associated treatment opportunities.*
2. *Review existing water quality data and identify, as far as is possible, the most significant water quality impairments.*
3. *Identify locations of potential water quality impairments including: sources of pollution from upland areas and within the stream channel such as significant glacial lake clay and till exposures and sources of contaminants from road runoff and households, and make prioritized recommendations for their treatment.*
4. *Identify, monument and survey selected sites of bank erosion, assess their relative stability, and make prioritized recommendations for their treatment.*
5. *Monitor constructed stream restoration sites to document the projects' status and performance. Monitoring includes measurements and analysis of geomorphic form, rock structures and vegetation. Data is collected to monitor project stability and vegetation establishment.*
6. *Establish Riparian Reference Reaches.*

Rondout and Neversink Watershed Stream Feature Inventory Assessment Projects		
Stream	**Location**	**Current Status**
Rondout Mainstem	Towns of Denning/Neversink	Complete
Stone Cabin Brook	Town of Denning	Complete
Bear Hole Brook	Town of Denning	Complete
East Branch Neversink, West Branch Neversink	Towns of Denning/Neversink	Complete
Mainstem Neversink	Town of Neversink	Summer 2022

With help from the Watershed Conservation Corp. of Ulster Community College and DEP, the East Branch Neversink and West Branch Neversink 10-year Stream Feature Inventory (SFI) walkover was completed in 2021. The report and recommendations will continue to be developed in early 2022.

During the 2022 field season, the Mainstem of the Neversink River will begin the 10-year update. We will also revisit prior and new Bank Erosion Hazard Index (BEHI) sites for data collection. Field work is anticipated to start in early summer, pending landowner permissions, with post-processing and data write-up throughout fall and winter 2022-2023. Updated BEHI data is expected to adjust prioritization of restoration sites.

Stream Restoration and Stabilization Recommendations

1. *Identify locations, such as those included in Ulster County Multi-Jurisdictional Hazard Mitigation Plan, where roads, bridges, or culverts and water quality may be threatened by SMP-prioritized bank erosion, or are otherwise unstable or threatened, and make prioritized recommendations for their treatment.*
2. *Identify locations where water quality may be threatened by bank erosion, and make prioritized recommendations for their treatment.*
3. *Identify locations of stream instabilities contributing to water quality impairment and make prioritized recommendations for their mitigation or treatment.*
4. *Implement the following stream stability restoration projects that have been identified through field assessments or prioritized in management plans (additional details below table):*

2022: Construction of Ladleton Restoration, East Branch Neversink
2022-2023: Design of Spindel/East Valley Ranch, East Branch Neversink

RONDOUT AND NEVERSINK STREAM RESTORATIONS

PROJECT NAME	STREAM	STATUS	EXPECTED COMPLETION	PROJECT DESCRIPTION	LENGTH (FT)	DESIGNER	COST
Blue Hill Lodge	East Branch Neversink River	Construction Complete 2018	Ongoing Vegetation Work	Full restoration with channel realignment and grade control	750	Barton & Logiudice	$510,825
Denning Town Hall	East Branch Neversink River	Construction Complete 2018	Ongoing Vegetation Work	Full restoration with channel realignment and grade control	700	Barton & Logiudice	$450,309
Frost Valley Road S-Turn	West Branch Neversink River	Construction Complete 2018	Ongoing Vegetation Work	Flood Hazard Mitigation Project	500	Milone & MacBroom	$500K (RNSP share)
Clothes Pool Restoration	West Branch Neversink River	**Flood Repairs Completed**	**Ongoing Vegetation Work**	Turbidity Reduction Project, hillslope stabilization and bankfull bench	800	Stantec	**$672,397, plus repairs $98,693.39**
Ladleton Restoration	East Branch Neversink	Ready to Bid	**2022**	Turbidity and Coarse Sediment Reduction Project	1100	Stantec	**Engineers Estimate $1.8M**
CR-47 at Lake Cole	East Branch Neversink	**Construction Completed 2021**	**Ongoing Vegetation Work**	Infrastructure Protection, Streambank Stabilization	450	Stantec	**$335,432.**
Spindel/East Valley Ranch	East Branch Neversink	Evaluation	**2023 or 2024, pending budget**	Turbidity Reduction, hillslope stabilization, flood mitigation	TBD	TBD	TBD

Clothes Pool (West Branch of the Neversink): Construction of Clothes Pool was completed in September 2020. The high-water event on December 25th, 2020 resulted in some damage to the soil lifts because the project was so fresh and the vegetation had yet to establish. Repairs to the soil lifts and vegetation were completed in Summer 2021.

West Branch Neversink at Lake Cole: During the December 2020 flood, a site that was being monitored for future work on the West Branch Neversink near Lake Cole eroded laterally over 30' toward the road and lake in the single storm. This put CR-47 at risk of damage if another similar event happened. RNSP tapped into DEP's engineering contract resources to fast-track a design with Stantec, Inc., with the goal of project completion before the commencement of Frost Valley's summer season and the associated heavy visitor use. Additional plantings are expected to continue at both sites in late 2022 and early 2023 as needed to sufficiently establish vegetation.

Ladleton (East Branch Neversink): Ladleton Restoration project is slated for August 2022 construction. Stantec, Inc is the Engineering Firm. Their construction estimate is $1,862,000. Ladleton project will be bid in April 2022, at which point we'll have a more accurate estimate of construction costs. Ladleton restoration reach parallels Denning Road, and flows east to west for a total length of approximately 880 linear feet. Two of the primary areas of concern are characterized as mass wasting hill slopes that were likely initially undermined by rotational shears along the outer bend and have since slumped to expose bare soil on the slope face, highly susceptible to mechanical erosion and freeze thaw effects. Seeps and upgradient roadway drainage along Denning Road, exacerbate the continuing observed erosion in these areas. The third primary destabilized area is located at the downstream extent of the restoration reach, and it continues to migrate as a direct result of shears during a range of elevated stream flows. The high vertical left bank is likely the location at greatest risk of rapid failure and the most significant source of sediment. Glacial clays are exposed along 100+ linear feet of this bank segment, contributing fine sediments and increasing turbidity within the river. Throughout the design reach, excess sediment is apparent in the formation of mid-channel bars and depositional features, redirecting flows and potentially contributing to further instability. To address flooding concerns by adjacent landowners, a segment of an unnamed tributary to the East Branch Neversink is also included in this project.

Restoration of these sites meets dual goals of reducing 1) fine sediment contributing to turbidity, and 2) coarse sediment contributing to aggradation and stream instability in downstream reaches nearby in population centers, which has both flood hazard mitigation and water quality benefit. A focus has been placed on state of the science soil restoration at past and future restorations and vegetation at all sites will take several years efforts to significantly establish.

RNSP plans to continue to develop soil mixes for use at CSBI and Restoration projects. RNSP is committed to being at the forefront of the latest science in creating the most sustainable and healthy soil mixes to optimize the success of the completed projects. Soil is amended with sand, compost, bio-char, rock-dust, and mycorrhizal inoculants to create the ideal conditions for growth.

B. Floodplain Management and Planning

Includes floodplain assessments; coordination with floodplain management effort in the watershed; and outreach, education and technical assistance for floodplain management.

LOCAL FLOOD ANALYSIS AND FLOODPLAIN ASSESSMENT RECOMMENDATIONS

1. *Identify locations where roads, bridges, or culverts may be threatened by flooding, and make prioritized recommendations for their treatment.*
2. *Identify locations where improved or residential areas may be threatened by flooding, and make prioritized recommendations for their treatment.*

3. *Support flood hazard mitigation efforts to reduce the impacts from flooding such as impacts to public safety, homes and businesses, critical facilities (i.e., Town Halls, Highway Depts.) infrastructure and the natural environment.*
4. *Through LFA, provide resources to help WOH municipalities: confirm that there is a significant flood hazard in the target area through engineering analysis; use engineering analysis to develop a range of hazard mitigation alternatives; evaluate both the technical effectiveness and the benefit/cost effectiveness of each solution, and compare different solutions to each other for the most practical, sustainable outcome.*

RONDOUT AND NEVERSINK LOCAL FLOOD HAZARD MITIGATION ANALYSIS		
STREAM	LOCATION	CURRENT STATUS
Neversink River	Claryville Towns of Denning, Neversink	Accepted 2014
Rondout Creek	Sundown, Town of Denning	Accepted 2017
Chestnut Creek	Town of Neversink	Summer 2022
Saw Mill Road Analysis	Town of Denning	Summer 2022

Chestnut Creek LFA has resumed, with an expected completion of summer 2022. After that, an analysis on Saw Mill Road in Denning will begin, which was a recommendation from the Claryville LFA and a localized area that experiences frequent flooding from poor drainage and extensive mountain runoff. Results may provide potential projects that are eligible for flood mitigation funding that could be implemented in 2023.

RONDOUT AND NEVERSINK LOCAL FLOOD HAZARD MITIGATION PROJECTS		
PROJECT	LOCATION	CURRENT STATUS
Hunter Road Flood Model Detail	Claryville Town of Neversink	Complete
Denning Culvert Assessment	Town of Denning	Complete
Sugarloaf Road Culvert Assessment	Town of Neversink	Complete
Chestnut Creek Vacant Lot Analysis	Town of Neversink	Design Expected Summer 2022
Slater Road Culvert	Town of Neversink	Expected Summer 2022

The Chestnut Creek LFA is anticipated to return recommendations to replace a culvert conveying the Chestnut Creek under Slater Road. The preliminary estimates for the culvert replacement are approximately $237,000. Within the Chestnut Creek LFA the consultants were able to look at a vacant lot adjacent to the Neversink Town Hall for potential flood reduction options. RNSP plans to assist with permitting and implementation costs, if any, in addition to a native buffer planting extending the Town Hall's buffer.

FLOODPLAIN MANAGEMENT COORDINATION, EDUCATION AND OUTREACH RECOMMENDATIONS

1. *The SCSWCD can support local municipalities in the use of FIRM maps.*
2. *Municipalities in the watershed can conduct a review of current floodplain ordinances and adopt revisions as appropriate. Revisions should reflect current building trends, new technologies, compliance and integrated broader community plans as appropriate.*
3. *Support municipal exploration of Community Rating System as a feasible activity.*
4. *Access to flood prevention/protection information can be established and supported throughout the basins.*
5. *Watershed municipalities, working with local and state agencies, can support periodic training sessions on flood related issues. Audiences can include municipal leaders, code enforcement staff, planning boards, landowners, realtors, lending institutions and others.*

6. *Watershed municipalities can facilitate development of a flood damage reporting system to track types of flooding, their location and the costs associated with flood damage.*
7. *Stream and floodplain management guidelines, which integrate stream form and function, can be developed for use during post flood response.*

POST-FLOOD TECHNICAL ASSISTANCE	
STAKEHOLDER/AUDIENCE	EXPECTED COMPLETION
Establish a staff operator/partnership for post-flood emergency response at Frost Valley YMCA	Ongoing
Establish Town operator/partnership for post-flood emergency response in Claryville	Ongoing
Town of Neversink person assigned	Ongoing
Town of Denning person assigned	Ongoing
Ulster County DPW person assigned	Ongoing

Throughout the year, RNSP will extend technical information and provide assistance from staff to a variety of stakeholders. RNSP will provide technical support to municipalities and landowners experiencing stream and floodplain related problems. RNSP will provide technical assistance to highway departments and others on hydraulic and stormwater issues. The District will continue the ditch seeding and maintenance program with Denning and Neversink Towns, as time requested and time allows.

In the event of significant flooding, RNSP will provide information and assistance to watershed residents and communities. Based on past-experience, RNSP may play a significant role in assisting watershed residents with finding information and directing flood victims to available resources, such as assisting with debris removal and flood buyouts, or other programming as agreed upon by DEP.

RNSP will coordinate with DEP to identify stream project funding needs, survey flood damage, and record high water marks, when it is safe to do so.

C. Highway and Infrastructure Management in Conjunction with Streams

Outreach, training and financial assistance to highway departments (two Counties and two Towns) to encourage the adoption of best management practices. Early detection and rapid response to control and eradicate invasive species.

HIGHWAY INFRASTRUCTURE AND STORMWATER MANAGEMENT RECOMMENDATIONS

1. *Provide support for County and Town Highway Departments for vegetation management on critical areas such as roadside ditches and steep slopes.*
2. *Watershed municipalities can evaluate winter road abrasive procedures to address abrasive quality, application methods and spring sweeping.*
3. *The Town and County Highway Departments and NYSDOT can integrate geomorphology principles in all new projects and routine maintenance activities related to the streams and tributaries.*
4. *Work with local highway departments to minimize the negative effects of bank armor through the use of vegetation within and above the armor. Replant existing rip rap. This will increase the effectiveness and strength of the rip rap and cool water temperatures through shading and reducing the thermal effects of heated rock.*
5. *Work with the Denning and Neversink Highway Departments to identify opportunities to address infrastructure that is leading to stream instability and water quality degradation.*

6. *Study potential for science-based criteria for selective stream gravel management and decisions about impacts of Large Wood.*

RONDOUT AND NEVERSINK HIGHWAYS & INFRASTRUCTURE PROJECTS		
STREAM	**LOCATIONS**	**CURRENT STATUS**
East Branch Neversink Critical Area Seeding	Denning Road	Ongoing, annual as needed
Little Hollow Road Erosion Site	Town of Neversink	Complete 2017
Road Ditch Mapping/Assessment	Town of Denning	Completed 2019
Peekamoose Road Critical Area Seeding	Town of Denning	Ongoing, annual as requested
Swale @ WB Stn 20200	Town of Denning	Planning
Chestnut Creek at Town Garage	Town of Neversink	Planning

RNSP continues to work with Ulster County Highway Department to address a drainage swale adjacent to West Branch Neversink at Station 20200 that is eroding. The proposed treatment consists of redirecting road drainage, replacing culverts, and repairing the streambank with coir logs and planting. RNSP removed hazard leaning trees in 2021 and UCHD is currently working on appropriate culvert sizing, which they would then apply for funding to implement approved drainage options.

RNSP will provide technical assistance to watershed landowners when requested, including stream and riparian best management practices, and flood safety and mitigation. RNSP will pursue a grant application with the Town of Neversink to install a barrier between the Chestnut Creek and the Town's gravel storage location to prevent gravel from entering the stream system.

RNSP will continue to seek Highways & Infrastructure eligible projects to fund by working closely with the Towns of Denning and Neversink.

RECOMMENDATIONS FOR OUTREACH AND TECHNICAL SUPPORT TO HIGHWAY DEPARTMENTS, STORMWATER MANAGERS AND CONTRACTORS

1. *Provide municipal highway departments and local contractors with hands-on training in various stream management activities. Conduct field days, workshops and demonstration projects to meet this goal.*
2. *Educate and train municipal highway departments in stream process, and provide them with information about how maintenance of road systems and other public infrastructure may impact local waterways.*
3. *Provide education and outreach to municipal highway departments, stormwater managers and contractors to improve their ability to recognize changes in stream stability and impacts to water quality that may be associated with infrastructure management activities and to understand the impact of management actions.*

RONDOUT AND NEVERSINK HIGHWAY DEPT AND STAKEHOLDERS TRAINING		
SUBJECT	**AUDIENCE**	**CURRENT STATUS**
NYS DEC Erosion & Sediment Control Certification	Land/Operation Managers	Completed 2019
Rosgen Level 1 Basic Stream Process Training	Land Managers/ Highways/DPW	Searching for candidate(s)
Japanese Knotweed Early Detection	Highway Departments	Ongoing

D. Assisting Streamside Landowners (Public and Private)

Provide access to training and technical assistance to increase the knowledge, skills and capabilities of landowners in the watershed. Also provide support for riparian buffer restoration.

CATSKILL STREAMS BUFFER INITIATIVE RECOMMENDATIONS

1. *Preserve and protect existing riparian buffers and provide for improved stewardship.*
2. *Protect/enhance the stream corridor through the establishment of effective forested buffers. Stream buffers will offer some measure of protection against encroaching land uses and act to protect public and private property.*
3. *Assist landowners with their efforts to protect and maintain healthy riparian buffers, address invasive species, and improve the condition of unstable or degraded riparian areas.*
4. *Provide assistance with managing and preventing the spread of Japanese knotweed and other invasive species.*
5. *Provide assistance for streamside landowners to maintain diverse and healthy riparian buffers of at least 35-100 feet using native shrubs, trees and other woody vegetation.*

RONDOUT AND NEVERSINK BUFFER PROJECTS

PROJECT NAME	WATERBODY	STATUS	EXPECTED COMPLETION	PROJECT DESCRIPTION	LENGTH (FT)	DESIGNER	COST
State Route 55	Chestnut Creek	Complete	2020	Erosion control hillslope stabilization/revegetation	110	SCSWCD	$31,202.08
Ballfield	Rondout Creek	Invasives Control	TBD	Demo site for sustainable landscape design	550	Phyto Studio	TBD
Chestnut Creek Buffer	Chestnut Creek	Ongoing Invasive	Ongoing	Invasive removal and replanting with Sullivan County Renaissance	300	SCSWCD	$0
Time and Valley Museum	NA	Ongoing Maintenance	Summer 2022	Native garden display	NA	SCSWCD	$600
Plant Material Center	NA	Ongoing	Ongoing	Repotting stock to larger pots	NA	NA	TBD
One Nature Contract Extension	NA	Executed	Active through 2024	Contract extension with One Nature to grow plants from tubelings	NA	NA	~$240K/4 years
Molls Brook	Tributary to Rondout Creek	Planning and Design	TBD	Bank stabilization project	200	SCSWCD	TBD
Vegetation Monitoring	Multiple	Ongoing	Annually in August	Vegetation monitoring at past project sites	NA	NA	NA
Wintoon RipRap Retro Planting	West Branch Neversink	Complete	Completed Fall 2020	Retrofitting riprap along West Branch Neversink with soil and willow/shrub plantings	302	SCSWCD	$24,906
Frank-Kerrigan	Rondout Creek	Complete	Completed Fall 2020	Riparian planting	164	SCSWCD	$1,300.00
Kelly	Red Brook	Complete	Completed Fall 2020	Streambank stabilization and riparian planting	103	SCSWCD	$6,849.95
Eighmey	Rondout Creek	Complete	Completed Fall 2020	Riparian planting	715	SCSWCD	$8,276.50
Stanley	Rondout Creek	Complete	Completed Fall 2020	Riparian planting	746	SCSWCD	$12,689

Wintoon Waters HWA	West Branch Neversink	Complete	Completed Fall 2020	Hemlock Wooley Adelgid Treatment	N/A	N/A	$9,000
Rodriguez	Chestnut Creek	Complete	**Completed Fall 2021**	Riparian Planting	**186**	SCSWCD	**$514**
Tooey at Hunter Rd	Mainstem Neversink	Complete	**Completed Fall 2021**	Riparian Planting	**100**	SCSWCD	**$0**
Reichman Repairs	Sundown Creek	Complete	**Completed Fall 2021**	Riparian Planting	**95**	SCSWCD	**$0**
Wellington	**East Branch Neversink**	**Planning**	**Fall 2022**	**HWA Treatment/Riparian Planting**	**TBD**	**SCSWCD**	**TBD**
Rodriquez Phase 2	**Chestnut Creek**	**Planning**	**Fall 2022**	**Riparian Planting**	**TBD**	**SCSWCD**	**TBD**

In 2021, a total of 3 CSBI projects were completed, vegetating 381 feet of streambank, 0.26 acres, with 89 trees and shrubs and 95 feet of willow fascines.

In 2022, 2 CBSI projects are planned so far. One includes treatment of Hemlock Wooley Adelgid and then a riparian planting and willow staking. The second is the expansion of a previous project site, where an adjacent parcel has been purchased. There are 5 site visits scheduled for Spring 2022, which will likely lead to project development for implementation in Fall 2022 and Spring 2023.

Ongoing invasive species treatment is anticipated in early fall. Japanese Knotweed is the primary target species on the Chestnut Creek and Rondout Creek. Oriental bittersweet, Japanese stiltgrass, and Mugwort are also planned for continued treatment at a project area along Chestnut Creek.

Multi-year contracts with One Nature and Greenbelt will continue for the supply of plant materials to all West-of-Hudson basins. RNSP is currently exploring options with a local botanist to provide native seed collection and propagation services.

In a continuous effort to develop the most fertile and productive soil, RNSP will continue to work closely with consultants to develop specific protocols to engineer a high-quality soil and compost medium to be used at restoration and buffer sites as needed.

OUTREACH, EDUCATION AND TECHNICAL ASSISTANCE TO STREAMSIDE LANDOWNERS

1. *Provide streamside landowners detailed technical information on the establishment and maintenance of riparian buffers.*
2. *Provide stakeholders technical assistance that will guide restoration of stream system stability and help to maintain ecological integrity. Technical assistance can range from a landowner consultation to activities that will help meet the priorities of protecting water quality and establishing riparian buffers.*
3. *Provide long-term access to technical assistance to landowners and municipalities for assessment of their stream-related problems, and development of effective management strategies and to supervise stream project implementation.*
4. *Educate streamside landowners by providing a basic understanding of fluvial process, factors impacting streambank stability and water quality, and management decisions for the promotion of a healthy stream.*
5. *Characterize current riparian vegetation management in the watershed and make prioritized recommendations for changes that can improve ecosystem integrity.*
6. *Educate municipal leaders by providing a basic understanding of fluvial process, with an emphasis on how local decision makers can support stream health through their*

leadership and provide information on the multiple benefits which can be realized by protecting stream and watershed health.

RONDOUT AND NEVERSINK OUTREACH EVENTS		
SUBJECT	AUDIENCE	CURRENT STATUS
Annual Tree & Shrub Sale	Streamside Landowners	April 22-23, 2022
Fly-Tying Workshop	General Public	TBD
Forest to Frying Pan Cultivating Mushroom Buffer Workshop	Streamside Landowners	TBD
Neversink Paddling Tour	General Public	Annual
Peek in the Creek Family Stream Exploration	Neversink Parks & Recreation	TBD
Glacial History of the Catskills	General Public	Webinar
River Geology Walk and Talk	General Public	Digital
NYWEA Conference Presentation	Local Officials	Complete
Best Management Practices for Riparian Buffers	Streamside Landowners	Webinar
Tree ID Walk	General Public	Planning
Neversink Association Meeting	Neversink Residents	Annual
Virtual Presentation on Ecology/JKW	General Public	Planning

A tree identification stream walk is planned for July 2022 with staff from Catskill Forest Association. We are also exploring options for a riparian bird and plant education workshop. RNSP has been invited by Time and the Valleys Museum to host a virtual workshop on ecology with a highlight on Japanese Knotweed identification and control. The workshop is scheduled for September.

See also Section G. Stream Stewardship Education and Outreach, below.

E. Protecting and Enhancing Riparian and Aquatic Habitat

Support for research and education programs that encourage protection of aquatic and riparian ecosystems.

RECOMMENDATIONS FOR RIPARIAN AREAS

1. *Preserve and protect existing riparian buffers and provide for improved stewardship.*
2. *Protect/enhance the stream corridor through the establishment of effective forested buffers. Stream buffers will offer some measure of protection against encroaching land uses and act to protect public and private property.*
3. *Assist landowners with their efforts to protect and maintain healthy riparian buffers, address invasive species, and improve the condition of unstable or degraded riparian areas.*
4. *Provide assistance with managing and preventing the spread of Japanese knotweed and other invasive species.*
5. *Provide assistance for streamside landowners to maintain diverse and healthy riparian buffers of at least 35- 100 feet using native shrubs, trees and other woody vegetation.*

RONDOUT AND NEVERSINK JAPANESE KNOTWEED CONTROL SITES		
STREAM	LOCATION	CURRENT STATUS
Chestnut Creek	Multiple sites	2010 - Ongoing
Rondout Creek	Multiple sites	2010 - Ongoing

West Branch Neversink	County Road 47	Complete 2016
RONDOUT AND NEVERSINK HEMLOCK WOOLY ADELGID CONTROL SITES		
West Branch Neversink	Multiple Sites	Complete 2020
East Branch Neversink	Wellington	Summer 2022

See also Section D, on Catskill Streams Buffer Initiative updates.

RECOMMENDATIONS FOR HEALTHY AQUATIC HABITAT

1. *Conduct a detailed assessment of current and potential fisheries conditions.*
2. *Provide technical support for post-construction monitoring of fisheries habitat conditions at restoration project sites to confirm benefits to fisheries.*

RONDOUT AND NEVERSINK RESEARCH GRANTS		
PARTNER	**SMIP GRANT FUNDING**	**CURRENT STATUS**
US Geological Survey 3-Year Fish Population Study	$174,584	Peer reviewed study published in 2020
Colorado State University 2-Year Large Wood Sediment Study	$99,086	Completed 2018
Cary Institute for Ecosystem Studies Research Fellowships	$37,761	Completed 2019
USGS Fish Populations Pre and Post Restoration	$59,400	3rd Year
Cary Institute for Ecosystem Studies Research Fellowships	$25,619	Completed 2021
Cary Institute for Ecosystem Studies Research Fellowships	$30,598.78	Expected 2022
Cary Institute for Ecosystems Studies Research Fellowships	TBD	2023

USGS is in the final year of a 3-year study focusing on capturing population data before and after restoration projects to determine the effects that construction and restoration have on fish species over SCSWCD will also provide intern and staff support to USGS.

In 2021 a research project was completed by a Binghamton University student as part of the Cary Institute for Ecosystem Studies' Student Research Fellowship program. The project titled, "An Evaluation of Environmental Communication Methods in the Rondout and Neversink Watershed" looks at changing demographics in the watershed, how effective previous outreach efforts have been, and which types of communication return the most stakeholder response. The report is available on our website.

A research proposal has been submitted through Cary Institute by a Rensselaer Polytechnic Institute graduate student for "Assessing Spatial and Temporal Variability in Dissolved Organic Matter in the Neversink Reservoir and Watershed". This research will provide essential information used to improve models of disinfection byproduct precursors in water from the Neversink watershed through an assessment of the spatial and temporal variations in dissolved organic matter quantity and quality which is disproportionally high for the area. The grant award is approximately $30,598,78.

We will be developing a research project idea to map the bedrock locations along the Neversink to determine a correlation between exposed bedrock and clay impoundment areas. This will be submitted to Cary in the fall 2022, with fieldwork collection in Summer 2023 if an acceptable proposal is received. The estimated budget is $26,000.

G. Stream Stewardship Education and Outreach

Support for projects that engage the community through targeting diverse stakeholders/audience ages on stream health and stewardship. Includes honoring local

knowledge, illuminating land use history and providing context for future use of best management practices; includes partnership with three major educational institutions: Frost Valley YMCA, Tri Valley Central School and Time and the Valleys Museum.

STREAM STEWARDSHIP EDUCATION AND OUTREACH RECOMMENDATIONS

1. *Collaborate with local and regional partners to enhance education and outreach efforts related to stream and floodplain management, sediment and erosion control, and other topics critical to sound watershed management.*
2. *Maintain a watershed website to provide information to all stakeholders.*
3. *Develop publications focused on stream management which can be provided to watershed stakeholders and/or used in training workshops.*
4. *Host an annual watershed conference for the community to promote stream management and stewardship awareness.*
5. *Increase public and technical awareness about the importance of the Rondout and Neversink watersheds and ecosystems by providing educational workshops for a variety of stakeholders including riparian landowners, municipal leaders, planning boards, code enforcement personnel, highway departments, local businesses, contractors, developers and educators.*
6. *Increase technical awareness about stream science, water quality protection and best management practices by providing educational workshops for a variety of stakeholders including riparian landowners, municipal leaders, planning boards, code enforcement personnel, highway departments, local businesses, contractors, developers and educators.*
7. *Develop detailed science-based guidelines for stream management and natural channel design which are readily available to those entities responsible for stream activities in Rondout and Neversink watershed.*

RONDOUT AND NEVERSINK STAKEHOLDER OUTREACH PROJECTS		
TITLE	**AUDIENCE**	**STATUS**
Anglers Symposium Podcast	General Public	2016-2019
Streamside Landowner Participation Guide	Project Site Landowners	Completed 2019
Getting to Know Your SMP	New Municipal Officials	In Development w/DEP
Floodplain Management	New Municipal Officials	In Development w/DEP
Stream Process 101	New Municipal Officials	In Development w/DEP
The Source E-News	Partners and Participants	Ongoing, biannual
www.rondoutneversink.org	Partners and Participants	Ongoing
Instagram @nycheadwaters	Partners and Participants	Ongoing, weekly
Facebook	Partners and Participants	Ongoing, weekly
Catskill Waters Video Clips and Podcast	General Public	Completed 2019
Hemlock Conservation Prioritization Planning	Frost Valley and Wintoon Waters	2019-2021
Catskill Stream Geology	General Public	Completed 2020
Know Your Nature: Japanese Knotweed	General Public	Completed 2020
CSBI Video Short	Streamside Landowners	Planning
Ecology Symposium	General Public	Planning Spring 2023

Twice annually, a digital newsletter, The Source, featuring information on stream projects, educational topics, and events announcements, will be sent to all subscribers.

Municipal official training in the three FAD deliverable topics (Getting to Know Your Stream Management Plan and Program, Floodplain Management and the NFIP, Stream Process 101) are still in

development with DEP and once approved will be given on an as-needed basis. RNSP staff have worked closely in collaboration with the other Districts to develop content for the Streams 101 online training.

A series of short videos are planned, beginning with a focus on CSBI, recorded and produced professionally. RNSP plans to host an ecology-focused symposium in 2023. This is to broaden the audience of the previously held Anglers' Symposium.

Rondout and Neversink Education and Outreach SMIP Grant Projects					
Project Name	**Recipient**	**Status**	**Expected Completion**	**Project Description**	**Award**
Watershed Project	Tri-Valley School	Completed	November 2017	Interdisciplinary multi-media storytelling with high schoolers	$15,000
School Trip Scholarships	Time and the Valleys Museum	Completed	2018	Funding for transportation/museum visits	$5,000
Catskill Waters	Keiko Sono/ Fractured Atlas	Completed	2019	Film stories of stream stewardship	$24,241
Watershed Model	Sullivan BOCES	Completed	2018	An augmented reality topographical model using gaming and projection software to create an interactive sandbox that shows how water flows over the surface of the earth.	$2,000
Water Power & Streams Exhibit	Time and the Valleys Museum	Completed	2018	With the assistance of Tri Valley Central School 8th graders, the Museum is building a properly buffered streamside area feeding a mill pond in a new exhibit to teach visitors about the history of water powered tools on a 1930s farm and the impacts manufacturing land uses had on local rivers.	$12,500
Augmented Reality Watershed Model	Time and the Valleys Museum	Completed	2019	An augmented reality topographical model using gaming and projection software to create an interactive sandbox that shows how water flows over the surface of the earth.	$2,585
Peekamoose Blue Hole Stewards	Catskill Center for Conservation & Development	Completed	2018	In partnership with NYS DEC and Catskill Center, funding provides for two full-time outreach workers to present Blue Hole visitors with Leave No Trace principles of outdoor recreation on-site five days during peak use time (summer).	$31,568
Wild About Water	Tri-Valley School	Completed	May 2018	Wild About Water in-school presentation for elementary science students	$1,000
USGS Fish Study Support	Frost Valley YMCA	Completed	2018	Staff support for USGS Fish Population Study	$2,500
USGS Fish Study Support	Frost Valley YMCA	Completed	2019	Staff support for USGS Fish Population Study	$2,500
Peekamoose Blue Hole Stewards	Catskill Center for Conservation & Development	Completed	2019	Extension of successful program from 2018 for which NYS DEC has increased its match.	$15,000
Stream History Kiosks	Town of Neversink	Completed	2019	First in series of three. Partnership project with Town of Neversink, NYS DEC and NYC DEP for three kiosks one on each main river.	TBD
Bedloader Curriculum	Syzygy Science	Completed	2019	NYS approved model lesson plan introducing students to stream science.	$3,000
Peekamoose Blue Hole Stewards	Catskill Center for Conservation & Development	Completed	2020	Extension of successful program from 2018 for which NYS DEC has increased its match.	$10,000

How the Forest Sings to the Stream	Arm of the Sea	Active	Phase 1- **2022**	Develop initial story boards for a new theatrical piece describing historical changes in Catskill forests and rivers from early Colonial period to the present including anthropomorphic influences on hemlock population decline.	$12,500
Peekamoose Blue Hole Stewards	Catskill Center for Conservation & Development	Active	**Completed 2021**	Fourth year extension of successful program to provide stream stewards at Blue Hole swimming "hot spot".	$8,000
Stream History e-Book	Time and the Valleys Museum	Complete	**Completed 2021**	The second in the series, on the Rondout River History was originally proposed as a kiosk but was switched to an e-book format.	$3,400
Neversink River History e-book	Time and the Valleys Museum	Active	**Summer 2023**	The third in the series on local stream history. Signage at the Covered Bridge and e-book	$8,000
Soil Barn Quilt	Town of Neversink	**On Hold**	TBD	Working with Cornell artist to use local riverine soils to create a Neversink Barn Quilt, with participation from local landowners through one or more workshops	TBD
Neversink Kayaking Day	Town of Neversink Parks and Rec	**Completed 2021 Renew 2022 Renew 2023**	Annual	Guided tour of Neversink Reservoir aimed at first time kayakers with rental equipment, safety gear, and instructions with lifeguards present	$3,400
Waterwheel Exhibit Improvements	Time and the Valleys Museum	**Active**	**2022**	Providing funding for a stream table at the museum and enhancements to the waterwheel exhibit.	$13,862
Peekamoose Blue Hole Stewards	Catskill Center for Conservation & Development	**Active**	**Summer 2022**	**Fifth year** extension of successful program to provide stream stewards at Blue Hole swimming "hot spot".	$8,000
Arm of the Sea Performance	Neversink Parks and Rec	**Active**	**September 2022**	**Performance of the previously funded Arm of the Sea, "How the Forest Sings to the Stream"**	$2,500

Several previous SMIP grants are being progressed in phases throughout 2022. A SMIP grant ($12,500) awarded to Arm of the Sea, a local not-for-profit theatre group focused on environmental education, in April 2020 is expected to be completed in 2022. Arm of the Sea has been developing a new production, "How the Forest Sings to the Stream" and are about 90% complete with the storyboards. A grant to the Town of Neversink to host the pageant is planned for late Summer 2022. Arm of the Sea will work with

local volunteers to rehearse and perform the pageant. It is expected that the implementation grant will be approximately $2,500.

The Catskill Center Stream Stewards completed another successful season in 2021 with outreach efforts and Leave No Trace education at an over-used site, Blue Hole, along the Rondout Creek. Over the past four years there has been a measurable improvement to the issues as a direct result of the Stewards presence and a use-permit system implemented in 2019. A grant in the amount of $8,000 will be awarded to the Catskill Center to continue this work in summer 2022. Catskill Center Stream Stewards will be increasing their presence to 7 days per week and will also have staff at Buttermilk Falls near Blue Hole.

We are continuing the River History series with the Neversink Historian to develop the Neversink focused e-book. Additionally, a history panel is being pursued with Town of Neversink to be located at the Covered Bridge on the Neversink. The panel will feature a QR Code to link to the e-book. The budget for this work is capped at $8,000.

A very successful pilot event for Kayaking on the Neversink Reservoir was completed in Summer 2021. The interest in the event has guided the decision to offer 2 to 4 days of the Kayaking program for Summer 2022. This program will likely continue into Summer 2023. This event allows kayaking instruction for first time kayakers, provides for the rental kayak and safety equipment, lifeguards to attend both the training in a local pool and on the reservoir, and a guided ecology tour by RNSP staff. The budget is estimated at $3,400.

A grant was awarded to Time and the Valleys Museum for improvements to the Waterwheel exhibit. The work is ongoing and expected to be completed by December 2022. Additionally, RNSP had provided in-house education support to develop design and content for visual information panels.