New York City Department of Environmental Protection
Bureau of Water Supply

Stream Management Program
Two-Year Action Plans for Ashokan, Schoharie, Neversink/Rondout and Delaware Programs

May 2021

Prepared in accordance with Section 4.6 of the NYSDOH

2017 Filtration Avoidance Determination

Prepared by: DEP, Bureau of Water Supply

Action Plan 2021-2023

Ashokan Watershed
Stream Management Program

Ashokan Watershed
Stream Management Program

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To: Dave Burns, Project Manager, NYC DEP Stream Management Program
From: Leslie Zucker, CCE Ulster County, and Adam Doan, Ulster County SWCD
Date: May 1, 2021
Re: Ashokan Watershed Stream Management Program 2021-2023 Action Plan

Cornell Cooperative Extension of Ulster County (CCE) and Ulster County Soil & Water Conservation District (SWCD) with support from the NYC Department of Environmental Protection (DEP) have developed the 2021-2023 Action Plan for your review. The purpose of the Action Plan is to identify the Ashokan Watershed Stream Management Program's planned activities, accomplishments, and next steps to achieve recommendations derived from stream management plans and stakeholder input. Program activities were reviewed by our Stakeholder Council at November 2019 and April 2020 meetings and their comments are reflected in this 2021-2023 work plan.

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 Infrastructure Management in Conjunction with Streams
D. Assisting Streamside Landowners (public and private)
E. Protecting and Enhancing Aquatic and Riparian Habitat and Ecosystems
F. Enhancing Public Access to Streams

The Action Plan is updated annually. This proposed plan will run from June 1, 2021 until May 31, 2023, at which time the recommendations will be revised based on new stream assessments and program needs.

Cornell University
Cooperative Extension
Ulster County

ULSTER COUNTY
Soil and Water
Conservation District
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NYC
Environmental
Protection

2021-2023 Action Plan
Ashokan Watershed Stream Management Program

PURPOSE

This Action Plan identifies goals and makes recommendations for implementation by the Ashokan Watershed Stream Management Program for the period 2021-2023. The Action Plan also provides a framework for reporting progress on planned activities to the public.

How to read this document: The Action Plan is organized around key programmatic areas. Under each topic area is a list of action recommendations, derived from Stream Management Plans and the program's working groups. Under the list of recommendations, ongoing projects funded through the Stream Management Implementation Program (SMIP) are listed.

BACKGROUND

In 1997, the NYC Watershed Memorandum of Agreement (MOA) was reached between New York State, New York City, the U.S. Environmental Protection Agency, watershed communities and counties, and several non-profit environmental organizations. The MOA included establishing a set of watershed partnership programs to help ensure that the NYC water supply watersheds were adequately protected.

The Ashokan Watershed Stream Management Program (AWSMP) was established as a joint effort between Cornell Cooperative Extension of Ulster County (CCEUC), the Ulster County Soil and Water Conservation District (SWCD), and the New York City Department of Environmental Protection (DEP). The three agencies work collaboratively to protect and restore the stability and ecological integrity of streams in the Ashokan Reservoir Watershed.

Action planning in the Ashokan Watershed began with the development of stream management plans for the Broadstreet Hollow Creek in 2003, Stony Clove Creek in 2004, and the Upper Esopus Creek in 2007. In subsequent years, AWSMP completed stream assessments of the Woodland Creek (and reassessment), Beaver Kill, Warner Creek, Birch Creek, Bush Kill, Bushnellsville Creek, Stony Clove Creek (and reassessment), Stony Clove Creek tributaries, Little Beaver Kill, and most recently, Lost Clove, Hatchery Hollow, McKinley Hollow, Elk Bushkill, and Little Peck Hollow headwater tributaries to the Esopus Creek.

A Filtration Avoidance Determination (FAD) granted to NYC in December 2017 requires DEP and its partners to develop an Action Plan for the coming year to show how the findings and recommendations of the stream management plans will be implemented. The first post-implementation phase Action Plan for the Ashokan Watershed covered the period June 1, 2009 - May 31, 2011. This newest Action Plan covers the period June 1, 2021 - May 31, 2023 and includes actions identified in five-year contracts beginning in late 2019 and early 2020 between the DEP and county partner organizations CCEUC and SWCD.

The AWSMP moved its primary focus from planning to implementation in 2008. During that year the program staff, with input from local stakeholders, developed a process for distributing funding to watershed communities to help implement stream management plan recommendations (the "Stream Management Implementation Program"). In 2014, a Local Flood Hazard Mitigation Program was implemented to address the protection of water quality and flood hazard mitigation. To date, over $5,400,000 in community grants has been committed to implement stakeholder-driven projects throughout the watershed.

A. Protecting and Enhancing Stream Stability and Water Quality

Includes stream corridor assessments, stream stabilization/restoration projects with a goal to restore stream stability and reduce turbidity; monitoring of stream projects; and outreach, education and technical assistance to encourage stream stewardship.

Summary of recommendations in 2021-2023 Action Plan and allocation of SMIP funding in support of recommendations

STREAM CORRIDOR ASSESSMENTS

1. Continue a program of multi-phased stream corridor geomorphic assessments including: Phase 1- GIS watershed scale assessments for most sub-basins in the watershed; Phase 2 - field-based stream feature inventories (SFI) for one stream per year or every other year; and Phase 3 - reach to site scale monitoring (e.g. BEHI, geomorphic surveys). The assessments are used to help diagnose stream corridor condition and identify stream erosion hazards and/or water quality impairment that may require treatment. The table below includes candidate streams for assessment in 2021-2023. One stream per year may be subject to a rapid Phase 2 reassessment if conditions appear to be degrading.
    a. Pilot use of unmanned aerial vehicle (UAV) to conduct rapid assessment of erosion site conditions and project planning. Exploring use of drone photogrammetry for stream assessment addresses a recommendation in the 2020 National Academy of Sciences Review of the NYC Watershed Protection Program.
2. Participate in a NYC Watershed technical working group discussing sediment sampling and support a pilot of Rosgen's Watershed Assessment and River Stability Supply (WARSSS 2009) methods for quantifying and ranking sources of sediment loading within sub-watersheds and reaches. The methods may allow us to identify and characterize high supply erosion reaches, predict sediment loading using actual watershed rates and estimate loading per reach, and predict reductions in sediment loading following implementation of stream projects.
    a. Test the use of WARSSS procedures in a sub-watershed of the Ashokan Watershed.
3. Streambank erosion prediction curves were successfully developed from data collected in the Ashokan Watershed from 2017-2020 (a SMIP-funded study now continued by SWCD) using the Bank Assessment for Non-Point Source Consequences of Sediment (BANCS) protocol. Additional data-gathering using BANCS was piloted during Stream Feature Inventories in the Esopus Creek headwaters in 2019-2020.
    a. Continue to collect BANCS data for a range of stream types and conditions along with SFI, and use collected data to further calibrate stream bank erosion predication curves.
    b. Work with other NYC Watershed basin partners to standardize methods for BANCS survey and coordinate data collection in the NYC Watershed.

4. Review previously surveyed reference reaches and develop survey and monitoring objectives to fill gaps in the reference reach database.
5. Participate in partner meetings to review water quality analyses and prioritize stream feature inventory locations.
6. Bedload sediment is an important component of sediment transport that must be understood to better ensure the success of stream restoration projects. However, bedload data is expensive to collect. To explore the feasibility and cost-effectiveness of methods, a small-scale pilot project began in 2017 to test multiple bedload sampling and monitoring techniques at 2-3 sites and the ability to estimate the percentage of total sediment load contributed by bedload. Initial results suggest bedload can be sampled successfully using traditional methods at or near bankfull flows to develop regional curves useful for design and project prioritization. Initial results also suggest tracer rock monitoring can be used to track the movement of larger material not captured with traditional methods. The use of hydrophones was ruled out with current technology. Actions for continued testing of bedload monitoring methods and bedload monitoring over the period include:
    a. As feasible and effective methods are identified, monitor bedload in coordination with a NYC Watershed technical working group that includes other basin programs and DEP.
    b. As field conditions allow, obtain bedload samples at two locations in the watershed at feasible flows through a SMIP-funded project with USGS.
    c. Complete a study to test the use of submerged load cell systems for measuring bedload sediment in the Esopus Creek watershed and evaluate results.
7. Provide funding for study of stream condition and function, and monitoring of system condition and management practices.

Ashokan Watershed Stream Assessment Projects

Streams	Location	Current Status
Broadstreet Hollow	Towns of Shandaken and Lexington	Completed 2001
Stony Clove	Towns of Shandaken, Woodstock, Hunter, and Lexington	Completed 2001
Esopus Creek	Towns of Shandaken and Olive	Completed 2007
Woodland Creek	Town of Shandaken	Completed 2008
Beaver Kill	Towns of Shandaken and Woodstock	Completed 2010
Warner Creek	Town of Shandaken and Woodstock	Completed 2010-2012
Birch Creek	Town of Shandaken	Completed 2012
Bush Kill	Towns of Shandaken and Olive	Completed 2012
Bushnellsville Creek	Towns of Shandaken and Lexington	Completed 2013
Stony Clove Creek	Towns of Shandaken and Hunter	Reassessment 2013
Woodland Creek	Town of Shandaken	Completed mainstem reassessment 2015
Stony Clove Creek Tributaries	Towns of Shandaken and Hunter	Completed 2015
Maltby Hollow Brook	Town of Olive	Completed 2015
Warner Creek	Town of Shandaken and Woodstock	Completed reassessment 2015
Little Beaver Kill	Town of Woodstock	Completed 2017

Esopus Creek Headwaters - Lost Clove, Hatchery Hollow Brook	Town of Shandaken	Completed 2018
Stony Clove Creek	Towns of Shandaken and Hunter	Completed reassessment 2018
Esopus Creek Mainstem – Oliverea Section to Bushnellsville Creek Confluence	Town of Shandaken	Completed reassessment 2019
Stony Clove Creek Tributaries – Ox Clove and Myrtle Brook	Towns of Shandaken and Hunter	2019-2020
Esopus Creek Headwaters - Elk Bushkill, McKenley, and Little Peck Hollows	Town of Shandaken	2020
Panther Kill	Town of Shandaken	2021
Peck Hollow	Towns of Shandaken and Lexington	TBD
Fox Hollow Creek	Town of Shandaken	TBD
Ashokan Reservoir Tributaries	Town of Olive and Town of Hurley	TBD

Ashokan Watershed Turbidity Monitoring Projects

In summer 2015, DEP began a multi-year geomorphic and suspended sediment/turbidity (SS/T) monitoring study with USGS in the Stony Clove Creek watershed to understand the impacts of restoration projects on SS/T and the relative contributions of each tributary to SS/T in the Upper Esopus Creek watershed. Water quality monitoring began through an agreement with USGS in 2016 and is expected to continue through 2026.

Ashokan Watershed SMIP Projects Supporting Stream Corridor Assessment and Monitoring *(Active 2021)*

USGS	Continuation of Sediment Source Fingerprinting and Quantifying Bedload Transport	AWSMP-2018-145	$58,743	Active	Contribute to production of sediment discharge rating curves with measurements of bedload and suspended sediment. Evaluate several methods to quantify bed transport at two location within the upper Esopus Creek watershed. Collect suspended sediment samples for sediment fingerprinting analysis.
USGS	Fabrication and Testing of Submerged Load Cell Systems / Active and Passive Tracer Monitoring	AWSMP-2019-154	$57,889	Active	Fabricate and lab-test two submerged load cell systems as a method for estimating bedload transport. Continue monitoring active and passive tracers (rocks) deployed in the Stony Clove Creek. Develop USGS Data Series Report on tracer rock findings.

STREAM RESTORATION/STABILIZATION PROJECTS TO RESTORE STREAM SYSTEM STABILITY AND/OR REDUCE CHRONIC TURBIDITY INPUTS

8. Identify locations in the Ashokan Watershed that are long-term, chronic suspended sediment/turbidity sources and evaluate the potential efficacy of restoration practices. Annually update and prioritize potential stream restoration and/or channel stabilization projects identified through the stream corridor geomorphic assessments. Begin the survey and design process for future turbidity reduction projects.
9. Participate in partner meetings to review water quality analyses to outline the water quality basis for project site selection. Review, select and restore three Stony Clove Creek project locations based on ongoing water quality monitoring studies.
10. SMIP funding for 2019-2024, along with funds provided to SWCD for stream restoration projects, may be used to implement additional projects expected to have a measurable reduction in turbidity. Support efforts to obtain additional funding to pursue this goal.
11. After completion of a Stream Feature Inventory of the Esopus Creek mainstem in Oliverea, coordinate with the Town of Shandaken and County DPW to determine next steps in assessment and planning to treat flood hazards and channel instability in the area.

Ashokan Watershed Stream Projects to Restore Stream Stability and Reduce Chronic Sources of Sediment *(Active 2021)*

SWCD	**Warner Creek at WC-1**	**$TBD**	**2019/20 design 2021 construction**
	Treatment of a chronic source of suspended sediment, as well as adjoining stream that has become unstable due to mass wasting.		
SWCD	**Warner Creek at WC-2**	**$TBD**	**2019/20 design 2021 construction**
	Treatment of an eroding streambank that is a chronic source of suspended sediment, as well as adjoining stream that has become unstable.		
SWCD	**Stony Clove Creek at SCC-03**	**$TBD**	**2020/21 design 2021 construction**
	Stabilize failing hillslope that is chronic source of suspended sediment and improve overall stream stability through a historically unstable section of Stony Clove Creek.		
SWCD	**Panther Kill Stream Restoration Project**	**$TBD**	**2020/2021 design 2022 construction**
	Stabilize failing hillslope and channel instability that is chronic source of suspended sediment from clay rich glacial till.		

SWCD	**Elk Bushkill Stream Restoration Project**	**$TBD**	**2021/2022 design 2023 construction**
	Stabilize failing hillslope and channel instability that is chronic source of suspended sediment in a headwater tributary to Esopus Creek.		

Ashokan Watershed SMIP Projects Supporting Stream Restoration *(Active 2021)*

No active SMIP projects at this time.

MONITORING OF STREAM PROJECTS

12. Annually monitor performance of stream corridor projects funded by the Ashokan Watershed Stream Management Program. See table below for specific project requirements.
13. Continue to monitor previously completed restoration projects on a case-by-case basis. Special consideration given to monitoring after bankfull and above flows.
14. Monitor turbidity and suspended sediment at stream restoration project sites before and after project construction to quantify effects on water quality. To be implemented on a case-by-case basis.
15. Refine monitoring objectives and evaluate pre- and post- restoration project conditions for changes in channel geometry and geomorphic function, habitat and biotic populations, and flow and thermal regimes. Continue monitoring stream restoration project sites for changes in water quality.
    a. Continue to implement a multi-year study to evaluate the effects of stream restoration projects on geomorphic condition, fish and macroinvertebrate community assemblages, and physical habitat.
    b. Monitor turbidity and suspended sediment at a small number of stream restoration sites outside the Stony Clove Creek watershed before and after project construction to quantify effects on water quality. Data will be provided to DEP for incorporation into the multi-year suspended-sediment monitoring study.
    c. Develop a standard framework for evaluating stream project success based on goals identified for the project. Use the evaluation framework to inform post-project monitoring.
16. Develop University and agency partnerships to supplement existing funding and begin implementation of a comprehensive monitoring and evaluation program of stream management activities to better target management intervention and efficiently use resources.

Ashokan Watershed Stream Projects Monitoring

Stream Project (Year Completed)	Last Surveyed	Monitoring Goals and Permit Requirements

Stony Clove at Wright Road (2015)	2020	Completed all permit requirements in 2020. Survey following high flow events and as needed.
Stony Clove and Warner Creek Confluence (2014)	2018	Completed all permit requirements in 2016. Survey following high flow events and as needed.
Stony Clove Lane (2014)	2018	Completed all permit requirements in 2016. Survey following high flow events and as needed.
Stony Clove at Chichester #1, 2, 3, 4 (2012 – 2013)	2018 (partial)	Completed all permit requirements in 2015. Survey following high flow events and as needed.
Warner Creek Site 5 (2013)	2016	Completed all permit requirements in 2015. Survey following high flow events and as needed.
Stony Clove at Phoenicia Main Street (2011)	2018	Continue survey monitoring to track sediment deposition fluctuations per DEC permit. Survey following high flow events and as needed.
CSBI Bioengineering Project @ Bushkill (2016)	2017, 2019	Completed five years of survey. Survey as needed.
Beaver Kill at Van Hoagland (2018)	2020	Bi-annual survey and report for ACOE: 2018, 2020, 2022.
Woodland Creek at Woodland Valley Park Association (2018)	2019	Bi-annual survey and report for ACOE: 2019, 2021, 2023
Bush Kill at Watson Hollow (2018)	2019	Bi-annual survey to track change over time: 2019, 2021, 2023

OUTREACH, EDUCATION AND TECHNICAL ASSISTANCE TO ENCOURAGE STREAM STEWARDSHIP

17. Distribute Stream Stewardship Principles to relevant entities.
18. Hold meetings of the AWSMP Stakeholder Council (2-3 per year) and working groups (6-12 per year) to solicit participation and input from local community members.
19. Provide outreach to municipal officials, agencies, affected landowners, and the public about findings from stream assessments and plans, and planned and completed stream restoration projects.
    a. Meet with newly elected and other key municipal officials to review stream management plan findings, provide education on stream process, and raise awareness of the stream management program.
    b. Hold landowner stream walks in the Warner Creek and Stony Clove Creek watersheds to educate landowners on stream assessment findings and stream restoration projects planned for construction.
    c. Print and distribute the Little Beaver Kill Stream Management Plan and findings of the headwaters Esopus Creek assessment.
    d. Use remote imagery obtained with UAV to communicate project site conditions, need for restoration, and project plans with affected landowners and project consultants.
20. Provide information from stream and floodplain assessments and plans in formats useable by watershed towns for integration with guidance documents such as natural resource inventories, open space plans, and climate smart plans.
21. Provide education, outreach, and training to municipal officials on the topics of the stream management program, floodplain management, and stream processes.

a. Offer trainings on the basics of stream process ("Stream Process 101") to municipal officials throughout the year. Produce the training as an educational video and make available online.
b. Offer Stream and Floodplain Training Scholarships to local municipal officials and key staff, allowing town supervisors, highway superintendents, local code enforcement officers, and floodplain managers to attend state and national courses and receive certifications in floodplain management and policy and stream management.

22. Deliver a youth education program in partnership with the Onteora Central School District to teach stream and watershed science to students through field studies, and after-school and classroom programs. All programs to be delivered using virtual education methods as necessary.

    a. Hold the Stream Explorers Youth Adventure one-day conference to engage local youth grades 3 through 7 in outdoor studies about streams and watersheds.
    b. Engage youth grades 4 through 6 in the Watershed Detectives After School Club at the Bennett Elementary School.
    c. Deliver Onteora School District Classroom Enrichment programs on water and watershed science as invited by teachers.
    d. Deliver stream science education activities on local streams during the summer.

23. Fund public education and outreach activities that promote stream stewardship.

24. Develop written education and outreach materials for streamside landowners and other watershed stakeholders. Use a variety of media (newsletters, fact-sheets, press, video, website, and social media) to disseminate information about the program and encourage stream stewardship (1-2 fact sheets per year).

    a. Develop or update Stream Guides (fact sheets) on gravel management, large wood management, sizing of private road-stream crossings, and flood preparedness.
    b. Develop a series of educational videos for landowners and stream and floodplain managers on stream best management practices.
    c. Continue to promote the *Ashokan Watershed Adventure Guide* developed by AWSMP*;* a 27-page illustrated guide to 11 educational stops in the Ashokan Watershed for anyone to learn more about streams and how they are managed.
    d. Develop and publish a field methods manual and data sheets for use of the Multi-Objective Stream Crossing Assessment Protocol (MOSCAP) for distribution to partners within the NYC Watershed.
    e. Update and modernize the AWSMP website to improve functionality and accessibility.

25. Participate in local community events to promote the goals of the Ashokan Watershed Stream Management Program.

26. Organize an Ashokan Watershed Conference to provide general education to watershed residents and train municipal officials in specific topics (1 every two years). Deliver using virtual education methods as necessary.

27. Co-organize a Catskill Environmental Research and Monitoring (CERM) conference to disseminate the results of river and watershed studies (1 every two years). The next CERM conference will be held in fall of 2022.
28. Hold stream walks and other public engagement events (5-10 per year).
29. Develop citizen stewardship volunteer programs and opportunities for adult and youth volunteers.

Ashokan Watershed SMIP Projects Supporting Education, Outreach and Technical Assistance to Encourage Stream Stewardship *(Active 2021)*

No active SMIP projects at this time.

B. Floodplain Management

Includes floodplain assessments; coordination with floodplain management planning and implementation efforts; and outreach, education and technical assistance for floodplain management in the Ashokan Watershed.

Summary of recommendations in 2021-2023 Action Plan and allocation of SMIP funding in support of recommendations

FLOODPLAIN ASSESSMENT

1. Pro-actively assist communities with the review, understanding, and interpretation of data, reports, studies, and other information to reduce future flood risk. Examples include the Flood Insurance Studies, existing Flood Insurance Rate Maps (FIRMs), and NYS-adopted climate change / future flow projections and subsequent guidelines. Seek updates to maps where projects have lowered flood elevations.
2. Using updated hydrologic models, stream assessments and other tools, identify natural floodplain areas that enhance sediment, debris, and water storage; riparian and aquatic habitat; and reduce flood elevations in downstream areas. Work with local planners and landowners to identify and implement protection strategies for these critical areas.

COORDINATION OF FLOODPLAIN MANAGEMENT

3. Work with communities to coordinate the implementation of projects recommended in completed Local Flood Analyses within eligible population centers. Make available $2,500,000 for Local Flood Analysis projects through 2023. Assist with obtaining additional state and federal funding for project implementation.
4. Promote Town development of Flood Hazard Mitigation Plans and Community Rating System applications in the Ashokan Watershed.
    a. Assist the Town of Shandaken with NFIP Community Rating System activities.
    b. Assist other Towns with entering the Community Rating System.
5. Coordinate with flood commissions and working groups (e.g., SAFARI, Olive Flood Advisory Committee) in the watershed. Encourage the prevention of inappropriate development in areas of high flood or erosion risk and foster uses that are compatible with the anticipated flooding and erosion conditions.
6. Where critical community structures and facilities are in at-risk locations, support community planning as a next-step where needed, and the application of flood-proofing or relocation measures as a means of mitigation.

7. Assist municipalities with completing and implementing local flood analyses in watershed population centers that require engineering and modeling studies and public input to select projects that will lower flood elevations and/or reduce flood risk.
    a. Assist the Town of Shandaken with completing Local Flood Analyses for the hamlets of Pine Hill, Chichester, and Big Indian.
    b. Track implementation of projects. Assist municipalities with completing procedural steps and securing resources that help to move implementation projects forward.
8. Assist communities with coordinating development of flood hazard mitigation funding applications that match NYC and other local funds to federal and state funding. Use information in the County All-Hazard Mitigation Plan and local flood mitigation plan(s) to access mitigation funding.
9. Work with towns to implement mitigation actions included in the 2017 update to the County's All-Hazard Mitigation Plan.
10. Assist communities with meeting outreach and technical review requirements of the NYC Funded Flood Buyout Program. The Ulster County Department of Environment and the Ulster County Soil and Water Conservation District Program Coordinator will provide assistance.
11. Assist municipalities with planning for parcels acquired through the NYC Funded Flood Buyout Program and how the local community can best utilize them.

Ashokan Watershed SMIP Projects Supporting Coordination of Floodplain Management Efforts in the Watershed *(Active 2020)*

Organization	Proposal Title	Proposal Number	Amount	Status	Purpose of Grant
Town of Shandaken	Community Rating System	AWSMP-2016-126	$15,000	Active	Take steps necessary to enter the NFIP CRS program and improve overall flood resilience in the town.

OUTREACH, EDUCATION AND TECHNICAL ASSISTANCE FOR FLOODPLAIN MANAGEMENT

12. Provide education and technical assistance to landowners and assist towns with reaching landowners interested in mitigating flood risks for existing structures in high-risk areas.
    a. Assist property owners with applying for funding and educating them on property protection measures such as elevations, floodproofing, tank anchoring, etc.
    b. Provide individuals with information about potential relocation areas and opportunities when practical.
13. Perform targeted outreach to landowners, including landowner associations, groups or neighborhoods that have expressed interest in learning more about floodplain management. Continue to provide training and assistance for local floodplain managers, municipal officials, and

landowners in using FIRMs (Flood Insurance Rate Maps) and other FEMA datasets, and understanding NFIP requirements. Use virtual education delivery as necessary.

a. Annually provide 10 weeks of instruction to local floodplain managers preparing them to take the Certified Floodplain Manager exam.
b. Provide flood map and NFIP trainings to local code enforcement officers and planning, conservation advisory council/committee, and zoning board members.
c. Provide trainings on floodplain management to local real estate professionals.
d. Provide funding for Code Enforcement Officers and Floodplain Administrators to attend training sessions on flood related issues and become Certified Floodplain Managers.

14. Increase access to flood prevention/protection information in the watershed through the AWSMP website, locally available technical publications at AWSMP, local libraries, town halls, etc. and through presentations, workshops and other outreach events.
15. Continue to provide education through Flood Hazard Mitigation Working Group meetings on topics such as: how to access funding opportunities; emergency response protocols and coordination; structural elevations; floodproofing; elevation certificates; changes in the NFIP and local implications; benefit to cost analysis for projects; and coordination between local, county, and state partners engaged in flood response and flood mitigation.
16. Offer technical trainings that promote an understanding of effective stream and floodplain management strategies for local stakeholders (1 per year).
    a. Provide a technical training on floodway encroachment review and no-rise certificates for Code Enforcement Officers and engineers.
17. Facilitate trainings on the topic of flood emergency response.
18. Prepare educational programming about the National Flood Insurance Program's (NFIP) redesigned risk rating system "Risk Rating 2.0," and offer to watershed residents with flood insurance through NFIP. Risk Rating 2.0 will ultimately reflect an individual property's specific flood risk as opposed to the current approach which uses national averages.

Ashokan Watershed SMIP Projects Supporting Local Flood Analysis Implementation *(Active 2021)*

Ulster County Dept. of Public Works	Construction Inspection Services for Maltby Hollow Bridge Replacement (LFA Implementation)	AWSMP-2019-151	$150,000	Active	Partial funding of construction inspection services for replacement of the Cty Rte 42 bridge over Maltby Hollow Brook with a new bridge that passes the 500-year flow. The project is recommended in the town-accepted "West Shokan and Boiceville Local Flood Analysis" (May 2017). To be constructed in 2021.

Town of Shandaken	Pine Hill Bridge Study and Local Flood Analysis	AWSMP-2020-163	$80,000	Active/ Pending	Current funding is to complete a feasibility and hydraulic study of bridges in the hamlet of Pine Hill, but an application to complete a full Local Flood Analysis is anticipated.
Ulster County Dept. of Public Works	Phoenicia Bridge Street Bridge Feasibility Analysis and Design	AWSMP-2021-165	$150,000	Pending	Engineering study to evaluate alternatives to the existing Bridge Street Bridge over the Esopus Creek, connecting Main Street Phoenicia to State Route 28. The project is recommended in the town-accepted "Phoenicia and Mt. Tremper Local Flood Analysis."

C. Highway and Infrastructure Management in Conjunction with Streams

Outreach, training and financial assistance to highway departments to encourage the adoption of best management practices.

Summary of recommendations in 2021-2023 Action Plan and allocation of SMIP funding in support of recommendations

APPLICATION OF HIGHWAY BEST MANAGEMENT PRACTICES TO REDUCE WATER POLLUTION

1. Work with the Highway Manager's Working Group to identify roadway infrastructure best management practices that treat sources of turbidity and stream system degradation (e.g., under-sized and perched culverts, outfalls that are point sources of sediment discharge collected from diffuse sources of road runoff, etc.).
2. Encourage local municipalities, highway departments and NYSDOT, to prioritize vegetation management on critical areas such as roadside ditches and steep slopes to reduce sources of turbidity in the Ashokan Watershed. Develop programs to provide road maintenance crews with additional resources for seeding newly cleaned ditches with native ground cover appropriate for reclamation. An agreement to access shared machinery for mulching seeded areas that was implemented in early 2016 is ongoing.
3. Continue working with Towns to reduce sediment loading through application of best management practices for winter road abrasives, mined locally in the Ashokan Watershed, that have a high clay and silt content and are a source of turbidity in the streams in the Ashokan Watershed.

REDUCING HYDRAULIC CONSTRICTIONS IN STREAMS: BRIDGES AND CULVERTS

4. Collaborate with state and local highway departments and stream management personnel to improve management and replacement efforts at small culverts by providing sizing guidance and revegetation strategies. Assist highway managers with interpreting hydraulic studies at larger culverts and bridges in order to adhere to natural channel design concepts of sediment connectivity and long-term channel stability.
5. Inventory and assess stream crossings in the Ashokan Watershed to rate and prioritize the structures based on their overall impact on water quality, specifically their structural condition, impact to aquatic ecology, geomorphic compatibility with the stream, and hydraulic capacity relative to expected flows from their individual watersheds. Use the Multi-Objective Stream Crossing Assessment Protocol (MOSCAP) field-tested in 2018 to regularly update and expand the road-stream crossing database.

6. Small road-stream crossings are regularly replaced by highway departments with little guidance on sizing that would improve their functional and geomorphic capacity and reduce threats to water quality. Test and improve the accuracy of the Cornell Culverts Model (hydrologic model) using field survey data and hydraulic modeling. Apply validated hydrology to small road-stream crossing designs.

7. Continue to work with Towns to rank priority crossings and develop proposals to complete field investigation, initial cost estimates and conceptual designs for high priority crossings.

STREAM/ROAD STABILIZATION PROJECTS AND IMPLEMENTATION OF BEST MANAGEMENT PRACTICES ON RIGHT OF WAYS

8. Collaborate with local, county and state highway departments to apply natural channel design concepts to streambank stabilization along roadsides.

9. Seek opportunities to mitigate the impact of public infrastructure (road, railroad, and utility) encroachment on the riparian vegetation community and aquatic habitats by improved planning, management, supplemental plantings and the improved care of existing vegetation.

Ashokan Watershed SMIP Projects Supporting Improved Stream/Road Stabilization and Improved Right of Way *(Active 2021)*

Organization	Proposal Title	Proposal Number	Amount	Status	Purpose of Grant
Town of Woodstock	Design of the Mink Hollow Bridge Up-Sizing	AWSMP-2018-137	$159,485	Active	Engineering and design to replace and increase the span of an old and undersized town-owned bridge along Mink Hollow Road and stabilize the stream channel.
Ulster County Dept. of Public Works	C.R. 139 Culvert Replacements for Aquatic Passage	AWSMP-2019-152	$52,500	Active	Replace two under-sized culverts on the Bushkill under County Route 42 in the Town of Olive (County Road 139 or Watson Hollow Rd.) with structures than pass a 50-year peak flow and appropriate for aquatic organism passage.
Town of Woodstock	Construction of the Mink Hollow Bridge Up-Sizing	AWSMP-2020-159	$333,950	Active	Construction of instream grade control structures, bank stabilization, and bridge enlargement for the Mink Hollow Road bridge over the Beaver Kill in the Town of Woodstock.
Town of Olive	Engineering Design for Bostock Road and Red Maple Road Crossings	AWSMP-2020-161	$145,660	Active	Design and engineering of crossing replacements at Bostock Road and Red Maple Road in the Town of Olive. The crossings over Butternut Creek are identified as a high priority for replacement and

					enlargement in several flood hazard mitigation plans.
Town of Shandaken	Peck Hollow Bridge Up-Sizing	AWSMP-2020-162	$221,038	Active	Cost-share for construction of an enlarged bridge over Peck Hollow with flood mitigation and habitat benefits. Anticipated construction in 2021. Match to $901,000 Bridge NY funds.

OUTREACH AND EDUCATION FOR HIGHWAY MANAGERS, EXCAVATION CONTRACTORS, AND ROAD-STREAM CROSSING OWNERS

10. Organize Highway Manager's Working Group meetings with relevant local, county, and state highway personnel to identify shared stream/road concerns and evaluate opportunities to support coordinated effort to use best management practices. Provide guidelines for "repairs" of streams and drainage systems with best management practices advocated by the AWSMP to reduce risk of further instability (2-3 per year).
11. After validation of the Cornell Culverts Model, develop a user interface that produces sizing information and design alternatives for small road-stream crossings that can be used by highway managers and stream managers to improve hydraulic capacity, geomorphic compatibility, and aquatic organism passage.
12. Provide SMIP funds for highway and infrastructure management projects with benefits to water quality and stream system integrity.
13. Design and implement a training program for Highway Department and contractor staff on stream process and best practices for working in and around streams. Annually assess training needs and facilitate and implement high priority trainings. Depending on the training subject and level of detail desired, trainings may be conducted by AWSMP staff, Cornell Local Roads Program staff, or engineering/consulting firms.
14. Host a workshop for private road-stream crossing structure owners on how to conduct a multi-objective assessment of their structures. Provide attendees with guidance on best management practices for designing or re-designing stream-crossings to reduce the amount of channel instability generated by private structures.

D. Assisting Streamside Landowners (public and private)

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

Summary of recommendations in 2021-2023 Action Plan and allocation of SMIP funding in support of recommendations

ASSESSMENT OF STREAMSIDE PROPERTY ISSUES

1. Work with towns and landowners to identify and document streamside property (public and private) where there are stream stability concerns. Provide this documentation to towns, agencies and landowners to help inform management decisions.
2. Use watershed land cover and stream assessments to identify riparian areas with inadequate vegetative cover and buffer width or degradation by invasive species and identify sites for landowner outreach through riparian zone improvement programs.

CATSKILL STREAMS BUFFER INITIATIVE

3. Offer and encourage voluntary participation in landowner incentive programs for stream and riparian zone protection and enhancement.
    a. Continue offering the Catskill Streams Buffer Initiative (CSBI), and the Conservation Reserve Enhancement Program (CREP) in partnership with CSBI to further enhance landowner participation in riparian land restoration programs by offering monetary incentive for enrolment.
4. Provide customized Riparian Corridor Management Plans to landowners enrolled in CSBI. These plans highlight the importance of healthy riparian buffers and sustainable streamside property management practices that landowners can implement on their properties.
5. Integrate recommendations made in the New York Natural Heritage Program's report "Inventory, Classification, and Description of Riparian Natural Community Reference Types for Ashokan Watershed, New York" into riparian restoration designs. The report can be accessed at http://ashokanstreams.org/publications-resources/technical-data/.
6. Continue exploring properties that could be eligible for soil-bioengineering projects through the CSBI program to help restore riparian habitat and function as well as demonstrate best practices for stabilizing streambanks utilizing native plant materials.
7. Focus on multi-phase riparian buffer restoration projects with invasive species removal, management and native plant establishment.

8. Explore opportunities for restoring native riparian buffers in watershed town parks and common places with volunteer assistance for demonstration and education of riparian best management practices.
9. Review data and perform Geographic Information Systems analysis to identify areas that would benefit from buffer enhancement to improve landowner recruitment into the Catskill Streams Buffer Initiative program.
10. Evaluate the ability of CSBI and related programs to shift landowner attitudes, understanding, and property management practices needed for maintenance of healthy riparian buffers. Consult with social scientists and plan a study that evaluates whether goals have been met, including a change in the attitudes and behaviors of watershed landowners, and what can be done to enhance programs to achieve desired outcomes.

Ashokan Watershed CSBI Projects

2021-2022	Repair and install pollinator seeding at projects completed in the fall of 2020 Installation of 2-3 landowner invasive removal and planting projects Promote CSBI program and buffer protection through participation in Trout Unlimited Earth Day planting project on the Bush Kill in West Shokan. Production of 6-8 landowner specific Riparian Corridor Management Plans Continue project vegetation monitoring – 21 sites scheduled

MONITORING OF RIPARIAN BUFFER PLANTINGS

11. Monitor performance of riparian buffer plantings funded by the Catskill Streams Buffer Initiative.
    a. Riparian buffer restoration sites that were installed through CSBI are monitored bi-annually for a period of 5 years after project completion. The monitoring helps inform management decisions on species selection and site characteristics: 13 sites for 2020, 21 sites expected in 2021.
    b. Monitor Stream Restoration Project vegetation and bioengineering practices to ensure projects are meeting goals for vegetation establishment and restoration.
        i. Develop and implement plans to monitor and study the effects of contributing factors to buffer success, such as source material, site condition, buffer installation practices, weather/hydrology during establishment period, deer herbivory and other factors to inform project designs and improve the growth and survival of buffer plantings.

OUTREACH, EDUCATION AND TECHINICAL ASSISTANCE TO STREAMSIDE LANDOWNERS

12. Provide site visits and office consultations with watershed landowners, municipalities, contractors and others for designing and implementing best management practices to reduce erosion.

13. Develop educational products (fact sheets, guidebooks, videos, displays, signage, etc.) to educate landowners on best management practices, such as riparian planting design and maintenance, and guidelines for proper sizing of private stream crossings.
    a. Develop riparian ecosystem educational signage for completed riparian buffer projects.
    b. Develop no-mow signage for completed CSBI projects on private and public property.
14. Develop several riparian buffer demonstration projects that can be accessed by volunteers and members of the public for educational purposes.
    a. Enhance the Riparian Buffer Pollinator Meadow Demo at the Emerson Resort with an outdoor "riparian ecosystem living classroom" and educational signage that promotes riparian buffer protection.
15. Develop reliable local sources of native plant material for stream and riparian improvement projects. Continue maintenance of 10,000 live willow plants for cutting beds that will be used in future riparian restoration projects. Coordinate with DEP Lands to develop a database of harvestable bioengineering materials on DEP lands and rights of way in the Ashokan watershed for on-going plant material supply. Continue to identify local native stands for harvest located in the watershed through Stream Feature Inventory and landowner outreach.

E. Protecting and Enhancing Aquatic and Riparian Habitat and Ecosystems

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

Summary of recommendations in 2021-2023 Action Plan and allocation of SMIP funding in support of recommendations

STREAM ECOSYSTEM ASSESSMENT

1. Continue research, evaluation, and monitoring of aquatic ecosystems in the watershed to improve stream best management practices. Support the characterization of physical and water-quality regimes and the condition of important species in the watershed.
    a. Determine the potential effects of current and future thermal regimes on the survival of individual trout and their species populations in the Ashokan Watershed from headwaters to Reservoir.
2. Conduct a review of recent climate change study findings for the Northeast and Mid-Atlantic regions with relevance to the Catskills to summarize implications for trout and stream management, particularly related to stream flows and temperature in the Catskills. Also consider implications of climate-related drought and fire. Identify gaps in knowledge needed for stream management and incorporate findings into program research agenda. The literature review will aid in identifying opportunities to leverage current data and funding through increased collaboration with other research groups.
3. Develop partnerships to supplement existing funding and begin implementation of a comprehensive monitoring and evaluation of stream management activities to better target management intervention and efficiently use resources.
    a. Evaluate the effects of stream restoration projects on geomorphic condition, fish and macroinvertebrate community assemblages, stream temperature, physical habitat, and turbidity and suspended sediment. Results of an ongoing study with USGS (see Section A, recommendation 18(a) above) should help the stream program better understand aquatic species use of project sites and incorporate meso- and microhabitat features into future projects, addressing a recommendation in the 2020 National Academy of Sciences Review of the NYC Watershed Protection Program.
    b. Coordinate SMIP-funded USGS fish community and habitat monitoring with an inland trout stream monitoring program the NYSDEC is planning to conduct.
4. Collaborate with partners to explore the effects of forest pest infestations and develop methods for addressing impacts on streams and water quality.

a. Participate in NYCDEP's Spotted Lanternfly (SLF) prevention working group. Employ preventative measures on sourcing plant material to minimize the risk of introducing SLF in the Ashokan watershed.

5. Coordinate with the NYC-funded flood buyout program and other acquisition efforts guided by local communities to provide high priority areas for acquisition related to stream and floodplain restoration projects for water quality, improved hydrologic connectivity, improved sediment storage and conveyance supporting overall geomorphic stability, and riparian corridor/stream habitat preservation. Coordination will address a recommendation in the 2020 National Academy of Sciences Review of the NYC Watershed Protection Program.

OUTREACH AND EDUCATION FOR AQUATIC AND RIPARIAN HABITAT AND ECOSYSTEMS

6. Enhance coordination and information sharing among regulators, scientists, educators and the public.
    a. Work with regional organizations to develop and disseminate outreach materials and offer public programs.
    b. Collaborate with the Catskill Science Collaborative to hold events that engage the public in learning about the Catskill environment and the research occurring in the region.
    c. Contribute to planning and delivery of the semi-annual Catskill Environmental Research & Monitoring conference for environmental scientists, resource managers, and other professionals.
7. As feasible, involve watershed residents in macroinvertebrate sampling to make the water quality and habitat effects of stream restoration projects more visible to the public.
8. Hold Stream Ecosystem Working Group meetings to advise the program on stream assessment, research, and monitoring needs. Work with the group to coordinate research, assessment, and monitoring projects in the Watershed (1-2 meetings per year, or as needed).
9. Distribute the *2018 Research, Assessment & Monitoring Strategy for the Ashokan Watershed*; a 10-year update to the 2007 Stream Ecosystem Research & Assessment Strategy for the Upper Esopus Creek. Begin a five-year review and update of the Strategy.
10. Participate in the inter-basin Riparian Buffers Working Group, quarterly Catskill Streams Buffer Initiative meetings, and Catskill Regional Invasive Species Partnership meetings as possible.
11. Coordinate with NYC DEP to better understand the impacts of changes in Schoharie Reservoir releases on Esopus Creek stream flow quantity, temperature, water quality, and potential impacts on the fishery.

Ashokan Watershed SMIP Projects Supporting Aquatic and Riparian Habitat and Ecosystem Assessment *(Active 2021)*

Organization	Proposal Title	Proposal Number	Amount	Status	Purpose of Grant
Trout Unlimited	Catskill Heritage Brook Trout Study – Ox Clove	AWSMP-2020-1157	$1,500	Active	Sample Brook Trout in Ox Clove Creek and conduct genetic analysis to determine if the population is a heritage strain.

F. Enhancing Stream-based Recreation and Public Access

Support for projects that improve the quantity and quality of public stream access and enhance stream-based recreational opportunities. These recommendations incorporate community development efforts into stream management.

Summary of recommendations in 2021-2023 Action Plan and allocation of SMIP funding in support of recommendations

ENHANCING PUBLIC ACCESS TO STREAMS

1. Identify and assess potential stream access sites in the watershed. Consider stream access improvements that engage a broad array of uses and users. Ensure that any stream access and recreation activities or projects will not harm or degrade the environment and the greater ecology of the stream system.
2. Work with DEP, DEC, Ulster County, watershed towns, and other entities to assess the possibility of using flood buy-out properties for recreational and educational purposes.
3. Investigate opportunities to develop multi-use, low-impact trail systems along stream corridors. Determine good areas for either new trail construction or existing trail improvement that would provide greater public access to streams.
    a. Support the Town of Shandaken's efforts to develop community access to the Esopus Creek corridor in conjunction with the Local Flood Analysis-recommended NYSDOT Mt. Tremper Route 28 bridge enlargement.
4. Make improvements to existing stream access sites. Monitor conditions at existing public access sites to determine need for repairs, enhancements and/or improvements.
5. Provide a forum that will give all stakeholders (anglers, whitewater enthusiasts, environmental conservation groups, et. al.) a place to let their voices be heard and to improve relationships between these important groups.
6. Utilize local recreation plans and documents, such as the Town of Shandaken's 2013 Recreation Master Plan, when developing programs and projects. Work with municipal parks and/or recreation committees, Ulster County, NYSDEC, and NYCDEP and other engaged entities to develop and execute projects.
7. Work with Stream Access and Recreation Working Group and other stakeholders on developing recommendations related to Shandaken Tunnel recreational releases and ensure mutually beneficial results for all stream users that do no harm. Engage in constructive dialogue with State and City officials about future protocols and procedures for Tunnel operations.
8. Develop awareness of non-native and/or invasive species, such as Hemlock Woolly Adelgid (HWA), didymo, and Japanese knotweed, and control efforts, and remain informed about the impact of

these species on the recreational use of streams and ecosystems, and how to prevent their spread in the Ashokan Watershed. Address emerging invasives such as Mile-a-Minute plant and Spotted Lantern Fly.

EDUCATION FOR RECREATIONAL USERS OF STREAMS

9. Support education on recreational stream safety that includes input and consensus from all stakeholder groups, such as educational/warning signage, hazard avoidance, and hazard removal.
10. Address stream access and recreational use topics at educational events/conferences/meetings on topics determined by the Stream Access and Recreation Working Group. Potential future topics include: how to disperse and manage use within the watershed, how to meet stewardship funding needs, recreational safety, in-stream wood management, potential impact to streams from invasive species, laws and policies relating to navigable waterways, and handicap accessibility issues.
11. Help to address through education and by providing a forum for discussion, any over-use and/or site monitoring issues at popular Esopus Creek access points.
12. Advocate for and advance educational opportunities in recreational areas to improve knowledge of streams, stream management, and the watershed. Examples of this may include educational signage, kiosks, interpretative trails and photo safaris.
13. Identify opportunities to advance stream and watershed education at the Ashokan Rail Trail that opened in 2019, in collaboration with Ulster County and DEP. Hold educational events on the Rail Trail.
14. Collaborate with local and state actors to reach new residents and visitors to the watershed with messages about responsible stream access and good stream management.

Ashokan Watershed SMIP Projects Supporting Stream-Based Recreation and Public Access *(Active 2020)*

No active SMIP projects at this time

Appendix A: Summary of Completed Projects 2009-2020

Stream Assessments

Streams	Location	Status
Broadstreet Hollow	Towns of Shandaken and Lexington	Completed 2001
Stony Clove	Towns of Shandaken, Woodstock, Hunter, and Lexington	Completed 2001
Esopus Creek	Towns of Shandaken and Olive	Completed 2007
Woodland Creek	Town of Shandaken	Completed 2008
Beaver Kill	Towns of Shandaken and Woodstock	Completed 2010
Warner Creek	Town of Shandaken and Woodstock	Completed 2010-2012
Birch Creek	Town of Shandaken	Completed 2012
Beaver Kill	Town of Shandaken and Woodstock	Completed mainstem reassessment in 2012
Bush Kill	Towns of Shandaken and Olive	Completed 2012
Bushnellsville Creek	Towns of Shandaken and Lexington	Completed 2013
Stony Clove Creek	Towns of Shandaken and Hunter	Completed mainstem reassessment 2013
Woodland Creek	Town of Shandaken	Completed reassessment in 2015
Maltby Hollow Brook	Town of Olive	Completed 2015
Little Beaver Kill	Towns of Woodstock, Olive, and Shandaken	Completed 2017
Lost Clove	Town of Shandaken	Completed 2018
Hatchery Hollow Brook	Town of Shandaken	Completed 2018
Esopus Creek	Town of Shandaken	Completed reassessment 2019 to confluence of Bushnellsville Creek

Stream Restoration/Stabilization Projects

Town	Project	Goal	Construction Cost	Status
Lexington	Broadstreet Hollow	Full channel restoration. Placement of in-stream structures, channel realignment, and hillslope stabilization.	$354,066 Total; AWSMP/Local Share $354,066	Completed 2001
Shandaken	Esopus Creek at Woodland Valley Demonstration	Full channel restoration. Placement of in-stream structures, channel realignment, and hillslope stabilization.	$1,027,968 Total; AWSMP/Local Share $591,593	Completed 2003
Shandaken	Woodland Valley Creek at Fawn Hill	Streambank stabilization to protect road.	$125,000.00 Total: AWSMP/Local Share $31,250.00	Completed 2010
Shandaken	Stony Clove Creek at Phoenicia (Main St. Bridge)	Post-flood emergency response.	AWSMP/Local Share $70,819	Completed 2011
Shandaken	Stony Clove at Chichester (Site # 1)	Reduce stream corridor instabilities that lead to chronic turbidity from suspended sediment loading.	$1,020,369 Total; AWSMP/Local Share $352,785	Completed 2012
Shandaken	Stony Clove at Chichester (Sites # 2,3,4)	Reduce stream corridor instabilities that lead to chronic turbidity from suspended sediment loading.	$1,636,255.70 Total; AWSMP/Local Share $791,129.59	Completed 2013
Shandaken	Warner Creek (Site #5)	Reduce chronic turbidity source and protect Silver Hollow Rd. (Town of Shandaken).	$495,465.68 Total; AWSMP/Local Share $284,862.27	Completed 2013
Shandaken	Warner Creek-Stony Clove Confluence	Protect transportation infrastructure and reduce potential future sources of chronic turbidity through grade control to mitigate upstream migration of headcut.	$1, 585,454.46 Total AWSMP/Local Share TBD	Completed 2014
Shandaken	Stony Clove at Stony Clove Lane	Protect vulnerable properties and reduce source of chronic turbidity.	$540,146.11 Total AWSMP/Local Share $135,036.49	Completed 2014
Hunter	Stony Clove Creek at Wright Rd.	Protect vulnerable properties and infrastructure, reduce source of chronic turbidity and enhance habitat and stream stability.	$1,678,050.14	Completed 2015

Hunter	Stony Clove Hillslope Stabilization	Stabilize failing hillslope that is source for fine sediment and water quality impairment.	$1,237,177.29	Completed 2016
Woodstock	Beaver Kill at Van Hoagland Road	Project 1 - Reach scale restoration and stabilization of hillslope failure about 400-ft upstream of the Van Hoagland bridge that is a source for fine sediment and water quality impairment.	$1,383,088.42	Completed 2018
Woodstock	Beaver Kill at Van Hoagland Road	Project 2 - Reach scale restoration and stabilization of hillslope failure about 1,200-ft upstream of the Van Hoagland bridge that is a source for fine sediment and water quality impairment.	Cost included in Van Hoagland Site 1 total	Completed 2018
Shandaken	Woodland Creek at Woodland Valley Park Association	Stabilize failing hillslope that is chronic source of suspended sediment and improve overall stream stability through a historically unstable section of Woodland Creek at the upstream extent of development.	$1,006,875.09	Completed 2018

Stream Buffer Projects

Project	Town	Goal
2010	Multiple	3 projects installed totaling 452 linear feet of bank treated.
2011	Multiple	11 projects installed totaling 2810 linear feet of bank treated.
2012	Multiple	13 projects installed totaling 2590 linear feet of bank treated.
2013	Multiple	8 Projects Totaling 3,350 linear feet, including planting, willow staking, and invasive control
2013 Warner Creek Site 5	Shandaken	Project covered 45,000 sq. ft., or 1.2 acres re-vegetated. Approx. 1500 trees and shrubs and 200 willow stakes.
2013 Phoenicia Main Street	Shandaken	Installation of 800 willows total extending 300' on both banks upstream of bridge.
2013 McKenley Hollow CSBI Site	Shandaken	Installed 130 trees and shrubs plus 225 willow stakes along 250 ft of McKenley Hollow Creek. Also, utilized custom seed mix designed by Catskill Center for restoration of native riparian plant communities. 650 linear feet treated.
2013 Amy's Takeaway and Upper Esopus Rod & Gun Club	Multiple	Japanese Knotweed control sites using landscape fabric to cover and attempt to control knotweed at upstream source areas. 205 linear feet treated.
2013 Moran Repair	Olive	Repaired buffer planting damaged during Tropical Storm Irene/Lee. 400 linear feet treated.
2013 Chichester Site 2	Shandaken	Began buffer plantings on portions of the Chichester 2/3/4 restoration project. 260 linear feet treated.
2014	Multiple	4 Projects Totaling 980 linear feet, including planting, willow staking, and invasive control; Assessment and surveying for 2 potential bioengineering sites (Bushkill and Upper Esopus).
2014 Stony Clove Stream Project	Shandaken	Buffer planting along 300 feet of Chichester project. Approximately 600 tree/shrub installed.
2014 UC-DPW Ct. Rt. 47 Slope	Shandaken	Provided buffer planting for DPW project to stabilize steep slope. Approximately 96 tree/shrub installed.
2014 Lerner Planting	Shandaken	Planting along 180 feet of Stony Clove Creek. Installed approximately 94 tree/shrubs
2014 Waldron Planting	Shandaken	Planting and invasive control along 400 feet of Broadstreet Hollow Creek. 379 tree/shrub installed.
2015 Waldron Planting	Shandaken	Native seeding along 300' of Broadstreet Hollow Creek within area 8,183 ft^2.
2015 Vitalo Planting	Shandaken	Installed 125 trees/shrubs along 275' of Stony Clove Creek within area 6,516 ft^2.
2015 Trigiani Planting	Woodstock	Installed 110 trees, 150 willows and native seeding along 175' of the Beaver Kill within area 1,345 ft^2.
2015 BIMA Planting	Shandaken	Installed 210 trees/shrubs along 140' of the Elk Bushkill within area 5,461 ft^2.
2015 Awan Planting	Hunter	Installed 136 trees/shrubs and 1,200 willows along 170' of Stony Clove Creek within area 3,234 ft^2.
2015 Chichester Site 2 Hillslope Stream Project	Shandaken	Installed 500 trees/shrubs and 1,200 willows along 1,010' of Stony Clove Creek within area 32,176 ft^2.
2015 Willow Field Planting		
2015 Buffer Planting Monitoring	Multiple	Established and surveyed 29 monitoring plots.
2015 Technical Assistance Site Visits	Multiple	Conducted 16 landowner technical assistance site visits.

Project	Town	Goal
2015 Riparian Corridor Management Plans	Multiple	Completed 26 Riparian Corridor Management Plans for landowners enrolled in CSBI.
2016 Catskill Interpretative Center Demonstration Buffer (CSBI & SMIP)	Shandaken	Established a demonstration riparian buffer display for education & outreach on streamside buffers. Project included volunteer invasive removal, installation of 265 native trees and shrubs, and wildflower pollinator seed mix.
2016 Wright Road CSBI Planting	Hunter	Project involved installation of over 400 native trees and shrubs on a previously restored failing hillslope.
2016 Menla Mountain CSBI Project	Shandaken	Phase 1 of a buffer restoration underway at Menla Mountain Retreat. This project engaged volunteers for invasive species awareness. Nearly 1 acre of invasives have been removed. Phase II is scheduled for Fall 2017 to re-plant with native species.
Moran Bushkill CSBI Bioengineering Project	Olive	600 linear feet of invasive removal, buffer restoration and streambank protection all wrapped in one project that showcases proper buffer management and use of soil bioengineering as a practical approach to streambank and ecosystem protection.
2016 CSBI provided plant materials for landowner installation	Shandaken	The CSBI Program provided plant materials to two separate landowners for self-installation of recommended buffer improvements as they were recommended in Riparian Corridor Management Plans.
2016 Riparian Corridor Management Plans	Multiple	Provided 5 landowner specific Riparian Corridor Management plans for landowners enrolled in CSBI
2016 Technical Assistance Site Visits	Multiple	Conducted 12 landowner technical site visits regarding stream problems and recommendations.
2016 Buffer Planting Monitoring	Multiple	Surveyed 24 sites and 41 individual monitoring plots on CSBI project sites for vegetation
2017 Buffer Planting Monitoring	Multiple	Conducted vegetation monitoring at 22 CSBI project sites
2018 Miller CSBI Project	Shandaken	Removed invasive species and installed 200 native tree/shrub, wildflower seed, and 155 live stakes on 560 ft. of an unnamed tributary to the Beaver Kill.
2018 Panther Kill Trib CSBI Project	Shandaken	Installed 390 native tree/shrub, 270 live stakes on 706 ft. of the Pantherkill tributary.
2018 Degennars CSBI Project	Shandaken	Removed debris and installed 75 native tree/shrub, 175 live stakes and pollinator seed mix on 529 ft. of an unnamed Esopus Creek tributary.
2018 Shokan Invasive Removal	Olive	Performed intensive invasive shrub removal on 1.2 acres of a riparian property along a direct Ashokan Reservoir tributary in Shokan. Area to be monitored for effectiveness.
2018 Meislan CSBI Project	Shandaken	Installed 250 native trees and shrubs along 446 ft. of Warner Creek. Live stakes, sedge transplants, and native pollinator wildflower mix to be installed in spring 2019.
2018 CSBI Site Visits	Multiple	Conducted 19 riparian landowner technical assistance visits.
2018 CSBI Project Monitoring	Multiple	Conducted CSBI project monitoring at 17 sites documenting condition of 33 planted plots.
2019 Amenta Live Staking Project	Shandaken	Provide material, tools and instruction for landowner self-install of 150 live willows on 175 feet of Esopus Mainstem streambank.
2019 Clugstone Invasive Removal	Woodstock	Remove invasive shrubs in planned bioengineering project area on 200 feet of a tributary to the Beaver Kill.
2019 Emerson Demonstration Buffer Project	Shandaken	Removed invasive plants and herbaceous layer. Installed 1,210 trees, shrubs and perennial sedges on 700 feet of a tributary to Esopus. Area re-seeded with pollinator friendly wildflowers and a walking trail in 2020, with interpretive signage and outdoor classroom planned in 2021.
2019 Kaiser Buffer Improvement Project	Shandaken	Removed dense thickets of invasive shrubs and installed 213 trees and shrubs along 400 feet of an un-named tributary to Esopus Creek in Mount Tremper. Pollinator seeding of ground cover and live staking to be completed in spring of 2020.
2019 Meislan CSBI Project	Shandaken	Installed pollinator seed, 150 live stakes and 40 herbaceous plugs in spring of 2019.
2019 CREP Solicitation	Multiple	Solicited 21 individual properties eligible for CREP/CSBI partnership projects.
2019 CSBI Site Visits	Multiple	Conducted 21 riparian landowner technical site visits.
2019 CSBI Project Monitoring	Multiple	Conducted CSBI project monitoring at 11 project sites documenting condition on 16 planting plots.
2020 Emerson Demonstraion Buffer Project	Shandaken	Installed pollinator seeding, walking trail, footbridge to complete the riparian demonstration in spring of 2020. Enrolled Emerson project into national pollinator pathway program. Enclosed area with deer exclosure in summer of 2020 and performed year 1 monitoring. Collaboration between CCE, UCSWCD & Emerson to develop educational signage and outdoor living classroom in 2021.
2020 Kaiser Buffer Improvement	Shandaken	Installed 75 live stakes and fern plugs in spring of 2020. Followed with herbaceous seeding and year 1 monitoring.

Project	Town	Goal
2020 Ashokan Brook Follow-up	Olive	Installed 265 trees and shrubs at Ashokan Brook in Shokan – follow-up to 2018 Shokan Invasive Spp. Removal Project. 270 linear feet of buffer installed. Yr. 1 monitoring 2021
2020 Clugstone Riparian Planting	Woodstock	Installed 130 trees and shrubs on 200 feet of tributary to Beaver Kill. Follow-up from 2019 Clugstone Invasive Removal. Live Staking along bank scheduled for spring 2021. Yr 1 monitoring 2021.
2020 Menla Brook Riparian Planting	Shandaken	Removed invasive shrubs and installed 98 trees and shrubs on both banks, comprising 270 feet of streambank, on a tributary to the Pantherkill Creek. Installed deer exclosure around planting. Yr. 1 monitoring 2021.
2020 Pantherkill Trib Buffer Replacement/Replant	Shandaken	Replaced 63 trees and shrubs with enhanced deer protection and provided deer protection for remaining live plants following high mortality of previously planted 2016 project.
2020 Walker Warner Creek Riparian Corridor Enhancement	Shandaken	Removed invasive shrubs and Installed 680 trees and shrubs plus herbaceous plugs to enhance 1,360 feet of riparian buffer along Warner Creek. Post-flood repair, seeding and staking scheduled for spring 2021. Yr. 1 monitoring 2021
2020 Birch Creekside House Buffer	Shandaken	Installed 65 trees and shrubs along 75 feet of Birch Creek in Pine Hill. Post flood repair, pollinator seeding and staking scheduled for spring of 2021. Yr. 1 monitoring 2021.
2020 Male Family Riparian Enhancement	Shandaken	Removed invasive shrubs and installed 335 trees and shrubs, 150 sedge plugs, and 125 ferns along 350 feet of the Broadstreet Hollow Creek. Post-flood repair, live staking and pollinator seeding scheduled for spring 2021. Yr. 1 monitoring 2021
2020 5-Arch Bridge Riparian Enhancement	Olive	Removed thick understory invasive shrubs and installed 233 tree and shrubs along 260 feet of Esopus mainstem to enhance riparian buffer. Post-flood repair and follow-up seeding and live staking scheduled for spring 2021. Yr. 1 monitoring 2021
2020 Farges of Warner Buffer Enhancement	Shandaken	Removed invasive shrubs and installed 234 trees and shubs on 320 linear feet of Warner Creek immediately upstream of the Warner/Stony confluence Stream Restoration Project. Yr. 1 monitoring 2021
2020 Bushkill Bioengineering Deer Exclosure Removal	Olive	Removed deer fence exclosure at Bushkill Bioengineering project in West Shokan.
2020 CREP Solicitation	Multiple	Solicited 4 individual properties eligible for CREP/CSBI partnership projects.
2020 CSBI Site Visits	Multiple	Conducted 17 riparian landowner technical site visits.
2020 CSBI Project Monitoring	Multiple	Conducted CSBI project monitoring at 13 project sites. Developed enhanced monitoring protocol to better evaluate site conditions and plant sources.

Education and Outreach Projects

Publications			
Type	Title(s)	Audience	Status
Stream Management Plans	Broadstreet Hollow Stream Management Plan (2003) Stony Clove Creek Stream Management Plan (2004) Upper Esopus Creek Management Plan (2007) Beaver Kill Stream Management Plan (2015) Bush Kill Stream Management Plan (2015) Bushnellsville Creek Stream Management Plan (2015) Woodland Creek Stream Management Plan (2018)	Watershed residents, stream managers, municipal officials, project partners	Completed for mainstem of Esopus Creek and several tributaries.
Newsletter	Esopus Creek News	Streamside landowners and project partners	2009 (3 issues) 2010 (2 issues) 2011 (3 issues) 2012 (3 issues) 2013 (2 issues) 2014 (3 issues) 2015 (3 issues) 2016 (3 issues) 2017 (2 issues) 2018 (1 issue) 2019 (3 issues) 2020 (1 issue)

Fact Sheets	Large Woody Debris Stream Guide (2012) Flood Preparedness Stream Guide (2012) Native Plant Stream Guide (2012)	General public, municipal employees, and streamside landowners	3 fact sheets completed (2009-2013)
Videos	Ashokan Conf – Speaker Presentations (2014) Ashokan Conf - Why We Are Here (2014) Ashokan Conf – Bark Peeling (2014) Ashokan Conf – Climate Change (2014) Ashokan Conf – Rivers are Dynamic (2014) Ashokan Conf – Stable Rivers Need Room (2014) Ashokan Conf – Dredging (2014) Ashokan Conf – Stream Expert Panel (2015) Ashokan Conf – Invasive Species (2015) Ashokan Conf – Ashokan Reservoir (2015) Ashokan Conf – River of the Future (2015) Watershed Detectives Youth – Get to Know your Watershed (2016) Ashokan Conf – Sustainable Communities (2017) Watershed Detectives Youth – All About Water (2017) Ashokan Conf - History and Future of the Esopus Ashokan Conf - Creek Fishery (2018) Ashokan Conf - Get to Know Invasive Plants (2018) Ashokan Conf - Prevent the Spread of Invasive Species (2018) Ashokan Conf - Invasive Species Management (2018) Ashokan Conf - Sustainable Fisheries (2018) Ashokan Conf - Managing for Sustainable Ecotourism (2018) Stream Study and Snorkeling Event (2018) Stream Snorkeling Program Info (2018) Watershed Detectives Youth – The Importance of Streams (2018) Watershed Detectives Youth – Stream Ecosystems (2019) Introduction to Rocks for Youth (2020) Introduction to Road Stream Crossing Assessment for Youth (2020) Sedimentary Rocks for Youth (2020) Celebrating Earth Day in the Watershed (2020) Stream Features for Youth (2020) Stream Cross Sections for Youth (2020) Igneous and Metamorphic Rocks for Youth (2020) Stream Channel Stability (2020) Sketching a Site Map for Youth (2020) Watershed Animal Spotlight-The American Beaver (2020) Watersheds and River Systems for Youth (2020) CCEUC Storytime: Little One and the Water (2020) The American Robin (2020) Stream Erosion for Youth (2020) The Movement of Stream Sediment for Youth (2020) Stream Feature Inventory in the Ashokan Watershed (2020) How to Read a FIRM Map (2020) How to Use a Flood Insurance Study (2020)	General public, stream managers, streamside landowners	2014-2020

	Stream Restoration Project Monitoring in the Ashokan Watershed (2020) Hydrograph of Tropical Storm Isaias (2020) Bank Erosion Monitoring (2020) Reference Reach Survey (2020) The Watershed Detectives Program (2020)		
Program Brochure	Guide to the Ashokan Watershed Stream Management Program	General public	Brochure completed 2011 Updated annually 2012-2020
Displays and Kiosks	AWSMP Program Esopus Creek Demo Project AWSMP Tabletop Program Display AWSMP Banner AWSMP 3-Sided Display	General public	Displays redesigned 2019
Action Plan	2009-2011 Action Plan 2010 Update 2011-2013 Action Plan 2012 Update 2013-2015 Action Plan 2014-2016 Action Plan 2016-2018 Action Plan 2017-2019 Action Plan 2019-2021 Action Plan 2020-2022 Action Plan 2021-2023 Action Plan	Project partners, municipal officials, applicants for funding, interested members of the public, FAD regulators	Updated annually
Websites	Ashokanstreams.org CERMconference.org	Watershed residents and stakeholders, grant applicants, event participants, general public	Updated regularly
Social Media	https://www.facebook.com/AWSMPUlster/ Twitter@AshokanStreams https://www.instagram.com/ashokanstreams/	General public	2011 Website published 2013 Website redesign Updated weekly 2015 Logo redesign 2017 Added Instagram
Press Releases	Projects and Events	General public	2011 (6) 2012 (15) 2013 (10) 2014 (16) 2015 (22) 2016 (14) 2017 (14) 2018 (12) 2019 (12) 2020 (12)
Email News Alerts	Various	Streamside landowners, municipal officials and project partners	Annually 2011-2020
Conferences and Training Programs			
Type	Title	Audience	Status
Watershed Conference	Ashokan Watershed Conference	Watershed residents, municipal officials, and project partners	2010, 2011, 2012, 2013, 2014, 2015, 2017, 2019, 2020
Research Symposium	Catskill Environmental Research and Monitoring (CERM)	Researchers, resource managers, project partners, interested members of the public	CERM 2010, 2012, 2014, 2016, 2018
Fluvial Geomorphology and Engineering Trainings	Rosgen 5-day Training (2009) Rosgen Public Presentation (2009) Intro to ArcGIS	Highway and DPW staff, stream managers,	2009-2019

	Cornell Local Roads Training (2010) Aquatic Organism Passage Training (2012) Stream Restoration Practices (2011) River Hydraulic Modeling (2014) Knotweed Management Training (2014) Turbidity and Suspended Sediment in the Upper Esopus Creek Seminar (2015) HEC-RAS Training for Modeling Culverts & Bridges (2019)	contractors, and program staff	
Floodplain Management Trainings	NYS Floodplain and Stormwater Manager's Conference and Certified Floodplain Manager Training (2010-2019) NFIP Educational Session (2013) Floodplain Mapping Fundamentals (2014) Benefit-Cost Analysis Workshop (2014) Using Depth Grids (2014) Emergency Waterfront Preparedness Class (2015) Community Rating System Workshop (2015) Flood Map and Insurance Basics-For Planning Boards/ZBAs, Towns of Hurley, Olive, Woodstock, Shandaken (2015, 2016, 2017, 2018, 2019, 2020) Elevation Certificate Training (2016) CFM Review Class (2014, 2015, 2016 2017, 2018, 2019, 2020) Floodplain Management for Real Estate Professionals (2017, 2018, 2019) Understanding Flood Maps and Flood Risks (2018) Elevation and Floodproofing Workshop (2019) Elevation Certificate Basics-For Planning Boards/ZBAs, Towns of Hurley, Olive, Woodstock, Shandaken (2020) Disaster Recovery Reform Act (2020) Route 212/Mount Tremper Bridge Replacement Updates (2020) Building Resilient Infrastructure and Communities Program (2020)	Code enforcement officers, planning board members, town board members, program staff, and watershed public	2010-2020
Stream Process/Get to Know Your Stream Management Plan Trainings	Get to Know the AWSMP (2019) Ashokan Watershed Weekend Municipal Officials Day (2020)	Municipal officials	2019-2020
Contractor Trainings	Post-Flood Emergency Stream Intervention (2012)	Local contractors, highway department staff, and project partners	2012
Landowner Workshops	Native Plants (2009, 2010) Raingardens (2011) Stream Erosion Class (2011) Little Beaver Kill Stream Walk (2015) Rochester Hollow Stream Walk (2015) Riparian Pollinators and Stream Buffer Program (2015) Beaver Kill Bus Tour (2016)Beaver Kill/Mink Hollow Stream Walk (2016) Winter Snowshoe Stream Walk – Rochester Hollow (2018) Woodland Creek Stream Project Walk (2018) Woodland Creek Stream Management Plan (2018) Ashokan Watershed Weekend Landowners Day (2020)	Streamside landowners	2009-2020
Teacher Trainings	Ashokan Center Education Staff Training (2015) Teacher In-Service (2019)	Formal and informal watershed educators	Occasional

Public Programs			
Type	Title	Audience	Status
Volunteer Events	Knotweed Pulls (2009, 2010) Stream Clean-Up (2010, 2011, 2012) Master Watershed Steward (2012) Willow Bed Planting (2012) Family, Fun & Fish Day (2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019)	General public, streamside landowners	2009-2019
Volunteer Buffer Plantings and Invasive Control	Various locations Menla Mountain Retreat (2016) Catskill Interpretative Center (2016) NYSDEC Love My Park Day (2016) Earth Day Tree Planting Wright Road (2017) Oliverea Knotweed Landowner Control (2017) Earth Day Tree Planting (2018) Invasive Removal & Ribbon Cutting Catskill Interpretive Center (2018) Van Hoagland Stream Project Volunteer Planting (2019) Catskill Visitor Center Earth Day Ashokan Girl Scout Chapter Buffer Service Project (2019) Woodland Creek Stream Project Trout Unlimited Volunteer Planting (2019)	General public, streamside landowners, students/interns	Annually 2010-2019
Booths and Displays	Shandaken Day Big Indian Spring Festival Olive Day Woodstock Library Day Ulster County Creek Week Ashokan Hoots Ulster County Fair Ashokan Watershed Conference Emerson Festival Mountain Valley Little League Day Rondout Valley Scout Camporee Longyear Farm Day National Outdoors Day Catskills Great Outdoors Expo	General public, streamside landowners	Annually 2009-2019
Public Meetings	Town Board Meetings, Other Meetings Elected Officials	Municipal officials	Annual presentations to Town Board of Shandaken, Olive, Woodstock, Hunter; meetings with Town officials, as needed
NYC Watershed Partner Meetings	NYC Watershed Education & Outreach Meetings Riparian Buffer Working Group Meetings CRISP Meetings FEMA Meetings NYC Watershed Partner Meetings CWT and CWC Meetings FHM Partner Meetings US-India Delegation Watershed Tour Sediment Management Working Group Meetings FAD Regulators Tour	Project partners	Program coordination and reporting annually, as required or needed
Public Talks and Events	Trout Research (2012) Rochester Hollow Stream Walk (2012) Arm of the Sea Theater (2012) Birch Creek Stream Walk (2012) Kanape Brook Stream Walk (2013) Trout Unlimited Meetings (2009-2013) Warner Creek Stream Walk (2014) Rochester Hollow Stream Walk (2013, 2015)	General public	Annually, as available

	Little Beaver Kill Stream Walk (2014, 2015) AWSMP Open House (2015) Film Showing and Lecture: Deep Water (2015) Riparian Pollinators Program (2015) Beaver Kill/Mink Hollow Stream Walk (2016) Menla Mountain Riparian Invasives Event (2016) Streamside Plant Invaders (CIC Project – 2016) Lark in the Park – Riparian Walk & Talk (2016) Maltby Hollow Stream Assessment (2016) NYC Funded Flood Buyout Program (2017) Floodplain Management Education (2017) Ashokan Watershed 2017 Updates (2017) Inland Flooding Local Flood Analysis (2017) Managing Your Flood Risk in the Hudson Valley (2017) Shandaken-Allaben LFA Final Public Meeting (2017) Fall in Love with Your Stream Event (2018) River Webs Film Screening (2018) DOT Mt. Tremper Bridge Public Meeting (2018) Boiceville Local Flood Analysis Results (2018) Understanding Flood Maps and Flood Risk – Schoharie Watershed Summit (2018) Snowshoe Stream Walk-Rochester Hollow (2018) Historic/Modern Stream Maps Event (2019) Final Presentation Olive Townwide Flood Hazard Mitigation Plan (2019) New Farmer Series – Streams and Floodplains (2019) Maltby Hollow Stream Feature Inventory Findings (2019) Understanding How Floods Happen and How to be More Flood Resilient (2019) Walking the Watershed Bus Tour – Stony Clove Flood Mitigation & Stream Restoration (2019) Stream Snorkeling – Esopus Creek Ecology (2018-2019) Sunset Rail Pedal – Esopus Creek Flood Mitigation & Stream Restoration (2019) Painting Stream Features (2019) Understanding Ashokan Reservoir Operations (2019) Watershed Paddle – Little Beaver Creek (2019) Book Signing and Reading “Little One and the Water” – Little Beaver Creek (2019) Paleoclimate of the Catskills (2019) Esopus Creek Fish and Fly Fishing Demonstration (2019) The Importance of Watershed Wetlands (2019) Messy Streams are Healthy Streams (2019) Stream Management – Woodstock (2019) Beyond NAAC: A Multi-Objective Road-Stream Crossing Assessment Protocol (2019) Snowshoe Stream Walk-Birch Creek (2020) Kanape Brook Stream Walk (2020) Bike Hike on Ashokan Rail Trail (2020) Ashokan Quarry Trail Fall Foliage Walk (2020)		
Youth Education			
Type	Title	Audience	Status
Presentations and Trainings	4-H Stream Team Stream Table Demo	Youth multiple ages	Annually, as available

	CCE Centennial Stream Table Demo UC Fair Floodplain Model Dem UC Fair Stream Table Demo Bennett Elementary Earth Day Macroinvertebrate Phoenicia School Earth Day Event Woodstock School Go Green Day Rondout Valley Scout Camporee Ashokan Center Education Staff Training (2015) 4-H Tech Wizards (2016) Onteora Summer School Stream Watch (2017, 2018, 2019) Stream Watch for Olive Summer Recreation Program (2017, 2018, 2019) 4-H Catskill Stream Champions (2017) Freshwater Snorkeling and Stream Study for Families (2018, 2019) Catskill Interpretive Center Nature Club (2018) CSBI Collaboration with Ashokan Chapter of Girl Scouts of America – Earth Day Events (2019) Ashokan Center YESS! Conference (2020) Summer Youth Hike Series (2020)		
After-School Activities and Classroom Enrichment	Watershed Detectives Club, Grades 4-6 Classroom Enrichment at Bennett, Woodstock and Phoenicia Elementary Schools Watershed Scientist in Residence	Onteora Central School District, Grades K-6	Annually
Youth Conference	Stream Explorers Youth Adventure (2018, 2019)	Youth grades 3 to 7 and parents/guardians	Annually

Program Coordination

Program Coordination			
Type	Purpose	Audience	Status
Stakeholder Council (Formerly the Advisory Council)	To provide overall guidance and oversight to the program	Project partners, municipal officials, streamside landowners and other community members	Meeting 2-3x per year
Flood Hazard Mitigation Working Group	To exchange information and identify opportunities to improve floodplain management and mitigate flood hazards	Municipal officials, project partners	Meet 3-4x per year
Stream Access & Recreation Working Group	To make recommendations for stream access/recreation improvements in the Ashokan Watershed	Project partners, recreation groups, municipal officials, local business owners	Meet 3-4x per year
Highway Managers Working Group	To exchange information and identify opportunities for technical or financial assistance to improve stream management	Highway managers, project partners	Meet 2-3x per year
Education and Outreach Working Group	To engage local educators in delivering educational programming and incorporate stakeholders into decision making	Project partners, watershed educators	Committee active 2012-2017 Replaced with NYC Watershed Education & Outreach Working Group 2018-2019
Stream Ecosystem Working Group	To advise on development of a program research, assessment and monitoring agenda	Researchers, resource managers, project partners	Meet 2-3x per year
Grant Review Committee	To review grants to the SMIP and make recommendations for funding	Project partners	Meet based on need

SMIP Projects

Education and Outreach					
Organization	Proposal Title	Proposal Number	Award Amount	Status	Purpose of Grant
Bennett Elementary School	Watershed Detectives Program	AWSMP-2011-1	$4,500	Complete	Expand the Scientist in Residence Program at Bennett Elementary School located in Boiceville, NY with the addition of a new Watershed Detective's program for the 2011/2012 school year. Hands-on program that introduces students to watershed topics: basic watershed morphology, hydrologic cycle, where their drinking water comes from, learning about negative impacts from overdevelopment, pollution, erosion, etc.
Ulster County Soil and Water Cons. District	Rosgen Level 2 - UC SWCD	AWSMP-2010-2	$2,235	Complete	The Ulster County Soil & Water Conservation District requested $6,586 to send staff member James Wedemeyer to attend River Morphology and Assessment training (Rosgen Levels II and III) in Shepherdstown, WV.
Ulster County Soil and Water Cons. District	Rosgen Level 3 - UC SWCD	AWSMP-2010-3	$4,097	Complete	The Ulster County Soil & Water Conservation District requested $6,586 to send staff member James Wedemeyer to attend River Morphology and Assessment training (Rosgen Levels II and III) in Shepherdstown, WV.
Ashokan-Pepacton Watershed Chapter-Trout Unlimited	Leaping Trout Art Project	AWSMP-2010-4	$925	Complete	The Leaping Trout Art Project was used to stimulate local awareness of Trout Unlimited and conservation issues in the Ashokan Watershed. The funds were used to cover the cost of printing a brochure containing the Leaping Trout Trail Map, a 4" x 9" rack card and maintaining the project website.
Catskill Center for Conservation and Development	Catskill Kiosk Panel Project	AWSMP-2010-12	$5,000	Complete	Interpretative kiosk along Route 28 in the Town of Shandaken, NY discussing the role and importance of the Catskill Park and the NYC Watershed. The kiosk is located near the site of the proposed Catskill Interpretive Center in Mount Tremper. The kiosk serves as a way to inform visitors to the area about what the Catskill Mountain region has to offer as well as issues facing the watershed and local ecology.
Ulster County Cornell Coop. Extension	Roadside Drainage Class for Highway Staff	AWSMP-2010-23	$874	Complete	Training for Ashokan Watershed Highway Departments on ditch and culvert best management practices.

Town of Woodstock	Woodstock Watershed Education Project	AWSMP-2010-26	$4,400	Complete	Education and outreach for Town of Woodstock Wetlands and Watercourse Law. Outreach and educational materials for town residents, local board members and businesses.
Phoenicia Library	Jerry Bartlett Memorial Angling Collection Improvement	AWSMP-2011-37	$10,000	Complete	Outreach and education to anglers of all ages and the general public about the links between robust fish and macroinvertebrate populations a water quality through workshops, presentations and events, digital exhibits and web design.
Ulster County Soil and Water Cons. District	Rosgen Level 4 - UC SWCD	AWSMP-2010-51	$5,000	Complete	The Ulster County Soil & Water Conservation District requested $5,000 to cover the costs associated with Rosgen Level IV trainings for James Wedermeyer. The trainings are to be held in October of 2011 at Pilot View, Inc. Dobson, North Carolina. They were awarded the full $5,000 requested.
Ulster County Dept. of Public Works	Rosgen Level 1 - UC DPW	AWSMP-2011-52	$3,000	Complete	Ulster County Department of Public Works requested $2,980 to send a stormwater specialist, Brendan Masterson, to Applied Fluvial Geomorphology (Rosgen Level I) training.
Ulster County Cornell Coop. Extension	Floodplain Manager Association Training Grant	AWSMP-2011-65	$2,445	Complete	Provide five scholarships for Town Floodplain Law administrators to attend the NYS Watershed Association Conference
Town of Shandaken	Floodplain Manager Training and Certifications	AWSMP-2013-71	$1,455	Complete	Send the Shandaken Town Supervisor, Code Enforcement Officer, and Highway Superintendent to the NYSFSMA 2014 conference and Certified Floodplain Manager training; and sit for CFM exam.
Town of Woodstock	Floodplain Manager Training and Certification	AWSMP-2013-72	$485	Complete	Send Town of Woodstock Code Enforcement Officer to the NYSFSMA 2014 conference and Certified Floodplain Manager training; and sit for CFM exam.
Town of Hurley	Floodplain Manager Continuing Education	AWSMP-2013-73	$325	Complete	Send Town of Hurley Code Enforcement Officer to the NYSFSMA 2014 conference and Certified Floodplain Manager training.
Ulster County Dept. of Environment	Floodplain Manager Certification and Continuing Education	AWSMP-2013-75	$810	Complete	Send two Ulster County staff to the NYSFSMA 2014 conference and Certified Floodplain Manager training; and sit for CFM exam.
Ulster County Dept. of Public Works	Wildland Hydrology Course Training for UCDPW Staff	AWSMP-2013-76	$3,186	Complete	Send Ulster County Civil Engineer, Andrew Emrich to Applied Fluvial Geomorphology Training (Rosgen Level I) in Shepardstown, WV.
Town of Lexington	NYSFSMA Annual Conference Attendance Plus CFM Test	AWSMP-2013-85	$988	Complete	Send Town of Lexington Code Enforcement Officer to the NYSFSMA 2014 conference and Certified Floodplain Manager training; and sit for CFM exam.

Town of Olive	NYSFSMA Annual Conference Attendance Plus CFM Test	AWSMP-2014-86	$2,199	Complete	Send Town of Olive Building Inspector and Code Enforcement Officer to NYS Floodplain and Stormwater Manager's Association Annual Conference from April 27 -29, 2015 and take CFM exam.
Town of Woodstock	NYSFSMA Annual Conference Attendance and CFM Continuing Education	AWSMP-2014-88	$1,312	Complete	Send Town of Woodstock Floodplain Administrator to NYS Floodplain and Stormwater Manager's Association Annual Conference from April 27 -29, 2015 and maintain CFM accreditation.
Ulster County Dept. of Public Works	Applied Fluvial Geomorphology Training for Ulster County DPW Staff	AWSMP-2014-89	$3,410	Complete	Send UC DPW staff to Rosgen Level II training from March 15 - 20, 2015.
Town of Shandaken	NYSFSMA Annual Conference Attendance and CFM Continuing Education	AWSMP-2014-99	$3,842	Complete	Send Town of Shandaken Supervisor, Highway Superintendent, Planning Board Chair, and new Code Enforcement Officer/Floodplain Manager to NYS Floodplain and Stormwater Manager's Association Annual Conference from April 27 -29, 2015 and acquire or maintain CFM accreditation.
Catskill Center	Riparian Buffer Demonstration Project at the Maurice D. Hinchey Catskill Interpretive Center	AWSMP-2015-105	$6 ,197	Complete	Education and outreach focused on a CSBI riparian buffer planting located at the Catskill Interpretive Center on St. Rt. 28. Features native Catskill plants and education about the care and restoration of riparian areas.
Cornell Cooperative Extension	2016 Stream & Floodplain Manager Training Scholarships	AWSMP-2015-111	$20,500	Complete	Offer up to 14 scholarships for town and county officials to attend stream and floodplain management trainings in 2016.
Cornell Cooperative Extension of Ulster County	2017-2019 Stream & Floodplain Manager Training Scholarships	AWSMP-2016-117	$20,847	Complete	Offer up to 19 scholarships for town and county officials to attend stream and floodplain management trainings in 2017 through 2019.
Cornell Cooperative Extension of Ulster County	Catskill Stream Champions	AWSMP-2017-132	$10,630	Complete	Train 4-H youth to educate Catskill trail users about streams and stream management practices.
Forge Collective	Catskill Waters	AWSMP-2017-133	$22,513	Complete	Create an online space for watershed residents about the importance of Catskill waters. Record and release a video series on stream assessment and condition of the Little Beaver Kill. Develop and publish a children's book featuring a tributary stream to the Ashokan Reservoir authored and illustrated by local artist Will Lytle.
Phoenicia Library	Educational Program About Licensed Guides	AWSMP-2019-147	$1,590	Complete	A public program at the Phoenicia Library about New York State licensed guides and stream management, professionally audio record the program, and archive a podcast and photos on the library's Jerry Bartlett Angling Collection website.

Catskill Mountain Club	Ashokan Quarry Trail Educational and Interpretive Signage	AWSMP-2019-148	$3,376	Complete	Develop interpretive signage for the Ashokan Quarry Trail on NYCDEP land within easy walking distance of the Ashokan Reservoir Promenade. Highlight the Esopus Creek valley.
Milone & MacBroom	HEC-RAS Workshop for Modeling Bridges & Culverts	AWSMP-2019-149	$27,850	Complete	Deliver a 3-day workshop for up to 20 people on how to use HEC-RAS hydraulic modeling software to evaluate bridges & culverts, with field and classroom components.
Infrastructure					
Organization	Proposal Title	Proposal Number	Award Amount	Status	Purpose of Grant
Town of Woodstock	Van Hoagland Road Bridge Replacement	AWSMP-2011-29	$200,000	Complete	Extend Van Hoagland Bridge by 20' to remove hydraulic constriction.
Ulster County Soil and Water Cons. District	Bradkin Road Culvert Replacement	AWSMP-2010-31	$107,480	Complete	Replace undersized culvert that was washed out in Oct 2010 flood with appropriately sized culvert.
Ulster County Dept. of Public Works	Woodland Valley at Fawn Hill	AWSMP-2010-41	$35,075	Complete	Stabilize a failing hillslope that endangers a road. Provides matching funds to a FEMA HMGP grant received by the Town of Shandaken.
Town of Woodstock	Van Hoagland Bridge Hydraulic Study	AWSMP-2011-57	$5,000	Complete	Engineering services to conduct a hydraulic analysis prior to replacing the Van Hoagland Bridge.
Ulster County Dept. of Public Works	Maben Hollow Bridge Repair and Expansion - Post Irene	AWSMP-2011-67	$29,300	Discontinued	Install a new abutment and bridge deck for the Maben Hollow Bridge on Esopus Creek that was damaged during Tropical Storm Irene. The new bridge has a 20-foot increased span length to improve hydraulic capacity.
Ulster County Dept. of Public Works	County Route 47 Culvert Replacement —Post Irene	AWSMP-2011-68	$77,300	Discontinued	Engineering to determine appropriate sizing and design of a culvert replacement for the Hillside Drive crossing.
Town of Olive	Engineering for Dry Brook at Hillside Drive Bridge Replacement	AWSMP-2013-69	$20,000	Complete	Engineering through 60% design to determine appropriate sizing and design of a culvert replacement for the Hillside Drive crossing.
Town of Shandaken Highway Dept.	Engineering for Woodland Creek at Fawn Hill Rd. Bridge Grade Control	AWSMP-2013-78	$10,000	Complete	Engineering for grade control downstream of the Fawn Hill Bridge to stop headcut moving toward bridge.
Town of Shandaken Highway Dept.	Conceptual Design for Fox Hollow Creek at Fox Hollow Rd. Bridge Grade Control by Panther Mountain Trail	AWSMP-2013-79	$10,000	Complete	Conceptual design for project to stop headcut moving toward the upper bridge on Fox Hollow Rd. across from Panther Mountain Park entrance. Retaining walls are failing and endangering the bridge and streambanks.
Town of Shandaken Highway Dept.	Engineering for Fox Hollow Creek at Herdman Rd. Bridge Grade Control	AWSMP-2013-80	$10,000	Complete	Engineering for grade control to prevent headcut and scour endangering the Herdman Rd. bridge off Fox Hollow Rd.
Town of Woodstock	Silver Hollow Creek at Silver Hollow Rd Culvert Replacement	AWSMP-2013-81	$50,000	Discontinued	Replace flood-damaged culvert with precast concrete box culvert. Project at the Intersection of Silver Hollow Rd. and Lane Rd.

Ulster County DPW	Mine Hollow Culvert Replacement	AWSMP-2014-90	$60,000	Complete	Replace and upsize culvert on Mine Hollow, a tributary to the Bushkill in the Town of Olive.
Ulster County Dept. of Public Works	Fischer Bridge over Esopus Creek Construction	AWSMP-2016-115	$77,300	Complete	Post-Irene construction of the Fischer Bridge carrying Oliverea Rd over the Little Panther Kill tributary to Esopus Creek in the Town of Shandaken. Replaces 8-foot diameter pipe with a 61- Ulster County Dept. of Public Works foot span bridge.
Local Flood Analysis Implementation					
Organization	Proposal Title	Proposal Number	Award Amount	Status	Purpose of Grant
Town of Olive Highway Dept.	Engineering & Design Upper Boiceville Road Culvert Replacement	AWSMP-2016-127	$0	Terminated and replaced with AWSMP-2018-140	Engineering and hydraulic studies for future replacement of Upper Boiceville Road culvert to reduce hydraulic constriction and maintain fish passage.
Town of Olive	Engineering Design for Upper Boiceville, DeSilva, and Burgher Road Crossings (LFA Implementation)	AWSMP-2018-140	$199,010	Complete	Engineering for upsizing of four Town crossings that are significantly impeding flood water and threatening public infrastructure and emergency access to homes. LFA recommended projects for Boiceville and West Shokan.
Ulster County Department of Public Works	Design Services for the Maltby Hollow Bridge Replacement (LFA Implementation)	AWSMP-2019-143	$80,000	Complete	Design a replacement bridge with proper sizing and abutment layout to reduce debris obstructions and prevent road flooding.
Planning					
Organization	Proposal Title	Proposal Number	Award Amount	Status	Purpose of Grant
Town of Woodstock	Habitat Mapping for the Town of Woodstock	AWSMP-2010-24	$29,000	Complete	Develop a large-format habitat map and a report describing terrestrial, wetland, and stream habitats; their relationship to maintaining groundwater and surface water resources; the plants and animals of conservation concern that may use the habitats; and detailed conservation recommendations. Maps to aid the town with planning, development and conservation decisions.
RCAP Solutions Community Resources	SAFARI Coordination with Mitigation Plan	AWSMP-2011-34	$10,000	Complete	Assist the Town of Shandaken with research and assembly of documentation of elevation certificates, repetitive loss areas, and information to support plan development, information meeting planning, advertising and coordination, other public outreach as needed.
Town of Shandaken	Phoenicia Mitigation Phase 1	AWSMP-2011-55	$32,771	Complete	Develop a design to reduce flooding from Stony Clove in Phoenicia at Rt. 212 bridge.
Town of Shandaken	Phoenicia Flood Resiliency Planning and Outreach	AWSMP-2011-56	$92,500	Complete	Hire a consultant to develop a flood hazard mitigation plan for the Town of Shandaken that provides overall coordination and improves

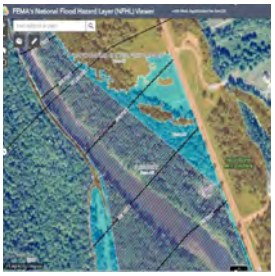
					communication of flood risks, develops flood mitigation measures and strategies, and materials for an application to FEMA's Community Rating System.
Town of Shandaken	Engineering Services for Pine Hill Trail Network	AWSMP-2013-70	$5,000	Complete	Develop plans for a hiking/ biking trail network with stream access and crossings interconnecting Smith Park to Main St., the Morton Memorial Library, and the Town of Shandaken Historical Museum (all town owned).
Town of Shandaken	Local Flood and Feasibility Analysis for Phoenicia and Mt. Tremper	AWSMP-2013-84 AWSMP-2014-101	$72,000 $20,850	Complete	Analyze flood conditions and identify hazard mitigation projects in Phoenicia and Mt. Tremper.
Town of Olive	Local Flood and Feasibility Analysis for Boiceville and West Shokan	AWSMP-2014-100	$76,631	Complete	Analysis of flood conditions and identification of hazard mitigation projects in Boiceville and West Shokan.
Town of Olive	Town of Olive Flood Hazard Mitigation Plan	AWSMP-2014-102	$18,788	Complete	Develop a Town Flood Hazard Mitigation Plan in the NYC Watershed portion of Town of Olive.
Town of Shandaken	Local Flood and Feasibility Analysis for Shandaken and Allaben Hamlets	AWSMP-2016-125	$115,000	Complete	Analysis of flood conditions and identification of hazard mitigation projects in the hamlets of Shandaken and Allaben.
Catskill Center	Pilot Chemical Control of Select Oliverea Japanese Knotweed Stands	AWSMP-2017-131	$3,065	Complete	Pilot chemical control methods on a stand of Japanese Knotweed in Oliverea across several years. Monitor treatment effectiveness and engage volunteers.
CCE Ulster County/Ulster County Dept. of Environment	Ashokan Watershed Stream Crossing Assessment and Prioritization	AWSMP-2017-136	$27,362	Complete	Assess approx. 500 public stream crossings for their potential to fragment streams and disrupt the natural movement of water, sediment, and aquatic organisms. Extend results to stream managers.
Town of Shandaken	Shandaken Flood Mitigation Plan: Required Five-Year Update	AWSMP-2018-141	$47,436	Complete	Hire a consultant to revise the Town's 2013 Flood Mitigation Plan to reflect Town's top flooding priorities in 2018 and beyond. Needed to quality for future flood disaster aid from New York State and/or FEMA.
Research and Monitoring					
Organization	Proposal Title	Proposal Number	Award Amount	Status	Purpose of Grant
SUNY New Paltz	Rock Snot in Sick Rivers	AWSMP-2010-8	$4,984	Complete	A research project to investigate the causes of invasive algae didymosphenia geminate "didymo." In particular, this project sought to find the causes of algae blooms in streams infested with didymo and whether certain factors such as climate, land use, water chemistry or hydrology play a role in the growth and spread of didymo. Funds were used to purchase field supplies for experimentation and sampling and decontamination equipment.

USGS Aquatic	Use of Telemetry to Assess Effects of Shandaken Tunnel on Trout	AWSMP-2010-9	$8,159	Complete	Purchase telemetry equipment used by USGS, DEC, DEP, CCE, and Cornell University to research river trout movements.
USGS Aquatic	Quantitative Assessment of Water Quality in the Upper Esopus Creek	AWSMP-2010-10	$27,080	Complete	Sample fish communities and habitat conditions at sites throughout the Esopus Creek Watershed in the summer of 2010.
NY State Museum/Geological Survey	Applied 3-Dimensional Geologic Mapping in Ulster County, NY	AWSMP-2010-13	$38,037	Complete	Conduct geological mapping in the Ashokan Watershed area.
Ulster County Cornell Coop. Extension	Trimble GPS Unit	AWSMP-2010-14	$8,375	Complete	Purchase a Trimble GPS for watershed-related data collection efforts.
USGS Aquatic	Quantitative Assessment of Fish, Macroinvertebrate, and Periphyton Communities in the Upper Esopus Creek	AWSMP-2010-19	$79,700	Complete	Conduct water quality quantitative assessments in the Upper Esopus Creek. Assess fish and algae populations in the Upper Esopus, the effect of the Shandaken Portal on aquatic organisms, the potential effects of Phoenicia water quality on aquatic organisms, and quantify water quality, sediment load and turbidity throughout the Upper Esopus and in the seven major tributaries to the Esopus for 1-3 years. Characterize temporal and spatial trends in biological indices and water quality. Work conducted in 2011 and 2012 (2011 field survey).
USGS Aquatic	Use of Telemetry to Assess Effects of Shandaken Tunnel on Trout	AWSMP-2010-20	$86,800	Complete	Study the effects of discharges from the Shandaken Tunnel on trout populations in the Upper Esopus Creek. Define the effects turbidity and sedimentation have on the local economy, trout populations, and quality of drinking water in the Upper Esopus Creek and Ashokan Reservoir.
USGS	Quantitative Assessment of Water Quality in the Upper Esopus Creek	AWSMP-2010-22	$90,990	Complete	Study water quality of the upper Esopus Creek. Conduct sampling to characterize fish and other aquatic organisms as well temperature, hydrology, turbidity, sediment and other variables. Work conducted in 2010 and 2011 (2010 field sampling water quality parameters).
USGS	Monitoring Turbidity, Suspended Sediment Concentrations, and Sediment Loads in the Beaver Kill and Warner Creek Watersheds	AWSMP-2011-27	$209,750	Complete	Extend Beaver Kill gage by 1 year and install gage on Warner Creek, collect and analyze sediment and turbidity samples, measure streamflow and develop a stage-to-discharge rating curve at both stream gages, and analyze how suspended sediment concentration and associated turbidity were impacted by stream restoration and stabilization projects.
SUNY - New Paltz	Characterization of Suspended Sediment in Warner Creek	AWSMP-2011-58	$5,000	Complete	Study the effects of suspended sediment on Warner Creek's ecology and geomorphology.

SUNY - New Paltz	Role of Suspended Sediment on Warner Creek's Ecology	AWSMP-2011-59	$5,000	Complete	Extend work on Warner Creek to conduct Stony Clove Creek watershed characterization. Covers the stipend of a SUNY New Paltz senior geology student.
SUNY New Paltz	Didymo in Esopus Creek: Identification of Bloom	AWSMP-2011-60	$7,400	Complete	Study didymo algae blooms in the Esopus Creek. Continues work done in 2011 to identify locations of didymo, measure water chemistry (a precursor to didymo infestation), test cleaning agents to determine functionality, and continue public education and outreach on techniques to prevent the spread of didymo.
Syracuse University	Bank Erosion Assessment and Analysis in Stony Clove Creek, 2001-2012	AWSMP-2011-61	$45,000	Complete	Resurvey 27 Bank Erosion Monitoring Sites (BEMS) along Stony Clove Creek and establish 10-12 new BEMS. Collect detailed measurements of elevation and calculate the volume of eroded material. Assess methodologies for suitability. Collect samples of stream bank material for physical characterization. Study streamflow data. Identify events most likely to have caused erosion.
USGS Aquatic	Impact of Climate Change (floods) on Stream Ecosystems in the Catskills	AWSMP-2011-62	$30,000	Complete	Assess the impacts of historic August 2011 flooding on the Upper Esopus Creek ecosystem, quantify short- and long-term rates of ecosystem recovery, characterize the effects of emergency channel repairs on the stream ecosystem, and provide data needed to help mitigate negative ecosystem impacts that may occur more frequently than in the past.
The Research Foundation SUNY New Paltz	Assessing the Impact of Groundwater and Heterogeneous Glacial Deposits on Streambank Erosion in the Stony Clove Creek Watershed	AWSMP-2013-74	$30,001	Complete	Study detailed glacial geology and groundwater-surfacewater interactions at study sites along the Stony Clove Creek and Warner Creek to inform understanding of streambank erosion dynamics and treatment options.
USGS Aquatic	Long-Term Effects, Resilience and Recovery of Fish in the Upper Esopus Creek	AWSMP-2013-77	$30,000	Complete	Survey fish assemblages at six-to-nine previously sampled sites in the Upper Esopus Creek during summer 2014 to assess the factors affecting the long-term impacts and (or) recovery of local fish populations and communities after floods. Continues work started under AWSMP-2010-19 and AWSMP-2011-62.
The Research Foundation SUNY New Paltz	Assessing the Impact of Groundwater and Heterogeneous Glacial Deposits on Streambank Erosion in the Stony Clove Creek Watershed	AWSMP-2013-74	$30,001	Complete	Study detailed glacial geology and groundwater-surfacewater interactions at study sites along the Stony Clove Creek and Warner Creek to inform understanding of streambank erosion dynamics and treatment options.
USGS	Long-term Trends in Rainbow Trout Growth	AWSMP-2014-94	$116,338	Complete	Study Rainbow Trout growth in the Ashokan Reservoir and long-term

	and Naturalized Populations in the Ashokan Basin				trends in their population sizes in the upper Esopus Creek. Conduct annual fish community surveys at six sites in 2015 and 2016.
USGS	Long-term monitoring of fish communities in the Upper Esopus Creek	AWSMP-2016-120	$35,781	Complete	Conduct annual fish community surveys in 2017 and 2018 at six previously surveyed sites to collect data that can be used to investigate long-term temporal trends in trout populations and fish communities.
Stantec Consulting Inc.	BANCS Model Calibration and Validation: Ashokan Watershed Predictive Regional Curve	AWSMP-2016-121	$260,260	Complete	Calibrate and validate the BANCS model to predict sediment supply contributed by bank erosion within the Ashokan Watershed. Pilot and test 3D laser scanning of banks.
SUNY New Paltz	Measure stream water temperature and evaluate spatial and temporal variation of thermal regime in the upper Esopus Creek Watershed	AWSMP-2016-122	$40,000	Complete	Measure stream water and air temperature in the Esopus Creek Watershed, predict dominant environmental variables controlling stream water temperature, and map thermal variation of water temperature over time and space.
U.S. Geological Survey	Analysis of Strategies to Monitor and Detect Change in Fish Assemblages of the Upper Esopus Creek	AWSMP-2018-138	$52,092	Complete	Determine the most effective strategies to monitor and detect changes in important fish resources across the Upper Esopus Creek watershed. Develop recommendations for future monitoring efforts while maintaining adequate statistical power to detect a biologically meaningful change in important natural resources.
Ashokan-Pepacton Watershed Chapter Trout Unlimited	Catskill Heritage Brook Trout Study	AWSMP-2018-142	$500	Complete	Study upper Esopus Creek tributaries for the possible existence of Catskill heritage brook trout in South Hollow Brook, a tributary to the Bushkill in West Shokan.
USGS	Continued Monitoring of the Wilmot Way Sediment and Turbidity Reduction Project in the Woodland Creek Watershed	AWSMP-2019-153	$14,953	Complete	Monitor suspended sediment concentrations and turbidity at the Wilmot Way bridge and upstream of the Woodland Creek Stream Restoration Project completed in 2018. This project continues funding for post-construction monitoring through 2020.
Restoration					
Organization	Proposal Title	Proposal Number	Award Amount	Status	Purpose of Grant
Town of Woodstock	Beaver Kill Channel Protection	AWSMP-2011-16	$5,700	Complete	Repair a breached section of steam bank on outside stream bend. During medium and high flows, this section diverts into a channel behind the streambank. Repair a stacked rock wall constructed on both sides of stream.
Town of Woodstock Hwy Dept.	Beaver Kill at Mink Hollow Projects	AWSMP-2011-17	$102,900	Complete	Projects to mitigate stream and road damages along Mink Hollow Road in the Town of Woodstock. Includes: above Van Hoagland Road reconnect the floodplain previously blocked by

					berms; stabilize the creek bed below a failed rock wall; and remove the buildup of LWD threatening to move the creek closer to road.
Town of Shandaken	Stony Clove at Phoenicia	AWSMP-2011-18	$234,000	Complete	Implement a stream restoration project to reduce Phoenicia flooding from the Stony Clove.
Ulster County Soil and Water Cons. District	Stony Clove at Chichester Site 1	AWSMP-2011-21	$431,337	Complete	Implement a stream restoration project to improve channel stability and water quality on the Stony Clove Creek (Chichester #1).
Town of Shandaken	Mitigation Grant Match Funds (Brown Road)	AWSMP-2011-63	$200,000	Discontinued	Provides matching funds to a HMGP grant to mitigate Brown Road.
Ulster County Dept. of Public Works	Maltby Hollow Brook Restoration - Post Irene	AWSMP-2011-66	$10,475	Complete	Maltby Hollow Brook's main channel was altered during tropical storm Irene. In order to mitigate potential dangers of flooding from future rainfall events, the County is going to remove the trees, excess sediment and debris in Maltby Hollow Brook and stabilize banks.
Town of Olive	Maltby Hollow Stream Feature Inventory and Erosion Site Assessment	AWSMP-2014-87	$30,219	Complete	Conduct a stream feature inventory and assess bank erosion on the Maltby Hollow Creek, a tributary to the Bush Kill.
Ulster County Department of Public Works	Bushkill / Watson Hollow Slope Stabilization	AWSMP-2015-103	$68,000	Complete	Engineering and design for Bush Kill streambank stabilization along Ulster County Rt. 42 in the Town of Olive.
Town of Shandaken	Final Design and Construction Fox Hollow Grade Control by Herdman Bridge	AWSMP-2015-110	$13,694	Complete	Field survey and conceptual design memo completed to investigate the need for a grade control structure on Fox Hollow Creek at the Town of Shandaken Herdman Road bridge. No active channel instability determined and treatment not recommended at this time. Monitor and reevaluate as needed.
Ulster County SWCD	Stony Clove Creek at Wright Road Stream Restoration	AWSMP-2015-112	$500,000	Complete	Local match for the EWP for the Stony Clove Creek at Wright Road stream project, in the Town of Hunter, Greene County, NY.
Town of Olive Highway Department	Hillside Drive Culvert Replacement over Dry Brook	AWSMP-2015-113	$344,000	Complete	Replace existing culvert with culvert better aligned with stream and able to pass the 100-year flow. Current culvert is a hydraulic constriction and in poor condition. Loss of the culvert would cut off access to 15 homes.
Town of Hunter	Town of Hunter Stream Restoration Project	AWSMP-2017-135	$8,650	Complete	Town costs associated with the Emergency Watershed Protection (federal) funded stream restoration project and hillslope stabilization at Stony Clove Creek Wright Rd. The Town of Hunter was project sponsor.



Cover photo: A glassy Ashokan Reservoir by Allison Lent.
At left from top to bottom: Bobby Taylor at a CSBI demonstration riparian buffer planting in Mt. Tremper; still image from the video 'How to Read a Flood Map' produced by Brent Gotsch; stream assessment monitoring crew from left to right: Elizabeth Axley, Tiffany Runge, Emily Polinsky, Allison Lent, and Laura Davis in Little Peck Hollow; step-pool on Esopus Creek headwaters stream; educational "bike hike" on the Ashokan Rail Trail; consultant Ethan Ely at a Local Flood Analysis implementation project in Boiceville.

DELAWARE WATERSHED
STREAM CORRIDOR MANAGEMENT PROGRAM

2021 – 2023 Action Plan for the East and West Branch of the Delaware River

Marvin Hollow Grade Control Town of Walton, NY constructed in 2019

Prepared by:
DCSWCD Stream Program
April 2021

Table of Contents

Introduction:

A comprehensive Stream Corridor Management Plan (SCMP) for the West Branch Delaware River was completed in 2005 and the East Branch Delaware River (EBDR) was completed in December 2007 by the Delaware County Soil & Water Conservation District (DCSWCD) Stream Corridor Management Program, Department of Environmental Protection (DEP), and Delaware County Planning Department (DCPD). Since their adoption, DCSWCD in partnership with DCPD and DEP have been implementing the 36 recommendations contained in the two plans following priorities established in the Action Plan for each basin. This Action Plan combines the previously separate Action Plans for each basin into one Action Plan for the entire upper Delaware Watershed within the New York City water supply watershed.

During the development of the West and East Branch Delaware River SCMPs, a Project Advisory Committee (PAC) was formed to represent the interests of local officials, residents, businesses, and agencies living and working in the Cannonsville and Pepacton Reservoir watersheds. The PAC assisted in the preparation of the SCMP recommendations and is now working collaboratively to guide the Stream Corridor Management Program (SCMPr) in the implementation of the recommendations.

In the implementation of the SCMPs, the PAC consists of all supervisors, mayors or their designated representatives. The PAC members have been instrumental in the development of program rules and selection of projects to be funded. In addition, the PAC has provided guidance to this SWCD as we move forward in our Flood Hazard Mitigation program.

The implementation of the recommendations shall be accomplished through the following program elements:

- Delaware Watershed Stream Management Implementation Program Grant (SMIP)
- Local Flood Hazard Mitigation Program (LFHMP)
- Catskill Stream Buffer Initiative (CSBI) Funding
- Restoration Project Funding
- Conservation Reserve Enhancement Program (CREP) Assistance
- Stream Corridor Management Program Technical Assistance and General Support

In 2020-2021, some action items within the Delaware Action Plan were impacted by the COVID-19 crisis. Delaware County SWCD will continue to follow the guidance from New York State, the US Federal government, local county government, and the Delaware County Soil and Water Conservation District's policies to stop the spread of the COVID-19 virus.

1. Delaware Watershed Stream Management Implementation Program Grant (SMIP)

The Delaware Watershed Stream Management Implementation Program (SMIP) grants, established in 2010, fund eligible stream and floodplain water quality protection construction projects and programs that advance the Stream Management Plan recommendations for municipalities that have adopted the Stream Corridor Management Plan and signed a Memorandum of Agreement with the Delaware County Soil and Water Conservation District.

The SMIP grant funds are typically offered through an annual application process with grants targeted to fulfill the SCMPr priorities and the recommendations of the stream management plans. The following section reviews the proposed Action Items related to the administrative aspects of the SMIP.

A. SMIP Administrative Action Items

1. **Update the grant application, review and award process for SMIP. (SCMPr Staff, DEP, PAC)**
    - **Schedule SMIP grant round 2021**
        i. **Pre-applications deadline March 1, 2021.**
        ii. **Formal applications will be scheduled in April/May 2021 after site visits.**
    - **Finalize and close out existing SMIP grants from 2017-2018 round**
    - **Continue an open enrollment for Local Flood Analysis-generated projects**

2. **Maintain information on the status of awarded grants and future grant rounds through the Catskillstreams.org website. (SCMPr Staff, DEP)**

3. **Regularly prepare and distribute press releases on the accomplishments of the recipients of SMIP grants. (SCMPr Staff, grant recipients)**

4. **Expand the scope of the SMIP grant funding to support flood hazard mitigation projects identified through the Local Flood Analysis (LFA) under the Local Flood Mitigation Program (LFHMP).**

5. **Create opportunities for the delegation of project design tasks to grant recipients, their consultants or consultants to DCSWCD.**

SMIP grants completed in 2020 are listed below:

Recreation and Habitat Improvements					
Project Title	**Applicant**	**Project Description**	**Length (feet)**	**Total Project Cost**	**Status**
½ Mile Hiking Trail	Catskill Recreation Center, Inc.	Recreation trail along the East Branch Delaware River	--	$40,383	Completed
East Branch Delaware River Trout Habitat Improvement	Trout Unlimited	Tag trout and monitor water temperature		$99,190	Completed
Flood Hazard Mitigation (since 2015)					
Project Title	**Applicant**	**Project Description**	**Length (feet)**	**Total Project Cost**	**Status**
Local Flood Hazard Mitigation Analysis	Town of Walton	LFA plan for the West Branch Delaware River	--	$194,840	Completed April 2015
Local Flood Hazard Mitigation Analysis	Village of Fleischmanns	LFA plan for the Village of Fleischmanns and the Hamlet of Clovesville	--	$77,250	Completed July 2016
Local Flood Hazard Mitigation Analysis	Arkville	LFA plan for the Hamlet of Arkville	--	$92,500	Completed May 2017
Local Flood Hazard Mitigation Analysis	Walton Tributaries	LFA plan for Village of Walton on East, West & Third Brook	--	$119,415	Completed Jan. 2018
Local Flood Hazard Mitigation Analysis	Town of Hamden	LFA plan for the Hamlet of Hamden	--	$70,000	Completed Dec. 2017
Local Flood Hazard Mitigation Analysis	Town of Andes	LFA plan for the Hamlet of Andes	--	$79,758	Completed April 2018
Local Flood Hazard Mitigation Analysis	Village of Delhi	LFA plan for Steele Brook, West Branch Delaware River, Elk Creek & Platner Brook	--	$96,758	Completed Jan. 2018
Local Flood Hazard Mitigation Analysis	Village of Stamford	LFA plan for the Villages of Stamford and Hobart, Hamlet of Kortright and Town of Stamford	---	$134,750	Completed April 2021
Local Flood Hazard Mitigation Analysis	Town of Roxbury	LFA plan for the Hamlets of Roxbury and Grand Gorge and the Town of Roxbury	---	$88,668	Completed March 2020
Local Flood Hazard Mitigation Analysis	Town of Halcott	LFA plan for the Town and Hamlet of Halcott	---	$64,804	Completed 2019
Water Street Floodplain Reclamation Project	Town & Village of Walton	Floodplain restoration & stormwater mitigation in the Village of Walton	640	$630,760 ($484,320 WRDA grant)	Completed 2019

2021-2022 SMIP grants are listed below:

Recreation and Habitat Improvements						
Project Title	**Applicant**	**Project Description**	**Length (feet)**	**Scheduled for Completion**	**Funding Awarded**	**Status**
Arkville Recreational Hub Trail Master Plan	Water Discovery Center	Recreation trail along the East Branch Delaware River	---	September 2021	$2,250.00	In-Progress
Highway/Infrastructure						
Project Title	**Applicant**	**Project Description**	**Length (feet)**	**Scheduled for Completion**	**Funding Awarded**	**Status**
Bull Run Stream Embankment Stabilization	Town of Middletown	Streambank restoration on steep embankment with fine sediment source of turbidity	400 (includes stream channel work)	Phase 1: December 2021 Phase 2: 2022 - 2023	$350,000 ($270,000 WRDA)	30% Design
Pines Brook Streambed Stabilization	Town of Walton	Streambed stabilization with grade control	600	Monitor Only	$275,000	Installed Monitor cross sections 2020
Tributary Grade Control Structures	Village of Walton	Stabilize streambed from erosion at the utility crossings	75	On-Going – Prioritized Based on Risk & Funding	$75,000	Site #8 : Preliminary Design Sites #4 & #6: 100% Design
Planning and Assessment						
Project Title	**Applicant**	**Project Description**	**Length (feet)**	**Scheduled for Completion**	**Funding Awarded**	**Status**
Carrol Hill Culvert Replacement	Town of Tompkins	Engineer design for culvert replacement	--	2021-2022	$30,000	Design in Progress with DCDPW
John Tuttle Culvert Replacement	Town of Middletown	Engineer design for culvert replacement	--	2021-2022	$30,000	Design in Progress with DCDPW

Flood Hazard Mitigation						
Project Title	**Applicant**	**Project Description**	**Length (feet)**	**Scheduled for Completion**	**Funding Awarded**	**Status**
Steele Brook Streambank Stabilization Phase I	Village of Delhi	Streambank stabilization on existing access route to Reservoir Park	125	December 2021	Phase I $238,700 Phase II $250,000 ($450,000 WRDA grant)	100% Design Bid Opened May 21, 2021
Steele Brook Streambank Stabilization Phase II	Village of Delhi	Streambank stabilization downstream of Phase I	250	December 2021		100% Design Bid opened on May 21, 2021
Breakey Motors Floodplain Reclamation project – Design only	Town of Walton	Floodplain reclamation design after the purchase and demolition of Breakey Motors building	625	December 2022	Part of CWC Project	Pending: 2-D Modeling needed to move project forward
West Branch Delaware River at the Confluence of Bagley Brook Bank Stabilization	Town of Hamden	Geomorphic assessment and bank stabilization design	2,000	December 2022	Potential LFHMA project	Preliminary nutrient load study Drafted; Initial Topo Surveyed
Andes Central School Stream Corridor Restoration	Town of Andes / Andes Central School	Floodplain bench, wall restoration, bridge replacement, sewer line protection/relocation and stream bed repair	1,050	December 2022-23	Potential LFHMA project	30% Design
Village of Stamford South Street Culvert Replacement	Village of Stamford	Replace partially collapsed arch bridge structure that spans WBDR	100	December 2021	Potential LFHMA project	Surveyed DPW to design and install Culvert
Pleasant Valley Brook / EBDR Confluence Debris	Town of Roxbury	Debris removal & minor channel shaping/dimensioning on Pleasant Valley Brook at the EBDR confluence	100	December 2021	Potential LFHMA project	GPS completed 2020 Survey pending Spring 2021

SMIP grant funds are offered to stakeholders to implement recommendations of the stream management plans and to further the evolving priorities of DCSWCD, DEP and the watershed communities. The following sections detail activities supported by the SMIP grant to implement plan recommendations.

Prioritization of Identified Stream Intervention Projects Action Items:

1. **Implement projects (example floodplain reclamation, bank stabilization, etc.) in collaboration with Municipalities. These projects will be identified in the Local Flood Analysis plans and in the East and West Branch Delaware River Stream Corridor Management Plans. (SCMPr Staff)**
   a. **Breakey Motors Floodplain Reclamation in the Village of Walton scheduled for 2022-2023.**
   b. **Steele Brook Phase I and II Bank Stabilization scheduled for 2021.**
   c. **Village of Stamford South Street Culvert Replacement scheduled for 2021.**

2. **Complete approved Delaware Watershed Stream Management Implementation Grant Program projects within the East and West Branch of the Delaware River watershed. A complete list of SMIP grants can be found on catskillstreams.org website. (SCMPr Staff and Sponsor)**

B. Enhance Recreation Opportunities Action Items:

1. **Provide technical assistance to communities to enhance streamside recreational opportunities. (DCPD, SCMPr staff, DEP)**
    a. **East Branch Recreation Access Plan Recommended Projects:**
        i. **Catskill Recreational Center ½ mile trail completed in 2020.**
        ii. **Arkville Recreational Hub Trail Master Plan to be completed in 2021.**

2. **Continue to work with the East Branch flood commission, municipalities and stakeholder groups in the implementation of the East Branch Recreation Access Plan. (DCPD, SCMPr staff, DEP)**

3. **Continue to work with the West Branch flood commissions, municipalities and stakeholder groups on improving recreation access on the West Branch Delaware River (DCPD, SCMPr staff, DEP)**
    a. **Water Street Boat Launch project completed in 2020.**
    b. **Beerston Boat Launch project to be scheduled for 2022-2023.**

4. **Continue to provide technical assistance to the flood commissions, municipalities and stakeholder groups for recreational opportunities (i.e. boat launch and river walk).**

C. Enhancement of Watershed Fisheries Action Items:

1. **Provide technical assistance and general direction to local grass-roots efforts, watershed associations and fisheries organizations to enhance existing fisheries. (DCPD, SCMPr staff, DEP)**

2. **Work with the Delaware County Chamber of Commerce, Central Catskills Chamber of Commerce, and the Recreation and Fisheries sub-committees to install boat launch access points along the West & East Branch Delaware River and to promote recreational fishing in the Cannonsville and Pepacton Reservoirs. Support the new boating program through outreach promotional activities such as sponsored fishing days, boating safety and fishing safety courses, etc. (SCMPr Staff, DCPD, DEP, EBDR Recreation and Fisheries sub-committee, CWC, DC Chamber of Commerce)**

3. **Encourage groups to work with municipalities to apply for funding through SMIP for projects that improve fish habitat, angling opportunities and an understanding of and appreciation for the aquatic ecosystem. (SCMPr Staff, DCPD, DEP, PAC)**
    a. **Work with Trout Unlimited to plant trees in the riparian buffer with volunteer groups and schools.**
    b. **Work with Trout Unlimited with culvert assessment and provide technical assistance for highway superintendents.**

2. Local Flood Hazard Mitigation Program

In response to major flood events in 2006 and 2011, the Delaware Stream Corridor Management Program partners have advanced the proposal for a watershed wide flood hazard mitigation effort that will identify the most beneficial projects for reducing flood related losses and water quality impacts and provide funds to implement those projects. In coordination with the CWC and at the request and direction of municipal government, the program will assist with the analysis, planning, funding, design and construction of hazard mitigation projects beginning during this Action Plan period. This effort will require the cooperation of all relative government entities, utilize the support of consultants and rely on the local knowledge of community leaders and residents. Funds will be made available for LFA recommended projects through the SMIP.

A. Flood Hazard Mitigation and Flood Recovery Action Items:

1. **Provide assistance to the Delaware County Planning Department and Delaware County Emergency Services through steering committee meetings for the regular updates of the Multi-Jurisdictional All-Hazards Mitigation Plan. (DCSWCD SCMPr Coordinator)**
    a. **The All-Hazard Mitigation Plan is in the process of being updated – Draft plan can be found online: https://delaware.mitigateny.org/**

2. **Provide documentation of completed flood hazard mitigation projects to the Hazard Mitigation Coordinator. Enhance the All-Hazard Mitigation Plan through the development of Local Flood Hazard Mitigation Plans (LFHMP) and by the implementation of the All-Hazards Mitigation Plan. (SCMPr Staff)**

3. **Provide assistance as requested by the Director of Emergency Services to the Emergency Operations Center during flood related events. (SCMPr Staff)**

4. **Maintain a list of historic problem areas where streams impact infrastructure during flood events and correlate to stream gage stage heights. (SCMPr Staff)**

5. **Work with communities to understand, utilize and revise FEMA floodplain maps. (DCPD, DEP Project Manager, NYSDEC, SCMPr Staff)**
    a. **Continue to work with SLR consultant to submit the East Brook Letter of Map Revision (LOMR) to FEMA.**

6. **Provide scholarships for training opportunities for Certified Floodplain Managers (CFM) and Code Enforcement credits**

7. **Work with communities to update local ordinances, laws and comprehensive land use plans to incorporate elements of the Stream Corridor Management Plan, its recommendations and stream stewardship principles. (DCPD, SCMPr Staff)**

8. **Provide technical assistance to municipalities with emergency stream intervention measures during flood recovery. (SCMPr Staff)**

9. **Support educational programs for the public and school students that promote a better understanding of meteorology, hydrology, hydraulics and flood issues. (DCPD, SCMPr Staff)**

10. **Design and implement flood mitigation practices including but not limited to floodplain reclamation, scientific channel dimensioning, and natural stream design techniques throughout the Delaware Watershed. (SCMPr Staff, DEP)**
11. **Implement the Local Flood Hazard Mitigation Program including the development and refinement of program rules, guidelines, procurement documents as well as providing guidance and outreach to participating communities, support of the consultants, and input on the identification and prioritization of projects. Provide assistance with the acquisition of grant funds and technical support for project design and construction (implementation). (DCSWCD staff, DC Planning staff, DEP)**

12. **Provide funds for the Local Flood Analysis process and recommended flood hazard mitigation stream projects through the SMIP.**

13. **Work with the following Flood Commissions to Implement the LFA plan recommendations:**
    - **Walton Flood Commission**
        i. **West Branch Delaware River & Tributaries (East Brook, West Brook, Third Brook)**
    - **East Branch Delaware Flood Commission including:**
        i. **Fleischmanns / Clovesville**
        ii. **Middletown**
        iii. **Arkville**
    - **Delhi Flood Commission**
    - **Hamden Flood Commission**
    - **Andes Flood Commission**
    - **Stamford Flood Commission**
    - **Roxbury Flood Commission**
    - **Halcott Flood Commission**

3. Catskill Streams Buffer Initiative (CSBI) funding

Catskill Streams Buffer Initiative (CSBI), established in 2009, provides a mechanism whereby streamside landowners, with property within the New York City Watershed, can receive technical assistance, educational materials, planning assistance, and funding to improve and maintain their riparian (streamside) areas. CSBI is a part of the overall Stream Management Program, and is a complement to other existing stream management programs. The CSBI program focuses on improving riparian buffer protection for private, non-agricultural landowners who are not covered or supported through other riparian protection programs within the East and West Branch Delaware River watersheds.

The overall goals of CSBI are to inform and assist landowners in better stewardship, and to work with landowners to identify practices to improve their riparian (streamside) areas, through proper management, protection, restoration, or enhancement. To achieve these goals, CSBI will assist riparian landowners throughout the Delaware Watershed by providing:

1) Access to technical assistance through their DCSWCD concerning their streamside property.
2) Development of Riparian Corridor Management Plans (RCMP) to create awareness about riparian management issues specific to individual properties.
3) Development of Best Management Practices (BMP) and prescriptive measures to improve landowner management of their riparian buffer in order to enhance the function and condition of the riparian buffer.
4) Assistance with installation of riparian buffer improvement measures, such as native plantings, and other prescriptive projects.

5) Educational materials and activities as needed by landowners to understand the critical role of their buffer and how to maintain it in optimal functioning condition.

The Action Items associated with these goals for the years 2021 – 2023 are identified below.

A. Stream Corridor Management Plans for Non-Agricultural Riparian Landowner Stewardship Action Items

1. **Continue the implementation of the Catskill Streams Buffer Initiative (CSBI) through the DCSWCD Stream Corridor Management Program Contract funded by DEP. (DCSWCD CSBI Coordinator, DEP Project Manager).**

2. **Periodically review and update the protocol for prioritizing the implementation of the Catskill Streams Buffer Initiative and strategies for soliciting participation in the program. (DCSWCD CSBI Coordinator, SCMPr Coordinator, DEP Project Manager)**

3. **Development of a minimum of 24 Riparian Corridor Management Plans (RCMP) by the end of the 2025 DCSWCD/DEP contract. (DCSWCD CSBI Coordinator, DCSWCD SCMPr Staff)**

4. **Implement a minimum of 5 Riparian Corridor Management Plans per year by means of contractual planting services. (DCSWCD CSBI Coordinator)**

5. **Installation of at least 2 bioengineering projects by the end of the 2025 DCSWCD/DEP contract. (DCSWCD CSBI Coordinator)**

6. **Installation of a minimum of 5,000 streambank feet of revegetation by the end of the 2025 DCSWCD/DEP contract. (DCSWCD CSBI Coordinator)**

CSBI Projects completed in 2020 are listed below:

CSBI Riparian Corridor Planting Projects				
Project Title	**Location**	**Length (feet)**	**Project Acres**	**Status**
Kerr's Creek Riparian Restoration	Town of Walton	1,960	8.75	Completed
SUNY Delhi Service Planting	Town of Delhi	100	0.42	Completed

CSBI Projects scheduled for 2021-2023 are listed below:

CSBI Riparian Corridor Management Planting Projects				
Project Title	**Location**	**Length (feet)**	**Scheduled for Completion**	**Status**
Old Herrick Road Riparian Plantings (Phase 3)	Town of Middletown	1,300	2021-2022	Phase 1 & 2 Completed
Cal Terry Riparian Restoration	Town of Hamden	300	2021	Planning
Vly Creek Trib Planting-Rauter	Town of Halcott	300	2021	Planning
Mill Brook Planting – Beyea	Town of Hardenburgh	950	2021	Planning
Hardscrabble Planting-Rodregues	Town of Roxbury	600	2021	Planning
East Brook-D'Orazio (Post-Stream Restoration) Planting	Town of Walton	600	2021	Planning
Delaware Basin Invasive Species Control	Delaware Basin	NA	2021	Planning
Beech Hill Post-Knotweed Control Planting	Town of Andes	1,300	2021	Planning
Uplands Center Planting	Walton	2,300	2021	Planning
Vly Creek Restoration-Brush Ridge Associates	Town of Middletown	900	2021	Planning
Mead Road Post Knotweed Control Planting	New Kingston	1,560	2021	Planning
Samuels Knotweed & Restoration	Massonville	300	2022	Application Received 2021
Sturdavant-Delaware Ave	Delhi	440	2022	Application Received 2021
Marvin Hollow Planting	Walton	400	2022	Application Received 2021
Little Delaware Knotweed Control	Delhi	250	2022	Application Received 2021

7. **Implement 1 demonstration or educational Riparian Corridor Management Plan per year. (DCSWCD CSBI Coordinator)**
    a. **Educational RCMP implementation:**
    b. **Conduct volunteer plantings or educational workshops with community groups and local students.**
    c. **Conduct a volunteer educational workshop on bare-root transplant to containers or tree planting events with local high school students, SUNY Delhi college students and BOCES students to promote the benefits of riparian buffers.**

CSBI Student/Educational Planting Projects & Workshops			
Project Title	**Location**	**Scheduled for Completion**	**Project Type**
Margaretville Elementary Student Planting	Halcottsville/East Branch Delaware River	Fall 2021	Student Planting
Trees for Trout - East Branch Delaware River Planting	East Branch Delaware River	Seasonally 2021-2023	Volunteer Planting
GreenNY Student Planting (NY City Students)	SUNY Delhi OEC; Town of Delhi	Spring 2022 & 2023	Student Planting
Riparian Forest Buffer Walk	Margaretville	October 2021	Workshop
DCMO-BOCES Student Plantings	Walton	Yearly 2021-2023	Student Plantings
Catskill Youth Climate Summit	Catskill Region	October 2021	Workshop
SUNY Delhi Outdoor Education Center Spring & Fall Plantings (SUNY Delhi Students)	Town of Delhi	Ongoing Yearly	Student Plantings
Bare-root transplant Activity – DCMO BOCES/Students	DCSWCD, Walton	Ongoing Yearly	Student Workshop

8. **Education and outreach for CSBI shall be accomplished by facilitating at least one riparian workshop for landowners per year. Education and outreach shall also be accomplished by active participation at relevant local events, direct mailings, website usage, and local media. (DCSWCD CSBI Coordinator)**

CSBI Education & Outreach Events		
Project Title	**Location**	**Date**
Riparian Buffer Working Group	Kingston	Annually
Various Student Events/Plantings	Cannonsville & Pepacton Watersheds	As needed 2021-2023
Walton 4H outreach & planting events	Walton	As needed/as requested 2021-2023
Bare-root transplant Activities – DCMO BOCES/Students	DCSWCD, Walton	Annually
Riparian Walks/Workshops	Various locations	Annually
Forestry Festival – Stream Table / Riparian Buffer Display	Village of Margaretville	Annually*
Cauliflower Festival – Stream Table / Riparian Buffer Displays	Village of Margaretville	Annually*
Delaware County Fair	Town of Walton	Annually*
Youth Climate Summit Workshops	Catskill Region	Annually

*** Note: Pending if outreach events occur in 2021 due to COVID-19 pandemic limitations.**

9. **Secure for all CSBI projects, landowner license and maintenance agreements for access by DCSWCD and DEP to facilitate ongoing maintenance and monitoring. (DCSWCD CSBI Coordinator)**

10. **Develop planting plans as requested for applicable stream program projects in coordination with stream program staff. (DCSWCD SCMPr Staff and DCSWCD CSBI Coordinator)**

11. **Develop and implement a monitoring program for riparian buffer projects to identify project success and effectiveness. (DCSWCD CSBI Coordinator, DEP CSBI Coordinator)**
    a. **Monitoring protocol developed for all implemented CSBI (and supplemental) projects.**

CSBI Yearly Project Monitoring	
Year Monitored	**Number Projects Sites**
2020	20 Completed
2021	28
2022	19
2023	18
2024	20

    b. **Monitoring protocol was developed for invasive species monitoring of CSBI planting project locations.**

12. **Develop local resources to maintain availability of native vegetation planting stock as needed. (DCSWCD CSBI Coordinator)**
    a. **Conduct bare-root transplant to containers event with Walton Central School and DCMO BOCES to secure supplemental plants and species for CSBI planting projects.**
    b. **Work with SUNY Delhi summer interns to assist in project monitoring, invasive species eradication efforts and maintenance of plant stock for planting projects.**
    c. **Collaborate with the DEP Project Manager on determining plant material needs and the coordination of logistics pertaining to delivery of native plant materials for riparian project planting sites.**

13. **Provide technical assistance to streamside landowners through ongoing coordination with the West-of-Hudson Riparian Buffers Working Group.**

B. Implement a Variable Width Riparian Buffer Pilot Program Action Items

1. **CSBI will continue to identify eligible sites for implementing variable width buffers. (DCSWCD CSBI Coordinator, DEP Project Manager, DCSWCD SCMPr staff)**

2. **Identify potential sites for demonstration of a variable width riparian buffer pilot project. Implement one demonstration project. (SCMPr Staff, DEP Staff, WAP Staff)**

C. Implement a CREP/CSBI Riparian Buffer Pilot Program on Non-Agricultural Lands with the USDA Conservation Reserve Enhancement Program (CREP) Action Items

1. **Implement the prioritization process for providing technical and financial assistance to the Watershed Agricultural Council (WAC) for fallow land CREP-CSBI projects and identify roles and responsibilities in implementation. (CREP-CSBI Pilot Program Working Group)**

2. **Conduct stream evaluation and assessment to determine Pilot Program eligibility, including if stream instability issues will preclude projects. Training and ongoing assistance to support evaluations and assessments. (CREP-CSBI Pilot Program Working Group)**

3. **Provide design support for the development and approval of conservation plans (Riparian Corridor Management Plans) and implementation of projects that facilitate CREP enrollment. (CREP-CSBI Pilot Program Working Group)**

4. **Provide CSBI cost-share funding to the Watershed Agricultural Council to facilitate fallow land CREP enrollment. (SCMPr Coordinator, SCMPr Staff, DEP Project Manager)**

5. **Monitor and evaluate the success of the CREP-CSBI projects. (SCMPr Staff)**

6. **Continue to monitor and evaluate metrics and report to assess the effectiveness of the extended Pilot Program (CREP-CSBI Pilot Program Working Group)**

7. **The Delaware County CREP-CSBI Pilot Program Working Group shall include: SCMPr Coordinator, SCMPr-CSBI Coordinator, DEP Project Manager, WAC Program Managers and Planner(s), DCSWCD and NRCS.**

CREP/CSBI Riparian Corridor Management Planting Projects				
Project Title	**Location**	**Length (feet)**	**Scheduled for Completion**	**Status**
West Terry Clove Brook Restoration	Town of Hamden	1560	Fall 2021	Planning
Winter Hollow Brook Restoration	New Kingston	2850	Fall 2021	Planning
Upper East Brook – Site 1	Town of Walton	375	2022	Planning
Upper East Brook – Site 2	Town of Walton	1230	2022	Planning
East Brook (D'Orazio) Post Restoration Planting	Town of Walton	500	2021	Planning
Hefele Planting	Town of Walton	200	2022	Planning
East Brook Farm	Town of Walton	2000	2023	Planning

D. Invasive Species Management Action Items

1. **Continue to work collaboratively with Delaware County Solid Waste Facility to compost Japanese Knotweed. (SCMPr staff, DCDPW)**
    a. **Continue to treat invasive species such as Japanese knotweed on CSBI project sites with a variety of methods including herbicide application and monitor the effectiveness of methods.**
    b. **Conduct a Japanese Knotweed pull and clean up educational workshop with local community groups and SUNY Delhi college students.**

CSBI Invasive Species Control Projects		
Project Title	**Location**	**Scheduled for Completion**
Mead Road Knotweed Control	New Kingston	Ongoing thru 2021
Kelly's Kayaks Knotweed Control	Halcottsville	Ongoing thru 2021
Depot Street Knotweed Control	Fleischmanns	Ongoing thru 2021
Upper East Brook Road IS Control	Town of Walton	Ongoing thru 2022
Vly Creek IS Control	Town of Halcott	Completed 2020
East Brook IS Control-Siegel	Town of Walton	Ongoing thru 2023
East Brook IS Control-Hobbs	Town of Walton	Ongoing thru 2023
East Brook IS Control-D'Orazio	Town of Walton	Ongoing thru 2023
East Brook IS Control-Parrinello	Town of Walton	Ongoing thru 2023
Delhi – Delaware Ave Knotweed	Town of Delhi	Beginning 2021
Kerr's Creek Knotweed Control	Town of Walton	2021-2023
Cal Terry Invasive Species Control	Town of Hamden	Ongoing thru 2023
Sturdevant-Delaware Ave	Town of Delhi	Beginning 2021
Little Delaware Knotweed Control	Town of Delhi	Beginning 2021
East Brook Farm Knotweed Control	Town of Walton	Beginning 2021

2. **Continue to participate in Catskill Regional Invasive Species (CRISP). (SCMPr staff, DCPD)**

3. **Working with program partners and local agencies on developing Japanese knotweed control focus group.**

4. Restoration Project Funding

Restoration projects utilize new and innovative stream management techniques with educational value. These projects make use of fluvial geomorphic principles and the scale of the project may vary from localized activities such as stream bank stabilization to more extensive stream restoration projects.

A. Debris Management Action Items

1. **Develop a Delaware County protocol for municipalities to manage woody debris in stream systems. (DCSWCD SCMPr Coordinator, DEP Project Manager, DCDPW)**

2. **Design and implement two demonstration projects that utilize the woody debris protocol developed by the SCMPr. (SCMPr Staff)**
    a. **Steele Brook woody debris removal SMIP grant to be completed in 2021.**

3. **Undertake a periodic review of the woody debris protocol developed by the SCMPr. (SCMPr Staff, DEP Staff)**

B. Stream Gravel Deposition Issues Action Items

1. **Develop and implement an educational and outreach program to teach municipal leaders and community members about the specific stream processes involved in the mobilization and transport of gravel and debris. Continue to promote training in Post-Flood Stream Intervention practices. (SCMPr Staff)**
    a. **Continue to support the Walton Central School students with the gravel study and encourage additional studies that were funded with a SMIP grant to study sediment issues in streams near the bridges in the Village of Walton. The SMIP grant was completed in 2015, but the program will continue the gravel study in the environmental class curriculum.**

2. **Continue to encourage one or two municipalities to apply for grant funding through the SCMPr to scientifically study stream reaches with identified gravel deposition issues for potential case studies to be used in Item 1. This could be accomplished through the Local Flood Hazard Mitigation Analysis process. (SCMPr Staff)**
    a. **MacGibbon Hollow stream in the Town of Walton**

3. **Continue to implement and monitor the West Branch Delaware River tributary bedload transport study to utilize passive radio frequency identification (RFID) tracers deployed into three study locations in East Brook tributary. This scientific study will determine the relation of discharge to the movement and displacement of sediment. (SCMPr Staff)**
    a. **East Brook in the Village of Walton was selected as the study area in (2019). A variety of rocks were collected and measured before the RFID were placed in the drilled holes and epoxied. The rocks were placed back into East Brook stream in approximately the same location. The rocks will be found using an antenna and the location GPS after a significant storm. Monitoring the movement of sediment will continue in 2021-2025.**

4. **Design and implement two demonstration projects that utilize the existing gravel management protocol developed by the SCMPr. (SCMPr Staff)**
    a. **Continue to photo monitor the Post-Flood Emergency Stream Intervention project located in the Town of Hamden on Launt Hollow stream that was completed in 2009. The Hamden Highway Department maintains the steam channel to the proper width and depth for approximately 100 linear feet whenever the stream capacity is compromised with gravel.**
    b. **MacGibbon Hollow and Marvin Hollow in the Town of Walton**

5. **Undertake a periodic review of the gravel maintenance protocol developed by the SCMPr. (SCMPr Staff, DEP Staff)**

C. Nutrient Loading Study Action Items

1. **Implement the West Branch Delaware River nutrient loading study to assist in the prioritization of projects. This scientific study will determine the relation of discharge to streambank erosion and the loading of Total Phosphorus (TP) and Total Nitrogen (TN) into the West Branch Delaware River. (SCMPr Staff)**
    a. **The confluence of Bagley Brook and the West Branch Delaware River on the River Haven Farm in the Town of Hamden was selected as a study area. An eroding streambank along a corn field is contributing excessive amounts of sediment to the river system. Several soil samples were taken and sent for laboratory analysis to determine the concentration of TP and TN in the loaded sediment. GIS analysis was used to determine volume of eroded soil. Together, these variables allow for the calculation of total mass of TP and TN loading at this site.**
    b. **An eroding streambank along the West Branch of the Delaware River at the Birdsong Farm in the Town of Hamden was selected as a second study area. An eroding streambank along a hay field is contributing excessive amounts of sediment to enter the river system. Several soil samples were taken and sent for laboratory analysis to determine the concentration of TP and TN in the loaded sediment. GIS analysis was used to determine volume of eroded soil. Together, these variables allow for the calculation of total mass of TP and TN loading at this site.**
    c. **A draft of the "Two Nutrient Loading Case Studies at Significant Streambank Erosion Sites on the West Branch Delaware River" report is in peer review. This report includes results from the data collected from the two projects listed above.**
    d. **Additional sites will be selected for study in 2021-2022 using GIS analysis. Sites will be chosen based on severity of erosion and nutrient content using the same process outlined for the River Haven Farm and Birdsong Farm sites.**

D. Utilize Existing Funding Sources Action Items

1. **Continue to explore opportunities for utilizing grant funding sources to match SCMPr funds for implementing recommendations. (DCSWCD SCMPr Coordinator)**
    a. **Army Corps of Engineer's Water Resources Development Act (WRDA)**
        i. **Bull Run Stream Slope Stabilization in the Town of Middletown**
        ii. **Steele Brook Streambank Stabilization in the Town of Delhi**

2. **Train staff and others within the watershed on how to prepare grant applications for obtaining additional funds for matching SCMPr funds.**

E. Demonstration/Restoration Projects for Construction in 2021 – 2022

1. **Bull Run Streambank Repair, EBDR Middletown**
    a. **This project was recommended by the PAC to fund as a demonstration project for repair of a 2013 Emergency Watershed Protection stream project upon request from the Town of Middletown Supervisor. In 2013, the streambed had been stabilized using 3 hardened riffle structures and the toe of the embankment was protected with rip rap, which are still working. The steep embankment failed in the spring of 2016 and the top area liquefied with the frost thawing out of the soil and sent the whole face sliding down in a debris flow.**
    b. **2021 Status: Milone and MacBroome, Inc. (now a part of SLR Consulting), an engineering consultant, has been selected to design the project. The project design is currently at 30%. Construction is anticipated in 2021.**

2. **Steele Brook Streambank Stabilization, WBDR Delhi**
    a. **This project was recommended by the Local Flood Analysis (LFA) for the Town and Village of Delhi, written by a consultant, Woidt Engineering & Consulting, PC, for the Delhi Flood Commission. The project consists of a streambank stabilization on one of the worst slope failures in the Steele Brook watershed that impairs water quality with fine sediment and woody debris.**
    b. **2021 Status: Delaware County SWCD Stream Staff surveyed the project area in the winter of 2018. Phase 1 and Phase II of the project design is complete and the Delaware County SWCD Stream Staff has applied for the regulatory permits. The project has been awarded to the lowest apparent bidder, with construction scheduled for Summer 2021.**

3. **East Brook CREP/CSBI Streambank Stabilization on East Brook, WBDR Walton**
    a. **This project was recommended by the CREP/CSBI program to repair eroding streambanks in order to establish a riparian buffer along fallow agricultural fields. This project is in the Town of Walton along East Brook in the West Branch of the Delaware River watershed.**
    b. **2021 Status: Delaware County SWCD Stream Staff completed a 100% design and have applied for the regulatory permits. The project has been awarded to the lowest apparent bidder, with construction scheduled for Summer 2021.**

4. **Water Street Boat Launch, WBDR Walton**
    a. **This project was recommended by the Walton Flood Commission to improve recreation access on the newly constructed floodplain reclamation project. This project is in the Village of Walton along the West Branch of the Delaware River.**
    b. **2021 Status: Delaware County SWCD Stream Staff completed a design and have received the regulatory permits. The project was constructed in the Spring of 2020.**

5. **Village of Stamford South Street Culvert Replacement, WBDR**
    a. **This project was recommended in the Stamford LFA and sponsored by the Stamford Flood Commission to replace an undersized arch bridge that has partially collapsed and resulted in a road closure along South Street.**
        i. **2021 Status: Delaware County SWCD Stream Staff have partnered with Delaware County DPW to design and replace the culvert. The project is expected to be constructed in 2022.**

6. **Grade Control at Utility Crossings on tributaries in the Village of Walton,**
    a. **This project was recommended by the Walton Flood Commission and is a SMIP grant project to protect utility crossings on three tributaries within the Village of Walton.**
        i. **Utility Crossing Site #4: West Brook – Austin Lincoln Park, North – 2021 Status: Delaware County SWCD Stream Staff completed the 100% design. The project bid advertisement will be published in June 2021 with construction in Summer 2021.**
        ii. **Utility Crossing Site #6: West Brook – East St. Bridge – 2021 Status: Delaware County SWCD Stream Staff completed the 100% design. The project bid advertisement will be published in June 2021 with construction in Summer 2021.**
        iii. **Utility Crossing Site #8: West Brook – Delaware Street Bridge – 2021 Status: Delaware County SWCD Stream Staff is working on the 60% design. The project is anticipated to be constructed in 2021.**

7. **Breakey Motors Floodplain Reclamation Project, WBDR Walton**
    a. **This project was recommended in the West Branch LFA and sponsored by the Walton Flood Commission to reduce flood impacts within the Village of Walton. This project is in the Village of Walton along the West Branch of the Delaware River.**
        i. **2021 Status: Delaware County SWCD Stream Staff completed a preliminary survey. CWC paid for the removal of the building and contaminated soils, which was completed in April 2020 through their LFHMA funds. SLR is currently developing 2-D hydraulic model to better study flood impacts and proposed floodplain alternatives. DCSWCD is providing SLR with drone data, survey data, and high water marks surveyed during past storm events to assist in model calibration.**

8. **West Branch Delaware River at the Confluence of Bagley Brook, WBDR Hamden**
    a. **This project was recommended by the Local Flood Analysis for the Town of Hamden along the West Branch of the Delaware River written by a consultant, Milone and MacBroom Inc. (now a part of SLR Consulting), for the Hamden Flood Commission. The bank erosion and channel instability is an ongoing problem at the confluence of Bagley Brook. A geomorphic assessment needs to be conducted to evaluate the problem of channel instability and sediment contribution to the West Branch. The information that is gathered will be used for the design of a restoration project.**
        i. **2021 Status: Delaware County SWCD Stream Staff collected soil data 2019-2020. Topographic survey and Rosgen Level I assessments were completed in summer 2020. A draft of the "Two Nutrient Loading Case Studies at Significant Streambank Erosion Sites on the West Branch Delaware River" report is in peer review.**

9. **West Brook SL 5.58 Site on Foreman's Property, Walton**

a. **This project was the identified after the December 2020 storm event. The Foreman's own approximately 0.43 miles of property on either side of West Brook. Currently, this land is being used for agricultural purposes and is rented to David Holley, a dairy farmer and a participant of the Watershed Agricultural Program. Excessive sediment deposition toward the upstream end of the Foreman property has contributed to the lateral migration of West Brook and subsequent erosion of West Brook's right bank. The right bank erosion continues downstream for approximately 425 linear feet to an existing hardened agricultural crossing.**
b. **2021 Status: Delaware County SWCD Stream Staff working on the 60% design. The project is anticipated to be constructed in 2021.**

5. Conservation Reserve Enhancement Program (CREP) Assistance

Provide assistance for the implementation of Conservation Reserve Enhancement Program (CREP) in agricultural areas where streambank stability issues make those lands ineligible for buffer enhancement under the CREP's guidelines.

A. Integration of the Stream Corridor Management Program and the Watershed Agricultural Program Action Items

1. **Provide stream assessment training to Watershed Agricultural Program's planning and technical staff to identify and classify impaired stream segments during the development or revision of individual Whole Farm Plans. (SCMPr and WAP Staff)**

2. **Continue to implement the MOU between DCSWCD and the Watershed Agricultural Council (WAC) and its protocols for providing technical assistance to the Watershed Agricultural Program. (DCSWCD SCMPr Coordinator, DCSWCD Executive Director, and DCSWCD Technical Coordinator, DEP Project Manager)**

3. **Provide assistance to the WAP Planning Staff in techniques for proper placement and planning of stream related agricultural Best Management Practices. (DCSWCD SCMPr Staff)**
   a. **Complete work on the following CREP streambank stabilization projects**
      i. **Willard Frisbee Farm**
         2021 Status: Preliminary survey completed. Additional survey with unmanned aerial vehicle (UAV) is needed in 2021 to update the design drawings with the extent of bank erosion and monitor.

4. **Provide engineering approval, technical support, regulatory permit and individual project design assistance to Watershed Agricultural Program engineers and technicians as per the Protocol identified in action item #2 above. (DCSWCD SCMP Coordinator, SCMP Professional Engineer, and DCSWCD SCMP Staff)**

5. **Provide a standard operation procedure for floodplain disturbance permits to be filed with the Code Enforcement Officers (CEO) across the county.**

6. **Provide opportunity for annual floodplain development permit training for Watershed Agricultural Program engineers, technician and planners. (SCMPr Staff, CEO)**

B. Provide Technical Support to the USDA Conservation Reserve Enhancement Program (CREP) Action Items

1. **Continue to develop the prioritization process for providing technical and financial assistance to the WAP on CREP projects. (SCMPr Coordinator, DEP Project Manager, WAP Program Managers)**

2. **Provide stream evaluation and assessment assistance to the Watershed Agricultural Program planners to determine if stream instability issues will preclude CREP enrollment. Training and ongoing assistance. (SCMPr Coordinator, SCMPr PE, SCMPr technicians, and DEP as needed)**

3. **Provide design and regulatory permit assistance and engineering approval to the Watershed Agricultural Program engineers and technicians in the preparation of approved stream stabilization designs and projects that facilitate CREP enrollment. (SCMPr Coordinator, SCMPr PE, SCMPr technicians, and DEP as needed)**

4. **Continue to provide funding to the Watershed Agricultural Program for stream stabilization projects that facilitate CREP enrollment. (SCMPr Staff)**

5. **In cooperation with the Watershed Agricultural Program, evaluate stream instability issues for remediation on existing CREP sites. (SCMPr Coordinator, SCMPr PE, and SCMPr Technicians)**

6. **Provide funding to the Watershed Agricultural Program for stream projects that stabilize existing CREP sites. (SCMPr Staff)**

7. **Continue to monitor and evaluate the success of the bank stabilization projects. (SCMPr Staff)**

C. Enhance the Implementation of CREP on NYC Watershed Cropland and Explore Long – Term CREP Contract Action Items

1. **Develop an interagency working group to prepare a white paper requesting USDA / FSA to enhance rental payments for CREP riparian buffers on cropland. (WAP Staff, DEP Staff, SCMPr Staff)**

2. **Explore options to maintain riparian buffers after CREP contract expiration and submit written recommendations. Development of an interagency advisory committee with Delaware County. (WAP Staff, SCMPr Staff, DEP Staff, DC Staff)**

6. Stream Corridor Management Program Technical Assistance and General Support

Stream Corridor Management Program staff from each of the partnering agencies (the Delaware County Soil and Water Conservation District, New York City Department of Environmental Protection and Delaware County Planning Department) to provide technical, planning and educational support for a range of stakeholders on water quality related issues such as floodplain management, flood response and recovery, debris and infrastructure management, property protection, aquatic habitat and recreation concerns. Support can include assessments, plans, designs, training workshops and general advice to stakeholders.

A. Provide Assistance to Community Watershed Groups/Associations and Government Entities Action Items

1. **Provide technical assistance and general direction to community watershed groups/association and government entities. (DCPD, SCMPr staff, DEP)**
    a. **East Branch Delaware Flood Commission**
    b. **Walton Flood Commission**
    c. **Delhi Flood Commission**
    d. **Hamden Flood Commission**
    e. **Andes Flood Commission**
    f. **Roxbury Flood Commission**
    g. **Halcott Flood Commission**
    h. **Stamford Flood Commission**
    i. **Coalition of Watershed Towns**
    j. **Recreation Access groups (Catskill Foundation and Water Discovery Center)**
    k. **Delaware County Board of Supervisors**

B. Participation with the Delaware County Action Plan (DCAP) Action Items

1. **Attend regular meetings of the Delaware County Action Plan (DCAP) and advocate for inclusion of Stream Corridor Management Plan and its recommendations into all relevant components of the DCAP. (DCPD Director, DCSWCD Executive Director, SCMPr Coordinator)**

C. Participation with the Catskill Watershed Corporation Action Items

2. **Provide technical assistance as requested for stream related CWC funded projects. (SCMPr Staff, DEP Staff, CWC Staff)**

3. **Explore ways to coordinate stream related education and outreach efforts (such as Catskill Streams and Watershed Education Program) with CWC. (SCMPr Staff, CWC Staff)**

4. **Coordinate with CWC on Local Flood Hazard Mitigation Program including the analysis of flood problems, identification and funding of potential mitigation projects. (Executive Directors and staff of DCSWCD, DEP, DC Planning, and CWC)**

D. Provide Annual Floodplain Development Permit Training for Municipal Officials Action Items

1. **Provide opportunity for annual floodplain development permit training for local municipal officials. (PAC, SCMPr Staff, DEP, NYS DEC)**

2. **Provide technical assistance and education on the Community Rating System (CRS) to local municipal officials in the CRS program. (DCPD, SCMPr Staff)**

3. **Development opportunity for Municipal Officials to obtain credits for participating in educational activities. (DCPD, SCMPr Staff)**

4. **Support training of Floodplain Administrators (Code Enforcement Officers), Planners and Stream Managers in various aspects of floodplain management through State and Federal programs to enable them to achieve and maintain Certification as Floodplain Managers through the Association of State Floodplain Managers. (DEC, FEMA, ASFM)**

5. **New York State Department of Environmental Conservation's 4-Hour Erosion and Sediment Control training offered annually to contractors, code enforcement officers, municipal engineers, highway departments and planning boards.**

E. Enhance Local Land Use Laws and Ordinances Action Items

1. **Provide assistance to local municipalities in development of stream components in local comprehensive plans, local laws and local management practices. (PAC, DCPD, SCMPr Staff, DEP)**

2. **Provide technical assistance to local municipalities to enhance local laws and local management practices. (PAC, DCPD, SCMPr Staff, DEP)**

F. Streamline Stream Work Permitting Action Items

1. **Work in cooperation with NYS DEC, US Army Corps of Engineers, DEP, and DCDPW to enhance the authority thresholds of the DCSWCD General Permit as delegated by the NYS DEC for approved stream management practices within the County. (SCMPr Staff, DEP RRE and SMP staff, US Corps of Engineers, DCDPW, Highway Subcommittee)**

G. Provide Technical Assistance to Local Highway Departments Action Items

1. **Continue to fund, provide technical assistance and support in the 2025 DCSWCD/DEP contract on the Medium Hydraulic Structure Study SMIP contract to evaluate watershed culverts for hydraulic capacity and prioritize them for upgrade through the SMIP. (DCDPW, SCMPr Staff)**

2. **Provide technical and regulatory permit assistance and educational support to municipalities for sizing and the design of routine culvert replacements. (SCMPr Staff, DCDPW)**

3. **Enable municipalities to apply for funding through the SMIP grants for infrastructure projects causing stream instability and/or water quality issues. (SCMPr Staff, DCDPW)**

4. **Support the membership of and attend regular meetings of Municipal Highway Superintendents and keep them up to date on status of SWCD projects, training opportunities and flood recovery efforts.**

5. **Advise and assist WBDR and EBDR communities and the DCPD with updates to the local Highway Management Plans to address best management practices as they relate to roadway and stormwater infrastructure improvements. (SCMPr Staff, DCPD, DCDPW and EBDR communities)**

6. **Provide technical assistance to highway departments and DCDPW by reviewing potential stream crossings including; large culverts and bridges. (SCMPr Staff, DCDPW and EBDR communities)**

7. **Continue to support best management practices for construction of stream crossings through the SMIP by allowing the acquisition of necessary equipment (i.e. dewatering pumps, hydro-seeder, etc.) (SCMPr Staff, DCPD, DCDPW and PAC)**

H. Geomorphic Assessments at Bridges and Culverts Action Items:

1. **Continue to support the Delaware County Department of Public Work's (DC DPW) evaluation of Medium Hydraulic Structures (culverts) funded through the Delaware Watershed Stream Management Implementation Program grants. (SCMPr Program Coordinator, DCSWCD Engineering staff, DEP Project Manager and DEP Stream Engineering Coordinator and DCDPW)**

2. **Continue to give advice and/or fund municipalities through the grants program for the replacement of publicly owned stream crossing structures that are causing stream instability and/or water quality issues. (SCMPr Staff)**

I. Continuation of Geomorphic Research / Assessments Action Items

1. **Perform Rosgen Level II assessment of Steele Brook in Delhi. (SCMPr Staff, Delhi Flood Commission)**

2. **Identify other river segments requiring geomorphic assessment and management plans. (SCMPr Staff , as needed consulting services)**
    a. **Stream Feature Inventories (SFIs) completed in 2017 on Steele Brook and tributary to Elk Creek in the Town of Delhi.**
    b. **SFI completed in 2018 on Little Red Kill in the Town of Middletown**
    c. **SFI completed in 2019 on Huntly Hollow in the Town of Colchester**
    d. **SFI completed in 2020 on the West Branch Delaware River.**
    e. **Complete a minimum of 6 SFIs by between 2018 and December 31, 2022.**
    f. **Continue using nutrient loading estimates to prioritize SFIs and assessments**

3. **Perform stream assessment and monitoring using a drone. (SCMPr Staff)**
    a. **Project site monitoring and survey**

4. **Continue bedload transport research in East Brook and its confluence with the West Branch Delaware River in the Village of Walton.**

J. Adopt Principles of Stream Stewardship at the Municipal Level Action Items

1. **Adoption completed for the following:**

Towns:

- Andes
- Bovina
- Deposit
- Colchester
- Franklin
- Halcott
- Hamden
- Harpersfield
- Kortright
- Masonville
- Meredith
- Middletown
- Roxbury
- Sidney
- Stamford
- Tompkins
- Walton

Villages:

- Delhi
- Hobart
- Margaretville
- Fleischmanns
- Stamford
- Walton

2. **Promote and secure plan adoption and extension of MOUs within East and West Branch Delaware communities. (DCPD, SCMPr Staff)**
   a. **Memorandum of Understandings (MOUs) have been extended for all municipalities. These MOUs do not have an expiration, but have the opportunity to be terminated by either party upon 30 days written notice.**

3. **Encourage municipalities to continue to develop stream stewardship requirements in their local comprehensive plans and land use regulations. (DCPD, SCMPr Staff, DEP)**

4. **Encourage municipalities to continue to participate in the PAC and Sub-committees. (SCMPr Staff, DEP, DCPD)**

K. Develop a Process for Updating the East and West Branch Delaware River Stream Corridor Management Plan Action Items

1. **Seek input from PAC as to when to update the East and West Branch Delaware River Stream Corridor Management Plan and the Delaware Action Plan. (PAC, DCPD, SCMPr Staff, DEP staff)**

L. Expand Public Education and Outreach Efforts Action Items

1. **Fund and implement education and outreach activities identified and prioritized by the Project Advisory Committee. (PAC, SCMPr Staff)**
    a. **Complete a minimum of 5 workshops and 5 trainings by the end of the 2025 DCSWCD/DEP contract.**

2. **Continue to educate municipalities and communities on the importance of floodplain function and the benefits of preserving floodplains, and opportunities for improving flood protection and reducing flood damages through the refinement and use of digital flood insurance rate maps (DFIRMs), the participation in the LFHMP, and other State/Federal programs such as the Community Rating System. (DCPD Staff, SCMPr Staff, NYSDEC)**

3. **Develop and implement an education and outreach effort to support the LFHMP for a range of involved and affected stakeholders including community officials, involved outside government agencies, landowners, residents, and not for profit groups. (DCSWCD staff, DC Planning Department staff, Department of Watershed Affairs, DEP, CWC)**

4. **Provide training and education opportunities for new officials appointed to office on the following three topics as made necessary by turnover 1) Getting to Know Your Stream Management Plan and Program; 2) Floodplain Management and the NFIP Program; and 3) Stream Process 101.**

    a. **Getting to Know Your Streams and Stream Management Program booklet was distributed to Town Supervisors, Village Mayors and Highway Departments along with the Delaware Watershed Stream Management Implementation Program grant applications. The booklet features the three topics listed above and can be found on the Delaware County Soil and Water Conservation District's website: www.dcswcd.org**

5. **Work with and support area schools and BOCES programs to educate students and promote awareness of stream process, floodplain preservation and streamside vegetation. Develop and promote a stream awareness program that can be used in area schools and with youth groups. (SCMPr Staff, DCPD staff, DEP, CWC, BOCES and area schools)**
    a. **Continue to work with the Youth Climate Summit committee to plan a youth environmental conference and provide funding for Delaware County School students that are within communities with Stream Management MOU.**

6. **Provide training and outreach to area real estate agents and bankers about the importance of preserving floodplains and the required disclosures of floodplain development permitting requirements. (SCMPr Staff, DCPD staff and DEP)**

7. **Provide up-to-date information to the catskillstreams.org website as well as support for the revision and maintenance of the Catskill Streams website.**

8. **Participate in the West-of-Hudson watershed-wide education and outreach efforts.**

9. **Maintain an up-to-date project status and education outreach information on the Catskillstreams.org website.**

M. Scientifically-Based Post-Flood Emergency Stream Intervention Action Items

1. **Provide Post-Flood Emergency Stream Intervention training to contractors, local municipalities, and agencies on an as needed basis. (Workshop, SCMPr Staff, DEP Project Managers)**
    a. **Provide technical assistance to the State-wide Emergency Stream Intervention, on an as needed basis.**
        i. **Post-Flood training has become a widely accepted practice that is being recognized throughout the State as the preferred practice for stream mitigation after the flood. Many agencies have requested training, which is being provided through Soil and Water Conservation District across New York State as well as through NYS DEC.**

2. **Continue to provide technical assistance to municipalities with emergency stream intervention measures during flood recovery. (SCMPr Staff)**

3. **Continue to provide technical review assistance to local planning and town boards when working on projects that include streams, culverts or floodplain infringements. (DCPD, SCMPr Staff)**

4. **Develop Post-Flood Emergency Stream Intervention Volume II with grade control structures and consideration for sediment supply.**

RONDOUT NEVERSINK STREAM PROGRAM

2021-2023 ACTION PLAN

2020 RESTORATION SITE: CLOTHES POOL, WEST BRANCH NEVERSINK

PO BOX 256, 273 MAIN STREET
GRAHAMSVILLE, NY 12740
(845) 985-2581
WWW.RONDOUTNEVERSINK.ORG

TO: *Mark Vian, Project Manager, NYC DEP Stream Management Program*
FROM: *Stacie Howell, Sullivan County Soil & Water Conservation District*
DATE: *April 15, 2021*
RE: *Rondout Neversink Stream Program 2021-2023 Action Plan*

Sullivan County Soil & Water Conservation District (SCSWCD) and NYC Department of Environmental Protection (DEP) have developed the 2021-2023 Action Plan for your review. The purpose of the Action Plan is to identify the Rondout Neversink Stream Program's (RNSP) 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 March 2021.

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 2021 through April 2023.

2021-2023 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 May 2021 and April 2023, and includes updates on program activity through March 31, 2021. 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 2021-2023. See the Projects tab at www.rondoutneversink.org for restoration activities by year from 2011-2020.

*<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). Within the tables, items and grants that are new or have been updated in 2021 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, West Branch, Mainstem Neversink	Towns of Denning/Neversink	Summer 2021
Molls Brook	Town of Neversink	Summer 2022

With help from the Watershed Conservation Corp. of Ulster Community College and DEP, the Rondout Creek 10-year Stream Feature Inventory (SFI) was completed in 2019 and 2020. The report and recommendations will continue to be developed, after completion of a proposed research project to determine the best method to reach and engage stakeholders. Several of the Rondout tributaries that were anticipated for SFI for summer 2020 were cancelled due to not receiving landowner permissions.

During the 2021 field season, the East Branch, West Branch and Mainstem of the Neversink River will begin the 10-year update. Field work is anticipated to start in late summer, pending landowner permissions, with post-processing and data write-up throughout winter 2021-2022.

A schedule for future tributary SFIs will be evaluated after completion of the Neversink 10-year walkover. It is anticipated that this SFI will lead to additional Bank Erosion Monitoring and a shift in restoration prioritization based on new streambank failures and self-healing of other 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
   2021-2022: 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	**Damaged during Dec 25 flood**	**Summer 2021**	Turbidity Reduction Project, hillslope stabilization and bankfull bench	800	Stantec	**$672,397, plus repairs**
Ladleton Restoration	East Branch Neversink	Design	**2022**	Turbidity and Coarse Sediment Reduction Project	**1100**	Stantec	**Engineers Estimate $1.3M**
CR-47 at Lake Cole	**East Branch Neversink**	**Design**	**2021**	**Infrastructure Protection, Streambank Stabilization**	**450**	**Stantec**	**$265,994**
Spindel/East Valley Ranch	East Branch Neversink	Evaluation	**2023**	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. Planting and willow staking continued through the fall. The high water event on December 25th resulted in some damage to the soil lifts because the project was so fresh and the vegetation had yet to

establish. Repairs are needed to the soil lifts and vegetation, planned for May-June 2021. Additionally, during the December flood, a site that was being monitored for future work on the West Branch Neversink near Lake Coleeroded laterally over 30' toward the road and lake in the single storm. This is putting CR-47 at risk of damage when another similar or larger high water event happens. RNSP tapped into DEP's engineering contract resources to fast-track a design with Stantec, Inc., with a goal of project completion before the commencement of Frost Valley's summer season and the associated heavy visitor use.

Due to the infrastructure priority of this site plus the repair work needed at Clothes Pool, it was decided to postpone Ladleton restoration until summer of 2022. Design of the Ladleton project is currently at about 60% and will continue to be developed through the summer.

The next large restoration project after Ladleton is Spindel/East Valley Ranch, unless the scheduled 2021 Neversink Stream Feature Inventory produces a higher priority streambank. Design will be initiated in Fall of 2021, with the intention of being ready for construction in summer 2023.

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.

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 2021
Saw Mill Road Analysis	Town of Denning	Summer 2021

Chestnut Creek LFA is ongoing, with an expected completion of early summer 2021. 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.

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 Implementation	Town of Neversink	Analysis in Progress

While the Chestnut Creek LFA is still underway, SLR was able to look at a vacant lot adjacent to the Neversink Town Hall for potential flood reduction options. Results are pending. RNSP plans to assist with 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

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 [Proganics Pilot]
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

RNSP plans 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 consist of redirecting road drainage and repairing the streambank with coir logs and planting. This work will likely be timed with Clothes Pool repairs.

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	Fall 2021	Invasive removal and replanting with Sullivan County Renaissance	300	Restaino Designs	$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	TBD	SCSWCD	$9,000
Rodriguez	Chestnut Creek	Planning	Spring 2021	Riparian Planting	TBD	SCSWCD	TBD

2020 was a very productive year for CSBI with a record number of plants installed and stream length vegetated. One new CSBI planting is being planned for Spring 2021 with repairs and maintenance also needed at several projects after the December flood event.

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 23-24, 2021
Fly-Tying Workshop	General Public	TBD
Forest to Frying Pan Cultivating Mushroom Buffer Workshop	Streamside Landowners	Postponed, New date TBD
Neversink Paddling Tour	General Public	June and August 2021
Peek in the Creek Family Stream Exploration	Neversink Parks & Recreation	August 2022 Tentative
River Geology Walk and Talk	General Public	Digital

All in-person events were postponed during 2020. A River Geology Walk and Talk was switched to digital format, a Japanese Knotweed educational video was also produced. A Glacial History webinar was also given in collaboration with Time and the Valleys museum. It is hoped that in-person events can resume in 2021 in a limited capacity. A reservoir kayaking day and fly-tying workshop are currently being planned for this summer. Peek-in-the-Creek, a kids' snorkeling event, will return in summer 2022.

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

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	2nd Year
FV support person for USGS study	TBD	In Progress, pending WAG approval
Cary Institute for Ecosystem Studies Research Fellowships	$25,619	In Progress, pending WAG approval

USGS fish study will focus on capturing population data before and after restoration projects to determine the effects that construction and restoration have on fish species over a 3-year period. Some sites already have several years of data pre-construction from the previous grant. A second grant will be

made to Frost Valley, for a staff support by a crew member, if needed. SCSWCD will also provide intern support to USGS.

A research proposal is being developed by a Binghamton University student as part of the Cary Institute for Ecosystem Studies' Student Research Fellowship program, which will oversee the student researcher and administration of the grant funds. The proposal is to 1) determine the most effective method(s) of reaching the landowners and stakeholders and increasing participation, potentially reaching different subsections in different ways (mail, e-mail, social media, etc.). 2) Solicit input from stakeholders regarding concerns to update management plan recommendations. 3) Raise awareness of Rondout Neversink Stream Program and its services. In an effort to support our 10-year update of the Rondout Creek Management Plan and the upcoming update of the Neversink River Management Plan, this study would look at changing demographics in the watershed, how effective previous outreach efforts have been, and which types of communication return the most stakeholder response.

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**
Streamside Landowner Participation Guide	Project Site Landowners	**Completed 2019**
Getting to Know Your SMP	New Municipal Officials	Ongoing, as-needed
Floodplain Management	New Municipal Officials	Ongoing, as-needed
Stream Process 101	New Municipal Officials	Ongoing, as-needed
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
Anglers Symposium Podcast	General Public	Ongoing/Annual
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**

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

Catskill Rivers	In Progress	Active	Phase 1- 2020	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	2021	Fourth year extension of successful program to provide stream stewards at Blue Hole swimming "hot spot".	$8,000
USGS Fish Study Support	Frost Valley YMCA	Active	2021	Staff support for USGS Fish Population Study	$4,000
Stream History e-Book	Town of Neversink	Active	2019-2020	The third in the series, on the Neversink River History was originally proposed as a kiosk but was switched to an e-book format.	$3,400
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
Time and the Valleys Museum	Town of Neversink	In development	2021	Providing funding for a stream table at the museum and enhancements to the waterwheel exhibit.	TBD

Arm of the Sea, a local not-for-profit theatre group focused on environmental education has been developing a new production, and is about 40% complete with the storyboards. It is anticipated that they'll be ready to begin performances by fall.

The Catskill Center Stream Stewards will continue outreach efforts and Leave No Trace education at an over-used site, Blue Hole, along the Rondout Creek. Over the past three years there has been a measurable improvement to the issues as a direct result of the Stewards presence and a use-permit system.

The kiosk that was planned for the recreation history of Rondout Creek was switched to an e-book format and the third in the series (Neversink River) is being considered for that format as well. The e-book is scheduled for completion in April, at which time work on the Neversink focused one will begin.

Schoharie Watershed
Stream Management Program
2021 – 2023 Action Plan

Photo of Schoharie Creek valley as viewed from Pratt's Rock, taken in 2020 in Prattsville. (Courtesy of Michelle McDonough, GCSWCD).

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To: David Burns, Project Manager, NYCDEP

From: Joel DuBois, Executive Director, GCSWCD

Date: May 6, 2021

Re: Schoharie Watershed Stream Management Program 2021-2023 Action Plan

The Greene County Soil and Water Conservation District (GCSWCD) and the NYC Department of Environmental Protection (DEP) have collaborated with the Schoharie Watershed Advisory Committee (SWAC) to develop the 2021 – 2023 Action Plan. The Action Plan provides the Schoharie Watershed Stream Management Program's activities, projects and programs that are planned for 2021-2023 as well as program accomplishments.

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. Riparian Buffer Assistance for Streamside Landowners (Public and Private)
E. Protecting and Enhancing Aquatic and Riparian Habitat and Ecosystems
F. Enhancing Public Access to Streams

The Action Plan is updated and revised annually. This plan will be implemented from May 2021 – May 2023.

Schoharie Watershed Stream Management Program
2021-2023 Action Plan

Purpose

This Action Plan identifies stream management goals, presents a subset of stream management plan recommendations and identifies current implementation initiatives by the Schoharie Watershed Stream Management Program for the period 2021-2023. The Action Plan also provides the current status or progress of each action item.

How to read this document: The Action Plan is organized around key programmatic areas. For each topic area, a list of recommendations, derived from Stream Management Plans and program staff, are provided in *italicized text*. Following the recommendations, the ongoing projects, programs and activities, including those that are funded through the Stream Management Implementation Program (SMIP), are listed. All completed projects are listed at the end of this document in Appendix A.

Background

The Schoharie Watershed Stream Management Program (SWSMP) was established in a partnership between the Greene County Soil & Water Conservation District (GCSWCD) and NYC Department of Environmental Protection (DEP) in 1997 to assist in meeting requirements of the Filtration Avoidance Determination (FAD) issued to DEP by the Environmental Protection Agency. Stream Management Plans have been completed for each major river corridor in the Schoharie Watershed and each plan includes a set of general recommendations, and project specific recommendations, which provide a "road map" for improved stream and floodplain management. In addition to supporting the FAD, SWSMP projects also targeted reductions to in-stream sources of suspended sediments as part of DEP's Shandaken Tunnel State Pollution Discharge Elimination System (SPDES) permit established in September 2006. The SWSMP seeks to advance state-of-the-art watershed management projects, policies and programs to improve and protect the Schoharie's water resources. Initiatives include the Stream Management Implementation Program (SMIP), the Catskill Streams Buffer Initiative (CSBI), stream and floodplain restoration projects, stream and watershed assessments, local flood analysis and mitigation, and education and outreach programs.

The following Action Plan summarizes the programs and projects that GCSWCD will be leading or supporting within the Schoharie Basin between May 2021 and May 2023, and includes action plan updates through May 1, 2021. The GCSWCD will lead, coordinate or support the efforts for each action item, and work cooperatively with watershed partners including, but not limited to, the Schoharie Watershed Advisory Committee (SWAC), NYCDEP, NYSDEC, CWC and watershed municipalities. Funding sources for our action items include, Stream Management Implementation Program (SMIP), Catskill Streams Buffer Initiative (CSBI), Watershed Assistance Program (WAP), Army Corps' Water Resources Development Act (WRDA), Catskill Watershed Corporation (CWC), DEP/GCSWCD Schoharie Watershed Stream Management Program (Contract, CAT-496), Federal Emergency Management Agency (FEMA), and Natural Resource Conservation Service Emergency Watershed Protection Program (EWP).

Program Administration

The Schoharie Watershed Stream Management Program requires on-going administrative and organizational support to implement stream management efforts. Many of the program administration action plan items began around 2007 and will continue through the duration of the stream management program. Additional action items may be added as the program evolves and as program goals are refined.

PROGRAM ADMINISTRATION				
Action Item	**Partners**	**Description**	**Funding**	**Status**
Program Administration and Implementation	NYCDEP, GCSWCD, MSMA, SWAC	The GCSWCD has developed an effective and efficient process for implementation of the stream management plans for Schoharie Creek and its associated tributaries. These efforts of the Schoharie Watershed Stream Management Program (SWSMP) help to fulfill the NYCDEP FAD obligations. Development and implementation of the program is an on-going process.	NYCDEP/ GCSWCD SMP Contract	On-going
Inter-Agency Coordination	GCSWCD, NYCDEP, NYSDEC, USACOE	Facilitate coordination between the agencies with stream management responsibilities. This is a key component of SMP implementation.	NYCDEP/ GCSWCD SMP Contract	On-going
Stream Management Implementation Program	GCSWCD, NYCDEP, SWAC	The Stream Management Implementation Program (SMIP) is a collaborative program between GCSWCD, NYCDEP, and municipalities within the Schoharie Reservoir watershed. This program offers funding for government agencies, streamside landowners, schools, and 501(c)(3) organizations involved in stream stewardship that fosters water quality protection and enhancement. The program is administered through the Schoharie Watershed Stream Management Program (SWSMP) at the GCSWCD. The SWAC meets with GCSWCD and NYCDEP two times per year to support stream management implementation efforts. Since 2008, the SMIP has completed 23 rounds of funding, and provided 117 awards, with a total of $5,465,870.77 in allocated funding.	NYCDEP/ GCSWCD SMP Contract	Organized May 2008, two application rounds per year

A. Protecting and Enhancing Stream Stability and Water Quality

Protecting and enhancing stream stability and water quality may include: stream corridor assessments; stream stabilization/restoration projects with goals to restore stream stability and reduce the targeted pollutant; 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 within the Schoharie Creek Watershed that have yet to be assessed and conduct updated assessments of sub-basin streams to record current conditions. These tributaries should be studied to identify and prioritize sediment sources, erosion hazards, and potential water quality impairments and associated treatment opportunities.

2. Review existing water quality data and identify, to the extent 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 exposures, and sources of contaminants from road runoff and households, and make prioritized recommendations for their mitigation.

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 will include measurements and analysis of geomorphic form, rock structures, and vegetation. Monitoring will be performed in accordance with Army Corps of Engineers permit requirements as well as GCSWCD/NYCDEP annual assessments of the need for additional monitoring. Data will be collected to monitor project stability and vegetation establishment.

STREAM ASSESSMENTS AND MONITORING				
Action Item	**Partners**	**Description**	**Funding**	**Status**
Stream Inventory and Assessment	NYCDEP, GCSWCD	Stream Feature Inventories (SFI) are an on-going priority to assess baseline conditions and identify potential projects. The Johnson Hollow Brook and Halsey Brook SFIs will be conducted in 2021. Stream corridors to assess in 2022 will be determined in winter 2021.	NYCDEP/ GCSWCD SMP Contract	Active
Monitoring of Restored Stream Reaches	NYCDEP, GCSWCD	Annual monitoring of restored stream reaches provides valuable information on the effectiveness of restoration practices in addition to fulfilling the permit requirements associated with these projects. Monitoring includes a visual inspection of the reach, photo documentation, pebble counts, and a survey of monumented cross sections and the longitudinal profile.	NYCDEP/ GCSWCD SMP Contract	Years 1, 2, 3 and 5 post-construction; schedule developed annually in January

Vegetation Monitoring	NYCDEP, GCSWCD	Annually, the GCSWCD and project partners monitor the native riparian vegetation that has been installed along streambanks. Riparian plantings are completed in conjunction with the installation of natural channel designed (NCD) stream restoration projects and CSBI projects. Vegetation provides for increased stability as trees and shrubs continue to mature, and it is a critical component to the long-term success of these types of projects. Annual vegetation monitoring provides valuable information on the effectiveness of restoration practices in addition to fulfilling the permit requirements associated with these projects.	NYCDEP/ GCSWCD SMP Contract	Annually, Schedule updated in January

STREAM RESTORATION AND STABILIZATION RECOMMENDATIONS

1. Identify locations 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 improved or residential areas and 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 stream stability restoration projects that have been identified through field assessments or prioritized in management plans.

5. Governmental landowners in the Schoharie Creek watershed should manage their lands using natural channel stability concepts, and should serve as a model for other watershed landowners.

STREAM RESTORATION AND STABILIZATION				
Action Item	**Partners**	**Description**	**Funding**	**Status**
Operation and Maintenance	NYCDEP, GCSWCD, Landowners	The GCSWCD, NYCDEP and project partners will continue to work to maintain project sites throughout the Schoharie Creek watershed. This may include, but is not limited to, supplemental planting, bioengineering, minor repairs, general maintenance and assessments as needed.	NYCDEP/ GCSWCD SMP Contract	On-going, maintenance plan developed annually in Spring
Batavia Kill Restoration at Red Falls Project 1	GCSWCD, NYCDEP	Project 1 of a full-channel restoration project located on the Batavia Kill at the border of Ashland and Prattsville will be implemented in multiple phases. This project will result in stabilization of eroding streambanks and protection of water quality by reducing fine sediment sources along this high-turbidity producing reach of stream. Phase I Gravel Access Road and Rock Lined Dewatering Channel, Completed 2020; Phase II Lower Reach Stream Restoration, 2021.	SMIP, GCSWCD/ NYCDEP SMP Contract	Active

Batavia Kill Restoration at Red Falls Project 2	GCSWCD, NYCDEP	Project 2 of a full-channel restoration project located on the Batavia Kill at the border of Ashland and Prattsville will be implemented in multiple phases. This project will result in stabilization of eroding streambanks and protection of water quality by reducing fine sediment sources along this high-turbidity producing reach of stream. Phase I Upper Reach Stream Restoration, 2022; Phase II Site Restoration, 2022.	GCSWCD/ NYCDEP SMP Contract	Active
West Kill above Wolff Road	GCSWCD, NYCDEP	The West Kill above Wolff Road stream project was identified through the stream feature inventory (SFI) that informed the West Kill Stream Management Plan (2005) and reevaluated in 2018. Due to the extent of active erosion, this site was identified as a priority for restoration. The stream repair project will halt the headcut that has led to erosion of the approximately 30' – 75' high and 500' long streambank. The assessment, design and permitting for this project are in progress. Implementation of this project is planned for 2022.	GCSWCD/ NYCDEP SMP Contract	Active
Windham Path Bank Stabilization Design	GCSWCD, NYCDEP	The Windham Path Bank Stabilization Design project involves the development of a restoration design for an unstable section of the Batavia Kill that poses a threat to the stability of the Windham Path. Design expected to be complete spring 2021.	SMIP	Active
Windham Path Bank Stabilization Implementation	GCSWCD, NYCDEP	The Windham Path Bank Stabilization project will address the bank retreat along a section of the Batavia Kill that poses a threat to the stability of the Windham Path. The project will serve to protect the recreational resource while reducing impacts to water quality associated with erosion of fine sediment. Project construction is planned for summer 2021 and is expected to be complete by September 2021.	SMIP	Active

STREAM STEWARDSHIP AND STREAM ACCESS 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 watershed stakeholders.

3. Develop publications focused on stream management which can be provided to watershed stakeholders and/or used in training workshops.

4. Host a Schoharie Watershed Educational Event Series with various events and activities planned for watershed residents and visitors to promote awareness and stewardship.

5. Increase public and technical awareness about the importance of the Schoharie Creek watershed and ecosystem 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 of 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 to stream management which are readily available to those entities responsible for stream activities in the Schoharie Creek watershed. Guidelines must emphasize natural channel stability.

8. Develop an interesting, hands-on display and accompanying presentation that could travel with staff or volunteers to public places. Include the definition of a watershed, how people affect the watershed in their daily lives, the importance of a healthy watershed and what they can do to help improve water quality.

9. At public stream access sites, provide educational materials, such as signage, that may lead to an increased stewardship ethic for the stream.

STREAM STEWARDSHIP AND STREAM ACCESS EDUCATION AND OUTREACH				
Action Item	**Partners**	**Description**	**Funding**	**Status**
Annual Education and Outreach Plan	NYCDEP, GCSWCD, SWAC	The GCSWCD continues to work with NYCDEP and others to develop and implement a comprehensive education and outreach strategy with goals submitted annually in January. The GCSWCD will help identify educational needs and plan educational activities for a wide range of audiences; educational activities may be basin-wide or specific to individual sub-basins.	GCSWCD/ NYCDEP SMP Contract, WAP, CWC	Annually, Schedule updated in January
Schoharie Watershed Educational Event Series	GCSWCD, NYCDEP, local schools, TU, CWC, WAC, CGCCE, DEC, SWAC	Community involvement and awareness is important for promoting the protection of streams and their watersheds. Schoharie Watershed Educational Event Series will be hosted throughout the year, and will provide watershed-wide educational and recreational events. The events will provide multiple opportunities for watershed residents, students, community groups, tourists, officials and others to get to know their stream and the resources available to help provide watershed protection. The ability for GCSWCD/NYCEP to provide educational events may be limited due to the on-going COVID pandemic.	SMIP GCSWCD/ NYCDEP SMP Contract,	Annually
Schoharie Watershed Summit	NYCDEP, GCSWCD, SWAC	The annual conference, which began in 2007, is organized for local municipal officials, county and non-profit agencies, highway departments, regulatory agencies and engineering firms active in the Schoharie Basin, and offers training in relevant water resources management, regulations, land use, and stormwater management. Credits for planning board members are provided. The 2021 Schoharie Watershed Summit will be held as a series of virtual events, instead of an in-person conference, due to the on-going COVID pandemic.	GCSWCD/ NYCDEP SMP Contract	Annually

Community Outreach	NYCDEP, GCSWCD	Success of SMP implementation requires community awareness and involvement. In order to keep watershed communities and interested stakeholders informed of SMP implementation progress and activities, the GCSWCD and its partners may use a variety of outreach media including newspaper articles, an "e"-newsletter, program print newsletter, brochures, facts sheets, project announcements, media contacts, press releases and kiosks. Throughout the year, GCSWCD attends and/or hosts meetings that provide educational and outreach opportunities for Schoharie Reservoir watershed stakeholders.	GCSWCD/ NYCDEP SMP Contract, CWC, GCSWCD-WAP	On-going
Catskill Streams Website	NYCDEP, GCSWCD Schoharie SMP Contract	The GCSWCD will continue to provide logistical support in the development and maintenance of the Catskill Streams Website as a valuable tool for sharing information with watershed stakeholders.	NYCDEP/ GCSWCD SMP Contract	On-going
Greene County Soil & Water Conservation District Website	GCSWCD	The GCSWCD will continue to maintain and update the District's website. The website is a valuable tool for sharing information with watershed residents and stakeholders.	GCSWCD, NYCDEP/GCSWCD SMP Contract	On-going
Educational Model Demonstrations	NYCDEP, GCSWCD	The GCSWCD and partners offer watershed-related demonstrations using educational models to present programming about streams, watersheds and floodplains. The models offered include the Enviroscape, Stormwater Floodplain Simulation System, an augmented reality sandbox and a stream table. The educational model demonstrations may be presented in classrooms, at public events, during summer camps or other educational programs offered throughout each year.	NYCDEP/ GCSWCD SMP Contract	On-going
Greene County Soil & Water Conservation District Website Redesign	GCSWCD	The GCSWCD is developing an improved website format. Upgrades will include redesigning the layout, format, map imagery and navigation of the website. Content within the website will also be updated. Redesign of the website will be completed in 2021.	GCSWCD, NYCDEP/GCSWCD SMP Contract	Active
CD Lane Park Educational Panels	NYCDEP, GCSWCD, Windham	The Town of Windham will implement a project to design, manufacture and install two educational panels and support materials for a viewing platform within CD Lane Park. The park is an outdoor recreational park along the Batavia Kill, downstream of the flood control structure. Educational panels will include information about the Batavia Kill watershed, the history of the flood control dam, and local environmental and park information. Implementation of the project is planned for spring and summer 2021.	SMIP	Active
Mountain Top Arboretum – Rain Garden Interpretive Signage & Educational Materials	Mountain Top Arboretum	The Mountain Top Arboretum will implement a project to design, manufacture and install two interpretive signs for the Arboretum's rain gardens. The signs will inform visitors about the purpose and importance of rain gardens and the role rain gardens play in protecting water quality, particularly within the Schoharie Reservoir drainage basin. Project design will occur in 2021; sign fabrication and installation will occur in 2022.	SMIP	Active

Village of Tannersville Earth Day Celebration	Village of Tannersville	The Village of Tannersville will hold an Earth Day Celebration with activities and education programs that may include a steam clean up and hands-on watershed exhibits. Promotional materials for this event will be developed in coordination with SWSMP staff.	SMIP	Active

B. Floodplain Management and Planning

Floodplain management and planning may include: floodplain assessments; coordination of floodplain management efforts in the watershed; and outreach, education and technical assistance for floodplain management in the Schoharie Watershed.

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, infrastructure and the natural environment.

4. Through LFA provide resources to help WOH municipalities: confirm that there is a significant flood inundation hazard in the target area through engineering analysis; use engineering analysis to develop a range of hazard mitigation alternatives; the primary focus of the analysis is to identify the potential for reducing flood elevations through channel and floodplain restoration, as the first alternative to other hazard mitigation solutions; 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.

LOCAL FLOOD ANALYSIS AND FLOODPLAIN ASSESSMENT				
Action Item	**Partners**	**Description**	**Funding**	**Status**
Jewett Local Flood Analysis	GCSWCD, NYCDEP, Town of Jewett	A local flood analysis (LFA) is being conducted for the designated hamlet areas in the Town of Jewett. The LFA will help to determine the causes of flooding, investigate and analyze the overall potential of specific projects, and projects in combination, in an attempt to mitigate flood damages and hazards. A kick off meeting for the Jewett LFA was held March 2021.	SMIP, NYCDEP/ GCSWCD SMP Contract	Active
Sawmill Creek Embankment Stabilization Design	GCSWCD, NYCDEP, Village of Tannersville	Assessment of Sawmill Creek instability along Railroad Avenue was an LFA recommended project. A detailed assessment of this reach of the Sawmill was conducted in 2019 and recommendations were provided for the stabilization of approximately 600 feet of the channel and embankment. This project involves further assessment and design for stabilizing the Sawmill Creek and reducing flood risk to public infrastructure. The advanced design and permitting for this project are in progress.	SMIP, NYCDEP/ GCSWCD SMP Contract	Active

LOCAL FLOOD ANALYSIS IMPLEMENTATION, FLOODPLAIN MANAGEMENT COORDINATION, EDUCATION AND OUTREACH RECOMMENDATIONS

1. The GCSWCD should support local municipalities in the use of FIRM maps.

2. Municipalities in the watershed should 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. Schoharie Watershed municipalities should evaluate participation in the FEMA Community Rating System.

4. Access to flood prevention/protection information should be established and supported throughout the Schoharie Creek Watershed.

5. Watershed municipalities, working with local and state agencies, should support periodic training sessions on flood related issues. Audiences should include municipal leaders, code enforcement staff, planning boards, landowners, realtors, lending institutions and others.

6. Watershed municipalities should 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, should be developed for use during post flood response.

8. Identify locations where roads, bridges, or culverts may be threatened by bank erosion or flooding, or are otherwise unstable or threatened, and make prioritized recommendations for their treatment. Implement projects that will minimize impacts of flooding, prioritize the implementation of LFA recommended projects.

9. Identify locations where improved or residential areas may be threatened by bank erosion or flooding, and make prioritized recommendations for their treatment. Implement projects that will minimize impacts of flooding, prioritize the implementation of LFA recommended projects.

LFA IMPLEMENTATION, FLOODPLAIN MANAGEMENT COORDINATION, EDUCATION AND OUTREACH				
Action Item	**Partners**	**Description**	**Funding**	**Status**
NYCDEP Flood Buyout Program	NYCDEP, GCSWCD, Schoharie Watershed Municipalities	The NYCDEP flood buyout program was initiated in 2017. GCSWCD facilitates the program and serves as the technical and outreach lead for some Schoharie Watershed municipalities. The program began with erosion hazard buyout properties. GCSWCD continues to provide outreach and assessment support the leads for NYC flood buyout program in the Schoharie Reservoir watershed.	NYCDEP/ GCSWCD SMP Contract	On-going
LFA Mitigation Coordination	NYCDEP, GCSWCD, Schoharie Watershed Municipalities	Provide support for municipalities to identify and coordinate flood mitigation efforts. Assist municipalities with critical community structures and facilities in at-risk locations, and help coordinate implementation of flood-proofing or relocation measures as a means of mitigation.	NYCDEP/ GCSWCD SMP Contract	On-going
Technical Support for LFA Recommended Relocation Projects	NYCDEP, GCSWCD, Schoharie Watershed Municipalities	GCSWCD and partners will provide technical support and mapping assistance for relocation projects that have been recommended in a municipality's local flood analysis. The municipalities will reach out to GCSWCD as technical assistance is needed.	NYCDEP/ GCSWCD SMP Contract	On-going

C. Highway and Infrastructure Management in Conjunction with Streams

Highway and infrastructure management in conjunction with streams may include: best management practices (BMPs) to improve infrastructure and stream intersections; stormwater management; and outreach, training and financial assistance to infrastructure managers to demonstrate BMPs.

HIGHWAY, INFRASTRUCTURE AND STORMWATER MANAGEMENT RECOMMENDATIONS

1. Local municipalities, Greene County Highway Department and NYSDOT should place a priority on vegetation management on critical areas such as roadside ditches and steep slopes.

2. Watershed municipalities should evaluate winter road abrasive procedures to address abrasive quality, application methods and spring sweeping.

3. The Town and County Highway Departments and NYSDOT should integrate geomorphology principles in all new projects and routine maintenance activities related to the Schoharie Watershed.

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 both 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 SWAC Highway Committee to identify opportunities to address infrastructure that is leading to stream instability and water quality degradation.

HIGHWAY, INFRASTRUCTURE AND STORMWATER MANAGEMENT				
Action Item	**Partners**	**Description**	**Funding**	**Status**
Critical Area Seeding and Slope Stabilization Program	GCSWCD, NYCDEP, County & Municipal Highway Departments	Stream Management Plans and the SWAC Highway and Infrastructure subcommittee recommend that local municipalities, county highway departments and NYSDOT should place priority on vegetation management on critical areas such as roadside ditches and steep slopes. GCSWCD continues to partner with all highway departments to provide critical area seeding for roadside ditches and slopes using the district's hydroseeder and power mulcher.	SMIP, NYCDEP/ GCSWCD Schoharie SMP Contract	On-going
County Route 2 over Unnamed Tributary to Schoharie Creek Bridge Design	NYCDEP, GCSWCD, GCHD, Town of Lexington	The Greene County Highway Department, in coordination with GCSWCD and project partners, will design a replacement structure that will convey the flow of an unnamed tributary to the Schoharie Creek under County Route 2 in the Town of Lexington. Design expected to be complete spring 2021.	SMIP	Active
Rappleyea Road Culvert Design	NYCDEP, GCSWCD, Town of Lexington	The Lexington Highway Department, in coordination with GCSWCD and project partners, will design a replacement culvert. The culvert conveys the flow of an unnamed tributary to the Schoharie Creek under Rappleyea Road in the Town of Lexington. Design expected to be completed spring 2021.	SMIP	Active

County Route 2 over Unnamed Tributary to Schoharie Creek Culvert Replacement	NYCDEP, GCSWCD, GCHD, Town of Lexington	The Greene County Highway Department will work with GCSWCD and project partners to replace a culvert that conveys the flow of an unnamed tributary to the Schoharie Creek under County Route 2 in the Town of Lexington. This project will improve the resiliency of flow conveyance infrastructure during future flood events while also improving stream channel stability and aquatic and terrestrial organism passage. Project construction is planned for summer/fall 2021.	SMIP	Active
Rappleyea Road Culvert Replacement Project	NYCDEP, GCSWCD, Town of Lexington	The Lexington Highway Department, in coordination with GCSWCD and project partners, will replace a culvert that conveys the flow of an unnamed tributary to the Schoharie Creek under Rappleyea Road in the Town of Lexington. This project will improve the resiliency of flow conveyance infrastructure during future flood events, while also improving stream channel stability, and aquatic and terrestrial organism passage. Project construction is planned for summer 2021.	SMIP	Active
County Route 17 Embankment Stabilization	NYCDEP, GCSWCD, GCHD	The Greene County Highway Department will work with GCSWCD and project partners to repair the road embankment of County Route 17, along the East Kill in the Town of Jewett. In December 2020, the road was damaged during a high flow event and its repair is critical in order to reopen the road and mitigate potential hazards during emergency response. This project will improve the resiliency of highway infrastructure while minimizing bed and bank scour during future high flows, thereby reducing entrainment of fine sediment to the East Kill, Schoharie Creek and Reservoir. Project construction is planned for summer/fall 2021.	SMIP	Active

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 any management action they may take.

OUTREACH & TECHNICAL SUPPORT TO HIGHWAY DEPARTMENTS, STORMWATER MANAGERS & CONTRACTORS				
Action Item	**Partners**	**Description**	**Funding**	**Status**
NYS DEC endorsed Erosion and Sediment Control Required Construction Activity Training	NYSDEC, NYCDEP, GCSWCD	This training provides information on the GP-0-15-002 permit stormwater concerns. The training also informs participants about the requirements of stormwater pollution prevention plans (SWPPP). The target audience for the training includes contractors, engineers, local government, and watershed residents. Participants learn about erosion and sediment control practices and how to perform site inspections, and how to obtain technical assistance on erosion and sediment control problems. A training was planned for 2020, but was canceled due to COVID. GCSWCD is planning to host a training, the date of the training has not yet been determined due to the on-going COVID pandemic.	NYCDEP, GCSWCD	Active

D. Riparian Buffer Assistance for Streamside Landowners (Public and Private)

Assisting public and private streamside landowners may include: providing access to training and technical information to increase water resource knowledge, skills and capabilities of landowners; and providing technical assistance and programmatic support for stream issues and riparian restorations.

RIPARIAN BUFFER PROGRAMS AND ENHANCEMENTS

1. Preserve and protect existing riparian buffers and provide for improved stewardship.

2. Efforts should be made to 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.

6. Provide interested streamside landowners plant materials appropriate for use during riparian buffer restoration and enhancement projects.

RIPARIAN BUFFER PROGRAMS AND ENHANCEMENTS				
Action Item	**Partners**	**Description**	**Funding**	**Status**
Catskill Streams Buffer Initiative (CSBI)	GCSWCD, NYCDEP	The CSBI informs and assists landowners in better stewardship of their riparian area through protection, enhancement, management, or restoration. GCSWCD conducts site visits, with landowners interested in the CSBI program, to recruit future riparian buffer planting projects. To support landowners, GCSWCD provides Riparian Corridor Management Plans, designs and installs riparian planting projects, and provides education materials and activities for streamside landowners.	CSBI	On-going
Plant Materials Program	NYCDEP, GCSWCD	GCSWCD will continue to maintain its Plant Material Center, stocked with species native to the Catskills, in a way necessary to hold over/grow out native plant material to be used at stream restoration sites and Catskill Streams Buffer Initiative (CSBI) sites. Tasks include the ordering of plant material, willow harvesting, maintaining an inventory of the plants in the PMC, clearing plants of harmful weeds, watering as frequently as necessary and re-potting materials if they outgrow their containers.	NYCDEP/ GCSWCD Contract	On-going
Plant Material Center Upgrades	NYCDEP, GCSWCD	GCSWCD will add deer fencing around the planting area of the Plant Material Center in 2021.	NYCDEP/ GCSWCD Contract	Active

Ashland Town Park Project	GCSWCD, NYCDEP, Ashland	GCSWCD obtained landowner agreement with the Town of Ashland, graded 1,250 feet of streambank and controlled 0.77 acre of Japanese knotweed in 2018. In 2019, GCSWCD installed 20 balled and burlapped trees to enhance the riparian buffer. In 2020, GCSWCD chemically controlled 0.77 acre of Japanese knotweed, and will continue to control JKW in 2021.	CSBI	Active
Japanese Knotweed Treatment	GCSWCD, NYCDEP	Treat Japanese knotweed with herbicides on stream restoration sites and Catskill Stream Buffer Initiative project sites. Sites will be treated in 2021 as needed.	CSBI GCSWCD NYCDEP SMP Contract	Active
Weisberg Riparian Planting Site Preparation	GCSWCD, NYCDEP	GCSWCD chemically controlled 0.25 acre of Japanese knotweed along the Schoharie Creek in Lexington, NY. Japanese knotweed management efforts will continue in 2021 in order to prepare the site for native riparian plantings.	CSBI	Active
DEP Robinson Riparian Planting	GCSWCD, NYCDEP	Riparian planting to restore 0.1 acre of streamside vegetation along the Red Kill in Hunter, NY. GCSWCD installed 50 native trees and shrubs along 150 feet of streambank in spring 2021.	CSBI	Active
Blitz Riparian Planting	GCSWCD, NYCDEP	Riparian planting to restore 0.46 acre of streamside vegetation along a West Kill tributary in West Kill, NY. GCSWCD plans to plant 225 native trees and shrubs along 300 feet of streambank in spring 2021.	CSBI	Active
Levin Riparian Planting	GCSWCD, NYCDEP	Riparian planting to restore 0.11 acre of streamside vegetation along a West Kill tributary in, NY. GCSWCD plans to plant 46 native trees and shrubs along 225 feet of streambank in spring 2021.	CSBI	Active

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.

RIPARIAN BUFFER OUTREACH, EDUCATION AND TECHNICAL ASSISTANCE				
Action Item	**Partners**	**Description**	**Funding**	**Status**
Local Technical Assistance	GCSWCD, NYCDEP	The GCSWCD and NYCDEP have worked cooperatively to develop program resources and policies to provide technical assistance for municipalities, planning boards, highway departments, developers, landowners and other interested parties. Technical assistance may include, but is not limited to, stormwater planning and retrofit, stream management activities, project permitting, and land use planning.	NYCDEP/ GCSWCD Schoharie, WAP	On-going
Streamside Landowner Workshop	GCSWCD, NYCDEP	The GCSWCD will provide a Streamside Landowner Workshop that will be available for streamside landowners with the Schoharie Reservoir Drainage Basin. Attendees will learn how to establish and increase the riparian buffer zone on their own property, and discover funding opportunities through the CSBI. A planned workshop for 2020 was canceled due to the COVID pandemic. The GCSWCD/NYCDEP will offer a virtual workshop in 2021.	NYCDEP/ GCSWCD CSBI	Active
Multifunctional Riparian Buffer Guide and Workshop Series		The Cornell Cooperative Extension of Columbia & Greene Counties will develop a Multifunctional Riparian Buffer (MFRB) Guide and deliver two workshops to present the curriculum of the guide. MFRBs are designed to protect riparian buffers with native vegetation while also planting multi-purpose production species. The guide and workshop curriculum will be developed between January – June 2021. Workshops are planned for fall 2021 and spring 2022.	SMIP	Active

E. Protecting and Enhancing Aquatic and Riparian Habitat and Ecosystems

Protecting and enhancing aquatic and riparian habitat and ecosystems may include: support for research and education programs that encourage protection of aquatic and riparian ecosystems; support for comprehensive and community planning efforts that incorporate watershed protection; and support for habitat improvement projects that will benefit water quality.

STREAM AND RIPARIAN ECOSYSTEM RECOMMENDATIONS

1. Review existing water quality data and identify, to the extent possible, the most significant water quality impairments.

2. 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 exposures, and sources of contaminants from road runoff and households, and make prioritized recommendations for their mitigation.

3. Characterize the status of stream ecosystem health utilizing existing fish and insect population data, and outlining the general threats to ecosystem health and integrity.

4. Conduct a watershed aquatic habitat study including; mapping habitats and associated characteristics throughout Schoharie Creek, characterization of fish species presence or absence in those habitats, establish target fish community structure based on regional and historic fish community data, and make recommendations for improvement of habitat for target community.

5. A habitat assessment should be conducted in the Schoharie Creek and major tributaries, with particular attention paid to thermal refuge for cold water fish. Monitor summer season stream temperatures and associated impacts on fisheries. Identify areas where habitat improvements might mitigate these impacts, and areas of thermal refuge that may need protection.

STREAM AND RIPARIAN ECOSYSTEM ASSESSMENT AND ENHANCEMENT				
Action Item	**Partners**	**Description**	**Funding**	**Status**
Brook Trout Genetic Study	NYSDEC, Trout Unlimited, GCSWCD, NYCDEP	The New York State Department of Environmental Conservation and the Trout Unlimited will conduct a Brook Trout Genetic Study on the Hunter Brook population with the West Kill Watershed. GCSWCD staff will coordinate with project partners and support this effort as needed. Genetic samples were collected in 2020.	Trout Unlimited	Active

WATERSHED PROTECTION AND COMMUNITY PLANNING RECOMMENDATIONS

1. Establish and maintain a comprehensive program that supports localized efforts and mobilization of the public for stream stewardship and the coordination of agencies, interest groups, municipalities, and stakeholders in community planning and watershed protection.

2. Watershed municipalities should evaluate their existing land use regulations, and adopt provisions which will protect stream corridor resources including wetlands, floodplains and floodways and provide additional local review for proposed development in these special areas.

3. A watershed-wide evaluation of regulations, including ordinances and zoning laws, should be undertaken. The evaluation should seek to identify regulatory gaps and determine if the current laws and ordinances adequately protect the watershed and encourage municipalities to update their regulations as needed.

4. Establish and support a Project Advisory Committee consisting of representatives of all significant stakeholder groups to coordinate the implementation of stream management plans.

5. Watershed municipalities should evaluate local ordinances such as comprehensive plans, zoning regulations, site plan review laws, subdivision laws and floodplain ordinances to determine if adequate consideration is given to riparian buffer impacts.

6. Watershed communities should integrate the evaluation of stormwater impacts on stream systems as they develop and implement comprehensive stormwater management plans which will protect water quality and reduce impacts on stream morphology.

7. Identify locations of potential water quality impairments including; source of pollution from upland areas and within the stream channel such as significant glacial lake clay exposures, and sources of contaminants from road runoff and households, and make prioritized recommendations for their mitigation.

WATERSHED PROTECTION AND COMMUNITY PLANNING				
Action Item	**Partners**	**Description**	**Funding**	**Status**
Schoharie Watershed Advisory Committee (SWAC)	Schoharie Basin Municipalities, Technical Advisors, GCSWCD, NYCDEP	The organizational structure of the Schoharie Watershed Advisory Committee (SWAC) was developed in early 2008. The SWAC has met regularly to collaborate with the SWSMP on stream management and implementation efforts. Administrative support for the SWAC remains an on-going activity, with SWAC member reappointments, collaboration with municipalities on stream issues, and SWAC meetings.	NYCDEP/ GCSWCD SMP Contract	Organized May 2008, meet two times per year
Mountain Clove Scenic Byway Corridor Management Plan Extension	GCSWCD, NYCDEP, MSMA, Jewett, Lexington	The Mountaintop Supervisors and Mayors Associations, Towns of Jewett and Lexington and other project partners will collaborate to develop the extension of the Mountain Cloves Scenic Byway (MCSB) Corridor Management Plan (CMP) for Hunter to include the Towns of Jewett and Lexington. The MCSBCMP is a plan to maintain and enhance the historical, cultural, recreation, scenic and natural resources. The plan will provide strategies for outreach and stewardship efforts to protect byway resources.	NYCDEP/ GCSWCD SMP Contract/ NYSDEC/ SMIP	Active

F. Enhancing Public Access to Streams

Enhancing public access to streams may include: support for projects that improve the quantity and quality of public stream access and enhance stream-based recreational opportunities; and support for projects that provide water resource educational materials at public access points. These recommendations incorporate community development efforts into stream management.

ENHANCING PUBLIC ACCESS TO STREAMS RECOMMENDATIONS

1. Public access for fishing should be enhanced along the Schoharie Creek stream corridor. Additional public access, as well as improvements to parking and access trails, is representative of the type of activities that may be possible.

2. Investigate opportunities to develop multi-use, low impact trail systems along the stream corridor.

ENHANCING PUBLIC ACCESS TO STREAMS				
Action Item	**Partners**	**Description**	**Funding**	**Status**
Hunter Branch Rail Trail	NYCDEP, GCSWCD, Town of Hunter	The Hunter Area Trail Coalition (HATC) will construct a pedestrian bridge, over Clove Creek, on the former Hunter Branch Railroad. Engineering and permitting are complete, and a NYSDEC Smart Growth grant was awarded to this project.	SMIP	Active
Huntersfield Creek Falls Trail	NYCDEP, GCSWCD, Town of Prattsville	The Huntersfield Creek Falls Trail is a 1-mile loop trail with a portion of the trail bordering Huntersfield Creek. The Town of Prattsville and project partners will construct and install a boardwalk, small foot bridge and interpretative kiosk, and trail signage in spring 2021.	SMIP	Active

Appendix A: Summary of Completed Projects May 2007 – May 2021

PROGRAM ADMINISTRATION				
Action Item	**Partners**	**Description**	**Funding**	**Status**
Restoration Project Permits	GCSWCD, NYCDEP, NYSDEC	The GCSWCD and NYCDEP worked with NYSDEC to evaluate alternatives and to offer training to address the complexity of achieving turbidity control during construction. Two staff members have been trained as Certified Professional Erosion and Sediment Control Specialists, one has been trained as a Certified Professional in Stormwater Quality and the majority of staff were trained as part of the NYSDEC 4-hour erosion and sediment control certification. GCSWCD is also qualified to teach the 4-hour E/S control certification. GCSWCD purchased dewatering equipment for stream projects and routinely prepares stormwater pollution prevention plans for all size projects.	NYCDEP/ GCSWCD	Completed 2007
Program Administration Staffing Plan	GCSWCD, NYCDEP	To manage the many projects and priorities in the action plan, the GCSWCD needs staffing and resources to provide overall project administration. In 2007, a staffing plan was developed along with a new intergovernmental agreement between GCSWCD and NYCDEP that began in January 2009 and will fund watershed activities through January 2014.	NYCDEP/ GCSWCD	Completed 2007
Program Office	GCSWCD, GCWAP, NYCDEP	The GCSWCD and NYCDEP collaborated to establish a project office within the Schoharie Watershed. The GCSWCD and WAP identified and secured a Mountaintop project office in Tannersville. The office is used by various local, regional, and state committees working on watershed protection (e.g. Schoharie Watershed Advisory Committee, subcommittees of the SWAC, Mountaintop Supervisory & Mayors Association, WOH Education & Outreach committee, etc.).	NYCDEP/ GCSWCD	Completed 2008
Stream Management Implementation Program	GCSWCD, NYCDEP, SWAC	The Stream Management Implementation Program (SMIP) is a collaborative program between GCSWCD, NYCDEP, and municipalities within the Schoharie Reservoir watershed. This program offers funding for government agencies, streamside landowners, schools, and 501(c)(3) organizations involved in stream stewardship that fosters water quality protection and enhancement. The program was established in 2008 and is administered through the Schoharie Watershed Stream Management Program (SWSMP) at the GCSWCD.	NYCDEP/ GCSWCD SMP Contract	Organized May 2008
Riparian Buffer General Permit	GCSWCD, NYCDEP, NYSDEC, USACOE	To successfully implement a multi-year riparian buffer program it was necessary to work with NYSDEC, USACOE, and NYCDEP to develop a general permit to allow for rapid planning and installation of riparian buffers. The general permit applies to minor (less than 300 ft.), short-term impacts such as, bank preparation and planting.	NYCDEP/ GCSWCD	Completed 2009
General Contracting Specification	GCSWCD, NYCDEP	Completed an RFP process to develop a list of "pre-qualified" contractors for work including but not limited to, installing stormwater management practices, drainage improvements, and stream projects.	NYCDEP/ GCSWCD	Completed 2009

Local Adoption of SMPs	Schoharie Basin Municipalities, Conesville, GCSWCD, SCSWCD, NYCDEP	All Greene County municipalities within the Schoharie Basin and sub-basins (Batavia Kill, East Kill and West Kill watersheds) and the Town of Conesville (Manor Kill) have adopted the relevant SMPs and signed Memoranda of Understanding (MOU) with GCSWCD and SCSWCD, respectively. Annual reviews occur with the municipalities per the MOU and provide an update on current action items within the municipality, while also seeking input from municipal officials in identifying potential future projects based on local needs.	NYCDEP/ GCSWCD	Completed 2009, renewed as needed
Plant Materials Program: Greenbelt Plant Material	NYCDEP, GCSWCD	In 2014, there were 20,401 Greenbelt plants delivered to the GCSWCD Plant Materials Center; 14,571 of the plants were repotted. In 2015, approximately 5,830 plants were repotted.	NYCDEP/ GCSWCD	Completed 2015
Cycle 3 Stream Management Implementation Program Documents	NYCDEP, GCSWCD, SWAC	In 2020, Cycle 3 of the Stream Management Implementation Program was initiated. For Cycle 3, SWSMP staff developed new documents to support the program including: Schoharie Watershed SMIP Guidelines and Requirements; SMIP Application; SMIP Reimbursement Form; SMIP Grant Closeout Report; SMIP Grant Agreements; and SMIP Project Tracking.	NYCDEP/ GCSWCD SMP Contract	Completed 2020

STREAM ASSESSMENTS AND MONITORING				
Action Item	**Partners**	**Description**	**Funding**	**Status**
Batavia Kill Stream Walkover	NYCDEP/ GCSWCD	Collected erosion data along the Batavia Kill in the Towns of Windham, Ashland and Prattsville.	NYCDEP/ GCSWCD	Completed 1997
West Kill Stream Walkover	NYCDEP/ GCSWCD	Collected stream feature data along the West Kill in the Town of Lexington.	NYCDEP/ GCSWCD	Completed 2004 & 2005
Schoharie Creek SFI	NYCDEP/ GCSWCD	Stream Feature Inventory (SFI) along the Schoharie Creek in the Towns of Hunter, Jewett, Lexington, and Prattsville.	NYCDEP/ GCSWCD	Completed 2006
East Kill SFI	NYCDEP/ GCSWCD	Stream Feature Inventory (SFI) along the East Kill in the Town of Jewett.	NYCDEP/ GCSWCD	Completed 2006
Manor Kill SFI	NYCDEP/ GCSWCD	Stream Feature Inventory (SFI) along the Manor Kill in the Town of Conesville.	NYCDEP/ GCSWCD	Completed 2008
Monitoring of Restored Reaches	NYCDEP/ GCSWCD	Five stream restoration sites were monitored in 2008.	NYCDEP/ GCSWCD	Completed 2008
Manor Kill Stream Management Plan	NYCDEP/ GCSWCD, SCSWCD, SCPD	In 2008, a stream feature inventory, riparian vegetation mapping, and a significant portion of the stream management plan were completed. The Manor Kill Management Plan was completed in 2009, and the Town of Conesville adopted it and signed an MOU for implementation with the Schoharie County SWCD. This project offered an opportunity to expand our partnership and planning area, to include the Schoharie County Planning Dept. and SWCD.	NYCDEP/ GCSWCD	Completed 2009
Survey of potential SPDES stream restoration site	NYCDEP/ GCSWCD	A site on the East Kill was selected as a potential SPDES stream restoration site due to its high contribution of fine sediments. One landowner was unwilling to grant GCSWCD permission for the required pre-design survey work. Survey is no longer planned for this site.	NYCDEP/ GCSWCD	Completed 2009
Monitoring of Restored Reaches	NYCDEP/ GCSWCD	In 2009, four stream restoration sites were monitored including, Conine, Ashland Connector Reach, Brandywine, and Farber Farm.	NYCDEP/ GCSWCD	Completed 2009

Vegetation Monitoring	NYCDEP/ GCSWCD	In 2009, vegetation monitoring of stream restoration and Catskill Stream Buffer Initiative projects was completed for the following sites: Shoemaker, RAH Stables, Long Road, Ashland, Conine, Sugar Maples, Lanesville, Farber Farms, and Carr Road.	NYCDEP/ GCSWCD	Completed 2009
Dale Lane Survey and Hydraulic Analysis	NYCDEP/ GCSWCD	Site survey was completed in 2009 and hydraulic analysis using HEC RAS was completed in spring 2010.	NYCDEP/ GCSWCD	Completed 2010
Mauro Residence Bank Stability	NYCDEP/ GCSWCD	Geotechnical assessment of a failing streambank in relation to a private residence. Engineer concluded that the residential structure was not currently threatened by the slope condition. Report provided to the homeowner and the bank was seeded and mulched.	SMIP	Completed 2010
Lexington Sill (Schoharie Creek)	NYCDEP/ GCSWCD	Upon assessment, it was determined that the removal of the sill would have little impact on the stream. No further action is expected.	NYCDEP/ GCSWCD	Completed 2010
Tributary Assessment and Planning Projects	NYCDEP/ GCSWCD	Historical alignments, riparian vegetation mapping, watershed analysis, stream feature inventory, and Geodatabases have been completed for Batavia Kill Tributaries North Settlement Creek, Furnace/Red Falls Creek and Mad Brook.	NYCDEP/ GCSWCD	Completed 2010
Monitoring of Restored Reaches	NYCDEP/ GCSWCD	In 2010, six stream restoration sites were monitored including, Conine, Ashland Connector Reach, Shoemaker, Lanesville, Sugar Maples, and Long Road.	NYCDEP/ GCSWCD	Completed 2010
Vegetation Monitoring	NYCDEP/ GCSWCD	In 2010, vegetation monitoring of stream restoration and Catskill Stream Buffer Initiative projects was completed for the following sites: Shoemaker, RAH Stables, Long Road, ACR, Conine, Sugar Maples, Kastanis, Lanesville, Farber Farm, and Carr Road.	NYCDEP/ GCSWCD	Completed 2010
Monitoring of Restored Reaches	NYCDEP/ GCSWCD	In 2011, two stream restoration sites were monitored including, Long Road and Sugar Maples,	NYCDEP/ GCSWCD	Completed 2011
Vegetation Monitoring	NYCDEP/ GCSWCD	In 2011, vegetation monitoring of stream restoration and Catskill Stream Buffer Initiative projects was completed for the following sites: Dodson, ACR, Conine, Kastanis, and Long Road.	NYCDEP/ GCSWCD	Completed 2011
Monitoring of Restored Reaches	NYCDEP/ GCSWCD	In 2012, five stream restoration sites were monitored including, Ashland Connector Reach, Conine, Sugar Maples, Schoharie Street, and Long Road.	NYCDEP/ GCSWCD	Completed 2012
Vegetation Monitoring	NYCDEP/ GCSWCD	In 2012, vegetation monitoring of stream restoration and Catskill Stream Buffer Initiative projects was completed for the following sites: Dodson, Hensonville, North Settlement, Slutzky, and Valenti.	NYCDEP/ GCSWCD	Completed 2012
Monitoring of Restored Reaches	NYCDEP/ GCSWCD	In 2013, one stream restoration site, Vista Ridge, was monitored.	NYCDEP/ GCSWCD	Completed 2013
Vegetation Monitoring	NYCDEP/ GCSWCD	In 2013, vegetation monitoring of stream restoration and Catskill Stream Buffer Initiative projects was completed for the following sites: Kastanis, Hensonville, Slutzky, Cervini, Torsiello/Hegner, Valenti, Cole, and Mayo.	NYCDEP/ GCSWCD	Completed 2013
Monitoring of Restored Reaches	NYCDEP/ GCSWCD	In 2014, eight stream restoration sites were monitored including, Ashland Well Head, Maier, Conine, Sugar Maples, Holden, CR 6, SR 42, and Apple Hill.	NYCDEP/ GCSWCD	Completed 2014
Vegetation Monitoring	NYCDEP/ GCSWCD	In 2014, vegetation monitoring of stream restoration and Catskill Stream Buffer Initiative projects was completed for the following sites: Conine, Holden, Vista Ridge, Apple Hill, Hensonville, Cervini, Torsiello/Hegner, Slutzky, and Cole.	NYCDEP/ GCSWCD	Completed 2014

Monitoring of Restored Reaches	NYCDEP/ GCSWCD	In 2015, 11 stream restoration sites were monitored including, Ashland Well Head, Brandywine/Ashland Connector Reach, Maier Farm, Conine, Holden, Long Road, CR 6, SR 42, Lanesville, Vista Ridge and Apple Hill.	NYCDEP/ GCSWCD	Completed 2015
Vegetation Monitoring	NYCDEP/ GCSWCD	In 2015, vegetation monitoring of stream restoration and Catskill Stream Buffer Initiative projects was completed for the following sites: Ashland Wells, Brandywine/ACR, Maier, Conine, Holden, Vista Ridge, Apple Hill, Long Road, Lanesville, Kastanis, Kane, McRoberts, Avella, Brunsden, Valenti, Mayo, Hensonville, and Benjamin Cole.	NYCDEP/ GCSWCD	Completed 2015
Monitoring of Restored Reaches	NYCDEP/ GCSWCD	In 2016, 11 stream restoration sites were monitored including, Ashland Well Head, Brandywine/Ashland Connector Reach, Maier Farm, Conine, Holden, Shoemaker, Long Road, CR 6, SR 42, Lanesville and Apple Hill.	NYCDEP/ GCSWCD	Completed 2016
Vegetation Monitoring	NYCDEP/ GCSWCD	In 2016, vegetation monitoring of stream restoration and Catskill Stream Buffer Initiative projects was completed for the following sites: Benjamin, Donnelly, Wilkie, Enochty, Higgins, Dodson, Torsiello, Cervini, Hegner, and Slutzky.	NYCDEP/ GCSWCD	Completed 2016
Huntersfield Creek SFI	NYCDEP/ GCSWCD	Historical alignments and a Stream Feature Inventory (SFI) have been completed for Huntersfield Creek in the Town of Prattsville.	NYCDEP/ GCSWCD	Completed 2016
Little West Kill SFI	NYCDEP/ GCSWCD	Historical alignments and a Stream Feature Inventory (SFI) have been completed for the Little West Kill in the Town of Lexington.	NYCDEP/ GCSWCD	Completed 2016
Red Kill SFI	NYCDEP/ GCSWCD	Historical alignments and a Stream Feature Inventory (SFI) have been completed for the Red Kill in the Town of Hunter.	NYCDEP/ GCSWCD	Completed 2016
Monitoring of Restored Reaches	NYCDEP/ GCSWCD	In 2017, seven stream restoration sites were monitored including, Brandywine/Ashland Connector Reach, Big Hollow, Shoemaker, Long Road, Lanesville, Kozak, and Vista Ridge.	NYCDEP/ GCSWCD	Completed 2017
Vegetation Monitoring	NYCDEP/ GCSWCD	In 2017, vegetation monitoring of stream restoration and Catskill Stream Buffer Initiative projects was completed for the following sites: Bilash, Cole Deming Road, Hensonville, Mayo, Posch, South Street, Windham Path, ACR/Brandywine, Ashland Wellhead, Big Hollow, Kozak, Lanesville, Shoemaker and Vista Ridge.	NYCDEP/ GCSWCD	Completed 2017
Batavia Kill SFI	NYCDEP/ GCSWCD	Historical alignments, Japanese knotweed mapping and a Stream Feature Inventory (SFI) were completed for the Batavia Kill in the Towns of Windham, Ashland and Prattsville. The post-processing and geodatabase management is complete.	NYCDEP/ GCSWCD	Completed 2017
West Kill SFI	NYCDEP/ GCSWCD	Historical alignments, Japanese knotweed mapping and a Stream Feature Inventory (SFI) were completed for the West Kill in the Town of Lexington. The post-processing and geodatabase management is complete.	NYCDEP/ GCSWCD	Completed 2018
Gooseberry SFI	NYCDEP/ GCSWCD	Historical alignments, Japanese knotweed mapping and a Stream Feature Inventory (SFI) were completed for the Gooseberry Creek in the Town of Hunter. The post-processing and a geodatabase management is complete.	NYCDEP/ GCSWCD	Completed 2018
SMP Water Quality Workshop	NYCDEP GCSWCD	GCSWCD and DEP will get together to discuss available data, priority pollutants and the strategy for restoration project identification.	NA	Completed 2018

Monitoring of Restored Reaches	NYCDEP/ GCSWCD	In 2018, 13 stream restoration sites were monitored including, Ashland Well Head, Maier, Big Hollow, Conine, Sugar Maples, Holden, Kastanis, Shoemaker, CR 6, CR 42, Apple Hill, Schoharie Street and Kozak.	NYCDEP/ GCSWCD	Completed 2018
Vegetation Monitoring	NYCDEP/ GCSWCD	In 2018, vegetation monitoring of stream restoration and Catskill Stream Buffer Initiative projects was completed for the following sites: McWilliams, Grossman, Freedman, Pesciotta, Drake, Rikard, Simmons, Posch, Bilash, Deming Road, South Street, Windham Path Berm, Windham Path Tributary, Kastanis, Ashland Wells, Kozak Field, Kozak Barn, Shoemaker, Big Hollow, Holden, Conine and Apple Hill.	NYCDEP/ GCSWCD	Completed 2018
Monitoring of Restored Reaches	NYCDEP/ GCSWCD	In 2019, six stream restoration sites were monitored including, Brandywine/Ashland Connector Reach, Maier Farm, Big Hollow, Kastanis, Long Road and Kozak.	NYCDEP/ GCSWCD	Completed 2019
Vegetation Monitoring	NYCDEP/ GCSWCD	In 2019, vegetation monitoring of stream restoration and Catskill Stream Buffer Initiative projects was completed for the following sites: Ashland Wells, Brandywine/ACR, Big Hollow, Kastanis, Lanesville, Kozak, Shoemaker, Bilash, Bilash Phase 2, Deming Road, DEP/Cotrone, DEP/Riley, Drake, Freedman, Grossman, McWilliams, Pesciotta, Posch, Rikard, Simmons, South Street, Windham Path Berm, Windham Path Tributary.	NYCDEP/ GCSWCD	Completed 2019
East Kill SFI	NYCDEP/ GCSWCD	Historical alignments, Japanese knotweed mapping and a Stream Feature Inventory (SFI) were completed for the East Kill in the Town of Jewett.	NYCDEP/ GCSWCD	Completed 2019
Sawmill Creek	NYCDEP/ GCSWCD	Historical alignments, Japanese knotweed mapping and a Stream Feature Inventory (SFI) were completed for the Sawmill Creek in Hunter, NY.	NYCDEP/ GCSWCD	Completed 2019
Schedule for Monitoring of Restored Stream Reaches	NYCDEP, GCSWCD	Annual monitoring of restored stream reaches provides valuable information on the effectiveness of restoration practices in addition to fulfilling the permit requirements associated with these projects. The schedule for restoration project monitoring for the upcoming field season is determined in each year in January.	NYCDEP/ GCSWCD SMP Contract	Completed Annually 2020 - 2021
Schedule for Vegetation Monitoring	NYCDEP, GCSWCD	Annually, the GCSWCD and project partners monitor the native riparian vegetation that has been installed along streambanks. Annual vegetation monitoring provides valuable information on the effectiveness of restoration practices and CSBI project, in addition to fulfilling the permit requirements associated with these projects. The schedule for vegetation monitoring for the upcoming field season is determined each year in January.	NYCDEP/ GCSWCD SMP Contract	Completed Annually 2020-2021
Bank Erosion Guide	NYCDEP, GCSWCD	A Student Conservation Association member, collaborated with GCSWCD staff to develop a Bank Erosion Guide for use with the Stream Feature Inventory Data Dictionary. The document provides information about the types of erosion and causes of erosion, and serves as guidance during stream feature inventory assessments.	NYCDEP/ GCSWCD SMP Contract	Completed 2020
Monitoring of Restored Reaches	NYCDEP/ GCSWCD	In 2020, four stream restoration sites were monitored including, Kastanis, Shoemaker, Lanesville, and County Route 78.	NYCDEP/ GCSWCD	Completed 2020
Bear Kill SFI	NYCDEP/ GCSWCD	FEMA floodplain, historical alignments, Japanese knotweed, land cover mapping and a Stream Feature Inventory (SFI) were completed for the Bear Kill in the Towns of Stamford, Roxbury, and Gilboa, NY.	NYCDEP/ GCSWCD	Completed 2020

STREAM RESTORATION AND STABILIZATION				
Action Item	**Partners**	**Description**	**Funding**	**Status**
Holden Stream Restoration	NYCDEP, GCSWCD NYSDOT	Windham- Batavia Kill: a NYS DOT Article 15 stream disturbance permit was flagged by DEC Region 4 for potential inclusion of a natural channel design approach. The project, designed and implemented by GCSWCD, established a geomorphically appropriate channel and floodplain bench and included riparian plantings which restored floodplain function.	NYCDEP/ GCSWCD, NYSDOT	Completed 2007
Conine Farm Stream Restoration	NYCDEP, GCSWCD	Town of Prattsville- Batavia Kill: GCSWCD/NYCDEP completed a full geomorphic based restoration of a +/- 1800 foot reach on the lower Batavia Kill. The project addressed severe slope instability, reduced sediment loading and protected private property.	NYCDEP/ GCSWCD	Completed 2008
Lanesville Stream Restoration Project Repairs	NYCDEP, GCSWCD	Town of Hunter- Esopus Basin: repairs were made on the Lanesville Demonstration Stream Restoration Project. Most adjustments were associated with gullying on a high slope failure caused by poor drainage on the terrace above the slope, which had not been addressed as part of the restoration project. Other adjustments were made in rock vane elevations and additional bioengineering was added to mitigate gullying.	NYCDEP/ GCSWCD	Completed 2008
Broadstreet Hollow Stream (BSH) Restoration Project Repairs	NYCDEP, GCSWCD	Repairs to a restoration project GCSWCD implemented in 2000. The April 2005 flood damaged two dewatering wells which then failed to relieve artesian conditions and a mud boil returned, causing chronic turbidity. GCSWCD modified the damaged rock structures and hired a well drilling subcontractor to attempt to rehabilitate the dewater wells. The subcontractor found the well heads had broken and couldn't be rehabilitated. After reviewing all options, a decision was made to abandon the wells and monitor the projects' stability.	NYCDEP/ GCSWCD	Completed 2008
Faber Farm Stream Restoration	NYCDEP, GCSWCD	Town of Jewett- East Kill: excessive erosion, following 2005 and 2006 floods, caused damage to project grading and rock structures. Conservation Reserve Enhancement Program (CREP), seedling plantings never became established, limiting project success. This restoration included: removal or modification of damaged rock and cross vanes, treatment of the back channel area to reduce frequency of flows in the back channel, bank grading, construction of a bankfull bench, and vegetative stabilization to reduce erosion and establish a riparian buffer. 1,179 larger trees were planted, willow stakes and approximately 1,000 feet of willow fascines were installed, along with many shrubs, sedges, and herbaceous seed.	NYCDEP/ GCSWCD, ACOE	Completed 2008
Ashland Connector Reach	NYCDEP, GCSWCD	Town of Ashland- Batavia Kill: GCSWCD completed planting on the streambanks and floodplains at the lower end of the project reach. Also, compensatory wetland areas were planted with appropriate species. Limited site cleanup work on access/staging areas was completed, and the project was surveyed as part of routine project monitoring schedule.	NYCDEP/ GCSWCD	Completed 2008
Schoharie Street Stabilization	NYCDEP, GCSWCD	Village of Hunter: stabilization of approximately 120 feet of high stream bank to protect infrastructure and private property. Project includes stacked and pinned riprap and vegetated beds. The GCSWCD and NYCDEP also added additional riparian buffer plantings on the opposite bank. Additional plantings including balled and burlapped river birch trees, were added fall 2009.	NYCDEP/ GCSWCD	Completed 2009

West Kill Restoration Project, Long Road	NYCDEP, GCSWCD	Town of Lexington: completed a full geomorphic restoration of approximately 2,400 linear feet of stream on the West Kill in Spruceton Valley. The site had significant bank failure and clay exposures in bank and stream bed. Wetland delineation, archaeological investigation and final survey of site conducted.	NYCDEP/ GCSWCD	Completed 2009
Oakwood Pistol Club	NYCDEP, GCSWCD, CWC	Town of Prattsville: GCSWCD led the CWC Stream Program streambank projection project. Engineering services were contracted for this project; design plans and specifications have been submitted for permit, and construction completed.	CWC Stream Corridor Protection Grant	Completed 2009
Windham Golf Course Streambank Project	NYCDEP, GCSWCD, CWC	Primarily a CWC project with GCSWCD assistance. The project provided for the removal of failed sheet piling, armoring of the toe and sloping of the bank, and planting of approximately 155 feet of streambank.	CWC, NYCDEP/ GCSWCD	Completed 2009
Sugar Maples Stream Restoration	NYCDEP, GCSWCD	Town of Windham- Batavia Kill Tributary: removed mortared stone walls that confined a tributary and restored the stream to a natural shape and meander pattern. Floodplain grading was performed and the site was seeded with wetland and riparian seed mixes. GCSWCD hosted a student planting with three schools to install 1,584 herbaceous plugs, 340 willow stakes, 250 trees and shrubs, and 7 willow fascines. The project was designed to restore wetland functions and approximately 700 feet of stream that was historically channelized and confined.	NYCDEP/ GCSWCD, ACOE	Completed 2010
Wright Stream Bank Stabilization/ Riparian Project	NYCDEP, GCSWCD, SCA	A bankfull bench of approximately 1,200 feet was constructed and 3,127 feet of the streambank were re-vegetated. A rock installation was completed by the project contractor, while plantings were installed by GCSWCD staff and SCA service project hosted by GCSWCD.	NYCDEP/ GCSWCD, CWC, ACOE	Completed 2010
Wright Stream Bank Stabilization/ Riparian Project Enhancement	NYCDEP, GCSWCD	The previously constructed project was modified and enhanced with additional vegetative treatments in 2011 and monitoring initiated in 2012.	NYCDEP/ GCSWCD	Completed 2011
Vista Ridge Floodplain Restoration	NYCDEP, GCSWCD	This project improved the immediate project area and the aggraded reach upstream, by reducing a backwater condition at the Vista Ridge bridge. The project also enhanced the riparian buffer, reduced the risk of failure of Vista Ridge and Colgate Lake Roads, reduced erosion of silts and clays, and provides for improvement of the habitat value of the reach.	NYCDEP/ GCSWCD, ACOE	Completed 2011
Holden Stream Restoration Project	NYCDEP, GCSWCD	Phase 1 of the project was completed in 2011; continued construction was postponed due to Hurricane Irene. Project construction completed in 2012. The project included streambank and channel excavation to achieve stable geometry, installation of in-stream stabilization structures and a variety of bioengineering techniques along 3,500 feet of stream channel. Over 6,000 trees were planted along the restored stream channel.	NYCDEP/ GCSWCD	Completed 2011-2013
Windham Country Club Repairs	NYCDEP, GCSWCD	Windham- Batavia Kill: There were significant damages sustained at the Windham Country Club. Topographic data was collected to support cost, material and labor estimates for implementation of the repair work. GCSWCD provided technical support to the project due to the extensive damage that occurred along the stream corridor.	NYCDEP/ GCSWCD	Completed 2012

East Kill Restoration at Apple Hill	NYCDEP, GCSWCD	Project components included the realignment and resizing of 3,500 feet of channel, the installation of 23 rock structures, and installation of extensive bioengineering treatments and riparian plantings over the 11 acre site. These efforts will improve water quality, reduce risk to humans and property, reduce erosion and excessive sediment loading, restore floodplain function, and improve aquatic and terrestrial habitat.	NYCDEP/ GCSWCD, SMIP, ACOE, EWP	Completed 2012
NYS Route 42 West Kill Slope Failure	GCSWCD NYCDEP NRCS	Town of Lexington: The project addressed a large slope failure along a 1,400 foot reach of the West Kill, just downstream of the Pushman Bridge on NYS 42. The project included stream bank and channel excavation, and the installation of in-stream stabilization structures to achieve stable geometry. Practices include rock riffles, random boulder clusters, log boulder revetment and dry rock riprap with willow stakes to establish an armored flood plain bench at the toe of the slope, upper portions of the slope were hydroseeded and staked, and an as-built survey and plans have been prepared.	NYCDEP/ GCSWCD, EWP	Completed 2013
Conine Project Repairs	NYCDEP, GCSWCD	Town of Prattsville: The purpose of this work was to repair a project that was damaged during Irene in 2011. The repair project measured approximately 2,200 linear feet in length, with a disturbance area of 11 acres. Extensive earthwork required to restore original grades, and included excavation and placement of over 52K cubic yards of material. The project included the repair and reconstruction of 5 j-hook vane structures, two cross vanes, and a constructed riffle. Biotechnical measures taken included live staking and fascines, seeding native riparian and wetland seed mixes, and developing a 7.1 acre riparian zone.	FEMA NYCDEP/ GCSWCD	Completed 2013
Maier Farm Project Repairs	NYCDEP, GCSWCD	Town of Ashland- Batavia Kill: The purpose of the project was to repair a portion of a project constructed in 1999 that sustained damage during Irene in 2011. Damages included streambank erosion, structural damage to rock structures, channel migration and land loss, and excess sedimentation. Earthwork was completed to restore original grades. The reconstruction of two j-hooks and repair of one cross vane provided channel grade control, stream bank stabilization, and habitat enhancement. Bioengineering, including live staking and fascines, along with the establishment of a one acre riparian zone was completed.	FEMA NYCDEP/ GCSWCD	Completed 2013
Brandywine Project Repairs	NYCDEP, GCSWCD	Town of Ashland- Batavia Kill: The project addressed damages sustained to the Brandywine restoration site during Irene in 2011.	FEMA NYCDEP/ GCSWCD	Completed 2014
Ashland Connector Reach Project Repairs	NYCDEP, GCSWCD	Town of Ashland- Batavia Kill: The project addressed damages sustained to the Ashland Connector Reach during Irene in 2011.	FEMA NYCDEP/ GCSWCD	Completed 2014
Long Road Project Repairs	NYCDEP, GCSWCD	Town of Lexington- West Kill: The project addressed damages sustained to the Long Road restoration site during Irene in 2011.	FEMA NYCDEP/ GCSWCD	Completed 2014
Lanesville Project Repairs	NYCDEP, GCSWCD	Village of Hunter- Stony Clove: The project addressed damages sustained to the Lanesville restoration site during Irene in 2011.	FEMA NYCDEP/ GCSWCD	Completed 2014
Ashland Well Heads Protection Project	NYCDEP, GCSWCD	Town of Ashland- Batavia Kill: The project addressed damages sustained to the Ashland Wells Head restoration site during Irene in 2011.	NYCDEP/ GCSWCD, EWP, ESD	Completed 2014

Shoemaker Project Repairs	NYCDEP, GCSWCD	Damages sustained on the Shoemaker Stream Restoration project on the West Kill were repaired in 2014 and 2015.	FEMA, NYCDEP/ GCSWCD	Completed 2015
Manor Kill Stream Restoration	SCSWCD, GCSWCD, NYCDEP, Conesville	A full-channel restoration project was installed adjacent to the Conesville Town Park in order to stabilize eroding streambanks and protect water quality by reducing fine sediment sources along this reach of stream.	SMIP, NYCDEP/ GCSWCD,	Completed 2015
Schoharie Creek Stabilization and Riparian Restoration at Kozak	GCSWCD, NYCDEP	Located along the Schoharie Creek, this project involved restoring 750 linear feet of erosion with clay exposures by grading the bank and stabilizing the toe with rock and bioengineering treatments. A 50-100 feet wide riparian buffer was established by planting native tree and shrub species along 1,500 feet of streambank.	SMIP, GCSWCD, NYCDEP	Completed 2016
Operation and Maintenance	NYCDEP, GCSWCD, Landowners	The GCSWCD, NYCDEP and project partners worked to maintain project sites throughout the Schoharie Watershed. Maintenance activities included: *Lanesville* – supplemental plantings of trees and shrubs within the floodplain along the left streambank, and willow stake height maintenance. *Apple Hill* - installation of 500 additional willow stakes along outside of meander bends through project length; supplemental plantings of 1,765 trees and shrubs; fertilized planted material. *ACR Parking Area* – spread soil along access road and driveway entrance; seeded and mulched site with riparian mix and triple rye. *Shoemaker* – developed a planting plan; seeded site with riparian mix; fertilized the site. *Griffin Road* – fertilized planted trees and shrubs.	NYCDEP/ GCSWCD Schoharie SMP Contract	Completed 2016
West Kill Restoration at Shoemaker	GCSWCD, NYCDEP	Constructed to mitigate turbidity and excess sediments from clay-rich sources, reduce flood hazard erosion risk and improve ecological integrity.	GCSWCD/ NYCDEP Schoharie SMP Contract/ SEMO, FEMA	Completed 2016
Batavia Kill Restoration at Kastanis	GCSWCD, NYCDEP	A full channel restoration project of approximately 4,000 feet of streambank along the Batavia Kill that experienced significant rates of erosion and lateral migration. Full restoration involved natural channel design to realign the channel and stabilize the bed and bank using a combination of rock structures and bioengineering. The riparian buffer was enhanced with native seed, shrubs and trees.	SMIP, GCSWCD/ NYCDEP SMP Contract	Completed 2017
Operation and Maintenance	NYCDEP, GCSWCD, Landowners	The GCSWCD, NYCDEP and project partners worked to maintain project sites throughout the Schoharie Watershed. Maintenance activities included: *South Street* –installation of willow stakes and supplemental plantings of trees and shrubs on the bank. *Cranberry Road Culvert* –channel repair upstream of the culvert to correct the split channel that had started to establish. *Holden* – revegetation of streambanks with poor vegetative cover. Soils were loosened and seeded, fertilizer was applied and erosion control blankets were installed. *State Route 42* – large wood that was blocking stream flow and threatening a downstream bridge were cut and left in place to minimize potential impacts of fallen trees.	NYCDEP/ GCSWCD Schoharie SMP Contract	Completed 2019

		Kastanis – loosened up compacted soils removed rock and seeded and mulched the farm fields to address impacts of project construction.		
East Kill Streambank Stabilization near CR 78 Bridge	GCSWCD NYCDEP	Project included restoration of approximately 650 feet of the East Kill that had experienced continued streambank failure and mass wasting. An earthen berm had also caused the stream to be disconnected from the floodplain. The berm was removed and minor modifications were made to the channel alignment along this reach. Restoration also involved development of a stable bankfull bench and bank toe. The project included installation of live stone revetment, and root-wads for toe protection and bioengineering and installation of native vegetation to provide streambank stability and a healthy riparian buffer.	SMIP	Completed 2019
Batavia Kill Restoration at Red Falls Project 1, Phase I	GCSWCD, NYCDEP	Phase I of the Batavia Kill Restoration at Red Falls Project 1 is complete. Phase I included completion of the gravel access road and rock lined dewatering channel. This is part of a full-channel restoration project located on the Batavia Kill at the border of Ashland and Prattsville.	SMIP, GCSWCD/ NYCDEP SMP Contract	Completed 2020
CR78 Culvert on Tributary to East Kill Bed Stabilization	GCSWCD, NYCDEP, GCHD	This stream bed stabilization project is located upstream of an existing culvert crossing on an unnamed tributary to the East Kill. The GCHD, in collaboration with GCSWCD, installed three constructed riffles along 200 feet of stream channel.	SMIP	Completed 2020
Operation and Maintenance	NYCDEP, GCSWCD, Landowners	The GCSWCD, NYCDEP and project partners worked to maintain project sites throughout the Schoharie Watershed. Maintenance activities included: County Route 78 Stream Restoration- Fertilized planting area and maintained tree tubes. Windham Path- Installed new trees and shrubs on eroded bank, blocked up large wood that was blocking stream channel adjacent to planting so it would not impact downstream bridges. County Route 78 Culvert- Spread grass seed, fertilizer, and planted willows and trees on banks after grading was completed. Ashland Connector Reach Project – parking area maintenance.	NYCDEP/ GCSWCD Schoharie SMP Contract	Completed 2020

STREAM STEWARDSHIP AND STREAM ACCESS EDUCATION AND OUTREACH				
Action Item	**Partners**	**Description**	**Funding**	**Status**
What is turbidity and why is it important?	GCSWCD/ NYCDEP	Workshop held that provided an overview of what turbidity is, and the impact it has on the Schoharie Basin.	NYCDEP/ GCSWCD	Completed 2007
Watershed Tours	GCSWCD/ NYCDEP	Watershed tours provide an opportunity for local officials and interested basin residents to observe best management practices used in stream stewardship and management throughout the watershed. The tours foster and improved understanding of stream protection efforts and implementation projects.	NYCDEP/ GCSWCD	Completed Annually 2007-2010
Batavia Kill Stream Celebration	GCSWCD/ NYCDEP	Annual event promoting the wise use of our natural resources as they relate to water quality and ecosystem functions. Interactive exhibits, educational displays, and activities promoting understanding of the environment engage those of all ages.	NYCDEP/ GCSWCD, Ashland, CWC	Completed Annually 2007-2011

Educational Workshops	GCSWCD/ NYCDEP	Education, built into Summits and Tours, target elected and appointed officials, planning boards, code enforcement officers, highway department staff, and streamside property owners.	NYCDEP/ GCSWCD	Completed Annually 2007-2020
Watershed Summits	GCSWCD/ NYCDEP	Watershed conferences held to provide local decision makers and officials educational classes and networking opportunities around watershed protection. All eleven communities within the basin are represented by the vast and diverse number of attendees. The 2020 Watershed Summit was canceled due to the COVID pandemic.	NYCDEP/ GCSWCD	Completed Annually 2007-2021
Websites	GCSWCD/ NYCDEP	Although websites require continuous updating, the www.catskillstreams.org and www.gcswcd.com are established sites that are used to promote project updates and share information on watershed protection issues.	NYCDEP/ GCSWCD	Completed 2007, 2010, 2014, 2020
Program Office	GCSWCD NYCDEP	GCSWCD and WAP secured a Mountaintop project office in Tannersville which is used by various local, regional, and state committees working on watershed protection.	NYCDEP/ GCSWCD	Completed 2008
ESC Workshop	GCSWCD NYCDEP	GCSWCD sponsored three Construction Erosion and Sediment Control Training Courses that were attended by approximately 230 people from the Schoharie basin. Participants included watershed developers, planners, code enforcement officers, regulators and contractors. This course focused on the review of new state construction permit, the requirements of stormwater pollution prevention plans, and the proper installation of erosion and sediment control practices. This continued with workshops in 2015 and 2017. Courses are offered approximately every three years.	NYCDEP/ GCSWCD	Completed 2008-2017
Manor Kill Environmental Study Team,Stream Management Implementation	Schoharie River Center	Experimental, hands on environmental education and stream monitoring program for youth ages of 13 - 18. Youth members learn specific skills, develop and master abilities in environmental assessments, field research projects and community education activities. Members also participated in a riparian planting along Manor Kill in 2011.	SMIP	Completed Annually 2009-2011
Schoharie Watershed Week	GCSWCD/ NYCDEP/ Watershed Municipalities	A number of events scheduled to educate and engage local community members in watershed programs and stewardship activities. Intended to be an annual event, but replaced with Schoharie Watershed Month in 2011.	SMIP	Completed 2010
Rain Barrel Workshop	CCE, GCSWCD, NYCDEP	Workshop took place during Schoharie Watershed Week in May 2010 and Schoharie Watershed Months in 2011 & 2012. Watershed landowners took part in building their own rain barrels.	SMIP	Completed 2010-2012
Mountain Top Arboretum Wet Meadow-Interpretive Kiosk, Brochures, & Historic Pump House Repair	Mountain Top Arboretum	A kiosk was installed and brochures were developed to describe the wet meadow including the historical background of the historic pump house, an explanation of the site's hydrology, and other information about wetland plants and wildlife.	SMIP	Completed 2010
SWAC and Schoharie Watershed Week Logos	GCSWCD/ NYCDEP/ SWAC	Logos were developed for the Schoharie Advisory Committee and Watershed Week.	SMIP	Completed 2010

Schoharie Watershed Months	GCSWCD, NYCDEP, SWAC	Schoharie Watershed Month engages watershed communities and organizations in hands-on activities to learn about the watershed and its resources. Various activities, workshops and family events are organized each May by host communities and organizations that promote awareness and protection of streams and their watersheds.	SMIP	Completed Annually 2011-2019
Riparian Walk	GCSWCD, NYCDEP,	As part of the Hunter-Tannersville Elementary Trout Release Program, a guided riparian buffer walk was held at Dolan's Lake.	GCSWCD, NYCDEP	Completed annually 2011-2018
Identify Existing Resources	GCSWCD, NYCDEP	GCSWCD identified and cataloged existing resources that are currently available. The website was revamped in 2011, to provide web-based documentation of existing resources and links to additional resources.	NYCDEP/ GCSWCD	Completed 2011
Mountain Top Arboretum Outdoor Classroom Design	GCSWCD, NYCDEP, Mountain Top Arboretum	An outdoor classroom was designed and constructed at the arboretum. It accommodates approximately 45 people for year-round outdoor programming on a range of ecological and natural history topics relating to the watershed.	SMIP	Completed 2011
Water Quality at Home Workshop	GCSWCD, NYCDEP, CCE	Two action-based educational workshops held during Schoharie Watershed Month to raise awareness about stewardship of water quality. The Holistic Pond Management Workshop provided tools and strategies to address pond problems without the use of chemical treatments. The rain barrel workshop discussed the impacts of stormwater runoff on water quality and taught participants how to build a rain barrel.	SMIP	Completed 2011
Manor Kill Information Kiosk	GCSWCD, NYCDEP, Conesville, SCSWCD	A Kiosk for Conesville was provided by GCSWCD, and a general Schoharie Watershed/Schoharie SWCD educational panel was produced in conjunction with GCSWCD's kiosk series.	NYCDEP/ GCSWCD, SCSWCD	Completed 2011
Septic Workshop for Homeowners	CWC, GCSWCD, NYCDEP	As part of Schoharie Watershed Month, the Catskill Watershed Corporation provided an educational septic workshop for watershed homeowners held at the Windham Waste Water Treatment Plant. A tour of the state of the art treatment plant followed the workshop.	SMIP, CWC	Completed 2013
Earth, Wind & Water: The Seasons Student/Amateur Watershed Art Exhibit	SWM Committee, GCSWCD, NYCDEP	The artwork of local students and amateur artists was on display at the Kaaterskill Fine Arts Gallery in Hunter, NY. The artwork theme was Earth, Wind & Water: The Seasons. An opening reception was held and the exhibit was on display for the month of May.	SMIP	Completed 2013
Windham Path Stream Clean Up	Windham, GCSWCD, NYCDEP, WARF	The Windham Area Recreation Foundation (WARF), in coordination with NYCDEP and GCSWCD, held a Grand Opening of the Windham Path in May 2014. Volunteers who attended also participated in a stream clean-up along the property.	SMIP, WARF	Completed 2013
Greene Infrastructure at Work & Home	CGCCE, GCSWCD	As part of Schoharie Watershed Month, The Columbia-Greene Cornell Cooperative Extension and GCSWCD presented a workshop about green infrastructure. Topics included stormwater impacts, small scale treatment practices and a tour of the Mountain Top Library, and green infrastructure project supported by SMIP.	SMIP, GCSWCD, WAP	Completed 2013
Riparian Walk	Windham Path	As part of Schoharie Watershed Month and the grand opening of the Windham Path, a guided riparian buffer walk and discussion was held at the Windham Path.	GCSWCD, NYCDEP	Completed 2013

Invasive Species Workshop for Landowners	Catskill Center, SWM Committee, GCSWCD, NYCDEP	The Catskill Center for Conservation and Development provided a workshop about invasive species. This workshop was for small and large landowners in the watershed and was held in Prattsville, NY during Schoharie Watershed Month.	SMIP, Catskill Center	Completed 2014
The City that Drinks the Mountain Sky	SWM Committee, GCSWCD, NYCDEP	The Arm-of-the-Sea Theater, presented *The City that Drinks the Mountain Sky*, an educational puppet show for the entire family, held in Prattsville, NY as part of Schoharie Watershed Month.	SMIP	Completed 2014
Rain Garden Workshop	CCE, SWM Committee, GCSWCD, NYCDEP	Liz LoGiudice of Cornell Cooperative Extension provided the Rain Garden Workshop and site visit as part of Schoharie Watershed Month. The workshop was provided in Tannersville, NY and taught landowners about stormwater landscaping that will beautify your property.	SMIP	Completed 2014
Gilboa Dam Tour	GCSWCD, NYCDEP	GCSWCD partnered with NYCDEP to provide a tour of the Gilboa Dam as part of Schoharie Watershed Month.	SMIP, NYCDEP	Completed 2014
Water Workshop	Mrs. Puddle Duck's, GCSWCD, Catskill Center, Hunter Foundation, NYCDEP	As part of Schoharie Watershed Month, the Catskill Center for Conservation & Development and the Hunter Foundation supported a water workshop targeting preschoolers and their families. To workshop provided an opportunity for participants to discover what is in our stream and why it is important to protect them.	SMIP, Catskill Center, Hunter Foundation	Completed 2014
Windham Day of the Batavia Kill	SWM Committee, GCSWCD, NYCDEP	As part of Schoharie Watershed Month, Windham Day on the Batavia Kill was held at the Windham Path property. Attendees had the opportunity to participate in the COWF Pat Meehan Memorial Scholarship Walk, plant identification walks, and learned about local organizations that promote outdoor and community resources.	SMIP, COWF	Completed 2014
The Gilboa Ancient Forest	SWM Committee, GCSWCD, NYCDEP	During Schoharie Watershed Month, the Gilboa Ancient Forest lecture was presented by Kristen Wyckoff of the Gilboa Historical Society (GHS). Participants learned about the oldest known forest on earth and saw fossilized tree trunks.	SMIP	Completed 2014
Guided Bus Tour of the Schoharie Reservoir	SWM Committee, GCSWCD, NYCDEP	As part of Schoharie Watershed Month, Gerry Stoner and Diane Galusha, area historians, presented a Guided Bus Tour of the Schoharie Reservoir. Participants took a scenic tour around the reservoir and explored this history of the former valley and the creation of the Gilboa Dam.	SMIP	Completed 2014
Riparian Walk	Windham Path	As part of Lark in the Park, a guided riparian buffer walk and discussion was held at the Windham Path.	GCSWCD, NYCDEP	Completed 2014
Trout Release	SWM Committee, GCSWCD, NYCDEP	During Schoharie Watershed Month, a trout release and macroinvertebrate study were held at Dolan's Park in Hunter, NY. Participants also have the opportunity to learn about fly casting and tying.	SMIP	Completed 2015
Changing Trout Habitat in the Upper Schoharie Creek	TU, SWM Committee, GCSWCD, NYCDEP, Platte Clove Community	As part of Schoharie Watershed Month, Trout Unlimited supported the workshop, *Changing Trout Habitat in the Upper Schoharie Creek.* Walt Keller, a fisheries biologist, and a panel of speakers explored the factors that influence stream health and fish populations. The workshop was held at the Platte Clove Neighborhood Center in Hunter, NY.	SMIP/CSBI	Completed 2015

Guided Paddle on the Schoharie Reservoir	SWM Committee, GCSWCD, NYCDEP, Catskill Outback Adventures	Catskill Outback Adventures led a guided paddle on the Schoharie Reservoir beginning at Snyder's Cove. This trip was part of Schoharie Watershed Month.	SMIP	Completed 2015
Aquatic Invertebrates Workshop for Children	SWM Committee, GCSWCD, NYCDEP	As part of Schoharie Watershed Month, an Aquatic Invertebrates workshop was held in the Village of Hunter, NY. This after school program taught students about dragonflies, damselflies, and other aquatic insects and animals that play important roles in the watershed.	SMIP	Completed 2015
Interpretive Watershed Hike, Bearpen Mountain	SWM Committee, GCSWCD, NYCDEP	Peter Manning led a 7-mile interpretive watershed hike of Bearpen Mountain as part of Schoharie Watershed Month.	SMIP	Completed 2015
The Schoharie Basin and It's Ice Age History	SWM Committee, GCSWCD, NYCDEP	*The Schoharie Basin and It's Ice Age History* was presented by Bob and Johanna Titus. They told the story of how glaciers shaped the Schoharie Basin and created its most scenic views. This lecture was held at the Mountaintop Historical Society in Haines Falls, NY as part of Schoharie Watershed Month.	SMIP	Completed 2015
Town of Lexington Watershed Awareness Workshops	Town of Lexington	A series of four educational workshops for children in the Town of Lexington. The proposed workshops will teach local children, using hands-on experiences, about the insects and animals that play important roles in the watershed, and the role that streams play in the environment.	SMIP	Completed 2015
Opening Student/ Amateur Art Exhibit	NYCDEP/ GCSWCD	Students from schools around the mountaintop displayed their films, sculptures, photographs, and other artwork for the "Now Streaming: Life in the Schoharie" art show. Exhibit ran through the month of May. This exhibit was on display at the Doctorow Center for the Arts during Schoharie Watershed Month.	SMIP	Completed 2016
"RiverWebs" Film Showing	NYCDEP/ GCSWCD	"A true story about life, death, science, and streams." This documentary follows the life and work of Japanese ecologist, Dr. Shigeru Nakano. The documentary was shown at the Mountain Top Library as part of Schoharie Watershed Month.	SMIP	Completed 2016
Riverkeeper Sweep: Windham Tree Planting	NYCDEP/ GCSWCD	The NYC Department of Environmental Protection (NYCDEP) and the Greene County Soil & Water Conservation District (GCSWCD) organized a tree planting on Windham's Batavia Kill (at South Street) on Saturday, May 7, 2016 for the 5th Annual Riverkeeper Sweep, a day of service for the Hudson River. This event was part of Schoharie Watershed Month.	SMIP	Completed 2016
Schoharie Reservoir Bus Tour	NYCDEP/ GCSWCD	Gerry Stoner, of the Gilboa Historical Society, led a guided bus tour of the Schoharie Reservoir as part of Schoharie Watershed Month. Participants learned about the history of the reservoir, the building of the Gilboa Dam, the Gilboa fossils, and more! All participants received a 50-page tour booklet as a keepsake.	SMIP	Completed 2016
Local Stewardship Lectures	NYCDEP/ GCSWCD/ NYSDEC/ NYTU/ CIES	A series of three lectures was provided during Schoharie Watershed Month at the Platte Clove Neighborhood Center. "Our Rivers on Drugs". AJ Reisinger, a freshwater ecologist at the Cary Institute of Ecosystem Studies, discussed how pharmaceuticals and personal care products	SMIP	Completed 2016

		are polluting rivers and streams – and the consequences for aquatic life and drinking water supplies. "Guide to Creating a Natural Resources Inventory (NRI)" Ingrid Haeckel, from NYS Department of Environmental Conservation, spoke about the benefits of natural areas and the importance of community consideration of local land and water resources to better guide land-use decisions. "Microbeads Affecting Lake, Tributaries, and Your" Ron Urban, from NY Trout Unlimited, spoke about the potential environmental damage, and health consequences for fish and aquatic organisms due to microbeads found in waterways.		
Kids Program, following Stewardship Lectures	NYCDEP/ GCSWCD	Following the Local Stewardship Lectures held at the Platte Clove Neighborhood Center, a Kids Program was held during Schoharie Watershed Month. Kids joined storyteller Jill Olesker for story time, participated in a citizen science paint and sketch with local artists, and got creative with fairy house fun.	SMIP	Completed 2016
Hemlocks through History	NYCDEP/ GCSWCD	Mike Kudish, Catskills forest historian and author, discussed the history of hemlocks and their significance to the Schoharie Watershed. Dan Snider, Field Projects Manager at CRISP, discussed the hemlock woolly adelgid (HWA), a tiny forest pest that is currently threatening hemlock populations. Participants learned how to identify HWA and what to do if they find HWA on their property. All participants received a complementary hemlock tree seedling to take home for planting. This program was presented during Schoharie Watershed Month.	SMIP	Completed 2016
Arm-of-the Sea's "Rejuvenary River Circus" Theater Performance	NYCDEP/ GCSWCD/ CWC	The performance of a story that follows Malakai, the River messenger and water carrier who travels between Mountain Peaks and the Deep Blue Sea. Along his journeys Malakai encounter animals that offer insights into their particular role in a watershed's ecosystem services. This performance was as part of Schoharie Watershed Month.	SMIP/ CWC	Completed 2016
Riparian Walk	Windham Path	As part of Schoharie Watershed Month, a guided riparian buffer walk and discussion was held at the Windham Path.	GCSWCD, NYCDEP	Completed 2016
Schoharie Creek Arbor Day Volunteer Tree Planting	NYCDEP/ CSBI/ GCSWCD/ NYTU/ NYSDEC	GCSWCD teamed up with Trout Unlimited and NYSDEC for a volunteer tree planting in a riparian buffer zone along the Schoharie Creek in Jewett. This planting event was held on Saturday, April 29th, 2017 in honor of Arbor Day. This event was part of Schoharie Watershed Month.	SMIP	Completed 2017
Opening Student/ Amateur Art Exhibit	NYCDEP/ GCSWCD	Students from schools around the mountaintop displayed their films, sculptures, photographs, and other artwork for the "Now Streaming: Life in the Schoharie" art show. Exhibit ran through the month of May. This exhibit was on display at the Mountain Top Library during Schoharie Watershed Month.	SMIP	Completed 2017
Volunteer Potting-Up Events	NYCDEP/ GCSWCD	GCSWCD staff teamed up with the Platte Clove Community and a few volunteers from the general public to hold a volunteer potting-up event at the Plant Materials Center in Hensonville. The trees and shrubs that were potted up will be used in future streamside plantings with GCSWCD. The two volunteer potting-up events took place on Tuesday, May 9th, and Wednesday, May 17th, during Schoharie Watershed Month.	SMIP	Completed 2017

"Schoharie Passage: From Mountain to Manhattan"	NYCDEP/ GCSWCD	Diane Galusha's illustrated talk "Schoharie Passage: From Mountain to Manhattan." The Liquid Assets author traced the Schoharie Creek's journey from the Catskills High Peaks to the faucets of New York City. This talk described the history of the NYC drinking water supply, with a focus on the construction of the Schoharie Reservoir. Attendees had an opportunity for a book signing with Diane Galusha. This program was presented during Schoharie Watershed Month.	SMIP	Completed 2017
Invasive Species Day	NYCDEP/ GCSWCD	Invasive Species Day was held at the Mountain Top Arboretum. Attendees learned about common local invasive species and forest pests with Dan Snider from the Catskill Regional Invasive Species Partnership (CRISP). Attendees helped to remove lesser celandine and replant with native vegetation. The program was presented during Schoharie Watershed Month.	SMIP	Completed 2017
"Hometown Habitat" Film Showing and Q&A Panel Discussion	NYCDEP/ GCSWCD	The Meadow Project's documentary "Hometown Habitat" was shown at the Orpheum Film & Performing Arts Center in Tannersville. The movie highlighted the importance of planting native plant species, selecting plants that support habitat for wildlife and attract pollinators, and promoting the natural beauty of our local ecosystems. Following the film, there was a 30-minute Q&A panel discussion with local garden experts from the Mountain Top Arboretum, Cornell Cooperative Extension of Columbia-Greene Counties' Master Gardener Volunteer program, and GCSWCD staff. Registered participants received a free small native tree or shrub to take home for planting courtesy of GCSWCD. This program was presented during Schoharie Watershed Month.	SMIP	Completed 2017
"Spring Fling" Opening of the Expanded Kaaterskill Rail Trail	NYCDEP/ GCSWCD	GCSWCD helped with trail work for the newly expanded KRT section. GCSWCD set up a table display and materials inside the Mountain Top Historical Society building as part of the opening event. This program was presented during Schoharie Watershed Month.	SMIP	Completed 2017
"What's a Watershed" Programs	NYCDEP/ GCSWCD	GCSWCD staff offered "What's a Watershed?" programs at the Mountain Top Library. These programs involved the use of the Augmented Reality Sandbox, the EnviroScape model, and a pollution craft. Attendees learned how to define a watershed and how to identify common sources of watershed pollution. These programs were offered to girl scouts (July 12th) and the general public (July 14th).	NYCDEP/ GCSWCD	Completed 2017
Riparian Walk	Windham Path	As part of Lark in the Park, a guided riparian buffer walk and discussion was held at the Windham Path.	GCSWCD, NYCDEP	Completed 2017
Enviroscape	NYCDEP/ GCSWCD/ E&O Subcommittee	The Enviroscape Watershed/Nonpoint Source Model provides a hands-on demonstration of how watersheds work, with a focus on water pollution and runoff. Using the model throughout the Schoharie Watershed, we provide interactive lessons about different types of pollution (point and nonpoint sources) and how storm water carries these pollutants to nearby water bodies.	SMIP	Completed 2017
Eco-Friendly Story Time & Craft Hour at the Mountain Top Library	NYCDEP/ GCSWCD/ SWM Planning Committee	GCSWCD and the Mountain Top Library teamed up to select children's books to be read at the Mountain Top Library's regularly scheduled story time on Saturday mornings throughout Schoharie Watershed Month (May 2018). The stories were partnered with related crafts for young children. This program was offered as part of Schoharie Watershed Month 2018.	SMIP	Completed 2018

Invasive Species Day at the Mountain Top Arboretum	NYCDEP/ GCSWCD/ SWM Planning Committee/ Mountain Top Arboretum	The Mountain Top Arboretum hosted an Invasive Species Day. Dan Snider, of the Catskill Regional Invasive Species Partnership (CRISP), lectured and led a walk to ID invasive plant species. Attendees put new knowledge to practice with a group weed pull focusing on specific removal methods of the invasive lesser celandine ground cover. This program was offered as part of Schoharie Watershed Month 2018.	SMIP	Completed 2018
Trails Event	NYCDEP/ GCSWCD/ SWM Planning Committee	There was an outdoor educational walk on the Hunter Branch railroad bed presented by Joan Kutcher, Pete Senterman and Michelle Yost. Participants had the opportunity to learn about plant identification, early railroad history and outdoor recreation opportunities in the watershed. This program was offered as part of Schoharie Watershed Month 2018.	SMIP	Completed 2018
Bog Tour with Mike Kudish at the Mountain Top Arboretum	NYCDEP/ GCSWCD/ SWM Planning Committee/ Mountain Top Arboretum	Mike Kudish, forest historian, will led a short walk into the Mountain Top Arboretum's Spruce Glen where participants learned about bog ecology and history. Mike took a peat core sample to help determine the bog's age and evolution. This program was offered as part of Schoharie Watershed Month 2018.	SMIP	Completed 2018
Mountain Top Arboretum Native Shrub Replanting	NYCDEP/ GCSWCD/ SWM Planning Committee/ Mountain Top Arboretum	A native species planting project at the Mountain Top Arboretum. Dan Snider spoke on invasive shrubs, and provided participants with the opportunity to learn about native shrub alternatives. GCSWCD assisted with the removal of non-native honeysuckle and vetch and prepared the planting site prior to the volunteer event. Participants helped replant the area with beautiful native shrubs. This program was offered as part of Schoharie Watershed Month 2018.	SMIP	Completed 2018
Environmental Awareness Movie Series at the Mountain Top Library	NYCDEP/ GCSWCD/ E & O Subcommittee	This program presented screenings of educational documentaries on environmental topics throughout 2018. The Mountain Top Library held the screenings in an effort to inform the mountain top community about important environmental issues with a focus on water resources.	SMIP	Completed 2018
Stormwater Floodplain Simulation System	NYCDEP/ GCSWCD/ E & O Subcommittee	The Ward's Stormwater Floodplain Simulation System provides a hands-on demonstration of stormwater and the critical role of floodplains. The model can do simulations of different types of surfaces (wetland, parking lot, and retention pond) and it shows how retention ponds and wetlands are important for flood management. Purchase of the model with included curriculum was completed in 2018.	SMIP	Completed 2018
Bowery Creek Training Facility Curriculum Development for Onsite Field Trainings	CCE, NYCDEP/ GCSWCD/	Cornell Cooperative Extension adapted Post Flood Stream Intervention, Emergency Stream Intervention, and CCE's Streams 101 curricula to create standardized field components to be available for delivery at the Bowery Creek Training Facility. This curricula was developed to help increase awareness of stream, floodplain, and riparian buffer functions through hands-on field training.	SMIP	Completed 2019
Spring in Spruceton Photography Walk	NYCDEP/ GCSWCD/ SWM Planning Committee	Local photographer Francis X. Driscoll led a guided photography hike in the Spruceton Valley area. This program was offered during Schoharie Watershed Month 2019.	SMIP	Completed 2019

Arresting the Floodwaters: Hold your Ground with Native Plants	NYCDEP/ GCSWCD/ SWM Planning Committee	The Mountain Top Library in Tannersville, hosted author and landscape designer Carolyn Summers for a slide presentation and guided walk. This program was offered during Schoharie Watershed Month 2019.	SMIP	Completed 2019
Planting Hope: The Work of the CCC in the Catskills	NYCDEP/ GCSWCD/ SWM Planning Committee	Author Diane Galusha presented an illustrated talk of the New Deal's Civilian Conservation Corps at the Windham Civic Center. This program was offered during Schoharie Watershed Month 2019.	SMIP	Completed 2019
Becoming a Citizen Scientist with iNaturalist	NYCDEP/ GCSWCD/ SWM Planning Committee	Schoharie Watershed Month co-sponsored this event put on by the Mountain Top Arboretum. Participants learned how to use the iNaturalist mobile app with Mountain Top Arboretum staff. CRISP staff taught about the invasive plant species found near the Arboretum. This program was offered during Schoharie Watershed Month 2019.	SMIP	Completed 2019
Glacial Geology of the Schoharie Creek Valley	NYCDEP/ GCSWCD/ SWM Planning Committee	Robert and Johanna Titus offered a two-part event. The first part of the event was a one-hour long lecture at the Zadock Pratt Museum. The second part of the event was an optional two-hour hike at nearby Pratt Rock. This program was offered during Schoharie Watershed Month 2019.	SMIP	Completed 2019
Hemlock Woolly Adelgid Primer: What's Happening with Hemlocks in New York?	NYCDEP/ GCSWCD/ SWM Planning Committee	Schoharie Watershed Month co-sponsored this event put on by the Mountain Top Arboretum. The New York State Hemlock Initiative shared the importance of conserving hemlocks and the significance of the invasive hemlock woolly adelgid (HWA). The event included a walk to the Arboretum's hemlock stand to look for HWA.	SMIP	Completed 2019
Mountain Top Arboretum Emerald Bog Boardwalk and Education	NYCDEP/ GCSWCD/ Mountain Top Arboretum	This project included installation of an interpretative panel and a 45' boardwalk over a bog known as the Emerald Bog at the Mountain Top Arboretum.	SMIP	Completed 2019
Annual Education and Outreach Plan	NYCDEP, GCSWCD, SWAC	The GCSWCD continues to work with NYCDEP and others to develop and implement a comprehensive education and outreach strategy with goals submitted annually in January.	GCSWCD/ NYCDEP SMP Contract, WAP, CWC	Completed 2021
The Beauty of Survival: An Introduction to Reptiles	NYCDEP, GCSWCD, Mountain Top Arboretum	The Mountain Top Arboretum partnered with GCSWCD's SWSMP to offer this program about reptiles. The presentation provided an introduction to reptiles with an emphasis on reptiles found in the Catskill Mountains. The event was an online webinar due to the COVID pandemic. This program was a Schoharie Watershed Weekend 2020 summer event.	GCSWCD/ NYCDEP SMP Contract	Completed 2020
Streamside Photography Walk at the Windham Path	NYCDEP, GCSWCD	Local photographer Francis X. Driscoll led a guided photography walk at the Windham Path. This program was a Schoharie Watershed Weekend fall event.	GCSWCD/ NYCDEP SMP Contract	Completed 2020
Schoharie Watershed Tour	NYCDEP, GCSWCD, SWAC	The watershed tours are organized to provide public officials, watershed managers and landowners an opportunity to view project sites to see the range and diversity of completed and potential watershed projects. The tours offer training in relevant water resource issues and management. A Regulators Stream Project Tour was held October 27, 2020.	GCSWCD/ NYCDEP SMP Contract	Completed 2020

Community Outreach	NYCDEP, GCSWCD	In order to keep watershed communities and interested stakeholders informed of SMP implementation progress and activities, the GCSWCD and its partners complete a variety of outreach media and attend or host meetings. In 2020, GCSWCD staff issued three press releases and three newsletters; GCSWCD attended and/or hosted 51 partner/committee meetings and two Shandaken Tunnel Outlet State Pollutant Discharge Elimination System Permit general meetings; and materials for two SWAC meetings were distributed via the mail.	GCSWCD/ NYCDEP SMP Contract, CWC, GCSWCD-WAP	Completed 2020

LOCAL FLOOD ANALYSIS AND FLOODPLAIN ASSESSMENT				
Action Item	**Partners**	**Description**	**Funding**	**Status**
Prattsville Local Flood Analysis	Town of Prattsville, GCSWCD, NYCDEP, NYSDOT	The primary focus of the analysis was to identify the potential for reducing flood elevations through channel and floodplain restoration, as the first alternative to other hazard mitigation solutions and to 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.	NYCDEP/ GCSWCD	Completed 2013
Windham Local Flood Analysis	Town of Windham, GCSWCD, NYRCRP, NYCDEP	The Flood Mitigation Analysis provided baseline hydraulic modeling, evaluated the mitigation alternatives, and a Flood Engineering Analysis Report. The work completed through the local flood analysis supported the efforts that were underway through the NY Rising Community Reconstruction Program.	SMIP, NYRCRP	Completed 2015
Lexington Local Flood Analysis	GCSWCD, NYCDEP, Town of Lexington	In 2014, the Town of Lexington began a Local Flood Analysis (LFA) to determine the causes of flooding, investigate and analyze the overall potential of specific projects, and projects in combination, in an attempt to mitigate flood damages and hazards. The analysis and the LFA report is complete.	SMIP	Completed 2016
Conesville Local Flood Analysis	GCSWCD, NYCDEP, Town of Conesville, SCSWCD, SC Planning	In 2016, the Town of Conesville formed a Flood Advisory Committee (FAC) and began to work with consultants in 2016 - 2017 on a Local Flood Analysis (LFA). The LFA helped to determine the causes of flooding, investigate and analyze the overall potential of specific projects, and projects in combination, in an attempt to mitigate flood damages and hazards.	SMIP, NYCDEP/ GCSWCD SMP Contract	Completed 2017
Schoharie Corridor Local Flood Analysis	GCSWCD, NYCDEP, Town of Hunter, Villages of Hunter & Tannersville	The Villages of Tannersville and Hunter and the Town of Hunter coordinated on a Local Flood Analysis that will study the mapped FEMA streams within the three municipalities namely the Schoharie Creek, Gooseberry Creek, Sawmill Creek, and Red Kill. The LFA was undertaken to determine the causes of flooding, investigate and analyze the potential of specific projects, and projects in combination, in an attempt to mitigate flood damages and hazards. Tannersville and Hunter LFAs are complete.	SMIP, CWC, NYCDEP/ GCSWCD SMP Contract	Completed 2018
Ashland Local Flood Analysis	GCSWCD, NYCDEP, Town of Ashland	In 2016, the Town of Ashland formed a Flood Advisory Committee (FAC) that began to work with consultants through 2017 on a Local Flood Analysis (LFA). The LFA helped to determine the causes of flooding, investigate and analyze the overall potential of specific projects, and projects	SMIP, NYCDEP/ GCSWCD SMP Contract	Completed 2018

		in combination, in an attempt to mitigate flood damages and hazards.		
Windham LFA Implementation	GCSWCD, NYCDEP, Town of Windham	The GCSWCD will continue to support the LFA recommended project of relocating GNH Lumber to a site outside the floodplain in Windham. The project was withdrawn because it was not feasible for the property owner.	CWC, NYCDEP/ GCSWCD SMP Contract	Withdrawn 2019

LFA IMPLEMENTATION, FLOODPLAIN MANAGEMENT COORDINATION, EDUCATION AND OUTREACH				
Action Item	**Partners**	**Description**	**Funding**	**Status**
2008 FEMA Flood Maps: What Every Planner Needs to Know	GCSWCD, NYCDEP, FEMA	Information regarding FEMA's Flood Maps, geared towards planners.	NYCDEP/ GCSWCD	Completed 2008
Greene County All Hazards Mitigation Plan	GCSWCD, NYCDEP, GCPD	The Greene County Planning Department, GCSWCD, and NYCDEP interviewed potential subcontractors and awarded the development of the hazard mitigation plan to Tetra Tech, Inc. Tetra Tech worked with various municipalities and partners to gather input for the plan, which was completed in 2009.	NYCDEP/ GCSWCD	Completed 2009
National Flood Insurance Program: Intermediate Course	GCSWCD, NYCDEP, NYSDEC	NYSDEC, course focused on flood insurance maps and elevation certificates; DOS accredited course.	NYCDEP/ GCSWCD	Completed 2009
National Flood Insurance Program	GCSWCD, NYCDEP, NYSDEC	Introductory course on floodplain management NYSDEC.	NYCDEP/ GCSWCD	Completed 2009 & 2010
What to do After the Flood	GCSWCD, NYCDEP, NYSDEC	Floodplain administrators' and community officials' guide to surviving a flood, NYSDEC.	SMIP	Completed 2011
Post Flood Emergency Stream Work Training	GCSWCD, NYCDEP, UCSWCD, UCCCE, TU, Shandaken Highway Dept.	Flooding and damage caused by Tropical Storms Irene and Lee led to emergency stream work training. Training content developed by contributors from DEP, UCSWCD, GCSWCD, CCE Ulster, Trout Unlimited, and Shandaken Highway Dept. One session was presented by Ulster County and two sessions were presented in Greene County. Over 200 attendees were trained in basic consideration that should be addressed when planning an emergency intervention in a stream system.	NYCDEP/ GCSWCD, UCSWCD	Completed 2012
Post Flood Stream Intervention Training	GCSWCD, UCCCE, NRCS, NYCDEP, UCSWCD, TU	The training, held in Ulster, Greene, and Dutchess counties, was tailored to local highway departments, excavation contractors, and others involved in stabilizing streams following flood events. The training focused on the basics of stream process and the limits of what should be targeted for repair in the immediate days follow destructive flooding.	NYCDEP, GCSWCD, UCSWCD, UCCCE	Completed 2012 & 2013
Manor Kill Acquisition (Town of Conesville)	GCSWCD, NYCDEP, SCSWCD	The Town of Conesville assisted a landowner by acquiring a floodplain parcel approved for FEMA Pre-Disaster Mitigation funding (75%) and demolishing and removing the home. The SMIP grant was used to assist the Town in meeting the required 25% match. The project, which involved demolition and site restoration, was completed with demolition and site restoration occurring in June, 2013.	NYCDEP/ GCSWCD, FEMA	Completed 2013

All Hazards Mitigation Plan Updates	GCSWCD, NYCDEP, GCPD	The Greene County Planning Department, GCSWCD, and NYCDEP and other stakeholder organizations updated the existing All Hazards Mitigation Plan.	NYCDEP/ GCSWCD	Completed 2015
Hazard Mitigation Grant Program Flood Buyout Program	NYCDEP, GCSWCD, SEMO, FEMA, Watershed Municipalities, GC Economic Development, Tourism & Planning,	The GCSWCD facilitated a FEMA flood buyout program for 23 eligible landowners in 8 Greene County towns following Hurricane Irene in 2011. NYCDEP participated in the program by covering the 25% non-federal match for watershed properties that are not eligible for state assistance. Deed restriction and conservation easement for watershed properties are issued to maintain the property in perpetuity as open floodplain space, therefore eliminating future flood damage to the parcel.	FEMA, SEMO, NYCDEP	Completed 2016
NYCDEP Flood Buyout Program	NYCDEP, GCSWCD, Schoharie Watershed Municipalities	Planning and implementation of the NYCDEP flood buyout program began in 2017. GCSWCD has helped to facilitate the program and has served as the technical and outreach lead for some Schoharie Watershed municipalities. The program began with erosion hazard buyout properties and is on-going. Two properties, (Town of Jewett and Town of Conesville) completed participation in the program in 2017.	NYCDEP/ GCSWCD SMP Contract	Completed 2017
Manor Kill Floodplain Enhancement	NYCDEP, GCSWCD, SCSWCD	The Manor Kill Floodplain Enhancement was a recommended project identified during the Conesville LFA. The property was part of a DEP buyout and the existing structure has been demolished under CWC's program. The project involved removal of fill from the right stream bank, and construction of a floodplain bench. The floodplain enhancement project will reduce 100-year flood elevations at this location; reduce stream power and velocity; provide vegetative bank treatments to stabilize the streambanks, and reduce erosion and sedimentation.	SMIP	Completed 2019
Sawmill Creek Channel Assessment	NYCDEP, GCSWCD, Village of Tannersville	The GCSWCD conducted a Stream Feature Inventory for the Sawmill Creek. Further assessment was conducted, to determine the effects of stormwater runoff from Railroad Avenue. An engineering analysis of the embankment, between Railroad Avenue and the stream, was also completed.	SMIP	Completed 2019
Floodplain Management for Real Estate Professionals	NYCDEP, GCSWCD, CCE, AWSMP, UCDE	The GCSWCD coordinated a Floodplain Management for Real Estate Professionals workshop, held October 30th, 2019. The course presented information about natural and beneficial functions of floodplains, floodplain management, types of flooding and flood damage, flood frequency, using flood maps, basics of flood insurance, retrofits for flood-prone structures and the National Flood Insurance Program (NFIP).	NYCDEP/ GCSWCD SMP Contract	Completed 2019
Technical Support for LFA Recommended Relocation Projects	NYCDEP, GCSWCD, Schoharie Watershed Municipalities	GCSWCD and partners will provide technical support and mapping assistance for relocation projects that have been recommended in a municipality's local flood analysis. In 2020, the GCSWCD provided mapping support for the following projects: Village of Hunter Firehouse Relocation, Greene County Highway Department Relocation, and Windham-Ashland-Jewett School Bus Garage Relocation.	NYCDEP/ GCSWCD SMP Contract	Completed 2020

HIGHWAY, INFRASTRUCTURE AND STORMWATER MANAGEMENT				
Action Item	**Partners**	**Description**	**Funding**	**Status**
Critical Area Seeding	GCSWCD, NYCDEP, Schoharie Basin Municipalities	GCSWCD provided seeding assistance in the Towns of Hunter, Ashland, Tannersville, Jewett, and Lexington in 2007; the Towns of Windham, Ashland, Jewett, and Hunter in 2008; the Towns of Windham, Hunter, Ashland, Hunter, and Lexington in 2009; the Towns of Lexington, Windham, Tannersville and Hunter in 2010.	NYCDEP/ GCSWCD	Completed Annually 2007-2010
County Route 13A Culvert Upgrade	GCSWCD, NYCDEP, Lexington	Town of Lexington: GCSWCD/NYCDEP worked with Greene County Highway Department to upgrade a significantly undersized culvert that was the source of repetitive flooding in the Hamlet of Lexington. The project had excellent community and landowner support and demonstrated floodplain drainage concepts, proper conveyance sizing to allow fish migration and a riparian buffer component.	NYCDEP/ GCSWCD	Completed 2007
Hunter Highway	GCSWCD, NYCDEP, Hunter Highway Department	Provided Operation and Maintenance Plan and implemented stormwater maintenance and cleaning of the stormwater controls at the Hunter Highway Garage. Annual maintenance in 2008 captured 6.3 tons (3.6 cubic yards) of sand and salt from entering the downstream Schoharie Creek.	NYCDEP/ GCSWCD, CWC	Completed 2008
Hydraulic Analysis	GCSWCD, NYCDEP, GCHD	Provided technical assistance including hydrology and hydraulic assessment to better size culvert for Greene County Highway Department.	NYCDEP/ GCSWCD	Completed 2008
Driveway/Curb Cut Specifications	GCSWCD, NYCDEP, GCHD	Permit specifications were obtained from the Greene County Highway Department and given to the Highway Subcommittee in December 2009 in order to provide watershed communities with a model to consider when issuing permits. Each community will follow up based on their level of comfort. Some communities do not use driveway regulations, preferring to assess on sight and guide landowners.	NYCDEP/ GCSWCD	Completed 2009
Road Abrasives Program	GCSWCD	Upon further review with local and county highway departments, cost sharing for road abrasive was determined to be unfeasible due to limited funding available to support offsetting costs over time.		Completed 2009
Community Stormwater Planning	GCSWCD, NYCDEP, Schoharie Basin Municipalities	GCSWCD has initiated a series of projects to help develop Community Stormwater Management Plans for town and villages in the Schoharie Basin. GCSWCD has detailed information on stormwater structures, for the towns of Ashland and Prattsville, in GIS format. Community Stormwater Management Plans for Tannersville, Hunter, and Windham have been obtained.	NYCDEP/ GCSWCD	Completed 2009
Hunter Mountain: Village of Hunter	GCSWCD, NYCDEP, Hunter, CWC	Following discussions between GCSWCD and Hunter Mountain, it was determined that Hunter Mountain had received funding through the CWC Stormwater Program and completed stormwater retrofits for their parking areas.	CWC	Completed 2009
Sugar Maples Stormwater Project	GCSWCD, NYCDEP	GCSWCD installed stormwater treatments to serve approximately 4.7 acres of relatively high density commercial buildings and residential homes in the hamlet of Maplecrest, in the town of Windham. The components were initiated with an upgraded conveyance system and demolition of a single building to reduce impervious surfaces and allow for pervious grass parking area. Rain gardens (7), wetland (treats 4.7 acres of runoff), porous walkways and riparian planting beds were installed.	NYCDEP/ GCSWCD, ACOE, CWC	Completed 2010

Mountain Top Library & Learning Center	GCSWCD, NYCDEP, Mountain Top Library	GCSWCD worked with Mountain Top Library Capital Campaign on a stormwater retrofit project. This project was initiated in conjunction with the rehabilitation of a building that will be used as the Mountain Top Library and Learning Center. Innovative methods were used to meet water quality treatment standards for runoff from roofs and parking.	SMIP, ACOE, CWC	Completed 2011
Windham Mountain	GCSWCD CWC ACOE-WRDA	GCSWCD worked with Windham Mountain Ski Center to evaluate, assess, design and install stormwater management practices. An on-site pond was converted to a stormwater facility; the pond was expanded and improvements were installed in order to route 27 acres of drainage area into the pond.	GCSWCD CWC ACOE-WRDA	Completed 2011
Village of Tannersville Highway Dept. Technical Assistance	GCSWCD, NYCDEP, Village of Tannersville Highway Department	The Village of Tannersville requested assistance on sizing a culvert under Spring Street. GCSWCD inspected the existing culverts under the road and provided the village with a variety of culvert sizing options which would increase the flow capacity of the culvert system. The information was forwarded to the Village of Hunter Highway Department in March 2011.	NYCDEP/ GCSWCD	Completed 2011
Partridge Road Culvert Replacement	GCSWCD, NYCDEP, Ashland Highway Department	The culvert under B.G. Partridge Road, in the Town of Ashland, was undersized which contributed to roadway flooding during high flows. The culvert was also perched, which presented a barrier for fish passage. GCSWCD worked with the Town of Ashland Highway Department to design a properly sized culvert and oversee the installation of this culvert. A grant was approved by SWAC/SMIP to offset the costs of upgrading the culvert to a larger size. Design, permitting and construction were completed in the summer of 2011.	NYCDEP/ GCSWCD, SMIP	Completed 2011
Mitchell Hollow Road (CR 21) Stormwater Sewer Upgrade	GCHD, GCSWCD, NYCDEP, Town of Windham	Installed water quality treatment components associated with 370' of stormwater sewer with catch basins along Mitchell Hollow Road. Project mitigates stormwater flooding in area along NYS Route 23. Project completed without SMIP funds.	SMIP, NYCDEP/ GCSWCD SMP Contract	Completed 2011
Critical Area Seeding	GCSWCD, NYCDEP, Schoharie Basin Municipalities	GCSWCD continues to partner with all highway departments to provide critical area seeding for roadside ditches and slopes using the district's hydroseeder and power mulcher.	NYCDEP/ GCSWCD	Completed Annually 2011-2015, 2018
Griffin Road Culvert Replacement	GCSWCD, NYCDEP, Jewett	The existing culvert under Griffin Road in the Town of Jewett was undersized and washed out during the flooding caused by Hurricane Irene. GCSWCD and Delaware Engineering provided design plans, permits, specifications and contract documents for bidding, funding, construction management and administration for the culvert replacement. The new culvert was designed to withstand the 100-year runoff event and included a habitat friendly three sided precast concrete structure with wing walls at the inlet and outlet. Road improvements and stream enhancements, including an upstream cross vane, were installed.	FEMA NYCDEP/ GCSWCD	Completed 2012

County Route 6 Slope Failure	GCSWCD GC Highway Dept. NYCDEP NRCS EWP	This project included stabilization of the slope failure along County Route 6 and the West Kill in Lexington. Practices installed included the use of rock riffles and sheet piling to elevate stream profile adjacent to the slope failure, to help buttress the failing slope and to provide grade control. The installation of rock revetment to protect the toe of the slope from erosion and stormwater drainage in the area of the failure to help maintain moisture levels in the soil profile was completed.	GCSWCD GC Highway Dept. NYCDEP NRCS EWP, ESD	Completed 2014
Hunter Foundation	GCSWCD, NYCDEP, Hunter Foundation	The GCSWCD worked with the Hunter Foundation to design and implement a demonstration project integrating stormwater management in an area with limited space. Innovative methods including, porous gravel parking, bioswales and rain gardens, were used to meet water quality treatment standards for runoff from roofs and parking.	SMIP	Completed 2014
Glen Avenue Culvert Upgrade	Village of Hunter Highway Department, GCSWCD, NYCDEP	The GCSWCD worked with the Village of Hunter Highway Department to design and properly size the culvert under Glen Avenue near the entrance of Camp Loyaltown. Design of this project was partially funded by the Schoharie Watershed Stream Crossing/Culvert Design SMIP funding. Installation was completed in 2015 with a buried bottom for improved habitat. Supplemental plantings were installed in 2016.	SMIP, ESD, FEMA	Completed 2016
Cranberry Road Culvert Upgrade	Town of Hunter Highway Department, GCSWCD, NYCDEP	The GCSWCD worked with the Town of Hunter Highway Department to design, properly size and oversee the installation of this culvert. Design of this project was partially funded by the Schoharie Watershed Stream Crossing/Culvert Design SMIP funding. The upgrade culvert was installed in 2016 and will be able to convey 100-year storm flows, reduce negative impacts to water quality and improve aquatic habitat and fish passage.	SMIP, ESD, FEMA	Completed 2016
South Gilboa Road Stormwater Mitigation Project	SC Department of Public Works, SCSWCD, GCSWCD, NYCDEP	This project replaced a culvert that conveys stream flow from an unnamed tributary to the Schoharie Reservoir under South Gilboa Road. The SCSWCD worked with the Schoharie County Department of Public Works, NYCDEP and Milone and MacBroom to design and install a culvert that will provide for the appropriate alignment and structure to convey flow and reduce turbid discharges directly to the reservoir.	SMIP, SCDPW, NYCDEP/ GCSWCD Schoharie Contract	Completed 2016
Critical Area Seeding	GCSWCD, NYCDEP, Schoharie Basin Municipalities	GCSWCD continued to partner with municipal highway departments within the watershed to provide critical area seeding for roadside ditches and slopes using the district's hydroseeder and power mulcher. GCSWCD provided seeding assistance in the Towns of Hunter, Ashland, Jewett, and Windham in 2016.	NYCDEP/ GCSWCD	Completed 2016
Street Sweeper with Vacuum	Highway Superintendents Subcommittee, NYCDEP, GCSWCD	After the winter season, highway crews sweep road abrasives using different machines. Greene County owns a sweeper with a vacuum that is effective at collecting leftover sand material and cleaning out stormwater structures. Given its limited availability, a second sweeper was purchased for the mountaintop communities to allow more road miles to be cleaned and maintained across the mountaintop, thereby reducing the amount of abrasives washing into ditches and waterways.	CWC, SMIP	Completed 2017

County Route 2 Culvert Upgrade, Little West Kill	GCHD, GCSWCD, NYCDEP, Town of Lexington	The project replaced a culvert that conveys stream flow from the Little West Kill under County Route 2. The previous culvert alignment contributed to localized streambank instabilities and discontinuity of sediment transport. The replacement culvert will improve road stability, flow conveyance, sediment transport continuity, habitat connectivity and aquatic organism passage.	SMIP, NYCDEP/ GCSWCD, GCHD	Completed 2017
Critical Area Seeding	GCSWCD, NYCDEP, Schoharie Basin Municipalities	GCSWCD partnered with municipal highway departments within the watershed to provide critical area seeding for roadside ditches and slopes using the district's hydroseeder and power mulcher. GCSWCD provided 9.8 acres of highway seeding assistance in the Towns of Windham, Hunter, Jewett and Lexington in 2017.	NYCDEP/ GCSWCD	Completed 2017
Hunter Wetlands Leachate Treatment System Remediation - Implementation	Mountaintop Towns, GCSWCD, NYCDEP	Installed a remediation implementation project to address the problems with the Hunter Landfill Wetland Treatment System effluent discharges.	SMIP	Completed 2017
Kaaterskill United Methodist Church Stormwater/Rain Harvesting Project	NYCDEP, GCSWCD, Kaaterskill United Methodist Church	Several stormwater management practices were installed to treat the water from the roof drainage and provide storm water infiltration. These include rooftop rain harvesting (gutter system), and above ground cistern to capture the runoff and serve as a water source for the community garden, and four rain gardens to provide stormwater filtration and infiltration.	SMIP NYCDEP/ GCSWCD	Completed 2019
Schoharie Watershed Stream Crossing/ Culvert Design	Highway Superintendents Subcommittee, NYCDEP, GCSWCD	To support local highway departments three SMIP grants have been awarded ($50,000, $30,000, $75,000, and $24,000) to fund engineering design services to ensure prioritized culverts/embankments are designed properly. County Routes 2 and 78 culverts are being designed using these monies. The culverts are upgraded to reduce stream instability and associated pollutants, allow for proper conveyance and passage of aquatic organisms.	SMIP	Completed 2019
County Route 2 Culvert on Tributary to West Kill	NYCDEP, GCSWCD, GCHD	Replaced a culvert crossing on an unnamed tributary to the Little West Kill. The culvert had capacity issues that resulted in bed instability upstream and downstream of the structure. Increased flow capacity at this culvert will reduce the frequency of backwater and mitigate instability near the culvert that results from a discontinuity of sediment transport. Replacement of the culvert will also result in a structure with fewer impacts to habitat connectivity and aquatic organism passage.	SMIP	Completed 2019
Beech Ridge Road Embankment Stabilization Assessment	NYCDEP, GCSWCD, Town of Lexington Highway Department	This project involved assessment of the toe of an eroding bank that threatens the stability of Beech Ridge Road in the Town of Lexington. At this site, there is significant erosion and sediment loading which compromises the water quality of West Kill and Schoharie Creek.	SMIP	Completed 2019
Critical Area Seeding and Slope Stabilization Program	GCSWCD, NYCDEP, County and Municipal Highway Departments	GCSWCD has partnered with local highway departments, within the Schoharie Reservoir Drainage Basin, to provide critical area seeding of 21 sites, totaling seven roadside miles using the district's hydroseeder and power mulcher.	NYCDEP/ GCSWCD Schoharie SMP Contract	Completed 2019

Critical Area Seeding and Slope Stabilization Program	GCSWCD, NYCDEP, County and Municipal Highway Departments	GCSWCD has partnered with local highway departments, within the Schoharie Reservoir Drainage Basin, to provide critical area seeding of 16 sites, totaling five roadside miles using the district's hydroseeder and power mulcher.	NYCDEP/ GCSWCD Schoharie SMP Contract	Completed 2020
County Route 78 Culvert on Tributary to East Kill	NYCDEP, GCSWCD, GCHD	This project replaced an existing culvert crossing on an unnamed tributary to the East Kill. The culvert replacement will improve conveyance through the culvert and reduce impacts to bed and bank stability upstream and downstream of the structure. The culvert replacement will improve habitat connectivity and aquatic organism passage.	SMIP	Completed 2020

OUTREACH AND TECHNICAL SUPPORT TO HIGHWAY DEPARTMENTS, STORMWATER MANAGERS, AND CONTRACTORS				
Action Item	**Partners**	**Description**	**Funding**	**Status**
Impacts from Road Ditch Erosion	GCSWCD/ NYCDEP	Results of a field study on the impact of road ditch instability on erosion and sedimentation.	NYCDEP/ GCSWCD	Completed 2007
DEP and DEC Stormwater Regulations and Updates	GCSWCD/ NYSDEC/ NYCDEP	Presentation of NYSDEC and NYCDEP stormwater regulations.	NYCDEP/ GCSWCD, CWC	Completed Annually 2008-2010
Roadside Ditch Maintenance Workshop	GCSWCD, NYCDEP	NYSDOT, Greene County Highway and most Greene County municipalities in the Schoharie Watershed attended the workshop which covered 1) Impacts from roadside ditches on water quality and municipal budgets, 2) General ditch maintenance and importance of proper erosion control, 3) Distinctions with topography, soils, slopes, and drainage, 4) Cost factors, different applications and lifespan, and 5) Selective ditching, how to prioritize to save money and minimize water quality impacts.	SMIP	Completed 2011
Mountain Top Highway Ditch Re-vegetation Program	GCSWCD	Program to encourage greater use of critical area seeding equipment that the GCSWCD has available for highway departments by offsetting the cost of seed and mulch. In 2011, GCSWCD worked with highway departments, seeding 3 miles of roadway ditches.	SMIP	Completed Annually 2011-2015
NYS DEC endorsed Erosion and Sediment Control Required Construction Activity Training	NYSDEC, NYCDEP, GCSWCD	This training targeted contractors, engineers, local government and watershed residents and provided knowledge about why stormwater is a concern and information on the new GP-0-15-002 permit. The training also informed participants about the requirements of stormwater pollution prevention plans (SWPPP). Participants learned about erosion and sediment control practices and how to perform site inspections, and how to obtain technical assistance on erosion and sediment control problems.	NYCDEP, GCSWCD	Completed 2015 and 2017
Schoharie Watershed Stream Crossing Workshop	GCSWCD, GCHD, NYCDEP, NYSDOT, Local Highway Departments	Developed, designed and implemented a culvert workshop for local highway departments that highlighted the importance of proper design and installation of culverts for sediment transport, fish passage, and incorporates principles using natural channel design for long-term stability, protection of water quality and health of streams.	SMIP	Completed 2016

Highway Ditch Stabilization Workshop	NYCDEP, GCSWCD, SWAC, EJ Prescott	Develop, design, and implement a highway ditch stabilization workshop for local highway departments. Attendance will be mandatory for those interested in applying for funding through the Mountaintop Highway Ditch Stabilization Project (awarded by SMIP). This workshop occurred on April 18th, 2016 with presenters coordinated through EJ Prescott. Critical area seeding has been demonstrated annually since 2016.	GCSWCD NYCDEP SMP Contract	Complete 2019

RIPARIAN BUFFER PROGRAMS AND ENHANCEMENTS				
Project Title	**Partners**	**Description**	**Funding**	**Status**
Shadow Mountain	GCSWCD, NYCDEP	Town of Jewett- East Kill: planted 124 trees and shrubs, hydroseeded and interplanted the riprap at the Greene County Highway Dept. bridge replacement in Jewett over the East Kill.	GCSWCD, NYCDEP	Completed 2007
Riparian Buffer Implementation pilot	GCSWCD, NYCDEP	A protocol for identifying potential planting sites based upon stream management planning researched was evaluated. Also, GCSWCD approached five of the identified parcel owners and moved forward with the Carr Road riparian restoration project.	GCSWCD, NYCDEP	Completed 2007
Carr Road Project	GCSWCD, NYCDEP	Town of Jewett- Schoharie Creek: The project had three components including, stem injection treatment of Japanese knotweed to prepare location for re-vegetation with native species, planting of a 100 foot wide buffer along the streambank, and enhancing the existing buffer on the immediate streambank by tapering the bank and planting willow tublings and stakes.	GCSWCD, NYCDEP, ACOE	Completed 2007-2009
Riparian Program Development	GCSWCD, NYCDEP	In 2007-2008, the Catskill Streams Buffer Initiative (CSBI) was developed to educate and assist streamside landowners in order to provide for improved stewardship of riparian areas. GCSWCD & NYCDEP established guidelines, policies and protocols for the implementation of the program.	GCSWCD, NYCDEP	Completed 2008
Plant Materials Program	GCSWCD, NYCDEP	This program supported enhancement and utilization of GCSWCD's own nursery at the Plant Materials Center, to supply plant material for various planting and seeding projects. The native seed program was initiated in 2008. Currently, seeds are collected by Greenbelt Native Plant Center and plants are grown to tubelings. One Nature Nursery picks up the tubelings and grows them out for an additional year. GCSWCD continues to receive trees and shrubs annually each fall through this program.	GCSWCD, NYCDEP	Completed 2007-2020
Sugar Maples Riparian Buffer Project	GCSWCD, NYCDEP	Town of Windham- Batavia Kill: Treated invasive Japanese knotweed and then planted approximately 800 feet of riparian vegetation.	ACOE (WRDA)	Completed 2008
Vegetation Enhancements	GCSWCD, NYCDEP	Batavia Kill, West Kill, Schoharie Creek, and Manor Kill: Root Production Method (RPM) trees were planted at Big Hollow, Brandywine, and Ashland Connector Reach project sites. A certified herbicide applicator treated Japanese knotweed at Big Hollow, Carr Rd., Schoharie Ave. and Long Rd. project sites. DEP monitored vegetative techniques on a majority of these projects. Other vegetation enhancements included coordination with Greene County Highway, FEMA, at the County Route 13 culvert project, and a volunteer planting in Manor Kill behind the Conesville town hall.	GCSWCD, NYCDEP	Completed 2008

County Route 6	GCSWCD Greene County Highway Dept.	Town of Lexington- West Kill: Implemented vegetation stabilization methodologies at a site on the West Kill that was previously scheduled for all riprap. Along this site, a short section of Vegetation Reinforced Slope Stabilization (VRSS) was installed, and trees and shrubs were planted on the upper bank; willows were interplanted with the riprap.	GCSWCD, NYCDEP	Completed 2008
Deming Road Riparian Project	GCSWCD, NYCDEP	On this project, 723 trees and shrubs, along with 120 willow stakes, were installed on three contiguous parcels.	GCSWCD	Completed 2009
McRoberts Property Planting	GCSWCD, NYCDEP	GCSWCD has a 10 year landowner agreement for this property. Riparian Corridor Management Plan is complete. During this project, 50 trees and shrubs and 125 willow stakes were installed.	CSBI	Completed 2009
Manor Kill Grogan Property Planting	GCSWCD, NYCDEP	SCSWCD has a 5 year agreement for this property. Riparian Corridor Management Plan is complete. During this project, 54 trees and 500 sedge plugs were installed.	CSBI	Completed 2009
Kane Property Planting	GCSWCD, NYCDEP	GCSWCD has a 10 year landowner agreement for this property. Riparian Corridor Management Plan is complete. During this project, 116 trees and 250 willow stakes were installed.	CSBI	Completed 2009
Kastanis Property Planting	GCSWCD, NYCDEP	Catskill Streams Buffer Initiative Pilot: Obtained 5- year landowner agreement, completed a riparian corridor management plan and restored approximately 7.1 acres of streamside vegetation along the Batavia Kill, including hosting school groups in the effort and planting about 1,500 trees and shrubs.	CSBI	Completed 2009
Evergreen Planting	GCSWCD, NYCDEP	GCSWCD/NYCDEP worked with the landowner to develop a planting plan and to obtain a landowner agreement for the property. Project is located in the town of Hunter.	CSBI	Completed 2009
Silver Property Planting	GCSWCD, NYCDEP	GCSWCD has a 5 year landowner agreement for this property. Riparian Corridor Management Plan is complete. GCSWCD removed fence, graded 60 feet of streambank, planted 25 trees and shrubs, and installed 30 willow stakes in May 2010.	CSBI	Completed 2010
Grossman Property Planting	GCSWCD, NYCDEP	GCSWCD has a 5 year landowner agreement for this property. Riparian Corridor Management Plan is complete. Installed a 50 foot riparian buffer and 198 trees and shrubs were plant along 300 feet in May 2010.	CSBI	Completed 2010
Brunsden Property Planting	GCSWCD, NYCDEP	GCSWCD has a 5 year landowner agreement for this property. Riparian Corridor Management Plan is complete. Installed 54 herbaceous plugs, 22 willow stakes, 5 shrubs, and 2 trees in August 2010.	CSBI	Completed 2010
Avella Property Planting	GCSWCD, NYCDEP	GCSWCD has a 5 year landowner agreement for this property. Riparian Corridor Management Plan is complete. Installed 26 trees and shrubs in June 2010.	CSBI	Completed 2010
Rappleyea Property Planting	GCSWCD, NYCDEP	GCSWCD has a 5 year landowner agreement for this property. Riparian Corridor Management Plan is complete and 150 trees and shrubs were installed in June 2010.	CSBI	Completed 2010
Dodson/McCloskey Property Planting	GCSWCD, NYCDEP	GCSWCD has a 10 year landowner agreement for this property. Riparian Corridor Management Plan is complete and 300 trees, shrubs, and weed mats were installed in June 2010 to create a 100 foot wide riparian buffer along 300 feet of the East Kill. GCSWCD contracted Bevan Forestry to control a patch of Japanese knotweed; Aqua Master was used to inject 25 JKW stems.	CSBI	Completed 2010

Manor Kill Quinn Property Planting	SCSWCD, GCSWCD, NYCDEP	SCSWCD has a 5 year landowner agreement for this property. Riparian Corridor Management Plan is complete and 100 trees, 80 willow stakes/tubes, and 100 sedge plugs were installed in spring 2010. Also, approximately 50-100 JKW plants were removed from the site.	CSBI	Completed 2010
Manor Kill Brandow Property Planting	SCSWCD, GCSWCD, NYCDEP	SCSWCD has a 5 year landowner agreement for this property. Riparian Corridor Management Plan is complete and 50 trees, 100 willow stakes/tubes, and sedge plugs were installed in spring 2010.	CSBI	Completed 2010
Manor Kill Gentile Property Planting	SCSWCD GCSWCD NYCDEP	SCSWCD has a 5 year landowner agreement for this property. Riparian Corridor Management Plan is complete. 292 trees, 50 willow stakes, and 500 sedge plugs were installed in November 2009. 100 additional willow stakes were installed spring 2010.	CSBI	Completed 2010
Hegner Property Planting	GCSWCD, NYCDEP	This property is adjacent to Torsiello, where stream channel was repaired by the town highway department. GCSWCD has a 5 year landowner agreement for this property.	CSBI	Completed 2011
Torsiello PropertyPlanting	GCSWCD, NYCDEP	Flooding, due to Tropical Storm Irene, caused woody debris jam on property. Stream channel was repaired by town highway department. GCSWCD has a 5 year landowner agreement for this property. CSBI installed 275 trees and shrubs.	CSBI	Completed 2011
Cervini Property Planting	GCSWCD, NYCDEP	GCSWCD has a 5 year landowner agreement for this property. Riparian Corridor Management Plan is complete and 275 trees and shrubs were installed.	CSBI	Completed 2011
Kelly Property Planting	GCSWCD, NYCDEP	GCSWCD has a 10 year landowner agreement for this property. Riparian Corridor Management Plan is complete. Project involved installation of 94 trees and shrubs along 250 feet to create a 25 foot riparian buffer in the spring of 2011.	CSBI	Completed 2011
Slutzky Property Planting	GCSWCD, NYCDEP	GCSWCD has a 5 year landowner agreement for this property. Riparian Corridor Management Plan is complete. Project involved installation of 793 trees and shrubs with 15 high school students from Gilboa-Conesville CSD. Planting area was 950 feet long and 50 feet wide.	CSBI	Completed 2011
Rivera Property Planting	GCSWCD, NYCDEP	GCSWCD has a 5 year landowner agreement for this property. Riparian Corridor Management Plan is complete. GCSWCD installed 506 trees and shrubs, 500 willow stakes, and 50 lbs. in two areas along the East Kill. Most trees were lost to post-flood management activities in the fall of 2011.	CSBI	Completed 2011
Bardfield Property Planting	GCSWCD, NYCDEP	GCSWCD has a 5 year landowner agreement for this property. Riparian Corridor Management Plan is complete. Installed 432 trees and shrubs with 20 BYC students in a planting area of 700 ft. long and 35 ft. wide. Many of the trees were lost to post-flood management activities in fall 2011.	CSBI	Completed 2011
Cole Property Planting	GCSWCD, NYCDEP	GCSWCD has a 5 year landowner agreement for this property. The Riparian Corridor Management Plan is complete. A subcontractor was hired to grade 300 feet of streambank along the West Kill prior to the planting and then 225 trees and shrubs, 200 willow stakes and 300 feet of fascines were installed along 350 feet of the right streambank.	CSBI	Completed 2012
Manor Kill Colangelo Riparian Planting	SCSWCD, GCSWCD, NYCDEP	Riparian planting project on the Manor Kill in Conesville. A Riparian Corridor Management Plan has been completed for this property. In 2009, 354 trees were planted, 150 willow stakes and 500 sedge plugs were installed along 546 feet of stream. In 2010, 340 additional trees and 200 stakes were	CSBI	Completed 2012

		installed. In 2012, potted stock was planted along 900 feet of the left streambank.		
Mayo Property Planting	GCSWCD, NYCDEP	GCSWCD has a 5 year landowner agreement for this property. Riparian Corridor Management Plan is complete and 300 willow stakes were installed along 200 feet of streambank, 94 native trees and shrubs were installed, and 0.23 acres of streamside habitat was seeded.	CSBI	Completed 2013
Enochty Property Planting	GCSWCD, NYCDEP	GCSWCD has a 5 year landowner agreement for this property. GCSWCD installed 30 willow stakes and 25 native trees and shrubs along 100 feet of stream in the fall of 2013.	CSBI	Completed 2013
Donnelly Riparian Project	GCSWCD, NYCDEP	GCSWCD has a 5 year landowner agreement for this property. GCSWCD installed 125 willow stakes and 117 native trees and shrubs along 250 feet of stream in the fall of 2013.	CSBI	Completed 2013
Wilkie Riparian Project	GCSWCD, NYCDEP	GCSWCD has a 5 year landowner agreement for this property. GCSWCD installed 75 willow stakes and 15 native trees and shrubs along 150 feet of stream in the fall of 2013.	CSBI	Completed 2013
Dodson/McCloskey Property Planting Phase 2	GCSWCD, NYCDEP	GCSWCD re-installed a 100 foot wide riparian buffer along 300 feet of stream including, 250 native trees and shrubs and 250 willow stakes in the fall of 2013.	CSBI	Completed 2013
Manor Kill Dahlberg PropertyPlanting	GCSWCD, NYCDEP	GCSWCD has a 5 year landowner agreement for this property and installed 50 native trees and shrubs and willow stakes along 150 feet of stream in 2014.	CSBI	Completed 2014
Police Anchor Camp (Windham Path) Riparian Project	GCSWCD, NYCDEP	Riparian planting project at multiple locations along tributaries of the Batavia Kill and the Windham Path. GCSWCD hosted a volunteer planting in 2013, installing 1,028 native trees and shrubs along 1,375 feet of stream. 2.41 acres were restored at three planting locations. GCSWCD removed a gravel berm 223 ft. long x 10 ft. wide x 4.5 ft. high and relocated 371 cubic yards of berm material outside 100 yr. floodplain prior to installing 350 trees to create a riparian buffer. Project area was graded and seeded with riparian mix. With an additional planting along a tributary that bisects the parcel, 460 native trees and shrubs were installed along 820 ft. of stream. 1.23 acres were restored in 2015.	CSBI	Completed 2015
Former Kastanis Property Planting Phase 2	GCSWCD, NYCDEP	Riparian planting project to reestablish a forested riparian buffer 100 feet wide along 1,200 feet of the Batavia Kill was planted in 2009, as a pilot project to restore approximately 7.1 acres of streamside vegetation. In 2015, GCSWCD obtained a land use and herbicide permit to reestablish a forested riparian buffer and treat Japanese knotweed. GCSWCD hosted a volunteer planting and installed 1,100 native trees and shrubs along 1,650 feet of stream, a total of 3.8 acres were restored. Japanese knotweed will require monitoring and follow-up treatment.	CSBI	Completed 2015
Saenger Property Planting	GCSWCD, NYCDEP	A riparian planting to restore approximately 4,500 square feet of streamside vegetation along a Schoharie Creek Tributary in Hunter. In 2015, a volunteer planting was hosted at the site; 120 native trees and shrubs and 20 willow stakes were installed along 137 feet of stream, 0.1 acre was restored.	CSBI	Completed 2015
Posch Riparian Planting	GCSWCD, NYCDEP	Restore approximately 300 linear feet of streamside vegetation along the East Kill. GCSWCD has a 5 year landowner agreement for this property. GCSWCD will install willow stakes along 300 ft. of streambank to reestablish vegetation that washed out in Irene flooding. A riparian	CSBI	Completed 2016

		planting of 300 native trees and shrubs was installed in spring 2016.		
South Street Riparian Planting	GCSWCD, NYCDEP	Riparian plantings were installed to a length totaling approximately 1,000 feet, with buffer widths varying from 45 feet to 100 feet, covering an area of 1.15 acre, along the Batavia Kill in Windham. This volunteer planting project was a 2016 Riverkeeper Sweep event. Staff and volunteers installed 563 native trees and shrubs.	CSBI	Completed 2016
Sawicki Property Grading and Planting	GCSWCD, NYCDEP	Restore approximately 4,500 square feet of streamside vegetation along a portion of the Schoharie Creek in Hunter. GCSWCD obtained a permit from DEC to grade less than 300 ft. of eroding bank. 35 riparian trees and shrubs were planted along with 180 willow stakes, 3 vertical bundles and 22 fascines to establish riparian vegetation along the left bank of the Schoharie Creek.	CSBI	Completed 2016
Prattsville Ball Field	GCSWCD, NYCDEP, Town of Prattsville	Riparian planting project to restore approximately 200 linear feet of streamside vegetation along the Batavia Kill just upstream of the confluence with the Schoharie Creek in Prattsville at the Everett Conine Memorial Field. Project is not feasible due to presence of Japanese knotweed. CSBI application form was never received.	CSBI	N/A
Chase Property Planting	GCSWCD, NYCDEP	Riparian planting to restore approximately 200 linear feet of streamside vegetation along a Batavia Kill tributary in Hensonville in Fall 2017. Landowner is not interested in planting despite outreach attempts. CSBI application form was never received.	CSBI	N/A
Freedman Planting	GCSWCD, NYCDEP	Restored 0.03 acre of streamside vegetation along a portion of the Stony Clove in Hunter. Planted 55 riparian trees and shrubs along 45 feet of streambank. Will monitor for Japanese knotweed and treat as needed.	CSBI	Completed 2017
Pesciotta Planting	GCSWCD, NYCDEP	Restored 0.3 acre of streamside vegetation along a portion of the East Kill in East Jewett. Planted 195 riparian trees and shrubs along 193 ft. of streambank.	CSBI	Completed 2017
Simmons Planting	GCSWCD, NYCDEP	Restored 0.2 acre of streamside vegetation along a portion of the West Kill in Lexington. Planted 171 riparian trees and shrubs along 176 feet of streambank.	CSBI	Completed 2017
Drake Planting	GCSWCD, NYCDEP	Restored 0.7 acre of streamside vegetation along a portion of the Schoharie Creek in Lexington. Planted 412 riparian trees and shrubs along 362 feet of streambank.	CSBI	Completed 2017
Rikard Planting	GCSWCD, NYCDEP	Restored 0.26 acre of streamside vegetation along a portion of the Schoharie Creek in Lexington. Planted 120 riparian trees and shrubs along 115 feet of streambank.	CSBI	Completed 2017
Bilash Arbor Day Planting	GCSWCD, NYCDEP, Trout Unlimited	Restored approximately 1.32 acre of streamside vegetation along 570 feet of the Schoharie Creek in Jewett. Plant 600 bare root riparian trees and shrubs for an Arbor Day volunteer planting event.	CSBI	Completed 2017
Japanese Knotweed Treatment	GCSWCD, NYCDEP	Treated Japanese knotweed with herbicides on the Kastanis Stream Restoration Project in 2017.	CSBI	Completed 2017
McWilliams Planting	GCSWCD, NYCDEP	Restored 0.25 acre of streamside vegetation along a portion of the Batavia Kill in Prattsville. Planted 170 riparian trees and shrubs along 210 feet of streambank.	CSBI	Completed 2018

Russ Planting	GCSWCD, NYCDEP	Restored 0.53 acre of streamside vegetation along a portion of the West Kill in West Kill, NY. Provided native seed and soil for riprap inter-planting and planted 40 riparian trees and shrubs along 575 feet of streambank.	CSBI	Completed 2018
Potter Planting	GCSWCD, NYCDEP	Restored 0.23 acre of streamside vegetation along a portion of the West Kill in West Kill, NY. Provided native seed and soil for riprap inter-planting and planted 116 riparian trees and shrubs along 245 feet of streambank.	CSBI	Completed 2018
Benjamin Property Planting	GCSWCD, NYCDEP	Riparian planting project restored approximately 300 linear feet of streamside vegetation along the East Kill. The Greene County Highway Department restored the stream channel. GCSWCD installed willow stakes along 300 feet of streambank.	CSBI	Completed 2018
Grossman Property Planting	GCSWCD, NYCDEP	Riparian planting restored approximately 300 linear feet of streamside vegetation along a Schoharie Creek tributary in Hunter. Streambank was graded in 2016. 221 native trees and shrubs and 6 vertical bundles were installed in fall 2017.	CSBI	Completed 2018
Japanese Knotweed Treatment	GCSWCD, NYCDEP	Treated Japanese knotweed with herbicides on the Brandywine/Ashland Connector Reach, Kastanis, Holden, Conine, and Ashland Town Park in 2018.	CSBI	Completed 2018
DEP Parcel 5251 Planting	GCSWCD, NYCDEP	Riparian planting to restore 2.39 acres of streamside vegetation along a portion of the Schoharie Creek in Lexington, NY. GCSWCD graded 100 feet of streambank, installed 8 willow clumps, and planted 1,476 native trees and shrubs along 1,800 feet of streambank.	CSBI	Completed 2019
Bilash Phase 2 Planting	GCSWCD, NYCDEP	Riparian planting to restore 0.68 acre of streamside vegetation along the Schoharie Creek in Jewett, NY. GCSWCD planted 492 native trees and shrubs along 1,200 feet of streambank.	CSBI	Completed 2019
DEP Riley (Meadowbrook Lane)	GCSWCD, NYCDEP	Riparian planting to restore 0.13 acre of streamside vegetation along the Stony Clove in Hunter, NY. GCSWCD graded the project site and installed three balled and burlapped trees and planted 67 native trees and shrubs along 100 feet of streambank.	CSBI	Completed 2019
DeSantis Riparian Buffer Planting	GCSWCD, NYCDEP	Riparian planting to restore 0.74 acre of streamside vegetation along the Batavia Kill in Ashland, NY. GCSWCD planted 360 native trees and shrubs along 300 feet of streambank.	CSBI	Completed 2019
Sawicki Planting and Willow Staking	GCSWCD, NYCDEP	Riparian planting to restore 0.25 acre of streamside vegetation along the Schoharie Creek in Jewett, NY. GCSWCD installed 500 willow stakes and planted 94 native trees and shrubs along 400 feet of streambank.	CSBI	Completed 2019
Japanese Knotweed Treatment	GCSWCD, NYCDEP	Treated Japanese knotweed with herbicides on the Kastanis project site and the Ashland Town Park in 2019.	CSBI	Completed 2019
Matz Riparian Buffer Planting	GCSWCD, NYCDEP	Riparian planting to restore 0.1 acre of streamside vegetation along the East Kill in Hunter, NY. GCSWCD planted 88 native trees and shrubs along 50 feet of streambank in spring 2020.	CSBI	Completed 2020
Pepe Invasive Honeysuckle Removal & Riparian Planting	GCSWCD, NYCDEP	GCSWCD mechanically removed 0.12 acre of invasive honeysuckle prior to restoring native habitat along 180 feet of a tributary to the East Kill. GCSWCD planted 85 native trees and shrubs in fall 2020.	CSBI	Completed 2020
CR 78 Culvert Buffer Planting & Willow Staking	GCSWCD, NYCDEP	Riparian planting to restore 0.18 acre of streamside vegetation along the East Kill in Jewett, NY. GCSWCD planted 93 native trees and shrubs and installed 250 live willow stakes along 265 feet of streambank in fall 2020.	CSBI	Completed 2020

DEP Ashland Riparian Planting	GCSWCD, NYCDEP	Riparian planting to restore 0.84 acre of streamside vegetation along the Batavia Kill in Ashland, NY. GCSWCD planted 478 native trees and shrubs along 250 feet of streambank in fall 2020.	CSBI	Completed 2020
Dahlberg Riparian Buffer Planting & Willow Staking	GCSWCD, NYCDEP	GCSWCD replanted a prior CSBI project to enhance .25 acre of riparian vegetation along the Manor Kill in Conesville, NY. GCSWCD planted 80 native trees and shrubs and installed 350 live willow stakes along 470 feet of streambank in fall 2020.	CSBI	Completed 2020
Dodson Riparian Buffer Planting & Willow Staking	GCSWCD, NYCDEP	GCSWCD replanted a prior CSBI project to enhance .4 acre of riparian vegetation along the East Kill in Jewett, NY. GCSWCD planted 200 native trees and shrubs and installed 200 live willow stakes along 470 feet of streambank in fall 2020.	CSBI	Completed 2020
Windham Path Replant	GCSWCD, NYCDEP	GCSWCD replanted a prior CSBI project to enhance .02 acre of riparian vegetation along the Batavia Kill in Windham, NY. GCSWCD planted 27 native trees and shrubs along 50 feet of streambank in fall 2020.	CSBI	Completed 2020
Windham Manor Riparian Planting	GCSWCD, NYCDEP	Riparian planting to restore 0.75 acre of streamside vegetation along a Batavia Kill tributary in Windham, NY. GCSWCD planted 538 native trees and shrubs and installed 100 live willow stakes along 850 feet of streambank in fall 2020.	CSBI	Completed 2020
Plant Material Center Improvements	NYCDEP, GCSWCD	In 2020, GCSWCD made the following improvements to the Plant Material Center: 1. A 10' x 30' storage pad was installed to hold soil and woodchips to help prevent outside debris and seeds from getting into the planting media. 2. A small pole barn was built to store equipment and materials in order to improve their longevity.	NYCDEP/ GCSWCD Contract	Completed 2020
Japanese Knotweed Treatment	GCSWCD, NYCDEP	Treated Japanese knotweed with herbicides on the Kastanis project site, the Ashland Town Park, and the Lexington CSBI Project site in 2020.	CSBI	Completed 2020

OUTREACH, EDUCATION AND TECHNICAL ASSISTANCE TO STREAMSIDE LANDOWNERS				
Action Item	**Partners**	**Description**	**Funding**	**Status**
Riparian Program Development	GCSWCD, NYCDEP	CSBI developed to educate and assist streamside landowners in order to provide for improved stewardship in riparian areas. Program guidelines, policies, protocols, and other items required to offer a riparian buffer program to watershed landowners were developed. A protocol was developed that utilizes stream feature inventory and vegetation mapping to identify potential riparian planting sites.	NYCDEP/ GCSWCD	Completed 2008
Where Infrastructure & Streams Collide: How to Manage Both Responsibly	GCSWCD, NYCDEP	How infrastructure and streams are influenced by each and what potential strategies exist for prevention and mitigation of problems where stream instability has impacted infrastructure and vice-versa.	NYCDEP/ GCSWCD	Completed 2008
Catskill Streams Buffer Initiative Education Materials	GCSWCD, NYCDEP	CRSR, Inc. conducted a needs assessment, developed a marketing strategy, and developed initial program roll-out with above mentioned educational materials. Streamside Assistance Program was renamed the Catskill Streams Buffer Initiative (CSBI) based on the assessment. The marketing strategy, program slogan, logo, introduction language, program brochure, and application for funding have all been developed.	CSBI	Completed 2009

Conduct Watershed Survey	GCSWCD/ NYCDEP/ SWAC	It was decided by the SWAC E/O subcommittee to focus on surveys on events; that enough watershed surveys have already been done. No larger survey is expected.		Completed 2009
Dream Homes & Ditch Nightmares	GCSWCD	A skit involving landowners learning about permit requirements when building their dream home- volunteer role playing by audience NYSDEC, DOS approved course.	NYCDEP/ GCSWCD	Completed 2009
Japanese Knotweed Mailing	GCSWCD/ NYCDEP	GCSWCD printed 1,000 copies of a revised JKW prevention brochure for distribution to landowners in knotweed prevention areas identified by stream feature inventories. The brochures were mailed to 286 streamside landowners and distributed to 11 municipal town halls (15 copies each).	NYCDEP/ GCSWCD	Completed 2010
Riparian Buffer Workshop	GCSWCD/ NYCDEP	GCSWCD CSBI sponsored Healthy Buffers, Healthy Streams: A Landowner Workshop in July 2010. The interactive workshop was held at the Spruceton Community Center in West Kill and showed participants the characteristics of healthy vs. degraded buffers and different management practices to maintain healthy buffers.	CSBI	Completed 2010
Mountaintop Mapping	GCSWCD	Workshop participants learned how environmental mapping software can assist local communities in site planning and subdivision reviews.	SMIP	Completed 2011
Riparian Buffer Workshop	GCSWCD, NYCDEP, TU	A workshop was held for streamside landowners to highlight the importance of riparian buffers. The workshop included a demonstration of management practices used to maintain healthy stream buffers.	CSBI	Completed 2015
Guided Walk & Riparian Buffer Discussion	GCSWCD/ NYCDEP	During Schoharie Watershed Month, Greene County Soil & Water Conservation District's Laura Weyeneth led a guided walk at the Windham Path. Participants learned about the significance of riparian buffers, native plants, and healthy aquatic ecosystems. Participants also got a chance to see a newly installed riparian buffer along the Windham Path.	NYCDEP/ GCSWCD	Completed 2016
Streamside Landowner Workshop	GCSWCD, NYCDEP	The GCSWCD provided a Streamside Landowner Workshop at the Mountain Top Library in Tannersville, January 27th, 2018. The workshop was available to individuals who own streamside property in Hunter, Tannersville, Windham, Ashland, Jewett, Lexington, and Prattsville. Attendees learned how to establish and increase the riparian buffer zone on their own property by planting native trees and shrubs. Participants learned about the Catskill Streams Buffer Initiative (CSBI) program.	NYCDEP/ GCSWCD CSBI	Completed 2018
Stream Management Implementation Program Information Session	GCSWCD, NYCDEP	The Greene County Soil & Water Conservation District provided an information session for the Stream Management Implementation Program (SMIP) at the Schoharie Watershed Program office in Tannersville on February 13th, 2018. A brief presentation about the program was provided followed by an informal Q&A for attendees.	NYCDEP/ GCSWCD	Completed 2018
CREP/CSBI Postcard Mailings	GCSWCD/ NYCDEP	GCSWCD solicited landowner interest to the CREP/CSBI pilot program through postcard mailings. Continued mailings are contingent on CREP/CSBI pilot program progress.	NYCDEP/ GCSWCD/ CSBI	Completed 2019
Streamside Landowner Workshop	GCSWCD, NYCDEP	The GCSWCD provided a Streamside Landowner Workshop at the Mountain Top Library in Tannersville, April 13th, 2019. The workshop was available to individuals who own streamside property in Hunter, Tannersville, Windham, Ashland, Jewett, Lexington, and Prattsville. Attendees learned how to establish and increase the riparian buffer zone on their own property by planting native trees and shrubs.	NYCDEP/ GCSWCD/ CSBI	Completed 2019

		Participants learned about the Catskill Streams Buffer Initiative (CSBI) program.		
Riparian Buffer Restoration Area Signage	GCSWCD, NYCDEP	Educational signs were developed for Catskill Stream Buffer Initiative (CSBI) project sites. The signs promote riparian buffers, provide information about the on-going riparian buffer restoration in the area, and provide contact information for the Schoharie Reservoir watershed CSBI program.	NYCDEP/ GCSWCD CSBI	Completed 2020

STREAM AND RIPARIAN ECOSYSTEM ASSESSMENT AND ENHANCEMENT				
Action Item	**Partners**	**Description**	**Funding**	**Status**
Catskill Riparian Reference Study	GCSWCD, NYCDEP, NYNHP	NY Natural Heritage Program completed a final report "Inventory, Classification, and Description of Riparian Natural Community Reference Types for West Kill Watershed, New York" and appendix "West Kill Restoration Guide to Planting."	NYCDEP/ GCSWCD	Completed 2009
Restoration Project Wetland Mapping	GCSWCD, NYCDEP	C.T. Male Associates was hired to remap the wetlands on the Ashland and Conine restoration sites to assure ACOE's wetland mitigation requirements were being met. Wetland mapping and reporting was completed by C.T. Male Associates.	NYCDEP/ GCSWCD	Completed 2009
Japanese Knotweed Management Project	GCSWCD, NYCDEP, Hudsonia	Hudsonia sampled Japanese knotweed management plots for several years. The results of their research are shown in the final report "Experimental Management of Japanese Knotweed on the Batavia Kill, Greene County, New York", which was submitted to GCSWCD in December 2009.	NYCDEP/ GCSWCD	Completed 2009
Organize Repository of Stream Ecosystem Data	GCSWCD, NYCDEP, Habitat & Recreation Subcommittee	SMPs included a recommendation to characterize the current health of stream ecosystems using food web dynamics, the presence or absence of indicator species and primary producers, and the status of fish populations, among others. Under guidance of Habitat/Recreation Subcommittee, GCSWCD has organized a master repository which integrated existing data and published documents.	NYCDEP/ GCSWCD	Completed 2013
Water Temperature Impacts on Fisheries Study	GCSWCD, NYCDEP, Habitat & Recreation Subcommittee, USGS	GCSWCD and NYCDEP worked with USGS and RIT to determine the location of thermal refugia, which are important to cold water fish communities during the summer months. The study was conducted to inform and guide entities whose activities may impact cold water inputs. In 2012, RIT conducted imagery collection flight and submitted report, in 2013, USGS analyzed and summarized the data, and in 2014, USGS submitted report.	NYCDEP/ GCSWCD, USGS	Completed 2014
Fisheries Project	NYCDEP, NYSDEC, GCSWCD, TU, SWAC, USFWS	DEC and Partners completed a habitat enhancement project for a brook trout fishing area along Hunter Brook in the West Kill. DEC previously conducted brook trout studies in the reach. In 2018, GCSWCD conducted the topographic survey of the reach. Design and construction were completed in 2019.	USFWS, DEC, SMIP	Completed 2019

WATERSHED PROTECTION AND COMMUNITY PLANNING				
Project Title	**Partners**	**Description**	**Funding**	**Status**
Implementing SEQRA, basics & determinations	GCSWCD, NYCDEP	Participants were provided a basic understanding of the SEQRA process.	NYCDEP/ GCSWCD	Completed Annually 2008-2010
Federal & NYS Wetland Protection & Regulation	GCSWCD, NYCDEP	Presentation of regulations.	NYCDEP/ GCSWCD	Completed 2008
Schoharie Watershed Strategy	GCSWCD, NYCDEP	Engaged multiple watershed partners and agencies, municipal officials, and departments (highway, planning, and code enforcement) in the strategy's development which focused on landscape sources that contribute to water quality impairments. Some recommendations were identified as implementation activities in 2009-11 action plan and Schoharie Watershed Advisory Committee reviewed proposals to allocate funding in 2009.	NYCDEP/ GCSWCD	Completed 2008
Schoharie Watershed Advisory Committee (SWAC)	Schoharie Basin Municipalities, Technical Advisors, GCSWCD, NYCDEP	The organizational structure of the Schoharie Watershed Advisory Committee (SWAC) was developed in early 2008. After the kick off meeting in May 2008, the SWAC has met regularly throughout the year, developed program materials to initiate a stream management plan implementation funding application process, and identified initial projects for implementation. Although administrative support for the SWAC remains an on-going activity, the effort to establish local representation and implementation of the SMP, coupled with technical agency support, has been accomplished.	NYCDEP/ GCSWCD	Organized May 2008, meet 2-3x per year
Low-Impact Development	NYCDEP, GCSWCD	An overview of an alternative approach to site planning, design, and building that minimizes landscape impacts and preserves the natural hydrological cycle.	NYCDEP/ GCSWCD	Completed 2009
Mountaintop Recreation Master Plan	NYCDEP, GCSWCD, WAP, Schoharie Basin Municipalities	GCSWCD WAP worked with numerous public and private sector partners to develop a comprehensive master plan that focuses on recreation, and also includes open space, scenic quality and cultural resources. Two implementation subcommittees are working on marketing and coordinating projects and outdoor resource improvements that promote access to, and appreciation of, the mountaintop's natural environment including stream systems.	NYCDEP/ GCSWCD	Completed 2009
Low Impact Development Made Local	NYCDEP, GCSWCD, WAP	How improved site planning can achieve multi-objectives for Schoharie basin communities.	NYCDEP/ GCSWCD	Completed 2010
Town of Hunter Corridor Regional Planning Study	NYCDEP, GCSWCD, WAP	GCSWCD worked with the Town of Hunter and the Villages of Tannersville and Hunter to undertake a Corridor Study that entailed comprehensive assessment of potential future development along the State Route 23A corridor. The study was in effort to evaluate foreseeable development and environmental mitigation associated with future development.	NYCDEP/ GCSWCD	Completed 2010
State and City Stormwater Regulations	GCSWCD, NYCDEP, NYSDEC	Workshop participants were informed about the permit requirements of NYSDEC, NYCDEP and what triggers a permit.	NYCDEP/ GCSWCD	Completed 2011

Mountaintop Better Site Design Plan Workshops	GCSWCD	GCSWCD's WAP, Kendall Stormwater Services, and Morris Associates worked with Ashland, Jewett, Lexington, Windham, Hunter, and Tannersville. For each community, there was a comprehensive code review against model development principles, helped identify which principles to address for local government, developed LID manual for communities to use in site planning, and to share with landowners and developers. Also, an education packet, for easier reference, was developed.	SMIP, LTAP	Completed 2011-2012
Town of Hunter Land Use Regulation Review & Development Guidelines	Town of Hunter, GCSWCD, NYCDEP	Conducted a detailed review of Hunter's land use regulations. Hunter adopted revisions, new regulations &/or guidelines that promote low impact design, climate smart and smart growth principles. A land use committee was formed to guide the process.	SMIP	Completed 2016
Hunter Wetlands Leachate Treatment System Remediation - Engineering	Mountaintop Towns, GCSWCD, NYCDEP	Designed a remediation implementation project to address the problems with the Hunter Landfill Wetland Treatment System effluent discharges.	SMIP	Completed 2018
Mountain Top Arboretum Education Center Rain Garden Design	GCSWCD, NYCDEP, MTA	This project involved the design of rain gardens that will capture and slow runoff and enable water filtration. The rain gardens are part of a larger project to build a year round Education Center at the Mountain Top Arboretum, a public garden that provides recreational and educational opportunities for residents and visitors to the Catskill Mountains. Design of the rain garden was completed in 2018, on-site design in-put continued during project implementation in 2018-2019.	SMIP	Completed 2019
Mountain Top Arboretum Education Center Rain Garden Implementation	GCSWCD, NYCDEP, MTA	This project involved installation of the rain gardens associated with the new MTA Education Center. The rain gardens will capture and slow runoff and enable water filtration from the existing roads, the new parking area and the Education Center itself. Native plants were planted in rain gardens and create habitat for wildlife while also providing an educational opportunity; staff and volunteers will teach visitors about water runoff, water quality, planting techniques for a rain garden and the importance of the watershed.	SMIP	Completed 2019

ENHANCING PUBLIC ACCESS TO STREAMS				
Action Item	**Partners**	**Description**	**Funding**	**Status**
Prattsville Conine Park	GCSWCD, NYCDEP, Prattsville	GCSWCD worked with the Town of Prattsville on a master plan for redevelopment of Conine Field. Key conservation issues included fishing access point, knotweed management, a riparian buffer planting and a conservation easement on sections of the property adjoining the Batavia Kill and Schoharie Creek and a stormwater pollution prevention plan retrofitting the site to meet current standards for new construction.	NYCDEP/ GCSWCD	Completed 2008
Windham Creamery Pond	GCSWCD, NYCDEP, Windham	GCSWCD assisted the Town of Windham with the development of a public access area on a NYCDEP owned parcel in the hamlet of Windham. The GCSWCD completed a site design, Stormwater Pollution Prevention Plan and other	NYCDEP/ GCSWCD, Windham	Completed 2008

		documents. The design included the construction of parking area and athletic fields and was left to the town to complete.		
Town of Windham (Police Anchor Camp)	GCSWCD, NYCDEP, Windham	GCSWCD provided conceptual plans to the Town of Windham to assist with assessment and planning for public use of a 65 acre parcel located in the Batavia Kill watershed.	NYCDEP/ GCSWCD, Windham	Completed 2010
Ashland Fishing Access Enhancements	GCSWCD, NYCDEP, Ashland	GCSWCD and NYCDEP completed a parking area and access to an existing public fishing area on the Batavia Kill at the Ashland Connector Reach Restoration Project. The access includes an information kiosk.	NYCDEP/ GCSWCD	Completed 2010
Promote Increased Recreational Use of Watershed Streams	GCSWCD, NYCDEP, Recreation & Habitat Subcommittee	All stream management plans recommend enhancing public access of the streams for fishing. Along many of the streams within the Schoharie Watershed, there are public fishing access points; existing access locations have been mapped. Through the Recreation and Habitat category, multiple stream access parks have been and will continue to be supported by SWAC.	NYCDEP/ GCSWCD	Completed 2010
Prattsville Stream Access Parking	GCSWCD, NYCDEP, Prattsville, SWAC	The Town of Prattsville was approved for SMIP funding October 2009; this grant was closed in August 2012, due to site constraints and significant flood damage throughout Prattsville during Hurricane Irene in 2011.		Completed 2012
Windham Path	GCSWCD, NYCDEP, WARF, Windham	GCSWCD and NYCDEP assisted Town of Windham and the Windham Area Recreation Foundation with installation of a public, non-motorized, multi-use trail along a 65 acre parcel located along the Batavia Kill. SWAC/SMIP funds were used to cover the cost of materials for a boardwalk and footbridges. The path is used almost daily by local residents and visitors of Windham.	NYCDEP/ GCSWCD, WARF	Completed 2013
Schoharie Creek Park (Town of Lexington)	NYCDEP, GCSWCD, Town of Lexington	The GCSWCD assisted the Town of Lexington with the development of a small “pocket park” located on the Schoharie Creek. The project included the removal of a derelict house (completed 2007), cleaning up weedy growth, enhancement of riparian vegetation, and installation of low impact improvements such as demonstrative plantings, informational signage and stream access. Plantings were installed in 2010 and repaired in 2012 following flood damages. In 2012, split rail fencing was installed. In 2015, signage was installed.	SMIP	Completed 2015
Windham Path Phase 2	NYCDEP, GCSWCD, WAP, WARF, SWAC	The Windham Area Recreation Foundation is working on expanding the Windham Path, a 1.3 mile non-motorized, multi-use recreational trail in the Town of Windham near the Batavia Kill. Phase 2 extends the trail over the Batavia Kill on a pedestrian bridge to the Route 296/South Street business district. A second SMIP grant was awarded in 2014 for two small wooden footbridges that cross wet areas along the path's phase 2 extension, a trailhead sign and kiosk on Route 296.	SMIP, Windham, NYCDEP/ GCSWCD, WARF	Completed 2015
Conesville Town Park Walking Path	NYCDEP, GCSWCD, SCSWCD	The SCSWCD, GCSWCD, NYCDEP and the Town of Conesville worked together to rehabilitate the existing walking path in the Conesville Town Park. A SMIP grant was awarded in 2014; the design, permitting and construction of the path were combined with the Manor Kill Stream Restoration Project.	SMIP	Completed 2015
Conine Fishing Access	NYCDEP, GCSWCD, Town of Prattsville, SWAC	The project is a sub-component of the overall redevelopment and expansion of Conine Field Recreation Complex in Prattsville. This part of the project focused on repairing and improving the fishing area and canoe launch at Conine Field.	SMIP	Completed 2016

Ashland Town Park	Ashland, GCSWCD, NYCDEP	The project supported efforts to provide public access to the Batavia Kill and included signage, seeding, and riparian plantings. Signage was installed in 2016. Riparian plantings were installed in spring 2017.	SMIP	Completed 2017
Lexington Riverfront Access Park	NYCDEP, GCSWCD, Town of Lexington, SWAC, FEMA, NYDOS	The Town of Lexington expanded the Schoharie Creek Park (Lexington Pocket Park) by purchasing two additional parcels, along County Route 13a, through the FEMA Property Acquisition Program. Components of the project included a low impact path, a shade structure, and signage/informational kiosk. The Schoharie Watershed Advisory Committee approved funding the riverfront access park contingent upon FEMA, and other regulatory, approvals for development of park-like amenities on the buyout parcels.	SMIP	Completed 2018
Windham Multi-Use Trail System – Public Access	NYCDEP, GCSWCD, WARF	The Windham Multi-Use Trails are for non-motorized uses intended to provide public access to the Batavia Kill, provide connectivity between residential, business and activity centers in the Town of Windham. The proposed project to construct a streamside connector trail along the Batavia Kill in the hamlet of Maplecrest was no longer feasible and was withdrawn.	SMIP	Withdrawn 2019