

**New York City Department of Environmental Protection
Bureau of Water Supply**

**Stream Management Program
Rolling Two-Year Action Plans**

May 2015

*Prepared in accordance with Section 4.6 of the NYSDOH
Revised 2007 Filtration Avoidance Determination*



Prepared by: DEP, Bureau of Water Supply
Greene County Soil and Water Conservation District
Sullivan County Soil and Water Conservation District
Delaware County Soil and Water Conservation District
Ulster County Soil and Water Conservation District
Cornell Cooperative Extension of Ulster County

Ashokan Watershed Stream Management Program 2015-2017 Action Plan



ASHOKAN WATERSHED
STREAM MANAGEMENT
PROGRAM

Cornell Cooperative
Extension of Ulster
County

Ulster County Soil and
Water Conservation
District

USDA Natural Resource
Conservation Service

New York City
Department of
Environmental Protection

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Cover Photo: The Esopus Creek floodplain at downtown Phoenicia, NY. The AWSMP is assisting the Town of Shandaken with completing an engineering analysis to identify flood hazard mitigation solutions for Phoenicia and Mt. Tremper.



ASHOKAN WATERSHED STREAM MANAGEMENT PROGRAM

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To: Danyelle Davis, Project Manager, NYC DEP Stream Management Program
From: Leslie Zucker, CCE Ulster County and Adam Doan, Ulster County SWCD
Date: May 8, 2015
Re: Ashokan Watershed Stream Management Program 2015-2017 Action Plan

Cornell Cooperative Extension of Ulster County (CCE), Ulster County Soil & Water Conservation District (UCSWCD), and the NYC Department of Environmental Protection (DEP) have developed the 2015-2017 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 in support of recommendations derived from stream management plans and working group input. The current set of recommendations was updated and reviewed by our Advisory Council and stakeholders in 2015.

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 and recommendations are fully revised biannually. This proposed plan will run from June 1, 2015 until May 31, 2017, at which time the recommendations will be revised based on new stream assessments and program needs.



Cornell University
Cooperative Extension
Ulster County



Soil and Water
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2015-2017 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 2015-2017. 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. For each topic area a list of recommendations, derived from Stream Management Plans and the program's working groups, are provided in *italicized text*. 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 (CCE), the Ulster County Soil and Water Conservation District (UCSWCD), 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, the Upper Esopus Creek in 2007, and the Beaver Kill in 2015. In subsequent years, AWSMP completed stream assessments of Woodland Creek, Beaver Kill, Warner Creek, Birch Creek, Bush Kill, Bushnellsville Creek, and the Stony Clove Creek was reassessed.

A Filtration Avoidance Declaration (FAD) granted to NYC in 2007 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, 2015 - May 31, 2017 and spans the completion of five-year contracts for CCE and UCSWCD and the start of new five-year contracts in 2014 (CCE) and 2015 (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"). To date, over \$2,000,000 has been allocated to implementation 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 2015-2017 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 to two streams per 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 2014 and 2015. One stream per year may be subject to a rapid Phase 2 reassessment if conditions appear to be degrading.*
2. *Support stream investigations by other organizations in the Ashokan Watershed, with an emphasis on turbidity reduction.*
3. *Develop an advanced conceptual model, applicable to the Ashokan Watershed, of Catskill stream channel and sediment processes that incorporates probable channel and sediment loading responses to expected climate change. The model will assist stream managers with planning for protection of water resources, water quality and geomorphic monitoring investigations, and prioritization of stream channel stabilization practices.*
4. *Provide funding for study of stream condition and function, and monitoring of system condition and management practices through the Stream Management Implementation Program (SMIP).*
5. *Develop a strategy for consolidating existing and future Stream Management Plans and assessments into one Ashokan Watershed Plan.*

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 2003
Esopus Creek	Towns of Shandaken and Olive	Completed 2007

Streams	Location	Current Status
Woodland Valley	Town of Shandaken	Completed 2008
Beaver Kill	Towns of Shandaken and Woodstock	Completed 2010
Warner Creek	Town of Shandaken and Woodstock	Completed 2010
Birch Creek	Town of Shandaken	Completed 2012
Bushkill	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
Esopus Creek Headwaters	Town of Shandaken, Oliverea Reach	2015-2016
Woodland Valley	Town of Shandaken	Mainstem reassessment 2015
Stony Clove Creek Tributaries	Towns of Shandaken and Hunter	2015
Fox Hollow Creek	Town of Shandaken	TBD
Peck Hollow	Towns of Shandaken and Lexington	TBD
Little Beaver Kill	Town of Woodstock	TBD
Ashokan Reservoir Tributaries	Town of Olive and Town of Hurley	TBD

ASHOKAN WATERSHED TURBIDITY MONITORING PROJECTS

In summer 2015, DEP anticipates beginning a multi-year geomorphic and suspended sediment/turbidity (SS/T) monitoring study in the Stony Clove Creek watershed and SS/T monitoring study in the Upper Esopus Creek watershed. Anticipated work in 2015 is to conduct modified Phase 2 SFI and Phase 3 assessments in tributaries to Stony Clove Creek to help inform water quality monitoring station site selection in 2016. Water quality monitoring will be implemented through an agreement with USGS and is anticipated to start in 2016. This work is expected to continue through 2025.

ASHOKAN WATERSHED SMIP PROJECTS SUPPORTING STREAM ASSESSMENT & MONITORING (ACTIVE 2015)

Organization	Proposal Title	Proposal Number	Amount	Status	Purpose of Grant
USGS	Monitoring Turbidity, Suspended Sediment Concentrations, and Sediment Loads in the Beaver Kill and Warner Creek Watersheds	AWSMP-2011-27	\$209,750	Active	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	Assessing the Impact of Groundwater and Heterogeneous Glacial Deposits on Streambank Erosion in the Stony Clove Creek Watershed	AWSMP-2014-74	\$30,000	Active	Study detailed glacial geology and groundwater-surface water interactions at study sites along the Stony Clove Creek and Warner Creek to inform understanding of streambank erosion dynamics and treatment options.
Town of Olive	Maltby Hollow Stream Feature	AWSMP-2014-87	\$20,000	Active	Conduct a stream feature inventory and assess bank erosion for the Maltby

	Inventory and Erosion Site Assessment				Hollow, a tributary to the Bush Kill. Project runs June through December 2015.
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STREAM RESTORATION/STABILIZATION PROJECTS TO RESTORE STREAM SYSTEM STABILITY AND/OR REDUCE CHRONIC TURBIDITY INPUTS

7. 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.
8. A current emphasis is the Stony Clove Creek, which has been shown through water quality monitoring to be the predominant source of chronic turbidity in the Ashokan Watershed. Complete additional stream restoration projects in the Stony Clove watershed in 2014 and 2015. Utilize NRCS Emergency Watershed Protection (EWP) Program funds for implementation.
9. SMIP funding for 2014-2019, along with funds provided to UCSWCD for stream restoration projects, will be used to implement additional projects expected to have a measurable reduction in turbidity. Support efforts to obtain additional funding to pursue this goal.
10. Coordinate with the Town of Shandaken and County DPW to conduct a geomorphic assessment of the Esopus Creek at Olivera. The diagnostic assessment is to provide information needed 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 2014)

UCSWCD	Stony Clove Creek at Wright Rd.	Costs to be Determined	2015
	<i>Protect vulnerable properties and infrastructure, reduce source of chronic turbidity and enhance habitat and stream stability.</i>		
UCSWCD	Chichester Reach Hillslope Bioengineering and Channel Structure Modification	Costs to be Determined	2015
	<i>Utilize bioengineering techniques to protect soils and establish native vegetation along treated hill slope of Chichester 2 project and modify instream structure between Sites 3 and 4 to provide long-term stability.</i>		

Possible 2015-16 projects (project selection is subject to change pending annual stream corridor geomorphic assessments and affected landowner support):

UCSWCD	Woodland Creek – Esopus Creek Confluence Project	Costs to be Determined	2016
	<i>Repair Esopus Creek at Woodland Valley Demonstration Project damaged by TS Irene and extend treatment to the Woodland Creek to treat eroding bank that is a chronic source of turbidity.</i>		

UCSWCD	FAD Deliverable Turbidity Reduction Project	Costs to be Determined	2016
<i>Project to be determined.</i>			

ASHOKAN WATERSHED SMIP PROJECTS SUPPORTING STREAM RESTORATION (ACTIVE 2015)

Organization	Proposal Title	Proposal Number	Amount	Status	Purpose of Grant
Town of Woodstock	Beaver Kill at Mink Hollow Project	AWSMP-2011-17	\$102,900	Active	Projects to mitigate stream and road damages along Mink Hollow Rd. Reconnect floodplain previously blocked by berms; stabilize the creek bed below a failed rock wall; and remove the buildup of large woody debris threatening to move the creek closer to Mink Hollow Rd.

MONITORING OF STREAM PROJECTS

8. *Annually monitor performance of stream corridor projects funded by the Ashokan Watershed Stream Management Program.*
 - a. *Stony Clove at Phoenicia Main Street Project – Continue survey monitoring to track sediment deposition fluctuations per DEC permit.*
 - b. *Stony Clove at Chichester Projects (#1, 2, 3, 4) – Monitor per requirement of ACOE permit.*
 - c. *Warner Creek Site #5 – Monitor per requirements of ACOE permit.*
 - d. *Stony Clove at confluence with Warner Creek Project – Monitor per requirement of ACOE permit.*
 - e. *Stony Clove at Stony Clove Lane Project – Monitor per requirement of ACOE permit.*
9. *Monitor turbidity and suspended sediment at stream restoration project sites before and after project construction to quantify effects on water quality.*

OUTREACH, EDUCATION AND TECHNICAL ASSISTANCE TO ENCOURAGE STREAM STEWARDSHIP - RECOMMENDATIONS

9. *Distribute Stream Stewardship Principles to relevant entities.*
10. *Hold meetings of the AWSMP Stakeholder Council (3-4 per year) and working groups to solicit participation and input from local community members.*
11. *Provide outreach to municipal officials, agencies, affected landowners, and the public about findings from stream assessments and planned stream restoration projects.*
12. *Develop an outreach tool for transferring stream assessment data to managers in a user-friendly format.*

13. *Provide youth education in partnership with the Onteora School District to teach stream and watershed science to students through field studies, and after-school and classroom programs.*
14. *Fund public education and outreach activities that promote stream stewardship through the SMIP.*
15. *Develop written education and outreach materials for streamside landowners and other watershed stakeholders. Use a variety of media (newsletters, fact-sheets, press, video, and website) to disseminate information about the program and encourage stream stewardship (1-2 fact sheets per year).*
16. *Offer trainings that promote an understanding of effective stream and floodplain management strategies for local stakeholders (1 per year).*
17. *Participate in local community events to promote the goals of the Ashokan Watershed Stream Management Program.*
18. *Organize an Ashokan Watershed Conference to provide general education to watershed residents and train municipal officials in specific topics (1 every two years).*
19. *Co-organize a Catskill Environmental Research and Monitoring conference to disseminate the results of river and watershed studies (1 every two years).*
20. *Hold stream walks and other public engagement events (10 per year).*
21. *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 2015)

Organization	Proposal Title	Proposal Number	Amount	Status	Purpose of Grant
Ulster County Department of Public Works	Applied Fluvial Geomorphology Training for UCDPW Staff	AWSMP-2014-89	\$3,410.00	Active	Funding to send Ulster County Civil Engineer, Andrew Emrich to Applied Fluvial Geomorphology Training (Rosgen Level II) in Asheville, NC.
Willow Mixed Media, Inc.	Fish Tales: A Documentary Film	AWSMP-2014-95	\$31,700	Active	A documentary film about the Ashokan watershed fishery and its history.

B. Floodplain Management and Planning

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

SUMMARY OF RECOMMENDATIONS IN 2015-2017 ACTION PLAN AND ALLOCATION OF SMIP FUNDING IN SUPPORT OF RECOMMENDATIONS

FLOODPLAIN ASSESSMENT - RECOMMENDATIONS

1. *Assist communities with the review of flood studies and revisions to the existing Flood Insurance Rate Maps (FIRMs) produced by FEMA.*
2. *Provide SMIP funds for the identification of natural floodplain areas that enhance sediment, debris, and water storage; riparian and aquatic habitat; and flood elevation reductions in downstream areas. Work with local planners and landowners to identify and implement protection strategies for these critical areas.*

COORDINATION OF FLOODPLAIN MANAGEMENT EFFORTS IN THE WATERSHED - RECOMMENDATIONS

3. *Promote Town development of Flood Hazard Mitigation Plans in the Ashokan Watershed.*
4. *Coordinate with flood commissions and working groups (e.g., SAFARI, NY Rising Community Reconstruction Program) 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. Where existing communities, structures and facilities are in at-risk locations, encourage the application of flood-proofing measures or relocation.*
5. *Assist municipalities with implementation of local flood analysis in watershed population centers that require engineering and modeling analysis and public input to select projects that will lower flood elevations.*
6. *Provide \$250,000 in funds for local flood hazard mitigation analysis and \$1,750,000 in funds for LFA-recommended and Town-adopted implementation projects through 2019, and assistance with obtaining additional state and federal funding for project implementation.*
7. *Encourage towns in the watershed without All-Hazard Mitigation Plans to develop plans. Additionally, work with towns that did not adopt the County's All-Hazard Mitigation Plan (2009) to participate in and ultimately adopt the revised County Plan (to be completed 2016).*
8. *Assist all Ashokan watershed towns with using information in the County All-Hazard Mitigation Plan and local flood mitigation plan(s) to access state and federal mitigation funding following declared emergencies or for pre-disaster mitigation grant projects.*

ASHOKAN WATERSHED SMIP PROJECTS SUPPORTING COORDINATION WITH FLOODPLAIN MANAGEMENT EFFORTS IN THE WATERSHED (ACTIVE 2015)

Organization	Proposal Title	Proposal Number	Amount	Status	Purpose of Grant
Town of Shandaken	Local Flood and Feasibility Analysis for Phoenicia and Mt. Tremper	AWSMP-2013-84 AWSMP-2014-101	\$72,000.00 \$20,850	Active	Analysis of flood conditions and identification of hazard mitigation projects in Phoenicia and Mt. Tremper.
Town of Olive	Local Flood and Feasibility Analysis for Boiceville and West Shokan	AWSMP-2014-100	\$70,995	Active	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	\$24,285	Active	Develop a Town Flood Hazard Mitigation Plan in the NYC Watershed portion of Town of Olive.

OUTREACH, EDUCATION AND TECHNICAL ASSISTANCE FOR FLOODPLAIN MANAGEMENT IN THE ASHOKAN WATERSHED - RECOMMENDATIONS

9. *Provide training and assistance for local floodplain managers and municipal officials in using revised FIRMs (Flood Insurance Rate Maps) and other FEMA datasets, and understanding NFIP requirements.*
10. *Increase access to flood prevention/protection information in the watershed.*
11. *Establish a Flood Hazard Mitigation (FHM) Working Group for the Ashokan Watershed as a forum to provide technical assistance for a range of topics (at least 2 meetings per year): How to develop Flood Hazard Mitigation Plans; Review of floodplain ordinances; Participation in FEMA’s Community Rating System; Implementation of FHM recommendations; Access to funding; and Coordination between local, county, and state partners engaged in flood response and flood mitigation.*
12. *Provide funding for Code Enforcement Officers and Floodplain Administrators to attend training sessions on flood related issues and become Certified Floodplain Managers.*

ASHOKAN WATERSHED SMIP PROJECTS SUPPORTING COORDINATION WITH FLOODPLAIN MANAGEMENT EDUCATION IN THE WATERSHED (ACTIVE 2015)

Organization	Proposal Title	Proposal Number	Amount	Status	Purpose of Grant
Towns of Lexington, Olive, Woodstock, and Shandaken	NYSFSMA Annual Conference Attendance and CFM Continuing Education	AWSMP-2013-85 AWSMP-2014-86 AWSMP-2014-88 AWSMP-2014-99	\$988.15 \$2,143 \$952 \$3,842	Active	Send Town officials to floodplain manager’s conference to attend trainings and acquire or maintain Certified Floodplain Manager certification.

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 2015-2017 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. One such program may be an agreement to access machinery for seeding or mulching to be shared by Towns.*
3. *Continue working with Towns to reduce sediment loadings 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 develop specifications for applying natural channel design concepts to bridge and culvert rehabilitation and replacement.*

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

5. *Collaborate with local, county and state highway departments to apply natural channel design concepts to streambank stabilization along roadsides.*
6. *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 2015)

Organization	Proposal Title	Proposal Number	Amount	Status	Purpose of Grant
Town of Olive	Dry Brook at Hillside Drive Bridge	AWSMP-2013-69	\$20,000	Active	Engineering to install grade control downstream of the Fawn Hill Bridge to stop head-cut moving toward bridge.
Town of Shandaken	Woodland Creek at Fawn Hill Rd. Bridge Grade Control	AWSMP-2013-78	\$10,000	Active	Engineering to install grade control downstream of the Fawn Hill Bridge to stop head-cut moving toward bridge.
Town of Shandaken	Fox Hollow Creek at Fox Hollow Rd. Bridge Grade Control by Panther Mountain Trail	AWSMP-2013-79	\$10,000	Active	Conceptual design for project to stop head-cut moving toward the upper bridge on Fox Hollow Rd. across from Panther Mountain Park entrance. Retaining walls are falling and endangering the bridge and streambanks.
Town of Shandaken	Fox Hollow Creek at Herdman Rd. Bridge Grade Control	AWSMP-2013-80	\$10,000	Active	Engineering to install grade control to prevent headcut and scour endangering the Herdman Rd. bridge off Fox Hollow Rd.
Ulster County Dept. of Public Works	Mine Hollow Creek Culvert Replacement	AWSMP-2014-90	\$60,000	Active	Replace and resize under-sized culvert on Mine Hollow, a tributary to the Bush Kill.

OUTREACH, EDUCATION AND TECHNICAL ASSISTANCE TO HIGHWAY MANAGERS AND EXCAVATION CONTRACTORS

7. *Organize Highway Manager's Working Group meetings with all 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 (3-4 per year).*
8. *Hold a highway manager and contractor training on installation of stream best management practices (1 in 2015-17).*
9. *Provide SMIP funds for highway and infrastructure management projects with benefits to water quality and stream system integrity.*

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 2015-2017 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.*

STREAMSIDE LANDOWNER FINANCIAL ASSISTANCE

2. *Offer and encourage participation in landowner incentive programs to encourage voluntary participation in stream and riparian zone protection and enhancement.*

Ashokan Watershed CSBI Projects

2015	Design and implementation of Bushkill bioengineering project 2-3 standard CSBI plantings using potted materials, live stakes, and native seeding 4-5 Customized Riparian Corridor Management Plans for streamside landowners Continue CSBI project monitoring Enhance in-house native willow & dogwood cutting source areas at Coldbrook Rd & New Paltz locations
2016	Implementation of Upper Esopus bioengineering project TBD standard CSBI plantings Continue CSBI project monitoring

OUTREACH, EDUCATION AND TECHNICAL ASSISTANCE TO STREAMSIDE LANDOWNERS

3. *Provide site visits and office consultations with local landowners, municipalities, contractors and others for designing and implementing best management practices to reduce erosion.*
4. *Develop educational products (fact sheets, guidebooks, videos, etc.) to educate landowners on best management practices, such as riparian planting design and maintenance, and guidelines for proper sizing of private stream crossings.*
5. *Develop reliable local sources of native plant material for stream and riparian improvement projects. Maintain the 2012 installation of 10,000+ live willow stakes to create cutting beds that will be used in future riparian restoration projects. These fields must be maintained for a 2-year period (2013-2015) before material will be available.*

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 2015-2017 ACTION PLAN AND ALLOCATION OF SMIP FUNDING IN SUPPORT OF RECOMMENDATIONS

STREAM ECOSYSTEM ASSESSMENT

1. *Identify riparian areas of particular environmental benefit or concern and create a database of targeted properties for riparian zone improvement programs.*
2. *Continue research, evaluation, and monitoring of aquatic ecosystems in the Watershed to improve best management practices as they relate to habitat and ecosystems. Support biological monitoring and studies of wildlife, their habitats, and interactions in the watershed by public agencies and interest groups.*
3. *Provide funding for study of stream condition and function, and monitoring of system condition and management practices through the SMIP related to habitat and ecosystems.*

OUTREACH, EDUCATION AND TECHNICAL ASSISTANCE FOR AQUATIC AND RIPARIAN HABITAT AND ECOSYSTEMS

4. *Work with regional organizations to develop and disseminate outreach materials and offer public programs on critical invasive species for the West of Hudson Watersheds.*
5. *Work with watershed municipalities to 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 impacts on riparian and aquatic ecosystems.*
6. *Hold Stream Ecosystem Working Group meetings to advise the program on stream system 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).*
7. *Update the Stream Ecosystem Research & Assessment Strategy for the Upper Esopus Creek.*
8. *Participate in inter-basin Riparian Buffers Working Group.*
9. *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.*

ASHOKAN WATERSHED SMIP PROJECTS SUPPORTING AQUATIC AND RIPARIAN HABITAT AND ECOSYSTEM ASSESSMENT (ACTIVE 2015)

Organization	Proposal Title	Proposal Number	Amount	Status	Purpose of Grant
USGS	Long-term Effects, Resilience, and Recovery of Fish Assemblages in the Upper Esopus Creek	AWSMP-2013-77	\$30,000	Active	Survey fish assemblages at six-to-nine previously sampled sites in the Upper Esopus Creek during summer 2014 and 2015 to assess the factors affecting the long-term impacts and (or) recovery of local fish populations and communities after floods. Prepare a USGS web-based report (4-to-8 page factsheet) that summarizes important findings during 2014 and 2015. Continues work started under AWSMP-2010-19 and AWSMP-2011-62.
USGS	Long-term Trends in Rainbow Trout Growth and Naturalized Populations in the Ashokan Basin	AWSMP-2014-94	\$100,938	Active	Study Rainbow Trout growth in the Ashokan Reservoir and long-term trends in their population sizes in the upper Esopus Creek.

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 2015-2017 ACTION PLAN AND ALLOCATION OF SMIP FUNDING IN SUPPORT OF RECOMMENDATIONS

ENHANCING PUBLIC ACCESS TO THE STREAMS

1. *Identify and assess potential stream access sites in the watershed. Investigate opportunities to develop multi-use, low-impact trail systems along the stream corridors. Trails for hiking, biking, cross country skiing and snowshoeing could provide multiple benefits, including drawing visitors to local resorts and increasing user awareness of stream management issues. Make improvements to existing stream access sites. 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. *Explore opportunities for and impacts of operational adjustments of the Shandaken Tunnel to accommodate the needs of biota along with other stakeholders.*
3. *Work with Stream Access and Recreation Committee and other stakeholders on developing a plan of action to modify the policy related to recreational releases to the Shandaken Tunnel and ensure mutually beneficial results for all stream users that do no harm.*
4. *Determine a good area for either new trail construction or existing trail improvement that would provide greater public access to streams.*
5. *Monitor conditions at existing public access sites to determine need for repairs, enhancements and/or improvements*
6. *Utilize the Town of Shandaken Recreation Master Plan and recreation and access documents from all watershed towns when developing programs and projects. Work closely with Town of Shandaken Parks and Recreation Committee and their counterparts in other watershed towns to develop and execute projects.*
7. *Work with DEP, DEC, County, Town, and other entities to assess possibility of utilizing flood buy-out properties for recreational and educational purposes.*
8. *Explore possibility of creating educational opportunities alongside recreational areas such as interpretative nature trails, wildlife viewing areas, bird observation points, "photo safaris," hiking/biking/walking/running trails, kiosks and educational signage, etc.*
9. *Collaborate with chambers of commerce, tourism industry, and others to promote the area as a destination. This will help spread the message of good stream management to a wider audience and strengthen and improve the local economy.*

EDUCATION FOR RECREATIONAL USERS OF STREAMS

10. *Develop and host at least one major educational event/conference/meeting devoted to stream access and recreation issues. Past topics have included Shandaken Tunnel Recreational Releases. Potential future topics include: in-stream debris management, laws and policies relating to navigable waterways, and handicap accessibility issues.*
11. *Provide a forum that will give all stakeholders (anglers, whitewater enthusiasts, environmental conservation groups, et. al.) a place to safely let their voices be heard and to improve relationships between these important groups.*
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.*

ASHOKAN WATERSHED SMIP PROJECTS SUPPORTING EDUCATION AND OUTREACH FOR RECREATIONAL USERS OF STREAMS (ACTIVE 2015)

Organization	Proposal Title	Proposal Number	Amount	Status	Purpose of Grant
Town of Shandaken	Engineering Services for Pine Hill Trail Network	AWSMP-2013-70	\$5,000	Active	Develop plans for an extensive hiking/ biking trail network with stream access and crossings interconnecting Smith Park (town owned) to Main St., the Morton Memorial Library (town owned), and the Town of Shandaken Historical Museum (town owned).

Appendix A: Summary of Completed Projects 2009-2014

STREAM ASSESSMENTS

Streams	Location	Status
Broadstreet Hollow	Towns of Shandaken and Lexington	Completed 2001
Stony Clove	Towns of Shandaken, Woodstock, Hunter, and Lexington	Completed 2003
Esopus Creek	Towns of Shandaken and Olive	Completed 2007
Woodland Valley	Town of Shandaken	Completed 2008
Beaver Kill	Towns of Shandaken and Woodstock	Completed 2010
Warner Creek	Town of Shandaken and Woodstock	Completed 2010
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	Completed mainstem reassessment 2013

STREAM RESTORATION/STABILIZATION PROJECTS

Town	Project	Goal	Construction Cost	Status
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

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.

Project	Town	Goal
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.

EDUCATION AND OUTREACH PROJECTS

Publications			
Type	Title(s)	Audience	Status
Stream Management Plans	Upper Esopus Creek Management Plan (2007)	Watershed residents, stream managers, municipal officials, project partners	Completed for mainstem of Esopus Creek and several tributaries; a combined Ashokan Watershed SMP is planned for the future
Newsletter	Esopus News	Streamside landowners and project partners	2009 (3 issues) 2010 (2 issues) 2011 (3 issues) 2012 (3 issues) 2013 (2 issues) 2014 (3 issues)
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 Ashokan Conf - Why We Are Here Ashokan Conf – Bark Peeling Ashokan Conf – Climate Change Ashokan Conf – Rivers are Dynamic Ashokan Conf – Stable Rivers Need Room Ashokan Conf - Dredging		2014
Program Brochure	Guide to the Ashokan Watershed Stream Management Program	General public	Brochure completed 2011 Updated annually 2012-2014
Displays and Kiosks	AWSMP Program Esopus Creek Demo Project	General public	Updated annually Updated 2013
Action Plan	2009-2011 Action Plan 2010 Update 2011-2013 Action Plan 2012 Update 2013-2015 Action Plan 2014-2016 Action Plan 2015-2017 Action Plan	Project partners, municipal officials, applicants for funding, interested members of the public, FAD regulators	Updated annually

Social Media	www.ashokanstreams.org www.facebook.com/AWSMPULster Twitter@AshokanStreams	General public	2011 Website published 2013 Website redesign Updated weekly
Press Releases	Projects and Events	General public	2011 (6) 2012 (15) 2013 (10) 2014 (16)
Email News Alerts	Various	Streamside landowners, municipal officials and project partners	Annually 2011-2014
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
Research Symposium	Catskill Environmental Research and Monitoring (CERM)	Researchers, resource managers, project partners, interested members of the public	CERM 2010, 2012, 2014
Fluvial Geomorphology and Engineering Trainings	Rosgen 5-day Training (2009) Rosgen Public Presentation (2009) Intro to ArcGIS Cornell Local Roads Training (2010) Aquatic Organism Passage Training (2012) Stream Restoration Practices (2011) River Hydraulic Modeling (2014) Knotweed Management Training (2014)	Highway and DPW staff, stream managers, contractors, and program staff	2009-2013
Floodplain Management Trainings	NYS Floodplain and Stormwater Manager's Conference and Certified Floodplain Manager Training (2010-2014) NFIP Educational Session (2013) CFM Exam Review (2014) Floodplain Mapping Fundamentals (2014) Benefit-Cost Analysis (2014) Using Depth Grids (2014)	Code enforcement officers, planning board members, town board members, and program staff	2010-2014
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)	Streamside landowners	2009-2011
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)	General public, streamside landowners	2009-2014
Volunteer Buffer Plantings	Various locations	General public, streamside landowners, students/interns	Annually 2010-2013
Booths and Displays	Shandaken Day Big Indian Spring Festival Olive Day Woodstock Library Day Ulster County Creek Week Ashokan Hoots Ulster County Fair	General public, streamside landowners	Annually 2009-2014

	Ashokan Watershed Conference Emerson Festival Mountain Valley Little League Day		
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	Grant Outreach Meetings Stream Project Meetings NYC Watershed Education & Outreach Meetings Riparian Buffer Working Group Meetings CRISP Meetings FEMA Meetings NYC Watershed Partner Meetings CWT and CWC Meetings	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) Rochester Hollow Stream Walk (2013) Kanape Brook Stream Walk (2013) Trout Unlimited Meetings (2009-2013) Little Beaver Kill Stream Walk (2014) Warner Creek Stream Walk (2014)	General public	Annually, as available
Youth Education			
Type	Title	Audience	Status
Presentations and Trainings	4-H Stream Team Stream Table Demo (2013) CCE Centennial Stream Table Demo (2013) UC Fair Floodplain Model Demo (2013) UC Fair Stream Table Demo (2014) Bennett Elementary Earth Day Macroinvertebrate Table (2011-2014)	Youth multiple ages	Annually, as available
After-School Activities and Classroom Enrichment	Watershed Detectives Club, Grades 4-6 Classroom Enrichment, Grades 4-6	Bennett Intermediate School	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 3-4x 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 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 4-6x 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	Met 2x per year through 2011; Committee inactive 2012-2013

Aquatic Ecosystem Working Group	To advise on development of a program research, assessment and monitoring agenda	Researchers, resource managers, project partners	Meet 1-2x 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	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.
Infrastructure					
Organization	Proposal Title	Proposal Number	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.

Appendix A: Completed Projects | 2015-2017

Ulster County Dept. of Public Works	Woodland Valley at Fawn Hill	AWSMP-2010-41	\$35,075	Complete	Stabilize a failing hill slope 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 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.
Planning					
Organization	Proposal Title	Proposal Number	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.
Research and Monitoring					
Organization	Proposal Title	Proposal Number	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

Appendix A: Completed Projects | 2015-2017

					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).
SUNY New Paltz	Rock Snot in Sick Rivers	AWSMP-2010-8	\$4,984	Complete	Investigate the causes of the invasive didymosphenia geminate, "didymo" algae blooms in streams and whether 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.
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.
Restoration					
Organization	Proposal Title	Proposal Number	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 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.

Appendix A: Completed Projects | 2015-2017

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.
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DELAWARE COUNTY SOIL & WATER CONSERVATION DISTRICT
STREAM CORRIDOR MANAGEMENT PROGRAM

DELAWARE WATERSHED STREAM CORRIDOR MANAGEMENT PROGRAM

2015 – 2017 Action Plan for the East and West Branch of the Delaware River



**Prepared by:
DCSWCD Stream Program
April 2015**

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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, New York City Department of Environmental Protection (NYCDEP), and Delaware County Planning Department (DCPD). Since their adoption, DCSWCD in partnership with DCPD and NYCDEP have been implementing the 36 recommendations contained in the two plans following priorities established in the Action Plan for each basin. This Action Plan update for the period 2015-2017 combines the previously separate Action Plans for each basin into a combined 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 (SCMP_r) in the implementation of the recommendations. The PAC is assisted by four sub-committees with the following focus: Fisheries and Recreation, Education and Outreach, Highway Infrastructure, and Floodplain Management. These sub-committee contribute their expertise to furthering the fulfillment of the relevant recommendations of the SCMP.

The implementation of the recommendations are 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
- ❖ Demonstration Project Funding
- ❖ Conservation Reserve Enhancement Program (CREP) Assistance
- ❖ Stream Corridor Management Program Technical Assistance and General Support

1. Delaware Watershed Stream Management Implementation Grant Program (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 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, NYC DEP, PAC)**
- 2. Maintain information on the status of awarded grants and future grant rounds through the Catskillstreams.org web site (SCMPr Staff, NYC 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 LFHMP**
- 5. Create opportunities for the delegation of project design tasks to grant recipients, their consultants or consultants to DCSWCD.**
- 6. Award additional grants in 2015 and 2016**

SMIP grants to be completed in 2015-2016 are listed below:

Education and Outreach		
<u>Project Title</u>	<u>Applicant</u>	<u>Scheduled for Completion</u>
Walton School Gravel Study	Village of Walton	November 2015
Recreation and Habitat Improvements		
<u>Project Title</u>	<u>Applicant</u>	<u>Scheduled for Completion</u>
East Branch Recreation Access Plan	Water Discovery Center	November 2015
Town of Walton River Access Boat Launch Hamden, Boat Launch Hoyt's Park	Catskill Development Foundation, Towns of Walton & Hamden	November 2015
Village of Delhi River Walk Design	Village of Delhi	November 2015
Highway/Infrastructure		
<u>Project Title</u>	<u>Applicant</u>	<u>Scheduled for Completion</u>
Little Delaware Streambank stabilization	Town of Bovina	September 2015
Medium Hydraulic Structure Study	DCDPW	November 2015
Holiday Brook Stream bank stabilization	Town of Andes	September 2015
Gulf Brook Stream bank stabilization	Town of Andes	September 2015
Planning and Assessment		
<u>Project Title</u>	<u>Applicant</u>	<u>Scheduled for Completion</u>
Ballantine Park Master Plan	Town of Andes	November 2015
Flood Hazard Mitigation		
<u>Project Title</u>	<u>Applicant</u>	<u>Scheduled for Completion</u>
Local Flood Hazard Mitigation Analysis	Village of Fleischmanns	December 2015
Local Flood Hazard Mitigation Analysis	Town of Middletown	2016
Walton Rt. 206 Study	Walton Flood Commission	April 2015

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

B. Prioritization of Identified Stream Intervention Projects Action Items:

- 1. Implement Floodplain Reclamation projects in collaboration with Municipalities. These project will be identified in the Local Flood Analysis plans. (SCMPr Staff)**
- 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/stream-management-program/grants/#delaware. (SCMPr Staff and Sponsor)**

C. Enhance Recreation Opportunities Action Items:

- 1. Provide technical assistance to communities to enhance streamside recreational opportunities. (DCPD, SCMP staff, NYC DEP)**
- 2. Continue to work with the East Branch Recreation and Fisheries subcommittee in the development and implementation of the East Branch Recreation Access Plan. (DCPD, SCMP staff, NYC DEP)**
- 3. Continue to work with West Branch communities and stakeholder groups on improving recreation access on the West Branch Delaware River (DCPD, SCMP staff, NYCDEP)**
- 4. Continue to provide technical assistance to the West Branch Recreation sub-committee for the boat launches in Delhi, Hamden and Walton.**

D. 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, SCMP staff, NYC DEP)**
- 2. Work with the Delaware County Chamber of Commerce and the East Branch Recreation and Fisheries sub-committee to promote recreational fishing in the Pepacton Reservoir and support the new boating program through outreach promotional activities such as sponsored fishing days, boating safety and fishing safety courses, etc. (SCMP Staff, DCPD, NYC 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 (SCMP Staff, DCPD, NYC DEP, PAC)**

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 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)**
- 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 Plan (LFHMP) 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, NYC DEP Project Manager, NYSDEC, SCMPr Staff)**
- 6. Provide scholarship for training opportunity 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, NYC DEP)**
- 12. Provide funds for the Local Flood Analysis process and recommended flood hazard mitigation stream projects through the SMIP.**
- 13. Complete work with the following Flood Commissions currently involved with the LFA process:**
 - **Walton Flood Commission**
 - i. **West Branch Delaware River Tributaries (East Brook, West Brook, Third Brook)**
 - **East Branch Delaware Flood Commission including:**
 - i. **Fleischmanns**
 - ii. **Middletown**
 - iii. **Clovesville**
 - iv. **Arkville**
 - **Delhi Flood Commission**
 - **Trout Creek Flood Commission**
 - **Hamden Flood Commission**
 - **Andes Flood Commission**

3. Catskill Streams Buffer Initiative (CSBI) funding

Catskill Stream Buffer Initiative (CSBI), established in 2009, works with local non-agricultural streamside landowners to provide assistance to enhance and maintain riparian buffers. Technical assistance includes; landowner consultation, landowner riparian corridor management plans that include operation and maintenance plans, and native vegetative plantings to establish or enhance riparian buffers.

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 NYC DEP. (SCMP Staff, NYC DEP CSBI Coordinator)**
- 2. Periodically update the protocol for prioritizing the implementation of the Catskill Streams Buffer Initiative and strategies for soliciting participation in the program. (SCMP Coordinator, DCSWCD CSBI Coordinator, NYC DEP CSBI Coordinator)**
- 3. Development of a minimum of 10 Riparian Corridor Management Plans (RCMP) per year. (DCSWCD CSBI Coordinator, DCSWCD SCMP Staff)**
- 4. Implement a minimum of 5 Riparian Corridor Management Plans per year by means of contractual planting services. Implement 1 demonstration or educational riparian Corridor Management Plan per year. (DCSWCD CSBI Coordinator)**
 - a. Riparian Corridor Management Projects:**
 - i. County Route 22 native plantings and live willow stakes**
 - ii. Vly Creek Restoration streambank and riparian restoration phase I in 2015 phase II in 2016**
 - iii. Willow Drive streambank stabilization**
 - iv. Peakes Brook monitoring pins in 2015**
 - v. Terry Clove Brook planting and stabilization**
 - vi. Oliver Farm planting and stabilization**
 - vii. Depot street planting, bank repair and knotweed control**
 - b. Educational RCMP implementation:**
 - i. Conduct a volunteer planting educational workshop with community groups and local high schools students, SUNY Delhi college students and BOCES students.**
 - ii. Conduct a volunteer potting-up educational workshop with local high schools students, SUNY Delhi college students and BOCES students.**
 - iii. Conduct a Japanese Knotweed pull and clean up educational workshop with local community groups and SUNY Delhi college students.**
- 5. 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, web site usage, and local media. (DCSWCD CSBI Coordinator)**
- 6. Secure landowner license and maintenance agreements for long-term access by DCSWCD and NYCDEP to facilitate ongoing maintenance and monitoring. (DCSWCD CSBI Coordinator)**

7. Develop planting plans as requested for applicable stream program projects in coordination with stream program staff. (DCSWCD SCMPr Staff and DCSWCD CSBI Coordinator)
8. Develop and implement a monitoring program for riparian buffer projects to identify project success and effectiveness. (DCSWCD CSBI Coordinator, NYC DEP CSBI Coordinator)
 - a. Monitoring protocol developed for all implemented CSBI (and supplemental) projects.
 - i. 33 in 2015
 - ii. 25 in 2016
 - b. Monitoring protocol was developed for invasive species monitoring of CSBI planting project locations.
9. Develop local resources to maintain availability of native vegetation planting stock as needed. (DCSWCD CSBI Coordinator)
 - a. Conduct potting-up 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 maintain plant stock for planting projects.
10. Provide technical assistance to streamside landowners through ongoing coordination with the West-of-Hudson Riparian Buffers Working Group.

B. Variable Width Riparian Buffer Pilot Program Action Items

1. CSBI will initiate a process defining eligible sites and for implementing variable width buffers. (DCSWCD CSBI Coordinator and NYC DEP CSBI Coordinator with NYC DEP and DCSWCD staff input)
2. Identify potential sites for demonstration of a variable width riparian buffer pilot project. Implement one demonstration project. (SCMPr Staff, DEP Staff, WAP Staff)
 - a. Produce planting and riparian buffer plan for the More Stream Restoration Project in the Town of Hamden along the West Branch of the Delaware River. The reach is approximately 1000 linear feet and construction is scheduled for 2015.

C. 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.
 - i. Thomson Hollow project site in 2015
 - ii. Beech Hill Knotweed Control in 2015
 - iii. State Route 28 knotweed and multiflora rose control in 2015
2. Continue to participate in CRISP. (SCMPr staff, DCPD)

4. Demonstration Project Funding

Demonstration 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, NYC DEP Project Manager, DCDPW)**
2. **Design and implement two demonstration projects that utilize the woody debris protocol developed by the SCMPr. (SCMPr Staff)**
3. **Undertake a periodic review of the woody debris protocol developed by the SCMPr. (SCMPr Staff, NYC 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. **Complete the Walton Central School students gravel study funded with a SMIP grant to study sediment issues in streams near the bridges in the Village of Walton.**
2. **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)**
3. **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 stream channel to the proper width and depth for approximately 100 linear feet whenever the stream capacity is compromised with gravel.**
 - b. **Continue to photo monitor the Marvin Hollow at State Route 10 culvert to remove excessive gravel upstream of the culvert for approximately 100 feet. Gravel was removed in November 2011 and 2 straight vanes were installed by LaFever Excavating. The Town of Walton received FEMA funding.**
4. **Undertake a periodic review of the gravel maintenance protocol developed by the SCMPr. (SCMPr Staff, NYC DEP Staff)**

C. Utilize Existing Funding Sources Action Items

- 1. Continue to explore opportunities for utilizing grant funding sources to match SCMPr funds for implement recommendations. (DCSWCD SCMPr Coordinator)**
- 2. Train staff and others within the watershed on how to prepare grant applications for obtaining additional funds for matching SCMPr funds.**

D. Demonstration Projects for Construction in 2015 and 2016

- 1. More Stream Restoration Project, WBDR Hamden**
- 2. Water Street Floodplain Restoration, WBDR Walton**
- 3. Mill Street Floodplain Restoration, EBDR Fleischmanns**

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 planning and technical staff to identify and classify impaired stream segments during the development or revision of individual Whole Farm Plans. (SCMPr and WAG Staff)**
2. **Continue to implement the MOU between DCSWCD and the WAC and its protocols for providing technical assistance to the Watershed Agricultural Program. (DCSWCD SCMPr Coordinator, DCSWCD Executive Director, and DCSWCD Technical Coordinator, NYCDEP 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. **Dominick Siniscalchi Farm**
 - ii. **Steve Boyd Farm**
 - iii. **Laura Phoenix Farm**
 - iv. **Willard Frisbee Farm**
4. **Provide engineering approval, technical support, 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)**

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, NYC 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 NYC DEP as needed)**
3. **Provide design 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 NYC 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 Contracts 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) 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, SCMP staff, NYC DEP)**
 - a. East Branch Delaware Flood Commission**
 - b. Walton Flood Commission**
 - c. Trout Creek Flood Commission**
 - d. Delhi Flood Commission**
 - e. Hamden Flood Commission**
 - f. Andes Flood Commission**
 - g. Coalition of Watershed Towns**
 - h. Recreation Access groups (Catskill Foundation and Water Discovery Center)**

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

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

C. Participation with the Catskill Watershed Corporation Action Items

- 1. Provide technical assistance as requested for stream related CWC funded projects. (SCMP Staff, NYC DEP Staff, CWC Staff)**
- 2. Explore ways to coordinate stream related education and outreach efforts (such as Catskill Streams and Watershed Education Program) with CWC. (SCMP Staff, CWC Staff)**
- 3. 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, NYC 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, SCMP Staff, NYC DEP, NYS DEC)**

2. Development opportunity for Municipal Officials to obtain credits for participating in educational activities. (DCPD, SCMP Staff)
3. Support training of Floodplain Administrators (Code 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)

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

F. Streamline Stream Work Permitting Action Items

1. Work in cooperation with NYS DEC, US Army Corps of Engineers, NYC 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. (SCMP Staff, NYC DEP RRE and SMP staff, US Corps of Engineers, DCDPW, Highway Subcommittee)

G. Provide Technical Assistance to Local Highway Departments Action Items

1. Provide technical assistance and support on the Medium Hydraulic Structure Study SMIP contract to evaluate watershed culverts for hydraulic capacity and prioritize them for upgrade through the SMIP. (DCDPW, SCMP Staff)
1. Provide technical assistance and educational support to municipalities for sizing and the design of routine culvert replacements. (SCMP Staff, DCDPW)
2. Enable municipalities to apply for funding through the grants program for infrastructure projects causing stream instability and/or water quality issues. (SCMP Staff, DCDPW)
3. Attend regular meetings of Municipal Highway Superintendents and keep them up to date on status of SWCD projects, training opportunities and flood recovery efforts.
4. 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. (SCMP Staff, DCPD, DCDPW and EBDR communities)
5. Provide technical assistance to highway departments and DCDPW by reviewing potential stream crossings including; large culverts and bridges. (SCMP Staff, DCDPW and EBDR communities)

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

H. Geomorphic Assessments at Bridges and Culverts Action Items:

1. Support the completion of DC DPW’s evaluation of Medium Hydraulic Structures (culverts) funded through the Delaware Watershed Stream Management Grants Program. (SCMP Program Coordinator, DCSWCD Engineering staff, DEP Project Manager and DEP Stream Engineering Coordinator and DCDPW)
2. Continue to 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. (SCMP Staff)

I. Continuation of Geomorphic Research / Assessments Action Items

1. Perform Rosgen Level II assessment of Steele Brook in Delhi. (SCMP Staff, Delhi Flood Commission)
2. Identify other river segments requiring geomorphic assessment and management plans. As needed, procure consulting services for the completion of this action item.

Adopt Principles of Stream Stewardship at the Municipal Level Action Items

1. Adoption completed for the following:

Towns:

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

Villages:

Delhi
 Hobart
 Margaretville
 Fleischmanns
 Stamford
 Walton

2. Promote and secure extension of MOUs within all adopting East and West Branch Delaware communities in 2015. (DCPD, SCMP Staff)
3. Encourage municipalities to continue to develop stream stewardship requirements in their local comprehensive plans and land use regulations. (DCPD, SCMP Staff, NYCDEP)

4. Encourage municipalities to continue to participate in the PAC and Sub-committees. (SCMPr Staff, NYC DEP, DCPD)
- J. Develop a Process for Updating the East and West Branch Delaware River Stream Corridor Management Plan Action Items**
1. Work with the Project Advisory Committee and it's Sub-Committees to initiate a comprehensive review of The East and West Branch Delaware River Stream Corridor Management Plan and initiate a process to update the plan as required. (PAC, DCPD, SCMPr Staff, DEP staff)
- K. Expand Public Education and Outreach Efforts Action Items**
1. Fund and implement education and outreach activities identified and prioritized by the Project Advisory Committee Education and Outreach sub-committee. (PAC, SCMPr Staff)
 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, NYCDEP, CWC)
 4. Work with 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, NYCDEP, CWC, BOCES and area schools)
 5. 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 NYCDEP)
 6. Provide up-to-date information to the catskillstreams.org website as well as support for the revision and maintenance of the Catskill Streams website.
 7. Participate in the West-of-Hudson watershed-wide education and outreach efforts.
 8. Maintain an up to date project status and education outreach information on the DCSWCD website.

L. 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, NYC 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)**

RONDOUT/NEVERSINK STREAM MANAGEMENT PROGRAM ACTION PLAN May 2015 – APRIL 2017

Town of Denning November 2014
Rip Rap Vegetation Installation on County Road 47



Town of Neversink November 2014
Catskill Streams Buffer Planting Chestnut Creek



Rondout and Neversink Stream Management Planning Program Action Plan 2015-2017

Executive Summary

Sullivan County Soil & Water Conservation District is currently under contract CAT-443 to NYC DEP to collaboratively deliver the Rondout Neversink Stream Management Planning Program through 2019. This contract provides Stream Management Implementation Program grants (SMIP) to implement recommendations identified in the prior contract, CAT-389, with broad goals that support watershed stewardship through assessment, planning, education, and stream and floodplain restoration activities in the Towns of Denning (Ulster County) and Neversink (Sullivan County).

A new program area of Local Flood Hazard Mitigation Analysis is initiated in this contract to help communities incorporate flood hazard mitigation into project implementation in conjunction with the municipalities' established stream management recommendations, and to provide eligibility to new programs available through other DEP and DEP-funded partner programs at Catskill Watershed Corporation. The Denning Neversink Local Flood Analysis Committee, with Town-appointed and agency representatives, will continue to meet regularly to guide the process of Local Flood Hazard Mitigation Analysis (LFHMA) through 2019.

CAT-443 provides resources for continued outreach efforts through educational programming, convening of the Watershed Advisory Group to advise program development, and Subcommittees of this group that meet more frequently and guide project planning and coordination. A web-site was established at www.rondoutneversink.org to document accomplishments of the program and to communicate progress and important information to participants and partners. Followers can join Rondout Neversink Stream Program's Facebook page and an Instagram feed, @nycheadwaters.

To date, ## projects to vegetate streamside buffers have been completed, representing ## acres, or # mile of linear buffer, restored with ## containerized native trees and shrubs installed. . Many of these projects include bioengineering design components to repair and/or improve stream stability along the banks. The Vegetator planting device was fabricated and successfully tested to provide a novel way to retrofit existing rip rap road protection with plant material to increase resilience and improve water quality. A riparian planting project incorporating up to 8 sites is in development for fall implementation. Round 1

A Stream Management Implementation Program (SMIP) commences in early 2015, following the adoption of a Memorandum of Understanding by Denning and Neversink Town Boards. The Watershed Advisory Group oversees the development of the SMIP grants program, and meets in subcommittees for Highways & Infrastructure and Education to initiate Round 1 applications for funding through CAT-443.

SMIP applications for 2015 were received by Towns of Denning and Neversink, as well as one each in development with Sullivan County and Ulster County DPWs. Sample 2015 projects: piloting improvement practices for better road ditch resilience, replacement of a metal grate bridge with 3-sided culvert to improve water quality, and providing a local match for a FEMA-funded streambank stabilization.

Due to repeat losses on main roads in this watershed, cooperative efforts were made to identify and explore hazard mitigation funding through Hazard Mitigation Grants Program. Grant application assistance and landowner outreach continues to be provided to Ulster County DPW for the safe reconstruction of County Road 47. A Local Flood Analysis is planned in 2016 for Frost Valley YMCA to explore facility-wide flood hazard mitigation options.

Each section of this Action Plan reflects a category of the current contract scope of work, followed by the specific stream management plan recommendations addressed by the tasks for Year 1 and 2 of the Plan. A proposed calendar (to be used as a general guide) is included.

Category: Stream Management Plans including Local Flood Mitigation Analysis

Stream Management Plan tasks address these General Recommendations:

6.1.1 Annual Action Plans

6.1.5 Advisory Committees General & Technical

6.1.6 Updating & Revision of Rondout Creek Management Plan

6.1.7 Town Adoption of Management Plan

6.1.6 Future Update and Revision of Chestnut Creek Management Plan

6.1.10 Post-Flood Technical Assistance

6.4.9 Hazard Mitigation Plans

6.5.4 Watershed Association Upper Rondout

6.8.2 Digital FIRM Maps

6.8.3 Flood Ordinance Review

6.8.4 Community Rating System

6.8.5 SFHA Notification

6.1.8 Public Lands

Year 1: 2015-2016

Watershed Advisory Group meetings April & December to review the Action Plan through 2017 and to report on annual accomplishments. Initiate grants program by releasing Education grant applications in February. LFA Committee supports Local Flood Analysis (LFHMA) through RFP to engineering firms for 3 population centers through bimonthly meetings to advise on project. Quarterly E-News. Bi-monthly meetings of Highways & Infrastructure Subcommittee. Convene second annual Anglers Symposium fisheries to engage landowners and angling community to identify priority recommendations for research. SMIP grant applications reviewed and selected for Round 1. Bi-annual meetings of Education Subcommittee.

Year 2: 2016-2017

A Research subcommittee will be initiated to identify and prioritize studies to illuminate stream conditions affecting ecosystem integrity, particularly fisheries and water quality. Completion of Claryville LFHMA study and initiation of Sundown study. Initiate design/construction of initial Claryville FHM projects; initiate Sundown flood analysis. Release SMIP grant applications for 2016.

Category: Stream Assessment

Stream Assessment tasks address these General Recommendations:

6.2.1 Identify Locations of Water Quality Impairment

6.2.4 Watershed Assessment of Major Rondout Creek/Neversink River Tributaries

6.2.8 Highway Activities & Infrastructure for Water Quality Improvement

6.3.12 Documentation of Eroding Banks

6.3.2 Establish Riparian Reference Reaches

6.3.3 Inventory Watershed Wetlands

6.5.1-6.5.3 Fisheries Research, Detailed Fisheries Assessment, Restoration Project Fisheries Assessment

6.8.7 Flood Damage Database

Year 1: 2015-2016

Bank Erosion Hazard Index (BEHI) assessment ongoing on the Rondout, Neversink and Chestnut Creeks to document change, prioritize and inform future implementation grants. Stream feature inventory on tributaries to aid in same and to initiate sediment studies for turbidity and bedload assessment; monitoring and suppression of invasive Japanese Knotweed sites will continue. Reference reaches selected and documented (ongoing). Completed projects will be monitored during establishment period. Additional stream study on entrenchment ratio will be completed in cooperation with SUNY ESF to collect data specific to Catskills to improve design engineering for effective sediment transport. Japanese Knotweed monitoring suppression plan in coordination with CRISP (Catskill Region Invasive Species Partnership). Frost Valley's Natural Resource staff initiates water quality monitoring with SMIP grant for fisheries health at locations identified by fishing members in coordination.

Year 2: 2016-2017

Stream feature inventory will be conducted on two major tributaries. Reference reach stream and riparian surveys will be conducted in each of the three basins. Research Subcommittee will identify projects to be initiated this year to address issues in fisheries and suspended sediment loading.

Category: Restoration Projects

Demonstration tasks address these General Recommendations:

- 6.2.4 Critical Area Seeding Program*
- 6.3.6 Knotweed Eradication/Suppression*
- 6.3.7 Invasive Species-Free Area and Spread Prevention*
- 6.3.9 Participate in CRISP*
- 6.2.8 Highway Activities*
- 6.2.9 Stream Stability Restoration*
- 6.5.4 Habitat Improvement Project*
- 6.1.3 Debris Management*

Year 1: 2015-2016

Stream Management Implementation Program begins with annual grant funding cycle to identify projects via subcommittees for approval by Watershed Advisory Group:

- Highways & Infrastructure Subcommittee
- Education Subcommittee
- Research Subcommittee
- Denning Neversink Flood Analysis Committee

2015 projects include local match for dewatering and riparian planting at FEMA streambank stabilization project (Denning); a three-sided culvert installation to replace a metal grate stream crossing on Town Road (Denning); a Town Road ditch resilience improvement project (Neversink); and a streambank stabilization for Town Road protection (Neversink). There is potential to add a streambank toe protection project in conjunction with Ulster County at Denning Road Bridge replacement. Support critical area seeding as requested by Towns. Adjustments made to Demo projects as needed during their establishment period. An annual cycle of funding and implementation of stream management projects in the Rondout & Neversink Basins will evolve with execution of the CAT contract. Release SMIP applications for Round 2 funding.

Year 2: 2016-2017

2016 restoration projects will be identified through Denning Neversink Local Flood Hazard Committee for Claryville. Sundown and Grahamsville LFAs are underway. Frost Valley YMCA submits application for facility-wide LFA to identify stormwater improvements at Main Camp to mitigate future flood damage and improve water quality.

Category: CSBI (Catskill Streams Buffer Initiative)

CSBI tasks address these General Recommendations:

- 6.3.1 Riparian Vegetation Mapping
- 6.3.5 Catskill Streams Buffer Initiative
- 6.2.4 Critical Area Seeding Program
- 6.3.6 Knotweed Eradication/Suppression
- 6.3.7 Invasive Species-Free Area and Spread Prevention
- 6.3.9 Participate in CRISP
- 6.2.8 Highway Activities

Year 1: 2015-2016

Riparian Corridor Management Plans (RCMPs) will be written for a minimum of 6 streamside landowners in the program area this year, each resulting in planting projects to be planned and implemented in Fall 2015 and Spring 2016. Outreach for the recruitment of CSBI grant applicants continues year round. Grant applications received by June 1st for implementation in the Fall of 2015, and November 1st for implementation in Spring 2016, with the flexibility to roll potential projects into future rounds when appropriate and necessary to ensure project success. Invasive species control is an integral part of this program; a long-term control strategy for suppression of target species will continue to be implemented in Fall 2015 through a partnership with Catskill Regional Invasive Species Partnership (CRISP). Existing native willow (*salix* spp.) planting beds improved on NYC DEP land; expanded permissions pursued for willow harvesting on private lands. A seasonal field intern may be hired in fall for assistance during CSBI project implementation. Labor for project installation will be explored through The Student Conservation Association (SCA) again.

Schedule for Actions:

Receive CSBI grant applications by June 1st; Develop RCMPs (3); year one vegetation monitoring for 6 projects installed in 2014, year 3 monitoring at 3 project sites installed in 2012, annual photo monitoring at 14 remaining sites; Complete RCMP's for Fall projects. June-October: submit Japanese Knotweed plots to CRISP/partners database; assist with enforcement of JKW prevention protocol for project contractors. July- October: Complete planting plans for Fall projects, CSBI project planning and implementation. November: CSBI grant applications due for potential spring projects; CSBI project planning for Spring 2016. February: Complete RCMPs (3) for Spring projects. Ongoing: Japanese Knotweed Control through partnership with private landowners, Town and County DPWs, Maintain an accurate inventory of plant materials center; Outreach for CSBI applicants; Oversee and manage Plant Materials contracts with Greenbelt and grow-out nursery.

Year 2: 2016-2017

Riparian Corridor Management Plans will be written to target the goal of 6 streamside landowners in the program area this year, each resulting in a planting project to be planned and implemented in Fall 2016 and Spring 2017. CSBI will also offer full planting support to the pilot stream restoration work that result from projects initiated by the grants program for Highways and Infrastructure, and Local Flood Analysis mitigation projects.

Outreach for the recruitment of CSBI grant applicants continues year round through a variety of forums. Grant applications received by June 1st for implementation in the Fall of 2016, and November 1st for implementation in Spring 2017, with the flexibility to roll potential projects into future rounds when appropriate and necessary to ensure project success. Invasive species control is an integral part of this program; action items will be in place for the long-term suppression strategy for suppression of target

species. The goal of establishing more native willow planting beds on NYC DEP land pursued including expanded permissions for willow harvesting on private lands.

Schedule for Actions:

May-September: CSBI project implementation for Spring projects; Receive and inventory plant materials from nursery; complete RCMPs (3) for Fall projects; Vegetation Monitoring for year 1 projects installed in 2015, Year 3 monitoring for projects installed in 2013, and Year 5 monitoring for projects installed in 2011. June: CSBI grants applications due by 1st for potential fall projects. October: Quarterly meeting; Receive and inventory plant materials from nursery; Complete planting plans for Fall 2016 projects. November: CSBI grant applications due by 1st, CSBI project planning for Spring 2017. February: Complete RCMPs (3) for Spring projects. Ongoing: Continue to identify partners for native willow harvest and bed planting establishment; Japanese Knotweed control through partnership with private landowners, Town and County DPWs; Maintain an accurate inventory of the plant materials center; Outreach for CSBI applications; Oversee and manage Plant Materials contract with Greenbelt and grow-out nursery.

Category: Education & Outreach

Education & Outreach tasks address these General Recommendations:

6.1.2 Selective Stream Gravel Management

6.1.4 Historic and Current Condition Analysis and Documentation

6.3.4 Watershed Forestry Program

6.3.8 Early Detection & Rapid Response to Invasives

6.4.2 Flood Response Technical Resources

6.4.5 Flood Damage Prevention Library

6.4.9 Hazard Mitigation Plans

6.6.1 Education & Outreach Working Group Strategy

6.6.2 Educational Workshops

6.6.3 Training of Stream Program Staff

6.6.4 Volunteer Opportunities

6.6.5 Web-based Outreach

6.6.6 Stream Management Publications

6.6.7 News Media Outreach

6.6.8 Training Opportunities

6.6.9 Stream Management Guidelines

6.5.5 Wildlife and Biodiversity Assessments

6.7 Public Recreation

6.8.6 Flood Hazard Education Sessions

Year 1: 2015-2016

An E-news format continues to be emailed to landowners and partners. Second Annual Anglers Symposium will take place to further engage water quality research stakeholders. Focus will continue of orientation and training for Sundown and Grahamsville streamside residents to gain the skills and information required to participate in the LFHMA process. Stream Program Coordinator participates in Interbasin Education and Outreach quarterly meetings and new program initiatives such as LFHMA. Program staff will attend Rosgen training Level 4 to increase knowledge in natural stream processes. In September, release applicant packet for Round 2 Education SMIP Grants. Outreach calendar includes: Second Annual Hemlock Woolly Adelgid Summit (April), Public Presentations for Claryville LFA (summer), Second Annual Anglers Symposium (summer). Lark in the Park Hike in partnership with NYC

DEP staff to Weather Station (October), Orientation Presentations on LFA process for Sundown and Grahamsville communities (Fall/Winter).

Year 2: 2016-2017

E-news and web updates continue. Ongoing partnership with Tri Valley Central School students; expand to include Ellenville students. Assess needs for supporting the creation of an Upper Rondout Watershed Association. Program staff will attend Rosgen training Level 4 to increase knowledge in channel design and natural stream processes. Initiate public search engine tool with Google to make Stream Feature Inventory and Stream Management Plan recommendations data available online.

Rondout Neversink Stream Program Team

Sullivan County Soil & Water Conservation District:

Brian Brustman, District Manager (Liberty Office)
Stacie Howell, Catskill Streams Buffer Initiative
Karen Rauter, Stream Program Coordinator
Lisa Schick, Program Assistant/Bookkeeper (Liberty Office)
John Kline, Les Kirby (Liberty Office)
Student Conservation Association Interns
Brenden Wagner, Riparian Field Intern

Contract Management and Partner Staff/NYC DEP Stream Management Program:

Mark Vian, Rondout / Neversink Basin Project Manager
Chris Tran, Catskill Streams Buffer Coordinator
Emily Smith, SUNY Ulster Stream Assessment and GIS Support

Sun	Mon	Tue	Wed	Thu	Fri	Sat
26	27	28	29	30	1	2
FHM Plan Development						
					Awards Announced Press Release on SMIP Projects 60% SMIP Tracking Sheet	Frost Valley Board
3	4	5	6	7	8	9
FHM Plan Development						
					E-News Distributed	
10	11	12	13	14	15	16
FHM Plan Development						
	Spring planting					
	Staff Meeting				Payment Request	
17	18	19	20	21	22	23
FHM Plan Development						
	Spring planting					
			FHM Feasibility Plan Flood Committee			
24	25	26	27	28	29	30
	Memorial Day	Sping planting				
			Public Meeting to			
31	1	2	3	4	5	6
	Vegetation Monitoring					
		Field Assessments				

Sun	Mon	Tue	Wed	Thu	Fri	Sat
31	1	2	3	4	5	6
	Vegetation Monitoring					
		Field Assessments				
7	8	9	10	11	12	13
	Vegetation Monitoring					
	Staff Meeting	Field Assessments				
			FHM Presentation to			
14	15	16	17	18	19	20
	Vegetation Monitoring					
	Community LFA	Field Assessments				
			Town of Shandaken			
21	22	23	24	25	26	27
		Field Assessments				
28	29	30	1	2	3	4
		Field Assessments				

Sun	Mon	Tue	Wed	Thu	Fri	Sat
28	29	30	1	2	3	4
		Field Assessments				
5	6	7	8	9	10	11
		Field Assessments			E-News Distributed	
		Presentation to			Invasive Species	
12	13	14	15	16	17	18
	Staff Meeting	Field Assessments				
19	20	21	22	23	24	25
	Community LFA	Field Assessments				
26	27	28	29	30	31	1
		Field Assessments				SMIP Tracking Sheet

Sun	Mon	Tue	Wed	Thu	Fri	Sat
26	27	28	29	30	31	1
		Field Assessments				SMIP Tracking Sheet
2	3	4	5	6	7	8
	JKW Assessment					
	SMIP Funding	Field Assessments				
9	10	11	12	13	14	15
	JKW Assessment					Payment Request
	Staff Meeting	Field Assessments				
16	17	18	19	20	21	22
		Field Assessments			Chestnut Creek SMP	
23	24	25	26	27	28	29
	Hunter Rd Floodplain Drains					
	Community LFA					
30	31	1	2	3	4	5
		Town Projects @ TBD, Hunter Rd?				

Sun	Mon	Tue	Wed	Thu	Fri	Sat
30	31	1	2	3	4	5
Town Projects @ TBD, Hunter Rd?						
6	7	8	9	10	11	12
Town Projects @ TBD, Hunter Rd?						
Labor Day					E-News Distributed	
13	14	15	16	17	18	19
Town Projects @ TBD, Hunter Rd?						
JKW Treatment						
Staff Meeting						
20	21	22	23	24	25	26
Town Projects @ TBD, Hunter Rd?						
Site Visits for Conceptual Designs (Next Year's Projects)						
27	28	29	30	1	2	3
Town Projects @ TBD, Hunter Rd?				Anglers Symposium		
				Conceptual Designs		
				Kurt Fausch River		

Sun	Mon	Tue	Wed	Thu	Fri	Sat
27	28	29	30	1	2	3
Town Projects @ TBD, Hunter Rd?				Anglers Symposium		
				Conceptual Designs		
				Kurt Fausch River		
4	5	6	7	8	9	10
Project Survey						
CR-55 Installation					Weather Station	
11	12	13	14	15	16	17
Project Survey						
CR-55 Installation						
Staff Meeting						
18	19	20	21	22	23	24
Project Survey						
Schoenburg Installation						
25	26	27	28	29	30	31
Project Survey						
Schoenburg Installation						

Sun	Mon	Tue	Wed	Thu	Fri	Sat
1 SMIP Tracking Sheet	2 Project Installation	3	4	5	6	7
8	9 Project Installation Staff Meeting	10	11	12	13 E-News Distributed	14
15 Payment Request	16 Project Installation	17	18	19 30% Design Review 30% Design Due	20	21
22 30% Design Review	23	24	25	26	27	28
29 30% Design Review	30	1 Applications Due	2	3 Subcommittee	4	5

Sun	Mon	Tue	Wed	Thu	Fri	Sat
27	28	29	30	31	1	2 Press Release SMIP SMIP Awards
3	4	5	6	7	8	9
10 Staff Meeting	11	12	13	14	15 60% Design Due	16
17	18 60% Design Review	19	20	21	22 60% Design Meeting	23
24	25 60% Design Revision	26	27	28	29	30
31	1 60% Design Revision Review 60% Design Revision SMIP Tracking Sheet	2	3	4	5	6

Sun	Mon	Tue	Wed	Thu	Fri	Sat
31	1	2	3	4	5	6
60% Design Revision Review						
60% Design Revision						
SMIP Tracking Sheet						
7	8	9	10	11	12	13
Landowner Agreements						
60% Design						
Staff Meeting						
14	15	16	17	18	19	20
Landowner Agreements						
Payment Request						
21	22	23	24	25	26	27
Landowner Agreements						
SMIP Subcommittee						
28	29	1	2	3	4	5
Landowner Agreements						
90% Design Review						
90% Design Due						
Joint Application						

Sun	Mon	Tue	Wed	Thu	Fri	Sat
28	29	1	2	3	4	5
Landowner Agreements		90% Design Review				
		90% Design Due				
		Joint Application				
6	7	8	9	10	11	12
90% Design Review						
13	14	15	16	17	18	19
90% Design Review						
Staff Meeting						
20	21	22	23	24	25	26
Announce Requests						
		Applications Due				
27	28	29	30	31	1	2
100% Design and						
		Project Site Showing		Subcommittee		

Sun	Mon	Tue	Wed	Thu	Fri	Sat
27	28	29	30	31	1	2
	100% Design and		Project Site Showing	Subcommittee		
3	4	5	6	7	8	9
10	11	12	13	14	15	16
	Spring Project Installation				Plant Sale?	
	Staff Meeting				Bid Opening	
17	18	19	20	21	22	23
	Begin Project Construction Contracting					
	Spring Project Installation				Plant Sale?	
24	25	26	27	28	29	30
	Begin Project Construction Contracting					
	Spring Project Installation					

Sun	Mon	Tue	Wed	Thu	Fri	Sat
1	2	3	4	5	6	7
Begin Project Construction Contracting						
Awards Announced						
Press Release on						
SMIP Tracking Sheet						

Schoharie Basin Stream Management Program Action Plan 2015 - 2017



Batavia Kill at Conine Stream Restoration Project, Batavia Kill, Ashland, NY



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Schoharie Basin Stream Management Program Action Plan 2015-2017

Updated May 15, 2015

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Schoharie Basin Stream Management Program

Action Plan 2015 – 2017

Update May 15, 2015

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 as part 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. 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, Flood Hazard Analysis and Mitigation and Education and Outreach programs.

The following Action Plan summarizes the programs and projects that GCSWCD will be leading within the Schoharie Basin between May 2015 and May 2017, and includes action plan item updates through May 1, 2015. The GCSWCD will lead 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. This is a dynamic document that is updated annually in May. Funding sources are presented with the following acronyms: Stream Management Implementation Grant Program (SMIP), Catskill Streams Buffer Initiative (CSBI), Watershed Assistance Program (WAP), Water Resources Development Act (WRDA), Catskill Watershed Corporation (CWC), DEP/GCSWCD Schoharie Watershed Stream Management Program (Contract), Federal Emergency Management Agency (FEMA), and Natural Resource Conservation Service Emergency Watershed Protection (EWP).

I. Education on Watershed Protection:

The GCSWCD works with a wide network of partners to enhance its education and outreach efforts related to stream and floodplain management, sediment and erosion control, and other topics critical to sound watershed management. A priority goal of this action plan is to increase education and outreach activities. Many of the following E/O initiatives were developed by the SWAC E/O Subcommittee. Education and Outreach action items include, but are not limited to:

A. Organize a Schoharie Watershed Month: Community involvement and awareness is important for promoting the protection of streams and their watersheds. Hosting a watershed-wide educational and recreational event (Schoharie Watershed Month) provides an opportunity for watershed residents, students, community groups, tourists, officials, etc. to get to know their stream and the resources available to help provide watershed protection.

GCSWCD Staff:	Yost
Project Partners:	Local schools and colleges, community organizations, Trout Unlimited Chapters, CWC, CCD, WAC, GCCCE, DEC, NYCDEP, SWAC Education and Outreach Subcommittee
Project Funding:	NYCDEP/GCSWCD Schoharie SMP Contract, CWC, GCSWCD-WAP, local sponsors, chambers of commerce
Project Schedule:	Organize annually from January through May; event held annually in May.
SMP Recommendation:	Schoharie/East Kill – Education and Outreach 6.4.8; Manor Kill- Education and Outreach 5.4.8
Date Added to Action Plan:	2009

Progress: Schoharie Watershed Month continues to engage watershed communities and organizations in learning about the watershed, its resources and taking part in hands-on activities. 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. Activity/event sponsors in 2014 included the three watershed school districts, Catskill Watershed Corporation, the NYC Department of Environmental Protection, Cornell Cooperative Extension of Columbia-Greene Counties, Catskill Center for Conservation and Development, Mrs. Puddle Duck’s Day Care, Arm-of-the-Sea Theater, Prattsville Community Church, Prattsville Fire Department, NYS Department of Environmental Conservation, Catskill Streams Buffer Initiative, Catskill Mountain Foundation, Community of Windham Foundation, Hunter Foundation, Windham Area Recreation Foundation, Gilboa Museum and the Gilboa Historical

Society, First Student Bus Rentals, Catskill Outback Adventures, Bob Janiszewski, and Gerry Stoner. Collectively, the partners created nine events (executed eight) that celebrated the region's beauty and natural resources, while raising awareness of the NYC Watershed and its protection. A list of activities can be found at <http://www.gcswcd.com/swp/eo/swm>. This event will continue annually.

B. Schoharie Watershed Summit: The annual conference, which began in 2007, is organized for local municipal officials, county and non-profit agencies, highway departments, regulatory 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.

GCSWCD Staff: Yost
Project Partners: NYCDEP, GCSWCD, SWAC
Project Funding: NYCDEP SMP Contract, GCSWCD
Project Schedule: Organize from September through January; event held annually in January.
SMP Recommendation: Schoharie -- Education and Outreach 6.4
Date Added to Action Plan: 2009

Progress: The annual Watershed Summit held in January continues to provide timely and important information to local officials, landowners, non-profit organizations, and consulting and engineering firms on watershed topics, initiatives and resources. The 2015 Summit, *Investment and Innovation for the Future*, highlighted communities, locally, nationally and internationally, that have demonstrated resilience and proactivity in flood mitigation and economic recovery. Various mitigation projects, relocation precedents, and collaborative success stories of communities and natural systems were covered along with training programs for local and elected officials, consultants and watershed managers. Workshops included New Flood Mitigation Programs and Resources in the NYC West-of-Hudson Watershed presented by Catskill Watershed Corporation and NYCDEP; Roles of the Municipal Planning Board; Understanding How the DEP Stormwater Regulations are Applied in Different Situations; and Reducing Flood Risks Using Hydraulic Modeling in the WOH Watershed & Beyond (interactive panel). This event will continue annually.

C. Schoharie Watershed Tour: The annual 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 potential watershed projects. The Watershed tours offer training in relevant water resource issues and management. For more information: <http://www.gcswcd.com/swp/eo/sw-tour>.

GCSWCD Staff: Yost
Project Partners: NYCDEP, GCSWCD, SWAC
Project Funding: NYCDEP SMP Contract, GCSWCD
Project Schedule: Organize from February through June; event held annually in June.
SMP Recommendation: Schoharie -- Education and Outreach 6.4
Date Added to Action Plan: 2009
Progress: The next tour will be scheduled for summer of 2016.

D. Riparian Buffer Workshop: Conduct workshop for streamside landowners that highlights the importance of riparian buffers and demonstrates management practices to maintain healthy stream buffers.

GCSWCD Staff: Weyeneth
Project Partners: CSBI
Project Funding: CSBI, NYCDEP/GCSWCD Schoharie SMP Contract
Project Schedule: 2015
SMP Recommendation: Schoharie -- Education and Outreach 6.4.8
Date Added to Action Plan: 2011

Progress:
riparian planting.

On May 9, 2015 there will be a habitat workshop along the Schoharie Creek in the Town of Hunter that will also include a

E. Schoharie Watershed Stream Crossing Workshop: Develop, design and implement a culvert workshop for local highway departments that highlights the importance of proper design & installation of culverts for sediment transport, fish passage and incorporates principals using natural channel design for long term stability, protection of water quality and health of streams.

GCSWCD Staff: Weyeneth
Project Partners: Local highway departments, Greene County Highway Dept., NYCDEP, NYSDOT
Project Funding: SMIP Round 3
Project Schedule: 2016 organize one day workshop.
SMP Recommendation: Schoharie -- Education and Outreach 6.4
Date Added to Action Plan: 2011
Progress: Awarded SWAC SMIP funding in October 2010. A fall 2011 workshop was being planned, however, flood recovery efforts, following Tropical Storms Irene and Lee took precedence. The workshop will proceed in 2016.

F. Town of Lexington Watershed Awareness Workshops: 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.

GCSWCD Staff: Education Coordinator
Project Partners: Town of Lexington, Educators (Lynn Byrne, Bonnie Blader, Beverly Dezan)
Project Funding: NYCDEP/GCSWCD Schoharie SMP Contract, Greene County Youth Bureau
Project Schedule: Summer 2015
SMP Recommendation: Schoharie -- Education and Outreach 6.4
Date Added to Action Plan: 2015
Progress: Awarded SWAC SMIP funding in April 2015. The workshops are planned for summer 2015.

II. Landowner Stream Assistance

The GCSWCD and NYCDEP recognize the importance of providing assistance to local landowners, as many of the identified problem areas in the management plans are on private property. The NYCDEP, GCSWCD and SCSWCD have provided the necessary training for project staff to be able to provide state-of-the-art technical assistance throughout the watershed. Technical assistance from staff members will guide the restoration of stream system stability and help to maintain ecological integrity. Technical assistance can range from a landowner consultation to activities that will help to meet the priorities of protecting water quality and establishing riparian buffers. Protection and enhancement of water quality can benefit both the City of New York's water supply and the residents of the Schoharie basin. Landowner Stream Assistance action items include, but are not limited to:

A. Catskill Streams Buffer Initiative: An effective riparian buffer program can 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. In 2009, the Catskill Streams Buffer Initiative was developed to educate and assist streamside landowners in order to provide for improved stewardship of riparian areas. The GCSWCD and NYCDEP will work with landowners to protect, enhance, manage and restore riparian buffers within the WOH watershed. GCSWCD staff will conduct site visits to determine eligibility for funding through the CSBI. In addition to site visits, recruitment may also include outreach mechanisms such as press releases, targeted mailings, presentations to organizations, and Riparian Corridor Management Plan development.

Catskill Streams Buffer Initiative Projects:

Site 1. Manor Kill Colangelo Riparian Planting:

SCSWCD/GCSWCD Staff: Nichols, Weyeneth
Project Partners: NYCDEP, GCSWCD, SCSWCD, Community Volunteers
Project Funding: NYCDEP CSBI
Project Schedule: Project started in 2011; additional willow clump plantings in 2015
SMP Recommendation: Manor Kill – Riparian Zone Management 5.7.1, 5.7.2, 5.7.4, 5.7.7
Date Added to Action Plan: 2009

Progress: Landowner has signed landowner agreement and applied for Floodplain Easement Program (NRCS). SCSWCD wrote a Riparian Corridor Management Plan for this property. In November 2009, 354 trees were planted and 150 willow stakes and 500 sedge plugs were installed along 546 feet of stream. In 2010, 340 additional trees and 200 stakes were installed. In 2012, potted stock was planted along 900 feet on the left streambank. An additional 319 ft. of willow clump planting at the first meander bend was planned; willow clumps will be installed in 2015.

Site 2. Tompkins Riparian Project: Replant a large section of Batavia Kill adjacent to Tompkins Quarry.

GCSWCD Staff: Weyeneth
Project Partners: GCSWCD, NYCDEP, Landowner
Project Funding: NYCDEP CSBI, GCSWCD, Landowner
Project Schedule: Scheduled to construct in 2015
SMP Recommendation: Batavia Kill – Riparian Buffer-03 (Very High, 3.46), 07 (Very High, 3.08), 11 (High, 2.69)
Date Added to Action Plan: 2009

Progress: Project on hold due to a change in ownership from Tompkins Quarry to the Town of Ashland. A planting plan has been developed and GCSWCD will obtain landowner agreement with Town of Ashland to proceed with planting.

Site 3. Benjamin Property Planting: Catskill Streams Buffer Initiative - Restore approximately 300 linear feet of streamside vegetation along the East Kill.

GCSWCD Staff: Weyeneth
Project Partners: GCSWCD, NYCDEP, Landowner
Project Funding: NYCDEP CSBI, GCSWCD
Project Schedule: Constructed in 2012, Planting 2015
SMP Recommendation: East Kill Stream Management Plan 6.7.1, 6.7.4, 6.7.8 Riparian Zone Management
Date Added to Action Plan 2012

Progress: GCSWCD has a 5 year landowner agreement for this property. Stream channel was restored by county highway department. GCSWCD installed willow stakes along 300 ft. of streambank to reestablish vegetation that washed out in Irene flooding. Additional trees and shrubs will be planted on the site. Project site will be evaluated to determine vegetation needs in 2015.

Site 4. Windham Country Club Riparian Planting: Catskill Streams Buffer Initiative - Restore approximately 1,000 linear feet of streamside vegetation along the Batavia Kill in Windham.

GCSWCD Staff: Weyeneth
Project Partners: GCSWCD, NYCDEP, Landowner
Project Funding: NYCDEP CSBI, GCSWCD, Landowner
Project Schedule: Determination of Status in 2015
SMP Recommendation: Batavia Kill – Riparian Buffer-03 (Very High, 3.46), 07 (Very High, 3.08), 11 (High, 2.69)
Date Added to Action Plan: 2013

Progress: GCSWCD will write a Riparian Corridor Management Plan for this property, develop the project design, and obtain a 5 year landowner agreement for this property. Installation of approximately 500 trees and shrubs was planned, however, the property was sold and riparian restoration plans were put on hold. The new landowner, Windham Mountain, has not responded with any interest in proceeding with installing native trees or shrubs along the streamside areas.

Site 5. Windham Path Riparian Project: Catskill Streams Buffer Initiative – riparian plantings totaling approximately 2,400 feet in length, with buffer widths varying from 45 feet to 100 feet, covering an area of 4.49 acres, at multiple locations along tributaries of the Batavia Kill in Windham. This planting project will enhance the riparian zone in six locations along the Windham Path.

GCSWCD Staff: Weyeneth
Project Partners: GCSWCD, NYCDEP, Town of Windham
Project Funding: NYCDEP CSBI, GCSWCD
Project Schedule: Berm removal and riparian planting in 2015.
SMP Recommendation: Batavia Kill – Riparian Buffer-03 (Very High, 3.46), 07 (Very High, 3.08), 11 (High, 2.69)
Date Added to Action Plan: 2013

Progress: GCSWCD has completed a Riparian Corridor Management Plan for this property and has obtained a landowner agreement for this property. GCSWCD hosted a volunteer planting in the spring of 2013 and installed 1,028 native trees and shrubs along 1,375 feet of stream. 2.41 acres were restored at three planting locations. Phase 1 is complete. Phase two will include removal of a berm and a riparian planting in 2015.

Site 6. Prattville Ball Field: Catskill Streams Buffer Initiative - Restore approximately 300 linear feet of streamside vegetation along the Batavia Kill just upstream of the confluence with the Schoharie Creek in Prattville at the Everett Conine Memorial Field. Plant an additional 550 linear feet of streamside vegetation along the Schoharie Creek at the same property.

GCSWCD Staff: Weyeneth
Project Partners: GCSWCD, NYCDEP, Town of Prattville
Project Funding: NYCDEP CSBI, GCSWCD

Project Schedule: Construct in 2015
SMP Recommendation: Schoharie/East Kill – RZM-6.7.1, RZM-6.7.2, RZM-6.7.3, RZM-6.7.4, RZM-6.7.6, RZM-6.7.7, RZM 6.7.8, RZM-6.7.9, RZM-6.7.10, RZM-6.7.11, RZM-6.7.12, RZM-6.7.13, GSMA-6.8.2
Date Added to Action Plan: 2014
Progress: GCSWCD will write a Riparian Corridor Management Plan for this property and obtain a landowner agreement with the town prior to project installation. Project is on hold due to park and trail construction.

Site 7. Former Kastanis Property Planting Phase 2: Catskill Streams Buffer Initiative – Reestablish a forested riparian buffer 100 feet wide along 1,200 feet of the Batavia Kill was planted in 2009 as a Streamside Assistance Program Pilot Project to restore approximately 7.1 acres of streamside vegetation along the Batavia Kill.

GCSWCD Staff: Weyeneth
Project Partners: NYCDEP, GCSWCD, Landowner
Project Funding: NYCDEP, GCSWCD
Project Schedule: Build in 2015
SMP Recommendation: Batavia Kill – RB-03 (Very High, 3.46), RB-07 (Very High, 3.08), RB-11 (High, 2.69)
Date Added to Action Plan: 2014
Progress (2009): GCSWCD received a land use permit with NYCDEP to plant approximately 5.25 acres in 2014. GCSWCD has obtained a Land Use and herbicide permit to reestablish a forested riparian buffer along the Batavia Kill and treat the Japanese knotweed, respectively.

Site 8. Chase Property Planting: Catskill Streams Buffer Initiative - Restore approximately 200 linear feet of streamside vegetation along a Batavia Kill tributary in Hensonville.

GCSWCD Staff: Weyeneth
Project Partners: GCSWCD, NYCDEP, Landowner
Project Funding: NYCDEP CSBI, GCSWCD
Project Schedule: Construct in 2015
SMP Recommendation: Batavia Kill – Riparian Buffer-03 (Very High, 3.46), 07 (Very High, 3.08), 11 (High, 2.69)
Date Added to Action Plan: 2014
Progress: GCSWCD will write a Riparian Corridor Management Plan for this property and obtain a landowner agreement prior to project installation.

Site 9. Grossman Property Planting: Catskill Streams Buffer Initiative - Restore approximately 300 linear feet of streamside vegetation along a Schoharie Creek tributary in Hunter.

GCSWCD Staff: Weyeneth, Langworthy
Project Partners: GCSWCD, NYCDEP, Landowner
Project Funding: NYCDEP CSBI, GCSWCD
Project Schedule: Assess and Construct in 2015
SMP Recommendation: Schoharie/East Kill – RZM-6.7, GSMA-6.8.2
Date Added to Action Plan: 2014
Progress: GCSWCD has conducted an initial survey to complete a bioengineering design. GCSWCD will resurvey and design bank treatments prior to planting 180 native trees and shrubs in 2015.

Site 10. Saenger Property Planting: Catskill Streams Buffer Initiative - Restore approximately 4,500 square feet of streamside vegetation along a Schoharie Creek tributary in Hunter.

GCSWCD Staff: Weyeneth
Project Partners: GCSWCD, NYCDEP, Landowner
Project Funding: NYCDEP CSBI, GCSWCD
Project Schedule: Assess and install in 2015
SMP Recommendation: Schoharie/East Kill – RZM-6.7, GSMA-6.8.2
Date Added to Action Plan: 2015
Progress: GCSWCD has conducted an initial site visit to develop planting recommendations. Volunteers will plant approximately 100 native trees in shrubs to establish riparian vegetation along the tributary.

B. Stream Restoration Projects and Modifications: The GCSWCD and NYCDEP will complete the following stream restoration projects. The GCSWCD and NYCDEP will also work cooperatively with the Schoharie Watershed Advisory Committee (SWAC) and others to identify additional sites. Projects are contingent on available funding, proper design, landowner cooperation and appropriate environmental and weather conditions. Implementation of these projects includes assessment, design, permitting, contracting, and construction oversight.

Site 1. Kozak Streambank Stabilization and Riparian Planting: Located along the Schoharie Creek, this project involves addressing 750 linear feet of erosion with clay exposures by grading the bank and stabilizing the toe with rock and bioengineering treatments. The proposal also includes creating a 50 foot wide riparian buffer by planting native tree and shrub species.

GCSWCD Staff: Buchanan, Langworthy
Project Partners: GCSWCD, NYCDEP, Landowner
Project Funding: SMIP Round 4, NYCDEP/GCSWCD Schoharie SMP Contract
Project Schedule: Construct in 2015
SMP Recommendation: Schoharie – Flood Protection 6.1.11, 6.1.12; Water Quality 6.3.11
Date Added to Action Plan: 2011
Progress: Awarded SWAC SMIP funds March 2011. Site was assessed in summer 2011. Due to Hurricane Irene (August 2011), the site required additional assessment and was topographically surveyed in the winter of 2015. The planning, assessment, permitting and design are currently in progress and upon approval by the regulatory agencies and landowners the project will be constructed in the summer of 2015.

Site 2. Shoemaker Project Repairs: Damages sustained to the Shoemaker project on the West Kill are scheduled for continued repair work in 2015.

GCSWCD Staff: DuBois
Project Partners: GCSWCD, NYCDEP, Landowners, FEMA
Project Funding: Schoharie SMP Contract, FEMA, NYCDEP/GCSWCD
Project Schedule: Survey 2012, Design 2013, Construct 2014 and 2015
SMP Recommendation: West Kill Stream Management Plan 6.8.7 Stream Stability Restoration
Date Added to Action Plan: 2012
Progress: Construction began in the fall of 2014. Construction was suspended at the end of October as the permit window expired. Construction is expected to resume in the 2015 construction season.

Site 3. Big Hollow Project Repairs: Damages sustained to the Big Hollow project on the Batavia Kill are scheduled for repair work in 2015.

GCSWCD Staff: Buchanan
Project Partners: GCSWCD, NYCDEP, Landowners, FEMA
Project Funding: FEMA, NYCDEP/GCSWCD Schoharie SMP Contract
Project Schedule: Survey 2012, Design 2013, Construct 2014
SMP Recommendation: Batavia Kill Stream Management Plan NO. SC -02, SC- 07
Date Added to Action Plan: 2012
Progress: Design, permitting and bidding were completed in 2013 and upon approval by a single landowner, construction will be performed in the summer of 2015.

Site 4. Manor Kill Stream Restoration: This project entails a stream bank restoration project adjacent to the Conesville Town Park in order to stabilize eroding streambanks and protect water quality by reducing fine sediment sources.

SCSWCD Staff: Nichols
Project Partners: SCSWCD, GCSWCD, NYCDEP, Town of Conesville
Project Funding: NYCDEP/GCSWCD Schoharie SMP Contract
Project Schedule: Design and construct 2015
SMP Recommendation: Manor Kill SMP 5.3 Water Quality and 5.2 Public Recreation
Date Added to Action Plan: 2015
Progress: The NYCDEP and SCSWCD are working with Milone and MacBroom Inc. on assessment, design, permitting and implementation of the Manor Kill Stream Restoration Project. The project also involves a potential property buyout and connection to the Town of Conesville recreation park with access for fishing included. Construction is planned for 2015.

III. Creative Stormwater Practices and Critical Area Seeding

In order to reduce runoff and protect groundwater resources in the basin, the GCSWCD and NYCDEP support promoting the infiltration of stormwater through erosion and sediment control techniques such as hydroseeding of open ditches, stormwater techniques to infiltrate water into the ground, wetland enhancement, filter strips, and creation of rain gardens and bioswales to manage stormwater. The GCSWCD will work with multiple partners to implement stormwater projects within the Schoharie Watershed. Creative Stormwater Practices and Critical Area Seeding action items include, but are not limited to:

A. Kaaterskill United Methodist Church Stormwater/Rain Harvesting Project: (Village of Tannersville) Several BMP's are proposed to treat the water quality of the roof drainage and provide storm water infiltration. BMPs 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. These components were selected based on existing land uses, physical feasibility, cost, and treatment capability and performance. Ease of maintenance, and educational benefits were also considered. Preference was given to infiltration and filtering practices.

GCSWCD Staff:	Buchanan
Project Partners:	NYCDEP, Kaaterskill United Methodist Church
Project Funding:	NYCDEP SMIP Round #10
Project Schedule:	Completion of project design in 2015.
SMP Recommendation:	Batavia Kill WQ-08 (Very High, 4.23); Schoharie – WQ-6.3.7, PR-6.2.3
Date Added to Action Plan:	2015
Progress:	A conceptual design is complete and detailed design and estimates will be performed winter 2015. Project construction is planned for 2016,

IV. Highway and Infrastructure Improvements

During development of SMPs for the various sub-basins, the GCSWCD, NYCDEP, and the SWAC Highway and Infrastructure Subcommittee identified a number of recommended actions that would provide water quality protection. Maintaining high water quality in the Schoharie Creek and its associated tributaries will provide multiple benefits including, improved recreational use, supplying quality drinking water, and enhancing the ecological health of the stream systems. Water quality protection activities may be site-specific, community-wide, or basin-wide. Highway and Infrastructure Improvements action items include, but are not limited to:

A. Glen Avenue Culvert Upgrade: The existing culvert under Glen Avenue located near the entrance of Camp Loyaltown is undersized, contributing to damage of the roadway, erosion, and roadway flooding during high flows. Culverts upstream of this one are drastically larger further indicating this culvert is undersized. The GCSWCD will work with the Village of Hunter Highway Department to design a properly sized culvert with a buried bottom for improved habitat, and oversee the installation of this culvert.

GCSWCD Staff:	Buchanan
Project Partners:	Village of Hunter Highway Department, NYCDEP, SWAC Highway/Infrastructure Subcommittee
Project Funding:	SMIP Round 4
Project Schedule:	Survey in 2011, design 2013, installation in 2015
SMP Recommendation:	Schoharie – Flood Protection 6.1.11
Date added to Action Plan:	2011

Progress: A SMIP grant was approved to offset costs of upgrading this culvert size and creating a buried culvert bottom. Culvert and roadway were damaged in Hurricane Irene, The assessment, planning, design and permitting were finalized in the spring of 2014 and construction is planned for the fall of 2015.

B. Cranberry Road Culvert Upgrade: The existing culvert under Cranberry Road is undersized, contributing to flooding of the roadway during high flows. The culvert is also substantially perched, which presents a barrier for fish passage. The GCSWCD will work with the Town of Hunter Highway Department to design a properly sized culvert and oversee the installation of this culvert.

GCSWCD Staff: Buchanan
Project Partners: Town of Hunter Highway Department, NYCDEP, SWAC Highway/Infrastructure Subcommittee
Project Funding: SMIP Round 3, Town of Hunter Highway Department
Project Schedule: Design in early 2012, installation in summer 2015
SMP Recommendation: Schoharie – Flood Protection 6.1.11
Date added to Action Plan: 2011

Progress: A grant was approved by the SWAC SMIP to offset costs of upgrading this culvert, and correcting its perched condition. Survey, design and permitting are complete and construction is planned for the summer of 2015.

C. Schoharie Watershed Stream Crossing/Culvert Design: A second component to the E/O workshop above (Schoharie Watershed Stream Crossing Workshop) is setting aside \$50,000 for engineered design services on retainer to work with towns to ensure prioritized culverts are designed properly.

GCSWCD Staff: Flack, Education & Outreach Coordinator
Project Partners: Highway superintendents subcommittee, SWAC, NYCDEP
Project Funding: SMIP Round 3, NYCDEP/GCSWCD Schoharie SMP Contract
Project Schedule: RFP in Fall 2011: funded design for the following culverts to be constructed: Griffin rd.(Jewett, 2012), Partridge Ridge (Ashland, 2011), Cranberry rd (Hunter, 2014) and Glen Ave (Village of Hunter, 2014).
SMP Recommendation: Schoharie – Water Quality 6.3
Date added to Action Plan: 2011

Progress: Currently the Cranberry road (Hunter), Glen avenue (Village of Hunter), South Gilboa rd (Gilboa) and Beech Ridge rd (Lexington) projects are being designed using these monies. The culverts are being upgraded to allow for proper conveyance and passage of aquatic organisms.

D. Mitchell Hollow Rd (CR 21) Stormwater Sewer Upgrade: Install water quality treatment components associated with 370' of stormwater sewer with catch basins along Mitchell Hollow Rd. to mitigate stormwater flooding in area along NYS Route 23.

GCSWCD Staff: Flack
Project Partners: County Highway Department, Town of Windham, SWAC, NYCDEP
Project Funding: SMIP Round 3, NYCDEP/GCSWCD Schoharie SMP Contract
Project Schedule: Design in 2013, Construction 2014
SMP Recommendation: Schoharie – Water Quality 6.3
Date added to Action Plan: 2010

Progress: The roadway stormwater and outlet protection was installed in 2014 and the added water quality treatment is being design and constructed in 2015.

E. Street Sweeper with Vacuum: After the winter season, highway crews sweep road abrasives (sand) using different machines. Some communities have their own outdated sweepers (Villages of Hunter and Tannersville), others brush the material aside with a broom. 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 during certain times of the year, purchasing

another one for the mountaintop communities was recommended by the highway subcommittee which would allow more road miles to be cleaned and maintained across the Mountaintop, therefore reducing the amount of abrasives washing into ditches and waterways.

GCSWCD Staff: Flack, Yost
Project Partners: Highway departments, Cornell Local Roads Program, SWAC Highway/Infrastructure Subcommittee
Project Funding: CWC, SMIP Round 1
Project Schedule: 1. Research the cost of purchasing a street sweeper with a vacuum.
2. Investigate the feasibility of providing, storing and coordinating shared access to the street sweeper.
SMP Recommendation: Schoharie – Water Quality 6.3.5
Date added to Action Plan: 2009
Progress: Application was submitted to CWC stormwater retrofit program in August 2010 and subsequently put on a waiting list until other projects were completed and CWC's new contract registered with DEP. New Stormwater program rules were released in Dec. 2014, the annual application deadline is October 1, a new application needs to be submitted with updates to the budget, A local match is no longer required, however, the application will rank higher if a cost share is included. Greene County Highway will oversee and operate the unit, and store it at either the Ashland or Hunter facility (allowing the other unit to be shared with fewer municipalities). As the program rules were revised with CWC's contract renewal, a new application will be required and submitted in 2015.

F. South Gilboa Road Stormwater Mitigation Project: This project will replace a culvert that conveys stream flow from an unnamed tributary to the Schoharie Reservoir under South Gilboa Road. The SCSWCD will work 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 provide better continuity of the floodplain associated with the wetlands and stream channel.

SCSWCD Staff: Nichols
Project Partners: Schoharie County Department of Public Works, SCSWCD, NYCDEP, GCSWCD, Private Consultant
Project Funding: SMIP Round 11
Project Schedule: Design and installation, 2015
SMP Recommendation: Schoharie – Flood Protection 6.1.11; Manor Kill – Flood Protection 5.1.11
Date added to Action Plan: 2015
Progress: A SMIP grant was approved replace the existing culvert and improve the alignment. Culvert and roadway were damaged during high flows. The assessment, planning, design and permitting will be finalized in the spring of 2015 and construction is planned for fall, 2015.

V. Planning and Assessment

During development of SMPs for the various sub-basins, the GCSWCD and NYCDEP identified a number of recommended actions that would require additional planning and assessment at various scales. Planning may be site-specific, community-wide, basin-wide or on the county level. Assessments may range from remote assessment of streams and their watersheds to site-specific streambank assessments, and will include survey and monitoring of various locations and project sites. Planning and Assessment action items include, but are not limited to:

A. Town of Hunter Land Use Regulation Review & Development Guidelines: Conduct detailed review of current land use regulations with intent of adopting revisions, new regulations &/or guidelines promoting low impact design, climate smart and smart growth principles. In the absence of zoning, the town is seeking to investigate, and adopt as appropriate, innovative land use practices which will be an incentive to achieve desirable future growth. The town is participating in proactive planning efforts (Climate Smart Action Plan, Hunter Regional Corridor Study, expansion of designated hamlets, Scenic Byways, Stream Management Plans), and this project would integrate the planning principles amongst the individual plans (low impact development, climate smart, & smart growth) and position the town to adopt changes to current regulations, propose new local rules and regulations as relevant and create detailed guidance resources for planning board and developers.

GCSWCD Staff:	Yost, Martin
Project Partners:	Greene County IDA, Town of Hunter
Project Funding:	SMIP Round 2
Project Schedule:	Approved for SMIP funding in March, 2010; Combined with MBSDW efforts 2012; Develop guidelines 2014-2015
SMP Recommendation:	Schoharie – Programmatic Approach 6.5.3
Date Added to Action Plan:	2010
Progress:	Awarded \$35,000 SWAC SMIP funding in March 2010, contract and scope of work completed with the Town of Hunter; project was on hold until the Town hired a new consultant, Delaware Engineering. Project commenced in June 2014, with expected completion in 2015. A land use committee was formed to guide the process and make recommendations for local code improvement including revisions to the town site plan law. The review of current land use regulations has been completed and revisions are in process in 2015.

B. Tributary Stream Inventory and Assessment: While existing SMPs cover the main stem of most major stream systems within the Schoharie Watershed, they do not address any tributaries to these systems. Therefore, less than 10% of total stream miles have been inventoried, assessed and planned. Inventory and assessment of tributaries is an on-going priority, although assessment of the tributaries and the subsequent planning efforts may not be at the same level as those efforts conducted along the main stems. In 2009-2010, the GCSWCD/NYCDEP worked to develop a condensed SMP planning process to include assessment of baseline conditions and an abbreviated SMP. This methodology should be applied to prioritized tributaries.

GCSWCD Staff:	Martin
Project Partners:	NYCDEP,
Project Funding:	NYCDEP/GCSWCD Schoharie SMP Contract
Project Schedule:	1. Developed protocol for inventory & assessment, spring 2009 2. 2009 – North Settlement, Furnace Creek, Mitchell Hollow Brook (Mad Brook) 3. 2015 – abbreviated SMPs (North Settlement, Furnace Creek, Mitchell Hollow (Mad) Brook) 3. 2016 – Two small tributaries TBD
SMP Recommendation:	Schoharie – Water Quality 6.3.8, 6.3.11; West Kill – Water Quality 6.3.8
Date Added to Action Plan:	2007

Progress: The GCSWCD and NYCDEP have identified three tributaries that were assessed during the 2009 field season; these include North Settlement Creek, Furnace Creek (along Dent Road) and Mad Brook (Mitchell Hollow Brook). Historical alignments, riparian vegetation mapping, watershed analysis and Geodatabases were completed in 2010. Abbreviated Stream Management Plans are expected to be completed in 2015.

C. Fisheries Assessment & Improvements Strategy: During development of SMPs for the various sub-basins, the GCSWCD and NYCDEP identified the need for further evaluation of fisheries and the importance of developing a comprehensive strategy to improve fish habitat. Improvements to fisheries would also provide economic and water quality benefits. In order to effectively evaluate basin fisheries, the GCSWCD and NYCDEP recognize the need for additional funding, increased coordination with potential project partners, and an understanding of the appropriate field methodologies.

GCSWCD Staff: Martin
Project Partners: NYCDEP, NYSDEC, Greene County Promotions, municipalities, Trout Unlimited, others
Project Funding: TBD, NYCDEP/GCSWCD Schoharie SMP Contract
Project Schedule: 1. Research potential funding sources, 2015.
2. Identify appropriate field methodologies, 2015.
3. Coordinate fisheries assessment, 2015.

SMP Recommendation: Batavia Kill – Public Enjoyment-04 (Medium, 0.38), Fisheries Habitat-03 (High, 2.31); Schoharie – Public Recreation 6.2.1, 6.2.2, 6.2.; Fisheries Habitat-6.6.1, 6.6.2, 6.6.3, 6.6.4, 6.6.5; General Stream Management Activities-6.8.8; West Kill – Fishery Habitat 6.6, 6.6.1, 6.6.2

Date Added to Action Plan: 2007

Progress: Public access maps were created during the stream management planning process and a thermal study was completed through the SMIP. Working through the SWAC Habitat and Recreation Subcommittee the GCSWCD will prioritize recommendations for fisheries improvements in 2015.

D. Project Monitoring: The GCSWCD will continue to monitor previously 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 ACOE 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.

- 1. Monitoring of Restored Stream Reaches (2015):** 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.

GCSWCD Staff: Langworthy
Project Partners: NYCDEP, GCSWCD
Project Funding: NYCDEP/GCSWCD Schoharie SMP Contract
Project Schedule: Monitor annually
SMP Recommendation: Schoharie – Water Quality 6.3.11, Riparian Zone Management 6.7.2; West Kill – Management Unit Recommendations 4.10, 4.11

Date Added to Action Plan: 2009

Progress: Nine (9) sites were monitored in 2014. The 2014 project monitoring sites included Ashland Well Head (Batavia Kill), Maier Farm 2013 Repairs (Batavia Kill), Conine 2013 Repairs (Batavia Kill), Sugar Maples (Batavia Kill), Holden (Batavia Kill), CR 6 (West Kill), CR 42 (West Kill), Vista Ridge (East Kill), and Apple Hill (East Kill). The 2014 Sugar Maples monitoring also included a full as built in accordance with the ACOE requirements for the 5th and final year of monitoring. The 2015 monitoring season will include eleven (11) sites. The scheduled monitoring sites for 2015 include Ashland Well Head (Batavia Kill), Brandywine/Ashland Connector Reach 2014 repairs (Batavia Kill),

Maier Farm 2013 Repairs (Batavia Kill), Conine 2013 Repairs (Batavia Kill), Holden (Batavia Kill), CR 6 (West Kill), CR 42 (West Kill), Long Road (West Kill), Vista Ridge (East Kill), Apple Hill (East Kill), and the Lanesville 2014 repairs (Stony Clove).

2. **Vegetation Monitoring (2015):** Annually, the GCSWCD and project partners monitor the native riparian vegetation that has been installed along streambanks within the West of Hudson New York City Watershed. Riparian plantings are completed in conjunction with the installation of natural channel designed (NCD) stream restoration projects. Vegetation provides for increased stability as trees and shrubs continue to mature, and is a critical component to the long-term success of these types of projects. Additionally, the Catskill Streams Buffer Initiative (CSBI) helps residential landowners protect their property and preserve natural habitat along streambanks by cultivating strong streamside buffers that use vegetation native to the Catskill region. 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. Annual monitoring of CSBI projects provides valuable information on the effectiveness of riparian plantings. Vegetative monitoring of restored stream reaches and CSBI projects includes, photo-documentation, vegetative health observations and measurements to document vegetative cover, vigor, growth rates and survival of planted vegetation.

GCSWCD Staff: Weyeneth
Project Partners: NYCDEP, GCSWCD
Project Funding: NYCDEP/GCSWCD Schoharie SMP Contract
Project Schedule: Monitor annually
SMP Recommendation: Schoharie – Water Quality 6.3.11, Riparian Zone Management 6.7.2; West Kill – Management Unit Recommendations 4.10, 4.11

Date Added to Action Plan: 2014

Progress: In 2014, vegetation monitoring was conducted for four stream restoration projects including, Conine, Holden, Vista Ridge and Apple Hill. In 2015, vegetation monitoring will continue at nine stream restoration project sites including, Ashland Wells, Brandywine/ACR, Maier, Conine, Holden, Vista Ridge, Apple Hill, Long Road and Lanesville. In 2014, vegetation monitoring was conducted for five CSBI projects including, Hensonville, Cervini, Torsiello/Hegner, Slutzky and Cole. Five CSBI project sites including, Kelly, Enochty, Higgins, Wilkie and Donnelly were monitored using photo documentation. In 2015, CSBI vegetation monitoring will continue at 10 project sites including, Kastanis, Kane, McRoberts, Avella, Brunsdon, Valenti, Mayo, Hensonville, Benjamin and Cole; 2016: Toriello, Cervini, Kelly, Slutzky, Hegner; Donnelly, Wilkie, Enochty, Higgins, Windham Path, Dodson, + any projects installed in 2015
2017: Mayo, Hensonville, Benjamin, Cole, + projects installed in 2016

VI. Recreation and Stream Habitat Improvements

In the general recommendations of all SMPs, enhanced public access to streams for recreational purposes was identified as a priority. The GCSWCD already has a number of these projects underway, and between 2011 and 2013 will continue to move forward with these projects. Assessing, protecting and improving fish habitat have also been recommended in the SMPs, and many of the following action items were developed by the SWAC Recreation and Habitat Improvement subcommittee. Recreation and Stream Habitat Improvements action items include, but are not limited to:

A. Schoharie Creek Park (Town of Lexington): The GCSWCD has been assisting the Town of Lexington with the development of a small “pocket park” to be located on the Schoharie Creek. Components of the project included the permanent removal of a derelict house right on the streambank, cleaning up weedy growth, enhancement of riparian vegetation and installation of low impact improvements such as demonstrative plantings, informational signage and stream access.

GCSWCD Staff: Weyeneth
Project Partners: NYCDEP, Town of Lexington, Greene County, Trout Unlimited, SWAC others
Project Funding: SMIP Round 3, NYCDEP/GCSWCD Schoharie SMP Contract, Town of Lexington, ACOE-(WRDA)

Project Schedule: Install sign, 2015
 SMP Recommendation: Schoharie – Public Recreation-6.2.2, 6.2.3; Riparian Zone Management 6.7.4, 6.7.7
 Date Added to Action Plan: 2010
Progress: Building removal and cleanup was completed during the summer of 2007. The Town of Lexington submitted a SWAC SMIP grant which was approved in August of 2010 for demonstrative plantings, fencing and signage. The plantings were installed in 2010, and then repaired in 2012 following Irene-related damages. In 2012, split rail fencing to define the park and protect the plantings was also installed, and the signage will be installed in 2015.

B. Windham Path Phase 2. The Windham Area Recreation Foundation will expand the Windham Path, a 1.3 mile non-motorized, multi-use recreational trail in the Town of Windham near the Batavia Kill. Phase 2 will extend the trail to the Route 296/South Street business district.

GCSWCD Staff: Yost
 Project Partners: Town, NYCDEP, GCSWCD-WAP, Windham Area Recreation Foundation (WARF)
 Project Funding: SMIP Round 10, Town of Windham, NYCDEP/GCSWCD Schoharie SMP Contract; WARF
 Project Schedule: Complete, 2015
 SMP Recommendation: Batavia Kill – Public Enjoyment 03, 01; Schoharie – Public Recreation 6.2.3, 6.2.2
 Date Added to Action Plan: 2015
Progress: A SMIP grant was approved in December, 2014 to cover the cost of materials for two small wooden footbridges that will cross wet areas along the path, and a trailhead sign and kiosk on Route 296. Contracting and scope of work are complete. Construction is scheduled for 2015.

C. Conesville Town Park Walking Path. The SCSWCD will work with Town of Conesville to rehabilitate the existing walking path in the Conesville Town Park.

SCSWCD Staff: Nichols
 Project Partners: Town, NYCDEP, SCSWCD, consultants
 Project Funding: SMIP Round 10, Town of Conesville, NYCDEP/GCSWCD Schoharie SMP Contract
 Project Schedule: Design, permit, construct, 2015
 SMP Recommendation: Manor Kill – Public Recreation 5.2; Schoharie – Public Recreation 6.2.3, 6.2.2
 Date Added to Action Plan: 2015
Progress: A SMIP grant was approved in December, 2014 to rehabilitate the Conesville Town Park walking path. The design, permitting and construction of the path will be combined with the Manor Kill Stream Restoration Project.

D. Lexington Riverfront Access Park: The Town of Lexington plans to expand the Schoharie Creek Park (Lexington Pocket Park) by purchasing two additional parcels, along County Route 13A, through the FEMA Property Acquisition Program. The project aims to enhance public outdoor recreation and education along the Schoharie Creek within the Town of Lexington. Components of the project may include a low impact path, a shade structure, and signage/informational kiosk.

GCSWCD Staff: Yost
 Project Partners: NYCDEP, Town of Lexington, Greene County, SWAC, FEMA, NYDOS
 Project Funding: SMIP Round 11, Town of Lexington, NYDOS LTRG
 Project Schedule: FEMA approvals 2015; Design, permitting and construction contingent upon FEMA approvals
 SMP Recommendation: Schoharie – Public Recreation-6.2.2, 6.2.3
 Date Added to Action Plan: 2015
Progress: 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 FEMA buyout parcels.

VII. Flood Hazard Mitigation

Flooding produces a variety of hazards and impacts to public safety, homes and businesses, infrastructure (roads, utilities, etc.) and the natural environment. It can have direct impacts on water quality, including contamination from dislodged fuel and chemical storage tanks, mobilization of household waste and toxic substances, excessive riverine erosion and massive hill slope failures. As such, flood hazard mitigation – the work of reducing the impacts from flooding - supports the social, economic and environmental interests of communities in the NYC watershed.

A. Local Flood Analysis (LFA): Local Flood Analysis (LFA) is undertaken 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. It is anticipated this analysis will prioritize projects for further SMIP and CWC funding.

GCSWCD Staff: Yost, Flack
Project Partners: Towns, NYCDEP, GCSWCD, CWC others
Project Funding: NYCDEP/GCSWCD Schoharie SMP Contract, CWC
Project Schedule: 1. Complete LFA for interested municipalities
2. Identify feasible alternatives
3. Complete projects
SMP Recommendation: Manor Kill – Section 5.1, Schoharie Creek West Kill and East Kill SMPs – Section 6.1, Batavia Kill SMP – Section 8(a)
Date Added to Action Plan: 2013
Progress: LFA projects are nearing completion in Lexington (started February 2014) and Windham (March 2014). Flood Advisory Committees (FAC) are assessing alternatives for possible flood reductions in the population centers of both towns. Lexington’s final report is drafted for review and adoption and the consultant is in the process of developing BCA’s for the identified Windham alternatives. Conesville is forming a FAC, developing an RFP and applying for LFA funds in 2015. These committees will also provide input for the 2015-2016 updating of Greene County’s All Hazard Mitigation Plan. Hazard Mitigation Grant Program applications were submitted in October 2013 to NYS SEMO for conducting LFA’s in the Village of Hunter and Tannersville. Prattsville’s LFA is completed and the Town is prioritizing projects for implementation and funding programs.

B. Hazard Mitigation Grant Program Flood Buyout Program: The GCSWCD is facilitating a FEMA flood buyout program for nineteen eligible landowners in six towns following Hurricane Irene in Aug. 2011. NYCDEP is participating in the program by covering the 25% non-federal match for watershed properties. For those that go through with a buyout, all structures are removed from the property and a deed restriction and conservation easement are issued maintaining the property in perpetuity as open floodplain space, therefore eliminating future flood damage to the parcel.

GCSWCD Staff: Yost, Flack
Project Partners: NYCDEP, SEMO, FEMA, Greene Co. Economic Devt, Tourism and Planning, Watershed Towns
Project Funding: FEMA/SEMO, NYCDEP
Project Schedule: 2013 – appraisals and preliminary soft costs (title report and insurance, environmental assessment, property survey)
2014 and 2015 – demolition plan for properties which still have structures. For vacant properties, commence closings.
SMP Recommendation: Manor Kill – Section 5.1, Schoharie Creek West Kill and East Kill SMPs – Section 6.1, Batavia Kill SMP – Section 8(a)
Date Added to Action Plan: 2013
Progress: State Agreements, Memorandums of Understanding with NYCDEP, the County and Towns and purchase contracts with landowners have been completed, as well as demolition and property management plans. Demolition plans have been approved

and closings are underway. NYS Office of Emergency Management is the contracting entity with FEMA and NYSOEM sub-contracts with Greene County. Greene County SWCD is performing the day to day functions of the program. Twenty-three properties in eight towns across the County are active in the buyout program (many more signed up initially but dropped out for various reasons). As of April 2015, nine properties closed and the remaining 14 will complete the program in 2015. Demolition takes place within three months of the closing and the property is restored to its natural floodplain state permanently removing any flood hazard.

VIII. On-going Activities

This section includes the on-going action items that began in 2007 and will continue through the duration of stream management plan implementation efforts. This is a dynamic document that will be modified annually to include additional action items or to update existing items. Efforts were made to make each task measurable within the action plan. However, the following items do not have an end, but rather are ongoing throughout the program.

A. Program Administration and Implementation: The GCSWCD will continue to develop and maintain an effective and efficient process for implementation of the stream management plans for Schoharie Creek and its associated tributaries. This process will help to fulfill the NYCDEP FAD obligations. Development and implementation of the program is an on-going process.

1. **Program Administration:** GCSWCD will provide overall project administration. Specific activities may include contract administration, book keeping, budgeting, schedule development and reporting.

GCSWCD Staff: Flack, Carl-Seebode, Treacy
 Implementation Category: Program Administration and Implementation
 Project Partners: NYCDEP, GCSWCD, MSMA, SWAC
 Project Funding: NYCDEP/GCSWCD Schoharie SMP Contract, Greene County Legislature, Grants, Other funding sources
 Project Schedule: On-going.
 Date Added to Action Plan: 2007
Progress: On-going.

2. **Schoharie Watershed Advisory Committee (SWAC):** The GCSWCD and NYCDEP have worked cooperatively to develop a single, watershed- wide project Advisory team, the Schoharie Watershed Advisory Committee, to help guide SMP implementation. The process by which this committee will guide implementation and allocate funding continues to be developed.

GCSWCD Staff: Martin, Yost
 Implementation Category: Program Administration and Implementation
 Project Partners: NYCDEP, Towns, Villages, Counties, local, county, state and federal agencies, NGO's, landowners
 Project Funding: NYCDEP Contract
 Project Schedule: On-going review of applications March 15th and September 15th each year.
 SMP Recommendation: Schoharie/East Kill – Programmatic Approach -6.5.8; West Kill – Programmatic Approach 6.5.2
 Date Added to Action Plan: 2007
Progress: The Schoharie Watershed Advisory Committee (SWAC) meets between two to three times a year to assist with funding and programmatic decisions associated with the Stream Management Implementation Program. The SWAC was formed in 2008 and represents the collective interests of local government, property owners, watershed agencies, and non-profit organizations, and consists of appointed representatives from each Schoharie Basin municipality, representatives from three subcommittees (Highway Superintendents, Education and Outreach and Recreation and Habitat), a Greene County Legislator and other local, state and federal agencies. The SWAC participates in reviewing applications and has approved 44 projects through eleven grant rounds. Funding rounds will continue through 2017.

B. Local Technical Assistance: The GCSWCD and NYCDEP will work 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 & retrofit, stream management activities and land use planning.

GCSWCD Staff: Flack, Langworthy
Implementation Category: Program Administration and Implementation
Project Partners: NYCDEP, Greene County Legislature, Local municipalities
Project Funding: NYCDEP/GCSWCD Schoharie SMP Contract, Greene County WAP Funding, Others
Project Schedule: On-going.
SMP Recommendation: Batavia Kill – Stream Corridor-01, Water Quality-08; Schoharie/East Kill – Flood Protection-6.1.2, Programmatic Approach-6.5.1, Riparian Zone Management-6.7.4, Stream Management Activities-6.8.2; West Kill – General Stream Management Activities 6.8.2
Date Added to Action Plan: 2007
Progress: The District and DEP have negotiated a new five year contract 2015-2020, which should register by the summer of 2015. The District continues to administer the county’s FEMA buyout program, as well as traditional stream and stormwater programs.

C. Inter-Agency Coordination: Further coordination between the agencies with stream management responsibilities is a key component of SMP implementation. Specifically, GCSWCD will coordinate with NYSDEC to have all stream disturbance permits (Article 15) undergo an appropriate review by local stream managers; this will help to ensure a high degree of consistency with SMP goals and objectives. To facilitate this process, it is important to provide streamside landowners with resources to help individuals with permit applications and to help develop better alternatives for addressing erosion sites.

NYSDEC/ACOE Permit Reviews: The GCSWCD/NYCDEP will continue to work with NYSDEC and the USACE to facilitate review of stream disturbance permits received by the agencies. The permits will be reviewed for their consistency with SMP goals and objectives and to evaluate stream channel morphology issues.

GCSWCD Staff: DuBois, Buchanan
Implementation Category: Program Administration and Implementation
Project Partners: NYSDEC, NYCDEP, ACOE
Project Funding: NYCDEP/GCSWCD Schoharie SMP Contract
Project Schedule: On-going
SMP Recommendation: Batavia Kill – Programmatic Resources-03 (High, 2.5); Schoharie – Programmatic Approach-6.5.1; West Kill – Programmatic Approach 6.5.4, Riparian Zone Management 6.7.1, 6.7.9
Date Added to Action Plan: 2007
Progress: Permit applications will be reviewed as they come in.

D. Catskill Streams Website – The GCSWCD will continue to provide logistical support in the development and maintenance of the Catskill Streams Website (www.catskillstreams.org) as a valuable tool for sharing information with watershed stakeholders.

GCSWCD Staff: Martin
Implementation Category: Education on Watershed Protection
Project Partners: NYCDEP
Project Funding: NYCDEP/GCSWCD Schoharie SMP Contract
Project Schedule: On-going maintenance and updates as appropriate
SMP Recommendation: Schoharie/East Kill – Education and Outreach 6.4.3; West Kill – Education and Outreach 6.4.2
Date Added to Action Plan: 2007

Progress: The website, Catskillstreams.org, is a comprehensive information source for streamside landowners in the Catskill Mountains. The website is updated regularly to include current resources and reports, and to provide a list of upcoming events. In 2013, CRSR Designs, Inc. updated the format, presentation style and content of the website. The new site went live in February 2014 and will continue to be improved and updated.

E. Community Outreach: 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. In addition, in accordance with the MOU between the GCSWCD and local municipalities, GCSWCD is required to provide the municipalities with a detailed action plan of stream management activities in the beginning of each spring. Furthermore, the GCSWCD will regularly report on the status of the annual action plan, and be available at the request of the municipalities to attend meetings, workshops or similar events when the annual action plan or specific items contained therein, require a more detailed understanding by the municipality or its constituents.

GCSWCD Staff: Yost
Implementation Category: Education on Watershed Protection
Project Partners: NYCDEP
Project Funding: NYCDEP/GCSWCD Schoharie SMP Contract, CWC, GCSWCD-WAP, others
Project Schedule: 1. On-going production of educational and outreach materials for dissemination of information
2. Conduct 22 community reviews (One review per community per year) by 2012.
3. Re-appoint SWAC representatives in 2012.

SMP Recommendation: Batavia Kill – Education and Outreach 08, 09, 06, 10; Schoharie/East Kill – Education and Outreach 6.4.2, 6.4.3, 6.4.4, 6.4.5, 6.4.6, 6.4.7, 6.4.8; Flood Protection-6.1.7; West Kill – Education and Outreach 6.4.3, 6.4.4, 6.4.5

Date Added to Action Plan: 2007

Progress: Outreach is ongoing through the GCSWCD and its WAP and consists of newspaper articles, newsletters (print and electronic), and dissemination of educational material to property owners, contractors, and municipal officials. Attendance at municipal and planning board meetings allows WAP staff to provide project updates to municipal leaders and to obtain information on specific municipal needs and issues. In addition, municipal board meetings provide the opportunity to update the municipalities on the progress of stream management plan implementation. MOU reviews are conducted annually with participating municipalities involved in the SMIP. In 2014 GCSWCD began the process to renew the MOU with municipalities, these efforts will continue in 2015. The MOU has been revised to incorporate flood hazard mitigation supports; these changes are being presented to the municipalities during the renewal process. Project summaries are provided on the status of SMIP funded projects for each community.

F. Critical Area Seeding Program: All of the SMPs 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 Staff: Flack, Terrill
Implementation Category: Creative Stormwater Practices and Critical Area Seeding
Project Partners: GCSWCD, NYCDEP, County and Municipal Highway Departments
Project Funding: SMIP Round 4, NYCDEP SMP Contract
Project Schedule: On-going - Provide personnel assistance with operation of the hydroseeder.
SMP Recommendation: Batavia Kill – Water Quality 03; West Kill- Water Quality 6.3.3; Schoharie/East Kill – Water Quality 6.3.3; Manor Kill- Water Quality 5.3.3
Date Added to Action Plan: 2009

Progress: The District 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. In 2013, 9.5 acres were seeded and mulched. In 2014, the seeding program provided seed and mulch for 4 highway sites covering 2,500 square feet and will continue annually.

G. Plant Materials Program: GCSWCD will continue to produce quality native plant materials for its stream restoration projects and riparian buffer plantings.

GCSWCD Staff: Terrill, Sutton
Implementation Category: Landowner Stream Assistance, CSBI
Project Partners: NYCDEP, GCSWCD, Community Volunteers
Project Funding: CSBI, NYCDEP/GCSWCD Schoharie SMP Contract, GCSWCD
Project Schedule: 1. Receive approximately 20,000 Greenbelt plants, 2014
2. Continue native seed program.
SMP Recommendation: West Kill – Riparian Zone Management 6.7.8
Date Added to Action Plan: 2007
Progress: In 2014, there were 20,401 Greenbelt plants delivered and 14,571 of the plants were repotted. The remaining plants, approximately 5,830, will be repotted in 2015.

H. Annual Education and Outreach Plan: 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 training needs and plan training activities for a wide range of audiences; training activities may be basin-wide or specific to individual sub-basins.

GCSWCD Staff: Educational Outreach Coordinator, Yost
Implementation Category: Education and Outreach
Project Partners: NYCDEP
Project Funding: NYCDEP SMP Contracts, WAP, CWC
Project Schedule: Goals submitted annually in January, Education efforts are on-going
SMP Recommendation: Batavia Kill – Education and Outreach-01 (Medium, 1.66); Schoharie/East Kill – Education and Outreach-6.4.1; West Kill – Education and Outreach 6.4
Date Added to Action Plan: 2007
Progress: As a sub-set of the WOH Education & Outreach Strategy, the Schoharie Basin's education and outreach programs are guided by the Schoharie Watershed Advisory Committee (SWAC) and the Schoharie Watershed Assistance Program. E & O action items offer watershed stakeholders (local decision-makers, agency regulators, county government, property owners) opportunities to network in small and large groups to learn about current practices, programs, and regulations governing watershed protection. The Schoharie Watershed Program includes E & O activities specific to particular audiences and their role in watershed protection (e.g., highway personnel, planning boards, code enforcement officials, property owners) and are supported by inter-basin and inter-county agencies (SWCD's, Cornell Cooperative Extension, Planning Departments). The GCSWCD also participates on the WOH E & O Committee, sharing information and suggestions on educational programs.

I. Operation and Maintenance: The GCSWCD, NYCDEP and project partners will 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.

GCSWCD Staff: Buchanan, Langworthy, Dubois, Weyeneth
Implementation Category: Landowner Assistance, CSBI
Project Partners: GCSWCD, NYCDEP, Landowner(s)
Project Funding: NYCDEP/GCSWCD Schoharie SMP Contract
Project Schedule: On-going

SMP Recommendation: Schoharie – 6.8 General Stream Management Activities

Date Added to Action Plan: 2015

Progress: Supplemental plantings and bioengineering are planned for Ashland Connector Reach, Conine, Maier Farm, Brandywine and Lanesville Project Repairs in the summer of 2015 and 2016.