

***NEW YORK CITY DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER SUPPLY***

**Two Year Action Plans
NYC DEP Stream Management Program:
Schoharie, Ashokan, Rondout-Neversink and Pepacton Basins
May 2014 – May 2016**

May 2014

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



*Prepared by: Stream Management Program staff of the Soil and Water Conservation Districts of
Greene, Ulster, Sullivan and Delaware Counties, and Cornell Cooperative Extension of Ulster County*

Ashokan Watershed Stream Management Program **2014-2016 Action Plan**



ASHOKAN WATERSHED
STREAM MANAGEMENT
PROGRAM

Cornell Cooperative
Extension of Ulster
County

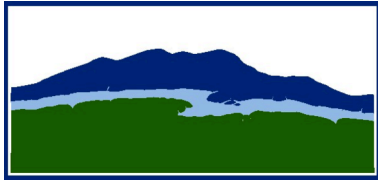
Ulster County Soil and
Water Conservation
District

USDA Natural Resource
Conservation Service

New York City
Department of
Environmental Protection

Main Project Office
6375 State Rt. 28
Phoenicia, NY 12464
(845) 688-3047
www.ashokanstreams.org

Cover Photo: AWSMP stream assessment field crew in the Stony Clove Creek, fall 2013.



ASHOKAN WATERSHED STREAM MANAGEMENT PROGRAM

6375 State Rt. 28, Shandaken, NY 12464 ♦ (845) 688-3047 ♦ www.ashokanstreams.org

To: Danyelle Davis, Project Manager, NYC DEP Stream Management Program
 From: Leslie Zucker, CCE Ulster County and Adam Doan, Ulster County SWCD
 Date: April 24, 2014
 Re: Ashokan Watershed Stream Management Program 2014 - 2016 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 2014–2016 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 2013 and early 2014.

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, 2014 until May 31, 2016, 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 Conservation District
5 Park Lane
Highland, New York 12528



2014-2016 Action Plan

Ashokan Watershed Stream Management Program

Purpose

The 2014-2016 Action Plan identifies goals and makes recommendations for implementation by the Ashokan Watershed Stream Management Program during the period 2014-2016. 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, and the Upper Esopus Creek in 2007. 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, 2014 - May 31, 2016 and spans completion of the current contracts for CCE and UCSWCD and the start of new five-year contracts in 2014.

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, \$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 2014-2016 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. *Review recommendations produced in previous reports on Large Woody Debris (LWD) and re-evaluate the need for LWD monitoring that focuses on debris accumulations that either threaten infrastructure, or that form beneficial stabilization and habitat features.*
4. *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, and inform prioritization of stream channel stabilization practices.*
5. *Provide funding for study of stream condition and function, and monitoring of system condition and management practices through the Stream Management Implementation Program (SMIP).*
6. *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 |

| Streams | Location | Current Status |
|-------------------------------|--|--------------------------------------|
| 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 |
| 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 |
| 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 SMIP PROJECTS SUPPORTING STREAM CORRIDOR ASSESSMENTS (ACTIVE 2014)

| 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 | 155,750.00 | Active | Extend Beaver Kill gage by 1 year and install gage on Warner Creek, collect and analyze sediment and turbidity samples, make streamflow measurements and develop a stage-to-discharge rating curve at both streamgages, and analyze how suspended sediment concentration and associated turbidity were impacted by stream restoration and stabilization projects. |
| SUNY - New Paltz | Role of Suspended Sediment on Warner Creek's Ecology | AWSMP-2011-59 | 5,000.00 | Active | Covers the stipend of a SUNY New Paltz senior geology student to conduct Stony Clove Creek watershed characterization; extends work on Warner Creek. |
| Syracuse University | Bank Erosion Assessment and Analysis in Stony Clove Creek, 2001-2012 | AWSMP-2011-61 | 45,000.00 | Active | 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. |

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. The next round of SMIP funds, along with funds provided to UCSWCD for stream restoration projects (expected in 2014), 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 identify potential stream restoration projects for the Esopus Creek at Oliverea. Consider developing a stream management plan for the Oliverea reach of the Esopus Creek.

ASHOKAN WATERSHED STREAM PROJECTS TO RESTORE STREAM STABILITY AND REDUCE CHRONIC SOURCES OF SEDIMENT (ACTIVE 2014)

| | | | |
|---|--|------------------------|--------|
| UCSWCD | Stony Clove and Warner Creek Confluence | Costs to be Determined | Active |
| <i>Protect transportation infrastructure and reduce potential future sources of chronic turbidity through grade control to mitigate headcut upstream migration.</i> | | | |
| Possible 2014-2015 projects (project selection is subject to change pending annual stream corridor geomorphic assessments and affected landowner support): | | | |
| UCSWCD | Stony Clove at Wright Road | Costs to be Determined | 2014 |
| <i>Protect vulnerable properties and reduce source of chronic turbidity</i> | | | |
| UCSWCD | Stony Clove at Stony Clove Lane | Costs to be Determined | 2014 |
| <i>Protect vulnerable properties and reduce source of chronic turbidity</i> | | | |
| UCSWCD | TBD Stony Clove Basin Stream Restoration Project | Costs to be Determined | 2015 |
| <i>Multi-objective project that includes goal of reducing chronic source of turbidity</i> | | | |
| UCDPW/ UCSWCD | Esopus Creek at Brown Road (Oliverea) | Costs to be Determined | 2015 |
| <i>Reduce sources of turbidity and protect Cty Rt 47</i> | | | |

MONITORING OF STREAM PROJECTS

11. *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.*

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

12. *Update Stream Stewardship Principles and promote the principles to relevant entities.*
13. *Provide outreach to municipal officials, agencies, affected landowners, and the public about findings from stream assessments and planned stream restoration projects.*
 - a. *Encourage municipal adoption of stream management plans and principles.*
 - b. *Hold meetings with municipal officials, landowners, and agency officials to discuss planned projects (as needed).*
 - c. *Include information on projects in Esopus Creek News (newsletter).*
 - d. *Conduct project site visits with landowners, contractors, regulators, and public officials (as needed).*
 - e. *Engage legislators to highlight accomplishments and planned activities (annually).*
 - f. *Report progress to funders and the Stakeholder Council (quarterly and annually).*
 - g. *Hold meetings of the AWSMP Stakeholder Council (3-4 per year).*
 - h. *Engage landowners in review of stream assessment findings.*
14. *Develop an outreach tool for transferring stream assessment data to managers in a user-friendly format. Integrate and prioritize recommendations associated with the data. Consider a web-based platform.*
15. *Solicit participation of local community members and education-related organizations in overall education and outreach activities.*
 - a. *Organize meetings of the Education & Outreach Working Group of the Stakeholder Council (2 per year).*
 - b. *Participate in West of Hudson watershed program education & outreach meetings and contribute to coordinated initiatives (quarterly).*
 - c. *Coordinate with local and regional organizations to integrate stream stewardship principles into education projects, such as participate in the Catskill Regional Invasive Species Program (CRISP) (as needed).*
 - d. *Partner with the Onteora School District's Bennett Elementary School to teach stream and watershed science to 4th and 5th grade classes and through after school programs (annually).*

16. *Fund public education and outreach activities regarding stream and watershed management through the SMIP.*
17. *Develop general written education and outreach materials for streamside landowners and other stakeholders in the communities of the Ashokan Watershed. Use a variety of media (newsletters, fact-sheets, press, video, and website) to disseminate information about the program and encourage stewardship.*
 - a. *2 Stream Guides (fact sheets) per year. Potential topics include:*
 - i. *NYS Water Law*
 - ii. *Shandaken Tunnel Releases*
 - iii. *Agency Roles and Regulations (related to stream management)*
 - iv. *Landowner Easement Agreements for AWSMP Stream Projects*
 - v. *Floodplain Management*
 - vi. *Update of 'Guide to Large Woody Debris Management'*
 - b. *3 Editions of the Esopus Creek News (newsletter) per year.*
 - c. *12 Press releases per year.*
 - d. *Email events and meetings announcements.*
 - e. *Release of new AWSMP website and regular updates.*
 - f. *Regular updates AWSMP Facebook page.*
 - g. *Produce videos of stream BMPs being installed for use in future trainings. Edit and prepare for YouTube publication.*
 - h. *Update AWSMP program brochure*
 - i. *Produce an annual AWSMP Action Plan.*
18. *Offer training programs that promote an understanding of effective stream management strategies for local stakeholders.*
19. *Hold contractor trainings on emergency stream intervention protocols and best management practice installation procedures (1 in 2014).*
20. *Provide and participate in local community events to promote the goals of the Ashokan Watershed Stream Management Program.*
21. *Organize an annual Ashokan Watershed Conference to provide general education to watershed residents and train municipal officials in specific topics (1 per year).*
22. *Hold stream walks (approx. 2 per year) and Family Fun & Fish Day, or similar public engagement event (1 per year).*
23. *Participate in Shandaken Day, Olive Day, Woodstock Library Day, Ulster County Creek Week, Ulster County Fair, and Harvest Festival (5 per year).*
24. *Develop a local group of volunteers committed to ongoing stewardship efforts in the watershed.*
 - a. *Explore opportunities to co-develop stream stewards programs for adult and youth volunteers working with partner organizations.*
 - b. *Offer educational opportunities such as presentations, site tours, and workshops to the Stakeholder Council and working groups.*

- c. *Involve volunteers in stream buffer plantings and other stream stewardship projects or learning opportunities (5 per year).*

**ASHOKAN WATERSHED SMIP PROJECTS SUPPORTING EDUCATION, OUTREACH AND TECHNICAL ASSISTANCE
TO ENCOURAGE STREAM STEWARDSHIP (ACTIVE 2014)**

| Organization | Proposal Title | Proposal Number | Amount | Status | Purpose of Grant |
|--|--|-----------------|------------|--------|---|
| Town of Woodstock | Woodstock Watershed Education Project | AWSMP-2010-26 | 4,400.00 | Active | Education and Outreach for Town of Woodstock Wetlands and Watercourse Law. Outreach and educational materials for town residents, local board members and businesses. |
| Ulster County Department of Public Works | Wildland Hydrology Course Training for UCDPW Staff | AWSMP-2013-76 | \$3,186.00 | Active | Funding to send Ulster County Civil Engineer, Andrew Emrich to Applied Fluvial Geomorphology Training (Rosgen Level I) in Shepardstown, WV. |

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 2014-2016 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. *Implement an agreement with the Ulster County Department of Environment to provide flood hazard mitigation coordination and raise capacity to deliver flood response in collaboration with county, state, and federal agencies within the Ashokan Watershed (beginning 2014).*
4. *Promote Town development of Flood Hazard Mitigation Plans in the Ashokan Watershed.*
5. *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.*
6. *Assist municipalities with identifying watershed areas that require further engineering and modeling analysis and public input to select projects that will lower flood elevations in populated areas of the watershed.*
7. *Provide \$2,000,000 in funds for local flood hazard mitigation analysis (LFHMA) and implementation projects starting in 2014, and assistance with obtaining additional state and federal funding for project implementation.*
8. *Encourage towns in the watershed without All-Hazard Mitigation Plans to develop plans. Work with the towns who adopted the County's all-Hazard Mitigation Plan to be prepared for use of state mitigation funding following declared state emergencies and to utilize the information in the plan.*

**ASHOKAN WATERSHED SMIP PROJECTS SUPPORTING COORDINATION WITH FLOODPLAIN MANAGEMENT
EFFORTS IN THE WATERSHED (ACTIVE 2014)**

| Organization | Proposal Title | Proposal Number | Amount | Status | Purpose of Grant |
|---|--|-----------------|-------------|---------|--|
| Town of Shandaken | Floodplain Manager Training and Certifications | AWSMP-2013-71 | \$1,455.00 | Active | 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 | \$485.00 | Active | 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 | \$325.00 | Active | Send Town of Hurley Code Enforcement Officer to the NYSFSMA 2014 conference and Certified Floodplain Manager training. |
| Ulster County Department of Environment | Floodplain Manager Certification and Continuing Education | AWSMP-2013-75 | \$810.00 | Active | Send two Ulster County staff to the NYSFSMA 2014 conference and Certified Floodplain Manager training; and sit for CFM exam. |
| Town of Lexington | NYSFSMA Annual Conference Attendance Plus CFM Test | AWSMP-2013-85 | \$560.00 | Active | Send Town of Lexington Code Enforcement Officer to the NYSFSMA 2014 conference and Certified Floodplain Manager training; and sit for CFM exam. |
| Town of Shandaken | Local Flood and Feasibility Analysis for Phoenicia and Mt. Tremper | AWSMP-2013-84 | \$72,000.00 | Pending | Analysis of flood conditions and identification of hazard mitigation projects in Phoenicia and Mt. Tremper. |

**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.*

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 2014-2016 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 2014)

| Organization | Proposal Title | Proposal Number | Amount | Status | Purpose of Grant |
|----------------------------------|---|-----------------|-------------|---------|--|
| UC DPW | Esopus at Maben Hollow Bridge | AWSMP-2011-67 | 29,300.00 | Active | Install a new abutment and bridge deck for the Maben Hollow Bridge which was damaged during tropical storm Irene. The new bridge is to have a 20 foot increase in the span length in order to increase the hydraulic capacity of the Esopus Creek. |
| UC DPW | Esopus at County Rt. 47 Bridge | AWSMP-2011-68 | 77,300.00 | Active | Replace an 8-foot diameter culvert which failed during tropical storm Irene with a 60 foot span bridge. |
| Town of Olive | Dry Brook at Hillside Drive Bridge | AWSMP-2013-69 | \$20,000.00 | Pending | Engineering to install grade control downstream of the Fawn Hill Bridge to stop head-cut moving toward bridge. |
| Town of Shandaken - Highway Dept | Woodland Creek at Fawn Hill Rd. Bridge Grade Control | AWSMP-2013-78 | \$10,000.00 | Pending | Engineering to install grade control downstream of the Fawn Hill Bridge to stop head-cut moving toward bridge. |
| Town of Shandaken - Highway Dept | Fox Hollow Creek at Fox Hollow Rd. Bridge Grade Control by Panther Mountain Trail | AWSMP-2013-79 | \$10,000.00 | Pending | 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 - Highway Dept | Fox Hollow Creek at Herdman Rd. Bridge Grade Control | AWSMP-2013-80 | \$10,000.00 | Pending | Engineering to install grade control to prevent headcut and scour endangering the Herdman Rd. bridge off Fox Hollow Rd. |
| Town of Woodstock - Highway Dept | Silver Hollow Creek at Silver Hollow Rd Culvert Replacement | AWSMP-2013-81 | \$50,000.00 | Pending | Replace flood-damaged culvert with precast concrete box culvert. Project at the Intersection of Silver Hollow Rd. and Lane Rd. |

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 (4-6 per year).*

8. *Hold a highway manager and contractor training on installation of stream best management practices (1 in 2014-15).*
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 2014-2016 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 Project

| | |
|---------|--|
| 2012 | 13 Projects Totaling 2,590 linear feet |
| 2013 | 8 Projects Totaling 3,350 linear feet, including planting, willow staking, and invasive control |
| 2014-15 | 2014 TBD (to include one large bioengineering BMP installed) 2015 TBD (to include one large bioengineering BMP installed) |

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. *Identify educational products (fact sheets, guidebooks, videos, etc.) for future development that will 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 2014-2016 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 efforts on aquatic ecosystems in the Watershed to improve best management practices as they relate to habitat and ecosystems. Support further aquatic biomonitoring and studies of other 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 the Catskill Region Invasive Species Partnership (CRISP) and with the West-of-Hudson DEP Education and Outreach group 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. *Organize a Stream Integrity Research & Assessment (SIRA) science forum to advise the program on stream system assessment, research, and monitoring needs. Work with the group to coordinate research, assessment, and monitoring projects that benefit stream system integrity and aquatic and riparian habitat in the Watershed (1-2 meetings per year, or as needed).*
7. *Begin regular meetings of the Stream Ecosystem Working Group to update the Aquatic Ecosystem Research & Assessment Strategy for the Upper Esopus Creek.*
8. *Begin development of a technical publication to distribute results of stream channel and sediment processes modeling.*

9. *Participate on the Catskill Environmental Research and Monitoring (CERM) committee and work with this group to identify and prioritize studies and projects that support stream management in the Ashokan Watershed (2-4 meetings per year). Contribute to development of a bi-annual CERM conference (1 in 2014).*
10. *Participate in biennial inter-basin Riparian Buffers Working Group (previous meeting was held in Ashokan Watershed 2012).*
11. *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 2014)

| Organization | Proposal Title | Proposal Number | Amount | Status | Purpose of Grant |
|--|---|-----------------|-------------|---------|--|
| USGS Aquatic | Impact of Climate Change (floods) on Stream Ecosystems in the Catskills | AWSMP-2011-62 | 30,000.00 | Active | Study to assess the impacts of historic August 2011 flooding on the Upper Esopus Creek ecosystem, quantify short and long term rates of ecosystem recovery, characterize the effects of emergency channel repairs on the stream ecosystem, and provide data needed to help mitigate negative ecosystem impacts that may occur more frequently than in the past. |
| The Research Foundation SUNY New Paltz | Assessing the Impact of Groundwater and Heterogeneous Glacial Deposits on Streambank Erosion in the Stony Clove Creek Watershed | AWSMP-2013-74 | \$30,000.00 | Pending | Study to determine the hydrostatic pressure along the Stony Clove Creek and Warner Creek at selected locations; perform more detailed characterization of the glacially derived sediments along the stream banks, which will aid in identifying preferential flow paths for groundwater; use bromide tracers to identify groundwater recharge areas; prepare a GIS-based map incorporating the above mentioned information, which will aid in locating vulnerable areas along the stream bank for future erosion. This information will also be helpful for Planning future stream restoration project(s) if needed; In addition, install piezometers for long-term monitoring of Chichester Site 2 to assess the effectiveness of the recently completed stream bank restoration project. |

| | | | | | |
|------|--|---------------|-------------|--------|---|
| USGS | Long-Term Effects, Resilience and Recovery of Fish in the Upper Esopus Creek | AWSMP-2013-77 | \$30,000.00 | Active | Survey fish assemblages at six-to-nine previously sampled sites in the Upper Esopus Creek during summer 2014 to assess the factors affecting the long-term impacts and (or) recovery of local fish populations and communities after floods. 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. |
|------|--|---------------|-------------|--------|---|

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 2014-2016 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.*
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 2014)

| Organization | Proposal Title | Proposal Number | Amount | Status | Purpose of Grant |
|-------------------|--|-----------------|------------|---------|---|
| Phoenicia Library | Jerry Bartlett Memorial Angling Collection Improvement | AWSMP-2011-37 | 10,000.00 | Active | Outreach and education to anglers of all ages and the general public about the links between robust fish and macroinvertebrate populations and water quality through workshops, presentations and events, digital exhibits and web design. |
| Town of Shandaken | Engineering Services for Pine Hill Trail Network | AWSMP-2013-70 | \$5,000.00 | Pending | 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 |

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 Warner Creek Site 5 | Shandaken | Project covered 45,000 sq. ft., or 1.2 acres re-vegetated. Approx 1500 trees and shrubs and 200 willow stakes. |
| 2013 Phoenicia Main Street | Shandaken | Installation of 800 willows total extending 300' on both banks upstream of bridge. |
| 2013 McKenley Hollow CSBI Site | Shandaken | Installed 130 trees and shrubs plus 225 willow stakes along 250 ft of McKenley Hollow Creek. Also utilized custom seed mix designed by Catskill Center for restoration of native riparian plant communities. 650 linear feet treated. |
| 2013 Amy's Takeaway and Upper Esopus Rod & Gun Club | Multiple | Japanese Knotweed control sites using landscape fabric to cover and attempt to control knotweed at upstream source areas. 205 linear feet treated. |
| 2013 Moran Repair | Olive | Repaired buffer planting damaged during Tropical Storm Irene/Lee. 400 linear feet treated. |
| 2013 Chichester Site 2 | Shandaken | Began buffer plantings on portions of the Chichester 2/3/4 restoration project. 260 linear feet treated. |

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) |
| 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) |
| Program Brochure | Guide to the Ashokan Watershed Stream Management Program | General public | Brochure completed 2011 Updated annually 2012-2013 |
| Action Plan | 2009-2011 Action Plan 2010 Update 2011-2013 Action Plan 2012 Update 2013-2015 Action Plan 2014-2016 Action Plan | Project partners, municipal officials, applicants for funding, interested members of the public, FAD regulators | Updated annually; moved to calendar year in 2014 |
| Website and Facebook | www.ashokanstreams.org www.facebook.com/AWSMPULster | General public | 2011 Website published 2013 Website redesign Updated weekly |
| Press Releases and Media | Per Project | General public | 2011 (6) |
| Email News Alerts | Various | Streamside landowners, municipal officials and project partners. | Annually 2011-2013 |
| Conferences and Training Programs | | | |
| Type | Title | Audience | Status |
| Annual Watershed Conference | | Watershed residents, municipal officials, and project partners | Conferences held in 2010, 2011, 2012, and 2013 |
| Research Symposium | Catskill Environmental Research and Monitoring (CERM) | Researchers, resource managers, project partners, interested members of the public | CERM conference held in 2010 and 2012 |
| 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) Hydraulic Analysis Training (2013) | Highway and DPW staff, stream managers, contractors, and program staff | Held 2009-2012 |
| Floodplain Management Trainings | Annual NYS Floodplain and Stormwater Manager's Conference Certified Floodplain Manager Training and Exam FEMA Community Rating System Training NFIP Educational Session (2013) | Code enforcement officers, planning board members, town board members, and program staff | Annually 2010-2013 |
| Contractor Trainings | Post-Flood Emergency Stream Intervention (2012) | Local contractors, highway department staff, and project | Offered 2012 |

| | | | |
|---|---|---|---|
| | | partners | |
| Landowner Workshops | Native Plant Training (2009, 2010) Raingarden Training (2011) Stream Erosion Class (2011) | Streamside landowners | Offered 2009-2011 |
| Public Programs | | | |
| Type | Title | Audience | Status |
| Volunteer Events | Knotweed Pulls (2009, 2010) Stream Clean-Up (2010, 2011, 2012) Family, Fun & Fish Day (2011, 2012) Master Watershed Steward (2012) | General public, streamside landowners | Held 2009-2013 |
| Volunteer Buffer Plantings | Various locations | General public, streamside landowners, students/interns | Annually 2010-2013 2010 (2 plantings) |
| Booths and Displays | Shandaken Day Olive Day Woodstock Library Day Ulster County Creek Week Ashokan Hoots Ulster County Fair Ashokan Watershed Conference Emerson Festival | General public, streamside landowners | Annually 2009-2013 |
| Public Meetings | Town Board Meetings; Other Meetings Elected Officials | Municipal officials | Annual presentations to Town Board of Shandaken, Olive, Woodstock, Hunter 2009-2012; meeting 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) | General public | Annually, as available |
| Youth Education | | | |
| Type | Title | Audience | Status |
| Presentations and Trainings | 4-H Stream Team Stream Table Demo (2013) CCE Centennial Celebration Stream Table Demo (2013) Bennett Elementary Earth Day (2011-2013) | Youth multiple ages | Annually, as available |
| After-School Activities and Classroom Education | | | |

PROGRAM COORDINATION

| | | | |
|---|--|--|-----------------------|
| Program Coordination | | | |
| Type | Purpose | Audience | Status |
| Stakeholder Council (formerly the Advisory) | To provide overall guidance and oversight to the program | Project partners, municipal officials, streamside landowners and other | Meeting 3-4x per year |

| | | | |
|--|---|---|--|
| Council) | | community members | |
| 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 |
| Catskill Center for Conservation and Development | Catskill Kiosk Panel Project | AWSMP-2010-12 | 5,000.00 | Complete | Interpretive 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. |
| UC Soil And Water Cons. District | Rosgen Level 2 - UC SWCD | AWSMP-2010-2 | 2,235.00 | 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 Cornell Coop. Extension | Cornell Local Roads Program, Roadside Drainage Class for Highway Staff | AWSMP-2010-23 | 874.00 | Complete | Training for Ashokan Watershed Highway Departments on ditch and culvert best management practices. |
| UC Soil And Water Cons. District | Rosgen Level 3 - UC SWCD | AWSMP-2010-3 | 4,097.00 | 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 | 925.00 | 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. |
| UC Soil And Water Cons. District | Rosgen Level 4 - UC SWCD | AWSMP-2010-51 | 5,000.00 | 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. |
| Bennett Elementary School | Watershed Detectives Program | AWSMP-2011-1 | 4,500.00 | 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 Dept. of Public Works | Rosgen Level 1 - UC DPW | AWSMP-2011-52 | 3,000.00 | 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 | 2,447.71 | Complete | Provide five scholarships for Town Floodplain Law administrators to attend the NYS Watershed Association Conference |
| Infrastructure | | | | | |
| Organization | Proposal Title | Proposal Number | Amount | Status | Purpose of Grant |
| UC Soil and Water Cons. District | Bradkin Road Culvert Replacement | AWSMP-2010-31 | 107,479.81 | Complete | Replace undersized culvert that was washed out in Oct 2010 flood with appropriately sized culvert. |
| Ulster County Cornell Coop. Extension | Raingarden Project | AWSMP-2010-25 | 43.00 | Complete | Construct a demonstration rain garden in an appropriate site in the Ashokan Watershed. Demonstrate that through proper landscaping, areas can be used to intercept rainwater and slow down its passage through the soil to prevent it from becoming run-off. Built with only native plants. |
| UC Highways And Bridges, DPW | Woodland Valley at Fawn Hill | AWSMP-2010-41 | 35,075.00 | 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 Hwy Dept. | Van Hoagland Road Bridge Replacement | AWSMP-2011-29 | 200,000.00 | Complete | Extend Van Hoagland Bridge by 20' to remove hydraulic constriction. |
| Town of Woodstock Hwy Dept. | Van Hoagland Bridge Hydraulic Study | AWSMP-2011-57 | 5,000.00 | Complete | Engineering services to conduct a hydraulic analysis prior to replacing the Van Hoagland Bridge. |

| Planning | | | | | |
|---------------------------------------|--|-----------------|-----------|----------|---|
| Organization | Proposal Title | Proposal Number | Amount | Status | Purpose of Grant |
| Town of Woodstock | Habitat Mapping for the Town of Woodstock | AWSMP-2010-24 | 29,000.00 | 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 aide the town with Planning, development and conservation decisions. |
| RCAP Solutions Community Resources | SAFARI Coordination with Mitigation Plan | AWSMP-2011-34 | 10,000.00 | 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 | 32,770.80 | 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 | 92,500.00 | 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 |
| USGS Aquatic | Quantitative Assessment of Water Quality in the Upper Esopus Creek | AWSMP-2010-10 | 27,080.00 | 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 | 38,037.00 | Complete | Conduct geological mapping in the Ashokan Watershed area. |
| Ulster County Cornell Coop. Extension | Trimble | AWSMP-2010-14 | 8,375.00 | 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 | 79,700.00 | 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 | 86,800.00 | 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 | 90,990.00 | Complete | Study of water quality on the Upper Esopus Creek. Conducted 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 | 4,984.00 | Complete | A research project on investigating the causes of the invasive algae didymosphenia geminate, "didymo" (colloquially known as "rock snot"). In particular this project sought to find the causes of algae blooms in streams infested with didymo and whether certain factors such as climate, land use, water chemistry or hydrology play a role in the growth and spread of didymo. Funds were used to purchase field supplies for experimentation and sampling and decontamination equipment. |
| USGS Aquatic | Use of Telemetry to Assess Effects of Shandaken Tunnel on Trout | AWSMP-2010-9 | 8,159.00 | 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 | 5,000.00 | Complete | Study the effects of suspended sediment on Warner Creek including ecological function and geomorphic condition. Hire a certified bio-assessment professional. |
| SUNY New Paltz | Didymo in Esopus Creek: Identification of Bloom | AWSMP-2011-60 | 7,400.00 | Complete | Study of 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 dydmo. |
| Restoration | | | | | |
| Organization | Proposal Title | Proposal Number | Amount | Status | Purpose of Grant |
| Town of Woodstock Hwy Dept. | Beaverkill Channel Protection | AWSMP-2011-16 | 5,700.00 | 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 which leads in behind the Van Hoagland Bridge. Repair a stacked rock wall constructed in the void on both sides of the stream and channel and fill of cobble for the center of the stream. |
| Town of Shandaken Hwy Dept | Stony Clove at Phoenicia | AWSMP-2011-18 | 234,000.00 | Complete | Implement a stream restoration project to reduce Phoenicia flooding from the Stony Clove. |

Appendix A: Completed Projects | 2014-2016

| | | | | | |
|-------------------------------------|---|---------------|------------|----------|--|
| UC Soil And Water Cons. District | Stony Clove at Chichester Site 1 | AWSMP-2011-21 | 431,337.00 | Complete | Implement a stream restoration project to improve channel stability and water quality on the Stony Clove Creek (Chichester #1). |
| UC DPW | Maltby Hollow Brook Restoration - Post Irene | AWSMP-2011-66 | 10,474.65 | 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 the Maltby Hollow Brook at the described location. The county will also armor the banks of the stream either with rocks placed at a 3:1 slop or by using the root wads of the fallen trees. |

DELAWARE COUNTY STREAM CORRIDOR MANAGEMENT PROGRAM

TWO-YEAR ACTION PLAN FOR THE EAST BRANCH DELAWARE RIVER
(PEPACTON RESERVOIR BASIN)



Floodplain enhancement at Vly Creek and Emory Brook in Fleischmanns

May 2014 - April 2016

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Develop a Process for Updating the EBDR Stream Corridor Management Plan

Introduction:

A comprehensive Stream Corridor Management Plan (SCMP) for 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 (NYC DEP), and Delaware County Planning Department (DCPD). In this Action Plan, DCSWCD and NYCDEP continue with the implementation phase of the local Stream Corridor Management Plan's (SCMP) 19 recommendations. This Two-Year Action Plan for the East Branch Delaware River outlines certain action items that are pertinent to the implementation of the SCMP recommendations and the overall program development.

Throughout the development of the East Branch Delaware SCMP, a Project Advisory Committee (PAC) was formed to represent the interests of local officials, residents, businesses, and agencies living and working in the NYC watershed. The PAC assisted in the development of the SCMP recommendations and is now working collaboratively to guide the Stream Corridor Management Program in the implementation of the SCMP recommendations. The PAC provides review and comment on program development and projects to the SCMP and the DCSWCD board. The PAC is further broken down into four sub-committees: Fisheries and Recreation, Education and Outreach, Highway Infrastructure, and Floodplain Management. These sub-committee contribute their expertise to the relevant recommendations of the SCMP.

Summary of Program Status:

In response to Tropical Storms Irene and Lee, DCSWCD, DCPD and DEP have committed resources aiding EBDR communities to recover from the flood and build greater resiliency to future flood events. This is evident in the action items of this plan, in particular its support for flood hazard mitigation planning, flood recovery projects under the Emergency Watershed Protection program, floodplain mapping and continuation of flood response training. Additionally, the program has begun to implement the Local Flood Hazard Analysis (LFA), a component of the overall Local Flood Hazard Mitigation Program.

Delaware Watershed Stream Management Implementation Grant

The Delaware Watershed Stream Management Implementation Grant Program is available to fund construction projects and programs within the NYC water supply watersheds for the implementation of the recommendations and the SCMP 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. This program is the Delaware basin version of the FAD required Stream Management Implementation grant Program (SMIP).

Stream Corridor Management Program (SCMPr)

Stream Corridor Management Program shall consist of all partnering agencies, such as the Delaware County Soil and Water Conservation District, New York City Department of Environmental Protection and Delaware County Planning Department.

Catskill Stream Buffer Initiative (CSBI) Funding

Catskill Stream Buffer Initiative (CSBI) will work with local streamside landowners to provide assistance to enhance and maintain riparian buffers. Technical assistance from staff members can include; landowner consultation, landowner riparian operation and maintenance plans, and vegetative plantings to establish riparian buffers.

Demonstration Project Funds

Demonstration projects provide significant opportunities to design, build, and monitor cutting-edge stream management techniques. These projects make use of fluvial geomorphic principles and may involve complete reconstruction.

Conservation Resource Enhancement Program (CREP) Funds

Provide assistance for the implementation of Conservation Resource Enhancement Program (CREP) in areas that are currently not eligible under the Program's guidelines.

Local Flood Analysis Funds

Provide assistance for communities to define specific flood hazards and options for mitigating those hazards. Once potential projects are identified through the analysis, work with communities to secure funding for and implement the mitigation projects.

Recommendation 1: Scientifically-Based Post-Flood Emergency Stream Intervention

The SCMPr should work cooperatively with the NYCDEP and the Project Advisory Committee to improve immediate post-flood emergency intervention capabilities by demonstrating and training contractors and local municipalities in scientifically-based stream principles, procedures and methods.

Action Items:

1. Provide 4-hour update of Post-Flood Emergency Stream Intervention training to contractors, local municipalities, and agencies.
 - May 2014 – December 2016 Workshop, SCMPr Staff, NYC DEP Project Managers
2. Continue to provide technical assistance to municipalities with emergency stream intervention measures during flood recovery.
 - May 2014 – April 2016 SCMPr Staff

Recommendation 2: Provide Technical Assistance To Local Highway Departments

The SCMP_r, in cooperation with the Delaware County Department of Public Works (DCDPW) and the NYCDEP, should enhance communication with local highway departments. These efforts should be developed and implemented in cooperation with the PAC and the DCPD, and utilize Catskill Watershed Corporation (CWC) program funds for stormwater retrofits and other practices as appropriate.

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 Grant Program.
 - May 2014 – October 2015 DCDPW, SCMP_r Staff
2. Provide technical assistance and educational support to municipalities for sizing and the design of routine culvert replacements.
 - May 2014 – April 2016 SCMP_r Staff, DCDPW
3. Enable municipalities to apply for funding through the grants program for infrastructure projects causing stream instability and/or water quality issues.
 - May 2014 – April 2016 SCMP_r Staff, DCDPW
4. Attend regular meetings of Municipal Highway Superintendents and keep them up to date on status of SWCD projects, training opportunities and flood recovery efforts.
 - May 2014 – April 2016 SCMP_r Project Coordinator

5. Advise and assist 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.
 - May 2014 – April 2016 SCMP Staff, DCPD, DCDPW and EBDR communities
6. Provide technical assistance to EBDR community highway departments and DCDPW by reviewing potential stream crossings including ;large culverts and bridges.
 - May 2014 – April 2016 SCMP Staff, DCDPW and EBDR communities
7. Continue to support best management practices for construction of stream crossings through the SMIP Grant Program by allowing the acquisition of necessary equipment (i.e. dewatering pumps, hydro-seeder, etc.)
 - May 2014 – April 2016 SCMP Staff, DCPD, DCDPW and PAC

Recommendation 3: Implement the Streamside Assistance Program (renamed Catskill Streams Buffer Initiative)

The SCMP_r should implement the Streamside Assistance Program as defined in the 2007 Filtration Avoidance Determination. This effort should be developed and implemented in cooperation with the PAC.

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.
 - May 2014 – April 2016 SCMP_r Staff, NYC DEP CSBI Coordinator
2. Continue to update and enhance the protocol for prioritizing the implementation of the Catskill Streams Buffer Initiative.
 - May 2014 – April 2014 SCMP_r Coordinator, DCSWCD CSBI Coordinator, NYC DEP CSBI Coordinator
3. Development of a minimum of 5 Riparian Corridor Management Plans (RCMP) per year (between the EBDR and WBDR).
 - June 2014 – June 2016 DCSWCD CSBI Coordinator, DCSWCD SCMP_r Staff,
4. Implement a minimum of 3 Riparian Corridor Management Plans per year by means of contractual planting services. Implement 1 demonstration or educational riparian Corridor Management Plan per year by means of volunteer plantings or landowner plantings.
 - June 2014 – June 2016 DCSWCD CSBI Coordinator
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.

- June 2014 – June 2016 DCSWCD CSBI Coordinator
6. Secure landowner license and maintenance agreements for long-term access by DCSWCD and NYCDEP to facilitate ongoing maintenance and monitoring.
 - June 2014 – June 2016 DCSWCD CSBI Coordinator
 7. Develop planting plans as requested for applicable Stream Program projects in coordination with Stream Program staff.
 - June 2014 – June 2016 DCSWCD SCMP Staff and DCSWCD CSBI Coordinator
 8. Develop and implement a monitoring program for riparian buffer projects to identify project success and effectiveness.
 - June 2014 – June 2016 DCSWCD CSBI Coordinator, NYC DEP CSBI Coordinator
 9. Develop local resources to maintain availability of native vegetation planting stock as needed.
 - June 2014 – June 2016 DCSWCD CSBI Coordinator

Recommendation 4: Continue with and Enhance Education and Outreach Efforts

The SCMP_r should coordinate with the NYCDEP and the PAC to better inform and educate all stakeholders regarding stream stewardship, the importance of floodplain function, stream processes, and the importance of streamside vegetation. Education and outreach efforts should be developed and implemented in cooperation with the PAC, with cooperation from the Catskill Watershed Corporation's (CWC) Education Program.

Action Items:

1. Fund and implement education and outreach activities identified and prioritized by the Project Advisory Committee Education and Outreach sub-committee.
 - May 2014 – April 2016 PAC, SCMP_r 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 participation in East Branch Delaware Flood Commission, the Map Steering Committees supporting the refinement and use of flood insurance rate maps (FIRMs) and other State/Federal programs.
 - May 2014 – April 2016 DCPD Staff, SCMP_r Staff, NYSDEC
3. Work with EBDR 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 EBDR area schools and with you the groups.
 - May 2014 – April 2016 SCMP_r Staff, DCPD staff, NYCDEP, CWC, BOCES and EBDR area schools

4. 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.
 - May 2014 – April 2016 SCMP Staff, DCPD staff and NYCDEP

Recommendation 5: Provide Annual Floodplain Development Permit Training for Municipal Officials

The SCMP, in cooperation with the NYSDEC, NYCDEP, DCPD and PAC should work toward providing annual Floodplain Development Permit training for local municipal officials.

Action Items:

1. Provide opportunity for annual floodplain development permit training for local municipal officials.
 - May 2014 – April 2016 PAC, SCMP Staff, NYC DEP, NYS DEC
2. Development opportunity for Municipal Officials to obtain credits for participating in educational activities.
 - May 2014 - April 2016 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.
 - May 2014 –April 2016 DEC, FEMA, ASFM, NYSAFSM

Recommendation 6: Enhance Local Land Use Laws and Ordinances

The SCMP, in cooperation with the DCPD, NYCDEP, PAC and other interested stakeholders, should work toward including a stream management component in local Comprehensive Plans, local laws and local management practices as may be appropriate.

Action Items:

1. Provide assistance to local municipalities in development of stream components in local comprehensive plans, local laws and local management practices.
 - May 2014 – April 2016 PAC, DCPD, SCMP Staff, NYC DEP
2. Provide technical assistance to local municipalities to enhance local laws and local management practices.
 - May 2014 – April 2016 PAC, DCPD, SCMP Staff, NYC DEP
3. Continue to provide technical review assistance to local planning and town boards when working on projects that include streams, culverts or floodplain infringements.
 - May 2014 – April 2016 DCPD, SCMP Staff

Recommendation 7: Adopt Principles of Stream Stewardship at the Municipal Level

Local legislative boards should incorporate principles of stream stewardship into the creation and/or revision of their town or village comprehensive plans and local land use regulations.

Action Items:

1. Adoption completed for the following:

Towns:

Andes, Bovina, Halcott, Hamden, Hardenburg, Middletown, Roxbury

Villages:

Margaretville, Fleischmanns

2. Promote and secure adoption and extension of MOUs within EBDR communities
 - May 2014 – April 2016 DCPD, SCMPR Staff
3. Encourage municipalities to continue to develop good stream stewardship in their local comprehensive plans and land use regulations.
 - May 2014 – April 2016 DCPD, SCMPR Staff, NYC DEP
4. Encourage municipalities to continue to participate in the PAC and Sub-committees.
 - May 2014 – April 2016 SCMPR Staff, NYC DEP, DCPD

Recommendation 8: Streamline Stream Work Permitting

The Stream Corridor Management Program (SCMP_r) proposes that the permitting process for stream work be simplified and streamlined. It is proposed that an interagency working group composed of representatives from the New York State Department of Environmental Conservation, U.S. Army Corps of Engineers, Delaware County Soil & Water Conservation District (DCSWCD), New York City Department of Environmental Protection, neighboring Soil & Water Conservation Districts, Delaware County Department of Public Works (DCDPW) and local community leaders identify ways to delegate, simplify and streamline the permitting process for the benefit of all agencies and stakeholders.

Action Items:

1. Work in cooperation with NYSDEC, US Army Corps of Engineers, NYC DEP, and DCDPW to enhance the authority thresholds of the DCSWCD General Permit as delegated by the NYSDEC for approved stream management practices within the County.
 - 2014 – 2016 SCMP_r Staff, NYCDEP RRE and SMP staff, US Corps of Engineers, DCDPW

Recommendation 9: Selective Stream Gravel Management

The SCMP, NYCDEP, and the Delaware County Department of Watershed Affairs should work with the NYSDEC and U.S. Army Corps of Engineers to identify and fund an independent stream scientist or engineer to create a guidance document with recommendations on how, when and where to scientifically manage problematic gravel deposits within the East Branch Delaware River system. Such a document might require a study. In this interim, the Delaware County SCMP Draft Stream Maintenance Protocol would be employed.

Action Items:

- Scientifically study a sub watershed in the East Branch Basin to develop regional sediment discharge rating curve that can be used for
 - Characterizing the current sediment transport conditions and evaluate the sediment transport capacity of the system.
 - Develop dimensionless sediment discharge rating curves for use throughout the region.
- May 2014 – April 2016 SCMP Staff, NYCDEP
- Develop and implement an education 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.
 - May 2014 – April 2016 SCMP Staff

- Encourage one or two municipalities to apply for grant funding through the SCMP_r to scientifically study stream reaches with identified gravel deposition issues for potential case studies to be used in Item 1.
 - May 2014 – April 2016 SCMP_r Staff
- Design and implement two demonstration projects that utilize the existing gravel management protocol developed by the SCMP_r.
 - May 2014 – April 2016 SCMP_r Staff
- Develop a Delaware County protocol for municipalities to manage woody debris in stream systems.
 - May 2014 – April 2016 DCSWCD SCMP_r Coordinator, NYC DEP Project Manager, DCDPW
- Undertake a periodic review of the gravel maintenance protocol developed by the SCMP_r.
 - May 2014 – April 2016 SCMP_r Staff, NYC DEP Staff

Recommendation 10: Provide Assistance to Community Watershed Groups/Associations and Government Entities

The SCMP, working with the PAC and NYCDEP, should provide technical assistance and general direction to community watershed groups/associations and government entities that are actively engaged in grassroots stream stewardship/management activities.

Action Items:

1. Provide technical assistance and general direction to community watershed groups/association and government entities.
 - May 2014 – April 2016 DCPD, SCMP staff, NYC DEP
2. Provide technical assistance and support to East Branch Delaware River Flood Commission.
 - May 2014 – April 2016 SCMP staff, NYC DEP, DCPD

Recommendation 11: Participation with the Delaware County Action Plan (DCAP)

The Stream Corridor Management Program will continue to work closely with all DCAP participants to integrate the East Branch Delaware River Stream Corridor Management Plan and its recommendations into all relevant components of the Delaware County Action Plan.

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.
 - May 2014 – April 2016 DCPD Director, DCSWCD Executive Director, SCMPr Coordinator

Recommendation 12: Debris Management

The SCMP_r should cooperate with the Project Advisory Committee, Delaware County Solid Waste Coordinator and NYCDEP to develop a protocol for inventorying floodplain debris and assist municipalities and communities with developing appropriate action plans for debris management.

Action Items:

1. Develop a Delaware County protocol for municipalities to manage woody debris in stream systems.
 - May 2014 – April 2016 DCSWCD SCMP_r Coordinator, NYC DEP Project Manager, DCDPW
2. Design and implement two demonstration projects that utilize the woody debris protocol developed by the SCMP_r.
 - May 2014 – April 2016 SCMP_r Staff
3. Undertake a periodic review of the woody debris protocol developed by the SCMP_r.
 - May 2014 – April 2016 SCMP_r Staff, NYC DEP Staff

Recommendation 13: Prioritization of Identified Stream Intervention Projects

The SCMP, working with the PAC and NYCDEP, should prioritize potential restoration reaches, including the type and level of intervention needed.

Action Items:

1. Design and implement approved grant projects and programs within the East Branch of the Delaware River.
 - May 2014 – April 2016 SCMP Staff
 - Projects:
 - i. Little Dingle Hill Stream Stabilization
 - ii. Holiday Brook Stream Stabilization
 - iii. Gulf Road Stream Stabilization
 - iv. Briggs Road Stream Stabilization
 - Programs:
 - i. Ballentine Park Master Plan
 - ii. Fleischmanns Local Flood Analysis
 - iii. Middletown Local Flood Analysis
2. Design and construct the following restoration projects:
 - May 2014 - April 2016 SCMP Staff
 - i. Floodplain Restoration Project on the Vly Creek at Mill Street in Fleischmanns (EWP Site 4)

Recommendation 14: Enhancement of East Branch Watershed Fisheries

The SCMP, in cooperation with the NYSDEC, the NYCDEP, and the PAC, should provide support to local grass-roots efforts, watershed associations, and fisheries organizations to enhance existing fisheries in the East Branch Delaware River watershed.

Action Items:

1. Provide technical assistance and general direction to local grass-roots efforts, watershed associations and fisheries organizations to enhance existing fisheries.
 - May 2014 – April 2016 DCPD, SCMP staff, NYC DEP
2. Continue to work with the East Branch Recreation and Fisheries in the development and implementation of the recreation management plan.
 - May 2014 – April 2016 DCPD, SCMP staff, NYC DEP
3. Encourage groups to work with municipalities to apply for funding through the grants program for high priority critical impacted fishing areas that are improperly sized or aligned and causing stream instability and/or water quality issues.
 - May 2014 – April 2016 SCMP Staff, DCPD, NYC DEP, PAC

Recommendation 15: Enhance Recreation Opportunities

The SCMP, in cooperation with the PAC and NYCDEP, should assist communities to enhance streamside recreational opportunities where possible. These efforts should be developed and implemented in cooperation with the PAC and with assistance with the DCPD.

Action Items:

1. Provide technical assistance to communities to enhance streamside recreational opportunities.
 - May 2014 – April 2016 DCPD, SCMP staff, NYC DEP
2. Work in collaboration with municipalities in the Towns of Roxbury, Middletown, Andes and Villages of Margaretville and Fleischmanns, the Central Catskills Chamber of Commerce and the East Branch Recreation and Fisheries sub-committee to implement the East Branch Enhanced Recreational Access Plan. Together, support programs and create events to advance education and awareness of the importance of stream stewardship and expand access and promote enjoyment of the streams of the East Branch Delaware watershed.
 - May 2014 – April 2016 DCPD, SCMP staff, NYC DEP
3. Work with the Delaware County Chamber of Commerce and the Central Catskills Chamber of Commerce to partner with the CWC and the NYCDEP on activities, programs and initiatives to promote recreational fishing and boating on the Pepacton Reservoir. Developing appropriate events such as sponsored fishing days, boating safety and fishing safety courses, and encouragement of kayak and canoe group events will increase use and expand opportunities for area businesses and vendors. .
 - May 2014 – April 2016 SCMP Staff, DCPD, NYC DEP, EBDR Recreation and Fisheries sub-committee, CWC, DC Chamber of Commerce

Recommendation 16: Invasive Species Management

The SCMP, in cooperation with NYCDEP, PAC, TNC, Catskill Region Invasive Species Partnership (CRISP), and other interested stakeholders, should continue its involvement with invasive species management, following and promoting all invasive plant programs in the East Branch watershed. These efforts should be developed and implemented in cooperation with the PAC.

Action Items:

1. Continue to work collaboratively with Delaware County Solid Waste Facility to compost Japanese Knotweed.
 - May 2014– April 2016 SCMP staff, DCDPW
2. Continue to participate in CRISP
 - May 2014– April 2016 SCMP staff, DCPD

Recommendation 17: Flood Hazard Mitigation and Flood Response and Recovery

The SCMP should continue to work with the Delaware County Planning Department and Emergency Services to implement the county-wide, multi-jurisdictional, All-Hazards Mitigation Plan. The SCMP should continue to work with the Delaware County Board of Supervisors, the NYCDEP, the NYSDEC, and the State Emergency Management Office (SEMO) to revise the FEMA flood study and floodplain maps.

Action Items:

1. Provide documentation of completed flood hazard mitigation projects to the Hazard Mitigation Coordinator.
 - May 2014 – April 2016 SCMP Staff
2. Provide assistance as requested by the Director of Emergency Services to the Emergency Operations Center during flood related events.
 - May 2014 – April 2016 SCMP Staff
3. Develop a list of historic problem areas where streams impact infrastructure during flood events and correlate to stream gage stage heights.
 - May 2014 – April 2016 SCMP Staff
4. Work with communities to understand, utilize and revise (FEMA) floodplain maps.
 - May 2014 – April 2016 DCPD, NYC DEP Project Manager, NYSDEC, FEMA

5. 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.
 - May 2014 – April 2016 DCPD, SCMPR Staff
6. Provide technical assistance to municipalities with emergency stream intervention measures during flood recovery.
 - May 2014 – April 2016 SCMPR Staff
7. Continue to support USGS efforts to create inundation mapping throughout the basin.
 - May 2014 – April 2016 DCPD, SCMPR Staff
8. Work to create a new educational program that promotes a better understanding of meteorology, stream gages and other assessment tools throughout the East Branch Basin schools to better understand and model stream flows and assist with supporting grant application for schools to utilize existing and/or purchase stream gages and rain fall gages to better model the hydrology in the basin.
 - May 2014 – April 2016 DCPD, SCMPR Staff
9. Facilitate and support scientific flood modeling studies throughout the East Branch basin
 - May 2014 – April 2016 SCMPR staff, DEP
 - Continue to promote, support and give technical assistance to the East Branch Flood Commission in the Town of Middletown and The Village of Fleischmanns Local Flood Analysis
 - Continue to promote, support and give technical assistance to the NY Rising Community Reconstruction program in the Village of Margaretville
 - Prepare a prioritization plan and schedule for implementing LFA in other EBDR population centers
10. Design and implement flood mitigation practices including, but not limited, to floodplain reclamation, scientific channel dimensioning, and natural stream design techniques throughout the East Branch basin.
 - May 2014 – April 2016 SCMPR Staff, DEP

Recommendation 18: Utilize Existing Funding Sources

The SCMPr should cooperate with the NYCDEP to explore opportunities for existing funding sources to enable implementation of recommendations identified in this Stream Corridor Management Plan.

Action Items:

1. Continue to explore opportunities for utilizing existing funding sources to implement recommendations.
 - May 2014 – April 2016 DCSWCD SCMPr Coordinator

Recommendation 19: Develop a Process for Updating the East Branch Delaware River Stream Corridor Management Plan

In cooperation with the PAC and the NYCDEP, the Stream Corridor Management Program should develop a process for updating the East Branch Delaware River Stream Corridor Management Plan.

Action Items:

1. **Work with the Project Advisory Committee and its Sub-Committees to initiate a comprehensive review of The East Branch Delaware River Stream Corridor Management Plan and initiate a process to update the plan as required.**
 - **November 2013 PAC, DCPD, SCMP Staff, DEP**

RONDOUT/NEVERSINK

STREAM MANAGEMENT PROGRAM

ACTION PLAN May 2014 – APRIL 2016

Streambank Stabilization, Town of Neversink November 2013



Catskill Streams Buffer Project in Denning October 2013



Rondout and Neversink Stream Management Planning Program Action Plan 2014-2016

Executive Summary

Sullivan County Soil & Water Conservation District is currently under contract to NYC DEP to collaboratively deliver the Rondout Neversink Stream Management Planning Program through 2014. A follow-up contract for Stream Management Implementation Program grants (SMIP) is in the final stages of preparation to provide funds to implement recommendations planned in the current contract. The broad goals of this contract are to support watershed stewardship through assessment, planning, education, and stream and floodplain restoration activities. A new program area was added, post-Irene, to help communities incorporate flood hazard mitigation activities into project implementation in conjunction with the community's established stream management recommendations.

FAD deliverables completed in this contract were stream management plans for the upper Rondout and upper Neversink basins, with prioritized recommendations for the major rivers in the basin; the construction of a demonstration restoration project in each basin; and development of a streamside assistance program for landowners focused on vegetative stabilization of banks and floodplains (Catskill Streams Buffer Initiative). Additionally, non-FAD contract deliverables include educational programming; development of a Watershed Advisory Group to advise program development; and initiation of Subcommittees of this group to meet more frequently and guide project planning and coordination. A Community Flood Analysis stakeholder meeting is convening monthly, with the purpose of initiating the process of Local Flood Hazard Mitigation Analysis (LFHMA) in 2014.

To date, fifteen landowners have participated in the program to vegetate streamside buffers on their property. Many of these projects include bioengineering design components to repair and/or improve stream stability along the banks. Final restoration plantings have been completed at all demonstration projects, including those delayed by storm flows in 2011-12. A pilot SMIP grant was awarded to the Town of Denning in 2013 to replace an old, undersized bridge believed to be the culprit of extensive flooding in roadways and homes in the center of the town population center at the site of the Claryville Fire Department.

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 was provided to Ulster County DPW for the safe reconstruction of County Road 47; and to Frost Valley YMCA for a bridge replacement on Biscuit Brook. In addition, the Rondout Neversink Stream Program has supported a grant application by Northeast Regional Office of Trout Unlimited to complete a detailed assessment of road culverts on the Neversink River with the intention of providing hydraulics analysis and conceptual design for replacement designs on priority locations for proper fish passage.

A Stream Management Implementation Program (SMIP) will commence in late 2014, following the recent 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 has begun meeting in subcommittees for Highways & Infrastructure and Education to initiate its direction under the current contract. 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

6.5.4 Habitat Improvement Project

Year 1: 2014-2015

Watershed Advisory Group meetings April & December to review the Action Plan through 2015 and to report on annual accomplishments. Initiate grants program by releasing Education grant applications in September. Committee meets monthly to shepherd and coordinate with Towns to support their Community Flood Analysis (LFHMA) through RFP to engineering firms for 3 population centers. Initiate quarterly E-News; bi-annual print news. LFHMA Committee meets monthly. Distribute Chestnut summary plan for Town adoption including neighborhood meeting on Chestnut Creek Management Units; Bi-monthly meetings of Highways & Infrastructure Subcommittee. Convene fisheries landowners to identify priority recommendations for research. Engineer contracted for flood analysis. Release SMIP grant applications. Bi-annual meetings of Education Subcommittee. Annual Report print newsletter.

Year 2: 2015-2016

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: 2014-2015

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). Rondout and Neversink Demo project will be monitored during establishment period. BEHI Surveys and reference reach survey; tributary stream feature inventory
May-October: Japanese Knotweed monitoring suppression plan in coordination with CRISP (Catskill Region Invasive Species Partnership).

Year 2: 2015-2016

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: Demonstration Projects

Demonstration tasks address these General Recommendations:

6.1.3 Debris Management

6.1.8 Public Lands

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

Year 1: 2014-2015

Support critical area seeding as requested by Towns. Adjustments made to Demo projects as needed during their establishment period. Identify projects for 2015 construction season through grant applications from Towns and initial surveys of flood hazard mitigation analysis. An annual cycle of funding and implementation of stream management projects in the Rondout & Neversink Basins will evolve with execution of the successor contract. Monitoring of the Rondout and Neversink demonstration projects will continue throughout the establishment period.

Year 2: 2015-2016

This category will be re-named from "Demonstration" to "Restoration Projects." Through the SMIP grants cycle, projects will be identified, designed and constructed based on the activities of the sub-Committees of the program, and applications by Towns.

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

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

Year 1: 2014-2015

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 2014 and spring 2015.

Outreach for the recruitment of CSBI grant applicants will continue to take place year round through a variety of forums. Grant applications will be received by June 1st for implementation in the Fall of 2014, and November 1st for implementation in Spring 2015, 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 suppression strategy for suppression of target species will be developed and implemented in the fall of 2014. Existing native willow (*salix* spp.) planting beds will be expanded on NYC DEP land; expanded permissions will be pursued for willow harvesting on private lands. A seasonal field intern may be hired in fall for assistance during CSBI project implementation.

Year 2: 2015-2016

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 2015 and spring 2016. CSBI will also offer full planting support to the pilot stream restoration projects that result from projects initiated by the grants program for Highways and Infrastructure.

Outreach for the recruitment of CSBI grant applicants will continue to take place year round through a variety of forums. Grant applications will be 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; 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 will be pursued, expanded permissions for willow harvesting on private lands will continue to be pursued.

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: 2014-2015

An E-news format will be mailed quarterly to landowners and partners. An annual report to document yearly accomplishments (electronic) is scheduled for December. Initial outreach will be conducted for a Research Subcommittee. Focus will be on orientation and training for the Denning Neversink Community Flood Analysis Committee to gain the skills and information required to direct the LFHMA process. Stream Program Coordinator participates in Inter-basin Education and Outreach quarterly meetings and new program initiatives such as LFHMA. Program staff will attend Rosgen training Level 3 to increase knowledge in natural stream processes. Arm of the Sea Theater performance of Rejuvenary River Circus at Tri Valley CS. Presentations on Hydraulics, Flood Mapping, and Benefit/Cost Analysis by MMI to Committee and community members. Hemlock Woolly Adelgid Informational Woodswalk (CRISP) for Invasive Species Week in July. Fisheries Roundtable for Landowners, August. In September, release applicant packet for Round 1 Education SMIP Grants; September: Ulster County Creek Week Stream History Tour. Initiate public search engine tool with Google to make Stream Feature Inventory and Stream Management Plan recommendations data available online.

Year 2: 2015-2016

Bi-annual newsletters 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. Execute the sharing of Stream Feature Inventory data on Google's public search engine format; add crowdsourcing of photos.

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)

Emily Smith, Seasonal Field Intern

Brenden Wagner, Riparian Field Technician

John Kline, Les Kirby (Liberty Office)

NYC DEP Stream Management Program:

Mark Vian, Rondout / Neversink Basin Project Manager

| Rondout Neversink Stream Management Program - Action Plan 2014-2015 | | | | | | |
|---|---|---|--|--|--|--|
| | May 2014 | June 2014 | July 2014 | August 2014 | September 2014 | October 2014 |
| Stream Management Plans | Finalize Annual Action Plan Googlemaps Public Data Planning Meeting Highways & Infrastructure Committee Meeting | Distribute Chestnut Creek SMP | | Highways & Infrastructure Committee Meeting Post-Flood Channel Geometry Guide Chestnut Creek SMP Summary | Prioritize Bank Erosion Sites Release SMIP Grant Applications for 2015 Chestnut Creek SMP for Town Adoption | |
| Assessment | BEHI (Bank Erosion Hazard Index) Surveys Initiate Suspended Sediment Loading Study | Stream Feature Inventory/Tribs Reference Reach Surveys | Stream Feature Inventory/Tribs Reference Reach Surveys | Stream Feature Inventory/Tribs Reference Reach Surveys | Stream Feature Inventory/Tribs Reference Reach Surveys | Field Data Processing |
| Restoration Projects | Restoration Project Monitoring West Branch Neversink Demo As-Built Survey Hydroseeding with Town/County DPW | Japanese Knotweed Monitoring | | | Japanese Knotweed Suppression | 2015 Restoration Project Selection Contract w/ Restoration Designer Stinger Demonstration Planting |
| CSBI | Install CSBI spring implementation Fall CSBI project planning | CSBI Project Monitoring | | Complete RCMPs for fall project landowners | | CSBI fall implementation Plant delivery & inventory |
| Local Flood Analysis | LFA Committee Meeting Release RFP for Flood Analysis Claryville | LFA Committee Meeting Select Contractor | LFA Committee Meeting Contract for LFA? (budget-contingent) | LFA Committee Meeting Phase 1 LFA | LFA Committee Meeting Phase 1 LFA Labor Day Community Mtg? (Flood photos intake) | LFA Committee Meeting Phase 1 LFA |
| Education & Outreach | Japanese Knotweed Prevention Ulster Co DPW CSBI Landowner Ads Mail E-News #2 | Googlemaps Public Data Planning Meeting | Landowner Comments on Chestnut SMP Japanese Knotweed Landowner Notification Mail E-News #3/Print Newsletter #3 Hemlock Woolly Adelgid Woodswalk | Landowner Comments on Chestnut SMP Fisheries Landowners Research Roundtable | Ulster Co Creek Week Stream History Tour Explore WARSS Training in Watershed Initiate projects with Tri Valley Photography class | Catskill Env Research Conference Mail E-News #4 Annual Reports for Partners: EPA, CWT |
| | November 2014 | December 2014 | January 2015 | February 2015 | March 2015 | April 2015 |
| Stream Management Plans | Education SMIP Meeting Highways & Infrastructure SMIP Meeting | Watershed Advisory Group SMIP Grants | | | | Watershed Advisory Group Meeting |
| Assessment | Data processing from summer assessments | Data processing from summer assessments | Data processing from summer assessments | Data processing from summer assessments | | |
| Restoration Projects | Schedule design/build 2015 projects Survey 2015 Restoration Project(s) | Design Report(s): Objectives, Hydrology, Geomorphology (Table 2) HEC-RAS Current Conditions Conceptual Design(s) | | Feb 15 60% design landowner consultations/agreements submit permit applications | 90% design | Final design Bid Book Publish Request for Bids Stinger Demonstration Planting |
| | Additional geomorphic data as needed to complete Table 2 | | Infrastructure Projects Development | Infrastructure Projects Development | Infrastructure Projects Development | |
| CSBI | CSBI Applications Due Nov 1 CSBI Planning for Spring 2015 | CSBI Planning for Spring 2015 | | Complete RCMPs for spring project landowners | | |
| Local Flood Analysis | LFA Committee Meeting Public Meeting? | LFA Committee Meeting Phase 2 LFA | LFA Committee Meeting Public Meeting? Select FHM Project to develop | LFA Committee Meeting FHM Project Development (design) | LFA Committee Meeting FHM Project Development (design) | LFA Committee Meeting 60% Design |
| Education & Outreach | CSBI Landowner Ads | | Mail E-News #5 Annual Report/Print Newsletter #4 Launch Googlemaps public data | | | Mail E-News #6 |

| Rondout Neversink Stream Management Program - Action Plan 2015-2016 | | | | | | |
|---|---|--|---|---|---|--|
| | May 2015 | June 2015 | July 2015 | August 2015 | September 2015 | October 2015 |
| Stream Management Plans | Finalize Action Plan 2015-2017 Watershed Advisory Group Meeting Highways & Infrastructure Meeting | | | | | |
| Assessment | BEHI (Bank Erosion Hazard Index) Surveys Suspended Sediment Loading Study | BEHI (Bank Erosion Hazard Index) Surveys Reference Reach Surveys | BEHI (Bank Erosion Hazard Index) Surveys Reference Reach Surveys | BEHI (Bank Erosion Hazard Index) Surveys Reference Reach Surveys | BEHI (Bank Erosion Hazard Index) Surveys Reference Reach Surveys | |
| Restoration Projects | Restoration Project Monitoring West Branch Neversink Demo As-Built Survey Receive Bids 2015 Restoration Project(s) Hydroseeding with Town/County DPW | Infrastructure Projects Development/Execution Contract w Contractor | Infrastructure Projects Development/Execution July 15 Start Construction | Infrastructure Projects Development/Execution Construction | Infrastructure Projects Development/Execution Construction | Planting As-built survey |
| CSBI | Install CSBI spring implementation Fall CSBI project planning | CSBI Project Monitoring | | Complete RCMPs for fall project landowners | | CSBI fall implementation Plant delivery and inventory |
| Local Flood Analysis | LFA Committee Meeting FHM Project Development (design) Landowner Agreements and Permits | LFA Committee Meeting FHM Project 90% design | LFA Committee Meeting Final Design and Bid Doc Publish RFBs | LFA Committee Meeting Select contractor | LFA Committee Meeting Construction | LFA Committee Meeting |
| Education & Outreach | CSBI Landowner Ads West Branch Neversink History Reprint | Mail E-News #7/Print Newsletter #5 Beneficial Pollinators for Streamside Landowners | Hemlock Tour/ NYS Invasive Species Week | | Ulster County Creek Week Event TBD | Mail E-News #8 Annual Reports for Partners, EPA, CWT |
| | November 2015 | December 2015 | January 2016 | February 2016 | March 2016 | April 2016 |
| Stream Management Plans | Education SMIP Meeting Highways & Infrastructure SMIP Meeting | Watershed Advisory Group SMIP Grants | Mail E-News #9 Annual Report/Print Newsletter #6 | | | |
| Assessment | Data processing from summer surveys | Data processing from summer surveys | Data processing from summer surveys | Data processing from summer surveys | | |
| Restoration Projects | 2016 Project Design Report(s): Objectives, Hydrology, Geomorphology (Table 2) HEC-RAS Current Conditions Conceptual Design(s) | | Feb 15 60% design landowner consultations/agreements submit permit applications | 90% design | Final design Bid Book Publish RFBs | |
| CSBI | CSBI Application Due Nov 1 CSBI Planning for spring 2015 | CSBI planning for spring 2015 | | Complete RCMPs for spring project landowners | | CSBI spring implementation |
| Local Flood Analysis | LFA Committee Meeting | LFA Committee Meeting | LFA Committee Meeting | LFA Committee Meeting | LFA Committee Meeting | LFA Committee Meeting |
| Education & Outreach | | | Mail E-News #9 Annual Report | | | Mail E-News #10 |

Greene County Soil & Water Conservation District
907 County Office Building, Cairo NY 12413
Phone (518) 622-3620 Fax (518) 622-0344



To: David Burns, Project Manager, NYCDEP

From: Jeff Flack, Executive Director, GCSWCD

Date: May 12, 2014

Re: Schoharie Basin Action Plan

To Whom It May Concern,

The Greene County Soil and Water Conservation District (GCSWCD) and the NYC Department of Environmental Protection (DEP) have collaborated with the Schoharie Watershed Advisory Committee (SWAC) to develop the 2014– 2016 Action Plan. The Action Plan is one piece of a three-part package that includes:

- Section 1. Executive Summary: Schoharie Basin Stream Management Program Action Plan 2014-2016,
- Section 2. Schoharie Basin Stream Management Program Action Plan 2014-2016, including project/program updates through 5/1/2014
- Section 3. Completed Action Items May 2007 through May 2013

Enclosed you will find each of these documents.

The Action Plan provides summaries of the projects and programs that GCSWCD will be leading between May 2014 and May 2016, including updates through May 1, 2014. The completed projects synopsis provides summaries of the action items that have been completed from previous Action Plans (May 2007- May 2013). The executive summary provides a brief description and the current status of action plan items from the 2014 – 2016 Action Plan, as well as completed items from May 2009 to present. The complete action plan and completed project synopsis are updated annually and revised biannually. The executive summary is a working document that is updated more frequently for the SWAC.

Section 1. Executive Summary: Schoharie Basin Stream Management Program Action Plan 2014-2016 Updated May 15, 2014

NYCDEP Stream Management Program

71 Smith Ave, Kingston NY 12401

Dave Burns, Project Manager



Greene County Soil & Water Conservation
District

907 County Office Building, Cairo NY 12413

Jeff Flack, Executive Director



Action Plan Executive Summary, 2014-2016*

* - For more information, including projects completed prior to 2009, refer to the complete action plan available at www.catskillstreams.org/majorstreams_sc.html

Action Plan Executive Summary, 2014-2016, Updated May 15, 2014

Introduction

The Schoharie Watershed Stream Management Program (SWSMP) was established in partnership with 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. In addition to supporting the FAD, many SWSMP projects also target reductions to in-stream sources of suspended sediment to partially fulfill requirements set forth in DEP’s Shandaken Tunnel State Pollution Discharge Elimination System (SPEDES) permit established in September 2006.

The following Action Plan Executive Summary summarizes the programs and projects that GCSWCD will be leading within the Schoharie Basin between May 2014 and May 2016, as well as programs and projects completed from May 2009 to present. The SWSMP seeks to advance state-of-the-art watershed management projects, policies and programs to improve and protect the Schoharie Watershed. Initiatives include the Stream Management Implementation Program (SMIP), the Catskill Streams Buffer Initiative (CSBI), Stream and Floodplain Restoration Projects, Stream and Watershed Assessments, and Education and Outreach programs. The funding source for each item is noted in the right column with “General” referring to the item as being a program or project of the GCSWCD/DEP Schoharie Watershed Stream Management Program.

^ - SMIP = Stream Management Implementation Grant Program, CSBI = Catskill Streams Buffer Initiative, WAP = Watershed Assistance Program, WRDA = Water Resources Development Act (ACOE), CWC = Catskill Watershed Corporation, General = DEP/GCSWCD SWSMP

Action Plan Executive Summary, 2014-2016*

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Education on Watershed Protection

The Schoharie Watershed Stream Management Program will be administering four annual events focused on education and awareness and twelve Education and Outreach projects between 2014 and 2016. The GCSWCD will continue to work 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.

| Annual Projects | | | | |
|---|-----------------|--|-------------------------|---------------------------|
| <i>Project</i> | <i>Progress</i> | <i>Notes</i> | <i>Year Added to AP</i> | <i>Program^</i> |
| Schoharie Watershed Month (formerly Week) | Annual | Annually plan and hold action-focused educational and recreational event for community involvement and awareness- held May 2010, 2011, 2012, 2013 and scheduled for 2014. | 2009 | SMIP Round 2/ General/WAP |
| Batavia Kill Stream Celebration | Annual | Annually plan and hold streamside educational celebratory event - held in August 2007, 2008, 2009, 2010 and 2011; celebration was not held in 2012 or 2013 due to local need to focus on recovery from the impacts of Hurricane Irene. | 2009 | General/Other/WAP |
| Schoharie Watershed Summit | Annual | Annually plan and hold seminar-based training and educational event for municipal officials - held in January 2007, 2008, 2009, 2010, 2011, 2012, 2013 and 2014. | 2009 | General/WAP |
| Schoharie Watershed Tour | Annual | Annually plan and hold Watershed Tour - held in June 2007, 2008, 2009, 2010. SWT put on hold for 2011, 2012, and 2013 due to flood recovery and limited staff availability. | 2009 | General/WAP |

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Action Plan Executive Summary, 2014-2016*

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| 2014-2016 Projects | | | | |
|---|-----------------|--|-------------------------|-----------------|
| <i>Project</i> | <i>Progress</i> | <i>Notes</i> | <i>Year Added to AP</i> | <i>Program^</i> |
| Riparian Buffer Workshop | In-Process | GCSWCD's CSBI will host a workshop for streamside landowners that will highlight the importance of buffers and demonstrate management practices to maintain healthy stream buffers; planning will resume when an Education & Outreach Coordinator is on staff. | 2011 | CSBI/General |
| Schoharie Watershed Stream Crossing Workshop | Contracting | GCSWCD staff will develop and implement a culvert design workshop for local highway departments. Planning this workshop will resume when an Education & Outreach Coordinator is on staff. | 2010 | SMIP Round 3 |
| Complete Kiosk Series | Near Complete | The kiosk series highlights the various restoration projects throughout the Schoharie Watershed. Three have been installed (Sugar Maples, Conesville, Ashland Connector Reach). | 2009 | General |
| Completed Projects | | | | |
| <i>Project</i> | <i>Progress</i> | <i>Notes</i> | <i>Year Completed</i> | <i>Program^</i> |
| Post Flood Stream Intervention Training | Complete | GCSWCD presented and/or contributed to five Post Flood Stream Intervention Trainings, held in Ulster, Greene, and Dutchess counties. The training was tailored to local highway departments, excavation contractors, and other involved in stabilizing streams following flood events. | 2012 & 2013 | General |
| Post Flood Emergency Stream Work Training | Complete | The flooding and damage caused by Tropical Storms Irene and Lee led to the coordination and presentation of the emergency stream work training. Three sessions were held and over 200 attendees were trained in the basic considerations that should be addressed when planning an emergency intervention in a stream system. | 2012 | General |
| Mountain Top Arboretum Outdoor Classroom Construction | Complete | An outdoor classroom was designed and constructed at the arboretum. Design plans and bid specifications for the classroom construction were developed through SMIP Round 2. The classroom accommodates approximately 45 people for year-round outdoor programming on a range of ecological and natural history topics relating to the watershed. | 2011 | SMIP Round 4 |

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Action Plan Executive Summary, 2014-2016*

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| | | | | |
|--|----------|---|-------------|--------------|
| Environmental Film Series | Complete | Watershed Agricultural Council hosted an environmental film series, in 2011 & 2012, at the Doctorow Center in Hunter during Schoharie Watershed Month. The films highlighted watershed issues, pollution mitigation, and watershed, food shed, and view shed topics. | 2011 & 2012 | SMIP Round 4 |
| Roadside Ditch Maintenance Workshop | Complete | GCSWCD held a workshop for highway departments and NYSDOT in 2011. The workshop covered water quality impacts from roadside ditches, ditch characteristics and conditions, and maintenance options, erosion control, and prioritization. | 2011 | SMIP Round 4 |
| Water Quality at Home Workshops | Complete | Greene County Cornell Cooperative Extension held two action-based educational workshops to help raise awareness about stewardship of water quality. The workshops, building rain barrels and holistic pond management, were held during Schoharie Watershed Month 2011. | 2011 | SMIP Round 3 |
| CD Lane Family Day | Complete | Community of Windham Foundation sponsored a Family Day as part of the 2011 Schoharie Watershed Month. Activities were intended to encourage responsible use of water and nearby land areas. Approximately 60 individuals participated along Main Street in Windham. | 2011 | SMIP Round 3 |
| Manor Kill Information Kiosk | Complete | GCSWCD provided a kiosk for Conesville, and a general Schoharie Watershed and Schoharie County SWCD educational panel was produced in conjunction with GCSWCD's kiosk series. | 2011 | SMIP Round 2 |
| Manor Kill Environmental Study Team | Complete | The Manor Kill Environmental Study Team program provided experientially based, hands on environmental education and stream monitoring program for youth (ages 13-18). The program served 20 youth from the Gilboa-Conesville School District and an additional 40 youth from Schoharie, Montgomery and Schenectady Counties from August 2009 – June 2011. | 2011 | SMIP Round 1 |
| Identify Existing Resources | Complete | GCSWCD identified and cataloged existing resources that are currently available. The website was revamped in 2011, to provide web-based documentation of existing resources and links to additional resources. | 2011 | General/WAP |
| Floodplain Management and Wetland Protection Workshops | Complete | Trainings were conducted by DEC and EPA at the annual Watershed Summits in January 2008, 2009, 2010 and 2011. | 2011 | General/WAP |
| Japanese Knotweed Mailing | Complete | Distributed knotweed informational brochure to streamside landowners. | 2010 | General |

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Action Plan Executive Summary, 2014-2016*

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| | | | | |
|--|----------|--|------|--------------|
| Riparian Buffer Workshop | Complete | CSBI sponsored workshop July 10, 2010 that showed participants the characteristics of healthy vs. degraded buffers and different management practices to maintain healthy stream buffers. | 2010 | CSBI |
| Erosion and Sediment Control Workshops | Complete | Trainings on sediment and erosion control for compliance with SPDES General Permit for construction activities were held in December 2008, January 2009 and March 2010. | 2010 | General |
| Mountain Top Arboretum Outdoor Classroom Design | Complete | Design plans and bid specifications for an accessible outdoor classroom were completed in 2010. | 2010 | SMIP Round 2 |
| Rain Barrel Workshop | Complete | Cornell Cooperative Extension workshop took place during Schoharie Watershed Week May, 2010. Fifteen people took part in building their own rain barrels. | 2010 | SMIP Round 2 |
| Mountaintop Arboretum Wet Meadow – Interpretive Kiosk, Signage and Brochures | Complete | A kiosk was installed and brochures were developed to describe the wet meadow including the historical background of the historic pump house, an explanation of the site's hydrology, and other information about wetland plants and wildlife. | 2010 | SMIP Round 1 |
| SWAC and Schoharie Watershed Week Logos | Complete | Logos were developed for the Schoharie Advisory Committee and Watershed Week/Month. | 2010 | SMIP Round 1 |
| Conduct Watershed Survey | Complete | Survey to determine educational needs and interests of stakeholders and watershed residents. | 2009 | |
| Websites | Complete | Schoharie pages have been created on www.catskillstreams.org and the revised www.gcsxcd.com to guide information sharing. | 2009 | General |

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Landowner Stream Assistance

The Schoharie Watershed Stream Management Program is currently administering twelve Landowner Stream Assistance projects of which four are funded through SMIP and seven through CSBI. Several Stream Restoration projects are a product of the Stream Restoration Program that GCSWCD that has been overseeing in the Schoharie Watershed since 1996. Landowner Stream Assistance projects are prioritized as those that improve and protect water quality by enhancing stream stability and establishing riparian buffers.

| 2014 – 2016 Projects | | | | |
|--|------------|--|------------------|----------|
| Project | Progress | Notes | Year Added to AP | Program^ |
| Catskill Streams Buffer Initiative Projects | | | | |
| Manor Kill Dahlberg Property Planting | In-Process | CSBI planting project on the Manor Kill in Conesville. | 2010 | CSBI |
| Manor Kill Colangelo Riparian Planting | In-Process | CSBI planting project on the Manor Kill in Conesville - need to add willow clumps to previous planting. | 2009 | CSBI |
| Tompkins Riparian Project | In-Process | Riparian demonstration project in Ashland; delayed due to change of ownership. Purchased by town for well head protection. GCSWCD plans to proceed with Town of Ashland in 2014. | 2009 | CSBI |
| Benjamin Property Planting | In-Process | CSBI planting project on the East Kill in Jewett. | 2012 | CSBI |
| Windham Country Club Riparian Planting | In-Process | CSBI planting project on the Batavia Kill in Windham. Project on hold due to change of ownership. | 2013 | CSBI |
| Police Anchor Camp Riparian Project | In-Process | CSBI planting project along tributaries of the Batavia Kill in Windham. | 2013 | CSBI |

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| | | | | |
|--|---------------|---|------|----------------------|
| Prattsville Ball Field | In-Process | CSBI planting project along the Batavia Kill in Prattsville. | 2014 | CSBI |
| Former Kastanis Property Planting Phase 2 | In-Process | CSBI planting project along the Batavia Kill in Ashland. | 2014 | CSBI |
| Chase Property Planting | In-Process | CSBI planting project along a tributary to the Batavia Kill in Hensonville. | 2014 | CSBI |
| Stream Restoration Projects | | | | |
| Windham Country Club Repairs | In-process | Restoration of streambank along Batavia Kill at the Windham Country Club. Put on hold due to change in ownership. | 2012 | General/FEMA |
| Ashland Well Heads Protection Project | Near Complete | Repair of Ashland drinking water wells along the Batavia Kill. | 2012 | General/Ashland/NRCS |
| Lanesville Project Repairs | In-process | Repair of the Lanesville Stream Restoration Project on the Stony Clove. | 2012 | General/FEMA |
| Long Road Project Repairs | In-process | Repair of the Long Road Stream Restoration Project on the West Kill in Lexington. | 2012 | General/FEMA |
| Big Hollow Project Repairs | In-process | Repair of the Big Hollow Stream Restoration Project on the Batavia Kill in Maple Crest. | 2012 | General/FEMA |
| Ashland Connector Reach Project Repairs | In-Process | Repair of the Ashland Connector Reach Stream Restoration Project on the Batavia Kill in Ashland. | 2012 | General/FEMA |
| Shoemaker Project Repairs | In-Process | Repair of the Shoemaker Stream Restoration Project on the West Kill in Lexington. | 2012 | General/ FEMA |
| Brandywine Project Repairs | In-Process | Repair and replace several rock structures and re-grade. Project located in Ashland. | 2012 | General/ACOE/FEMA |
| Kozak Streambank Stabilization and Riparian Planting | Assessment | Bank stabilization on the Schoharie Creek in Jewett. | 2011 | SMIP Round 4 |
| | | | | |

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Action Plan Executive Summary, 2014-2016*

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| Completed Projects | | | | |
|--|----------|--|----------------|----------|
| Project | Progress | Notes | Year Completed | Program^ |
| Catskill Streams Buffer Initiative Projects | | | | |
| Dodson/McCloskey Property Planting Phase 2 | Complete | CSBI re-planting project on the East Kill in Jewett. | 2013 | CSBI |
| Wilkie Riparian Project | Complete | CSBI planting project on a Schoharie Creek tributary in Prattsville. | 2013 | CSBI |
| Donnelly Riparian Project | Complete | CSBI planting project on a Schoharie Creek tributary in Prattsville. | 2013 | CSBI |
| Enochty Property Planting | Complete | CSBI planting project on the West Kill. | 2013 | CSBI |
| Mayo Property Planting | Complete | CSBI planting project on the Batavia Kill in Hensonville. | 2013 | CSBI |
| Higgins Property Planting | Complete | CSBI planting project on the Batavia Kill in Windham. | 2013 | CSBI |
| Cole Property Planting | Complete | CSBI planting project on the West Kill in Lexington. | 2012 | CSBI |
| Bardfield Property Planting | Complete | CSBI planting project on the East Kill in Jewett. | 2011 | CSBI |
| Rivera Property Planting | Complete | CSBI planting project on the East Kill in Jewett. | 2011 | CSBI |

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| | | | | |
|--------------------------------------|----------|---|------|-----------|
| Slutzky Property Planting | Complete | CSBI planting project on the Schoharie in Jewett. | 2011 | CSBI |
| Kelly Property Planting | Complete | CSBI planting project on the Schoharie in Hunter. | 2011 | CSBI |
| Cervini Property Planting | Complete | CSBI planting along North Settlement Creek. | 2011 | CSBI |
| Torsiello Property Planting | Complete | CSBI planting project along North Settlement Creek. | 2011 | CSBI |
| Hegner Property Planting | Complete | CSBI Planting project along North Settlement Creek. | 2011 | CSBI |
| Manor Kill Gentile Property Planting | Complete | CSBI planting project on the Manor Kill in Conesville. | 2010 | CSBI/WRDA |
| Manor Kill Brandow Property Planting | Complete | CSBI planting project on the Manor Kill in Conesville. | 2010 | CSBI/WRDA |
| Manor Kill Quinn Property Planting | Complete | CSBI planting project on the Manor Kill in Conesville. | 2010 | CSBI/WRDA |
| Dodson/McCloskey Property Planting | Complete | CSBI planting project on the East Kill in Jewett. | 2010 | CSBI |
| Rappleyea Property Planting | Complete | CSBI planting project on the East Kill in Jewett. | 2010 | CSBI |
| Avella Property Planting | Complete | CSBI planting project on the Batavia Kill in Windham. | 2010 | CSBI |
| Brunsdon Property Planting | Complete | CSBI planting project on the Batavia Kill in Windham. | 2010 | CSBI |
| Grossman Property Planting | Complete | CSBI planting project on the Schoharie Creek in Hunter. | 2010 | CSBI |
| Silver Property Planting | Complete | CSBI planting project on the Schoharie Creek in Hunter. | 2010 | CSBI |
| Evergreen Planting | Complete | CSBI planting project in the Schoharie Creek in Hunter. | 2009 | CSBI |

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| | | | | |
|---|-----------|--|------|------------------------|
| Kastanis Property Planting | Complete | CSBI planting project on the Batavia Kill in Ashland. | 2009 | CSBI/WRDA |
| Kane Property Planting | Complete | CSBI planting project in the Batavia Kill in Ashland. | 2009 | CSBI/WRDA |
| Manor Kill Grogan Riparian Planting | Complete | CSBI planting project on the Manor Kill in Conesville. | 2009 | CSBI/WRDA |
| McRoberts Property Planting | Complete | CSBI planting project on the Batavia Kill in Windham. | 2009 | CSBI/WRDA |
| Catskill Streams Buffer Initiative (CSBI) Educational Materials | Complete | CRSR was contracted to develop educational materials. Marketing strategy, slogan, logo, introduction language, brochure and application for funding have been developed. | 2009 | CSBI/General |
| Additional Riparian Buffer Pilot Projects | | | | |
| Carr Road | Complete | Riparian project on Schoharie Creek in the Town of Jewett. | 2009 | General |
| Deming Road Riparian Project | Complete | Addition of riparian component to a landowner project in Jewett. | 2009 | General/WRDA |
| Stream Restoration Projects | | | | |
| Maier Farm Project Repairs | Complete | Repair of the Maier Farm Stream Restoration Project on the Batavia Kill in Ashland. | 2013 | General/FEMA |
| Conine Project Repairs | Complete | Repair of the Conine Stream Restoration Project on the Batavia Kill in Prattsville. | 2013 | General/FEMA |
| NYS Route 42 West Kill Slope Failure | Complete | Restoration of slope failure along the West Kill, below Pushman Bridge. | 2013 | General/Lexington/NRCS |
| East Kill Restoration at Apple Hill | Complete | Stream restoration on the East Kill in Jewett. | 2012 | SMIP Round 4/General |
| Nikolaidis Stream Restoration Project | Complete. | Stream restoration on the East Kill in Jewett, combined with Kirk/Rotella SMIP projects into the East Kill at Apple Hill Stream Restoration. | 2012 | SMIP Round 4 |

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Action Plan Executive Summary, 2014-2016*

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| | | | | |
|---|----------|--|------|----------------------|
| Holden Stream Restoration Project | Complete | Full channel restoration of the Batavia Kill in Ashland in compliance with the Filtration Avoidance Determination (FAD) and the Shandaken Tunnel SPDES Permit. | 2012 | SMIP Round 1/General |
| Vista Ridge Stream Restoration | Complete | Stream restoration on the East Kill in Jewett in compliance with the FAD. | 2011 | SMIP Round 1/General |
| Wright Stream Bank Stabilization/Riparian Project | Complete | Stream restoration and planting along the Schoharie Creek; site of SCA service project. | 2010 | SMIP Round 4/CSBI |
| Prattsville Riparian Project (Wright) | Complete | Restoration and stabilization of approximately 3,000 feet of the Schoharie Creek. | 2010 | General/CWC/WRDA |
| Sugar Maples Stream Restoration | Complete | Restoration of wetland and 700ft of a tributary of the Batavia Kill in Windham. | 2010 | General/CWC/WRDA |
| Windham Golf Course Streambank Project | Complete | Bank Stabilization and riparian demonstration project for approximately 155 feet of stream. | 2009 | CWC/General |
| West Kill Restoration Project (Long Road) | Complete | Full channel restoration of approximately 3,000' of the West Kill in Lexington in compliance with the FAD and the Shandaken Tunnel SPDES Permit. | 2009 | General/WRDA |
| Oakwood Pistol Club | Complete | CWC streambank protection project in Prattsville. | 2009 | CWC/General |
| Schoharie Street Stabilization | Complete | Stabilization of high bank and plantings in the Village of Hunter. | 2009 | General/FEMA |
| | | | | |

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Creative Stormwater Practices and Critical Area Seeding

The Schoharie Watershed Stream Management Program is currently administering four Creative Stormwater Practices and Critical Area Seeding projects of which two are funded through SMIP. The GCSWCD will continue to work with multiple partners to implement stormwater projects that reduce runoff and protect groundwater resources within the Schoharie Watershed.

| 2014-2016 Projects | | | | |
|--|---------------|---|------------------|-----------------------|
| Project | Progress | Notes | Year added to AP | Program^ |
| Windham Mountain | Near-Complete | Pond expansion, parking lot terraces and stormwater conveyance improvements were installed 2010. Maintenance facility improvements will be scheduled once additional funding is attained. | 2007 | General/WRDA/CWC |
| Hunter Foundation, Tannersville office | Near-Complete | Porous gravel parking area and bioswale were installed in 2009. Rain gardens and the creek walk will be installed in 2014. | 2007 | General/WRDA/CWC |
| Completed Projects | | | | |
| Project | Progress | Notes | Year Completed | Program^ |
| Mountain Top Highway Ditch Re-vegetation Program | Complete | Program to encourage greater use of critical area seeding equipment that the GCSWCD has available for the highway departments by offsetting the cost of seed and mulch. | 2011 | SMIP Round 4 |
| Mountain Top Library & Learning Center | Complete | Stormwater management demonstration project. Design has been completed, construction is scheduled for 2011. | 2011 | SMIP Round 1/WRDA/CWC |
| Sugar Maples Stormwater Project | Complete | GCSWCD installed stormwater treatments including the installation of a permeable grass parking lot, rain gardens, wetland, porous walkways and riparian planting beds. Supplemental plantings performed in the rain gardens and wetland in spring 2011. | 2010 | General/WRDA/CWC |
| Hunter Mountain | Complete | Following preliminary discussions, it was determined that Hunter Mt. already received funding through CWC and completed stormwater retrofits. No further action is expected. | 2009 | General |
| Community Stormwater Planning | Complete | Stormwater structure GIS information and Community Stormwater Management Plans are available for various communities. | 2009 | General/CWC |

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Highway and Infrastructure Improvements

The Schoharie Watershed Stream Management Program is currently administering nine Highway and Infrastructure Improvement projects of which seven are funded through SMIP. Proper highway and infrastructure management are a vital component to managing streams for natural stability and ecologic integrity. It was observed that a number of recommended actions would provide water quality enhancement or protection such as properly sizing culverts to reduce flooding and increase stream stability both up and downstream, and minimizing the introduction of road abrasives. Culverts addressed through this program must pose a threat to water quality to be eligible for funding.

| 2014-2016 Projects | | | | |
|--|------------|--|------------------|----------------------|
| Project | Progress | Notes | Year added to AP | Program^ |
| Glen Avenue Culvert Upgrade | In-Process | GCSWCD will work with the Village of Hunter Highway Department to design a properly sized culvert with a buried bottom for improved conveyance, stream stability and habitat enhancement and oversee the installation. | 2011 | SMIP Round 4 |
| County Route 6 Slope Failure | In-Process | Project involves the stabilization of a slope failure along CR6 and the West Kill in the Town of Lexington. | 2011 | SMIP Round 4 |
| Cranberry Road Culvert Upgrade | In-Process | GCSWCD will work with the Town of Hunter Highway Department to design a properly sized culvert with a buried bottom for improved conveyance, stream stability and habitat enhancement and oversee the installation. | 2011 | SMIP Round 3 |
| Schoharie Watershed Stream Crossing/Culvert Design | In-Process | \$50,000 to be set aside for engineered design services on retainer to work with towns to ensure prioritized culverts are designed properly. | 2010 | SMIP Round 3 |
| Mitchell Hollow Rd (CR 21) Stormwater Upgrade | In-Process | 370' of stormwater conveyance with catch basins and sumps will be installed along Mitchell Hollow Rd. to mitigate stormwater flooding in area along NYS Route 23 and will be treated for water quality by the creation of a filtering wetland. | 2010 | SMIP Round 3 |
| Street Sweeper with Vacuum | Pending | CWC application submitted with SMIP funds providing the cost share match. On CWC wait list. | 2009 | SMIP Round 1/ CWC |
| Completed Projects | | | | |
| Project | Progress | Notes | Year Completed | Program^ |

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| | | | | |
|--|----------|--|------|----------------------|
| Flood Response | Complete | A Critical Response Plan is being developed for a culvert replacement along Griffin Road in the Town of Jewett. Three-sided concrete culvert was installed, which will pass flows above the 100-year runoff event. | 2012 | General |
| Partridge Road Culvert Replacement | Complete | GCSWCD worked with the Town of Ashland Highway Department to design and install a properly sized culvert. | 2011 | SMIP Round1/ FEMA |
| Village of Tannersville Highway Dept. Technical Assistance | Complete | GCSWCD assisted Tannersville in sizing a culvert under Spring Street. | 2011 | General |
| Driveway Specifications | Complete | Permit specifications from GC Highway Department were provided to watershed communities to use as a model. | 2009 | General/WAP |

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Planning and Assessment

The Schoharie Watershed Stream Management Program is currently administering six Planning and Assessment projects of which three are funded through SMIP. Planning and Assessment projects range from land use planning, assessment of streams and their watersheds, and the survey and monitoring of various locations and project sites.

| 2014-2016 Projects | | | | |
|--|-----------------|--|-------------------------|----------------------|
| <i>Project</i> | <i>Progress</i> | <i>Notes</i> | <i>Year added to AP</i> | <i>Program^</i> |
| Town of Hunter Land Use Regulation Review & Development Guidelines | In-Process | Community of Natural Resource Solutions will conduct a detailed review of current land use regulations with the intent of adopting revisions, new regulations &/or guidelines promoting low impact design, climate smart and smart growth principles. Town changed consultants and will begin the project in 2014. | 2010 | SMIP Round 2/ WAP |
| Water Temperature Impacts on Fisheries Study | Near Complete | Thermograph study to locate thermal refugia. Imagery collection flight conducted in 2012 and report expected in 2014. | 2009 | SMIP Round 1 |
| Tributary Management Plans | In-Process | Complete simplified plans for three Batavia Kill tributaries. | 2007 | General |
| Fisheries Assessment & Improvements Strategy | Not Started | Assess fisheries and develop habitat improvement strategy. | 2007 | General |
| Annual Projects | | | | |
| <i>Project</i> | <i>Progress</i> | <i>Notes</i> | <i>Year added to AP</i> | <i>Program^</i> |
| Restoration Project Monitoring | Annual | Restored stream reaches were monitored in 2008, 2009 and 2010, 2011, 2012 and 2013. Project monitoring is scheduled for 2014. | 2008 | General |

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| Completed Projects | | | | |
|---|-----------------|---|-----------------------|----------------------------|
| <i>Project</i> | <i>Progress</i> | <i>Notes</i> | <i>Year Completed</i> | <i>Program[^]</i> |
| Mountaintop Better Site Design Plan Workshops | Complete | Kendall Stormwater Services and Morris Associates guided each community through a comparison of the local codes against model development principles using a consensus building approach. | 2011 & 2012 | SMIP Round2/ CWC/WAP |
| Town of Hunter Corridor Study | Complete | Assessment of future development along State Route 23A corridor was completed in 2010. | 2010 | CWC/WAP |
| Dale Lane Survey and Hydraulic Analysis | Complete | Site survey was completed in 2009 and hydraulic analysis in 2010. | 2010 | General |
| Mauro Residence Bank Stabilization | Complete | Geotechnical assessment of a failing streambank in relation to a private residence completed in April 2010. Engineer's report was provided to the home owner and the bank was seeded and mulched. | 2010 | SMIP Round 1 |
| Lexington Sill (Schoharie Creek) | Assessed | Upon assessment it was determined that removal of sill would have little impact on the stream. No further action is expected. | 2010 | General |
| Tributary Assessment and Planning Projects | Complete | Historical alignments, riparian mapping, watershed analysis, stream feature inventory and Geodatabases have been completed for 3 tributaries to the Batavia Kill. | 2010 | |
| Manor Kill SMP | Complete | Stream Management Plan for the Manor Kill. | 2009 | General |
| Mountaintop Recreation/Resource Master Plan | Complete | GCSWCD WAP worked with public and private partners to develop plan in 2009. | 2009 | NYS DOS /WAP |
| Greene County All Hazards Mitigation Plan | Complete | Tetra Tech completed plan for Greene County in 2009. | 2009 | General |
| Survey of second SPDES site | Complete | Landowner is unwilling to allow access for survey work. No further action is expected. | 2009 | General |
| Japanese Knotweed Management Project | Complete | Hudsonia submitted report to GCSWCD in December of 2009. | 2009 | General |
| Restoration Project Wetland Mapping | Complete | Wetland mapping and reporting were completed in 2009. | 2009 | General |
| Catskill Riparian Reference Study | Complete | New York Natural Heritage Program completed a final report for the West Kill Watershed | 2009 | General |

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Recreation and Stream Habitat Improvements

The Schoharie Watershed Stream Management Program is administering five Recreation and Stream Habitat Improvement projects of which three are funded through SMIP. Recreation and Stream Habitat Improvement projects include enhanced public access to streams for recreational purposes on the basis that public access will promote an appreciation of the stream while increasing user awareness of proper stream management.

| 2014-2016 Projects | | | | |
|---|-----------------|--|-------------------------|-----------------|
| <i>Project</i> | <i>Progress</i> | <i>Notes</i> | <i>Year added to AP</i> | <i>Program^</i> |
| Schoharie Creek Park (Town of Lexington) | Near-complete | Building was removed in 2007; demonstrative plantings and fencing installed in 2012. Working with town to add signage. | 2010 | SMIP Round 3 |
| Promote Increased Recreational Use of Watershed Streams | In-Process | Work with SWAC Habitat and Recreation Subcommittee to identify and implement opportunities. | 2009 | General/WAP |
| Completed Projects | | | | |
| <i>Project</i> | <i>Progress</i> | <i>Notes</i> | <i>Year Completed</i> | <i>Program^</i> |
| Organize Repository of Stream Ecosystem Data | Complete | The Stream Ecosystem Data Repository – Upper Schoharie Creek Watershed is complete and available at: http://dspace.gcswwcd.com/ | 2013 | General |
| Windham Path (Police Anchor Camp) | Complete | GCSWCD is assisting the Town of Windham with installing a public, non-motorized, multi-use trail at a 65 acre town owned parcel along the Batavia Kill. Construction of boardwalk and foot bridges complete. | 2013 | SMIP Round 2 |
| Ashland Fishing Access Enhancements | Complete | Parking area, stream access and kiosk are complete. | 2010 | General |
| Town of Windham (Police Anchor Camp) | Complete | Conceptual plans were completed and provided to the Town. | 2010 | General |

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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.

| 2014 – 2016 Projects | | | | |
|--|------------|---|------------------|---------------|
| Project | Progress | Notes | Year added to AP | Program^ |
| Local Flood Analysis | In-Process | 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. LFA projects underway in Lexington and Windham. The Prattsville LFA is complete and can be found at http://catskillstreams.org/major-streams/schoharie-creek/ . | 2013 | SMIP, General |
| Hazard Mitigation Grant Program Flood Buyout Program | In-Process | 2013 – appraisals and preliminary soft costs (title report and insurance, environmental assessment, property survey) 2014 – demolition plan for properties which still have structures. For vacant properties, commence closings. | 2013 | FEMA/NYCDEP |
| Completed Projects | | | | |
| Manor Kill Acquisition (Town of Conesville) | Complete | The Town of Conesville is assisting a landowner by acquiring a floodplain parcel approved for FEMA Pre-Disaster Mitigation funding (75%) and demolishing and removing the home. The SMIP grant is being used to assist the Town in meeting the required 25% match. | 2013 | SMIP Round 6 |

Ongoing Activities

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On-going action items began in 2007 and will continue through the duration of stream management plan implementation efforts. The following items do not have an end, but rather are ongoing throughout the program.

| <i>Project</i> | <i>Progress</i> | <i>Notes</i> | <i>Year added to AP</i> | <i>Program^</i> |
|---|-----------------|---|-------------------------|-----------------|
| Program Administration | On-going | Maintain an effective and efficient process for implementation of the stream management plans for Schoharie Creek and its associated tributaries | 2007 | General |
| Schoharie Watershed Advisory Committee (SWAC) | On-going | SWAC established, assists with funding and programmatic decisions associated with the SMIP. SWAC met 3 times in 2013 and three subcommittees (Education and Outreach, Habitat and Recreation, Highway Superintendents) each met 2-3 times per year. | 2007 | General/WAP |
| Local Technical Assistance | On-going | GCSWCD has developed process for tracking and responding to stakeholders. | 2007 | General |
| NYSDEC/ACOE Permit Reviews | On-going | Technical review provided as needed. | 2007 | General |
| Catskill Streams Website | On-going | Site development complete and site continues to be maintained. | 2007 | General |
| Community Outreach | On-going | Basic outreach activities - newspaper articles, newsletters, brochures, media contacts. | 2007 | General |
| Critical Area Seeding Program | On-going | Program to help highway departments with vegetation management on critical areas. | 2007 | General |
| Plant Materials Program | On-going | Native seed program initiated - other components in place to annually provide native plant materials for CSBI and restoration projects. | 2007 | General |
| West Of Hudson Education & Outreach Strategy | On-going | Covers topics universal to water quality initiatives and includes other counties and agencies (SWCD's, CCE, DEP.) in the WOH watershed. | 2007 | General |

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Section 2. Schoharie Basin Stream Management Program Action Plan 2014-2016

Updated May 15, 2014

NYCDEP Stream Management Program
71 Smith Ave, Kingston NY 12401
David Burns, Project Manager
845.340.7850
dburns@dep.nyc.gov



Greene County Soil & Water
Conservation District
907 County Office Building, Cairo NY 12413
Jeff Flack, Executive Director
518.622.3620
jeff@gcswcd.com



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NYCDEP Stream Management Program

71 Smith Ave, Kingston NY 12401

David Burns, Project Coordinator

845.340.7850

dburns@dep.nyc.gov



Greene County Soil & Water

Conservation District

907 County Office Building, Cairo NY 12413

Jeff Flack, Executive Director

518.622.3620

jeff@gcswcd.com



Schoharie Basin Stream Management Program

Action Plan 2014 – 2016

Update May 15, 2014

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. In addition to supporting the FAD, many SWSMP projects also target reductions to in-stream sources of suspended sediments as part of DEP’s Shandaken Tunnel State Pollution Discharge Elimination System (SPEDS) permit established in September 2006. The SWSMP seeks to advance state-of-the-art watershed management projects, policies and programs to improve and protect the Schoharie’s water resources. Initiatives include the Stream Management Implementation Program (SMIP), the Catskill Streams Buffer Initiative (CSBI), Stream and Floodplain Restoration Projects, Stream and Watershed Assessments, 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 2014 and May 2016, and includes action plan item updates through May 1, 2014. 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. The Action Plan is one piece of a three-part package that includes: this action plan, an executive summary and a completed projects synopsis. 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 (Youth Summit Committee), CCCD, 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. In 2013, six events were organized including <i>Earth, Wind & Fire</i> Student Watershed Art Exhibit, Septic Workshop for Homeowners, Stream Clean up and Riparian Buffer Planting on Batavia Kill, Green |

Infrastructure at Work and Home, and the Grand Opening of the Windham Path, a SMIP-supported project. Attendance varies based on the event/activity with average participation across the month numbering in the hundreds. The 2013 events culminated with the Opening of the Windham Path on May 27, 2013. Approximately 200 people attended the opening and participated in many activities occurring throughout the day including, a plant and tree identification walk, a Pat Meehan Scholarship Walk, a treasure hunt, and inaugural walks on the 1.5 mile Path with access to the Batavia Kill.

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 2014 Summit, *Consequences of Inaction in a Changing Climate*, focused on meteorological factors that result in extreme rainfall for the Schoharie Watershed, state funding programs to help communities recover from floods, and how a local flood analysis can help communities minimize flood damage and leverage state and federal funds. Afternoon workshops provided planning credits for local officials in understanding benefit and cost analysis in project funding decisions, NFIP Reform Act and changes in flood insurance rates, Revised SEQRA forms, and installing a rain garden as a means to reduce onsite stormwater runoff. Due to inclement weather, attendance was lower than usual with approximately 105 participants.

D. 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 Schoharie Watershed Tour has been a successful educational opportunity when previously held. Due to staffing limitations, the event has not been held annually. We will continue to provide this event when an Education and Outreach Coordinator is on staff to plan the event.

E. 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: GCSWCD has not conducted a workshop for streamside landowners since Hurricane Irene. Instead, staff efforts have been focused on installing projects to increase riparian buffers in the watershed. An Education & Outreach Coordinator will be extremely valuable in planning for this event in the future.

F. 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. We will provide this workshop when an Education and Outreach Coordinator is on staff to plan the event.

G. Complete Kiosk Series: Kiosks will be based upon categories of water resource-related best management practices.

GCSWCD Staff: Flack

Project Partners: Organizations, property owners where kiosks will be located

Project Funding: NYCDEP/GCSWCD Schoharie SMP Contract

Project Schedule: Complete installation in 2014.

SMP Recommendation: Batavia Kill – Education and Outreach-08 (High, 2.27), 09 (Medium, 1.54), 06 (Medium, 1.15), 10 (Medium, 0);
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 Prevention-6.1.7
West Kill – Education and Outreach 6.4.3, 6.4.4, 6.4.5

Date Added to Action Plan: 2009

Progress: The kiosk series highlights the various restoration projects throughout the Schoharie Watershed; three kiosks were constructed and installed at three different locations, Sugar Maples, Manor Kill in Conesville, and at the Ashland Connector Stream Restoration Project and public access parking area. Due to continued construction at the Tannersville site, installation of the remaining kiosk and signage has been delayed, and is now scheduled for summer/fall 2014.

II. Landowner Stream Assistance

The GCSWCD and NYCDEP recognize the importance of providing assistance to local landowners, as most 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 Dahlberg Property Planting: Catskill Streams Buffer Initiative - Obtain landowner agreement, create property management plan and restore approximately 3,750 square feet of streamside vegetation along the Manor Kill.

SCSWCD/GCSWCD Staff: Nichols, Weyeneth
Project Partners: NYCDEP, GCSWCD, SCSWCD, Landowner
Project Funding: NYCDEP CSBI
Project Schedule: Plant in 2014
SMP Recommendation: Manor Kill –Riparian Zone Management 5.7.1, 5.7.2, 5.7.4, 5.7.7
Date Added to Action Plan: 2010

Progress: Riparian Corridor Management Plan is complete. Planting will include the installation of a 25' buffer along 150' of the Manor Kill. Project will include vertical bundles along the toe of the bank and minor bank grading along approximately 75' to accommodate additional plantings. Floods delayed the fall 2011 installation. Planting is being planned for 2014.

Site 2. 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 plantings in 2014
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 2014.

Site 3. 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 2014
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 plans to proceed with the Town of Ashland in 2014.

Site 4. 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 2014
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 2014.

Site 5. 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 2013
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 6. Police Anchor Camp 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: Plant in 2013 and 2014
 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 the remaining three locations at the Windham Path, removal of a berm and will be planted in 2014.

Site 7. Prattsville 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 Prattsville 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 Prattsville
 Project Funding: NYCDEP CSBI, GCSWCD
 Project Schedule: Construct in 2014
 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.

Site 8. 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 2014
 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 has applied for a land use permit with NYCDEP to plant approximately 5.25 acres in 2014.

Site 9. 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 2014
 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 10. 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
Project Partners: GCSWCD, NYCDEP, Landowner
Project Funding: NYCDEP CSBI, GCSWCD
Project Schedule: Assess and Construct in 2014
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 plant 180 native trees and shrubs in 2014.

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.

Stream Restoration Projects:

Site 1. Kozak Streambank Stabilization and Riparian Planting: Located along the Schoharie Creek, this project involves addressing 500 linear feet of erosion with clay exposures by grading the bank and stabilizing the toe with rock. The proposal also includes creating a 50 foot wide riparian buffer by planting native tree and shrub species.

GCSWCD Staff: DuBois, Weyeneth
Project Partners: GCSWCD, NYCDEP, Landowner
Project Funding: SMIP Round 4, NYCDEP/GCSWCD Schoharie SMP Contract
Project Schedule: Survey and Design 2015
SMP Recommendation: Batavia Kill -- Stream Corridor 02; 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 surveyed in summer 2011. Due to Hurricane Irene (August 2011), the site will require additional assessment; survey of the project site is planned for fall, 2015.

Site 2. Brandywine Project Repairs: The GCSWCD/NYCDEP will rebuild the previously constructed Brandywine stream restoration project.

GCSWCD Staff: Buchanan
Project Partners: NYCDEP, ACOE, FEMA
Project Funding: FEMA, WRDA, NYCDEP/GCSWCD Schoharie SMP Contract
Project Schedule: Survey 2012, Design 2013, Construct 2014
SMP Recommendation: Schoharie -- Riparian Zone Management 6.7.4; General Stream Management 6.8.7
Date Added to Action Plan: 2012
Progress: A site survey has been conducted to document changes in the topography resulting from flooding associated with Tropical Storm Irene. Planning, design and permitting are in progress and will be completed in the spring of 2014. Upon approval by regulatory agencies and landowners project construction is planned for summer of 2014.

Site 3. Shoemaker Project Repairs: Damages sustained on the Shoemaker project on the West Kill are scheduled for repair work in 2014. Topographic data has been collected to support cost, material and labor estimates for implementation of the repair work.

GCSWCD Staff: DuBois
Project Partners: GCSWCD, NYCDEP, Landowners, FEMA
Project Funding: FEMA, NYCDEP/GCSWCD Schoharie SMP Contract
Project Schedule: Survey 2012, Design 2013, Construct 2014
SMP Recommendation: West Kill Stream Management Plan 6.8.7 Stream Stability Restoration
Date Added to Action Plan: 2012
Progress: Topographic survey is complete. Estimates and final design began in 2013. Project permitting and design finalization are underway, and construction is expected to begin in the summer of 2014.

Site 4. Ashland Connector Reach Project Repairs: Damages sustained on the Ashland Connector Reach project on the Batavia Kill are scheduled for repair work in the summer of 2014.

GCSWCD Staff: Buchanan
Project Partners: GCSWCD, NYCDEP, Landowners, FEMA
Project Funding: FEMA, NYCDEP/GCSWCD Schoharie SMP Contract
Project Schedule: Survey 2012, Design 2012, Construct 2014
SMP Recommendation: Batavia Kill Stream Management Plan NO. SC -02, SC- 07
Date Added to Action Plan: 2012
Progress: A site survey has been conducted to document changes in the topography resulting from flooding associated with Tropical Storm Irene. Planning, estimates, design and permitting are in progress and will be completed in the spring of 2014. Upon approval by regulatory agencies and landowners project construction is planned for summer of 2014.

Site 5. Big Hollow Project Repairs: Damages sustained on the Big Hollow project on the Batavia Kill are scheduled for repair work in 2014.

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 and permitting were complete in 2013 and construction is planned for summer of 2014.

Site 6. Long Road Project Repairs: Damages sustained on the Long Road project on the West Kill are scheduled for repair work in 2014. Topographic data has been collected to support cost, material and labor estimates for implementation of the repair work.

GCSWCD Staff: DuBois
Project Partners: GCSWCD, NYCDEP, Landowners, FEMA
Project Funding: FEMA, NYCDEP/GCSWCD Schoharie SMP Contract
Project Schedule: Survey 2012, Design 2013, Construct 2014
SMP Recommendation: West Kill Stream Management Plan 6.8.7 Stream Stability Restoration

Date Added to Action Plan: 2012

Progress: Topographic survey is complete. Estimates and final design will be completed in 2014. Upon approval by regulatory agencies and landowners project construction is planned for summer of 2014.

Site 7. Lanesville Project Repairs: Damages sustained on the Lanesville project on the Stony Clove Creek are scheduled for repair work in 2014.

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: Stony Clove Stream Management Plan 6.8.7 Stream Stability Restoration

Date Added to Action Plan: 2012

Progress: Design and permitting are in progress with construction planned for the summer of 2014.

Site 8. Ashland Well Heads Protection Project: Damages sustained to the Town of Ashland drinking water wells along the Batavia Kill were repaired in 2013 as part of the NRCS's EWP program.

GCSWCD Staff: DuBois

Project Partners: GCSWCD, NYCDEP, Town of Ashland, NRCS

Project Funding: NRCS EWP, NYSDEC, NYCDEP/GCSWCD Schoharie SMP Contract

Project Schedule: Survey 2012, Design 2012, Construct 2013, Plant 2014

SMP Recommendation: Batavia Kill Stream Management Plan NO. WQ – 05 Water Quality Protection

Date Added to Action Plan: 2012

Progress: The GCSWCD and partners (NYCDEP, Town of Ashland, NRCS) completed construction of this stream restoration project in 2013. Damages sustained during flooding from Tropical Storm Irene left the project reach and the municipal drinking water wells located on the floodplain in the reach vulnerable to additional damages from future flood events. Instability was likely due to a combination of several factors including past management practices, poor riparian conditions and valley morphology. The restoration strategy recommended for this stream reach consisted of a geomorphically based full channel restoration. Project construction began in September 2013. The project included stream bank and channel excavation to achieve stable geometry, installation of in-stream stabilization structures such as rock vanes, cross vanes and rock rip rap. A variety of vegetative treatments were installed on the project site following construction including, live willow fascines, live willow stakes and seeding and mulching. Project construction was completed in 2013. As-built survey has been completed for the project and have been approved by NRCS. Installation of a mix of tree and shrub species that are adapted to stream-side conditions are expected to be planted along the project in 2014.

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. Windham Mountain: (Town of Windham) The GCSWCD has been working with Windham Mountain ski center to evaluate stormwater impacts at the ski slope and adjacent high density development areas. A detailed assessment of impacts has been completed and a strategy for long term implementation of a series of

stormwater retrofit activities has been developed. The GCSWCD is working with Windham Mountain and others to design and implement stormwater management practices that will be installed.

GCSWCD Staff: Buchanan
Project Partners: NYCDEP, Windham Mountain, CWC, ACOE, NYSDEC
Project Funding: CWC, ACOE-WRDA, NYCDEP
Project Schedule: First set, of storm water management practices, was installed in 2010: Phase 2 will be constructed when funding becomes available.
SMP Recommendation: Batavia Kill -- Water Quality-08 (Very High, 4.23)
Schoharie – Water Quality 6.3.7
Date Added to Action Plan: 2007
Progress: A design for the stormwater retrofit of the site has been completed. Funding, which is in place from the CWC and ACOE (through WRDA), were used to implement this stormwater retrofit in two phases. In phase one, the pond was converted to a storm water facility and expanded, and material was used to terrace the existing parking area, stormwater conveyance improvements were installed in order to route 27 acres of drainage area into the pond. In phase two, the maintenance facility will be equipped with gutters and an underground sand filter will be installed to treat runoff from this hotspot area. Phase one was completed in 2010 and 2011. Design and permitting for phase two are complete; the project will be constructed as funding is attained.

B. Hunter Foundation: (Village of Tannersville) The GCSWCD is working with the Hunter Foundation on a stormwater retrofit project that will be completed in conjunction with the Foundation's rehabilitation of a block of buildings in the Village of Tannersville. The Project will use innovative methods to meet water quality treatment standards for runoff from roofs and parking. The site presents space challenges and has served as a demonstration project for integrating stormwater management in an area with limited space. In addition, the project will include the design and construction of a "Creek walk" along a small tributary stream that will link with main street commercial businesses.

GCSWCD Staff: Buchanan
Project Partners: NYCDEP, Hunter Foundation, CWC, ACOE,
Project Funding: CWC, ACOE-WRDA, NYCDEP
Project Schedule: Completion of project construction, 2014.
SMP Recommendation: Batavia Kill WQ-08 (Very High, 4.23); Schoharie – WQ-6.3.7, PR-6.2.3
Date Added to Action Plan: 2007
Progress: The porous gravel parking area and bioswale were installed in 2009. Rain gardens and the creek walk will be installed in 2014.

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 early 2014
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 Village of Hunter is working with FEMA to leverage SMIP funds to put toward larger replacement structure. Topographic surveys are complete. The design will be finalized in the spring of 2014 and construction is planned for the spring of 2014 or as funding is attained.

B. County Route 6 Slope Failure: Project involves stabilization of the slope failure along CR 6 and the West Kill in Lexington. Lacustrine clay deposits are exposed at the toe of the streambank along the entire 260 feet length of the failure. Stress cracks are evident in the pavement of CR 6, and this failure poses an imminent threat to the stability of the sole egress from the upper valley. Project design and construction will be coordinated through the Greene County Highway Department. GCSWCD will review the design.

GCSWCD Staff: Flack
Project Partners: Greene County Highway Department, GCSWCD, NYCDEP, NRCS
Project Funding: SMIP, Round 4, NRCS EWP
Project Schedule: Assessment and design in 2011; Construction 2013 and 2014
SMP Recommendation: Schoharie -- Flood Protection 6.1.11, Water Quality 6.3.11
Date added to Action Plan: 2011
Progress: This EWP project was constructed in 2013. Practices installed include the use of rock riffles and sheet piling to elevate the stream profile adjacent to the slope failure, to help buttress the failing slope and to provide grade control. The installation of rock revetment to protect the toe of the slope from erosion and stormwater drainage in the area of the slope failure to help maintain moisture levels in the soil profile. Additional practices included the establishment of flood plain bench and use of random boulder clusters. The in-stream portions of the project were completed in 2013. Much of the road stabilization work was also completed in 2013. The contractor is expected to return to the site in 2014 to complete roadside drainage work and to complete the road surfacing.

C. 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 2014
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 have commenced, with construction planned for the summer of 2014. It is anticipated that upstream and/or downstream grading will be required to meet slope requirements within the culvert and prevent the culvert from being perched.

D. 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 and glen avenue culverts in the town and village of Hunter are being designed using these monies. Both culverts are being upgraded to allow for proper conveyance and passage of aquatic organisms, they are both scheduled for construction in 2014.

E. 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: This project is currently under design by Delaware Engineering and is slated for construction in 2014.

F. 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 submitted to CWC stormwater retrofit program in August 2010 for majority of the cost, with SWAC SMIP funds covering the required match (\$40,000). 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). CWC is waiting on contract renewal for their Stormwater Program before allocating funds.

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.

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| 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 has not begun due to constraints of the original consultant (Greene IDA). Town of Hunter is now working with Delaware Engineering to begin the project. The contract has been extended. The scope is under review by Town and consultant to determine whether any changes in deliverables will be necessary. |

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.

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| 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. 2014 – abbreviated SMPs (North Settlement, Furnace Creek, Mitchell Hollow (Mad) Brook) 3. 2015 – 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 2014. |

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.

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| 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, 2014. 2. Identify appropriate field methodologies, 2014. 3. Coordinate fisheries assessment, 2014. |
| 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: | Working through the SWAC Habitat and Recreation Subcommittee the GCSWCD will prioritize recommendations for fisheries improvements in 2014. |

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 (2014):** 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.

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| 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: | The East Kill Restoration at Vista Ridge project site was monitored in 2013. In spring 2013, groundwater monitoring wells will be installed at Conine, Ashland and Sugar Maples to meet wetland restoration requirements. Priority monitoring for 2014 includes five (5) sites on the Batavia Kill, two (2) sites on the West Kill, and two (2) sites on the East Kill. The Batavia Kill monitoring sites include Ashland Well Head, Maier Farm (2013 Repair), Conine (2013 Repair), Sugar Maples, and Holdens. The West Kill monitoring sites will include the County Route 6 and County Route 42 projects. East Kill monitoring sites will include the Vista Ridge and Apple Hill projects. |

2. **Vegetation Monitoring of Restored Stream Reaches (2014):** Many riparian plantings have been completed within the West of Hudson New York City Watershed 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. 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. Vegetative monitoring includes, photo-documentation, vegetative health observations and data is collected to determine 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 2013, two project sites (Vista Ridge, Sugar Maples) were monitored. Priority monitoring for 2014 includes 11 project sites including Ashland, Maier, Conine, Sugar Maples, Holden, Windham Mountain, Long Road, CR 6, Vista Ridge, Apple Hill, Prattsville Riparian Planting.

- 3. Vegetation Monitoring of Catskill Stream Buffer Initiative Projects (2014):** The Catskill Streams Buffer Initiative (CSBI) helps residential landowners protect their property and preserve natural habitat along stream banks in the West of Hudson New York City watershed by cultivating strong streamside buffers that use vegetation native to the Catskill region. Annual monitoring of CSBI projects provides valuable information on the effectiveness of riparian plantings. Vegetative monitoring includes, photo-documentation, vegetative health observations and data is collected to determine 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 2013, 8 project sites were monitored including Kastanis, Hensonville, Slutzky, Cervini, Torciello/Hegner, Valenti, Cole, Mayo. Priority monitoring for 2014 includes 12 project sites including Hensonville, Mayo, Cervini, Torsiello/Hegner, Slutzky, Valenti, Cole, Windham Path, Enochty, Higgins, Wilkie, Donnelly.

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 will include 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, 2014
 SMP Recommendation: Batavia Kill – Riparian Buffer B-09 (High, 1.81), Education and Outreach-11 (Medium, 0.91); 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. Residents participated in riparian planting in October 2010. The Town of Lexington submitted a SWAC SMIP grant which was approved in August of 2010 for demonstrative plantings and signage. Due to storm impacts of Irene and Lee and subsequent recovery work, GCSWCD assisted the Town in reestablishing plantings in 2012 and installed split rail fencing to define the park and protect the plantings. Town is interested in creating a sign for the park.

B . Promote Increased Recreational Use of Watershed Streams: All stream management plans recommend enhancing public access of the streams for fishing. Along many of the streams within the Schoharie Watershed, there are public fishing access points. Some streams have limited or no public access. In order to enhance recreational use of the streams, existing access locations have been mapped and additional access points should be identified. Increasing recreational use of fisheries has also been identified as a priority by the SWAC Habitat and Recreation Subcommittee. Providing stocked fish in public still waters (lakes, ponds), in addition to stream stocking efforts, may improve fishing opportunities and provide for enhanced access to fisheries. Supporting and organizing community or basin-wide fishing events, and promoting interest in fishing for wild fish will help increase recreational use of watershed streams.

GCSWCD Staff: Weyeneth, Education & Outreach Coordinator
 Project Partners: NYCDEP, Trout Unlimited, NYSDEC
 Project Funding: To be determined
 Project Schedule: 1. Conduct an inventory of access points and create a GIS map of existing locations, 2010.
 2. Identify locations that may provide additional access, 2010.
 3. Investigate the feasibility of increasing the locations of stocked fish to include public still waters (such as Rip Van Winkle Lake or Dolan's Lake, and others), 2011.
 4. Coordinate, organize or support a basin-wide or localized fishing derbies along watershed streams, 2010.
 SMP Recommendation: Batavia Kill – Public Enjoyment 01 (Very High, 3.08); West Kill- Public Recreation 6.2.2; Schoharie/East Kill- Public Recreation- 6.2.2; Manor Kill- Public Recreation-5.2.2
 Date Added to Action Plan: 2009
Progress: Current projects noted above (Windham Path, Lexington Creek Park) will improve access to streams. In 2010 NYSDEC published *Public Fishing Rights Maps* that can be obtained on their website and public fishing access has been identified in the Mountaintop Community Resource/Recreation Plan. Streams will continue to be assessed where improving access would benefit both anglers and mountaintop communities (e.g., East Kill and along the Batavia Kill). Through the Habitat & Recreation Subcommittee, SMIP will work with NYSDEC to create a standard procedure that will assesses municipal properties for establishing public fishing rights on properties that are conducive for public access and may be supported with SMIP funds.

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): Previously called Local Flood Hazard Mitigation Analysis (LFHMA), now known as 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 underway in Lexington (started February 2014) and Windham (March 2014). Hazard Mitigation Grant Program applications were submitted in October 2013 to NYS SEMO for conducting LFHMA's in the Village of Hunter and Tannersville. Decisions on these planning applications should be made in the summer of 2014. 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. The program is expected to take 1.5 – 2 years to complete. 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 – 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: Sixteen property owners in the Watershed are in the Buyout Program (three dropped out in past year). State Agreements, Memorandums of Understanding with NYCDEP, the County and Towns and purchase contracts with landowners are being processed, as well as demolition and property management plans. Extensions are being requested from FEMA, as all steps will not be completed by the deadlines in the applications.

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 and Shandaken Tunnel SPDES permit 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 August 1st and February 1st 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 38 projects since the first grant round in 2009.

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 2014-19, which should register by the end of 2014. 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.

1. 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.

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| 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.

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| 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. |

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.

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| 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. Throughout 2014, GCSWCD intends to renew the MOU with municipalities. 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. The Action Plan is also provided through the SWAC and Mountaintop Supervisors & Mayors Association.

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; the program will be assessed for the 2014 season to determine if adjustments need to be made to meet highway department needs and watershed program goals.

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

GCSWCD Staff: Weyeneth, Terrill

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: Native seed program was initiated in 2008. GCSWCD arranged delivery of 20,000 herbaceous plugs grown from locally collected seeds by Staten Island Greenbelt Center in October 2009. Greene County received 9,800 plugs while the others were distributed to Ulster, Schoharie and Delaware counties. The GCSWCD Plant Material Center received another 10,000 herbaceous plugs and 5,000 Greenbelt tubelings in June 2010, 1,250 RPM trees and shrubs in September 2010, 2,256 Greenbelt tubelings and 1,212 gallon pots from the Greenbelt Center in October 2010. In 2011, GCSWCD will receive 5,000 2-gallon trees and shrubs, 10,000 herbaceous plugs, and 1,500 1-gallon trees and shrubs. In 2012 GCSWCD received 632 Greenbelt plants in the spring and 1,462 in the fall. GCSWCD received 1,811 Greenbelt plants in May 2013. There will be a 2014 spring delivery with approximately 20,000 plants which will need repotted to 2-gallons.

H. WOH Education & Outreach Strategy: The GCSWCD continues to work with NYCDEP and others on a detailed education and outreach strategy for the West of Hudson (WOH) watershed area, incorporating initiatives conducted in the Schoharie basin. 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.

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| GCSWCD Staff: | Yost |
| Project Partners: | NYCDEP |
| Project Funding: | NYCDEP SMP Contracts, WAP, CWC |
| Project Schedule: | WOH E&O Strategy completed, 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 listed below 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.

Section 3. Completed Action Items May 2007 through May 1, 2014

Updated May 15, 2014

NYCDEP Stream Management Program
71 Smith Ave, Kingston NY 12401
David Burns, Project Manager
845.340.7850
dburns@dep.nyc.gov



Greene County Soil & Water
Conservation District
907 County Office Building, Cairo NY 12413
Jeff Flack, Executive Director
518.622.3620
jeff@gcswcd.com



Schoharie Basin Stream Management Program

Action Plan - Completed Action Items May 2007 through May 1, 2014

The *Schoharie Basin Stream Management Program Action Plan* summarizes the programs and projects of the GCSWCD, NYCDEP and Schoharie Watershed Advisory Committee. Completion of these programs and projects leads to successful implementation of Schoharie Basin stream management plans. The first Action Plan was completed in May of 2007, and is updated annually. This document summarizes **completed** action items from the previous action plans (May, 2007 through May 1, 2014).

I. Program Administration

1. **General Contracting Specification (2009):** The GCSWCD went through an RFP process to develop a list of “pre-qualified” contractors for miscellaneous contract work, including installing stormwater management practices, drainage improvements, and stream projects. Having the four pre-qualified contractors will shorten the contracting process in times of emergency, such as following floods.
2. **Inter-Agency Coordination:** Further coordination between the agencies with stream management responsibilities is a key component of SMP implementation. Although this is an on-going activity in Schoharie basin action plans, and everyday interactions among agencies are difficult to account for, the following measurable items have been completed:
 - a. **Riparian Buffer General Permit (2009):** To successfully implement a multi-year riparian buffer program it was necessary to work with NYSDEC, USACOE and NYCDEP to develop a general permit to allow for rapid planning and installation of riparian buffers. The general permit applies to minor (less than 300-ft), short-term impacts such as bank preparation and planting. For more information on the general permit contact GCSWCD.
 - b. **Restoration Project Permits (turbidity controls) (2007):** The GCSWCD and NYCDEP worked with NYSDEC to evaluate alternatives and to offer training to address the complexity of achieving turbidity control during construction. The GCSWCD had two staff members trained as Certified Professional Erosion and Sediment Control specialists, one trained as a Certified Professional in Stormwater Quality and the majority of staff were trained as part of the NYSDEC 4-hour erosion and sediment control certification. In addition, the GCSWCD is qualified to teach the 4-hour E/S control certification. Finally, through DEP, GCSWCD purchased dewatering equipment for stream projects and routinely prepares stormwater pollution prevention plans for all size projects.
3. **Local Adoption of SMPs (April 2009) -** All Greene County municipalities within the Schoharie Basin and sub-basins (Batavia Kill, East Kill, and West Kill watersheds) and the Town of Conesville (Manor Kill) have adopted the relevant SMPs and signed Memoranda of Understanding (MOU) with GCSWCD and SCSWCD, respectively. Annual reviews occur with the municipalities per the MOU and provide an update on current action items within the municipality as well as seek input from municipal officials in identifying potential future projects based on local needs.
4. **Schoharie Watershed Advisory Committee (Organized, May 2008):** The organizational structure of the Schoharie Watershed Advisory Committee (SWAC) was developed in early 2008. After the kick off meeting in May 2008, the SWAC has met regularly throughout the year, developed program materials to initiate a stream management plan implementation funding application process, and identified initial projects for implementation. Although administrative support for the SWAC remains on ongoing activity, the effort to establish local representation and implementation of the SMP, coupled with technical agency support, has been accomplished. For more information: <http://www.catskillstreams.org/SWAC.html>.

5. **Program Office (April 2008):** The GCSWCD and NYCDEP collaborated to establish a project office within the Schoharie watershed. The GCSWCD and WAP identified and secured a Mountaintop project office in Tannersville which is being used by various local, regional, and state committees working on watershed protection (e.g., Schoharie Watershed Advisory Committee, subcommittees of the SWAC, Mountaintop Supervisor & Mayors Association, WOH Education & Outreach committee, Stream Restoration Committee for NJ Chapter of AWRA, to name a few). For directions to the office contact Michelle Yost at michelle@gcswcd.com or 518.589.6871.
6. **Program Administration, Staffing Plan (2007):** To manage the many projects and priorities in the action plan, the GCSWCD needs staffing and resources to provide overall project administration. In 2007, a staffing plan was developed along with a new intergovernmental agreement between the GCSWCD and NYCDEP that began in January of 2009 and will fund watershed activities through January, 2014.

II. Education on Watershed Protection

The GCSWCD continues to work with a wide network of partners to enhance its education and outreach efforts related to stream management, floodplain management, sediment and erosion control and other topics critical to sound watershed management. A number of successful educational projects were completed between May 2007 and May 2013:

1. **Post Flood Stream Intervention Training (2012 & 2013):** GCSWCD presented and/or contributed to five Post Flood Stream Intervention Trainings, held in Ulster, Greene, and Dutchess counties. The training was tailored to local highway departments, excavation contractors, and other involved in stabilizing streams following flood events. The training focused on the basics of stream process and the limits of what should be targeted for repair in the immediate days following destructive flooding.
2. **CD Lane Family Day (2011):** The Community of Windham Foundation (COWF) sponsored a Family Day as part of the 2011 Schoharie Watershed Month (May 2011). The Family Day activities included Trout Unlimited fly fishing demonstrations, water quality testing activities with the Schoharie River Center, nature hikes, kayak demonstrations, and a water-focused craft activity. The Family Day activities were intended to encourage responsible use of water and nearby land areas. Approximately 60 individuals participated in the 2011 Family Day, which was held along Main Street in Windham. This location was chosen (instead of CD Lane Park) in order to increase attendance at, and public participation in, Family Day.
3. **Manor Kill Information Kiosk (2011):** GCSWCD provided a Kiosk for Conesville, and a general Schoharie Watershed/ Schoharie Soil and Water Conservation District educational panel was produced in conjunction with GCSWCD's kiosk series. The kiosk was installed in December 2011.
4. **Identify Existing Resources (2011):** GCSWCD identified and cataloged existing resources that are currently available. The website was revamped in 2011, to provide web-based documentation of existing resources and links to additional resources.
5. **Environmental Film Series (2011 & 2012):** The film series was held at the Doctorow Center in Hunter during the Schoharie Watershed Month. The films highlighted watershed issues, pollution mitigation, and watershed, foodshed, and viewshed topics.
6. **Mountain Top Arboretum Outdoor Classroom Construction (2011):** An outdoor classroom was designed and constructed at the arboretum. The classroom accommodates approximately

45 people for year-round outdoor programming on a range of ecological and natural history topics relating to the watershed.

7. **Schoharie Watershed Months (2011 & 2012):** Schoharie Watershed Week was expanded to one month in 2011. The 2011 Schoharie Watershed Month involved hands-on workshops, stream clean ups, riparian buffer plantings, an Environmental Film Series, and other fun, educational, hands-on activities.
8. **Schoharie Watershed Week (2010):** The first Annual Schoharie Watershed Week was held May 17-23rd, 2010. A number of events were scheduled during the week to educate and engage local community members in watershed programs and stewardship activities.
9. **Batavia Kill Stream Celebration (Aug. 2007, 2008, 2009, 2010 & 2011):** recommended in the BK SMP and organized through a strong partnership of local communities, watershed agencies, non-profit organizations, educators and businesses, the BKSC has become a premier annual environmental event. At its core, the BKSC is about celebrating and promoting the wise use of our natural resources as they relate to water quality and ecosystem functions. Designed to engage people of all ages, especially children, the Celebration offers interactive exhibits, educational displays, and activities promoting understanding of the environment. For more information: <http://gcswcd.com/swp/eo/bksc.html>.
10. **Manor Kill Environmental Study Team/Stream Management Implementation (August 2009 – June 2011):** The Manor Kill Environmental Study Team (EST) Program was an experientially based, hands on environmental education and stream monitoring program. Through this program, youth EST members (ages 13 - 18) learn specific skills, and develop and master abilities in environmental assessments, field research projects and community education activities. The EST also participated in a riparian planting along the Manor Kill in 2011. The program served 20 youth from the Gilboa-Conesville School District and an additional 40 youth from Schoharie, Montgomery and Schenectady Counties.
11. **Watershed Summits (January 2007, 2008, 2009, 2010, 2011, 2012 & 2013):** initiated under the Schoharie Watershed Strategy noted below, watershed conferences were held in January '07, '08, '09, '10 and '11 to provide local decision makers and officials educational classes and networking opportunities around watershed protection. Interest in the Summits is evident by the number and diversity of attendees, with all eleven communities in the basin being represented.
12. **Watershed Tours (2007 through 2010):** Watershed tours were organized in June '07, '08, '09 and '10 as a follow up to the successful Watershed Summits. Recommended by local officials to continue educational outreach on a basin-scale, the tours are designed to demonstrate best management practices to foster an improved understanding of stewardship practices.
13. **Educational Workshops (2007 through May 2013):** although listed as a separate category, educational workshops are built into the Summits and Tours. Targeted audiences included elected and appointed officials, planning boards, code enforcement officers, highway department staff and streamside property owners.
 - a. **Post Flood Emergency Stream Work Training (2012):** The flooding and damage caused by Tropical Storms Irene and Lee led to the coordination and presentation of the emergency stream work training. The training content was developed by a team of contributors from DEP, UCSWCD, GCSWCD, CCE Ulster, Trout Unlimited, and Shandaken Highway Department In the first quarter of 2012. One session of the training was presented in Ulster County on March 20, 2012. Two sessions of the training were presented in Greene County on March 26 and 27, 2012. Over 200 attendees were trained in the basic considerations that should be addressed when planning an emergency intervention in a stream system.

- b. Water Quality at Home Workshops (2011): Two action-based educational workshops were held during Schoharie Watershed Month to help raise awareness about stewardship of water quality. The Holistic Pond Management Workshop provided tools and strategies to address pond problems without the use of chemical treatments. The rain barrel workshop discussed the impacts of stormwater runoff on water quality and taught participants how to build a rain barrel.
- c. Roadside Ditch Maintenance Workshop (2011): NYSDOT, Greene County Highway and most municipalities in Greene County and the Schoharie Watershed attended the Workshop which covered 1) Impacts from roadside ditches on water quality and municipal budgets, 2) General ditch maintenance and importance of proper erosion control, 3) Distinctions with topography, soils, slopes, and drainage; 4) Cost factors, different applications and lifespan; and 5) Selective ditching, how to prioritize to save money and minimize water quality impacts.
- d. State and City Stormwater Regulations (2011): Workshop participants were informed about what triggers a permit and what are permit requirements of NYSDEC, NYCDEP.
- e. What to do After the Flood (2011): Floodplain administrators' and community officials' guide to surviving a flood. NYSDEC.
- f. Mountaintop Mapping (2011): workshop participants learned how environmental mapping software can assist local communities in site planning and subdivision reviews.
- g. Low Impact Development Made Local (2010): how improved site planning can achieve multi objectives for Schoharie basin communities
- h. Implementing SEQRA, basics and determinations (2008, 2009, 2010)
- i. DEP and DEC Stormwater Regulations & Updates (2008, 2009, 2010): Presentation of NYSDEC and NYCDEP stormwater regulations.
- j. Basics of implementing low impact development practices, what communities need
- k. National Flood Insurance Program (2009, 2010): Introductory course on floodplain management NYSDEC
- l. National Flood Insurance Program: Intermediate Course (2009): NYSDEC, course focused on flood insurance maps and elevation certificates; DOS accredited course
- m. Low-Impact Development (2009): an overview of an alternative approach to site planning, design and building that minimizes landscape impacts and preserves the natural hydrological cycle.
- n. Dream Homes & Ditch Nightmares (2009) A skit involving landowners learning about permit requirements when building their dream home - volunteer role playing by audience NYSDEC, DOS approved course
- o. Where Infrastructure & Streams Collide: How to Manage Both Responsibly (2008): how infrastructure and streams are influenced by each and what potential strategies exist for prevention and mitigation of problems where stream instability has impacted infrastructure and vice-versa.
- p. Federal & NYS Wetland Protection & Regulation (2008)
- q. 2008 FEMA Flood Maps: What Every Planner Needs to Know (2008)

- r. What is Turbidity & Why is it Important (2007): an overview of what turbidity is, and the impact it has in the Schoharie Basin.
 - s. Impacts from Road Ditch Erosion (2007): results of a field study on the impact of road ditch instability on erosion and sedimentation.
14. **Japanese Knotweed Mailing (2010):** GCSWCD printed 1000 copies of a revised JKW prevention brochure for distribution to landowners in knotweed prevention areas identified by stream feature inventories. The brochures were mailed to 286 streamside landowners and distributed to 11 municipal town halls (15 copies each).
 15. **Riparian Buffer Workshop (2010):** GCSWCD CSBI sponsored Healthy Buffers, Healthy Streams: A Landowner Workshop July 10, 2010. The interactive workshop was held at the Spruceton Community Center in West Kill and showed participants the characteristics of healthy vs. degraded buffers and different management practices to maintain healthy buffers.
 16. **ESC Workshops (2008 through 2010):** sponsored three Construction Erosion and Sediment Control Training Courses that were attended by approximately 230 people from the Schoharie basin. Participants included watershed developers, planners, code enforcement officers, regulators and contractors. This course focused on the review of new state construction permit, the requirements of stormwater pollution prevention plans, and the proper installation of erosion and sediment control practices.
 17. **Mountain Top Arboretum Outdoor Classroom Design (2010):** Design plans and bid specifications for an accessible outdoor classroom were completed in 2010. Visit <http://www.catskillstreams.org/grants> for project materials.
 18. **Rain Barrel Workshop (2010):** Workshop took place during Schoharie Watershed Week May, 2010. Fifteen people took part in building their own rain barrels.
 19. **Mountaintop Arboretum Wet Meadow – Interpretive Kiosk, Brochures, & Historic Pump House Repair (2010):** A kiosk was installed and brochures were developed to describe the wet meadow including the historical background of the historic pump house, an explanation of the site's hydrology, and other information about wetland plants and wildlife. Visit <http://www.catskillstreams.org/grants> for project materials.
 20. **SWAC and Schoharie Watershed Week Logos (2010):** Logos were developed for the Schoharie Advisory Committee and Watershed Week. Visit <http://www.catskillstreams.org/grants> for project materials.
 21. **Conduct Watershed Survey (2009):** It was decided by the SWAC E/O subcommittee to focus surveys on events; that enough watershed surveys have already been done. No larger survey is expected.
 22. **Websites (2007 & 2010):** although websites require continuous updating, the www.catskillstreams.org and www.gcswcd.com are established sites that are used to promote project updates and share information on watershed protection issues.

III. Landowner Stream Assistance

The GCSWCD and NYCDEP recognize the importance of providing assistance to local landowners. The NYCDEP, GCSWCD and SCSWCD have provided necessary training for project staff to be able to provide state-of-the-art technical assistance throughout the watershed. Technical assistance from staff

members guide restoration of stream system stability and help to maintain ecological integrity. The 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. Completed Landowner Stream Assistance action items include:

1. **Catskill Streams Buffer Initiative Educational Materials (2009):** CRSR, Inc. was awarded a contract in February 2009 to conduct a needs assessment, develop a marketing strategy, and develop initial program roll-out with above mentioned educational materials. Based on a needs assessment conducted by CRSR, the Streamside Assistance Program has been renamed the Catskill Streams Buffer Initiative (CSBI). The Marketing Strategy, Program Slogan, Program Logo, Introduction Language, Program Brochure and Application for funding have all been developed.
2. **Riparian Program Development (2008):** In 2007-08, the Catskill Streams Buffer Initiative (CSBI) was developed to educate and assist streamside landowners in order to provide for improved stewardship of riparian areas. The GCSWCD worked closely with NYCDEP and others to establish program guidelines, policies, protocols and other items required to offer a riparian buffer program to watershed landowners. GCSWCD developed a protocol that utilizes stream feature inventory and vegetation mapping to identify potential riparian planting sites. In addition, GCSWCD, NYCDEP and other agencies and organizations worked together to guide development of the CSBI, develop CSBI Guidelines and GCSWCD hired a program coordinator to guide riparian projects. For more information visit: <http://www.catskillstreams.org/CSBI/>
3. **Plant Materials Program (Progress – 2007 through 2010):** GCSWCD and NYCDEP staff planted RPM trees at the majority of stream restoration projects and are monitoring 10% of the trees at each site. During the fall of 2007, 202 RPM trees were planted on 8 different sites. Sedges were planted in beds during the spring of 2007 and were over-wintered to establish better root growth. The project team also potted 7950 trees during the spring of 2007 and planted the following project sites: 3200 trees at Conine, Prattsville; 124 trees on the two sites of Shadow Mt. Bridge, Jewett and Holden, Ashland; 1000 trees at Accardi, Jewett; and 400 trees at Ashland Connector, Ashland. The GCSWCD over wintered approximately 3000 trees each year for spring plantings. In addition, the project team utilized balled and burlaped trees that were obtained from the Plant Materials Center. The native seed program was initiated in 2008. GCSWCD arranged delivery of 20,000 herbaceous plugs grown from locally collected seeds by Staten Island Greenbelt Center in October 2009. In 2009, approximately 9,000 trees and shrubs were over-wintered, and 13 planting sites were planted with 4,135 trees and shrubs. Over 1,500 trees were ordered in the spring of 2010. The GCSWCD Plant Material Center received another 10,000 herbaceous plugs and 5,000 Greenbelt tubelings in June 2010, 1,250 RPM trees and shrubs in September 2010, 2,256 Greenbelt tubelings and 1,212 gallon pots from the Greenbelt Center in October 2010.
4. **Catskill Stream Buffer Initiative Projects:** For additional information and project reports visit <http://www.catskillstreams.org/projectmaps/>
 - a. Dodson/McCloskey Property Planting Phase 2 (2013): GCSWCD re-installed a 100 ft. wide riparian buffer along 300 feet of stream including, 250 native trees and shrubs and 25 willow stakes, in the fall of 2013.
 - b. Wilkie Riparian Project (2013): GCSWCD has a 5 year landowner agreement for this property. GCSWCD installed 75 willow stakes and 15 native trees and shrubs along 150 feet of stream in the fall of 2013.
 - c. Donnelly Riparian Project (2013): GCSWCD has a 5 year landowner agreement for this property. GCSWCD installed 125 willow stakes and 117 native trees and shrubs along 250 feet of stream in the fall of 2013.

- d. Enochty Property Planting (2013): GCSWCD has a 5 year landowner agreement for this property. GCSWCD installed 30 willow stakes and 25 native trees and shrubs along 100 feet of stream in the fall of 2013.
- e. Mayo Property Planting (2013): GCSWCD has a 5 year landowner agreement for this property. Riparian Corridor Management Plan is complete. 300 willow stakes were installed along 200 ft. of streambank; 94 native trees and shrubs were installed; 0.23 acres of streamside habitat was seeded.
- f. Higgins Property Planting (2013): GCSWCD has completed a Riparian Corridor Management Plan for this property and obtained a 10 year landowner agreement for this property. 60 willow stakes and 49 trees and shrubs were installed in the fall of 2013.
- g. Cole Property Planting (2012): GCSWCD has a 5 year landowner agreement for this property. The Riparian Corridor Management Plan is complete. A subcontractor was hired to grade 300 ft. of streambank along the West Kill prior to planting. GCSWCD planted 225 trees and shrubs and, 200 willow stakes and 300ft of fascines were installed along 350 ft of the right streambank.
- h. Bardfield Property Planting (2011): GCSWCD has a 5 year landowner agreement for this property. Riparian Corridor Management Plan is complete. Project planned for the installation of 465 trees, shrubs and willow stakes to create a 35ft. wide riparian buffer along approximately 850 feet of the East Kill in the spring of 2011. Installed 432 trees and shrubs with 20 NYC students on May 5th, 2011. Planting area was 700 feet long and 35 feet wide. Many of the trees were lost to post-flood management activities in the fall of 2011.
- i. Rivera Property Planting (2011): GCSWCD has a 5 year landowner agreement for this property. Riparian Corridor Management Plan is complete. Project planned for the installation of 514 trees and shrubs in the spring of 2011 in two separate planting areas along the East Kill. One planting area is 200ft by 50ft. The other is 250ft by 90 ft. In addition, another 500 feet of streambank will be seeded with a riparian buffer mix and staked with willows. GCSWCD installed 506 trees and shrubs, 500 willow stakes, and 50 lbs. of seed. Most trees were lost to post-flood management activities in the fall of 2011.
- j. Slutzky Property Planting (2011): GCSWCD has a 5 year landowner agreement for this property. Riparian Corridor Management Plan is complete. Project planned for the installation of 1,484 trees and shrubs in the spring of 2011 next to a parcel that was planted by GCSWCD in 2009. Installed 793 trees and shrubs on May 13th, 2011 with 15 high school students from Gilboa-Conesville CSD. Planting area was 950 ft. long and 50 ft. wide.
- k. Kelly Property Planting (2011): GCSWCD has a 10 year landowner agreement for this property. Riparian Corridor Management Plan is complete. Project planned for the installation of 97 trees and shrubs along 250 ft. to create a 25 ft. riparian buffer in the spring of 2011. Installed 94 trees and shrubs.
- l. Cervini Property Planting (2011): GCSWCD has a 5 year landowner agreement for this property. Riparian Corridor Management Plan is complete. Installed 275 trees and shrubs.
- m. Torsiello Property Planting (2011): Flooding, due to Tropical Storm Irene, caused woody debris jam on property. Stream channel was repaired by town highway department.

GCSWCD has a 5 year landowner agreement for this property. CSBI installed 275 trees and shrubs.

- n. Hegner Property Planting (2011): This property is adjacent to Torsiello, where stream channel was repaired by the town highway department. GCSWCD has a 5 year landowner agreement for this property. Installed 175 trees and shrubs.
- o. Manor Kill Gentile Property Planting (2010): Catskill Streams Buffer Initiative Pilot. SCSWCD has a 5 year landowner agreement for this property. Riparian Corridor Management Plan is complete. 292 trees, 50 willow stakes, and 500 sedge plugs were installed in November 2009. 100 additional willow stakes were installed spring (2010).
- p. Manor Kill Brandow Property Planting (2010): SCSWCD has a 5 year landowner agreement for this property. Riparian Corridor Management Plan is complete. 50 trees, 100 willow stakes/tubes, and sedge plugs were installed spring (2010).
- q. Manor Kill Quinn Property Planting (2010): SCSWCD has a 5 year landowner agreement for this property. Riparian Corridor Management Plan is complete. 100 trees, 80 willow stakes/tubes, and 100 sedge plugs were installed spring (2010). Approximately 50 – 100 Japanese knotweed plants were removed from the site.
- r. Dodson/McCloskey Property Planting (2010): GCSWCD has a 10 year landowner agreement for this property. Riparian Corridor Management Plan is complete. 300 Trees, shrubs, and weed mats were installed on 6/11/2010 to create a 100 ft. wide riparian buffer along 300 ft. of the East Kill. GCSWCD contracted Bevan Forestry to control a patch of Japanese knotweed. 25 JKW stems were injected with Aqua Master. Some follow up will be required to monitor JKW.
- s. Rappleyea Property Planting (2010): GCSWCD has a 5 year landowner agreement for this property. Riparian Corridor Management Plan is complete. 150 trees and shrubs were installed on 6/10 and 6/11 2010.
- t. Avella Property Planting (2010): GCSWCD has a 5 year landowner agreement for this property. Riparian Corridor Management Plan is complete. 26 trees and shrubs were installed 6/24/2010.
- u. Brunsdon Property Planting (2010): GCSWCD has a 5 year landowner agreement for this property. Riparian Corridor Management Plan is complete. 54 herbaceous plugs, 22 willow stakes, 5 shrubs, and 2 trees installed on 8/18/2010.
- v. Grossman Property Planting (2010): GCSWCD has a 5 year landowner agreement for this property. Riparian Corridor Management Plan is complete. Installed a 50 ft. riparian buffer. 198 trees and shrubs were planted 5/27/2010 along 300 ft.
- w. Silver Property Planting (2010): GCSWCD has a 5 year landowner agreement for this property. Riparian Corridor Management Plan is complete. GCSWCD removed fence, graded 60 ft. of streambank, planted 25 trees and shrubs, and installed 30 willow stakes on 5/27/2010.
- x. Evergreen Planting (2009): Town of Hunter: The GCSWCD/NYCDEP worked with the landowner to develop a planting plan and to obtain a landowner agreement for the property. The Catskill Streams Buffer Initiative (CSBI) riparian planting project was completed in April 2009.
- y. Kastanis Property Planting (2009): Catskill Streams Buffer Initiative Pilot - Obtained 5-year landowner agreement, completed a riparian corridor management plan and restored

approximately 7.1 acres of streamside vegetation along the Batavia Kill, including hosting school groups in the effort and planting ~1,500 trees and shrubs.

- z. Kane Property Planting (2009): GCSWCD has a 10 year landowner agreement for this property. Riparian Corridor Management Plan is complete. 116 trees and 250 willow stakes were installed in November 2009.
- aa. Manor Kill Grogan Property Planting (2009): SCSWCD has a 5 year landowner agreement for this property. Riparian Corridor Management Plan is complete. 54 trees and 500 sedge plugs were installed in November 2009.
- bb. McRoberts Property Planting (2009): GCSWCD has a 10 year landowner agreement for this property. Riparian Corridor Management Plan is complete. 50 trees and shrubs and 125 willow stakes were installed in November 2009.

5. Additional Riparian Buffer Pilot Projects

- a. Carr Road Project (2007-2009): Town of Jewett- Schoharie Creek: The Carr Road riparian project extends over 2,300 feet of the Schoharie Creek in the Town of Jewett. Initiated in 2007, the project had three strategic components: stem injection treatment of Japanese knotweed (*Polygonum cuspidatum*) with glyphosate (Glypro) to prepare the locations for replanting with native vegetation, planting of a 100 foot wide buffer strip from the top of the streambank establishing approximately 2.4 acres of buffer, and enhancing the existing buffer on the immediate streambank by tapering the bank and planting willow tublings and stakes. In 2009, improvements were made to the DEC fishing access parking area and a walking path was improved to the stream.
- b. Deming Road Riparian Project (2009): A stream disturbance permit application has been prepared and submitted to NYSDEC for review and approval. Grading work on an eroded bank was funded jointly by two neighboring landowners and was completed by C&C Excavating in June 2009. During completion of the original project scope, a third landowner approached GCSWCD interested in planting a riparian buffer in open fields adjacent to the original project area. GCSWCD was able to accommodate the additional landowner's request. 723 trees and shrubs and 120 willow stakes were installed on three contiguous parcels.
- c. County Route 6 (2008): Town of Lexington-West Kill: The GCSWCD and the Greene County Highway Dept worked together to implement vegetation stabilization methodologies at a site on the West Kill that was previously scheduled for all rip-rap. Along this site, a short section of Vegetation Reinforced Slope Stabilization (VRSS) was installed, and trees and shrubs were planted on the upper bank; willows were interplanted with the rip rap.
- d. Vegetation Enhancements (2008): Batavia Kill, West Kill, Schoharie Creek and Manor Kill: Root Production Method (RPM) trees were planted at Big Hollow, Brandywine and Ashland Connector. A certified herbicide applicator treated Japanese knotweed at Big Hollow, Carr Rd., Schoharie Ave. and Long Rd. project sites. DEP conducted monitoring of vegetative techniques on a majority of these projects. Vegetation was installed as an enhancement to a Greene County Highway project in the West Kill (County Route 6) and at a FEMA project along the mainstem of the Schoharie Creek (Faulkeys). Sedges were added to the County Route 13 culvert project that was completed in 2007. Sedges are excellent at holding soil. Finally, a volunteer planting was conducted in the Manor Kill behind the Conesville town hall.

- e. Sugar Maples Riparian Buffer Project (2008): Town of Windham (Batavia Kill). The GCSWCD has received funding from the ACOE (WRDA) for a project to treat invasive Japanese knotweed and then replant ~ 800' for riparian vegetation along the Batavia Kill.
 - f. Riparian Buffer Implementation pilot (2007): The GCSWCD/NYCDEP researched a protocol for identifying potential planting sites based upon stream management planning research. In addition, the GCSWCD approached five of the identified parcel owners and moved forward with the Carr Road riparian restoration project.
 - g. Shadow Mountain (2007): Town of Jewett-East Kill: The GCSWCD planted 124 trees and shrubs, hydroseeded and interplanted the rip rap at the Greene County Highway Department bridge replacement in Jewett over the East Kill.
6. **Stream Restoration Projects:** For additional information and project reports visit <http://www.catskillstreams.org/projectmaps/>
- a. NYS Route 42 West Kill Slope Failure (2013): The GCSWCD/NYCDEP and partners (NRCS, Town of Lexington) completed this stream restoration project in 2013. This EWP project was constructed in 2013. The project addresses a large slope failure along a 1400' reach of the West Kill, just downstream of the Pushman Bridge on NYS 42. The project included stream bank and channel excavation, and the installation of in-stream stabilization structures to achieve stable geometry. Practices include rock riffles, to provide grade control throughout the reach, random boulder clusters, which provide channel roughness, as well as the use of log boulder revetment and dry rock rip rap with willow stakes to establish an armored flood plain bench at the toe of the slope to prevent future erosion along the toe. Upper portions of the slope were hydroseeded and staked to establish vegetation on the eroded barren hillside. Construction was completed in 2013. As-built survey and plans have been prepared for the project and they have been approved by NRCS.
 - b. East Kill Restoration at Apple Hill (2012): The GCSWCD/NYCDEP completed this stream restoration project in 2012; project components included the realignment and resizing of 3,500 feet of channel, the installation of 23 rock structures, and installation of extensive bioengineering treatments and riparian plantings over the 11 acre site. These efforts will improve water quality, reduce risk to humans and property, reduce erosion and excessive sediment loading, restore floodplain function, and improve aquatic and terrestrial habitat. The site included two large active mass failures, measuring approximately 300 feet long, and several hundred feet of exposed streambank. Historic channel instability, caused from ineffective land use management and flooding, started both mass failures and accelerated stream instability in the reach. Historic efforts to control the reach included berming, stream dredging and bank armament. Soil borings confirmed the upstream mass failure generated serious risk to two homes, a barn and septic system, causing risk to humans, property and water quality. This project mitigated the hazard to the homes by realigning the channel away from the slope and providing armament of the toe of the slope. Due to the extensive damage to the barns foundation, the homeowner demolished and removed the structure from the slope and a new septic system was installed on the newly stabilized slope. The lower high bank failure was also stabilized by re-grading the bank to a lower stable slope, realignment of the channel away from the toe of the slope, and the installation of slope drains to remove excessive water in the slope. Several rock structures and bioengineering treatments were also installed to provide long term stability to the bank. Project combined two SMIP projects: Nikolaidis and Kirk/Rotella landowner assistance projects.
 - c. Windham Country Club Repairs (2012): Windham – Batavia Kill: Damages sustained at the Windham Country Club along the Batavia Kill are scheduled for repair work in 2012. Topographic data is being collected to support cost, material and labor estimates for

implementation of the repair work. GCSWCD will be providing technical support to this project due to the extensive damage that occurred along the stream corridor.

- d. Holden Stream Restoration Project (2011 - 2013): The GCSWCD/NYCDEP completed Phase 1 of the project in 2011, continued construction was postponed due to Hurricane Irene. Project construction was completed in 2012. The project included streambank and channel excavation to achieve stable geometry, installation of in-stream stabilizations structures and a variety of bioengineering techniques along 3,500 feet of stream channel; over 6,000 trees were planted along the restored stream channel.
- e. Vista Ridge Floodplain Restoration (2011): The GCSWCD/NYCDEP completed construction of this stream restoration project in 2011. This project improved the immediate project area and the aggraded reach upstream, by reducing a backwater condition at the Vista Ridge bridge. The project also enhanced the riparian buffer, reduced the risk of failure of Vista Ridge and Colgate Lake Roads, reduces erosion of silts and clays and provides for improvement of the habitat value of the reach.
- b. Wright Stream Bank Stabilization/Riparian Project Enhancement (2011): In 2011, the GCSWCD/NYCDEP modified and enhanced the previously constructed project with additional vegetative treatments. Monitoring will be initiated in 2012.
- c. Wright Stream Bank Stabilization/Riparian Project (2010): The GCSWCD/NYCDEP constructed a bankfull bench (~1,200') and re-vegetated approximately 3,127 feet of streambank. Rock installation was completed by the project contractor, while plantings were installed by GCSWCD staff and SCA Members during an SCA service project hosted by GCSWCD.
- d. Sugar Maples Stream Restoration (2010): Batavia Kill Tributary, Town of Windham: The GCSWCD/NYCDEP removed mortared stone walls that confined a Batavia Kill tributary and restored the stream to a natural shape and meander pattern. Floodplain grading was performed and the entire site was seeded with wetland and riparian seed mixes. GCSWCD hosted a student planting with three schools to install 1584 herbaceous plugs, 340 willow stakes, 250 trees and shrubs, and 7 willow fascines. This project was designed to restore wetland functions and approximately 700 feet of stream that was historically channelized and confined by mortared stone walls.
- e. Windham Golf Course Streambank Project (2009): This was primarily a CWC Stream Corridor project with GCSWCD assistance. The project provided for the removal of failed sheet piling, armoring of the toe and sloping of the bank, and planting of approximately 155 feet of streambank.
- f. West Kill Restoration Project, Long Road (2009): Town of Lexington: The GCSWCD/NYCDEP has completed a full geomorphic restoration of approximately 2,400 linear feet of stream on the West Kill in Spruceton valley. The site was characterized by significant bank failure and clay exposures in the banks and stream bed. This was implemented in 2009. Wetland delineation, archaeological investigation and final survey of the site were conducted. Project design work is complete and construction was finished in October 2009.
- g. Oakwood Pistol Club (2009): GCSWCD led the CWC Stream Program streambank protection project in the Town of Prattsville. A CWC Stream Corridor Protection Grant had been applied for in the amount of \$99,200 and was awarded by CWC. Engineering services were contracted for this project; design plans and specifications are complete and have been submitted for permit. Construction of this project was completed in Summer 2009.

- h. Schoharie Street Stabilization (2009): Village of Hunter: Stabilization of approximately 120 feet of high stream bank to protect infrastructure and private property. Project includes stacked and pinned rock riprap as well as vegetated beds. The GCSWCD and NYCDEP also added additional riparian buffer plantings on the opposite bank. Project construction is complete. Additional plantings were installed in the fall of 2009. The new plantings were balled and burlapped River Birch trees.
 - i. Conine Farm Stream Restoration (2008): Town of Prattsville -Batavia Kill: The GCSWCD/NYCDEP completed a full geomorphic based restoration of a +/-1800 foot reach on the lower Batavia Kill. The project addressed severe slope instability, reduced sediment loading and protected private property.
 - j. County Route 13a Culvert Upgrade (2007): Town of Lexington: The GCSWCD/NYCDEP worked with the Greene County Highway Department to upgrade a significantly undersized culvert that was the source of repetitive flooding in the Hamlet of Lexington. The project had excellent community and landowner support and demonstrated floodplain drainage concepts, proper conveyance sizing to allow fish migration and a riparian buffer component.
 - k. Holden Stream Restoration (2007): Windham - Batavia Kill: In 2007, a NYS DOT Article 15 stream disturbance permit was flagged by DEC Region 4 for potential inclusion of a natural channel design approach. NYS DOT welcomed the design and implementation assistance of GCSWCD for this sensitive reach. The project established a geomorphically appropriate channel and floodplain bench and included riparian plantings which restored floodplain function in an area that would have simply been armored with rock.
7. **Completed Modifications of Existing Projects:** The Schoharie Stream Management Program routinely inspects and monitors previously completed projects for 10 years post-construction. . Inspections often lead to adjustments to structures. , replace vegetation, and/or control invasive species. For additional information and project reports visit <http://www.catskillstreams.org/projectmaps/> Tasks completed under this action item include:
- a. Conine Project Repairs (2013): The GCSWCD/NYCDEP completed this stream restoration project in 2013. Brief Description: The Conine Stream Restoration Project is located in the lower Batavia Kill along NYS Route 23 in Prattsville, NY. The purpose of this work was to repair a project, originally constructed in 2007, that experienced extensive damage during tropical storm Irene in 2011. Evidence suggests that the magnitude of Irene, and failure of an upstream culvert and section of NYS Route 23, were primary contributors to the damages and excessive sedimentation that occurred at the site. The repair project commenced in August of 2013, and measured approximately 2,200 linear feet in length, with a disturbance area of approximately 11 acres. The proposed earthwork required the stream channel to be dewatered throughout construction; this was achieved by diverting flow through a passive dewatering channel and pumping. Extensive earthwork was required to restore the reach to original grades, and included excavation and placement of over 52K cubic yards of material. To provide channel grade control, stabilize stream banks, and enhance habitat, the project included the repair and reconstruction of five rock j-hook vane structures, two cross vane structures and a constructed riffle. To improve stream bank stability through the reach, additional biotechnical measures were installed including, 6,100 live stakes and posts and 6,000 feet of live fascines. Vegetative restoration included seeding of native riparian and wetland seed mixes and establishing a 7.10 acre riparian zone planted with 5,560 potted trees and shrubs. The work impacted approximately one acre of existing impacted low quality scrub shrub wetland that was mitigated with over 2.5 acres of native scrub shrub wetland in the northern floodplain. The project, completed in October 2013, cost

approximately 872 K; funding was provided by FEMA and NYCDEP. Bioengineering measures and riparian vegetation were installed to achieve revegetation and provide long term stability goals, objectives and permit requirements.

- b. Maier Farm Project Repairs (2013): The GCSWCD/NYCDEP completed this stream restoration project in 2013. The Maier Farm Stream Restoration Project is located in the middle Batavia Kill along NYS Route 23 in Ashland, NY and measured approximately 800 linear feet in length. The purpose of this work was to repair a portion of a project that was originally constructed in 1999 and sustained damages during tropical storm Irene in 2011. Damages included streambank erosion, structural damage to rock structures, channel migration and land loss, and excess sedimentation. These impacts left the reach prone to future erosion which may affect water quality and habitat. An objective of the repair was to recreate the appropriate channel dimension, pattern and profile through the reach. This earthwork required dewatering of the stream channel throughout construction; stream flow and turbid water were collected from within the work area and pumped to temporary settling areas. Extensive earthwork was necessary to restore the reach to original grades, and included the excavation and the placement of 6K cubic yards of material. To provide channel grade control, stabilize stream banks, and enhance habitat, work included the reconstruction of two rock j-hook vane structures and repair of one cross vane structure. To substitute the loss of two rock vanes, and to provide additional resistance to erosion and channel migration into an adjacent agricultural field in the lower meander, a 400 foot long section of live stone revetment was installed; this was an enhancement to the original design. Additional bioengineering measures were installed to strengthen streambanks including, 1,000 live stakes and posts, and 1,000 feet of live fascines. To establish a one acre riparian zone, vegetative restoration included seeding of native riparian grasses and the installation of 1,000 tree and shrub saplings. The project, completed in October 2013, cost approximately 273K; funding was provided by FEMA and NYCDEP. Bioengineering measures and plantings and vegetation were installed to achieve revegetation and provide long term stability goals, objectives and permit requirements.
- c. Ashland Connector Reach (2008): (Town of Ashland (Batavia Kill): The GCSWCD completed planting on the streambanks and floodplains at the lower end of the project reach. Additionally, compensatory wetland areas were planted with appropriate species. Limited site cleanup work on access/staging areas was also completed, and the project was surveyed as part of the routine project monitoring schedule.
- b. Farber Farm Stream Restoration (2008): (Town of Jewett (East Kill): Following flooding in 2005 and 2006, excessive erosion resulted in damage to the Farber farm project grading and rock structures. Several rock structures experienced damage as a result of the flood flows which peaked at over 3000 cfs. The damaged structures include 4 rock vanes and 2 cross vanes. The site was originally revegetated through the Conservation Reserve Enhancement Program (CREP). The CREP seedlings never became established, which limited project success and, the lack of vegetation may have contributed to the overall project damages. This project included: removal or modification of damaged rock and cross vanes; treatment of the back channel area to reduce frequency of flows in the back channel and to promote the use of the primary channel; bank grading and vegetative stabilization to reduce erosion; and establishment of a riparian buffer along the restored reach. In addition to the vane retrofits, a bankfull bench was added, 1,179 larger trees were planted, willow stakes and approximately 1000 feet of willow fascines were installed, and numerous shrubs, sedges and herbaceous seed were planted throughout the site.
- c. Broadstreet Hollow Stream (BSH) Restoration Project Repairs (2008): (Town of Hunter, (Esopus Basin): The January 1996 flood caused excessive erosion along a 1,100' section of BSH. The initial restorative action by the USDA Natural Resource

Conservation Service (NRCS) resulted in considerably more damage to this unstable reach. In addition to the damage to streamside residential property, extensive exposures of glacial lake clays and a “mudboil” caused chronic turbidity in BSH from continually entrained suspended sediment. The “mudboil” is a “relief valve” for artesian groundwater conditions, originating in the adjacent failing hillslope. In 2000, the GCSWCD restored the project reach again. There were two main components to the project: (1) stream channel restoration using natural channel design techniques to address erosion and channel instabilities; and (2) a geotechnical investigation of the adjacent hillslope with installation of dewatering wells to reduce the potentiometric pressure driving the artesian conditions. The April 2-3, 2005 flood caused damage to both project components. Two of the three dewatering wells were damaged and now fail to relieve the artesian conditions. Consequently the mudboil has returned and has been present off and on since then. In 2008, the GCSWCD modified the damaged rock structures, and hired a well drilling subcontractor to attempt to rehabilitate the dewatering wells. The subcontractor found the well heads had been broken and that they couldn't be rehabilitated. After reviewing options, the decision was made to abandon the wells and monitor the project's stability. Installing new wells would have required a large disturbance to the existing forest and continual maintenance; this wasn't the most palatable option for the landowners. The GCSWCD and DEP will continue to monitor the project's stability.

- d Lanesville Stream Restoration Project Repairs (2008) (Town of Hunter (Esopus Basin): In 2008, repairs were made on the Lanesville Demonstration Stream Restoration Project. Most adjustments were associated with gullyng on a high slope failure caused by poor drainage on the terrace above the slope, which had not been addressed as part of the restoration project. Some adjustments were made in the elevation of rock vanes protecting the base of this slope, and additional bioengineering was added to mitigate the gullyng.

IV. 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 state-of-the-art 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. Completed stormwater and critical area seeding projects include:

1. **Mountain Top Highway Ditch Re-vegetation Program (2011):** Program to encourage greater use of critical area seeding equipment that the GCSWCD has available for highway departments by offsetting the cost of seed and mulch. In 2011, GCSWCD worked with highway departments, seeding 3 miles of roadway ditches.
2. **Mountain Top Library & Learning Center (2011):** (Town of Hunter, Village of Tannersville) The GCSWCD worked with the Mountain Top Library Capital Campaign on a stormwater retrofit project. Located in the Village of Tannersville, this project was initiated in conjunction with the rehabilitation of a building that will be used as a Mountain Top Library and Learning Center. The project used innovative methods to meet water quality treatment standards for runoff from roofs and parking. The site presented space challenges and serves as an excellent demonstration project for integrating stormwater management in an area with limited space. In addition, the project offers substantial educational opportunities on stormwater impacts and integrating stormwater management practices during the redevelopment project.
3. **Sugar Maples Stormwater Project (2010):** GCSWCD installed stormwater treatments to serve approximately 4.7 acres of relatively high-density commercial buildings and residential homes in the hamlet of Maplecrest in the town of Windham. The components were initiated with an upgraded conveyance system and demolition of a single building to reduce

impervious surfaces and to allow for construction of the pervious grass parking area. The project was completed with the installation of a permeable grass parking lot (~2,400 sq. ft.), rain gardens (7 total), wetland (treats 4.7 acres of runoff), porous walkways and riparian planting beds. Supplemental plantings performed in the rain gardens and wetland in spring 2011. For additional information and project reports visit <http://www.catskillstreams.org/projectmaps/>

4. **Hunter Mountain: (Village of Hunter) (2009):** Following discussions between the GCSWCD and Hunter Mountain it was determined that Hunter Mountain had already received funding through the CWC Stormwater Program and completed stormwater retrofits for their parking areas.
5. **Community Stormwater Planning (2009):** The GCSWCD has initiated a series of projects which to help develop Community Stormwater Management Plans for various Towns and Villages within the Schoharie Basin. The GCSWCD has detailed information on stormwater structures in a GIS format for the Towns of Ashland and Prattsville. GCSWCD has also obtained copies of Community Stormwater Management Plans which have been completed for the Village of Tannersville, Town of Hunter, and Town of Windham.
6. **Hunter Highway (2008):** Provided Operation and Maintenance Plan and implemented stormwater maintenance and cleaning of the stormwater controls at the Hunter Highway Garage. Annual maintenance in 2008 captured 6.3 tons (3.6 cubic yards) of sand and salt from entering the downstream Schoharie Creek.
7. **Critical Area Seeding (2007-2010):** GCSWCD provided seeding assistance in the Towns of Hunter, Ashland, Tannersville, Jewett, and Lexington in 2007; the Towns of Windham, Ashland, Jewett, and Hunter in 2008; the Towns of Windham, Hunter, Ashland, Hunter and Lexington in 2009; the Towns of Lexington, Windham, Tannersville and Hunter in 2010.

V. Highway and Infrastructure Improvements

During development of Stream Management Plans 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. The following were completed between 2007 and 2013:

1. **Griffin Road Culvert Replacement (2012):** The existing culvert conveyed Halsey Brook under Griffin Road in the Town of Jewett was undersized (<10 year capacity) and washed out during the flooding caused by Hurricane Irene. The culvert historically has caused flooding and repetitive damage to nearby homes and significant risk to the community. GCSWCD and Delaware Engineering provided design plans, permits, specifications and contract documents for bidding, funding, construction management and administration for the culvert replacement for the Town of Jewett Highway Department. The new culvert was designed to convey the 100-year runoff event and included a habitat friendly three-sided precast concrete structure with wing walls at the inlet and outlet. Road improvements to provide a stable surface for Griffin Rd over the culvert were installed and stream enhancements to the adjacent reaches included the installation of an upstream cross vane to improve alignment and conveyance of water and sediment through the opening. A grant was approved by FEMA to offset the costs of upgrading the culvert to a larger size and funding from NYCDEP provided the engineering, oversight and other incidentals for the project. Design, permitting and construction were completed in the fall of 2012.
2. **Flood Response (2012):** A site visit was conducted in April 2010 to an East Kill tributary that is frequently dredged under Griffin Road in the Town of Jewett. Hurricane Irene completely destroyed the crossing and GCSWCD staff assisted the Town in constructing a temporary crossing. The new three sided structure is durable, made of concrete, will pass flows above the 100-year runoff event, and will have limited impact on upstream and downstream reaches and aquatic habitat. Design, permitting and construction were completed in 2012.

3. **Partridge Road Culvert Replacement (2011):** The culvert under B.G. Partridge Road, in the Town of Ashland, was undersized which contributed to roadway flooding during high flows. The culvert was also perched, which presented a barrier for fish passage. The GCSWCD worked with the Town of Ashland Highway Department to design a properly sized culvert and oversee the installation of this culvert. A grant was approved by the SWAC/SMIP to offset the costs of upgrading the culvert to a larger size. Design, permitting and construction were completed in the summer of 2011.
4. **Village of Tannersville Highway Department Technical Assistance (2011):** The Village of Tannersville requested assistance on sizing a culvert under Spring Street in the Village of Tannersville. The GCSWCD inspected the existing culverts under the road and provided the village with a variety of culvert sizing options which would increase the flow capacity of the culvert system. The information forwarded to the Village of Hunter Highway Department in March 2011.
5. **Road Abrasives Program (2009):** Upon further review with local and county highway departments, cost sharing for road abrasives was determined to be unfeasible due to limited funding available to support offsetting costs over time.
6. **Driveway/Curb Cut Specifications (2009):** Permit specifications were obtained from the Greene County Highway Department and given to the Highway Subcommittee in December 2009 in order to provide watershed communities with a model to consider when issuing permits. Each community will follow up based on their level of comfort. Some communities do not use driveway regulations, preferring to assess on sight and guide landowners. Communities and landowners may obtain additional assistance by contacting the GCSWCD WAP office if they are interested in updating curb and driveway standards.
7. **Hydraulic Analysis (2008):** Provided technical assistance including hydrology and hydraulic assessment to better size culverts for Greene County Highway Department.

VI. Planning and Assessment

Assessment of previous projects and programs and land use planning are key components to a watershed program. Planning and assessment conducted through the stream management program ranged from land use planning, assessment of streams and their watersheds, and the survey and monitoring of various locations and project sites. Completed Planning and Assessment action items include:

1. **Water Temperature Impacts on Fisheries Study (2014):** The Greene County Soil & Water Conservation District and NYC Department of Environmental Protection worked with the United States Geological Survey (USGS) and the Rochester Institute of Technology (RIT) to determine the location of thermal refugia, which are important to cold water fish communities during the summer months. The study was conducted to inform and guide entities whose activities may impact cold water inputs. In 2012, RIT conducted the imagery collection flight and submitted their report, *Aerial Thermal Imaging of Select Streams In Greene County*. In 2013, the USGS analyzed and summarized the imagery data. In 2014, the USGS submitted their final report *Variations in Water Temperature and Implications for Trout Populations in the Upper Schoharie Creek and West Kill, 2010-2012*.
2. **Mountaintop Better Site Design Plan Workshops (2011 & 2012):** The Greene County Soil & Water Conservation District's Watershed Assistance Program, Kendall Stormwater Services, and Morris Associates worked with the following mountaintop communities, Towns of Ashland, Jewett, Lexington, Windham and Hunter, and the Village of Tannersville. For each community, consultants conducted a comprehensive code review against model development principles; helped to identify which principles to address for local improvement; developed a Low Impact

Development Manual for communities to use in site planning, and to share with landowners and developers; and developed an education packet for easier reference. Final reports were provided to the communities highlighting code recommendations specific to that community, as identified by those community participants. Communities are expected to review recommendations and adopt supported changes at the local municipal level. More information can be found at <http://www.gcswwd.com/swp/wap/mbsd>.

3. **Town of Hunter Corridor Regional Planning Study (formerly called Generic Environmental Impact Statement) (2010):** The GCSWCD worked with the Town of Hunter and the Villages of Tannersville and Hunter to undertake a Corridor Study that entailed a comprehensive assessment of potential future development along the state route 23A corridor. The Corridor Study is a cooperative, multi-municipality effort to evaluate foreseeable development and environmental mitigation associated with future development. The full report with appendices can be found at <http://gcswwd.com/swp/wap.html>.
4. **Dale Lane Survey and Hydraulic Analysis (2010):** Site survey was completed in 2009. Hydraulic analysis using HEC RAS was completed in spring 2010. A report was prepared detailing the results of the hydraulic model.
5. **Mauro Residence Bank Stabilization (2010):** This project involved a geotechnical assessment of a failing streambank in relation to a private residence. A site visit with an engineer was completed April 27, 2010. The engineers report stated that the residential structure was not currently threatened by the slope condition. A copy of the report was provided to the home owner and the bank was seeded and mulched.
6. **Lexington Sill (Schoharie Creek) (2010):** Upon assessment, it was determined that the removal of the sill would have little impact on the stream. No further action is expected.
7. **Tributary Assessment and Planning Projects (2010):** Historical alignments, riparian vegetation mapping, watershed analysis, stream feature inventory and Geodatabases have been completed for Batavia Kill Tributaries North Settlement Creek, Furnace/Red Falls Creek and Mad Brook. Management Plans are scheduled to be completed in 2013.
8. **Manor Kill Stream Management Plan (2009):** In 2008, a stream feature inventory, riparian vegetation mapping and significant portions of a stream management plan were completed. The Manor Kill Management Plan was completed in early 2009, and the Town of Conesville adopted it and signed an MOU for implementation with the Schoharie County SWCD. This project also offered an opportunity to expand partnerships, and planning area, to include the Schoharie County Planning Department and Soil and Water Conservation District. For complete plan visit: http://www.catskillstreams.org/Stream_Management_Plans.html
9. **Mountaintop Recreation Master Plan (2009):** Report available at: <http://gcswwd.com/swp/wap.html> The GCSWCD WAP worked with numerous public and private sector partners to develop a comprehensive master plan that focuses on recreation, and also includes open space, scenic quality and cultural resources. Two implementation subcommittees are working on marketing and coordinating projects and outdoor resource improvements that promote access to, and appreciation of, the mountaintop's natural environment including stream systems.
10. **Greene County All Hazards Mitigation Plan (2009):** In the past, access to federal Hazard Mitigation Grant funds has helped the GCSWCD to mitigate significant flood related problems in Greene County. Since 1996, the GCSWCD has accessed over \$1,000,000 in funds from this program for major projects in the Village of Hunter (Melody wood condominiums) and Town of Lexington (West Kill Stream restoration). New FEMA program rules prohibit access to these funds unless a community has a FEMA approved All Hazards Mitigation Plan in place. The Greene County Planning Department, GCSWCD and NYCDEP interviewed potential

subcontractors and awarded the development of the hazard mitigation plan to Tetra Tech, Inc. Tetra tech worked with the various municipalities and partners to gather input for the plan, which was completed in 2009 and can be accessed at <http://www.greenegovernment.com/draft.htm>.

11. **Survey of potential SPDES stream restoration site (2009):** A site on the East Kill was selected as a potential SPDES stream restoration site due to its high contribution of fine sediments. One landowner was unwilling to grant GCSWCD permission for the required pre-design survey work. Survey is no longer planned for this site.
12. **Japanese Knotweed Management Project (2009):** Hudsonia sampled Japanese knotweed management plots for several years. The results of their research are shown in the final report "Experimental Management of Japanese Knotweed on the Batavia Kill, Greene County, New York", which was submitted to GCSWCD in December 2009 and can be viewed online at: http://www.catskillstreams.org/pdfs/Hudsonia_knotweed.pdf.
13. **Restoration Project Wetland Mapping (2009):** C.T. Male Associates was hired to remap the wetlands on the Ashland and Conine restoration sites to assure ACOE's wetland mitigation requirements are being met. Wetland mapping and reporting was completed by C.T. Male Associates in 2009.
14. **Catskill Riparian Reference Study (2009):** New York Natural Heritage Program completed a final report "Inventory, Classification, and Description of Riparian Natural Community Reference Types for West Kill Watershed, New York" and appendix "West Kill Restoration Guide to Planting". Report available at: http://www.catskillstreams.org/stewardship_streamside_rb.html
15. **Schoharie Watershed Strategy (2008):** Engaged multiple watershed partners and agencies, municipal officials, and departments (highway, planning, and code enforcement) in the strategy's development which focused on landscape sources that contribute to water quality impairments. Some recommendations have been identified as implementation activities within the 2009 - 2011 action plan and the Schoharie Watershed Advisory Committee will review proposals in September 2009 to allocate implementation funding to support those activities. Copy of report can be found here: <http://gcswcd.com/swp/wap.html>
16. **Monitoring of Restored Stream Reaches:**
 - a. **2008:** Restoration project performance monitoring was completed at five sites in 2008.
 - b. **2009:** Monitoring has been performed and reports compiled for the priority monitoring sites, Conine Stream Restoration Project and the Ashland Connector Stream Restoration Project. Additionally the Brandywine Stream Restoration Project and the Farber Farm Stream Restoration Project sites were also monitored and reports compiled.
 - c. **2010:** Monitoring has been performed for priority monitoring sites: Conine, Ashland Connector Reach, Shoemaker, Lanesville, Sugar Maples and Long Road Stream Restoration Sites.
 - d. **2011:** Monitoring has been performed for priority monitoring sites: Long Road and Sugar Maples.
 - e. **2012:** Monitoring has been performed for priority monitoring sites: Ashland Connector Reach, Conine, Sugar Maples, Schoharie Street, and Long Road.
 - f. **2013:** Monitoring has been performed for priority monitoring site: East Kill Restoration at Vista Ridge.

VII. Recreation and Stream Habitat Improvements

In the general recommendations of all stream management plans enhanced public access to streams for recreational purposes was identified as a priority. The GCSWCD already has a number of these projects underway through partnerships with the members of the SWAC Habitat and Recreation Subcommittee. Completed Recreation and Stream Habitat Improvements action items include:

1. **Windham Path (2013):** GCSWCD and NYCDEP assisted the Town of Windham with installation of a public, non-motorized, multi-use trail along a 65 acre parcel located along the Batavia Kill. SWAC/SMIP funds were used to cover the cost of materials for a boardwalk and footbridges. Contracting, scope of work, permitting and construction have been completed. The Town and Windham Area Recreation Foundation (WARF) held the Grand Opening of the Windham Path on May 27th, 2013, which was well attended. The Windham Path is used almost daily by local residents and visitors to Windham. WARF is planning Phase 2, which plans to include a pedestrian bridge over the Batavia Kill to link to the business district on South Street and Route 296.
2. **Organize Repository of Stream Ecosystem Data (2013):** Stream management plans included a recommendation to characterize the current health of stream ecosystems. In order to determine the health of streams, a variety of data may be useful including food web dynamics, the presence or absence of indicator species and primary producers, and the status of fish populations, among others. Various studies have been conducted by different agencies and colleges over the years (e.g., USGS, NYSDEC, NYCDEP, ESF, Stroud Resource Center, GCSWCD). Under the guidance of the Habitat/Recreation Subcommittee, the GCSWCD has organized a master repository which integrates existing data and published documents and may help determine where additional field studies are warranted. Project is complete. The Stream Ecosystem Data Repository – Upper Schoharie Creek Watershed is available at: <http://dspace.gcswcd.com/>
3. **Prattsville Stream Access Parking (2012):** The Town of Prattsville was approved for SMIP funding October 2009; this grant was closed in August 2012, due to site constraints and significant flood damage throughout Prattsville during Hurricane Irene in 2011.
4. **Ashland Fishing Access Enhancements (2010):** GCSWCD and NYCDEP completed a parking area and access to an existing public fishing area on the Batavia Kill at the Ashland Connector Reach Restoration Project. The access includes and informational kiosk.
5. **Town of Windham (Police Anchor Camp) (2010):** GCSWCD provided conceptual plans to the Town of Windham to assist with assessment and planning for public use of a 65 acre parcel located in the Batavia Kill watershed. Long term plans have not been established. A multi-use trail will be installed in 2011 to allow for recreation and stream access. See Windham Path in the Action Plan for more details.
6. **Windham Creamery Pond (2008):** The GCSWCD assisted the Town of Windham with the development of a public access area on a NYCDEP owned parcel in the hamlet of Windham. The GCSWCD completed a site design, Stormwater Pollution Prevention Plan and other documents. The design included the construction of parking area and athletic fields and was left to the town to complete.
7. **Prattsville Conine Park (2008):** The GCSWCD worked with the Town of Prattsville on a master plan for redevelopment of Conine Field. Key conservation issues under consideration included fishing access point, knotweed management, a riparian buffer planting and a conservation easement on sections of the property adjoining the Batavia Kill and Schoharie Creek, and a stormwater pollution prevention plan retrofitting the site to meet current standards for new construction. Preliminary designs were completed for the park by GCSWCD and provided to the Town of Prattsville for completion.

VIII. 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.

- 1. Manor Kill Acquisition (Town of Conesville) (2013):** The Town of Conesville assisted a landowner by acquiring a floodplain parcel approved for FEMA Pre-Disaster Mitigation funding (75%) and demolishing and removing the home. The SMIP grant was used to assist the Town in meeting the required 25% match. The project, which involved demolition and site restoration, was completed with demolition and site restoration occurring in June, 2013.
- 2. Prattsville Local Flood Analysis (2013):** The intent of the LFA was to use engineering analysis to develop a range of flood hazard mitigation alternatives; the primary focus of the analysis was to identify the potential for reducing flood elevations through channel and floodplain restoration, as the first alternative to other hazard mitigation solutions and to evaluate both the technical effectiveness and the benefit/cost effectiveness of each solution, and compare different solutions to each other for the most practical, sustainable outcome. The LFA can be found at: <http://catskillstreams.org/major-streams/schoharie-creek/>