

Ashokan Watershed Stream Management Program

2011 -2013 Action Plan (2012 Update)



ASHOKAN WATERSHED STREAM MANAGEMENT PROGRAM



Cornell University
Cooperative Extension
Ulster County



SOIL & WATER
Conservation District



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



ASHOKAN WATERSHED STREAM MANAGEMENT PROGRAM

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To: Danny Davis, Contract Manager, NYC DEP Stream Management Program
From: Elizabeth Higgins, CCE Ulster County
Cory Ritz, UC SWCD
Date: May 11, 2012
Re: Ashokan Watershed Stream Management Program 2011 – 2013 Action Plan

Cornell Cooperative Extension Ulster County (CCE), Ulster County Soil & Water Conservation District (UCSWCD), the NYC Department of Environmental Protection (DEP) have updated the 2011– 2013 Action Plan for your review. The purpose of the Action Plan is to identify the AWSMP planned activities, accomplishments, and next steps in support of the recommendations derived from stream management plans and working group input. The current set of recommendations was significantly updated and reviewed by our Advisory Council and stakeholders in 2011. The Action Plan provides the foundation for our plan of work. In support of the Action Plan, \$2,000,000 has been allocated in the SMIP for implemented AWSMP projects and they are highlighted at the beginning of each programmatic area.

This Action Plan is divided into key programmatic areas:

- Protecting and enhancing the integrity and water quality of the stream systems
- Floodplain management and planning
- Highway infrastructure management in conjunction with streams
- Assistance to streamside landowners (public and private)
- Protecting and enhancing aquatic and riparian habitat and ecosystems
- Enhancing public access to the streams
- Summary of tables of key planned activities 2011-2013

The Action Plan is updated annually and recommendations are fully revised biannually. This current plan will run from June 1, 2011 until May 31, 2013 at which time the recommendations will be revised based on new stream assessments and program needs.



Cornell University
Cooperative Extension
Ulster County



2012 Update to the 2011-2013 Action Plan Ashokan Watershed Stream Management Program

Purpose

The 2012 update provides a progress report at the midpoint of the 2011-2013 Action Plan for the Ashokan Watershed Stream Management Program. It identifies progress on goals, changes to the plan, and makes recommendations for changes for the 2013-2015 revision of the Action Plan. The 2011-2013 Action Plan identifies the planned activities that support the needs identified by stream assessments and stakeholders in the Ashokan Reservoir Watershed. These activities are being undertaken by the Ashokan Watershed Stream Management Program team¹. The Action Plan also provides a framework for reporting progress on those planned activities to the public.

How to read this document

The Action Plan is organized around the key programmatic areas: Protecting and Enhancing the Integrity of Stream Systems and Water Quality; Floodplain Management and Planning; Highway and Infrastructure Management in Conjunction with Streams; Assistance to Streamside Landowners (Public and Private); Protecting and Enhancing Aquatic and Riparian Habitat and Ecosystems; and Enhancing Public Access to Streams. Within each program area there are sub-topic areas

For each topic and sub-topic areas a list of the recommendations are provided. The recommendations, which come directly from the Stream Management Plans and the program's working groups, are the basis for the Action Plan and are in ***italicized text***. Under the list of recommendations, the specific Stream Management Implementation Program (SMIP) Funds to address the recommendations are listed. This summary section is followed by a detailed section that, for each recommendation, provides the planned activities for the next two years and some of the progress that has been made to date. If the program staff felt that a recommendation should be considered for revision in the 2013-2015 Action Plan, that information was included.

Summary tables of key planned activities and projects have been included at the end to assist the reader in quickly identifying the key outcomes for the program.

¹ NYC DEP, Cornell Cooperative Extension of Ulster County, Ulster County Soil and Water Conservation District, and USDA Natural Resources Conservation Service

Background

In 1997 New York City negotiated a Memorandum of Agreement (MOA) to avoid filtration of the NYC West-of-Hudson water supply. The MOA included establishing a set of watershed partnership programs to help ensure that the NYC water supply watersheds were adequately protected.

The DEP Stream Management Program was one of several watershed partnership programs developed as part of the Memorandum of Agreement. The Stream Management Program was established to work with all Catskill Mountain stream stakeholders to devise strategies and best management practices to protect and enhance the integrity of the stream system. In each water supply watershed, DEP stream management program staff collaborates with local education and resource management agencies. In the Ashokan Watershed those agencies are Ulster County Soil and Water Conservation District and Cornell Cooperative Extension of Ulster County.

Stream assessment efforts in the Ashokan watershed began with the development of the Broadstreet Hollow Stream Management Plan (SMP) in 2003. Stream Management Plans were developed for the Stony Clove (2004) and the Upper Esopus Creek (2007). In 2008, DEP and Cornell Cooperative Extension of Ulster County (CCE) completed a stream assessment of Woodland Creek, and assessments of the Beaverkill and Birch Creek by Ulster County Soil and Water Conservation District (UCSWCD) are underway and the Bushkill will be underway this summer. Copies of the Stream Management Plans are available on the Ashokan Watershed Stream Management Program's website WWW.ASHOKANSTREAMS.ORG. Information about the overall stream management program in the New York City drinking water watersheds that are west of the Hudson River at WWW.CATSKILLSTREAMS.ORG

General watershed-level goals were developed in the stream management planning process to further the overall program goal of restoring stream system stability and ecologic integrity while sustaining viable communities in the Catskill watersheds. The goals are formed around the basic categories of issues associated with managing streams: stream system integrity, floodplain management, highway and infrastructure management (related to streams), educating and assisting streamside landowners, protecting aquatic and riparian ecosystems, and enhancing public use and access to the streams in the watershed.

After stream management plans are developed, the MOA requires DEP and its partners to develop an action plan every two years to show how the findings and recommendations of the stream management plans will be implemented. The first post-implementation phase Action Plan was developed in 2009 for June 1, 2009- May 31, 2011 - with an update in 2010.² The

² In the Ashokan Watershed, the plans run from June 1-May 31.

current plan runs from June 1, 2011-May 31, 2013. At this point the current contract for CCE Ulster County will be completed.

The Ashokan Watershed Stream Management Program moved into the implementation phase of the program in 2008. During that year the program staff, with input from local stakeholders, developed a process for distributing funding provided in the FAD to the watershed communities to help implement stream management plan recommendations (the Ashokan Watershed SMP Implementation Program, or "SMIP"). To date, \$2,000,000 has been allocated to implementation projects and they are highlighted in red text in each section of this plan.

Protecting and Enhancing the Integrity of Stream Systems and Water Quality

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

SUMMARY OF RECOMMENDATIONS IN 2011-2013 ACTION PLAN AND ALLOCATION OF SMIP FUNDING IN SUPPORT OF RECOMMENDATIONS

I. STREAM CORRIDOR ASSESSMENTS

- *Support continued stream feature inventories (SFI) in the tributary streams to the Esopus that have not been previously assessed. The SFI's are used to help diagnose stream corridor condition and identify stream erosion hazards and/or water quality impairment that may require some treatment.*
- *Support stream investigations by other organizations in Ashokan Watershed, with an emphasis on turbidity reduction*
- *Complete riparian corridor assessments for the assessed streams using the program-established protocol.*
- *Support investigations of the geotechnical processes controlling coupled hill slope and stream bank erosion in order to evaluate management feasibility. These erosion sites are typically long-lasting and chronic sources of turbidity to Esopus watershed streams.*
- *Support the NYS Geological Survey's efforts to update/revise the mapping of the surficial geology of the Upper Esopus Creek watershed. The results of this mapping can be used to help (1) improve our understanding of where potential stream channel and hill slope sources of suspended sediment are likely to occur; and (2) aid in development of spatially distributed models of suspended sediment entrainment and transport in the stream network.*
- *Advocate an active monitoring program for large woody debris (LWD) that focuses upon (1) the identification and removal of debris that poses a flood hazard to infrastructure and a threat to human welfare and (2) identifies LWD key to ecologic health.*

ASHOKAN WATERSHED SMIP PROJECTS SUPPORTING STREAM CORRIDOR ASSESSMENTS (TOTAL ALLOCATION IS \$342,402)

NYS Geological Survey	An Investigation of Glacial Geology and Applied Three Dimensional Geologic Mapping in Ulster County, NY <i>To develop new geologic maps of the Ashokan Watershed</i>	\$38,037	Active
USGS	Quantitative Assessment of Water Quality in the Upper Esopus Creek <i>To measure turbidity at 20 sites in the watershed.</i>	\$90,990	Active
USGS	Warner Creek and Beaverkill Gauge <i>To extend the period of data collection on the Beaverkill gauge and install a new gauge on Warner Creek</i>	\$150,000	Active
SUNY New Paltz	Role of Suspended Sediment on Warner Creek's Ecology <i>Funding will go toward the stipend of a senior geology teaching assistant to work with students on Warner Creek project.</i>	\$5,000	Completed
SUNY New Paltz	Characterization of Suspended Sediment in Warner Creek <i>To conduct a research project on the effects of suspended sediment on Warner Creek and its effects on ecological functions in the creek as well as its geomorphic conditions. Funding would be used toward the hiring of a certified bio-assessment professional, who will help train New Paltz students for BMI analysis and species identification as well as to purchase a kick net for data collection.</i>	\$5,000	Completed
CCE Ulster County	Trimble <i>To Purchase a Trimble for watershed-related data collection efforts</i>	\$8,375	Completed
Syracuse University	Bank Erosion Assessment and Analysis in Stony Clove Creek <i>To resurvey the High Erosion Hazard Index sites from the 2003 Stony Clove Management Plan in 2012 and also do a longitudinal profile of the Stony Clove.</i>	\$45,000	Active

II. STREAM RESTORATION/STABILIZATION PROJECTS TO REDUCE TURBIDITY

- *Identify locations in the Ashokan Watershed that are long-term, chronic fine sediment sources and evaluate the potential efficacy of restoration practices. AWSMP staff will annually update and prioritize the stream restoration and/or channel stabilization projects identified in each management plan and support efforts to obtain funding to design and implement them.*

ASHOKAN WATERSHED SMIP PROJECTS SUPPORTING STREAM RESTORATION TO REDUCE CHRONIC SOURCES OF SEDIMENT (TOTAL ALLOCATION IS \$422,790)

Ulster County Soil and Water Conservation District	Stony Clove at Chichester (Site 4)	\$25,000	Active
	<i>Protect vulnerable properties from work done on Stony Clove sites 1-3</i>		
Ulster County Soil and Water Conservation District	Stony Clove at Chichester (Site 1)	\$227,000	Active
	<i>for implementation of a high priority restoration project for water quality</i>		
Ulster County Soil and Water Conservation District	Match for USDA-NRCS EWP projects with a Turbidity Reduction goal on the Stony Clove and Warner Creek	\$170,790	Active
	<i>To provide the 25% cost share to leverage EWP funding for projects that have a goal of turbidity reduction.</i>		

III. MONITORING OF STREAM PROJECTS

- *Annually monitor performance of stream corridor projects funded by the Ashokan Watershed Stream Management Program.*

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

- *Develop a set of Stream Stewardship Principles and promote the principles to relevant entities.*
- *Facilitate a watershed wide Technical Advisory Committee to provide for routine networking between stream managers and agencies, researchers, and other experts. The Technical Advisory Committee would work with AWSMP staff and the Watershed Advisory Council*
- *Provide outreach to municipal officials, agencies, affected landowners, and the public about findings from stream assessments and planned stream restoration projects.*
- *Solicit participation of local community members and education-related organizations in overall education and outreach activities. Fund public education and outreach activities regarding stream and watershed management through the AWSMP Implementation Fund.*
- *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, and website) to disseminate information about the program and to encourage stewardship.*
- *Offer training programs that promote an understanding of effective stream management strategies for local stakeholders.*
- *Participate in local community events to promote the goals of the Ashokan Watershed Stream Management Program*

- *Develop a local group of volunteers committed to ongoing stewardship efforts in the watershed*

ASHOKAN WATERSHED SMIP PROJECTS SUPPORTING EDUCATION, OUTREACH AND TECHNICAL ASSISTANCE TO ENCOURAGE STREAM STEWARDSHIP (TOTAL ALLOCATION IS \$23,149)

Bennett Elementary School	<p>Watershed Detectives program <i>To expand the school's Scientist in Residence Program with the addition of a new Watershed Detective's program for the 2011/2012 school year. This program is hands-on and introduces students to a wide range of watershed related topics including basic watershed morphology, hydrologic cycle, where their drinking water comes from, learning about negative impacts from overdevelopment, pollution, erosion, etc.</i></p>	\$4,500	Active
Ulster County Soil and Water Conservation District	<p>Rosgen Levels 2-4 <i>Staff member Jake Wedemeyer attended three Natural Channel Design Training (AKA Rosgen) Levels II, III and IV.</i></p>	\$11,332	Completed
Ulster County DPW	<p>Rosgen Level 1 <i>to send Ulster County Department of Public Works stormwater specialist, Brendan Masterson, to Rosgen Level I training.</i></p>	\$2,917	Completed
Town of Woodstock	<p>Woodstock Watershed Education Project <i>For education and outreach for its new Wetlands and Watercourse law. This law was designed, among other things, to enhance stream stewardship principals. The audience for these outreach and educational materials are town residents, local board members and businesses.</i></p>	\$4,400	Active

DETAILED RECOMMENDATIONS, PLAN OF WORK AND ACCOMPLISHMENTS

I. STREAM CORRIDOR ASSESSMENTS

Recommendation

Support continued stream feature inventories (SFI) in the tributary streams to the Esopus that have not been previously assessed. The SFI's are used to help diagnose stream corridor condition and identify stream erosion hazards and/or water quality impairment that may require some treatment.

Plan of Work (2011-2013) – update is in bold

The project team plans to complete assessments for four streams during the two year planning period (2011-2013). This includes an assessment and brief report (with maps) documenting Phase 1 results and Phase 2 recommendations for each assessed stream and an assessment and brief annual reports documenting Phase 3 results and recommendations for selected sites at each assessed stream reach. The minimum effort will be to establish a Rosgen Level III reach assessment and monitoring program for the Ashokan watershed with the initial assessment per assessed stream. **UCSWCD completed the assessment of Birch Creek in the Town of Shandaken in 2012. UCSWCD will continue with a rapid assessment of the Bush Kill in the Town of Olive and Stony Clove Creek in the Towns of Hunter and Shandaken in the summer of 2012.**

Prior Accomplishments (2009-2011)

UC SWCD staff completed the assessment of the Beaverkill in 2010. This was the first stream to be assessed by the current AWSMP team, and the first stream assessed in the Towns of Woodstock and Shandaken.

Recommended Change for 2013-2015 Action Plan

Stream corridor assessments should include a rapid assessment process in order to expedite preliminary assessments. In addition, limited application of Rosgen Level III will be used as needed.

Recommendation

Support stream investigations by other organizations in Ashokan Watershed, with an emphasis on turbidity reduction.

Plan of Work (2011-2013) – update is in bold

AWSMP staff will participate with SUNY New Paltz REU summer research projects in the Ashokan Watershed. **In 2011 DEP and SUNY New Paltz-REU students continued their investigation of Warner Creek. The final year of this project is planned for summer 2012. USDA-NRCS National Stream Program Staff also conducted additional assessment work in support of designing treatment options for turbidity sites in Warner Creek.**

Staff will monitor the progress of the USGS grant related to turbidity and support dissemination of information about USGS research findings to the public. **USGS completed their first round of turbidity**

monitoring at the 13 sites and are assessing the results. In 2012 AWSMP provided additional funding to USGS for three additional years to support monitoring of water quality and turbidity in Warner Creek and to continue the Beaverkill gauge.

Prior Accomplishments (2009-2011)

Warner Creek was identified in 2009/2010 as one of the most significant sources of turbidity during low to moderate flows in the Ashokan watershed. A comprehensive assessment of Warner Creek was completed in 2010 by DEP and SUNY New Paltz summer undergraduate researchers and followed in 2011 by a more focused assessment on erosion and deposition in the lower 10,000 feet of this unstable stream. A further investigation of Warner Creek was conducted by a consultant under contract to UCSWCD (Clear Creeks Consulting) to identify specific areas of Warner Creek requiring treatment and to assess feasible treatment options.

In 2010 the AWSMP provided a grant through the Stream Management Implementation Fund to USGS to support monitoring water quality and turbidity at 13 sites in the watershed. Turbidity probes were installed at the base of tributaries entering into the Esopus Creek.

Recommended Change for 2013-2015 Action Plan

No change at this time.

Recommendation

Complete riparian corridor assessments for the assessed streams using the program-established protocol.

Plan of Work (2011-2013) – update is in bold

A complete riparian corridor assessment for the assessed streams using the program-established protocol will be completed. - **No action to date.**

Recommended Change for 2013-2015 Action Plan

Review the need for future riparian corridor assessments.

Recommendation

Support investigations of the geotechnical processes controlling coupled hill slope and stream bank erosion in order to evaluate management feasibility. These erosion sites are typically long-lasting and chronic sources of turbidity to Esopus watershed streams.

Plan of Work (2010-2013) – update is in bold

AWSMP team will evaluate the results of the investigations on the Stony Clove Creek in Chichester and Warner Creek and use the information to inform further management decisions in the Watershed. Information on the findings will be shared with agency and municipal partners and the public. **In the fall of 2011 the USDA-NRCS followed up on the Clear Creeks Consulting investigation with a focused assessment on a reach of stream that is a chronic source of turbidity associated with a coupled stream**

erosion and hill slope failure. The assessment informed a restoration design planned for construction in summer 2012. In 2011, AWSMP Implementation Fund also provided a grant through the Stream Management Implementation Fund to Dr. Chris Johnson and a graduate student from Syracuse University to conduct an investigation of High Erosion Areas documented in the Stony Clove SMP. The work will commence in the summer 2012. Staff from UCSWCD and DEP will contribute to Dr. Johnson's work, as feasible.

Prior Accomplishments (2009-2012)

UC SWCD and DEP initiated a geomorphic and geotechnical assessment of the Chichester reach of Stony Clove Creek (Management Units 17 and 18 in the Stony Clove Stream Management Plan) and in Warner Creek in support of treatment feasibility studies, Warner Creek was not reflected in the 2009-2011 Action Plan, but emerged as an issue in 2010. These reaches of stream are characterized by chronic suspended sediment loading from coupled streambank erosion and hill slope failures. Consultants were hired for both streams to conduct these investigations. Milone and MacBroom completed their investigation of the Chichester and issued a report on the four proposed stream remediation sites in the Chichester area of the Stony Clove in 2010. Clear Creeks Consulting was hired to investigate a turbidity-prone section of Warner Creek. Their report was completed in May 2011.

Recommended Change for 2013-2015 Action Plan

No change.

Recommendation

Support the NYS Geological Survey's efforts to update/revise the mapping of the surficial geology of the Upper Esopus Creek watershed. The results of this mapping can be used to help (1) improve our understanding of where potential stream channel and hill slope sources of suspended sediment are likely to occur; and (2) aid in development of spatially distributed models of suspended sediment entrainment and transport in the stream network.

Plan of Work (2011-2013) – update is in bold

AWSMP staff will continue to meet with NYSGS staff seasonally to stay apprised as to their efforts and provide additional data as available. AWSMP staff will support dissemination of information about this project to the public. **Drilling was not done by NYS Geological Survey in 2011, but recommended in the spring of 2012. The project is scheduled to be completed by 2013. At that point this recommendation will no longer need to be included in further updates. A final report and maps will be described in the 2013 Annual Report**

Prior Accomplishments (2009-2011)

NYSGS submitted a request for AWSMP Implementation Funds and the project was approved for funding in 2010 by the Advisory Council. NYS Geological Survey commenced drilling summer 2010. AWSMP staff helped to provide outreach to the community about the drilling project. Using this information, NYSGS updated the surficial geologic maps for the Phoenicia USGS quadrangle. Revised maps for the Bearsville and Shandaken quadrangles are under review. NYSGS will submit a report describing the investigation findings in the spring/summer 2011.

Recommended Change for 2013-2015 Action Plan

Because this work will be completed, this recommendation will no longer need to be included in further updates.

Recommendation

Advocate an active monitoring program for large woody debris (LWD) that focuses upon (1) the identification and removal of debris that poses a flood hazard to infrastructure and a threat to human welfare and (2) identifies LWD key to ecologic health.

Plan of Work (2011-2013) – update is in bold

AWSMP staff will continue to support the ongoing LWD monitoring project in Woodland Valley and elsewhere throughout the watershed. **The LWD monitoring site was removed by the Town of Shandaken, due to flooding concerns. In 2012 CCEUC and UCSWCD prepared a landowner fact-sheet on LWD to help inform and guide decisions around LWD removal. In addition, UCSWCD assisted landowners and municipalities in assessing LWD threats for applications to CWC for debris removal after Tropical Storm Irene. Dr. Cliff Craft of Cornell University gave a presentation to staff from the West of Hudson DEP watersheds in March 2012 at the riparian buffer working group meeting to help provide more training on this issue to staff. Inventory of LWD sites will continue as needed but no monitoring projects are planned. Staff will continue to provide guidance on LWD to municipalities and landowners as needed.**

Prior Accomplishments (2009-2011)

From 2008-2010, two interns worked with CCE and SWCD on LWD monitoring projects. Both interns undertook a literature review to determine conditions likely leading to LWD persistence in Catskill Mountain streams. The first intern developed a DEP data dictionary for documenting LWD in the field – especially during the stream feature inventories based on his review of literature. He then initiated a LWD photo monitoring project at key locations. He used aerial imagery to identify persistent LWD sites. He presented his findings to the Advisory Council at the August 2009 meeting.

The second intern helped to make recommendations to refine the DEP data dictionary, based on attempts to use the documentation protocol in the field. She focused her assessment efforts on Woodland Valley as a demonstration site because of data availability as the 2008 assessment also included data on LWD. She identified all of the sites that had LWD in 2008 and assessed them in the summer of 2010 and again after a flood in October 2010. A report and a website for the public documenting the changes over time (from 2008-2011) was developed demonstrating the persistence of LWD on Woodland Creek. One permanent LWD monitoring site in Woodland Valley, with cross sections, to monitor the geomorphic effect that LWD is having on the stream was established. She also presented a poster for the Catskill Monitoring and Research Conference in November 2010.

Recommended Change for 2013-2015 Action Plan

Change recommendation in future plan. LWD will move into technical assistance, not monitoring.

II. STREAM RESTORATION/STABILIZATION PROJECTS – PLAN OF WORK

Recommendation

Identify locations in the Ashokan Watershed that are long-term, chronic fine sediment sources and evaluate the potential efficacy of restoration practices. AWSMP staff will annually update and prioritize the stream restoration and/or channel stabilization projects identified in each management plan and support efforts to obtain funding to design and implement them³.

Plan of Work (2011-2013) – update is in bold

Undertake stream restoration projects in the Chichester Reach and Warner Creek to address fine sediment sources. For Chichester, four stabilization projects along distinct segments of stream are planned during this period. Design and construction of Site 1 is planned for 2011. Sites 2 and 3 are planned for completion in 2012. Site 4 is an optional project that may be installed in 2011. This project is a combined effort of DEP and MMI to complete the design and UCSWCD and MMI to install the project. **A new plan of work was developed in response to Tropical Storms Irene and Lee. Stony Clove Creek and Warner Creek continue to be the highest priority streams for turbidity source reduction projects. The construction of Chichester Site 1 project was delayed due to Tropical Storms Irene and Lee. Construction for Site 1, 2, 3 and 4 are now scheduled for 2012. In addition, construction of Warner Site 5 project designed by NRCS and a new project, Silver Hollow Road Warner Creek Confluence are planned for 2012. Additional funding for these projects is being provided by USDA NRCS EWP Program because of the additional damage to the area caused by the storms. AWSMP is leveraging EWP funding to make these projects feasible in this contract period.**

Prior Accomplishments (2009-2011)

In 2009, AWSMP staff reviewed available assessment documentation from the completed Stream Management Plans⁴ and developed an initial project list. The project staff met with multiple municipal officials, highway department staff and local and state agency staff and included projects they identified, that also met AWSMP objectives, as concerns onto AWSMP project list. This list currently includes projects in the towns of Shandaken, Woodstock and Olive. The staff continues to reach out to municipal officials through meetings held at AWSMP office, attendance at town meetings and one on one discussion with area leaders. Town of Shandaken has endorsed the Chichester and Warner Creek projects by a town resolution.

Stony Clove Creek at Chichester

This 1 km of unstable stream has been a chronic source of turbidity in Stony Clove Creek from stream bank erosion and adjacent hill slope failure for over 10 years. MMI submitted a river assessment report in late 2010 and completed 60% of the design for Sites 1 and 4 in March, 2011. Six groundwater observation wells were installed in March 2011 to inform assessment and design on the role of groundwater in the hill slope failure process.

³ The smaller site projects that have a primary objective of road or public infrastructure protection are described in the Highway Management Section of the Action Plan.

⁴ Broadstreet Hollow SMP, Stony Clove SMP and Esopus Creek SMP

Warner Creek Restoration Plan

This reach of stream is characterized by chronic suspended sediment loading from coupled streambank erosion and hill slope failures. The UC SWCD-commissioned, initial investigation by Clear Creeks Consulting of Warner Creek turbidity sites is underway. The final design and construction will take place during the 2011-2013 Action Plan.

Recommended Change for 2013-2015 Action Plan

Plan of work for all restoration projects including turbidity related, infrastructure, etc. will be reported in one recommendation.

III. MONITORING OF STREAM PROJECTS – PLAN OF WORK

Recommendation

Annually monitor performance of stream corridor projects funded by the Ashokan Watershed Stream Management Program.

Plan of Work (2011-2013) – update is in bold

A general project monitoring protocol will be developed prior to the construction of any more AWSMP-sponsored projects to be adapted and implemented during this period as projects are completed. **A plan for monitoring was developed for the Stony Clove at Phoenicia project. Fawn Hill (installed in 2010) is also being monitored by the District.**

Recommended Change for 2013-2015 Action Plan

No change

IV. OUTREACH, EDUCATION AND TECHNICAL ASSISTANCE TO ENCOURAGE STREAM STEWARDSHIP

Recommendation

Develop a set of Stream Stewardship Principles and promote the principles to relevant entities.

Plan of Work (2011-2013)

The Ashokan Watershed Stream Management Program uses the *Catskill Streams Principles of Stream Stewardship*. These principles are used by all of the DEP West of Hudson Watershed Stream Management Programs. The principles are located in the Appendix. **The AWSMP program promotes the Principles of Stream Stewardship in education and outreach materials, including the website and program brochure.**

Recommended Change for 2013-2015 Action Plan

Assuming that there are no changes to the Stream Stewardship Principles. The recommendation should be to “Ensure that the Ashokan Watershed Stream Management Program’s activities and communications are consistent with the Catskill Streams Principles of Stream Stewardship”

Recommendation

Facilitate a watershed wide Technical Advisory Committee to provide for routine networking between stream managers and agencies, researchers, and other experts. The Technical Advisory Committee would work with AWSMP staff and the Watershed Advisory Council

Plan of Work (2011-2013) – update is in bold

Staff will develop a Technical Advisory Committee in 2011 to meet the above objectives. The committee will meet at least once annually. **Due to other work, this recommendation has been put on hold.**

Prior Accomplishments (2009-2010)

AWSMP staff developed a process for the Committee and a list of potential members in 2010. Although it was intended that this group would meet in early January 2011, the departure of key staff delayed the start of this committee.

Recommended Change for 2013-2015 Action Plan

The need for this group should be discussed going forward.

Recommendation

Provide outreach to municipal officials, agencies, affected landowners, and the public about findings from stream assessments and planned stream restoration projects.

Plan of Work (2011-2013) – update is in bold

Staff will provide public presentations on findings from stream corridor assessments as they are completed. **Information about the Beaver Kill plan was presented in a poster at the Ashokan Watershed Conference in April 2012 in Woodstock. In 2012 the program has started to feature a stream in each issue of the newsletter that covers the findings from stream assessments. In addition, a series of fact sheets for landowners about the streams that have been assessed is in development and are planned for distribution in 2012.**

Staff will use the sub-committee for project review, composed of representatives from stakeholders, to inform municipal officials and agencies about planned projects. Staff will also inform and solicit feedback from municipal officials and agencies about possible stream restoration projects through meetings and other contacts. **Staff have reached out to municipal officials and will continue to reach out through meetings held at AWSMP office, attendance at town meetings and one on one discussion with area leaders. Planned and completed projects are also featured in the newsletter.**

Staff will contact and provide specific information to landowners, in areas that have long-term, chronic fine sediment sources where restoration practices are planned, about possible remediation options. **Staff from UCSWCD and DEP have met and will continue to meet with Stony Clove and Warner Creek residents about planned projects.**

Prior Accomplishments (2009-2010)

UC Soil and Water Conservation District established the AWSMP sub-committee for project review in 2009 to provide a forum for outreach and comment on proposed projects with key agency, non-profit, and municipal stakeholders. Three meetings of the committee were held. Projects are also vetted through the Highway Managers working group and the Advisory Council. In addition, UC SWCD staff met with NYS DEC permit representatives to review projects prior to permit application submittals. The newsletter is also used as a forum for disseminating information about projects.

Staff also provided outreach to landowners whose properties are adjacent to proposed stream restoration projects. In Chichester an informational meeting was held about the proposed project in 2010 and multiple meetings were held on a one on one basis with residents. Staff also met and communicated frequently with Brown Road landowners during the emergency project on Esopus in November 2010.

Staff also met with and communicated with landowners prior to planned construction for smaller projects – during the Woodland Valley project, information was disseminated to landowner association blog; AWSMP staff met with Bradkin Road residents about the planned stream crossing culvert replacement and presented the project to the Olive Town Board; AWSMP staff have met with the landowners affected by the proposed project on Cross Patch Road in Woodstock.

Recommended Change for 2013-2015 Action Plan

No change

Recommendation

Solicit participation of local community members and education-related organizations in overall education and outreach activities. Fund public education and outreach activities regarding stream and watershed management through the AWSMP Implementation Fund.

Plan of Work (2011-2013) – update is in bold

Staff will continue to organize quarterly Education and Outreach Working Group meetings. They will also organize committees of stakeholders for conferences and large trainings. **E and O meetings were held in 2011 and in 2012 it was decided that they should be held every other month instead of quarterly to allow for greater coordination of efforts. Stakeholders from Trout Unlimited, DEP, and other organizations participated in the planning of the Contractor training that was held in March 2012 and for the Ashokan Watershed Conference that was held in April 2012.**

Local partnerships will be supported by soliciting and funding education and outreach activities through the Ashokan Implementation Fund Grant Programs. **The AWSMP fund allocated \$23,000 for grants for Education and Outreach to promote stream stewardship. Education and Outreach grants were also provided to train code enforcement officers on floodplain management and for recreation (fishing).**

Prior Accomplishments (2009-2010)

The Education and Outreach Working Group met three times in 2009 and three times in 2010 to review proposed education and outreach activities and to make recommendations for improvement. A

conference planning committee of stakeholders was established and used for planning the 2010 and the 2011 Ashokan Watershed Conferences. A working group was also convened in 2009 to plan the Watershed Stewards Volunteer Program.

Two grant projects supporting general public education and awareness about water resources were funded in 2010. One was for the town of Woodstock to develop an education program around their Wetlands and Watercourse Law and the other was to Trout Unlimited to include information about the benefits of water quality protection on literature disseminated through their "Leaping Trout" project.

Recommended Change for 2013-2015 Action Plan

No change

Recommendation

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, and website) to disseminate information about the program and to encourage stewardship.

Plan of Work (2011-2013) – update is in bold

Staff will continue to publish the program newsletter, Esopus Creek News, three times per year. **Three issues of the Esopus Creek News were published in 2011 and 1 was published in 2012. Five more issues are planned through 2013.**

Staff will develop and produce at least 10 additional factsheets that address common stream management issues for the general public. Fact sheets will be distributed to mailing list and made available on-line. AWSMP will collaborate with the other watershed programs in the West of Hudson Watershed on development of outreach materials to reduce duplication of efforts. **Two factsheets were completed using the new template – Guide to Native Riparian Plants of the Catskills and Guide to Large Woody Debris. The Landowner Guides to the assessed streams are currently under review. Guides are planned for the Stony Clove, Beaverkill, Woodland Valley, Birch Creek and the Esopus Creek. Staff are working with the West of Hudson Education and Outreach group to identify future topics for factsheets. All factsheets are available on-line. In addition, all factsheets were reviewed by the West of Hudson Watersheds to ensure that the content is usable across the WoH watershed programs.**

Staff will provide ongoing media exposure through press releases, purchase of advertising and articles in local and county newspapers. **The program issues regular press releases for programming and has been successful in placing articles in local and county newspapers. For example, one story, about a post-flood bus tour, was picked up by the AP in January 2012 and carried by 100s of papers nationally.**

Staff will continue development of website content for www.ashokanstreams.org, Facebook page, and www.catskillstreams.org and include more information of program successes and progress on website. **The program has contracted with a firm to upgrade the www.ashokanstreams.org website in 2012. The use of Facebook expanded in 2011/2012, primarily due to the need to get information out quickly**

after Tropical Storm Irene. The site currently has over 200 “likes” and about 87 people access the site each day.

Prior Accomplishments (2009-2011)

Six issues of the project newsletter Esopus Creek News were published in 2009 and 2010. The newsletter is distributed by mail to over 2500 watershed residents and agencies. It is also available on-line.

Two factsheets were developed, Stream Project Permit Guide and Flood Emergency Preparedness Guide. The Flood Emergency Preparedness Guide was revised after the October 2010 flood and sent out to the program mailing list of watershed residents. It was also shared with, and used by the other West of Hudson watersheds after the October 2010 flood. A draft fact-sheet for landowners living in specific sub-basins was developed (“Guide to Living on Woodland Valley Creek”). These will be finalized in 2011. A graphic design template was developed for a future set of factsheets. Staff also prepared outreach materials on Didymo, culverts, native plants and large woody debris.

A two page and a four-page program brochure for the AWSMP were developed to describe program projects and services for all audiences. Packets of information were collated for streamside landowners including the above factsheets and other existing stream stewardship handouts from Cornell University and other conservation programs

The program provided ongoing media exposure through press releases, purchase of advertising and articles in local and county newspapers. Press releases were distributed for each event in 2009-2011.

A new program website was developed in 2010 (www.ashokanstreams.org) and collaboration with catskillstreams.org site was improved. The ashokanstreams.org website reported 3216 unique visitors in 2010, visitors to the site increased from 33 in January 2010 to 423 in November. The site is currently averaging about 400 unique visitors per month. In addition, a Facebook site was developed, HTML-mail newsletters were developed, and improved e-mail communications were developed with volunteers, increasing volunteer participation in the program.

Recommended Change for 2013-2015 Action Plan

Improve web and electronic communications. Continue process of better coordinating publications across the NYC DEP West of Hudson Watersheds to reduce duplication of efforts.

Recommendation

Offer training programs that promote an understanding of effective stream management strategies for local stakeholders.

Plan of Work (2011-2013) – update is in bold

Staff will continue to build their own knowledge about stream restoration practices and will encourage and support training for partners in the watershed. UCSWCD/NRCS stream restoration design staff will take Rosgen Level IV training in the fall. **In 2011 staff from UCSWCD, DEP and NRCS took Rosgen IV and new watershed educators from CCE Ulster County took Rosgen Level 1. In addition, most of the technical staff as well as local stakeholders will be attending an Aquatic Organism Passage Training**

offered by the US Forest Service for culvert design in May 2012. Support for this training is being provided by AWSMP staff.

The program will continue to host an Annual Conference with workshops that promote an understanding of effective stream management strategies for local stakeholders in 2012 and 2013. **The Annual Conference in 2012 was held with over 100 attendees. A conference is planned for 2013.**

The program staff will continue to hold at least three public educational events per year on stewardship topics relevant to the Ashokan Watershed. **Three sessions of a post-flood stream restoration class for municipal highway crews and private contractors was held in March 2012. Over 200 people attended the trainings. In addition, a public workshop for landowners on stream erosion was held in July 2011 with about 20 attendees. During Creek Week in September 2011 a class on using forest road erosion BMPs on gravel driveways and private roads was held. The program offered a bus tour for legislators, the press and other key stakeholders in December 2011 to discuss stream projects, post Irene.**

Prior Accomplishments (2009-2011)

AWSMP staff attended trainings to increase their knowledge and ability to support stream restoration practices that are consistent with the Principles of Stream Stewardship. All staff has had Rosgen level 1 training. Higher levels of training have been achieved by UCSWCD and DEP staff. AWSMP Implementation funds supported Rosgen level II-IV training for an additional UCSWCD staff person to increase the capacity of the office. Many of the AWSMP staff also attended the bio-engineering class taught by USDA offered by DEP in 2010.

The AWSMP organized two Annual Watershed Conferences to provide training and information to landowners and municipal officials. The first was held in May, 2010 and the second was April, 2011.

AWSMP staff held the following stewardship-related public events in 2009-2011:

- Streamside stewardship tour, July, 2009
- USGS Presentation – the Shocking Truth, August, 2009
- Native Plant Workshops 2009 and 2010
- Open House and BBQ, Aug, 2009
- Dave Rosgen Public Presentation, Oct, 2009
- Presentation on Invasive Species by Leslie Suprenaut of DEC
- Ashokan Watershed Creek Week Events, Sept, 2010
 - Rain Barrel Class, Environmental Film Night, Youth Fishing Day, Crummy Culvert Contest, Native Plant Walk, Streamside Restoration Planting, Photo Contest & Opening

Recommended Change for 2013-2015 Action Plan

No change

Recommendation***Participate in local community events to promote the goals of the Ashokan Watershed Stream Management Program******Plan of Work (2011-2013) – update is in bold***

AWSMP staff will participate in at least one community event per watershed town (Olive Day, Shandaken Day and other local events). Staff will provide a display or booth for at least one other event per year (Catskill Local Government Day, Ashokan Center Fall Festival) and offer one day at the Ulster County Fair that emphasizes stream management and the NYC watersheds. **The program participated in Shandaken Day, the Woodstock Library festival and the Ulster County Fair (2012). Olive Day was cancelled due to Irene. Program displays were given at the CCE Legislative breakfast. Staff plan to attend the Phoenicia Duck Race, and the various festivals in 2012 and 2013.**

Staff will also speak to outside groups and organizations, as requested and time permits. **CCE Staff taught 100 youth about soil erosion and turbidity in streams at Earth Day at Bennett Elementary School in June 2011. Staff also presented proposed stream projects to both local Chapters of Trout Unlimited and helped educate their members about the program. After the flood, staff from CCE UCSWCD and DEP spoke to many groups in Shandaken that were advocating for emergency stream work to help encourage and promote best practices.**

Prior Accomplishments (2009-2010)

AWSMP provided informational displays and streamtable demonstrations at Shandaken Day 2009 and 2010, Olive Day 2010, Ashokan Center Fall Festival 2010, and Phoenicia Rotary Duck Race 2009, Ulster County Fair 2009 and 2010, Catskill Local Government Day 2009. Program displays were also developed for the CCE Legislative breakfasts in 2009 and 2010, and the Catskill Environmental Monitoring and Research Conference, 2010.

Staff gave presentations to the Ashokan-Pepacton and Catskill Trout Unlimited Chapters, Ulster County Environmental Management Council, Kiwanis Club, Rotary Club, Main Street Program (Phoenicia), Rt. 28 Scenic Byway committee and other community organizations. AWSMP staff was interviewed on local radio stations and cable TV stations.

Recommended Change for 2013-2015 Action Plan

No change

Recommendation***Develop a local group of volunteers committed to ongoing stewardship efforts in the watershed.******Plan of Work (2011-2013) – update is in bold***

Staff will provide a regular schedule of weekend and evening core volunteer activities that integrate mini trainings as part of the activities and will continue to recruit volunteers to participate in CSBI planting projects. At least three volunteer events will be organized each year. **In 2011 two volunteer stream plantings and a stream clean up were held. In 2012 there was a stream clean up in May, one is planned for June and two plantings were held in the spring of 2012. More are planned for the fall and for 2013. Several volunteer training programs will be offered summer 2012. There will be an 80 hour**

Master Watershed Steward pilot training starting summer 2012. The staff are also partnering with NYS DEC to offer trainings to volunteers who are interested in stream bio-monitoring for this summer and early fall.

Staff will work with local volunteer and community organizations to engage their members in volunteer efforts in collaboration with the Ashokan Watershed Stream Management Program. **CCE has partnered with Trout Unlimited on plantings and stream clean-ups in 2011 and 2012. In addition, the newly formed Oliverea Landowner's Association was a partner with CCE on the most recent stream clean-up in 2012.**

Staff will continue to recruit and reach volunteers through use of website, local media, and other outreach efforts. Staff will put volunteer applications and job descriptions on the website. **Staff are working with Cornell Cooperative Extension Master Watershed Steward program to develop volunteer job descriptions and trainings. Volunteers are currently recruited through e-mail, facebook, press releases and other means. Participation in volunteer events is increasing as more regular programs are held. We had 13 volunteers for the 2010 stream clean up, 20 for the 2011 clean up and 40 for the first clean-up in 2012. This process will continue through 2013.**

Prior Accomplishments (2009-2011)

The AWSMP program staff provided a one day training in basic stream stewardship concepts to give volunteers a common background in July 2010. Several evening meetings for volunteers were also held in 2009 and 2010.

Program staff offered weekend and evening core volunteer activities that integrated mini trainings as part of the volunteer activities. These included:

- Volunteer Knotweed Pulls, May 2009 and 2010
- Volunteer Stream Clean-up, June 2010
- Training on using GPS for data collection
- Native Seed Collection Training
- Volunteer Riparian Plantings, two in 2010

Staff reached volunteers through use of website, local media, speaking to local community groups, and other outreach efforts. Volunteer applications, job descriptions are available on the program website. Press releases announcing program and events were covered in local papers.

Staff began to partner with existing volunteer and community organizations including Trout Unlimited and Bruderhof on volunteer activities. Bruderhof has provided members for stream plantings. Trout Unlimited, Catskill Chapter will be co-sponsoring a stream clean-up with our program in 2011.

Recommended Change for 2013-2015 Action Plan

No change.

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 2011-2013 ACTION PLAN AND ALLOCATION OF SMIP FUNDING IN SUPPORT OF RECOMMENDATIONS

I. FLOODPLAIN ASSESSMENT - RECOMMENDATIONS

- *Support the completion of Flood Studies by FEMA to produce necessary revisions to the existing Flood Insurance Rate Maps (FIRMs). Revise FIRMs for Ashokan Reservoir watershed via an Agreement between DEP and FEMA.*

II. COORDINATION WITH FLOODPLAIN MANAGEMENT EFFORTS IN THE WATERSHED - RECOMMENDATIONS

- *Assist municipalities in the Watershed to review their current floodplain ordinances and adopt revisions as appropriate. 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. Revisions in ordinances should reflect current building trends, new technologies, and compliance and integrate broader community plans as appropriate. Where existing communities, structures and facilities are in at-risk locations, encourage the application of flood-proofing measures or relocation.*
- *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.*
- *Watershed communities should develop and implement comprehensive stormwater management plans which will protect water quality as well as reduce impacts on stream morphology.*

ASHOKAN WATERSHED SMIP PROJECTS SUPPORTING COORDINATION WITH FLOODPLAIN MANAGEMENT EFFORTS IN THE WATERSHED (TOTAL ALLOCATION \$415,181)

RCAP Solutions	SAFARI Coordination with Mitigation Plan <i>To help 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.</i>	\$10,000	Active
Town of Shandaken	Phoenicia Flood Mitigation Phase 1 <i>To hire an consultant to analyze Stony Clove reach at Main Street bridge and develop design for mitigation project</i>	\$32,681	Completed
Town of Shandaken	Shandaken Flood Planning <i>To hire a consultant to develop a long-term mitigation strategy for Town of Shandaken, with an emphasis on Phoenicia, and to assist the town in applying to the FEMA Community Rating System program.</i>	\$92,500	Active
Ulster County Soil and Water Conservation District	Brown Road HMGP <i>To buy-out a repetitive loss property and implement a stream stabilization project with the goal of flood risk reduction. The grant will provide the match to a FEMA Hazard Mitigation Grant.</i>	\$200,000	Active
Town of Shandaken	Phoenicia Flood Mitigation Phase 2 <i>For implementation of the design to reduce flooding from the Stony Clove. The purpose of funding the project is to assess the efficacy and cost-effectiveness of gravel removal in that location.</i>	\$80,000	Active

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

- *Provide training and assistance for local floodplain managers and municipal officials in using revised FIRMs (Flood Insurance Rate Maps)*
- *Increase access to flood prevention/protection information in the watershed. The Ashokan Watershed SMP Field Office in Shandaken will be a host site for flood prevention/protection information.*
- *Develop a flood emergency preparedness program for stream management stakeholders. Watershed municipalities, working with local and state agencies, should support periodic training sessions on flood related issues. Audience should include municipal leaders, code enforcement staff, planning boards, landowners, realtors, lending institutions and others*

ASHOKAN WATERSHED SMIP PROJECTS SUPPORTING OUTREACH, EDUCATION AND TECHNICAL ASSISTANCE FOR FLOODPLAIN MANAGEMENT (TOTAL ALLOCATION \$3,250)

Cornell Cooperative Extension of Ulster County – Master Gardeners	Raingarden Training <i>To offer a training to the public on raingardens.</i>	\$48	Completed
Cornell Cooperative Extension of Ulster County	Floodplain Manager Association Training Grant <i>To provide 5 scholarships for Town Floodplain Law administrators to attend the NYS Watershed Association Conference in May 2012 and obtain CFM certification.</i>	\$3,200	Active

DETAILED RECOMMENDATIONS, PLAN OF WORK AND ACCOMPLISHMENTS

I. FLOODPLAIN ASSESSMENT

Recommendation

Support the completion of Flood Studies by FEMA to produce necessary revisions to the existing Flood Insurance Rate Maps (FIRMs). Revise FIRMs for Ashokan Reservoir watershed via an Agreement between DEP and FEMA.

Plan of Work (2011-2013) – update is in bold

FEMA will revise FIRMs based on updated terrain and modeling information and will provide opportunities to municipalities for review/comment. FEMA contractors have been actively surveying in the Ashokan Watershed and are developing the models in support of the maps. Regular meetings have been held to provide an opportunity for the public to learn about the project and comment on the process. AWSMP will continue to attend those meetings.

DEC has received a grant from FEMA to lead education efforts in the watershed around the map revisions. CCE will participate in mapping committee and support work of DEP and DEC in outreach and education. AWSMP staff will support town adoption of revised FIRMs when completed. DEC has organized regular meetings (approximately every three months) in the Watershed and has offered educational programming and information. CCE staff have assisted DEC in outreach and in organizing their meetings. In addition, DEC, at the request of CCE offered training for code enforcement officers and municipal officials at the Ashokan Watershed Conference in 2012 on the National Flood Insurance Program. Staff will continue to provide support to DEC in their outreach to the communities.

Prior Accomplishments (2009-2011)

The DEP/FEMA contract for the flood studies has been registered and the project is underway. In 2009 DEP procured recent LIDAR topographic data necessary for FIRM development. DEP and contractors updated digital elevation models based on LIDAR data. Updated digital elevation models will be used for hydraulic modeling and subsequent hydraulic modeling results to be used in deriving FIRMs.

NYS DEC, DEP and CCE sponsored an initial meeting with towns (4/10) to identify priority areas for detailed FIRM mapping.

Recommended Change for 2013-2015 Action Plan

If the FIRMs are adopted in 2013, then this recommendation can be modified.

II. COORDINATION WITH FLOODPLAIN MANAGEMENT EFFORTS IN THE WATERSHED

Recommendation

Assist municipalities in the Watershed to review their current floodplain ordinances and adopt revisions as appropriate. 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. Revisions in ordinances should reflect current building trends, new technologies, and compliance and integrate broader community plans as appropriate. Where existing communities, structures and facilities are in at-risk locations, encourage the application of flood-proofing measures or relocation.

Plan of Work (2011-2013) – update is in bold

AWSMP staff will monitor AWSMP Implementation Fund grant to Shandaken for flood mitigation planning and participate in SAFARI (Shandaken Area Flood and Remediation Initiative). Staff will provide support to Shandaken as they proceed with Community Rating System application. Work with the town of Shandaken, through their grant from the AWSMP program, to identify and implement flood-proofing measures in Phoenicia and seek sources of funding for mitigation efforts. Work with the town of Shandaken on other locations where structures are particularly prone to flood damage (Brown Road, Mt. Tremper) to identify options for remediation. **Flood Hazard Mitigation has been a significant amount of work in 2011 and 2012 due to floods in 2010 and Tropical Storm Irene. AWSMP staff have assisted the Town of Shandaken in developing their flood hazard mitigation plan and their application to the CRS. They will continue to assist the town until the projects are completed. AWSMP Implementation Funds were used for a stream project in Phoenicia in 2011 that was designed to reduce the level of the 25 year flood. This project was conceived after the 2010 floods and implemented after Irene. In addition, an assessment of the Phoenicia Main Street Bridge was done to assess its impact on flooding, and the results will be incorporated into the Town's Mitigation plan. AWSMP staff also submitted a stream project and buy-out to SEMP in 2011 (before Irene) for flood mitigation. This project is currently under review by FEMA. AWSMP staff also assisted the town in submitting 40 properties to the County for their buy-out application to SEMO and 1 property for an elevation project after Irene and helped communicate with landowners about the programs. AWSMP staff are serving on the Catskill Flood Mitigation Working Group to try to identify ways that the DEP programs can coordinate with local and county needs for flood hazard mitigation. AWSMP staff have served as a point of contact between DEP/FEMA mapping committee staff and requests from the County and the Army Corps for updated survey data and models post-Irene to assist with design of restoration projects. AWSMP will continue to assist in this role through 2013.**

Based on the experience of Shandaken, AWSMP will encourage other towns to participate in Community Rating System through National Flood Insurance Program. Towns who are interested may be encouraged to apply for support through AWSMP Implementation Fund. Work with the towns to discourage inappropriate construction practices in flood-prone areas. **This option will be progressed in 2013.**

Prior Accomplishments (2009-2011)

In 2009 AWSMP staff met with Town of Shandaken Supervisor to assess interest in applying for NYS DOS funds flood hazard mitigation in Phoenicia. At that point in time, Shandaken was not ready to submit an application for this. After the 2010 floods, a flood hazard mitigation committee, the Shandaken Area Flood Advisory and Remediation Initiative (SAFARI), was formed in Shandaken and the town applied for funding to hire a consultant to assist them with flood hazard mitigation, including flood-proofing, in the hamlet of Phoenicia. Assisted in coordinating agency response to 2010 floods and helped develop Flood Mitigation Planning group in Shandaken (SAFARI). AWSMP staff assisted the town with a grant to hire a

consultant to develop a flood-mitigation plan and to help the town apply for the FEMA Community Rating System.

CCE submitted a letter of intent to SEMO in March, 2011, for funds to mitigate repetitive loss structures in Phoenicia. UCSWCD also submitted a letter of intent to SEMO at that time for a project on Brown Road, which includes mitigation or relocation of flood-prone structures.

Recommended Change for 2013-2015 Action Plan

Modify recommendation to reflect post-Irene conditions

Recommendation

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.

Plan of Work (2011-2013) – update is in bold

Staff will work with towns who have not signed on to the County All-Hazard Mitigation Plan (Olive, Woodstock) to prepare them to participate in the revised county All-Hazard Mitigation plan in 2014. **Ulster County Emergency Management has applied to SEMO for funding to expand the County All Hazard Mitigation Plan to include the towns that are not included in the current Plan. It is very likely that this grant will be funded and that work on this activity will begin in 2013. The AWSMP program staff have spoken to Olive and Woodstock about the benefits of adopting the Plan.**

Staff will coordinate with SEMO and Emergency Management to track availability of Hazard Mitigation funds, assist in the development of proposals and support, through the AWSMP Implementation Fund, match for projects that are consistent with the stream management program. **CCE UC and SWCD applied to the HMGP for a grant to stabilize a section of the Esopus Creek at Brown Road where channel avulsion has caused flood damage to homes and infrastructure. This grant includes the buy-out of a severe repetitive loss property. In addition, CCEUC assisted the Town of Shandaken in identifying 40 properties that were eligible for the Ulster County HMGP application for buy-outs after Tropical Storm Irene. They also assisted the Town of Shandaken in putting in an application to HMGP to elevate a structure. If approved, AWSMP will support the Town's implementation of the grants in 2012 and 2013.**

Prior Accomplishments (2009-2011)

CCE/SWCD worked with Town of Shandaken to develop project plans for their grant proposal to receive mitigation funding (Fawn Hill Project in Woodland Valley). CCE and SWCD submitted letters of intent for two additional Mitigation projects in Shandaken. Staff highlighted the fact that Shandaken is eligible for funding because of its participation in the County All-Hazard Plan in media outreach and to other communities.

Staff worked with the Towns of Olive and Woodstock to see if they could retroactively participate in the FEMA Hazard Mitigation Plan - the option is not available to them until the County renews its plan in 2014.

Recommended Change for 2013-2015 Action Plan

If plans are developed and adopted, then this recommendation will be modified.

Recommendation

Watershed communities should develop and implement comprehensive stormwater management plans which will protect water quality as well as reduce impacts on stream morphology.

Plan of Work (2011-2013) – update is in bold

Continue to work with Towns, CWC, and UC Department of the Environment to identify status of stormwater management planning and formulate recommendations for developing or improving, as needed. **Staff will serve in an advisory role as requested and time permits. Stormwater management may be included in the Phoenicia Flood Mitigation Plan that was funded by AWSMP Implementation Funds.**

Provide training to area stakeholders (mainly focused on municipal employees) from Cornell Local Roads, or other sources, for BMP installation of runoff drainage on roads and driveways. **A class for landowners on driveway BMPs was offered in 2011 and may be offered again if there is interest.**

Use results of FEMA flood study to identify areas where existing stormwater infrastructure may be undersized. **When the FEMA flood studies are completed, this information will be shared with the impacted communities and residents.**

Prior Accomplishments (2009-2011)

AWSMP staff met with UC Department of the Environment regarding stormwater planning requirements in Ashokan Watershed (2009).

The Annual Watershed Conferences in 2010 and 2011 focused on flooding and offered sessions on reducing erosion. Stormwater was particularly emphasized at the 2010 conference.

The AWSMP Implementation Fund paid for a training for municipal highway employees, taught by Cornell Local Roads, on best management practices for installation of runoff drainage systems on roads and driveways.

Recommended Change for 2013-2015 Action Plan

Modify recommendation to reflect that most of the resources in Stormwater provided by the program will be in an educational and resource coordination role, not in planning. This recommendation should be moved to Education and Outreach.

III. OUTREACH, EDUCATION AND TECHNICAL ASSISTANCE FOR FLOODPLAIN MANAGEMENT IN THE ASHOKAN WATERSHED

Recommendation

Provide training and assistance for local floodplain managers and municipal officials in using revised FIRMs (Flood Insurance Rate Maps)

Plan of Work (2011-2013) – update is in bold

Provide assistance to NYS DEC/DEP as needed for FIRM map trainings. CCE will continue to sponsor NYS DEC training on National Flood Insurance Program at Ashokan Watershed Conference. **The training was offered in 2012 and will be requested in 2013. In addition, DEC is offering additional training at the FIRM outreach meetings. In addition, CCE Ulster staff provided regular support to the Shandaken code enforcement officer after Tropical Storm Irene in understanding and implementing the National Flood Insurance requirements in Shandaken and in reading flood maps and flood studies.**

Encourage municipalities to use grants provided by the AWSMP to send employees to trainings and provide additional workshops or presentations as needed. **Funding was provided in 2012 to send local code enforcement officers and local officials who are responsible for floodplain management to the New York State Floodplain Managers Conference. 2 code enforcement officers sat for the Certified Floodplain Manager Exam and attended training sessions at the conference. In addition, one staff from the Ulster County Highway Department also attended the Floodplain Managers Conference and plans to sit for the CFM exam in 2013. CCE plans to continue to support training for key staff in this area in 2013.**

Staff will participate in continuing educational opportunities to increase their capacity to assist watershed communities and residents. **In 2012 one additional CCE staff person and one DEP staff person sat for the CFM exam and three staff attended the Floodplain Managers Conference.**

Prior Accomplishments (2009-2011)

CCE coordinated with DEP and DEC on meeting for Watershed Towns to review FIRM maps and make recommendations for priority study areas for new FIRMs 4/2010.

AWSMP staff have participated in trainings sponsored by DEP and DEC to increase their knowledge of floodplain management. AWSMP staff have encouraged municipal officials in the watershed communities to take advantage of these training opportunities. The Town of Shandaken floodplain manager, in particular, has participated actively in training opportunities. CCE staff attended floodplain manager training in Oneonta to prepare to assist watershed towns with outreach on new FIRMs 5/2010, Shandaken Code enforcement officer attended Floodplain management training in Oneonta in early May. Higgins gained CFM certification (certified floodplain manager) with support from DEP and SWCD Delaware County.

CCE sponsored NYS DEC training on National Flood Insurance Program at 2010 and 2011 Watershed Conferences that offered municipal training credits.

Recommended Change for 2013-2015 Action Plan

Broaden language to include National Flood Insurance Program, not just flood maps.

Recommendation

Increase access to flood prevention/protection information in the watershed. The Ashokan Watershed SMP Field Office in Shandaken will be a host site for flood prevention/protection information.

Plan of Work (2011-2013) – update is in bold

Continue to develop a physical and digital library of resources for Ashokan watershed towns and residents. Use the www.ashokanstreams.org website to guide people to Ulster County Emergency Management and FEMA on-line resources. Provide assistance by phone and in person to residents who have questions about flood insurance or flood risk. **In 2011 and 2012 staff provided trainings and information about the National Flood Insurance program directly to landowners. Assisted the flood-impacted landowners in understanding what assistance FEMA would provide and what assistance would be provided by Flood Insurance. These trainings will continue to be offered as requested.**

Continue to distribute the AWSMP Flood Emergency Preparedness Fact Sheet and Include flood emergency preparedness articles in Esopus Creek Newsletter. Update the website to include better information on flood related topics targeted to the watershed. **The program used the newsletter, the website, facebook and direct e-mails extensively to provide information and resources to flood-affected residents –particularly after Tropical Storm Irene. This service will be continued through 2013.**

Offer continuing education credit opportunities for floodplain managers and other municipal officials. **Continuing education credits were offered at the Ashokan Watershed Conference in 2012 and at the Floodplain Managers Meeting in 2012. The program provided financial support to code enforcement officers who wished to attend the meeting. We will continue to extend this opportunity to local officials through 2013.**

Prior Accomplishments (2009-2011)

Resources have been identified and a library of Flood and National Flood Insurance Program related resources is in process. Ulster County Emergency Management and FEMA offer many of the resources on-line.

Flood warning information was posted to front page of AWSMP website, with link to National Weather Service flood prediction website.

Recommended Change for 2013-2015 Action Plan

No change

Recommendation

Develop a flood emergency preparedness program for stream management stakeholders. Watershed municipalities, working with local and state agencies, should support periodic training sessions on

flood related issues. Audience should include municipal leaders, code enforcement staff, planning boards, landowners, realtors, lending institutions and others

Plan of Work (2011-2013) – update is in bold

Continue to offer workshops on flood emergency preparedness topics at Ashokan Watershed conference and work with watershed towns, DEP, and DEC to offer other training programs. **Flood emergency preparedness was covered in the 2012 Ashokan Watershed Conference. The program plans to update the Flood Emergency Preparedness fact sheet and redistribute it. Other programs will be offered as requested.**

Work with the Town of Shandaken’s flood mitigation group (SAFARI) to develop improved flood preparedness. Share information/processes developed by Shandaken with other watershed towns. Assist with programs in other towns as requested and time permits. **In 2012 the consultant working on the Flood Hazard Mitigation Plan for Shandaken is working on a flood emergency preparedness plan for the Town. The Town Supervisor of Shandaken has taken NIMS training and is recommending it for other community officials. The Town’s command center was considered to be very effective following Irene. Will continue to support the watershed towns in considering flood emergency preparedness as needed.**

Prior Accomplishments (2009-2011)

AWSMP staff offered workshop on flood emergency preparedness topics at May 2010 and 2011 Watershed conferences. Multiple speakers at the 2010 Watershed Conference covered topics on floodplain planning and development including Art Snyder, Director of Ulster County Emergency Management and regional SEMO representative.

CCE staff worked with the County Department of Economic Development and Planning to coordinate a workshop for flood-affected businesses/residents in Shandaken in January 2011 and offered a presentation on the basics of flood insurance at the workshop.

Produced and distributed Flood Emergency Preparedness Fact Sheet. The fact sheet was provided to all 2010 conference participants, mailed to mailing list and revised and resent to mailing list after October 2010 flood. Included flood emergency preparedness articles in Spring, 2010 newsletter.

Recommended Change for 2013-2015 Action Plan

No change.

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 2011-2013 ACTION PLAN AND ALLOCATION OF SMIP FUNDING IN SUPPORT OF RECOMMENDATIONS

I. APPLICATION OF HIGHWAY BEST MANAGEMENT PRACTICES TO REDUCE WATER POLLUTION

- *Winter road abrasives, mined locally in the Ashokan Watershed, have a high clay and silt content and are a source of turbidity in the streams in the Ashokan Watershed. There may be opportunities to reduce loadings through application of BMPs.*
- *Culvert outfalls create point sources of discharge, collected from the diffuse sources of road runoff. These outfalls can discharge significant amounts of concentrated pollutants into the stream. Identify the most critical outfalls with regard to point-source discharges and substrate stability, and which offer opportunities for mitigation.*
- *Local municipalities, highway departments and NYSDOT, should place a priority on 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.*
- *Local municipalities, highway departments and NYSDOT, should place a priority on 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.*

II. REDUCING HYDRAULIC CONSTRICTIONS IN STREAMS: BRIDGES AND CULVERTS

- *Encourage collaboration between 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.*

ASHOKAN WATERSHED SMIP PROJECTS SUPPORTING REDUCING HYDRAULIC CONSTRICTIONS IN STREAMS (TOTAL ALLOCATION \$344,854)

Town of Olive	Bradkin Road Culvert Replacement <i>To replace stream crossing culvert that was washed out during the October 2010 flood with a culvert that is sized appropriately for the stream channel.</i>	\$107,000	Completed
Town of Woodstock	Van Hoagland Road Hydrology Study <i>To help fund a hydraulic analysis for the replacement of the Van Hoagland Road bridge to help size the structure appropriately.</i>	\$5,000	Completed
Town of Woodstock	Van Hoagland Road Bridge Replacement <i>To extend the Van Hoagland Bridge by 20' in order to remove a hydraulic constriction. Bridge construction is in process</i>	\$126,254	Completed
Ulster County DPW	Esopus at Maben Hollow bridge repair and expansion <i>to provide matching funds to FEMA Public Assistance to 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.</i>	\$29,300	Active
Ulster County DPW	Esopus at County rt. 47 bridge <i>Provide matching funds to FEMA Public Assistance to replace an 8 foot diameter culvert which failed during tropical storm Irene with a 60 foot span bridge.</i>	\$77,300	Active

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

- *Collaborate with local, county and state highway departments to apply natural channel design concepts to streambank stabilization along roadsides.*
- *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 (Total Allocation \$77,775)

Town of Shandaken	Woodland Valley at Fawn Hill <i>Stabilize streambank and hillslope where road was threatened by stream erosion.</i>	\$35,075	Completed
Town of Woodstock	Beaverkill Channel Protection <i>To repair a breached section of steam bank on an outside curve in the stream. During medium and high flows, this section diverts into a channel behind the streambank which leads in behind the Van Hoagland Bridge. The repair would consist of 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.</i>	\$5,700	Completed
Town of Woodstock	Mink Hollow LWD removal on Beaverkill <i>To remove large LWD jam on Beaverkill on DEP property threatening Mink Hollow Bridge</i>	\$29,100	Active
Ulster County DPW	Maltby Hollow Brook Restoration <i>Maltby Hollow Brook's main channel was altered during tropical storm Irene. County DPW worked with UC SWCD and DEP to develop a mitigation strategy and design that they then implemented as part of their emergency repair work.</i>	\$7,900	Active

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

- *Establish a quarterly or semi-annual meeting with all relevant local, county, and state highway personnel to identify shared stream/road concerns and evaluate opportunities to support coordinated effort to use BMPs. Develop annually revised Plan of Works for collaboration.*
- *During periods of post -flood response, municipalities need information and technical support to minimize impacts on stream system stability. Documented guidelines for “repairs” of flood damaged streams and drainage systems with best management practices advocated by the AWSMP would greatly reduce risk of further instability. Develop guidelines, which integrate stream form and function, for use during post flood response.*

Ashokan Watershed SMIP Projects Supporting Outreach, Education and Training for Highway Managers (Total Allocation \$874)

<p>Cornell Cooperative Extension of Ulster County</p>	<p>Cornell Local Roads Ditch and Culvert Class <i>Provide training on roadside drainage and ditch management to staff from watershed highway departments and Ulster County DPW</i></p>	<p>\$874</p>	<p>Completed</p>
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DETAILED RECOMMENDATIONS, PLAN OF WORK AND ACCOMPLISHMENTS

I. APPLICATION OF HIGHWAY BEST MANAGEMENT PRACTICES TO REDUCE WATER POLLUTION

Recommendation

Winter road abrasives, mined locally in the Ashokan Watershed, have a high clay and silt content and are a likely source of turbidity in the streams in the Ashokan Watershed. There may be opportunities to reduce loadings through application of BMPs.

Plan of Work (2011-2013) – update is in bold

Continue investigation with Towns, County, CWC and DEP into the benefits of acquiring sweeper/vac truck and investigate other viable management options, from a water quality perspective, to reduce turbidity loading in streams from road sand and salt. **We met with the highway managers and they agreed that the sweeper/vac was not cost-effective to treat this source of turbidity.**

Prior Accomplishments (2009-2011)

Assessed town needs for street cleaning and vacuuming. Evaluated denied County grant application for vacuum /sweeper truck. Contacted CWC, UC DOE, USDA NRCS and DEP for feedback on reasons for denial and provided feedback to Town of Shandaken Highway Department. Sponsored a demonstration for highway personnel in September 2010 at the Ulster County Highway Garage in Boiceville of the recommended sweeper/vac truck. Highway managers and AWSMP staff evaluated the effectiveness of the vac truck in picking up the clay mixed in with locally-mined sand. There was concern that the amount of area that could be effectively covered by one sweeper/vac would not justify the cost from a water quality improvement perspective.

Recommended Change for 2013-2015 Action Plan

Remove recommendation to keep focus on stream-channel sources of turbidity, which are the predominant source of water quality impairment in the Ashokan Watershed.

Recommendation

Culvert outfalls create point sources of discharge, collected from the diffuse sources of road runoff. These outfalls can discharge significant amounts of concentrated pollutants into the stream. Identify the most critical outfalls with regard to point-source discharges and substrate stability, and which offer opportunities for mitigation.

Plan of Work (2011-2013) – update is in bold

The Cross Patch Road Demonstration Project (Town of Woodstock) funded by AWSMP Implementation Fund was planned to be implemented. **Unfortunately the town was not able to get an agreement with the key landowner, and as a result this project was discontinued.**

Work with the other Ashokan watershed municipalities, County DPW and NYSDOT to map culvert outfalls and identify those culvert outfalls that may contribute pollutants into the stream system and

prioritize opportunities for mitigation. Use AWSMP Implementation Fund to help address problems if identified. **This would be a project that we would support through funding, if requested.**

Prior Accomplishments (2009-2011)

Town of Shandaken has mapped with GPS, the locations of all culvert outfalls. Received report from Ulster County DOE on prior work done on mapping culverts in Ulster County. CCE and SWCD researched culvert assessment and monitoring protocol in other states.

Recommended Change for 2013-2015 Action Plan

This recommendation should be modified to reflect current program priorities.

Recommendation

Local municipalities, highway departments and NYSDOT, should place a priority on 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.

Plan of Work (2011-2013) – update is in bold

Continue to identify current roadside ditch and steep slope vegetation management practices and provide support as needed to improve those practices. Use survey developed by Cornell University to establish baseline of current practices. **Survey was never implemented by Cornell University due to the departure of a staff person. This project has not been a priority in 2011-2012 due to shift in workload from floods. It is unlikely to be a priority through 2013.**

Organize town requirements into strategy for acquiring hydro-seeding opportunities and training. Apply AWSMP Implementation Funding as appropriate. Coordinate SWCD access to multi-county hydro-seeder for larger projects. **This project was not as high a priority as other projects due the floods.**

Prior Accomplishments (2009-2011)

Met with town highway supervisors to discuss needs for hydro-seeding and current practices Group recommended continued training for town personnel. Offered a Cornell Local Roads led training on roadside drainage and ditch maintenance for area highway personnel. Held multiple highway manager meetings at AWSMP office.

Recommended Change for 2013-2015 Action Plan

This recommendation will be modified to reflect current program priorities.

II. REDUCING HYDRAULIC CONSTRICTIONS IN STREAMS: BRIDGES AND CULVERTS

Recommendation

Encourage collaboration between 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.

Plan of Work (2011-2013) – update is in bold

Continue to use highway managers' meetings with the highway superintendents for each of the Ashokan Watershed municipalities, Ulster and Greene County DPW staff, and NYS DOT representatives to discuss opportunities for collaboration and technical support. **The meetings are held every other month and we plan to continue them through 2013.**

Use results of FEMA Flood Study to help identify bridges and culverts that are likely to be hydraulic constrictions. Provide technical assistance to ensure application of fluvial geomorphic principles and fiscal support for bridge replacements in the Watershed as a program-sponsored demonstration project. **In 2012 AWSMP staff assisted Ulster County DPW in accessing FEMA survey data on the Esopus from the in progress Flood Study to help them assess the Phoenicia Bridge Street bridge replacement. The program also funded MMI to run a hydraulic model of removing the Main Street (rt. 213) bridge on the Stony Clove.**

Use AWSMP Implementation Fund to support projects where hydraulic constrictions contribute to stream instability, flooding hazard, habitat degradation, or erosion. **In 2011 the McKinley Hollow Bridge was replaced by County DPW without center pier, based on AWSMP recommendations. AWSMP funded a replacement culvert in Olive in Traver Hollow, expanded the width of the new Van Hoagland Bridge by 20 feet, provided local match to replace the failed culverts on county route 47 with a bridge and also provided the match to expand the width of the Maben Hollow bridge.**

Prior Accomplishments (2009-2011)

Established a regular meeting with all relevant local, county, and State highway personnel to identify shared stream/road concerns and evaluate opportunities to support coordinated effort to use BMPs. As a result of these meetings, identified several bridge projects. Staff met with Ulster County bridge engineer to discuss plans for bridge replacement in McKinley Hollow. Met with Town of Woodstock highway manager and identified need for geomorphic assessment on Van Hoagland Bridge in Woodstock. Offered support to Woodstock for hydraulic analysis of bridge.

Recommended Change for 2013-2015 Action Plan

No change. Recommend changing natural channel design to applied fluvial geomorphology

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

Recommendation

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

Plan of Work (2011-2013) – update is in bold

Assist with design and construction supervision of stream projects. Provide financial support to high priority projects through the Ashokan Watershed SMIP. Assist towns with securing funding from other sources for priority projects. **Assisted the towns, county and state with post Irene projects on numerous streams in the Ashokan Watershed. Funded and provided technical support for stream stabilization projects in Woodstock, Olive and Shandaken. Developed Town sponsorship of EWP projects in 2012. Will continue to support highway departments with post-Irene technical support in 2012 and 2013.**

Reach-level projects that are being considered include sections of the Beaverkill above Van Hoagland Bridge, the Esopus Creek at Brown Road. **AWSMP staff submitted the Esopus Creek at Brown Road project to SEMO for mitigation grant funding. The project is currently under review by FEMA and, if funded, may be scheduled for construction in 2013. The Town of Woodstock is planning to undertake work on the Beaverkill above the VanHoagland Bridge in 2012.**

Prior Accomplishments (2009-2011)

Used the highway manager working group meetings to discuss opportunities for collaboration and technical support. Met with highway department staff in the field post flood response to discuss possible projects.

Assessed and designed a project on Woodland Valley Road to stabilize large/steep failing stream bank adjacent to stream. Met with FEMA representatives and assisted in the Town of Shandaken's application for hazard mitigation funding for the project. Assisted the town with post-flood (2010) projects on the Esopus, Woodland Valley Creek and Warner Creek.

Started assessment of BMPs for ditch management on Cross Patch Road in Woodstock.

Recommended Change for 2013-2015 Action Plan

No change. Recommend changing natural channel design to applied fluvial geomorphology

Recommendation

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.

Plan of Work (2011-2013) – update is in bold

As opportunities arise, work in cooperation with highway departments, utility companies, and Catskill Scenic Railroad, to identify and prescribe specific sites for planting or improved management of vegetation in right of ways. Provide funding through the program for plantings either as buffers or as bioengineering/biotechnical stabilization projects. **Coordinated with CSBI to plant native species at municipal infrastructure projects. Continue to serve on County Pesticide Management Working Group when Railroad Right of Way issues for weed management are reviewed.**

Prior Accomplishments (2009-2011)

AWSMP staff had multiple site visits with landowners in close proximity to streams and roads. Recommended best practices for maintaining riparian vegetation and offered funding to 11 landowners through the CSBI program.

Worked with Ulster County Dept. of the Environment to make recommendations to Catskill Scenic Rail Road for railroad corridor weed management on County-owned right of way.

Recommended Change for 2013-2015 Action Plan

No change.

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

Recommendation

Establish a quarterly or semi-annual meeting with all relevant local, county, and state highway personnel to identify shared stream/road concerns and evaluate opportunities to support coordinated effort to use BMPs. Develop annually revised Plan of Works for collaboration.

Plan of Work (2011-2013) – update is in bold

Continue bi-monthly highway managers' meetings. Increase training opportunities for highway department staff in stream management concepts. **Continue to offer highway managers meetings on a regular basis. With Greene County and DEP, developed and taught three sessions to train contractors to do streamwork after floods. In addition, offered Rosgen level 1 training and Aquatic Organism Passage training to Ulster County DPW staff.**

Prior Accomplishments (2009-2011)

Organized regular meetings of Highway managers. Meetings were used to identify possible projects, network, and provide technical assistance and information.

Recommended Change for 2013-2015 Action Plan

No change.

Recommendation

During periods of post -flood response, municipalities need information and technical support to minimize impacts on stream system stability. Documented guidelines for “repairs” of flood damaged streams and drainage systems with best management practices advocated by the AWSMP would greatly reduce risk of further instability. Develop guidelines, which integrate stream form and function, for use during post flood response.

Plan of Work (2011-2013) – update is in bold

CCE, UC SWCD, and DEP will work with West of Hudson NYC DEP Watershed Stream Management Program partners to develop documentation of guidelines for post-flood response to stream channel and corridor. **See training listed above. During Tropical Storm Irene, AWSMP staff served as members of the Town of Shandaken Emergency Command Post for stream restoration activities. In addition, DEP provided engineering support to the communities for stream and bridge assessment, design and implementation. In 2013 will follow up with developing guidelines for stream response to future flood events.**

CCE, UC SWCD and DEP will publicize documents, trainings and other resources on this topic developed by other West of Hudson NYC DEP Watershed Partners. CCE, UCSWCD, and DEP will collaborate on development of a series of three short trainings in 2011 on key topics, review program for continuation or expansion. If successful, expand the trainings based on feedback from participants.

Prior Accomplishments (2009-2011)

CCE participated in review and comment on Delaware County SWCD training program. One contractor from Ulster County participated in first training session.

Offered a presentation by the Delaware County DPW commissioner to Ulster County and municipal highway department staff on Delaware County’s process for post-flood response, based on lessons learned from recent significant flood events.

Recommended Change for 2013-2015 Action Plan

No change.

Assistance to 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 2011-2013 ACTION PLAN AND ALLOCATION OF SMIP FUNDING IN SUPPORT OF RECOMMENDATIONS

I. ASSESSMENT OF STREAMSIDE PROPERTY ISSUES

- *Work with towns 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.*

II. STREAMSIDE LANDOWNER FINANCIAL ASSISTANCE

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

Ashokan Watershed CSBI Projects

2011	12 PROJECTS TOTALLING 2810 FEET (\$700)
2012	15 ARE PLANNED (2 COMPLETED, TO DATE)

III. OUTREACH, EDUCATION AND TECHNICAL ASSISTANCE TO STREAMSIDE LANDOWNERS

- *Assist local landowners, municipalities, contractors and others in designing and implementing best management practices to reduce erosion.*
- *Develop a riparian enhancement education program that assists landowners in education on the role of riparian buffers in protecting their property and supports landowner incentive programs, in particular the Catskill Streams Buffer Initiative.*
- *Develop reliable local sources of native plant material for stream and riparian improvement projects*

DETAILED RECOMMENDATIONS, PLAN OF WORK AND ACCOMPLISHMENTS

I. ASSESSMENT OF STREAMSIDE PROPERTY ISSUES

Recommendation

Work with towns 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.

Plan of Work (2011-2013) – update is in bold

Site visits with town and agency staff, helicopter reconnaissance, aerial imagery will be used to provide assistance. Program staff can provide GIS, engineering consultation and data support to this effort. Continue to refine and enhance tracking systems for areas of concern. **Completed over 200 site visits to private and public landowners in 2011 and 2012. The number of site visits has increased exponentially as a result of the 2010 and 2011 floods. Will continue to provide this service through 2013.**

Prior Accomplishments (2009-2011)

Using the highway managers group, other meetings with agency and municipal officials and over 55 landowner site visits in 2010, Ashokan Watershed staff have been working with the towns and landowners to identify and document streamside property where there are stream stability concerns. Tracking process for documenting concerns was developed.

Recommended Change for 2013-2015 Action Plan

No change.

II. STREAMSIDE LANDOWNER FINANCIAL ASSISTANCE

Recommendation

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

Plan of Work (2011-2013) – update is in bold

Continue to provide outreach on Catskill Stream Buffer Initiative and using assessment information, target applicable landowners. **Twelve projects were installed in 2011 and fifteen projects are planned for 2012. The program is expected to continue into 2013.**

Continue to identify other existing incentive programs that are applicable to streamside landowners in the watershed and develop outreach materials for landowners regarding these programs. Directly contact landowners (public and private) with targeted properties. Continue support of watershed landowners with site visits, informational packets and formal site reports. Integrate intake form into

database to better track landowner needs. **Assisted landowners in applying to grant from Catskill Watershed Corporation to mitigate flood debris issues on their property.**

Prior Accomplishments (2009-2011)

CSBI Coordinator and CCE Staff were trained on existing incentive programs. AWSMP staff attended in-service in Delaware County on existing incentive programs for private landowners. Ashokan Program developed landowner intake form to help assess landowner needs.

CCE advertised NRCS floodplain easement program in fall 2009 on their website, contacted town supervisors in the watershed about the program and contacted targeted landowners directly. Landowners have also been referred to flood insurance programs, CWC septic replacement program and post-flood low interest loans offered by various agencies.

CSBI program has developed program outreach materials. The informational materials and enrollment forms have been made available in the AWSMP office and have been distributed to landowners and municipal officials. Three CSBI projects were approved for funding in 2010.

Recommended Change for 2013-2015 Action Plan

No change

III. OUTREACH, EDUCATION AND TECHNICAL ASSISTANCE TO STREAMSIDE LANDOWNERS

Recommendation

Assist local landowners, municipalities, contractors and others in designing and implementing best management practices to reduce erosion.

Plan of Work (2011-2013) – update is in bold

AWSMP staff will continue to provide technical assistance to landowners and municipalities for assessment of their stream-related problems. Staff will help landowners develop effective management strategies for their property and supervise stream project implementation. Staff will provide regularly scheduled times in office or for site visits to assist streamside landowners and municipalities with evaluating and addressing stream-related problems. **Staff meet regularly with landowners to advise them on their stream erosion, floodplain management, and other BMP recommendations. This will continue through 2013.**

AWSMP staff will continue to offer trainings, including sessions at the annual Ashokan Watershed Conference, on effective stream management strategies for resource managers and landowners. **These trainings were offered in 2011 and 2012 and are planned for 2013.**

Prior Accomplishments (2009-2011)

- **Outreach and Assistance**

In 2010, over 55 streamside landowners were directly assisted by staff. Technical assistance, training, and support were provided in all six watershed communities.

- **Trainings and Education**

Introduction to Fluvial Geomorphology, October 8-12, 2009, taught by Dave Rosgen was offered to highway managers and others in the West of Hudson Watersheds. The Ashokan Watershed SMP staff sponsored the training.

Roadway and Roadside Drainage Workshop: A one day training for highway department workers on roadside drainage was held on October 15, 2010. David Orr from Cornell Local Roads Program led the training for 25 participants who were members of highway crews in four of the five towns in the Ashokan Watershed. The main reason for the workshop was to encourage practices for proper culvert installation and limiting runoff pollution from roads and ditches.

Ashokan Watershed Conference: May 1, 2010 Belleayre Mountain, 65 participants attended the first annual Ashokan Watershed Conference was held with the theme of “Floodplain and Stormwater Management for Towns and Landowners.” Highlights included broad representation from each town board or planning board in the watershed with attendance roughly split between streamside landowners and municipal or other agency officials.

Ashokan Watershed Conference: April 9, 2011, The Emerson Resort, over 80 participants attended about evenly distributed between municipal and agency staff and landowners. Emphasis was on information about flood mitigation and the impact of projected increased precipitation on streams.

Recommended Change for 2013-2015 Action Plan

Broaden language in recommendation to include other one-on-one technical assistance provided to landowner, including floodplain management (accessing FIRMs, understanding insurance) and other BMPs in addition to erosion reduction. The recommendation should emphasize direct technical assistance to landowners.

Recommendation

Develop a riparian enhancement education program that assists landowners in education on the role of riparian buffers in protecting their property and supports landowner incentive programs, in particular the Catskill Streams Buffer Initiative.

Plan of Work (2011-2013) – update is in bold

Provide streamside landowners and others detailed technical information through publications and the project website on the best practices for establishment and maintenance of riparian buffers. **Riparian buffers and their benefits were featured in the revised Catskill Riparian Native Plant Guide, which was issued in 2012. In addition, CSBI is featured at least once a year in the Esopus Creek News and frequently mentioned on the project Facebook site. Landowners are regularly steered to the catskillstreams.org website to learn more about riparian buffers.**

Prior Accomplishments (2009-2011)

Offered native plant workshops to landowners in February 2009 and March 2010

Publications

Media and outreach strategy was developed: including initially using newsletter and direct outreach to landowners identified as needing riparian enhancement.

- Spring, 2010 newsletter featured launch of CSBI
- CSBI is featured on both the ashokanstreams.org website and the catskillstreams.org website.
- Streamside landowner guide was included in the spring, 2009 issue of the Esopus Creek News, highlighting the importance of streamside buffers.
- CSBI program announcement covered by local press

Recommended Change for 2013-2015 Action Plan

Incorporate recommendations into general stream stewardship education and outreach recommendations because the target audience and the programs are the same.

Recommendation

Develop reliable local sources of native plant material for stream and riparian improvement projects.

Plan of Work (2011-2013) – update is in bold

Store additional potted plant materials at office site and establish willow beds for projects. Possible location near Ulster County Fairgrounds has been explored for willow bed development. **This project will begin to be implemented in 2012.**

Start willows at office site for use as plant material in projects. Investigate additional locations for willow bed plantings for use in restoration projects. **Staff have assessed sites for plantings and source material.**

Continue to train volunteers to collect native seeds for restoration projects. **This has not been needed.**

Prior Accomplishments (2009-2011)

UC SWCD developed a plant materials center at the Ashokan Watershed Office and identified sources of native willows for use as cuttings to establish willow beds. Stream Steward volunteers were trained to collect native seeds for use in future restoration projects.

Recommended Change for 2013-2015 Action Plan

No change.

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 2011-2013 ACTION PLAN AND ALLOCATION OF SMIP FUNDING IN SUPPORT OF RECOMMENDATIONS

I. AQUATIC AND RIPARIAN ECOSYSTEM ASSESSMENT

- *Identify riparian areas of particular environmental benefit or concern and create a database of targeted properties for riparian zone improvement programs.*
- *Assess the impacts of restoration projects on aquatic ecosystems and riparian habitats. 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 bio-monitoring and studies of other wildlife, their habitats, and interactions in the watershed by public agencies and interest groups.*
- *Work with the Catskill Region Invasive Species Partnership (CRISP) and with the West of Hudson (WoH) 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*
- *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*

ASHOKAN WATERSHED SMIP PROJECTS SUPPORTING AQUATIC AND RIPARIAN HABITAT AND ECOSYSTEM ASSESSMENT (TOTAL ALLOCATION \$273,123)

SUNY New Paltz	Rock Snot in Sick Rivers 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.	\$4,984	Completed
SUNY New Paltz	Didymo in Esopus Creek: Identification of Bloom <i>to continue research didymo algae blooms in the Esopus Creek. Funds will be used to continue work done in 2011 to identify locations of didymo, to measure water chemistry (a precursor to didymo infestation), testing of cleaning agents to determine functionality, and continue education and outreach efforts to educate the public about didymo and prevention technique.</i>	\$7,400	In Progress
USGS	Use of telemetry to assess potential effects of Schoharie Reservoir waters on trout populations in the Upper Esopus Creek <i>Purchase radio transmitter and receiver for telemetry project</i>	\$8,159	Completed
USGS	Quantitative Assessment of Water Quality in the Upper Esopus Creek <i>funds to hire one senior scientist and a student intern to sample fish communities and habitat conditions at sites throughout the Esopus Creek Watershed in the summer of 2010.</i>	\$27,080	Completed
Town of Woodstock	Habitat Mapping for the Town of Woodstock <i>to cover the costs of developing a large-format habitat map and a report describing the 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. These maps will be used in aiding the town with planning, development and conservation decisions.</i>	\$29,000	In Progress
USGS	Quantitative assessment of fish, macroinvertebrate, and periphyton communities in the Upper Esopus Creek <i>to conduct water quality quantitative assessments in the Upper Esopus Creek. The study focuses on fish, macroinvertebrates and periphyton. The funds will go towards researcher's salaries, travel expenses, and overhead costs. The study seeks to research the fish populations and algae populations in the Upper Esopus, assess the effect of the Shandaken Portal on aquatic organisms, evaluate the potential effects of Phoenicia water quality on aquatic organisms, quantify water quality, sediment load and turbidity throughout the Upper Esopus and in the seven major tributaries to the Esopus for 1-3 years, and characterize temporal and spatial trends in biological indices and water quality.</i>	\$79,700	In Progress
USGS	Use of telemetry to assess potential effects of Schoharie Reservoir waters on trout populations in the Upper Esopus Creek <i>USGS requested and received \$86,800 to study the effects of discharges from the Shandaken Tunnel on trout populations in the Upper Esopus Creek. The study will help define the effects that turbidity and sedimentation have on the local economy (recreation), trout populations, and quality of drinking waters in the Upper Esopus Creek and Ashokan Reservoir.</i>	\$86,800	In Progress
USGS	Impact of Climate Change on Stream Ecosystems in the Catskills <i>To quantify ecosystem impacts from the Historic August 2011 floods, quantify short and long term rates of ecosystem recovery, characterize the effects that emergency channel repairs have on stream ecosystems and provide data needed to help mitigate negative ecosystem impacts which may occur more frequently than in the past.</i>	\$30,000	In Progress

DETAILED RECOMMENDATIONS, PLAN OF WORK AND ACCOMPLISHMENTS

I. AQUATIC AND RIPARIAN ECOSYSTEM ASSESSMENT

Recommendation

Identify riparian areas of particular environmental benefit or concern and create a database of targeted properties for riparian zone improvement programs.

Plan of Work (2011-2013) – update is in bold

Evaluation of Ashokan Watershed utilizing updated imagery to inform the database of riparian zone properties for CSBI. **This was done in 2011. The follow-up has been outreach to the targeted properties (50-60). This list will be revisited after the post-Irene projects are completed in the fall of 2012. We are still waiting for the results of the Riparian Reference Reach study being conducted by NY Natural Heritage.**

Prior Accomplishments (2009-2011)

New York Natural Heritage Program began Riparian Reference Reach study for selected streams in Ashokan Watershed. Data to be used to guide restoration plantings.

Recommended Change for 2013-2015 Action Plan

No change.

Recommendation

Assess the impacts of restoration projects on aquatic ecosystems and riparian habitats. 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 bio-monitoring and studies of other wildlife, their habitats, and interactions in the watershed by public agencies and interest groups.

Plan of Work (2011-2013) – update is in bold

Continue to support and coordinate with USGS-DEC grants and SUNY REU research projects related to habitat and ecosystems. Use this research to make recommendations on management strategies to improve biological condition and water quality, based on the data collected. **USGS is currently analyzing the data that was collected in the field from 2010-2011. They will begin to release their results in 2012 and 2013. The initial results of one of the USGS studies was presented to the public by TJ Ross of Cornell in February 2012. The SUNY REU projects will be completing their third year of field work this summer 2012. It is anticipated that their results will be presented at the Catskill Conference in October 2012. Continuation of their work in the watershed will depend on the availability of future funding.**

Collaborate with other researchers working in the Watershed by: supporting an additional research conference in 2012 for researchers working in the Catskills; coordinating or participating in panels at other conferences; maintaining the e-list for researchers and resource managers in the Catskills. **We are**

planning a Catskill Environment Conference for October 2012. The results of the conference will be published as a special issue of the NYS Academy of Science.

Use Technical Advisory group to help integrate ecosystems information into stream management decisions. **This group has not been formed and is under review.**

At the 2012 Ashokan Watershed Conference a presentation by USGS and DEC on the Ecosystem Impacts of Floods on the watershed was offered.

Prior Accomplishments (2009-2011)

Held two Ecosystem Working Group Meetings (2009)

Supported USGS-DEC investigation of aquatic habitat “Quantitative Assessment of Water Quality in the Upper Esopus Creek: fish, macro invertebrates, periphyton, turbidity and nutrients” by providing financial support and allowing USGS, DEP and DEC fishery staff and interns to use Shandaken office for field work during the summer in 2009 and 2010. The purpose of this study is to provide a comprehensive assessment of biological condition (fish, invertebrates and algae). USGS is including data collection near proposed sites in Stony Clove’s “Chichester Reach” restoration project.

Provided financial support to SUNY New Paltz REU students engaged in research on Didymo in the Esopus Creek summer 2010.

Organized a Catskill Environmental Monitoring and Research Conference in November 2010 in collaboration with USGS, DEC, Cary Institute, DEP to help support sharing of research related to Catskills Ecosystems. Barry Baldigo (USGS) and TJ Ross (Cornell) presented their preliminary findings at the Watershed Technical Conference in September and the Catskill Environmental Research Conference in November. SUNY New Paltz REU students also presented posters at the Catskill Environmental Research Conference.

Recommended Change for 2013-2015 Action Plan

No change except that language about communicating ecosystem and environmental information to the public should be included.

Recommendation

Work with the Catskill Region Invasive Species Partnership (CRISP) and with the West of Hudson (WoH) 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.

Plan of Work (2011-2013) – update is in bold

AWSMP staff will continue to participate in DEP West of Hudson Watershed and CRISP efforts to coordinate outreach around key invasive species of concern. Staff will continue to provide outreach to partners about prevention of transmission of aquatic invasive species. AWSMP Implementation funds can be used to provide financial assistance for outreach activities and to help implement feasible management strategies for species that are of concern in the watershed. **Staff are participating in**

CRISP and we will continue to participate through 2013. Invasive species removal is included in CSBI plans.

Staff will continue to work with TU and DEC to disseminate information about Didymo and how to prevent it. **Didymo has not been as significant an issue in the past year (probably as a result of the floods). Staff continue to promote best practices for Didymo.**

Staff will assist with and encourage volunteer projects in the watershed that relate to invasive species monitoring or prevention and encourage small grants for other targeted invasive species awareness and prevention projects.

Prior Accomplishments (2009-2011)

Michael Courtney and Adam Doan are designated as CRISP representative and attended CRISP meetings. Staff from CCE and SWCD participated in WoH Watershed-wide efforts to disseminate information on key invasive species; Japanese Knotweed, Emerald Ash Borer, Asian Long Horn Beetle, and Didymo were the species of concern during the 2009-2011 plan period.

In 2010 CCE hosted a public presentation by Leslie Suprenaut on invasive species in the Catskills region. CCE also sponsored a county-wide presentation on invasive species, particularly Emerald Ash Borer, at their annual meeting in Stone Ridge. CCE's agriculture program and Master Gardeners are a primary source of information about invasive insects and plants in the County. UCSWCD is a resource for information about invasive in ponds, Cornell University faculty have also been a resource to respond to questions by landowners.

Asian Longhorn Beetle and Emerald Ash Borer: Staff from CCE attended DEP/Nature Conservancy training on identifying outbreaks of Asian Longhorn Beetle and European Emerald Ash Borer in the Catskills. Invasive species displays about these insects were provided at Shandaken Day, Olive Day and Ulster County Fair. CCE's Teresa Rusinek has provided most of the outreach and information on Emerald Ash Borer in Ulster County.

Didymo: In 2009, CCE researched Didymo cleaning protocol used in other states and shared findings with DEP and WoH program staff in other watersheds and developed Didymo Flyer aimed at recreational users (Flyer distributed in Esopus Creek Newsletter) Laminated flyer also provided to CWC and others for inclusion in kiosks and along stream access points. In 2010, ASWMP funded a grant to SUNY New Paltz for a REU Didymo Project. REU (Research Experience for Undergraduate) students from SUNY New Paltz, under the direction of David Richardson of New Paltz and Catherine O'Reilly of Bard conducted research on the factors that lead to Didymo blooms in the Esopus. They presented their findings at the Catskill Environmental Research Conference in November.

Japanese Knotweed: Staff collaborated with DEP for disseminating recommendations about Knotweed removal. A demonstration site has been established at the corner of Bridge and High St. in Phoenicia. Volunteers have been pulling the knotweed at that location each spring since 2009 and monitoring its rate of return.

Recommended Change for 2013-2015 Action Plan

No change.

Recommendation

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

Plan of Work (2011-2013) – update is in bold

Staff will support local projects and efforts as requested and time permits. **The Shandaken ordinances are being evaluated as a part of their Flood Mitigation Planning effort. The Town of Woodstock is in the process of developing a comprehensive plan and is incorporating waterway protection. They are continuing to use their grant for education and training around their wetland and watercourse law.**

Prior Accomplishments (2009-2011)

Ulster County Department of the Environment started a project to review local ordinances for municipalities in the watershed in regard to floodplain management (riparian buffer, flood hazard mitigation, stormwater management).

The AWSMP Implementation Fund provided resources to the Town of Woodstock for ecosystem mapping in Woodstock to help in their municipal land use planning.

Recommended Change for 2013-2015 Action Plan

No change.

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 2011-2013 ACTION PLAN AND ALLOCATION OF SMIP FUNDING IN SUPPORT OF RECOMMENDATIONS

I. ENHANCING PUBLIC ACCESS TO THE STREAMS

- *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*
- *Explore opportunities for and impacts of operational adjustments of the Shandaken Tunnel to accommodate the needs of biota along with other stakeholders.*

II. EDUCATION FOR RECREATIONAL USERS OF STREAMS

ASHOKAN WATERSHED SMIP PROJECTS SUPPORTING EDUCATION AND OUTREACH FOR RECREATIONAL USERS OF STREAMS (TOTAL ALLOCATION \$15,925)

Catskill Center for Conservation and Development	Catskill Kiosk Panel Project <i>To help support an informational Kiosk on Rt. 28 in Boiceville</i>	\$5,000	Completed
Ashokan Pepacton Chapter Trout Unlimited	Leaping Trout Art Project <i>To stimulate local awareness of Trout Unlimited and conservation issues in the Ashokan Watershed.</i>	\$925	Completed
Phoenicia Library	Jerry Bartlett Memorial Angling Collection Improvement <i>to provide outreach and education services to anglers of all ages and the general public about the intimate links between a healthy ecosystem, clean water, robust fish and abundant aquatic macroinvertebrate populations through workshops, presentations and events, digital exhibits and web design</i>	\$10,000	Active

DETAILED RECOMMENDATIONS, PLAN OF WORK AND ACCOMPLISHMENTS

I. ENHANCING PUBLIC ACCESS TO THE STREAMS

Recommendation

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

Plan of Work (2011-2013) – update is in bold

In 2011 the AWSMP program allocated \$200,000 in implementation funding to improve public stream access. The project development committee will review public input to develop a set of recommended projects for funding. The public will have an opportunity to comment on proposed projects prior to implementation. Staff will work with other partners in the watershed to develop and implement projects including the Rt. 28 Corridor improvement group, and the Pine Hill, Phoenicia and Boiceville Main Street Programs to coordinate efforts. **The funding for stream access was removed due to the need to reallocate funds following Tropical Storm Irene. However, the amount of stream access in the Ashokan Watershed is likely to increase as a result of FEMA buyouts of flood damaged property in 2012 and 2013. The program will work with the County and DEP to help ensure that appropriate parcels are made available for public access. The AWSMP program is also working to improve the Woodland Valley kiosk area, plans to upgrade the kiosk and the surroundings are planned for summer 2012. This area was one of the highest recommended for improvements by the committee.**

Prior Accomplishments (2009-2011)

Attended Rt. 28 Corridor and Main Street Meetings. Public outreach sessions were held in Shandaken, Olive and Woodstock. AWSMP staff distributed information to planning boards, Trout Unlimited chapters, and other stakeholders. A survey and editable Google map was included on the website (www.ashokanstreams.org/streamaccess.html) to encourage additional feedback. A committee to develop the projects has been formed and will begin meeting in spring 2011.

Recommended Change for 2013-2015 Action Plan

No change.

Recommendation

Explore opportunities for and impacts of operational adjustments of the Shandaken Tunnel to accommodate the needs of biota along with other stakeholders.

Plan of Work (2011-2013) – update is in bold

If specific recommendations for making adjustments to the Tunnel for recreational purposes are included in the public feedback from the stream access/recreation improvement project, these

recommendations will be considered in updated management plans. **Members of the recreation committee are concerned about this issue and more specific recommendations may be considered for the 2013 Action Plan revision. Because of the floods, the committee has not been able to more fully explore this issue.**

Recommended Change for 2013-2015 Action Plan

This recommendation may be changed in the upcoming Action Plan.

II. EDUCATION FOR RECREATIONAL USERS OF STREAMS

Recommendation

Support the placement of information kiosks at common put-in and take-out locations as a means to share pertinent information about the location of in stream hazards, invasive species, safety tips and other key information.

Plan of Work (2011-2013) – update is in bold

Continue to offer grants to develop or enhance educational information. Work with stream access committee in 2011 to develop projects in the watershed that may include informational kiosks and signage at stream access locations. **There are plans to upgrade the Woodland Valley kiosk in 2012 which is heavily used by kayakers. Other areas may be considered depending on the availability of funding.**

Prior Accomplishments (2009-2011)

Finished Woodland Valley kiosk with additional informational materials (Summer 2009). Provided grant to Catskill Center for Conservation and Development to develop an informational kiosk on Rt.28. Kiosk constructed in 2010.

Recommended Change for 2013-2015 Action Plan

No change.

Recommendation

Study the economic impacts of stream-based recreation and tourism related activities on the local economy.

Plan of Work (2011-2013) – update is in bold

Support relevant projects through the AWSMP Implementation Fund. **None have been advanced at this point.**

Prior Accomplishments (2009-2011)

CCE researched prior similar studies done in the Ashokan Watershed or WoH watersheds. Identified study done by CWC. Contacted UC Planning, Catskill Center, and UC Economic Development to determine what type of project would be useful for other efforts in the region.

Recommended Change for 2013-2015 Action Plan

Evaluate the need for funding this study through the AWSMP given program priorities.

Appendix

Summary Tables of Key Planned Activities and Projects

Stream Assessments

Streams	Location	Current Status
Broadstreet Hollow	Towns of Shandaken and Lexington	Completed 2001
Stony Clove	Towns of Shandaken, Woodstock Hunter, and Lexington	Completed 2003 Re-walk Summer 2012
Esopus Creek	Towns of Shandaken and Olive	Completed 2007
Woodland Valley	Town of Shandaken	Completed 2008
Beaverkill	Towns of Shandaken and Woodstock	Completed 2010
Warner Creek	Town of Shandaken and Woodstock	Completed 2010
Birch Creek	Town of Shandaken	Completed 2011
Bush Kill	Towns of Shandaken and Olive	Summer 2012
Bushnellsville Creek	Towns of Shandaken and Lexington	TBD
Fox Hollow Creek	Town of Shandaken	TBD
Peck Hollow	Towns of Shandaken and Lexington	TBD
Little Beaverkill	Town of Woodstock	TBD
Ashokan Reservoir Tributaries	Town of Olive and Town of Hurley	TBD

Stream Project Lists

Project list reflects updated plans post-Irene and the coordination of AWSMP with NRCS EWP program. Several of the projects were incorporated into EWP given the significant impact from TS Irene. The plan for 2012 is to complete construction of the top five projects in the list below. Projects below are estimated to cost in excess of \$4 million. AWSMP will be providing 25% match and additional funds not covered by EWP. We anticipate this will spend the total available AWSMP budget for project implementation. Budget is expected to be replenished in 2013.

USDA-NRCS Emergency Watershed Protection Projects

Stream	Description	Town	Goal
Stony Clove Creek	Silver Hollow Rd /Warner Creek Confluence	Shandaken	Channel stabilization, sediment reduction and infrastructure protection.
Stony Clove Creek	Chichester Site 1	Shandaken	Channel stabilization, sediment reduction and property protection.
Stony Clove Creek	Chichester Sites 2 and 3	Shandaken	Channel stabilization, sediment reduction and property protection.
Stony Clove Creek	Dan Vitalo Property	Shandaken	Channel stabilization, sediment reduction and property protection.
Warner Creek	Warner Site 5	Shandaken	Channel stabilization, sediment reduction and property protection.
Beaver Kill	Rt 212 below S-curve	Woodstock	Channel stabilization, sediment reduction and property protection.

Other Projects

Project	Town	Priority	Goal	Current Status
Beaverkill Creek at Mink Hollow Road LWD	Woodstock	High	Removal of large woody debris jam on DEP property threatening road and private residence. Utilize BMPs with tree and root wad revetment	Construction planned for summer 2012
Beaverkill Creek at Van Hoagland Road	Woodstock	High	Streambank stabilization using channel realignment and natural channel design techniques	Survey planned for summer 2011. Possible project in 2012 or 2013 using NCD techniques
Beaverkill Creek at Mink Hollow Road Rock Wall Repair	Woodstock	High	Assist Town with stream stabilizing techniques near a failed rock wall	Construction planned for summer 2012
Esopus Creek at Brown Road	Shandaken	High	Stabilize reach of stream threatening homes and public infrastructure	If FEMA funding awarded planned design for 2012 and construction in 2013
Warner Creek #1	Shandaken	Low	Realignment of creek into former channel to reduce bridge and road flooding.	Engineering design in progress, possible construction planned 2011
Warner Creek #2	Shandaken	Low	Stabilize streambank. Source of turbidity in Ashokan Watershed	Conceptual designs complete in 4/11. Construction planned TBD
Warner Creek #3	Shandaken	Low	Mitigate large eroding hill slope in clay sediment source. Possible significant point source of turbidity in Ashokan Watershed	Conceptual designs complete 4/11. Construction date TBD
Warner Creek #4	Shandaken	Low	Streambank stabilization near road.	Conceptual designs complete in 4/11. Construction date TBD
Little Peck Hollow Creek Culvert	Shandaken	Low	Stream crossing culvert replacement	Town pursuing FEMA Hazard mitigation funds
McKinley Hollow Creek at Cemetery	Shandaken	Low	Stream crossing culvert and streambank stabilization	On-going monitoring

Completed Projects

Project	Town	Goal	Current Status
Woodland Valley Creek at Fawn Hill	Shandaken	Streambank stabilization to protect road	Completed in 2010
Beaverkill Creek at Van Hoagland Road Bridge	Woodstock	Bridge extension for possible hydraulic constriction mitigation	Funds provided to town for hydraulic analysis of bridge. Project completed February 2012.
Traver Hollow Creek at Bradkin Road Culvert	Olive	Replacement of stream crossing culvert	Funds provided to town for culvert. Construction completed summer 2011
Stony Clove Creek at Phoenicia	Shandaken	Modification to channel for post flood mitigation. Reduce flood stage at moderate floods (25 year)	Engineering and construction planned for 2011. Funds provided to town for engineering and design work.

CSBI Program

Year	Goal
2010	First year of the CSBI program. Started outreach to landowners. Completed three (3) projects.
2011	Completed installation of eight (8) CSBI projects, plus an additional 4 supplemental riparian plantings
2012	Planned installation of fifteen (15) CSBI projects

Program Coordination

Type	Purpose	Audience	2011-2013 Goal
Stakeholder Council ⁵	To provide overall guidance and oversight to the program	Project partners, municipal officials	Meet quarterly
Education and Outreach Working Group	To incorporate stakeholders into decision making for education and outreach programs	Project partners, watershed educators	Meet quarterly – changed to meeting every other month in 2012
Grant Review Committee	To review grants to the SMIP and make recommendations for funding	Project partners	Meet based on need.
Technical Advisory Committee	To provide technical review of AWSMP information and data	Researchers, resource managers, project partners	Meet annually
Recreational Access Committee	To make recommendations for stream access/recreation improvements in the Ashokan Watershed.	Resource managers, recreation groups, planning board or recreation departments managers, economic development groups, interested members of the public	Meet twice in 2011, annually thereafter.
Project Review Committee	To review and comment on proposed stream projects	Resource managers, project partners	TBD
Highway Managers Group	To exchange information and identify opportunities for technical or financial assistance to improve stream management	Highway managers, project partners	Meet every other month
Shandaken Area Flood Advisory and Remediation Initiative (SAFARI) and other floodplain management groups	To exchange information and identify opportunities to improve floodplain management	Representatives from Shandaken, project partners	Meet every other month
Mapping Committee	To share information about FEMA/DEP flood study and FIRM development	DEP, DEC, municipal representatives	Meet at a schedule to be determined by DEP

⁵ Formerly known as the Advisory Council

Education and Outreach - Publications

Type	Purpose	Audience	2011-2013 Goal
Newsletter (Esopus Creek News)	Program information and updates written for a general audience.	Streamside landowners and project partners	3 issues per year in 2011-2013
Fact Sheets	General information on key topics related to the program, written for a lay-audience.	General public, municipal employees, and streamside landowners	10 factsheets 2011-2013
Program Brochure	Provides a summary of the program, to be used for outreach with municipalities, other agencies and landowners.	General public.	n/a – update brochure as needed.
Action Plan	Outlines the prioritized activities for the program based on Stream Management Plan recommendations and input from stakeholders.	Project partners, municipal officials, applicants for funding, interested members of the public.	Update plan in 2012 Develop 2013-2015 plan in 2013
Combined Ashokan Watershed SMP	Combines information from prior stream assessments, management plans and input from stakeholders into a single plan document. Improves the accessibility of information.	Project partners, municipal officials, agencies, interested members of the public.	Single plan document by 2012
Website	Distribute information to the public and provide program updates. To make materials and documents available.	General public	Maintain website and improve content.
Technical Documents	Provide access to the detailed research, analysis and information that is the basis for the watershed plan and action plans	Project partners, researchers, interested members of the public.	Organize existing program information into technical documents to improve accessibility of information.
Project Reports	Share information about projects. Document project history	Project partners, municipal officials, researchers	Complete a project report for each AWSMP project; make reports available to the public on-line.
Press Releases and Media	Disseminate information about programs and encourage participation in events and trainings.	General public, municipal officials.	Disseminate a press release for all events and programs.

Education and Outreach – Conferences and Training Programs

Type	Purpose	Audience	2011-2013 Goal
Annual Watershed Conference	Provide a day of information and training for landowners and municipal officials on key watershed program concepts (flooding, stream management, regulations)	Streamside landowners, municipal officials	1 conference per year in 2012 and 2013.
Research Symposium	Sharing information on data and research being conducted in the Watershed. Goal is to improve management decisions based on research.	Researchers, resource managers, project partners, interested members of the public	1 additional symposium (2012). Continue research e-list and webpages.
Trainings for Hwy Dept. Staff	Improve staff management practices and knowledge	Highway and DPW staff, contractors	2 trainings per year on topics of interest to highway managers
Trainings for Floodplain Managers	Improve management and knowledge of floodplain managers. Encourage adoption of best management practices and improved policies at the local level.	Code enforcement officers, planning board members, town board members, highway managers, contractors	At least one session at Annual Conference to provide municipal credit opportunities. 1 additional training will be offered within the west of Hudson watershed region. DEC will be sponsoring education in watershed in 2011-2012 in conjunction with revision of FIRMs.
Trainings for contractors (and hwy. dept. staff) on stream restoration practices.	Improve knowledge and skills of local contractors who engage in stream work	Local contractors, highway department staff.	Trainings in 2011 on key topics was developed. Worked with contractors and highway managers to identify areas where professional development is needed.
Classes for Landowners	Improve management	Streamside landowners	At least one class per year beyond Watershed Conference

Education and Outreach – Public Programs

Type	Purpose	Audience	2011-2013 Goal
Volunteer Events	Increase knowledge of resource and program	General public, streamside landowners	At least 2 non-planting project opportunities per year
Volunteer Plantings	Increase knowledge of program. Assist landowners	General public, streamside landowners	Offer volunteer planting opportunities in conjunction with CSBI projects
General Public Talks and Events	Increase knowledge	General public, streamside landowners	Provide at least 6 general talks per year

Education and Outreach – Booths and Displays

Type	Purpose	Audience	2011-2013 Goal
Local events	Disseminate information, support local events	General public, streamside landowners	Attend at least 1 local festival in Shandaken, Olive and Woodstock per year.
UC Fair	Disseminate information to large numbers of people	General public	Offer one day at the fair focused on watershed information and activities
Other events	Disseminate information	General public, project partners	At least 1 per year

Education and Outreach – Public Meetings

Type	Purpose	Audience	Goal
Public Programs	Provide information specifically about the program or planned project(s)	General Public, landowners, municipal officials	At least three per year
Town Board Meetings/Planning Board Meetings other meetings with elected officials	Increase awareness of the program	Municipal elected officials	Attend at least one board meeting per year in each town

Principles of Stream Stewardship in Catskills Streams

Management of natural stream systems often results in the perception of competing or inconsistent goals and objectives. Using sound, science-based principles, stream managers will find it easier to guide their work, and achieve a common ground between landowners, municipalities, regulatory agencies and others that play an important role in the health of our Catskill stream systems. These guiding principles set a common framework upon which stream managers may carry out their important activities.

1. We celebrate the role streams play in the natural heritage of our communities.

The creeks, streams and rivers that run through our neighborhoods play a subtle but profound role in the identity of our communities, and also in the larger landscape: they are the “kills” in “Catskills.” Our streams are intimately tied to our culture and history.

2. We will work to protect and restore the environmental services provided by our streams and floodplains.

Streams and their floodplains provide many essential environmental services: they are the major conduits of our stormwater system, convey sediment eroded from upland areas, process a large portion of the human waste stream --both in the stream and through the floodplain “filter”-- and for many anglers, provide significant food resources. Streams and floodplains also provide highly valued recreational and economic benefits, and their natural beauty is an invaluable collective asset of the community.

3. We will work to protect and restore the health of our stream and floodplain ecosystems.

Stream and floodplain ecosystems are complex. They are key components of the larger ecosystem, interconnected with upland biological diversity and integrity. The health of our ecosystem is dependent on the health of our streams, and vice versa. The health of the environment is likewise connected to human health—both individuals and communities.

4. Wherever possible, we will manage streams so as to maintain their naturally effective channel form and function.

The shape of the stream –its characteristic planform, cross-section and profile— are matched to the hydrologic regime, the geology, the vegetation on the banks

and floodplain, and the landscape forms through which they flow. Streams must move sediment as well as water, and the shape of the channel determines how effectively it can perform that function. When we disturb the shape of the stream --widening, narrowing, deepening, straightening, removing gravel bars, or berming-- we alter its effectiveness. Streams evolve over time, and need to be able to shift somewhat within the constraints of their floodplain. Generally speaking, however, in the Catskills, healthy streams are more stable and resilient than disturbed streams, and maintain their characteristic form after even large flood events.

5. Wherever possible, we will manage floodplains as part of the natural stream system.

Floodplains play a critical role in the stream system, and in the environmental services streams provide: floodplains should be considered part of the stream. When streams and their natural floodplains are well-connected, the risk of flood hazards downstream are reduced and water quality is improved. The most appropriate land use for floodplains will allow natural stream processes to occur.

6. Wherever possible, we will protect and restore mature forest in the riparian buffer.

If we want to prevent bank erosion, the most critical concern should be maintaining a healthy buffer of mature, native vegetation along the stream bank. Ideally, the wider the buffer, the better. The root system of natural, dense vegetation in the streamside, or riparian, buffer holds the soil together, and makes it more resistant to the erosive force of fast moving floodwaters. Mowing down to the edge of the stream bank puts the bank at higher risk of erosion. Natural streamside vegetation also supports healthy communities of organisms in the stream and floodplains and moderates water and soil temperatures, protecting fish and amphibians.

7. As we manage streams to protect public safety and investments in infrastructure, our actions in one location shouldn't compromise the health of the stream upstream or downstream, or threaten the adjacent upland ecosystem through which the stream runs.

Even small disturbances at one location on a stream can propagate upstream or downstream, or laterally into floodplains and upland areas. When we engage in management practices in response to flooding or bank erosion, we need to anticipate these off-site impacts, and apply the principle of “do no harm.”

8. We will strive to keep abreast of the state-of-the-science and best management practices related to streams and floodplains.

Our understanding of how healthy streams function is still growing. As the science of stream ecosystems and the best management practices to protect and restore them continue to evolve, this improved understanding needs to be incorporated into our day-to-day management activities.
