

Ashokan Watershed Stream Management Program 2013-2015 Action Plan



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

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Cover Photo: Monitoring of the Stony Clove Creek at Phoenicia Flood Hazard Mitigation Project in Phoenicia, NY, spring 2013.



ASHOKAN WATERSHED STREAM MANAGEMENT PROGRAM

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

To: Danyelle Davis, Project Manager, NYC DEP Stream Management Program
From: Leslie Zucker, CCE Ulster County; and Adam Doan, Ulster County SWCD
Date: May 13, 2013
Re: Ashokan Watershed Stream Management Program 2013 - 2015 Action Plan

Cornell Cooperative Extension of Ulster County (CCE), Ulster County Soil & Water Conservation District (UCSWCD), and the NYC Department of Environmental Protection (DEP) have developed the 2013– 2015 Action Plan for your review. The purpose of the Action Plan is to identify the Ashokan Watershed Stream Management Program’s planned activities, accomplishments, and next steps in support of recommendations derived from stream management plans and working group input. The current set of recommendations was updated and reviewed by our Advisory Council and stakeholders in 2013.

The Action Plan is divided into key programmatic areas:

- A. Protecting and Enhancing Stream Stability and Water Quality
- B. Floodplain Management and Planning
- C. Highway Infrastructure Management in Conjunction with Streams
- D. Assisting Streamside Landowners (public and private)
- E. Protecting and Enhancing Aquatic and Riparian Habitat and Ecosystems
- F. Enhancing Public Access to Streams

The Action Plan is updated annually and recommendations are fully revised biannually. This proposed plan will run from June 1, 2013 until May 31, 2015, at which time the recommendations will be revised based on new stream assessments and program needs.



Cornell University
Cooperative Extension
Ulster County



2013-2015 Action Plan

Ashokan Watershed Stream Management Program

Purpose

The 2013-2015 Action Plan identifies goals and makes recommendations for implementation by the Ashokan Watershed Stream Management Program during the period 2013-2015. The Action Plan also provides a framework for reporting progress on planned activities to the public.

How to read this document

The Action Plan is organized around key programmatic areas. For each topic area a list of recommendations, derived from Stream Management Plans and the program's working groups, are provided in *italicized text*. Under the list of recommendations, ongoing projects funded through the Stream Management Implementation Program (SMIP) are listed.

Background

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

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

Action planning in the Ashokan Watershed began with the development of stream management plans for the Broadstreet Hollow Creek in 2003, Stony Clove Creek in 2004, and the Upper Esopus Creek in 2007. In subsequent years, AWSMP completed stream assessments of Woodland Creek, Beaver Kill, Warner Creek, Birch Creek, and Bush Kill.

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 for the Ashokan Watershed covered the period June 1, 2009 - May 31, 2011. The most recent Action Plan ran from June 1, 2011 - May 31, 2013. This newest Action Plan covers the period June 1, 2013 - May 31, 2015 and spans completion of the current contracts for CCE and UCSWCD and the start of new five-year contracts in 2014.

The AWSMP 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 to watershed communities to help implement stream management plan recommendations (the "Stream Management Implementation Program"). To date, \$2,000,000 has been allocated to implementation projects throughout the watershed.

A. Protecting and Enhancing Stream Stability and Water Quality

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

SUMMARY OF RECOMMENDATIONS IN 2013-2015 ACTION PLAN AND ALLOCATION OF SMIP FUNDING IN SUPPORT OF RECOMMENDATIONS

STREAM CORRIDOR ASSESSMENTS

- 1. Continue a program of multi-phased stream corridor geomorphic assessments including: Phase 1 - GIS watershed scale assessments for most sub-basins in the watershed; Phase 2 - field-based stream feature inventories (SFI) for one to two streams per year; and Phase 3 - reach to site scale monitoring (e.g. BEHI, geomorphic surveys). The assessments are used to help diagnose stream corridor condition and identify stream erosion hazards and/or water quality impairment that may require treatment. The Bushnellsville Creek will be assessed in 2013. The table below includes candidate streams for assessment in 2014 and 2015. One stream per year may be subject to a rapid Phase 2 reassessment if conditions appear to be degrading. Stony Clove Creek first assessed in 2002 - 2003 will be re-assessed in 2013.*
- 2. Support stream investigations by other organizations in Ashokan Watershed, with an emphasis on turbidity reduction.*
- 3. Review recommendations produced in previous reports on Large Woody Debris (LWD) and reevaluate the need for LWD monitoring that focuses on debris accumulations that either threaten infrastructure, or that form beneficial stabilization and habitat features.*
- 4. Develop an advanced conceptual model, applicable to the Ashokan Watershed, of Catskill stream channel and sediment processes that incorporates probable channel and sediment loading responses to expected climate change. The model will assist stream managers with planning for protection of water resources, and inform prioritization of stream channel stabilization practices.*
- 5. Provide funding for study of stream condition and function, and monitoring of system condition and management practices through the Stream Management Implementation Program (SMIP).*

ASHOKAN WATERSHED STREAM ASSESSMENT PROJECTS

Streams	Location	Current Status
Broadstreet Hollow	Towns of Shandaken and Lexington	Completed 2001
Stony Clove	Towns of Shandaken, Woodstock Hunter, and Lexington	Completed 2003
Esopus Creek	Towns of Shandaken and Olive	Completed 2007
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 2012
Bush Kill	Towns of Shandaken and Olive	Completed 2012
Bushnellsville Creek	Towns of Shandaken and Lexington	Summer 2013
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

ASHOKAN WATERSHED SMIP PROJECTS SUPPORTING STREAM CORRIDOR ASSESSMENTS (ACTIVE 2013)

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	Active
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

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

- Identify locations in the Ashokan Watershed that are long-term, chronic suspended sediment/turbidity sources and evaluate the potential efficacy of restoration practices. Annually update and prioritize potential stream restoration and/or channel stabilization projects identified through the stream corridor geomorphic assessments.
- A current emphasis is the Stony Clove Creek, which has been shown through water quality monitoring to be the predominant source of chronic turbidity in the Ashokan Watershed. Complete three stream restoration projects in the Stony Clove watershed planned for 2013: Chichester Reaches 2 and 3; Warner Creek Site 5; and the Silver Hollow Confluence. These projects are also receiving NRCS Emergency Watershed Protection (EWP) Program funds for implementation.

8. The next round of SMIP funds, along with funds provided to UCSWCD for stream restoration projects (expected in 2014), will be used to implement additional projects expected to have a measurable reduction in turbidity. Support efforts to obtain additional funding to pursue this goal.

ASHOKAN WATERSHED STREAM PROJECTS TO RESTORE STREAM STABILITY AND REDUCE CHRONIC SOURCES OF SEDIMENT (ACTIVE 2013)

UCSWCD	Stony Clove at Chichester (Sites # 2,3,4)	Costs to be Determined	Active
	<i>A set of stream restoration projects intended to reduce stream corridor instabilities that lead to chronic turbidity from suspended sediment loading at low to moderate flows.</i>		
UCSWCD	Stony Clove and Warner Creek Confluence	Costs to be Determined	Active
	<i>Protect transportation infrastructure and reduce potential future sources of chronic turbidity through grade control to mitigate headcut upstream migration.</i>		
UCSWCD	Warner Creek (Site #5)	Costs to be Determined	Active
	<i>Reduce chronic turbidity source and protect Silver Hollow Rd. (Town of Shandaken)</i>		

Possible 2014-2015 projects (project selection is subject to change pending annual stream corridor geomorphic assessments and affected landowner support):

UCSWCD	Stony Clove at Wright Road	Costs to be Determined	TBD
	<i>Protect vulnerable properties and reduce source of chronic turbidity</i>		
UCSWCD	Beacher Smith Property	Costs to be Determined	TBD
	<i>Reduce chronic source of turbidity</i>		
UCSWCD	Rt. 212 below s-curve	Costs to be Determined	2015
	<i>Protect transportation infrastructure and reduce source of chronic turbidity</i>		
UCSWCD	Full Moon Resort	Costs to be Determined	TBD
	<i>Protect vulnerable properties and reduce source of chronic turbidity</i>		

MONITORING OF STREAM PROJECTS

9. Annually monitor performance of stream corridor projects funded by the Ashokan Watershed Stream Management Program.
- a. Stony Clove at Phoenicia Main Street Project – Continue survey monitoring to track sediment deposition fluctuations per DEC permit.
 - b. Stony Clove at Chichester Projects (#1, 2, 3, 4) – Monitor per requirement of ACOE permit.

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

10. *Update Stream Stewardship Principles and promote the principles to relevant entities.*
11. *Provide outreach to municipal officials, agencies, affected landowners, and the public about findings from stream assessments and planned stream restoration projects.*
 - a. *Encourage municipal adoption of stream management plans and principles.*
 - b. *Hold workshops to obtain streamside landowner input during the development of the Beaverkill stream management plan (1 in 2013).*
 - c. *Hold meetings with municipal officials, landowners, and agency officials to discuss planned projects (as needed).*
 - d. *Include information on projects in Esopus Creek News (newsletter).*
 - e. *Conduct project site visits with landowners, contractors, regulators, and public officials (as needed).*
 - f. *Engage legislators to highlight accomplishments and planned activities (annually).*
 - g. *Report progress to funders and the Stakeholder Council (quarterly and annually).*
 - h. *Hold meetings of the AWSMP Stakeholder Council (3-4 per year).*
12. *Solicit participation of local community members and education-related organizations in overall education and outreach activities.*
 - a. *Organize meetings of the Education & Outreach Working Group of the Stakeholder Council (2 per year).*
 - b. *Participate in West of Hudson watershed program education & outreach meetings and contribute to coordinated initiatives (quarterly).*
 - c. *Coordinate with local and regional organizations to integrate stream stewardship principles into education projects, such as participate in the Catskill Regional Invasive Species Program (CRISP) (as needed).*
 - d. *Partner with the Onteora School District's Bennett Elementary School to teach stream and watershed science to 4th and 5th grade classes and through after school programs (annually).*
13. *Fund public education and outreach activities regarding stream and watershed management through the SMIP.*
14. *Develop general written education and outreach materials for streamside landowners and other stakeholders in the communities of the Ashokan Watershed. Use a variety of media (newsletters, fact-sheets, press, video, and website) to disseminate information about the program and encourage stewardship.*
 - a. *2 Stream Guides (fact sheets) per year. Potential topics include:*
 - i. *NYS Water Law*
 - ii. *Shandaken Tunnel Releases*
 - iii. *Agency Roles and Regulations (related to stream management)*
 - iv. *Landowner Easement Agreements for AWSMP Stream Projects*

- v. *Floodplain Management*
 - vi. *Update of 'Guide to Large Woody Debris Management'*
 - b. *3 Editions of the Esopus Creek News (newsletter) per year.*
 - c. *12 Press releases per year.*
 - d. *Email events and meetings announcements.*
 - e. *Release of new AWSMP website and regular updates.*
 - f. *Regular updates AWSMP Facebook page.*
 - g. *Produce videos of stream BMPs being installed for use in future trainings. Edit and prepare for YouTube publication.*
 - h. *Update AWSMP program brochure*
 - i. *Produce an annual AWSMP Action Plan.*
15. *Offer training programs that promote an understanding of effective stream management strategies for local stakeholders.*
 16. *Hold contractor trainings on emergency stream intervention protocols and best management practice installation procedures (1 in 2014).*
 17. *Provide and participate in local community events to promote the goals of the Ashokan Watershed Stream Management Program.*
 18. *Organize an annual Ashokan Watershed Conference to provide general education to watershed residents and train municipal officials in specific topics (1 per year).*
 19. *Hold stream walks (approx. 2 per year) and Family Fun & Fish Day, or similar public engagement event (1 per year).*
 20. *Participate in Shandaken Day, Olive Day, Woodstock Library Day, Ulster County Creek Week, Ulster County Fair, and Harvest Festival (5 per year).*
 21. *Develop a local group of volunteers committed to ongoing stewardship efforts in the watershed.*
 - a. *Explore opportunities to co-develop stream stewards programs for adult and youth volunteers working with partner organizations.*
 - b. *Offer educational opportunities such as presentations, site tours, and workshops to the Stakeholder Council and working groups.*
 - c. *Involve volunteers in stream buffer plantings and other stream stewardship projects or learning opportunities (5 per year).*

ASHOKAN WATERSHED SMIP PROJECTS SUPPORTING EDUCATION, OUTREACH AND TECHNICAL ASSISTANCE TO ENCOURAGE STREAM STEWARDSHIP (ACTIVE 2013)

Town of Woodstock	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>	\$4,400	Active
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B. Floodplain Management and Planning

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

SUMMARY OF RECOMMENDATIONS IN 2013-2015 ACTION PLAN AND ALLOCATION OF SMIP FUNDING IN SUPPORT OF RECOMMENDATIONS

FLOODPLAIN ASSESSMENT - RECOMMENDATIONS

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

COORDINATION WITH FLOODPLAIN MANAGEMENT EFFORTS IN THE WATERSHED - RECOMMENDATIONS

3. *Implement an agreement with the Ulster County Department of Environment to provide flood hazard mitigation coordination and raise capacity to deliver flood response in collaboration with county, state, and federal agencies within the Ashokan Watershed (beginning 2014).*
4. *Promote Town development of Flood Hazard Mitigation Plans in the Ashokan Watershed.*
5. *Coordinate with flood commissions and working groups (e.g., SAFARI) in the watershed. Encourage the prevention of inappropriate development in areas of high flood or erosion risk and foster uses that are compatible with the anticipated flooding and erosion conditions. Where existing communities, structures and facilities are in at-risk locations, encourage the application of flood-proofing measures or relocation.*
6. *Assist municipalities with identifying watershed areas that require further engineering and modeling analysis and public input to select projects that will lower flood elevations in populated areas of the watershed. .*
7. *Provide \$2,000,000 in funds for flood hazard mitigation analysis (LFHMA) and implementation projects starting in 2014, and assistance with obtaining additional state and federal funding for project implementation.*
8. *Encourage towns in the watershed without All-Hazard Mitigation Plans to develop plans. Work with the towns who adopted the County's all-Hazard Mitigation Plan to be prepared for use of state mitigation funding following declared state emergencies and to utilize the information in the plan.*

ASHOKAN WATERSHED SMIP PROJECTS SUPPORTING COORDINATION WITH FLOODPLAIN MANAGEMENT EFFORTS IN THE WATERSHED (ACTIVE 2013)

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
Town of Shandaken	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

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

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

C. Highway and Infrastructure Management in Conjunction with Streams

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

SUMMARY OF RECOMMENDATIONS IN 2013-2015 ACTION PLAN AND ALLOCATION OF SMIP FUNDING IN SUPPORT OF RECOMMENDATIONS

APPLICATION OF HIGHWAY BEST MANAGEMENT PRACTICES TO REDUCE WATER POLLUTION

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

REDUCING HYDRAULIC CONSTRICTIONS IN STREAMS: BRIDGES AND CULVERTS

4. *Collaborate with state and local highway departments and stream management personnel to develop specifications for applying natural channel design concepts to bridge and culvert rehabilitation and replacement.*

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

5. *Collaborate with local, county and state highway departments to apply natural channel design concepts to streambank stabilization along roadsides.*
6. *Seek opportunities to mitigate the impact of public infrastructure (road, railroad, and utility) encroachment on the riparian vegetation community and aquatic habitats by improved planning, management, supplemental plantings and the improved care of existing vegetation.*

ASHOKAN WATERSHED SMIP PROJECTS SUPPORTING IMPROVED STREAM/ROAD STABILIZATION AND IMPROVED RIGHT OF WAY (ACTIVE 2013)

	Beaverkill at Mink Hollow LWD Removal and Channel Protection	\$102,900	Active
Town of Woodstock	<i>Work with the Town of Woodstock to repair a section of Mink Hollow Rd. damaged by Tropical Storm Irene by stopping a headcut migration with a constructed riffle. Additional work may include removal of LWD accumulation that is causing channel avulsions that can threaten the road.</i>		

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

7. *Organize Highway Manager’s Working Group meetings with all relevant local, county, and state highway personnel to identify shared stream/road concerns and evaluate opportunities to support coordinated effort to use best management practices. Provide guidelines for “repairs” of streams and drainage systems with best management practices advocated by the AWSMP to reduce risk of further instability (4-6 per year).*
8. *Hold a highway manager and contractor training on installation of stream best management practices (1 in 2014-15).*
9. *Provide SMIP funds for highway and infrastructure management projects with benefits to water quality and stream system integrity.*

D. Assisting Streamside Landowners (public and private)

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

SUMMARY OF RECOMMENDATIONS IN 2013-2015 ACTION PLAN AND ALLOCATION OF SMIP FUNDING IN SUPPORT OF RECOMMENDATIONS

ASSESSMENT OF STREAMSIDE PROPERTY ISSUES

1. *Work with towns and landowners to identify and document streamside property (public and private) where there are stream stability concerns. Provide this documentation to towns, agencies and landowners to help inform management decisions.*

STREAMSIDE LANDOWNER FINANCIAL ASSISTANCE

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

Ashokan Watershed CSBI Projects

2012	13 Projects Totaling 2,590 linear feet
2013	8 Projects Planned (with one larger bioengineering BMP installed) 2014 TBD (to include one large bioengineering BMP installed) 2015 TBD (to include one large bioengineering BMP installed)

OUTREACH, EDUCATION AND TECHNICAL ASSISTANCE TO STREAMSIDE LANDOWNERS

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

E. Protecting and Enhancing Aquatic and Riparian Habitat and Ecosystems

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

SUMMARY OF RECOMMENDATIONS IN 2013-2015 ACTION PLAN AND ALLOCATION OF SMIP FUNDING IN SUPPORT OF RECOMMENDATIONS

STREAM ECOSYSTEM ASSESSMENT

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

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

4. *Work with the Catskill Region Invasive Species Partnership (CRISP) and with the West-of-Hudson DEP Education and Outreach group to develop and disseminate outreach materials and offer public programs on critical invasive species for the West of Hudson Watersheds.*
5. *Work with watershed municipalities to evaluate local ordinances such as comprehensive plans, zoning regulations, site plan review laws, subdivision laws and floodplain ordinances to determine if adequate consideration is given to impacts on riparian and aquatic ecosystems.*
6. *Organize Stream Integrity Research & Assessment (SIRA) Working Group meetings to advise the program on stream system assessment, research, and monitoring needs. Work through the group to coordinate research, assessment, and monitoring projects that benefit stream system integrity and aquatic and riparian habitat in the Watershed (1-2 meetings per year).*
7. *Begin development of a technical publication to distribute results of stream channel and sediment processes modeling.*
8. *Participate on the Catskill Environmental Research and Monitoring (CERM) committee and work with this group to identify and prioritize studies and projects that support stream management in the*

Ashokan Watershed (2-4 meetings per year). Contribute to development of a bi-annual CERM conference (1 in 2014).

9. *Participate in biennial inter-basin Riparian Buffers Working Group (previous meeting was held in Ashokan Watershed 2012).*
10. *Integrate recommendations made in the New York Natural Heritage Program’s report “Inventory, Classification, and Description of Riparian Natural Community Reference Types for Ashokan Watershed, New York” into riparian restoration designs.*

ASHOKAN WATERSHED SMIP PROJECTS SUPPORTING AQUATIC AND RIPARIAN HABITAT AND ECOSYSTEM ASSESSMENT (ACTIVE 2013)

USGS

Impact of Climate Change on Stream Ecosystems in the Catskills	\$30,000	Active
<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>		

F. Enhancing Stream-based Recreation and Public Access

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

SUMMARY OF RECOMMENDATIONS IN 2013-2015 ACTION PLAN AND ALLOCATION OF SMIP FUNDING IN SUPPORT OF RECOMMENDATIONS

ENHANCING PUBLIC ACCESS TO THE STREAMS

1. *Identify and assess potential stream access sites in the watershed. Investigate opportunities to develop multi-use, low impact trail systems along the stream corridors. Trails for hiking, biking, cross country skiing and snowshoeing could provide multiple benefits, including drawing visitors to local resorts and increasing user awareness of stream management issues. Make improvements to existing stream access sites.*
2. *Explore opportunities for and impacts of operational adjustments of the Shandaken Tunnel to accommodate the needs of biota along with other stakeholders.*
3. *Work with Stream Access and Recreation Committee and other stakeholders on developing a plan of action to modify the policy related to recreational releases to the Shandaken Tunnel.*
4. *Determine a good area for either new trail construction or existing trail improvement that would provide greater public access to streams.*
5. *Monitor conditions at existing public access sites to determine need for repairs, enhancements and/or improvements*
6. *Utilize Town of Shandaken Recreation Master Plan when developing programs and projects. Work closely with Town of Shandaken Parks and Recreation Committee and their counterparts in other watershed towns to develop and execute projects.*

EDUCATION FOR RECREATIONAL USERS OF STREAMS

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

ASHOKAN WATERSHED SMIP PROJECTS SUPPORTING EDUCATION AND OUTREACH FOR RECREATIONAL USERS OF STREAMS (ACTIVE 2013)

Phoenicia Library	<p>Jerry Bartlett Memorial Angling Collection Improvement \$10,000 Active</p> <p><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></p>
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