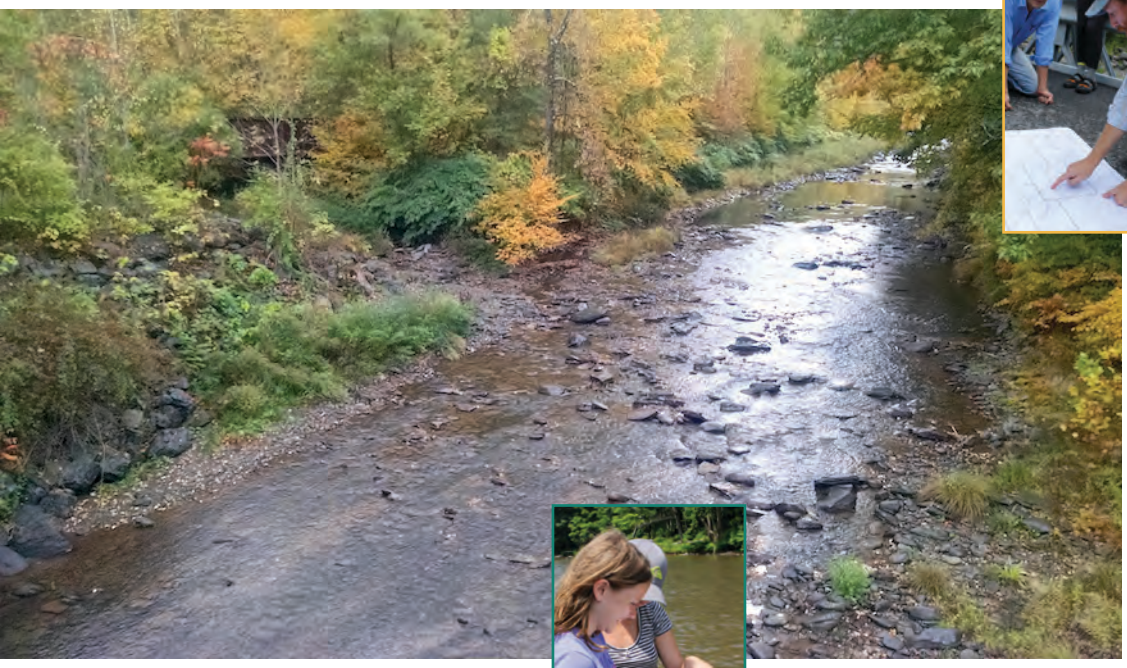
Ashokan Watershed Stream Management Program

2017-2019 Action Plan



Ashokan Watershed
Stream Management Program

Cornell Cooperative Extension of Ulster County

Ulster County Soil & Water Conservation District

NYC Department of Environmental Protection

Ashokan Watershed
Stream Management Program

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To: Chris Tran, Project Manager, NYC DEP Stream Management Program
From: Leslie Zucker, CCE Ulster County and Adam Doan, Ulster County SWCD
Date: May 1, 2017
Re: Ashokan Watershed Stream Management Program 2017-2019 Action Plan

Cornell Cooperative Extension of Ulster County (CCE) and Ulster County Soil & Water Conservation District (SWCD) with support from the NYC Department of Environmental Protection (DEP) have developed the 2017-2019 Action Plan for your review. The purpose of the Action Plan is to identify the Ashokan Watershed Stream Management Program's planned activities, accomplishments, and next steps to achieve recommendations derived from stream management plans and stakeholder input. Program activities were reviewed by our Stakeholder Council at May and November 2016 meetings and their comments are reflected in this 2017-2019 work plan.

The Action Plan is divided into key programmatic areas:

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

The Action Plan is updated annually. This proposed plan will run from June 1, 2017 until May 31, 2019, at which time the recommendations will be revised based on new stream assessments and program needs.

Cornell University
Cooperative Extension
Ulster County

ULSTER COUNTY
Soil and Water
Conservation District
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NYC
Environmental
Protection

2017-2019 Action Plan

Ashokan Watershed Stream Management Program

Purpose

This Action Plan identifies goals and makes recommendations for implementation by the Ashokan Watershed Stream Management Program for the period 2017-2019. The Action Plan also provides a framework for reporting progress on planned activities to the public.

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

Background

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

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

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

A Filtration Avoidance Determination (FAD) granted to NYC in 2007 requires DEP and its partners to develop an Action Plan for the coming year to show how the findings and recommendations of the stream management plans will be implemented. The first post-implementation phase Action Plan for the Ashokan Watershed covered the period June 1, 2009 - May 31, 2011. This newest Action Plan covers the period June 1, 2017 - May 31, 2019 and spans new five-year contracts between the DEP and partner agencies CCEUC and SWCD.

The AWSMP moved its primary focus from planning to implementation in 2008. During that year the program staff, with input from local stakeholders, developed a process for distributing funding to watershed communities to help implement stream management plan recommendations (the "Stream Management Implementation Program"). To date, over $3,200,000 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 2017-2019 Action Plan and allocation of SMIP funding in support of recommendations

Stream Corridor Assessments

1. *Continue a program of multi-phased stream corridor geomorphic assessments including: Phase 1- GIS watershed scale assessments for most sub-basins in the watershed; Phase 2 - field-based stream feature inventories (SFI) for one stream per year or every other year; and Phase 3 - reach to site scale monitoring (e.g. BEHI, geomorphic surveys). The assessments are used to help diagnose stream corridor condition and identify stream erosion hazards and/or water quality impairment that may require treatment. The table below includes candidate streams for assessment in 2016 and 2017. One stream per year may be subject to a rapid Phase 2 reassessment if conditions appear to be degrading.*
2. *Support stream investigations by other organizations in the Ashokan Watershed, with an emphasis on turbidity reduction.*
3. *Pilot methods for measuring bedload sediment in the Esopus Creek watershed. Bedload sediment is an important component of sediment transport that must be understood to better ensure the success of stream restoration projects. However, bedload is expensive data to collect. To explore the feasibility and cost-effectiveness of methods, conduct a small-scale pilot project that tests multiple bedload sampling and monitoring techniques at 1-2 sites and ability to estimate the percentage of the total sediment load contributed by bedload.*
4. *Provide funding for study of stream condition and function, and monitoring of system condition and management practices through the Stream Management Implementation Program (SMIP). A Request for Applications to meet priority science needs was issued in mid-2016, initiating several SMIP-funded projects. One of these projects is a study to develop and publish a new regionally calibrated streambank erosion rate curve. The curve will be derived from field measurements and used for predicting sediment contributions from bank erosion.*

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

Streams	Location	Current Status
Esopus Creek	Towns of Shandaken and Olive	Completed 2007
Woodland Creek	Town of Shandaken	Completed 2008
Beaver Kill	Towns of Shandaken and Woodstock	Completed 2010
Warner Creek	Town of Shandaken and Woodstock	Completed 2010
Birch Creek	Town of Shandaken	Completed 2012
Bush Kill	Towns of Shandaken and Olive	Completed 2012
Bushnellsville Creek	Towns of Shandaken and Lexington	Completed 2013
Stony Clove Creek	Towns of Shandaken and Hunter	Completed mainstem reassessment 2013
Woodland Creek	Town of Shandaken	Completed mainstem reassessment 2015
Stony Clove Creek Tributaries	Towns of Shandaken and Hunter	Completed 2015
Maltby Hollow Brook	Town of Olive	Completed 2015
Esopus Creek Headwaters	Town of Shandaken, Oliverea Reach	2016-2017
Little Beaver Kill	Town of Woodstock	Anticipated 2017
Fox Hollow Creek	Town of Shandaken	TBD
Peck Hollow	Towns of Shandaken and Lexington	TBD
Ashokan Reservoir Tributaries	Town of Olive and Town of Hurley	TBD

ASHOKAN WATERSHED TURBIDITY MONITORING PROJECTS

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

ASHOKAN WATERSHED SMIP PROJECTS SUPPORTING STREAM ASSESSMENT & MONITORING *(ACTIVE 2017)*

Organization	Proposal Title	Proposal Number	Amount	Status	Purpose of Grant
Stantec Consulting Inc.	BANCS Model Calibration and Validation: Ashokan Watershed Predictive Regional Curve	AWSMP-2016-121	$169,610	Active	Calibrate and validate the BANCS model to predict sediment supply contributed by bank erosion within the Ashokan Watershed.

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

7. *Identify locations in the Ashokan Watershed that are long-term, chronic suspended sediment/turbidity sources and evaluate the potential efficacy of restoration practices. Annually update and prioritize potential stream restoration and/or channel stabilization projects identified*

through the stream corridor geomorphic assessments. Begin the survey and design process for future turbidity reduction projects.

8. *SMIP funding for 2014-2019, along with funds provided to SWCD for stream restoration projects, will be used to implement additional projects expected to have a measurable reduction in turbidity. Support efforts to obtain additional funding to pursue this goal.*
9. *Coordinate with the Town of Shandaken and County DPW to conduct a geomorphic assessment of the Esopus Creek at Oliverea. The diagnostic assessment is to provide information needed to treat flood hazards and channel instability in the area.*

ASHOKAN WATERSHED STREAM PROJECTS TO RESTORE STREAM STABILITY AND REDUCE CHRONIC SOURCES OF SEDIMENT *(ACTIVE 2017)*

SWCD	**Project 1 at Beaverkill at Van Hoagland Stream Restoration Project**	**$TBD**	**2017**
	Treatment of a large failing hill slope (site 1) that is a chronic source of suspended sediment, as well as adjoining stream that has become unstable.		
SWCD	**Project 2 at Beaverkill at Van Hoagland Stream Restoration Project**	**$TBD**	**2017**
	Treatment of a large failing hill slope (site 2) that is a chronic source of suspended sediment, as well as adjoining stream that has become unstable.		
SWCD	**Woodland Creek at Woodland Valley Landowner Association**	**$TBD**	**2018**
	Stabilize failing hillslope that is chronic source of suspended sediment and improve overall stream stability through a historically unstable section of Woodland Creek at the upstream extent of development.		

Possible 2017-2019 projects (project selection is subject to change pending annual stream corridor geomorphic assessments and affected landowner support):

SWCD	**Warner Creek Site 5 - maintenance**	**TBD**	**2018**
	Evaluate adjustment of j-hook structure and determine necessary follow up actions and implementation plan.		
SWCD	**FAD Deliverable Turbidity Reduction Projects**	**Costs to be Determined**	**2017/18**
	Identify next round of turbidity reduction projects pursuant to 2017 FAD.		

ASHOKAN WATERSHED SMIP PROJECTS SUPPORTING STREAM RESTORATION *(ACTIVE 2017)*

Organization	Proposal Title	Proposal Number	Amount	Status	Purpose of Grant
Town of Shandaken	Final Design and Construction Fox Hollow Grade Control by Herdman Bridge	AWSMP-2015-110	$90,000	Active	Complete 100% design, permitting, and installation of grade control structure on Fox Hollow Creek at the Town of Shandaken Herdman Road bridge.
Ulster County Department of Public Works	Bushkill / Watson Hollow Slope Stabilization	AWSMP-2015-103	$68,000	Active	Engineering and design for Bush Kill streambank stabilization along Ulster County Rt. 42 in the Town of Olive.

MONITORING OF STREAM PROJECTS

10. *Annually monitor performance of stream corridor projects funded by the Ashokan Watershed Stream Management Program.*
    a. *See table below for specific project requirements.*
    b. *Continue to monitor previously completed restoration projects on a case-by-case basis. Special consideration given to monitoring after bankfull and above flows.*
    c. *Project monitoring will help guide maintenance intervention when site adjustment is outside the tolerance of the project parameters. See project table above for listing of maintenance work.*
11. *Monitor turbidity and suspended sediment at stream restoration project sites before and after project construction to quantify effects on water quality. To be implemented on a case-by-case basis. A Request for Applications to meet priority science needs was issued in mid-2016, initiating several SMIP-funded projects. One of these projects funds monitoring of suspended sediment and turbidity above and below a planned stream restoration site in the upper Woodland Creek. Monitoring begins in 2017 and will extend for at least one year after project implementation.*

ASHOKAN WATERSHED SMIP PROJECTS SUPPORTING STREAM MONITORING *(ACTIVE 2017)*

Organization	Proposal Title	Proposal Number	Amount	Status	Purpose of Grant
USGS	Suspended Sediment and Turbidity Monitoring in the Woodland Creek Watershed	AWSMP-2016-119	$29,726	Active	Collect discrete SSC and turbidity data upstream of a Woodland Creek hillslope failure Sediment and Turbidity Reduction Project (STRP) scheduled for treatment in 2017/2018; and collect continuous turbidity and discrete SSC data below the hillslope failure for 1 year before and 1 year after the STRP.

ASHOKAN WATERSHED STREAM PROJECTS MONITORING

Stream Project (Year Completed)	Last Surveyed	Monitoring Goals and Permit Requirements
Bush Kill Moran Bioengineering Project (2016)	2016 (As-built)	Begin survey monitoring to track survival rate and growth of live material and overall geomorphic performance.
Stony Clove at Wright Road (2015)	2016	Annual survey and report for ACOE, 2017.
Stony Clove and Warner Creek Confluence (2014)	2016	Completed all permit requirements in 2016. Survey following high flow events and as needed.
Stony Clove Lane (2014)	2016	Completed all permit requirements in 2016. Survey following high flow events and as needed.
Stony Clove at Chichester #1, 2, 3, 4 (2012 – 2013)	2016	Completed all permit requirements in 2015. Survey following high flow events and as needed.
Warner Creek Site 5 (2013)	2016	Completed all permit requirements in 2015. Survey following high flow events and as needed.
Stony Clove at Phoenicia Main Street (2011)	2016	Continue survey monitoring to track sediment deposition fluctuations per DEC permit. Survey following high flow events and as needed.
CSBI Projects	2016	Conduct vegetation monitoring at all CSBI projects on a bi-annual basis for a period of 5 consecutive years.

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

12. *Distribute Stream Stewardship Principles to relevant entities.*
13. *Hold meetings of the AWSMP Stakeholder Council (2-3 per year) and working groups (6-12 per year) to solicit participation and input from local community members.*
14. *Continue to provide outreach to municipal officials, agencies, affected landowners, and the public about findings from stream assessments and planned stream restoration projects. In 2016, AWSMP held two stream walks for watershed residents on the Beaver Kill in Mink Hollow. The second stream walk was followed by a watershed bus tour for landowners and municipal officials, including a stop at future stream restoration project sites. In fall 2016, AWSMP worked with the Town of Olive to hold a presentation of results from the Maltby Hollow Stream Feature Inventory and Bank Erosion Assessment.*
15. *Continue to provide youth education in partnership with the Onteora Central School District to teach stream and watershed science to students through field studies, and after-school and classroom programs. In 2016, the AWSMP reached over 500 students in the School District with hands-on and outdoor education on water, watershed, and stream science. In-school and after-school programming was delivered at the Bennett Intermediate School, and classroom and enrichment programs were delivered at Woodstock and Phoenicia elementary schools.*
16. *Fund public education and outreach activities that promote stream stewardship through the SMIP. In 2016, AWSMP offered 11 SMIP-funded training scholarships to local officials. A SMIP award to the Catskill Interpretive Center (CIC) funded outreach and signage on riparian buffer benefits at a CSBI planting site along a nature trail on the CIC grounds.*
17. *Develop written education and outreach materials for streamside landowners and other watershed stakeholders. Use a variety of media (newsletters, fact-sheets, press, video, and website) to*

disseminate information about the program and encourage stream stewardship (1-2 fact sheets per year).

18. *Offer trainings that promote an understanding of effective stream and floodplain management strategies for local stakeholders (1 per year). In 2016, AWSMP held a training on how to develop and use Elevation Certificates that was attended by 22 local officials and surveyors.*
19. *Participate in local community events to promote the goals of the Ashokan Watershed Stream Management Program. AWSMP staffed displays and demonstrations at school Earth Days, Scout Camporee, Shandaken Day, Olive Day, and the Ulster County Fair, we did it all in 2016!*
20. *Organize an Ashokan Watershed Conference to provide general education to watershed residents and train municipal officials in specific topics (1 every two years). The 2017 Ashokan Watershed Conference was held April 29, 2017.*
21. *Co-organize a Catskill Environmental Research and Monitoring (CERM) conference to disseminate the results of river and watershed studies (1 every two years). The 2016 CERM Conference was held October 27-28, 2016.*
22. *Hold stream walks and other public engagement events (5-10 per year). In 2016, AWSMP's Family, Fun & Fish Day was a rainy event but the fishing was good! Also in 2016, AWSMP piloted a summer education program to engage youth in streamside learning in collaboration with the Onteora Central School District, Town of Olive Recreation Department, and 4-H Tech Wizards.*
23. *Develop citizen stewardship volunteer programs and opportunities for adult and youth volunteers. In 2016, the AWSMP and community partners organized volunteers to clear invasive plants from two future CSBI planting sites.*

ASHOKAN WATERSHED SMIP PROJECTS SUPPORTING EDUCATION, OUTREACH AND TECHNICAL ASSISTANCE TO ENCOURAGE STREAM STEWARDSHIP *(ACTIVE 2017)*

Organization	Proposal Title	Proposal Number	Amount	Status	Purpose of Grant
Catskill Center for Conservation & Development	Riparian Buffer Demonstration Project at the Maurice D. Hinchey Catskill Interpretive Center	AWSMP-2015-105	$9,000	Active	Develop outreach materials and community engagement, plus fencing around a riparian buffer demonstration located at the Catskill Interpretive Center in Mt. Tremper.
Cornell Cooperative Extension of Ulster County	2017 Stream & Floodplain Manager Training Scholarships	AWSMP-2016-117	$20,585	Active	Offer up to 19 scholarships for town and county officials to attend stream and floodplain management trainings in 2017.

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 2017-2019 Action Plan and allocation of SMIP funding in support of recommendations

Floodplain Assessment - Recommendations

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

Coordination of Floodplain Management Efforts in the Watershed - Recommendations

3. *Promote Town development of Flood Hazard Mitigation Plans and Community Rating System applications in the Ashokan Watershed. In 2016, AWSMP assisted SAFARI (the Town of Shandaken flood advisory committee) with updates to the town flood mitigation plan. In 2018, AWSMP will assist and facilitate, as needed, the mandatory five-year comprehensive review and update of the flood hazard mitigation plan. AWSMP provided SMIP funding to the Town of Shandaken to complete an application to the National Flood Insurance Program's Community Rating System. AWSMP is also funding the Town of Olive's development of a town-wide flood mitigation, in the NYC watershed portion of the town.*
4. *Coordinate with flood commissions and working groups (e.g., SAFARI, NY Rising Community Reconstruction Program) in the watershed. Encourage the prevention of inappropriate development in areas of high flood or erosion risk and foster uses that are compatible with the anticipated flooding and erosion conditions.*
5. *Where existing community structures and facilities are in at-risk locations, support community planning as a next-step where needed, and the application of flood-proofing measures or relocation.*

   In 2016, AWSMP assisted the Town of Shandaken with successful funding applications, including for a relocation feasibility study in the hamlet of Phoenicia, and a grant to acquire property (outside the floodplain) for the future relocation of two critical facilities, both of which are currently located within the floodplain. The two critical facilities are the Town Hall and the Town Highway Garage.*

In 2017-18, AWSMP will work closely with the Town of Olive to undertake a "Sustainable Communities" planning study in the hamlet of Boiceville that will focus on relocation, elevation, and/or floodproofing alternatives for residents and businesses. This includes, but is not limited to, assisting the Town in its effort to relocate a critical facility (Fire Company #5) in the hamlet of Boiceville to a nearby location outside of the floodplain.*

6. *Assist municipalities with completing and implementing local flood analyses in watershed population centers that require engineering and modeling analysis and public input to select projects that will lower flood elevations. In 2016, the Town of Shandaken completed a Local Flood Analysis (LFA) with AWSMP support for the hamlets of Phoenicia and Mt. Tremper and began LFA implementation. AWSMP attended coordination meetings organized by the Town with the NYSDOT to discuss LFA modeling results for the Rt. 28 bridge in Mt. Tremper to inform a new bridge design. Funding was provided through SMIP to begin an LFA for the hamlets of Shandaken and Allaben in the Town of Shandaken to be completed in 2018. The AWSMP funded and assisted the Town of Olive Flood Advisory Committee with review and development of an LFA for Boiceville and Mt. Tremper that should be completed in 2017.*
7. *Provide $250,000 in funds for local flood hazard mitigation analysis and $1,750,000 in funds for LFA-recommended and Town-adopted implementation projects through 2019, and assistance with obtaining additional state and federal funding for project implementation.*
8. *Work with towns to implement mitigation actions included in the 2017 update to the County's All-Hazard Mitigation Plan.*
9. *Assist all Ashokan watershed towns with using information in the County All-Hazard Mitigation Plan and local flood mitigation plan(s) to access state and federal mitigation funding following declared emergencies or for pre-disaster mitigation grant projects.*

**AWSMP partners with the Ulster County Department of Environment (under agreement with CCEUC) to assist with coordination of floodplain efforts in the Ashokan watershed.*

ASHOKAN WATERSHED SMIP PROJECTS SUPPORTING COORDINATION WITH FLOODPLAIN MANAGEMENT EFFORTS IN THE WATERSHED *(ACTIVE 2017)*

Organization	Proposal Title	Proposal Number	Amount	Status	Purpose of Grant
Town of Olive	Local Flood and Feasibility Analysis for Boiceville and West Shokan	AWSMP-2014-100	$76,631	Active	Analysis of flood conditions and identification of hazard mitigation projects in Boiceville and West Shokan.
Town of Olive	Town of Olive Flood Hazard Mitigation Plan	AWSMP-2014-102	$24,285	Active	Develop a Town Flood Hazard Mitigation Plan in the NYC Watershed portion of Town of Olive.
Town of Shandaken	Local Flood and Feasibility Analysis for Shandaken and Allaben Hamlets	AWSMP-2016-125	$115,000	Active	Analysis of flood conditions and identification of hazard mitigation projects in the hamlets of Shandaken and Allaben.

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

10. *Continue to provide training and assistance for local floodplain managers and municipal officials in using revised FIRMs (Flood Insurance Rate Maps) and other FEMA datasets, and understanding NFIP requirements.*
11. *Increase access to flood prevention/protection information in the watershed through the AWSMP website, locally available technical publications at AWSMP, local libraries, Town Halls, etc. and through presentations, workshops and other outreach events.*
12. *Continue to provide education through working group meetings on topics such as 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; specialized trainings for surveyors, real estate, and other professionals; and coordination between local, county, and state partners engaged in flood response and flood mitigation.*
13. *Provide funding for Code Enforcement Officers and Floodplain Administrators to attend training sessions on flood related issues and become Certified Floodplain Managers.*
14. *Begin preparing formalized floodplain management education modules, designed to provide educators who do not have extensive training in flood hazard mitigation topics with the information and materials needed to deliver high quality education on floodplain management and related subjects.*

ASHOKAN WATERSHED SMIP PROJECTS SUPPORTING COORDINATION WITH FLOODPLAIN MANAGEMENT EDUCATION IN THE WATERSHED *(ACTIVE 2017)*

Organization	Proposal Title	Proposal Number	Amount	Status	Purpose of Grant
Cornell Cooperative Extension of Ulster County	2017 Stream & Floodplain Manager Training Scholarships	AWSMP-2016-117	$20,585	Active	Offer up to 19 scholarships for town and county officials to attend stream and floodplain management trainings in 2017.

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 2017-2019 Action Plan and allocation of SMIP funding in support of recommendations

Application of Highway Best Management Practices to Reduce Water Pollution

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

Reducing Hydraulic Constrictions in Streams: Bridges and Culverts

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

Stream/Road Stabilization Projects and Implementation of Best Management Practices on Right of Ways

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

ASHOKAN WATERSHED SMIP PROJECTS SUPPORTING IMPROVED STREAM/ROAD STABILIZATION AND IMPROVED RIGHT OF WAY *(ACTIVE 2017)*

Organization	Proposal Title	Proposal Number	Amount	Status	Purpose of Grant
Town of Olive Highway Dept.	Hillside Drive Culvert Replacement over Dry Brook	AWSMP-2015-113	$274,000	Active	Replace existing culvert with culvert better aligned with stream and able to pass the 100-year flow. Current culvert is a hydraulic constriction and in poor condition. Loss of the culvert would cut off access to 15 homes.
Ulster County Dept. of Public Works	Fischer Bridge over Esopus Creek Construction	AWSMP-2016-115	$77,300	Active	Post-Irene construction of the Fischer Bridge carrying Oliverea Rd over the Little Panther Kill tributary to Esopus Creek in the Town of Shandaken. Replaces 8-foot diameter pipe with a 61-foot span bridge.
Town of Olive Highway Dept.	Engineering & Design Upper Boiceville Road Culvert Replacement	AWSMP-2016-127	$13,500	Active	Engineering and hydraulic studies for future replacement of Upper Boiceville Road culvert to reduce hydraulic constriction and maintain fish passage.

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

7. *Organize Highway Manager's Working Group meetings with relevant local, county, and state highway personnel to identify shared stream/road concerns and evaluate opportunities to support coordinated effort to use best management practices. Provide guidelines for "repairs" of streams and drainage systems with best management practices advocated by the AWSMP to reduce risk of further instability (2-3 per year).*
8. *Hold a highway manager and contractor training on installation of stream best management practices (1 in 2016-18).*
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 2017-2019 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 and Technical Assistance

2. *Offer and encourage participation in landowner incentive programs to encourage voluntary participation in stream and riparian zone protection and enhancement. One such program is the Catskill Streams Buffer Initiative.*
3. *Provide customized Riparian Corridor Management Plans to landowners enrolled in CSBI. These plans highlight the importance of healthy riparian buffers and sustainable streamside property management practices that landowners can implement on their properties.*
4. *Demonstrate soil bioengineering as a feasible bank protection strategy for restoring riparian habitat, streambank stability and improving instream water quality in the Ashokan Watershed through a pilot bioengineering demonstration project on the Bushkill Creek in Town of Olive, NY.*
5. *Focus on multi-phase riparian buffer restoration projects with invasive species removal, management and native plant establishment.*
6. *Review data and perform Geographic Information Systems analysis to identify areas that would benefit from buffer enhancement to improve landowner recruitment into the Catskill Streams Buffer Initiative program.*
7. *Encourage landowner participation in CSBI through showcasing aesthetic value and habitat improvement using a combination of invasive species management and native plant installation at a Riparian Buffer Demonstration Display at the Catskill Interpretative Center.*

Ashokan Watershed CSBI Projects

2017	**In-house design of Ashokan Watershed Bioengineering Project (location TBD)** **Installation of 3-5 landowner invasive removal and planting projects** **Production of 3-5 landowner specific Riparian Corridor Management Plans** **Continue project monitoring – 35 sites scheduled**

2018	**Continue to assist 3-5 CSBI enrolled landowners with streamside vegetation projects** **Production of 3-5 landowner specific riparian corridor management plans** **Installation of streambank bioengineering project (Location TBD)**

MONITORING OF RIPARIAN BUFFER PLANTINGS

8. *Monitor performance of riparian buffer plantings funded by the Catskill Streams Buffer Initiative.*
    a. *Riparian buffer restoration sites that were installed through CSBI are monitored bi-annually for a period of 5 years after project completion. The monitoring helps inform management decisions on species selection and site characteristics. 35 sites scheduled for 2017, 15 sites in 2018.*
    b. *Geomorphic monitoring of Bushkill Creek bioengineering project implementation. As-built survey was completed in 2016, follow-up monitoring to be conducted in 2017.*

OUTREACH, EDUCATION AND TECHNICAL ASSISTANCE TO STREAMSIDE LANDOWNERS

9. *Provide site visits and office consultations with watershed landowners, municipalities, contractors and others for designing and implementing best management practices to reduce erosion.*
10. *Develop educational products (fact sheets, guidebooks, videos, etc.) to educate landowners on best management practices, such as riparian planting design and maintenance, and guidelines for proper sizing of private stream crossings.*
11. *Develop several riparian buffer demonstration projects that can be accessed by volunteers and members of the public for educational purposes.*
12. *Develop and encourage volunteer service projects to install, maintain, and enhance riparian buffer demonstration plots; and to collect seeds or cuttings of native plants used in buffers.*
13. *Develop reliable local sources of native plant material for stream and riparian improvement projects. Maintain the 2012 installation of 10,000 live willow plants for cutting beds that will be used in future riparian restoration projects. Continue to identify native local stands for harvest located in the watershed.*

ASHOKAN WATERSHED SMIP PROJECTS SUPPORTING RIPARIAN BUFFER RESTORATION *(ACTIVE 2017)*

Organization	Proposal Title	Proposal Number	Amount	Status	Purpose of Grant
Catskill Center for Conservation and Development	Riparian Buffer Demonstration Project at the Maurice D. Hinchey Catskill Interpretive Center	AWSMP-2015-105	$9,000	Active	Education and outreach focused on a CSBI-funded riparian buffer planting located at the Catskill Interpretive Center on St. Rt. 28. Features native Catskill plants and provides education about the care and restoration of riparian areas along Catskills streams.

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 2017-2019 Action Plan and allocation of SMIP funding in support of recommendations

Stream Ecosystem Assessment

1. *Identify riparian areas of particular environmental benefit or concern and create a database of targeted properties for riparian zone improvement programs.*
2. *Continue research, evaluation, and monitoring of aquatic ecosystems in the Watershed to improve stream best management practices. Support the characterization of physical and water-quality regimes and the condition of important species in the watershed by public agencies and interest groups. A Request for Applications to meet priority science needs was issued in mid-2016, initiating several SMIP-funded projects. One of these projects is a study of how stream water temperature varies annually within the Esopus Creek and major tributaries. The study will run through August 2019.*
3. *Provide funding for study of stream condition and function, and monitoring and evaluation of system condition and management practices through the SMIP. A Request for Applications to meet priority science needs was issued in mid-2016, initiating several SMIP-funded projects. One of these projects continues annual fish community survey through 2017-2018 with plans to develop a report on fish community status in 2019. Based on long-term fish monitoring partially supported by AWSMP, in 2016 the USGS published a report on "Long-Term Trends in Naturalized Rainbow Trout Populations in the Upper Esopus Creek 2009-15." A separate SMIP-funded study is examining the effects of introduced White Perch and Alewife on Rainbow Trout populations in the Ashokan Reservoir. A final report for this study is expected in 2018.*

Outreach, Education and Technical Assistance for Aquatic and Riparian Habitat and Ecosystems

4. *Enhance coordination and information sharing among regulators, scientists, educators and the public.*
5. *Work with regional organizations to develop and disseminate outreach materials and offer public programs on critical invasive species for the West of Hudson Watersheds. In 2017, AWSMP is partnering with the Catskill Regional Invasive Species Program (CRISP) at the Catskill Center to provide education and technical assistance to Oliverea landowners engaged in Japanese Knotweed eradication efforts in the headwaters of the upper Esopus Creek.*

6. *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.*
7. *Hold Stream Ecosystem Working Group meetings to advise the program on stream system assessment, research, and monitoring needs. Work with the group to coordinate research, assessment, and monitoring projects in the Watershed (1-2 meetings per year, or as needed).*
8. *The AWSMP Stream Ecosystem Working Group is drafting a 10-year update to the 2007 Stream Ecosystem Research & Assessment Strategy for the Upper Esopus Creek. Publish the updated Research, Assessment & Monitoring Strategy for the Upper Esopus Creek. The AWSMP will continue meetings of the Stream Ecosystem Working Group and finalize and publish an updated Research, Assessment & Monitoring Strategy for the Ashokan Watershed in 2017.*
9. *Participate in the inter-basin Riparian Buffers Working Group.*
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. The report can be accessed at http://ashokanstreams.org/publications-resources/technical-data/. AWSMP is referencing this report, along with CSBI guidance, when partners request information on regionally appropriate species to highlight in riparian education projects.*

ASHOKAN WATERSHED SMIP PROJECTS SUPPORTING AQUATIC AND RIPARIAN HABITAT AND ECOSYSTEM ASSESSMENT *(ACTIVE 2017)*

Organization	Proposal Title	Proposal Number	Amount	Status	Purpose of Grant
USGS	Long-term Trends in Rainbow Trout Growth and Naturalized Populations in the Ashokan Basin	AWSMP-2014-94	$116,338	Active	Study Rainbow Trout growth in the Ashokan Reservoir and long-term trends in their population sizes in the upper Esopus Creek. Conduct fish community surveys at six sites in 2015; funding increased by $15,400 to conduct fish survey in 2016.
USGS	Long-term monitoring of fish communities in the Upper Esopus Creek	AWSMP-2016-120	$35,781	Active	Conduct annual fish community surveys in 2017 and 2018 at six previously surveyed sites to collect data that can be used to investigate long-term temporal trends in trout populations and fish communities.
SUNY New Paltz	Measure stream water temperature and evaluate spatial and temporal variation of thermal regime in the upper Esopus Creek Watershed	AWSMP-2016-122	$40,000	Active	Measure stream water and air temperature in the Esopus Creek Watershed, predict dominant environmental variables controlling stream water temperature, and map thermal variation of water temperature over time and space.

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 2017-2019 Action Plan and allocation of SMIP funding in support of recommendations

Enhancing Public Access to the Streams

1. *Identify and assess potential stream access sites in the watershed. Investigate opportunities to develop multi-use, low-impact trail systems along the stream corridors. Trails for hiking, biking, cross country skiing and snowshoeing could provide multiple benefits, including drawing visitors to local resorts and increasing user awareness of stream management issues. Make improvements to existing stream access sites. Ensure that any stream access and recreation activities or projects will not harm or degrade the environment and the greater ecology of the stream system.*
2. *Explore opportunities for and impacts of operational adjustments of the Shandaken Tunnel to accommodate the needs of biota along with other stakeholders. Information needs related to this topic were discussed during development of an updated Research, Assessment & Monitoring Strategy for the Ashokan Watershed.*
3. *Work with Stream Access and Recreation Working Group and other stakeholders on developing a plan of action to modify the policy related to recreational releases to the Shandaken Tunnel and ensure mutually beneficial results for all stream users that do no harm. Moving forward, this working group plans to explore options for tunnel operations, and continue to engage in constructive dialogue with State and City officials about future protocols and procedures for Tunnel operations.*
4. *Determine a good area for either new trail construction or existing trail improvement that would provide greater public access to streams. In 2016, AWSMP met with Ulster County planners to review issues related to stream crossings on the Ashokan Rail Trail.*
5. *Monitor conditions at existing public access sites to determine need for repairs, enhancements and/or improvements. Help to address through education and by providing a forum for discussion, any over-use and/or site monitoring issues at popular Esopus Creek access points, if needed.*
6. *Utilize the Town of Shandaken Recreation Master Plan and recreation and access documents from all watershed towns when developing programs and projects. Work closely with Town of Shandaken Parks and Recreation Committee and their counterparts in other watershed towns to develop and execute projects.*
7. *Work with DEP, DEC, County, Town, and other entities to assess possibility of utilizing flood buy-out properties for recreational and educational purposes.*

8. *Explore possibility of creating educational opportunities alongside recreational areas such as interpretative nature trails, wildlife viewing areas, bird observation points, "photo safaris," hiking/biking/walking/running trails, kiosks and educational signage, etc.*
9. *Collaborate with chambers of commerce, tourism industry, and others to promote the area as a destination. This will help spread the message of good stream management to a wider audience and strengthen and improve the local economy. Work with stakeholder groups to prevent degradation of stream resources and sensitive locations from overuse.*
10. *Support development of a protocol for recreational stream safety that includes input and consensus from all stakeholder groups. The protocol will include criteria to identify in-stream safety hazards and mitigation options for those hazards. Potential options may include (but are not limited to) educational/warning signage, hazard avoidance, and hazard removal. The protocol will consider the impacts of any action on human safety, habitat, and stream stability.*

    In 2016, AWSMP stakeholder groups reviewed a risk analysis protocol for management of large wood in streams published by Colorado State University and discussed its possible application. Ulster County SWCD staff and members of the Stream Access and Recreation Working Group will be piloting the protocol in 2017 on a yet-to-be-determined section of the Esopus Creek.
11. *Develop awareness of Hemlock Woolly Adelgid (HWA) control efforts and remain informed about the impact of the HWA on streams in the Ashokan watershed.*

Education for Recreational Users of Streams

12. *Develop and host major educational events/conferences/meetings devoted to stream access and recreation issues as needed on topics determined by the Stream Access and Recreation Working Group. Past topics have included management of large wood in streams, Shandaken Tunnel recreational releases, and low-level outlet Issues in the Schoharie Reservoir. Potential future topics include: recreational safety, in-stream wood management, potential impact to streams for HWA infestation, laws and policies relating to navigable waterways, and handicap accessibility issues.*
13. *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.*
14. *Advocate for and advance educational opportunities in recreational areas to improve knowledge of streams, stream management, and the watershed. Examples of this may include educational signage, kiosks, interpretative trails and photo safaris.*

Appendix A: Summary of Completed Projects 2009-2016

Stream Assessments

Streams	Location	Status
Broadstreet Hollow	Towns of Shandaken and Lexington	Completed 2001
Stony Clove	Towns of Shandaken, Woodstock, Hunter, and Lexington	Completed 2003
Esopus Creek	Towns of Shandaken and Olive	Completed 2007
Woodland Creek	Town of Shandaken	Completed 2008
Beaver Kill	Towns of Shandaken and Woodstock	Completed 2010
Warner Creek	Town of Shandaken and Woodstock	Completed 2010
Birch Creek	Town of Shandaken	Completed 2012
Beaver Kill	Town of Shandaken and Woodstock	Completed mainstem reassessment in 2012
Bush Kill	Towns of Shandaken and Olive	Completed 2012
Bushnellsville Creek	Towns of Shandaken and Lexington	Completed 2013
Stony Clove Creek	Towns of Shandaken and Hunter	Completed mainstem reassessment 2013
Woodland Creek	Town of Shandaken	Completed reassessment in 2015
Maltby Hollow Brook	Town of Olive	Completed 2015

Stream Restoration/Stabilization Projects

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

Hunter	Stony Clove Creek at Wright Rd.	Protect vulnerable properties and infrastructure, reduce source of chronic turbidity and enhance habitat and stream stability.	$1,678,050.14	Completed 2015
Hunter	Stony Clove Hillslope Stabilization	Stabilize failing hillslope that is source for fine sediment and water quality impairment.	$1,237,177.29	Completed 2016
Woodstock	Beaver Kill at Van Hoagland Road	Project 1 - Reach scale restoration and stabilization of hillslope failure about 400-ft upstream of the Van Hoagland bridge that is a source for fine sediment and water quality impairment.	TBD	Design 2015/16; Implementation 2017
Woodstock	Beaver Kill at Van Hoagland Road	Project 2 - Reach scale restoration and stabilization of hillslope failure about 1,200-ft upstream of the Van Hoagland bridge that is a source for fine sediment and water quality impairment.	TBD	Design 2015/16; Implementation 2017

Stream Buffer Projects

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

Project	Town	Goal
2015 Technical Assistance Site Visits	Multiple	Conducted 16 landowner technical assistance site visits.
2015 Riparian Corridor Management Plans	Multiple	Completed 26 Riparian Corridor Management Plans for landowners enrolled in CSBI.
2016 Catskill Interpretative Center Demonstration Buffer (CSBI & SMIP)	Shandaken	Established a demonstration riparian buffer display for education & outreach on streamside buffers. Project included volunteer invasive removal, installation of 265 native trees and shrubs, and wildflower pollinator seed mix.
2016 Wright Road CSBI Planting	Hunter	Project involved installation of over 400 native trees and shrubs on a previously restored failing hillslope.
2016 Menla Mountain CSBI Project	Shandaken	Phase 1 of a buffer restoration underway at Menla Mountain Retreat. This project engaged volunteers for invasive species awareness. Nearly 1 acre of invasives have been removed. Phase II is scheduled for Fall 2017 to re-plant with native species.
Moran Bushkill CSBI Bioengineering Project	Olive	600 linear feet of invasive removal, buffer restoration and streambank protection all wrapped in one project that showcases proper buffer management and use of soil bioengineering as a practical approach to streambank and ecosystem protection.
2016 CSBI provided plant materials for landowner installation	Shandaken	The CSBI Program provided plant materials to two separate landowners for self-installation of recommended buffer improvements as they were recommended in Riparian Corridor Management Plans.
2016 Riparian Corridor Management Plans	Multiple	Provided 5 landowner specific Riparian Corridor Management plans for landowners enrolled in CSBI
2016 Technical Assistance Site Visits	Multiple	Conducted 12 landowner technical site visits regarding stream problems and recommendations.
2016 Buffer Planting Monitoring	Multiple	Surveyed 24 sites and 41 individual monitoring plots on CSBI project sites for vegetation

Education and Outreach Projects

Publications			
Type	Title(s)	Audience	Status
Stream Management Plans	Broadstreet Hollow Stream Management Plan (2003) Stony Clove Creek Stream Management Plan (2004) Upper Esopus Creek Management Plan (2007) Beaver Kill Stream Management Plan (2015) Bush Kill Stream Management Plan (2015) Bushnellsville Creek Stream Management Plan (2015)	Watershed residents, stream managers, municipal officials, project partners	Completed for mainstem of Esopus Creek and several tributaries.
Newsletter	Esopus News	Streamside landowners and project partners	2009 (3 issues) 2010 (2 issues) 2011 (3 issues) 2012 (3 issues) 2013 (2 issues) 2014 (3 issues) 2015 (3 issues) 2016 (3 issues)
Fact Sheets	Large Woody Debris Stream Guide (2012) Flood Preparedness Stream Guide (2012) Native Plant Stream Guide (2012)	General public, municipal employees, and streamside landowners	3 fact sheets completed (2009-2013)
Videos	Ashokan Conf – Speaker Presentations (2014) Ashokan Conf - Why We Are Here (2014) Ashokan Conf – Bark Peeling (2014) Ashokan Conf – Climate Change (2014) Ashokan Conf – Rivers are Dynamic (2014) Ashokan Conf – Stable Rivers Need Room (2014) Ashokan Conf – Dredging (2014) Ashokan Conf – Stream Expert Panel (2015) Ashokan Conf – Invasive Species (2015) Ashokan Conf – Ashokan Reservoir (2015) Ashokan Conf – River of the Future (2015)		2014-2015

Program Brochure	Guide to the Ashokan Watershed Stream Management Program	General public	Brochure completed 2011 Updated annually 2012-2016
Displays and Kiosks	AWSMP Program Esopus Creek Demo Project	General public	Updated annually Updated 2013
Action Plan	2009-2011 Action Plan 2010 Update 2011-2013 Action Plan 2012 Update 2013-2015 Action Plan 2014-2016 Action Plan 2016-2018 Action Plan 2017-2019 Action Plan	Project partners, municipal officials, applicants for funding, interested members of the public, FAD regulators	Updated annually
Social Media	www.ashokanstreams.org www.facebook.com/AWSMPUlster Twitter@AshokanStreams	General public	2011 Website published 2013 Website redesign Updated weekly 2015 Logo redesign
Press Releases	Projects and Events	General public	2011 (6) 2012 (15) 2013 (10) 2014 (16) 2015 (22) 2016 (14)
Email News Alerts	Various	Streamside landowners, municipal officials and project partners	Annually 2011-2016
Conferences and Training Programs			
Type	Title	Audience	Status
Watershed Conference	Ashokan Watershed Conference	Watershed residents, municipal officials, and project partners	2010, 2011, 2012, 2013, 2014, 2015, 2017
Research Symposium	Catskill Environmental Research and Monitoring (CERM)	Researchers, resource managers, project partners, interested members of the public	CERM 2010, 2012, 2014, 2016
Fluvial Geomorphology and Engineering Trainings	Rosgen 5-day Training (2009) Rosgen Public Presentation (2009) Intro to ArcGIS Cornell Local Roads Training (2010) Aquatic Organism Passage Training (2012) Stream Restoration Practices (2011) River Hydraulic Modeling (2014) Knotweed Management Training (2014) Turbidity and Suspended Sediment in the Upper Esopus Creek Seminar (2015)	Highway and DPW staff, stream managers, contractors, and program staff	2009-2015
Floodplain Management Trainings	NYS Floodplain and Stormwater Manager's Conference and Certified Floodplain Manager Training (2010-2016) NFIP Educational Session (2013) CFM Exam Review (2014) Floodplain Mapping Fundamentals (2014) Benefit-Cost Analysis (2014) Using Depth Grids (2014) CFM Exam Review (2015 Emergency Waterfront Preparedness Class (2015) Community Rating System Workshop (2015) Flood Map Basics: Regulatory and Non-Regulatory Products (2015) CFM Exam Review (2016) Flood Map Basics-For Planning Boards/ZBAs, Towns	Code enforcement officers, planning board members, town board members, program staff, and members of the public.	2010-2016

	of Hurley, Olive, Woodstock, Shandaken (2016) Elevation Certificate Training (2016)		
Contractor Trainings	Post-Flood Emergency Stream Intervention (2012)	Local contractors, highway department staff, and project partners	2012
Landowner Workshops	Native Plants (2009, 2010) Raingardens (2011) Stream Erosion Class (2011) Beaver Kill Bus Tour (2016)	Streamside landowners	2009-2016
Public Programs			
Type	Title	Audience	Status
Volunteer Events	Knotweed Pulls (2009, 2010) Stream Clean-Up (2010, 2011, 2012) Master Watershed Steward (2012) Willow Bed Planting (2012) Family, Fun & Fish Day (2011, 2012, 2013, 2014, 2015, 2016)	General public, streamside landowners	2009-2016
Volunteer Buffer Plantings	Various locations Menla Mountain Retreat (2016) Catskill Interpretative Center (2016) NYSDEC Love My Park Day (May 2016)	General public, streamside landowners, students/interns	Annually 2010-2016
Booths and Displays	Shandaken Day Big Indian Spring Festival Olive Day Woodstock Library Day Ulster County Creek Week Ashokan Hoots Ulster County Fair Ashokan Watershed Conference Emerson Festival Mountain Valley Little League Day Rondout Valley Scout Camporee	General public, streamside landowners	Annually 2009-2016
Public Meetings	Town Board Meetings; Other Meetings Elected Officials	Municipal officials	Annual presentations to Town Board of Shandaken, Olive, Woodstock, Hunter; meetings with Town officials, as needed
NYC Watershed Partner Meetings	Grant Outreach Meetings Stream Project Meetings NYC Watershed Education & Outreach Meetings Riparian Buffer Working Group Meetings CRISP Meetings FEMA Meetings NYC Watershed Partner Meetings CWT and CWC Meetings FHM Partners Meetings	Project partners	Program coordination and reporting annually, as required or needed
Public Talks and Events	Trout Research (2012) Rochester Hollow Stream Walk (2012) Arm of the Sea Theater (2012) Birch Creek Stream Walk (2012) Kanape Brook Stream Walk (2013) Trout Unlimited Meetings (2009-2013) Warner Creek Stream Walk (2014) Rochester Hollow Stream Walk (2013, 2015) Little Beaver Kill Stream Walk (2014, 2015) AWSMP Open House (2015) Film Showing and Lecture: Deep Water (2015) Riparian Pollinators Program (2015) Beaver Kill/Mink Hollow Stream Walk (2016)	General public	Annually, as available

	Menla Mountain Riparian Invasives Event (2016) Streamside Plant Invaders (CIC Project – 2016) Lark in the Park – Riparian Walk & Talk (2016) Maltby Hollow Stream Assessment (2016)		
Youth Education			
Type	Title	Audience	Status
Presentations and Trainings	4-H Stream Team Stream Table Demo CCE Centennial Stream Table Demo UC Fair Floodplain Model Dem UC Fair Stream Table Demo Bennett Elementary Earth Day Macroinvertebrate Phoenicia School Earth Day Event Woodstock School Go Green Day Rondout Valley Scout Camporee Ashokan Center Education Staff Training (2015) 4-H Tech Wizards (2016) Town of Olive Stream Studies Onteora Summer School Stream Watch	Youth multiple ages	Annually, as available
After-School Activities and Classroom Enrichment	Watershed Detectives Club, Grades 4-6 Classroom Enrichment, Grades 4-6 Classroom Enrichment, Grades K-3 - Expanded to Woodstock and Phoenicia Elementary Schools (2015)	Onteora Central School District, Grades K-6	Annually

Program Coordination

Program Coordination			
Type	Purpose	Audience	Status
Stakeholder Council (Formerly the Advisory Council)	To provide overall guidance and oversight to the program	Project partners, municipal officials, streamside landowners and other community members	Meeting 3-4x per year
Flood Hazard Mitigation Working Group	To exchange information and identify opportunities to improve floodplain management and mitigate flood hazards	Municipal officials, project partners	Meet 3-4x per year
Stream Access & Recreation Working Group	To make recommendations for stream access/recreation improvements in the Ashokan Watershed	Project partners, recreation groups, municipal officials, local business owners	Meet 3-4x per year
Highway Managers Working Group	To exchange information and identify opportunities for technical or financial assistance to improve stream management	Highway managers, project partners	Meet 2-3x per year
Education and Outreach Working Group	To engage local educators in delivering educational programming and incorporate stakeholders into decision making	Project partners, watershed educators	Meet 2x per year Committee inactive 2012-2014; Reactivated 2015
Stream Ecosystem Working Group	To advise on development of a program research, assessment and monitoring agenda	Researchers, resource managers, project partners	Meet 1-2x per year
Grant Review Committee	To review grants to the SMIP and make recommendations for funding	Project partners	Meet based on need

SMIP Projects

Education and Outreach					
Organization	Proposal Title	Proposal Number	Award Amount	Status	Purpose of Grant

Bennett Elementary School	Watershed Detectives Program	AWSMP-2011-1	$4,500	Complete	Expand the Scientist in Residence Program at Bennett Elementary School located in Boiceville, NY with the addition of a new Watershed Detective's program for the 2011/2012 school year. Hands-on program that introduces students to watershed topics: basic watershed morphology, hydrologic cycle, where their drinking water comes from, learning about negative impacts from overdevelopment, pollution, erosion, etc.
Ulster County Soil and Water Cons. District	Rosgen Level 2 - UC SWCD	AWSMP-2010-2	$2,235	Complete	The Ulster County Soil & Water Conservation District requested $6,586 to send staff member James Wedemeyer to attend River Morphology and Assessment training (Rosgen Levels II and III) in Shepherdstown, WV.
Ulster County Soil and Water Cons. District	Rosgen Level 3 - UC SWCD	AWSMP-2010-3	$4,097	Complete	The Ulster County Soil & Water Conservation District requested $6,586 to send staff member James Wedemeyer to attend River Morphology and Assessment training (Rosgen Levels II and III) in Shepherdstown, WV.
Ashokan-Pepacton Watershed Chapter-Trout Unlimited	Leaping Trout Art Project	AWSMP-2010-4	$925	Complete	The Leaping Trout Art Project was used to stimulate local awareness of Trout Unlimited and conservation issues in the Ashokan Watershed. The funds were used to cover the cost of printing a brochure containing the Leaping Trout Trail Map, a 4" x 9" rack card and maintaining the project website.
Catskill Center for Conservation and Development	Catskill Kiosk Panel Project	AWSMP-2010-12	$5,000	Complete	Interpretative kiosk along Route 28 in the Town of Shandaken, NY discussing the role and importance of the Catskill Park and the NYC Watershed. The kiosk is located near the site of the proposed Catskill Interpretive Center in Mount Tremper. The kiosk serves as a way to inform visitors to the area about what the Catskill Mountain region has to offer as well as issues facing the watershed and local ecology.
Ulster County Cornell Coop. Extension	Roadside Drainage Class for Highway Staff	AWSMP-2010-23	$874	Complete	Training for Ashokan Watershed Highway Departments on ditch and culvert best management practices.
Town of Woodstock	Woodstock Watershed Education Project	AWSMP-2010-26	$4,400	Complete	Education and outreach for Town of Woodstock Wetlands and Watercourse Law. Outreach and educational materials for town residents, local board members and businesses.
Phoenicia Library	Jerry Bartlett Memorial Angling Collection Improvement	AWSMP-2011-37	$10,000	Complete	Outreach and education to anglers of all ages and the general public about the links between robust fish and macroinvertebrate populations a water quality through workshops, presentations and events, digital exhibits and web design.

Ulster County Soil and Water Cons. District	Rosgen Level 4 - UC SWCD	AWSMP-2010-51	$5,000	Complete	The Ulster County Soil & Water Conservation District requested $5,000 to cover the costs associated with Rosgen Level IV trainings for James Wedermeyer. The trainings are to be held in October of 2011 at Pilot View, Inc. Dobson, North Carolina. They were awarded the full $5,000 requested.
Ulster County Dept. of Public Works	Rosgen Level 1 - UC DPW	AWSMP-2011-52	$3,000	Complete	Ulster County Department of Public Works requested $2,980 to send a stormwater specialist, Brendan Masterson, to Applied Fluvial Geomorphology (Rosgen Level I) training.
Ulster County Cornell Coop. Extension	Floodplain Manager Association Training Grant	AWSMP-2011-65	$2,445	Complete	Provide five scholarships for Town Floodplain Law administrators to attend the NYS Watershed Association Conference
Town of Shandaken	Floodplain Manager Training and Certifications	AWSMP-2013-71	$1,455	Complete	Send the Shandaken Town Supervisor, Code Enforcement Officer, and Highway Superintendent to the NYSFSMA 2014 conference and Certified Floodplain Manager training; and sit for CFM exam.
Town of Woodstock	Floodplain Manager Training and Certification	AWSMP-2013-72	$485	Complete	Send Town of Woodstock Code Enforcement Officer to the NYSFSMA 2014 conference and Certified Floodplain Manager training; and sit for CFM exam.
Town of Hurley	Floodplain Manager Continuing Education	AWSMP-2013-73	$325	Complete	Send Town of Hurley Code Enforcement Officer to the NYSFSMA 2014 conference and Certified Floodplain Manager training.
Ulster County Dept. of Environment	Floodplain Manager Certification and Continuing Education	AWSMP-2013-75	$810	Complete	Send two Ulster County staff to the NYSFSMA 2014 conference and Certified Floodplain Manager training; and sit for CFM exam.
Ulster County Dept. of Public Works	Wildland Hydrology Course Training for UCDPW Staff	AWSMP-2013-76	$3,186	Complete	Send Ulster County Civil Engineer, Andrew Emrich to Applied Fluvial Geomorphology Training (Rosgen Level I) in Shepardstown, WV.
Town of Lexington	NYSFSMA Annual Conference Attendance Plus CFM Test	AWSMP-2013-85	$988	Complete	Send Town of Lexington Code Enforcement Officer to the NYSFSMA 2014 conference and Certified Floodplain Manager training; and sit for CFM exam.
Town of Olive	NYSFSMA Annual Conference Attendance Plus CFM Test	AWSMP-2014-86	$2,199	Complete	Send Town of Olive Building Inspector and Code Enforcement Officer to NYS Floodplain and Stormwater Manager's Association Annual Conference from April 27 -29, 2015 and take CFM exam.
Town of Woodstock	NYSFSMA Annual Conference Attendance and CFM Continuing Education	AWSMP-2014-88	$1,312	Complete	Send Town of Woodstock Floodplain Administrator to NYS Floodplain and Stormwater Manager's Association Annual Conference from April 27 -29, 2015 and maintain CFM accreditation.
Ulster County Dept. of Public Works	Applied Fluvial Geomorphology Training for Ulster County DPW Staff	AWSMP-2014-89	$3,410	Complete	Send UC DPW staff to Rosgen Level II training from March 15 - 20, 2015.
Town of Shandaken	NYSFSMA Annual Conference Attendance and CFM Continuing Education	AWSMP-2014-99	$3,842	Complete	Send Town of Shandaken Supervisor, Highway Superintendent, Planning Board Chair, and new Code Enforcement Officer/Floodplain Manager to NYS Floodplain and Stormwater Manager's

					Association Annual Conference from April 27 -29, 2015 and acquire or maintain CFM accreditation.
Cornell Cooperative Extension	2016 Stream & Floodplain Manager Training Scholarships	AWSMP-2015-111	$20,500	Complete	Offer up to 14 scholarships for town and county officials to attend stream and floodplain management trainings in 2016.
Infrastructure					
Organization	Proposal Title	Proposal Number	Award Amount	Status	Purpose of Grant
Town of Woodstock	Van Hoagland Road Bridge Replacement	AWSMP-2011-29	$200,000	Complete	Extend Van Hoagland Bridge by 20' to remove hydraulic constriction.
Ulster County Soil and Water Cons. District	Bradkin Road Culvert Replacement	AWSMP-2010-31	$107,480	Complete	Replace undersized culvert that was washed out in Oct 2010 flood with appropriately sized culvert.
Ulster County Dept. of Public Works	Woodland Valley at Fawn Hill	AWSMP-2010-41	$35,075	Complete	Stabilize a failing hillslope that endangers a road. Provides matching funds to a FEMA HMGP grant received by the Town of Shandaken.
Town of Woodstock	Van Hoagland Bridge Hydraulic Study	AWSMP-2011-57	$5,000	Complete	Engineering services to conduct a hydraulic analysis prior to replacing the Van Hoagland Bridge.
Ulster County Dept. of Public Works	Maben Hollow Bridge Repair and Expansion - Post Irene	AWSMP-2011-67	$29,300	Discontinued	Install a new abutment and bridge deck for the Maben Hollow Bridge on Esopus Creek that was damaged during Tropical Storm Irene. The new bridge has a 20-foot increased span length to improve hydraulic capacity.
Ulster County Dept. of Public Works	County Route 47 Culvert Replacement —Post Irene	AWSMP-2011-68	$77,300	Discontinued	Engineering to determine appropriate sizing and design of a culvert replacement for the Hillside Drive crossing.
Town of Olive	Engineering for Dry Brook at Hillside Drive Bridge Replacement	AWSMP-2013-69	$20,000	Complete	Engineering through 60% design to determine appropriate sizing and design of a culvert replacement for the Hillside Drive crossing.
Town of Shandaken Highway Dept.	Engineering for Woodland Creek at Fawn Hill Rd. Bridge Grade Control	AWSMP-2013-78	$10,000	Complete	Engineering for grade control downstream of the Fawn Hill Bridge to stop headcut moving toward bridge.
Town of Shandaken Highway Dept.	Conceptual Design for Fox Hollow Creek at Fox Hollow Rd. Bridge Grade Control by Panther Mountain Trail	AWSMP-2013-79	$10,000	Complete	Conceptual design for project to stop headcut moving toward the upper bridge on Fox Hollow Rd. across from Panther Mountain Park entrance. Retaining walls are failing and endangering the bridge and streambanks.
Town of Shandaken Highway Dept.	Engineering for Fox Hollow Creek at Herdman Rd. Bridge Grade Control	AWSMP-2013-80	$10,000	Complete	Engineering for grade control to prevent headcut and scour endangering the Herdman Rd. bridge off Fox Hollow Rd.
Town of Woodstock	Silver Hollow Creek at Silver Hollow Rd Culvert Replacement	AWSMP-2013-81	$50,000	Discontinued	Replace flood-damaged culvert with precast concrete box culvert. Project at the Intersection of Silver Hollow Rd. and Lane Rd.
Ulster County DPW	Mine Hollow Culvert Replacement	AWSMP-2014-90	$60,000	Complete	Replace and upsize culvert on Mine Hollow, a tributary to the Bushkill in the Town of Olive.
Planning					
Organization	Proposal Title	Proposal Number	Award Amount	Status	Purpose of Grant

Town of Woodstock	Habitat Mapping for the Town of Woodstock	AWSMP-2010-24	$29,000	Complete	Develop a large-format habitat map and a report describing terrestrial, wetland, and stream habitats; their relationship to maintaining groundwater and surface water resources; the plants and animals of conservation concern that may use the habitats; and detailed conservation recommendations. Maps to aide the town with planning, development and conservation decisions.
RCAP Solutions Community Resources	SAFARI Coordination with Mitigation Plan	AWSMP-2011-34	$10,000	Complete	Assist the Town of Shandaken with research and assembly of documentation of elevation certificates, repetitive loss areas, and information to support plan development, information meeting planning, advertising and coordination, other public outreach as needed.
Town of Shandaken	Phoenicia Mitigation Phase 1	AWSMP-2011-55	$32,771	Complete	Develop a design to reduce flooding from Stony Clove in Phoenicia at Rt. 212 bridge.
Town of Shandaken	Phoenicia Flood Resiliency Planning and Outreach	AWSMP-2011-56	$92,500	Complete	Hire a consultant to develop a flood hazard mitigation plan for the Town of Shandaken that provides overall coordination and improves communication of flood risks, develops flood mitigation measures and strategies, and materials for an application to FEMA's Community Rating System.
Town of Shandaken	Engineering Services for Pine Hill Trail Network	AWSMP-2013-70	$5,000	Complete	Develop plans for a hiking/ biking trail network with stream access and crossings interconnecting Smith Park to Main St., the Morton Memorial Library, and the Town of Shandaken Historical Museum (all town owned).
Town of Shandaken	Local Flood and Feasibility Analysis for Phoenicia and Mt. Tremper	AWSMP-2013-84 AWSMP-2014-101	$72,000 $20,850	Complete	Analyze flood conditions and identify hazard mitigation projects in Phoenicia and Mt. Tremper.
Research and Monitoring					
Organization	Proposal Title	Proposal Number	Award Amount	Status	Purpose of Grant
SUNY New Paltz	Rock Snot in Sick Rivers	AWSMP-2010-8	$4,984	Complete	A research project to investigate the causes of invasive algae didymosphenia geminate “didymo.” In particular this project sought to find the causes of algae blooms in streams infested with didymo and whether certain factors such as climate, land use, water chemistry or hydrology play a role in the growth and spread of didymo. Funds were used to purchase field supplies for experimentation and sampling and decontamination equipment.
USGS Aquatic	Use of Telemetry to Assess Effects of Shandaken Tunnel on Trout	AWSMP-2010-9	$8,159	Complete	Purchase telemetry equipment used by USGS, DEC, DEP, CCE, and Cornell University to research river trout movements.
USGS Aquatic	Quantitative Assessment of Water Quality in the Upper Esopus Creek	AWSMP-2010-10	$27,080	Complete	Sample fish communities and habitat conditions at sites throughout the Esopus Creek Watershed in the summer of 2010.

NY State Museum/Geological Survey	Applied 3-Dimensional Geologic Mapping in Ulster County, NY	AWSMP-2010-13	$38,037	Complete	Conduct geological mapping in the Ashokan Watershed area.
Ulster County Cornell Coop. Extension	Trimble GPS Unit	AWSMP-2010-14	$8,375	Complete	Purchase a Trimble GPS for watershed-related data collection efforts.
USGS Aquatic	Quantitative Assessment of Fish, Macroinvertebrate, and Periphyton Communities in the Upper Esopus Creek	AWSMP-2010-19	$79,700	Complete	Conduct water quality quantitative assessments in the Upper Esopus Creek. Assess fish and algae populations in the Upper Esopus, the effect of the Shandaken Portal on aquatic organisms, the potential effects of Phoenicia water quality on aquatic organisms, and quantify water quality, sediment load and turbidity throughout the Upper Esopus and in the seven major tributaries to the Esopus for 1-3 years. Characterize temporal and spatial trends in biological indices and water quality. Work conducted in 2011 and 2012 (2011 field survey).
USGS Aquatic	Use of Telemetry to Assess Effects of Shandaken Tunnel on Trout	AWSMP-2010-20	$86,800	Complete	Study the effects of discharges from the Shandaken Tunnel on trout populations in the Upper Esopus Creek. Define the effects turbidity and sedimentation have on the local economy, trout populations, and quality of drinking water in the Upper Esopus Creek and Ashokan Reservoir.
USGS	Quantitative Assessment of Water Quality in the Upper Esopus Creek	AWSMP-2010-22	$90,990	Complete	Study water quality of the upper Esopus Creek. Conduct sampling to characterize fish and other aquatic organisms as well temperature, hydrology, turbidity, sediment and other variables. Work conducted in 2010 and 2011 (2010 field sampling water quality parameters).
SUNY New Paltz	Rock Snot in Sick Rivers	AWSMP-2010-8	$4,984	Complete	Investigate the causes of the invasive didymosphenia geminate, “didymo” algae blooms in streams and whether factors such as climate, land use, water chemistry or hydrology play a role in the growth and spread of didymo. Funds were used to purchase field supplies for experimentation and sampling and decontamination equipment.
USGS Aquatic	Use of Telemetry to Assess Effects of Shandaken Tunnel on Trout	AWSMP-2010-9	$8,159	Complete	Purchase telemetry equipment used by USGS, DEC, DEP, CCE, and Cornell University to research river trout movements.
USGS	Monitoring Turbidity, Suspended Sediment Concentrations, and Sediment Loads in the Beaver Kill and Warner Creek Watersheds	AWSMP-2011-27	$209,750	Complete	Extend Beaver Kill gage by 1 year and install gage on Warner Creek, collect and analyze sediment and turbidity samples, measure streamflow and develop a stage-to-discharge rating curve at both streamgages, and analyze how suspended sediment concentration and associated turbidity were impacted by stream restoration and stabilization projects.

SUNY - New Paltz	Characterization of Suspended Sediment in Warner Creek	AWSMP-2011-58	$5,000	Complete	Study the effects of suspended sediment on Warner Creek's ecology and geomorphology.
SUNY - New Paltz	Role of Suspended Sediment on Warner Creek's Ecology	AWSMP-2011-59	$5,000	Complete	Extend work on Warner Creek to conduct Stony Clove Creek watershed characterization. Covers the stipend of a SUNY New Paltz senior geology student.
SUNY New Paltz	Didymo in Esopus Creek: Identification of Bloom	AWSMP-2011-60	$7,400	Complete	Study didymo algae blooms in the Esopus Creek. Continues work done in 2011 to identify locations of didymo, measure water chemistry (a precursor to didymo infestation), test cleaning agents to determine functionality, and continue public education and outreach on techniques to prevent the spread of didymo.
Syracuse University	Bank Erosion Assessment and Analysis in Stony Clove Creek, 2001-2012	AWSMP-2011-61	$45,000	Complete	Resurvey 27 Bank Erosion Monitoring Sites (BEMS) along Stony Clove Creek and establish 10-12 new BEMS. Collect detailed measurements of elevation and calculate the volume of eroded material. Assess methodologies for suitability. Collect samples of stream bank material for physical characterization. Study streamflow data. Identify events most likely to have caused erosion.
USGS Aquatic	Impact of Climate Change (floods) on Stream Ecosystems in the Catskills	AWSMP-2011-62	$30,000	Complete	Assess the impacts of historic August 2011 flooding on the Upper Esopus Creek ecosystem, quantify short and long term rates of ecosystem recovery, characterize the effects of emergency channel repairs on the stream ecosystem, and provide data needed to help mitigate negative ecosystem impacts that may occur more frequently than in the past.
The Research Foundation SUNY New Paltz	Assessing the Impact of Groundwater and Heterogeneous Glacial Deposits on Streambank Erosion in the Stony Clove Creek Watershed	AWSMP-2013-74	$30,001	Complete	Study detailed glacial geology and groundwater-surfacewater interactions at study sites along the Stony Clove Creek and Warner Creek to inform understanding of streambank erosion dynamics and treatment options.
USGS Aquatic	Long-Term Effects, Resiliance and Recovery of Fish in the Upper Esopus Creek	AWSMP-2013-77	$30,000	Complete	Survey fish assemblages at six-to-nine previously sampled sites in the Upper Esopus Creek during summer 2014 to assess the factors affecting the long-term impacts and (or) recovery of local fish populations and communities after floods. Continues work started under AWSMP-2010-19 and AWSMP-2011-62.
The Research Foundation SUNY New Paltz	Assessing the Impact of Groundwater and Heterogeneous Glacial Deposits on Streambank Erosion in the Stony Clove Creek Watershed	AWSMP-2013-74	$30,001	Complete	Study detailed glacial geology and groundwater-surfacewater interactions at study sites along the Stony Clove Creek and Warner Creek to inform understanding of streambank erosion dynamics and treatment options.
Restoration					
Organization	Proposal Title	Proposal Number	Award	Status	Purpose of Grant

			Amount		
Town of Woodstock	Beaver Kill Channel Protection	AWSMP-2011-16	$5,700	Complete	Repair a breached section of steam bank on outside stream bend. During medium and high flows, this section diverts into a channel behind the streambank. Repair a stacked rock wall constructed on both sides of stream.
Town of Woodstock Hwy Dept.	Beaver Kill at Mink Hollow Projects	AWSMP-2011-17	$102,900	Complete	Projects to mitigate stream and road damages along Mink Hollow Road in the Town of Woodstock. Includes: above Van Hoagland Road reconnect the floodplain previously blocked by berms; stabilize the creek bed below a failed rock wall; and remove the buildup of LWD threatening to move the creek closer to Mink Hollow Rd.
Town of Shandaken	Stony Clove at Phoenicia	AWSMP-2011-18	$234,000	Complete	Implement a stream restoration project to reduce Phoenicia flooding from the Stony Clove.
Ulster County Soil and Water Cons. District	Stony Clove at Chichester Site 1	AWSMP-2011-21	$431,337	Complete	Implement a stream restoration project to improve channel stability and water quality on the Stony Clove Creek (Chichester #1).
Town of Shandaken	Mitigation Grant Match Funds (Brown Road)	AWSMP-2011-63	$200,000	Discontinued	Provides matching funds to a HMGP grant to mitigate Brown Road.
Ulster County Dept. of Public Works	Maltby Hollow Brook Restoration - Post Irene	AWSMP-2011-66	$10,475	Complete	Maltby Hollow Brook's main channel was altered during tropical storm Irene. In order to mitigate potential dangers of flooding from future rainfall events, the County is going to remove the trees, excess sediment and debris in Maltby Hollow Brook and stabilize banks.
Ulster County SWCD	Stony Clove Creek at Wright Road Stream Restoration	AWSMP-2015-112	$500,000	Complete	Local match for the EWP for the Stony Clove Creek at Wright Road stream project, in the Town of Hunter, Greene County, NY.
Town of Olive	Maltby Hollow Stream Feature Inventory and Erosion Site Assessment	AWSMP-2014-87	$30,219	Complete	Conduct a stream feature inventory and assess bank erosion on the Maltby Hollow Creek, a tributary to the Bush Kill.