

Esopus Creek NEWS

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ULSTER COUNTY

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Ashokan Watershed Conference Connects Communities Through Flood Preparedness and Watershed Education



Matt Savatgy, AWSMP's Youth and Community Education Lead, is an experienced environmental educator who led the community and family day stream walk.

This summer, the Ashokan Watershed Stream Management Program (AWSMP) launched its 2026 Ashokan Watershed Conference, *Summit to Stream: Building Watershed Resilience Together*. The conference features a series of educational events designed to help residents, municipal officials, and families better understand streams, flooding, and community resilience.

The conference began in June with *Water Has a Memory: Past Floods and Future Resilience*, a three-part presentation series held at the Olive Free Library, Woodstock Public Library, and Phoenicia Library. These hour-long programs invited residents to learn about the history of flooding in their communities, explore

why flooding occurs in the Catskills, and discuss practical ways to prepare for future flood events. By combining local flood history, watershed science, and community discussion, the series encouraged participants to better understand both the natural function of streams and the importance of individual and community preparedness.

The presentations started with AWSMP's Stream Educator, Max Kelly, explaining the natural processes that result in flooding in the Catskills. The combination of steep mountainous terrain, wet climate, and history of floodplain development result in many Catskill communities being particularly susceptible

Continued on Page 2

to flooding. Then, AWSMP's Education Program Manager, Sally Rodgers, shared advice on how households can prepare for and reduce the impacts of flooding within the NYC Watershed (see tips in side bar to right). Lastly, each library event featured a resident who has been impacted by flooding.

At the Olive Free Library, Brian Burns, the Town of Olive Highway Superintendent presented how the Town has worked with the AWSMP to create a more resilient road network through culvert enlargement projects. Martha Frankel, a long-time resident of Olive, described her experience during Tropical Storm Irene and Lee, where her bridge was destroyed, leaving her isolated and in need of rescue.

At the Woodstock Public Library, AWSMP collaborated with the Woodstock Land Conservancy to have volunteers Beth Reichheld and Jennifer Zackin share their knowledge and ongoing projects in Woodstock. Beth, the former director of the NYC Department of Environmental Protection Stream Management Program, presented on the different reaches of the Beaver Kill. Beth's presentation was a photo tour of the Beaver Kill, focusing on how valley topography creates distinct reaches with unique habitat and management considerations. The



Municipal Training: AWSMP has hosted many technical trainings in the past for officials and professionals in the Ashokan watershed.

event concluded with Jennifer inviting participants to mark locations where people have found joy on the river, experienced flooding and erosion, and places that we can become more resilient. Jennifer is including the maps in an exhibition at the Woodstock Artists Association & Museum (WAAM) from October 23 through November 29, 2026.

The final library presentation took place in the Phoenicia Library with lifelong town resident Aaron Bennett telling the

story *40 Years of Flooding, and Counting: Experiences and Impacts on a Lifelong Resident*. His talk was a powerful reminder of the devastation flooding has on communities and residents. Audience members expressed gratitude for Aaron's personal perspective and openness.

The conference also included *Reading the Landscape: Being Safe While Enjoying Streams, Forests, and Nature*, a community and family day stream walk held at Kanape Brook in August. Attendees practiced their skills for being prepared to enjoy time outdoors. Helpful tips included letting people know where you are going before leaving, signing in on the trail registry, and being able to safely build and maintain a fire. The program provided an opportunity for families to build outdoor confidence while connecting watershed science with real-world experience.

The final component of the conference is *Understanding Floodways — and How to Explain Them*, a training for municipal officials serving communities within the Ashokan watershed. The training will prepare code enforcement officers,



Brian Burns, Town of Olive Highway Superintendent, presented on how the Town of Olive has undertaken several projects to ensure that roads are passable and safe for future floods.



Residents of Woodstock joined the community mapping exercise after they watched presentations on why streams flood, flood mitigation, and what flooding looks like in their community.



Aaron Bennett presented a personal account of the flooding he has experienced as a lifelong resident in the Town of Shandaken.

planning and zoning board members, elected officials, and others involved in floodplain management, on how to understand floodway regulations, communicate flood risk to residents, and navigate development within flood-prone areas. The training supports informed local decision-making and helps communities reduce future flood risk through effective communication strategies and technical skills.

Together, these programs reflect the Ashokan Watershed Stream Management Program's commitment to providing science-based education for audiences of all ages and backgrounds. Building a more resilient watershed comes from the shared efforts of residents, municipalities, and watershed organizations working together to understand flood risk and prepare for the future.

How Should I Prepare for a Flood?

Preparing for a flood is similar to preparing for many other natural disasters. The US Department of Homeland Security's (DHS) ready.gov website recommends creating a survival kit. The kit should at minimum include the following items:

- Water (one gallon per person per day for at least three days)
- Food (at least a three-day supply of non-perishable food for each household member)
- Medications and prescriptions
- Battery powered or hand-crank radio (a NOAA weather radio if possible)
- Flashlight
- Extra batteries
- First aid kit
- Whistle (to signal for help)
- Dust mask (to help filter contaminated air)
- Duct tape and plastic sheeting (for sheltering in place)
- Moist towelettes, garbage bags and plastic ties (for personal sanitation)
- Wrench or pliers (to turn off utilities)
- Manual can opener
- Local maps
- Cell phone with chargers and a backup battery
- Cash or traveler's checks
- Important family documents such as copies of insurance policies, identification and bank account records saved electronically or in a waterproof, portable container

Local Flood Analyses in the Ashokan Watershed

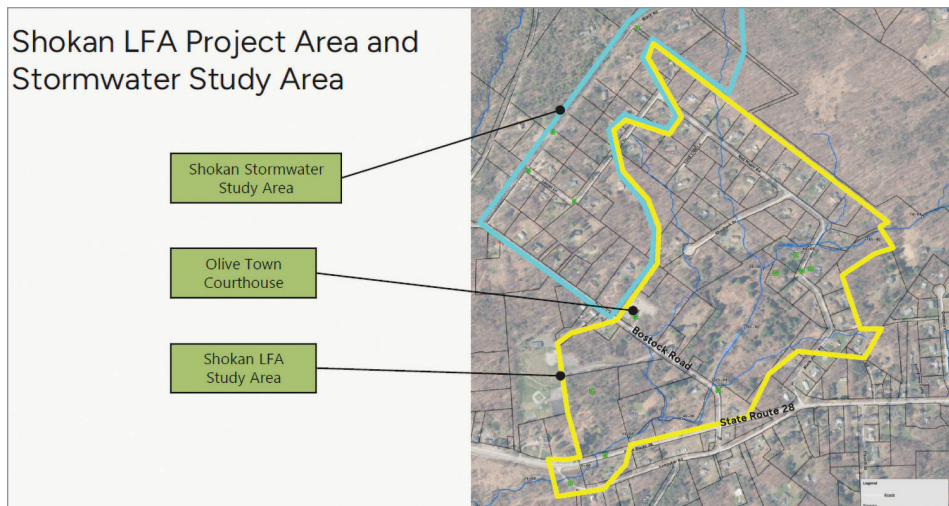
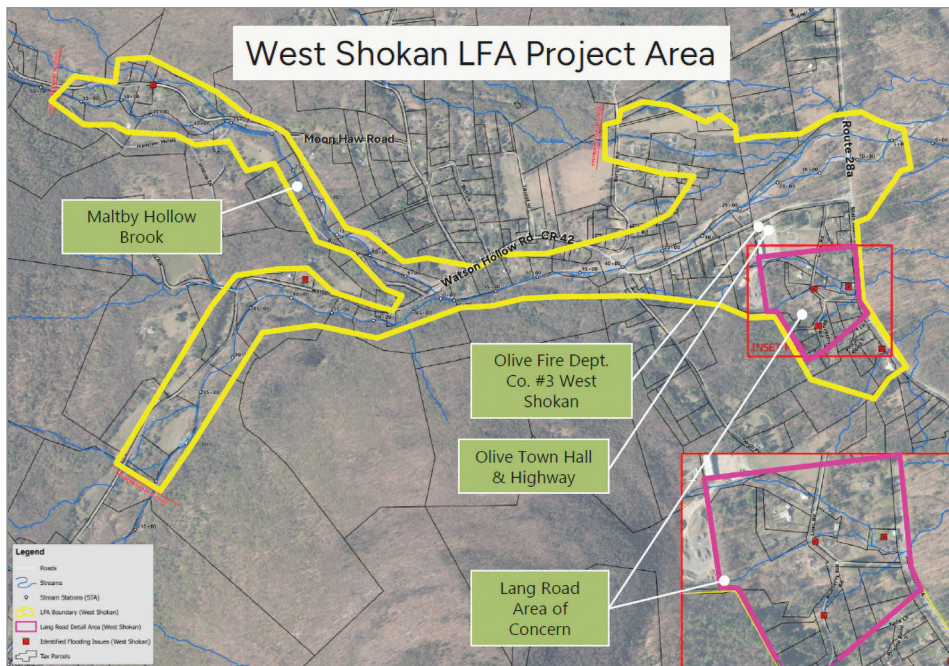
Understanding how floods affect a community is essential for reducing risk to residents, infrastructure, and property. This is particularly important in the Catskill region, where many hamlets historically developed along valley bottoms. Valley bottoms are areas that streams naturally access during periods of high flow. As communities across the region experienced major flood impacts from Tropical Storm Irene in 2011, the Christmas 2020 storm, and other events, the need for proactive flood mitigation and long-term planning has become increasingly clear.

The Local Flood Analysis (LFA) program in the NYC Watershed was developed to help communities better understand local flood conditions and identify practical opportunities to reduce flood risk. Local Flood Analyses provide communities with an opportunity to move beyond responding to flood events and toward long-term flood resilience planning.

LFAs evaluate the causes and extent of flooding, assess water flows and predict flood conditions, and identify potential hazard mitigation projects. The program

emphasizes community-scale solutions that aim to reduce flood impacts while also protecting water quality, public safety, and long-term watershed resilience. There are currently two Local Flood Analyses underway in the Ashokan Watershed.

Local Flood Analyses provide communities within the NYC Watershed with an opportunity to move beyond responding to flood events and toward long-term flood resilience planning.

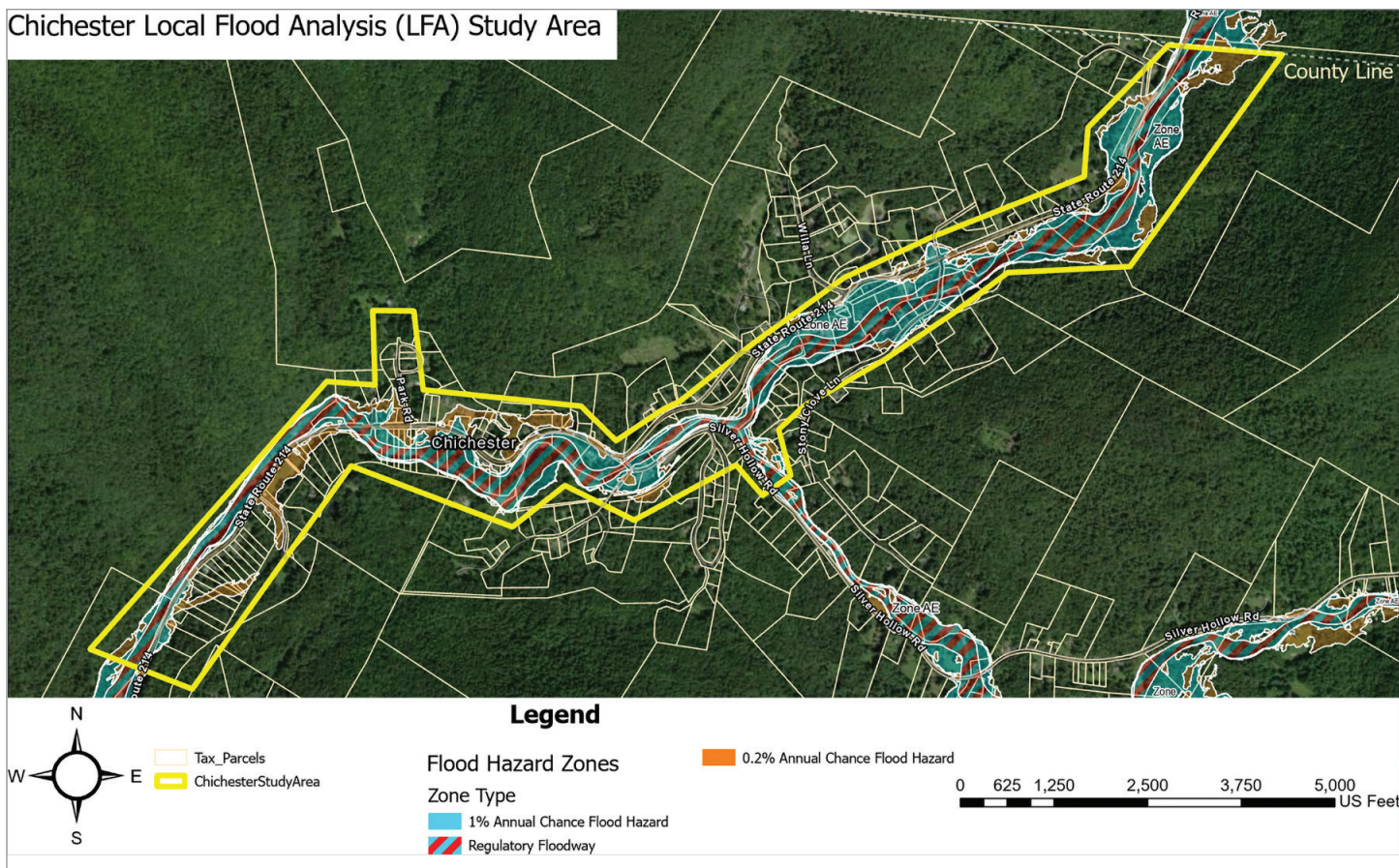


In July 2025, the Town of Olive initiated its LFA for the hamlet of Shokan, along with an expanded flood analysis for the hamlet of West Shokan. In addition, a stormwater study is being conducted for areas of Shokan that are not directly affected by riverine flooding. SLR Consulting is leading the engineering analysis and supporting the town's Flood Advisory Committee throughout the process.

At this stage of the project, SLR is developing and evaluating potential mitigation alternatives to determine which approaches may be technically feasible and effective at reducing flood risk. Concepts being explored include roadway elevation modifications, bridge improvements to increase flow conveyance, and enhancements to stream drainage infrastructure. Importantly, proposed actions are evaluated not only for their ability to reduce flood inundation, but also for feasibility and community impacts.

In early May, SLR presented conceptual mitigation alternatives at the project's second public meeting and discussed how different approaches may influence future flood conditions within the study area.

Chichester Local Flood Analysis (LFA) Study Area



The town plans to host a third public meeting to present the study's final recommendations. For more information and updates on the Shokan and West Shokan LFA, check the project website: <https://ashokanstreams.org/shokan-local-flood-analysis/>

The second Local Flood Analysis (LFA) underway in the Ashokan watershed began in March 2026 in the Town of Shandaken in the hamlet of Chichester. The initiative is being led by the Chichester Flood Advisory Committee. This committee was formed to create a comprehensive plan to mitigate flood risks in the area, similar to the completed LFA's for Phoenicia, Mt. Tremper, Shandaken, Allaben, Pine Hill and Lanesville. The engineering firm SLR is conducting hydraulic modelling to map areas where the Stony Clove Creek, Warner Creek,

and Ox Clove cause flooding to homes and infrastructure.

The first public meeting for the Chichester LFA took place in late April and provided residents with an opportunity to share their experiences, concerns, and observations related to flooding. Community input collected during this phase helps inform technical analyses and ensures that local flood history is incorporated into the modeling process.

Following this initial engagement, SLR began developing models that simulate flood flows within the study area. Current analysis includes evaluation of bridges along Stony Clove Creek and bridges along Ox Clove. Through an iterative process, the FAC and project team will develop and prioritize mitigation solutions that can alleviate flooding on roads and at structures.

The next public meeting is anticipated in early fall and will provide an opportunity for residents to review preliminary modeling results, discuss potential mitigation strategies, and continue contributing local knowledge to the planning process.

For more information and updates on the Chichester LFA, check the project website: <https://ashokanstreams.org/chichester-local-flood-analysis/>

Final LFA reports document existing hydrologic and hydraulic conditions, summarize community priorities, evaluate mitigation alternatives, and include benefit-cost information to support implementation decisions. Communities can then use these reports and supporting data to pursue funding opportunities and advance projects that reduce future flood risk.

Creature Feature: Mayflies, Stoneflies, and Caddisflies, Oh My!

Throughout the summer, you may notice dried husks clinging to rocks and boulders along your local stream. These husks are the empty external skeletons left behind when aquatic insects molt and transform into winged adults. Mayflies and stoneflies, especially a common Catskill mayfly called *Isonychia*, or the Slate Drake, are perhaps best known for their importance to fly fishing, as anglers imitate these insects to catch trout. However, these insects are also important indicators of stream health and play a crucial role in the food web of Catskill streams.

Mayflies and stoneflies have a simple, three-stage life cycle: egg, nymph, and adult. Adult insects lay their eggs on the surface of streams, where the eggs sink and become lodged among rocks, leaves, and woody debris. The eggs eventually hatch into aquatic insects, often referred to as nymphs. At this stage, the insects are considered benthic macroinvertebrates, meaning they live on the stream bottom, have exoskeletons rather than backbones, and are large enough to be seen without magnification.



Stonefly nymphs found during the 2026 Stream Explorers Youth Adventure. On the left is an *Isoperla* stonefly nymph, and on the right is a *Perlidae* stonefly nymph. Students studied macroinvertebrates collected from a nearby stream before releasing them back into the water [photo credit: Abby Bravo].



Isonychia exoskeletons left on a streamside rock after the insects molted and transformed into adult *Isonychia* mayflies.

While they are still aquatic insects, many mayflies and stoneflies feed on algae and leaves found on the streambed. Although these aquatic insects can appear similar at first glance, there are several key anatomical differences. For example, the *Isonychia* mayfly have a thin, white dorsal pinstripe, short antennae and one tarsal claw which is a claw at the end of their feet. They also have a distinctive pale stripe running down the center of their backs. By comparison, stoneflies, or *Perlidae*, generally have long antennae and two tarsal claws.

After spending months to more than a year underwater, depending on the species, mayfly and stonefly nymphs undergo their final transformation into adults. Mayfly nymphs rise to the water's surface, shed their exoskeletons, and emerge as winged insects. They then move to streamside vegetation, where

These insects are important indicators of stream health and play a crucial role in the food web of Catskill streams.

they complete their maturation into sexually mature adults. Some stonefly nymphs emerge in a similar way, but most crawl onto rocks, logs, or streamside vegetation before shedding their exoskeletons and transforming into winged adults.

Adult mayflies and stoneflies can be easily distinguished from one another. Mayflies typically hold their wings upright over their backs like small sails. Most species have two large forewings and much smaller hindwings, and their tail filaments are often as long as their bodies.



Left: This mayfly species is a Pale Evening Dun and has two tails, or cerci [photo credit: Edward Ostapczuk]. Right: The black caddis is an early-season caddisfly that appears in swarms during springtime. Its dark coloration and dense hatches make it easily recognizable [photo credit: Mark Loete].

Depending on the species, adult mayflies may have either two or three cerci, or tails. Stoneflies look quite different. They have long antennae and fold their wings flat over their long, slender bodies when at rest.

Caddisflies are a third group of insects commonly found in and around streams from spring through fall. Like mayflies and stoneflies, they are important to fly fishing, serve as indicators of stream health, and play a valuable role in stream food webs. Many caddisfly species are sensitive to poor water quality and ele-

vated water temperatures, which is one reason they are often abundant in cold, clean trout streams.

The life cycle of a caddisfly follows four stages: egg, larva, pupa, and adult. The first three stages are spent in the stream. After hatching from their eggs, many caddisfly larvae build protective cases from small pieces of plant material, sand, or gravel and can often be found beneath rocks on the streambed. During the pupal stage, they spin a silky cocoon and prepare to transform into adults. When emergence begins, the pupae

become active and rise through the water column before emerging from the stream and quickly taking flight. Adult caddisflies resemble small moths, with long antennae and four hairy wings held roof-like over their bodies.

As you explore your local stream this summer, keep an eye out for mayflies, stoneflies, caddisflies, and the exoskeletons they've left behind. Those seemingly insignificant husks on streamside rocks tell an important story. They are evidence of a thriving aquatic insect community, good water quality, and stream temperatures capable of supporting these sensitive species. In turn, these insects provide food for trout and other wildlife and help sustain the healthy stream ecosystems that make Catskill waterways so special.

Additional Reading:

<https://extension.psu.edu/indicator-insects-stoneflies-and-mayflies>

<https://catskillanglingcollection.org/hatchchart.html>

<https://www.epa.gov/national-aquatic-resource-surveys/indicators-benthic-macroinvertebrates>



Stonefly nymphal shucks left behind after the adults emerged. [photo credit: Ed Ostapczuk].



The Giant Black Stonefly is a common species found near Catskill streams. Stoneflies are identifiable by their long antennae and flat wings. [photo credit: Mark Loete].

The Fascinating Functions of Floodplains

Have you heard of the 100-year flood zone, Zone AE, or Special Flood Hazard Area? These are all terms for the regulatory floodplain. Flood zones are mapped by FEMA using a combination of computer modelling and field survey to graphically represent areas with a 1% annual chance of being inundated with floodwater. The primary purpose of creating flood maps is to communicate flood risks to homeowners, businesses, and communities.

In contrast, a geomorphic floodplain is a much smaller area that floods much more frequently, typically at an interval of every 1.5 to 2 years, which is known as a bankfull event. Geomorphic floodplains are located above the channel edge and typically are identified by looking for areas where the stream has deposited gravel and pieces of wood. Because this area floods so frequently, routine bankfull events move the greatest amount of sediment over time and shape the stream channel itself.

A common misconception is that a wider and deeper channel will contain floodwater in the stream. However, computer



A floodplain was created on this section of the Bushkill and planted with woody vegetation to prevent erosion into Watson Hollow Road.

simulations created by engineers and local case studies demonstrate that streams convey floodwaters more effectively when they can access their floodplains.

Floodplains can be thought of as nature's "pressure relief valve." When water rises onto the floodplain, water can spread

outside of the stream channel. Without floodplain access, water is concentrated within the stream channel and has greater erosive force on streambanks and the streambed. And a connected stream and floodplain can lower water surface elevations more effectively during floods since there is more area for water to flow.



FEMA flood maps for Mt. Tremper at the intersection of Route 212 and Plank Road. The red and blue hatched area is the floodway. The blue area is the 100-year flood zone or Zone AE.



Approximate location of a geomorphic floodplain on the Beaver Kill near the same intersection of Route 212 and Plank Road. This geomorphic floodplain relates to the bankfull width that is inundated approximately every 1.5 to 2 years.



The Mt. Tremper floodplain functioning as designed during the Christmas 2020 flood.

In Mt. Tremper, floodplain creation near the Route 28 bridge, in tandem with replacement of the bridge, resulted in significant reductions in water surface elevations at the bridge and over thousands of feet upstream. Several feet of floodplain material were removed and floodplains were regraded resulting in flood reductions in both lower and higher intensity storms. Similar modelling for Phoenicia indicates that a series of floodplains could result in significant reductions in flood depth along Main Street and surrounding streets.

The AWSMP funded the Ulster County Department of Public Works to restore a section of the Bushkill where the stream was threatening Watson Hollow Rd. A key element of the restoration strategy was to establish a floodplain so that the erosive energy of the stream would dissipate rather than erode into the road embankment. The floodplain increased the channel area and during high flows allows water to spread out instead of being concentrated in the stream channel.

You do not need to be a scientist to be fascinated by floodplains. This summer, find your way to a local floodplain to look for swooping birds, cast a fishing rod, or simply relax and listen to the soothing sounds of rushing water.

Streamside Plants Are Growing Well

AWSMP staff have been busy collecting geomorphic survey data at past and future restoration sites. Our team collects data on the physical form of the stream (its geomorphology) to evaluate overall stream stability and condition. We also measure the health and condition of streamside, or riparian vegetation. Willow, Alder, Hemlock, and other riparian vegetation provide canopy cover to the stream, blocking solar radiation from warming the water. Tree and shrub roots hold together soils in banks and prevent excess bank erosion.

This summer, vegetation surveys will be conducted at three stream restoration sites on the Elk Bushkill (completed in 2023), Stony Clove Creek above Jansen Road (completed in 2022), and Panther Kill (completed in 2022). Each site has between three and six vegetation plots. Within each plot, measurements are taken on trees and shrubs to determine their



Crown width is one of the measurements taken in the field and can be useful to determine plant health and vigor.

overall health and size. Sites are typically measured every other year to track how vegetation changes over time.

The Catskill Streams Buffer Initiative (CSBI) conducts vegetation community monitoring on their planting projects as well. Repeat monitoring offers staff the opportunity to learn from past projects and ensure future projects are successful. Gabe Bonse, Watershed Technician with Ulster County Soil and Water Conservation District has monitored vegetation plots since he started with the stream program three years ago. Gabe has a forestry background and enjoys revisiting planting sites to see how the riparian vegetation community has developed and grown. Gabe said, "I especially like going to sites where we have installed deer fences. Plants can grow much taller without herbivory from deer. Seeing how much taller the plants grow makes me realize how that extra effort of installing the fence is worth it in valleys with large deer populations."



Interns Chloe Goodin and Brooke Sapanaro conducted vegetation plot surveys at the Elk Bushkill stream restoration project in early June. Many trees and shrubs were defoliated due to forest tent caterpillars (See Field Notes).

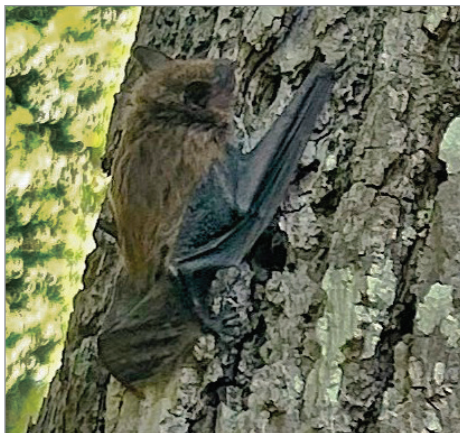
Field Notes

Local Bats Enjoy Streams

Have you ever seen bats fluttering between tree canopies in the warm months of the year? During a day in the field along the Beaver Kill Creek, AWSMP staff spotted a Little Brown Bat as it swooped down by their heads and landed on a white oak along the Beaver Kill. The bat was flying irregularly, indicating that it may have been collecting insects to eat.

Little Brown Bats are identifiable by their relatively small body lengths, between three and four inches, as well as their reddish-brown fur. Their range is a large portion of North America from Alaska to Labrador and south into central Mexico. When temperatures decrease, bats go into their hibernacula, or places where animals hibernate, such as caves, mines or barns.

Bats' appetite for insects makes them an important species in the ecosystem. They limit the need for pesticides used for crops and gardens, reduce mosquito populations and may limit the spread of invasive insects.



Little Brown Bat resting on a tree.

Many bat species, including Little Brown Bats, are under threat. Bats are vulnerable during hibernation. If awoken too soon bats lose necessary fat reserves that they rely on to survive in the winter. In recent decades, humans entering bats' hibernacula have spread white-nose syndrome (WNS) and disrupted hibernation. WNS is a disease caused by fungus that affects hibernating bats by damaging the bats' skin so much

that bats warm up and become active, wasting energy they need to make it through the winter. Little Brown Bats, the most common hibernating species in New York, have sustained the largest number of deaths.

Bat biologists across the country are evaluating strategies to monitor WNS. Additionally, researchers have been developing and testing a variety of experimental treatment options including vaccination, UV-C light, antifungal fog, and temperature and humidity control. If you find yourself in a place with nesting bats, give them space to not disrupt their hibernation.

The next time you are near a stream look for bats enjoying an insect feast!

Additional Reading:

<https://dec.ny.gov/nature/animals-fish-plants/little-brown-bat>

<https://dec.ny.gov/nature/animals-fish-plants/wildlife-health/animal-diseases/white-nose-syndrome>

<https://www.whitenosesyndrome.org/>

Pesky Caterpillars

Many landowners have noticed defoliation from spongy moths in recent years. Our field staff was conducting project monitoring on the Elk Bushkill and noticed many defoliated trees and initially assumed that spongy moth was active at this site. However, upon closer inspection, the field staff determined that forest tent caterpillars were causing most of the defoliation. There are a few main differences between spongy moth and forest tent caterpillars. Spongy moth is invasive and easily identified by both blue and red markings on their backs. Meanwhile, forest tent caterpillars are native to North America and have a distinct series of white dots on their back and blue streaks on their sides.

Some trees at the site had as many as 20 caterpillars on their trunk. Caterpillars need to eat large amounts of nutrient poor leaves to prepare for the next stages of their life cycle. After feeding, the caterpillars create cocoons to then enter the pupal

stage and transform from cylindrical crawlers to triangular airborne moths. The final stage of their life cycle is emergence as small brown nocturnal moths that deposit hundreds of eggs in the forest.



To the left is a spongy moth caterpillar, identifiable by the blue and red markings on its back. To the right are several forest tent caterpillars, which have white dots on their backs and blue streaks down their sides. Visit <https://dec.ny.gov/nature/animals-fish-plants/forest-tent-caterpillars> for more information.

A Stream Restoration Project in Broadstreet Hollow

The Ashokan Watershed Stream Management Program ([AWSMP](http://www.ashokanstreams.org)) began a significant stream restoration project in Broadstreet Hollow in mid-July. The Broadstreet Hollow stream flows into the Esopus Creek near Allaben in the Town of Shandaken. The streams feed water to the Ashokan Reservoir that supplies drinking water to over 9 million New York State residents. The project is intended to stabilize eroding stream banks and reduce the transport of fine sediments that can degrade water quality and habitat.

The project site was first flagged in 2001 as part of routine monitoring and assessment carried out by the stream program. The survey documented sources of fine sediments at the site that cloud water causing turbidity and impacting water quality. The AWSMP produced a stream management plan for Broadstreet Hollow in 2003 to guide the long-term stewardship of the stream and its adjacent floodplains, forests, and wetlands.

Broadstreet Hollow is largely an intact and healthy stream system, but the project site continued to be a major source of fine sediment and turbidity as the river eroded into stream banks. A reassessment in 2023 prompted the stream restoration project. About 1,300 linear feet of unstable stream channel will be stabilized and restored to more natural condition and function.

The project site will be cleared only where necessary and wood and rock found onsite will be reused. In addition, residents in the vicinity may see large trucks on Broadstreet Hollow Road hauling materials to the site. Walkers, joggers and motorists should keep a clear distance and be aware of increased activity on the road. Major project work should be complete within 10 weeks or by the end of September.



AWSMP staff review stream restoration plans facing an eroding hillslope on Broadstreet Hollow. The stream site near Allaben, NY will be restored to stable and healthy conditions this summer.

After instream construction is over, the site will be replanted with Catskill native trees and shrubs. The stream corridor should appear natural and healthy following several years of vegetation growth. The Ulster County Soil and Water Conservation District (SWCD) is managing the project and will monitor project success for at least five years after construction. Additionally, with separate funding the site will be studied to determine the restoration project's effects on habitat, fish, and overall channel stability.

The hired construction firm is Kinsley Construction that primarily operates in the Mid-Atlantic region. Construction costs will total approximately \$1 million. The project was designed by the firm Ecosystem Planning and Restoration (EPR) that specializes in ecological restoration on the East Coast.

Ulster SWCD obtained the required regulatory permits and will oversee project construction on private property with landowner agreement. Funding for the project is provided by the New

York City Department of Environmental Protection.

The AWSMP typically restores a large section of stream each year with a primary goal of removing major sources of fine sediment from water flowing into local streams and the Ashokan Reservoir.

Much of the stream program's work engages local landowners and communities in the use of stream best management practices to benefit not only the New Yorkers who rely on the water supply, but the local communities and landowners who suffer when streams are damaged during floods or due to poor management. Many of today's stream restoration sites are addressing problems that evolved out of past actions, such as dredging and straightening channels, combined with the effects of changing precipitation patterns.

To date, the AWSMP has completed 18 stream restoration and hillslope stabilization projects over 3 stream miles in the Ashokan watershed for a total cost of \$15 million.

Esopus Creek News



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**Soil and Water
Conservation District**
PO Box 667, 3130 State Route 28, Shokan, NY 12481
5 Park Lane, Highland, NY 12528



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Ashokan Watershed Stream Management Program
P.O. Box 667, 3130 State Route 28, Shokan, NY 12481
Phone 845-688-3047 • Fax 845-688-3130

EDITORS

Leslie Zucker (laz5@cornell.edu) and Sally Rodgers (ser287@cornell.edu), CCE Ulster County

CONTRIBUTORS

CCE Ulster: Max Kelly, Sally Rodgers and Leslie Zucker

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