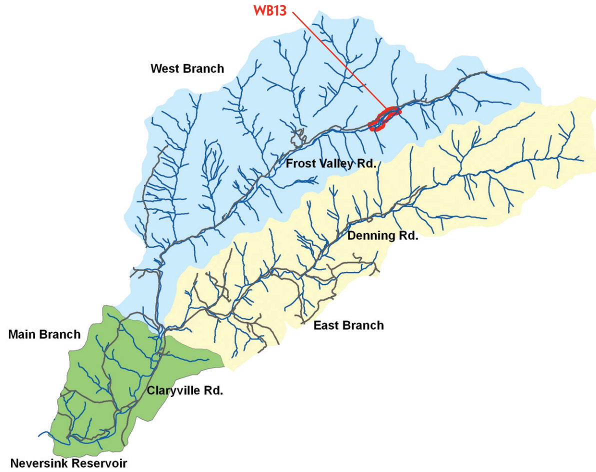
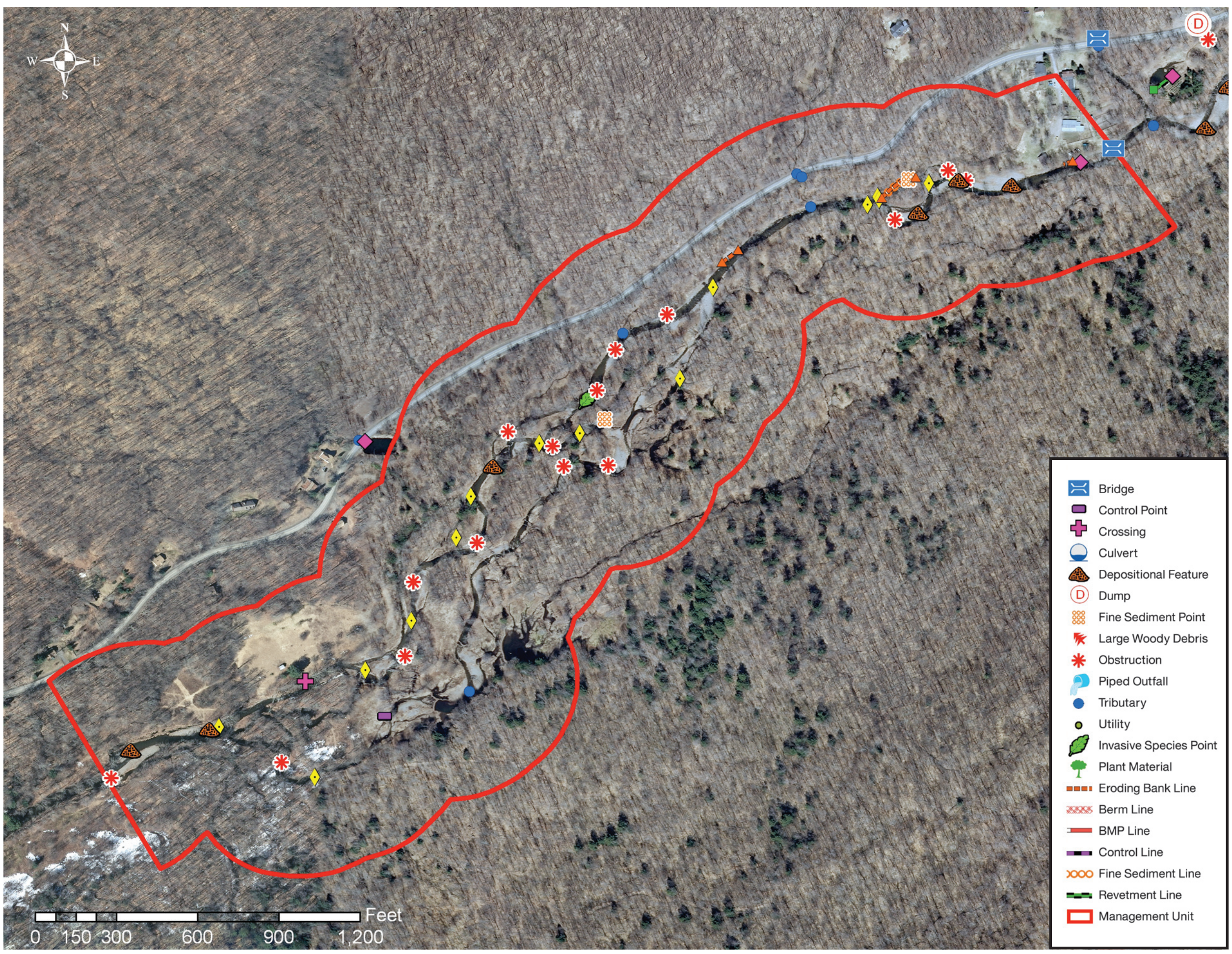
Neversink River West Branch

MANAGEMENT UNIT 13

STREAM FEATURE STATISTICS

- 3.00% of stream length is experiencing erosion
- 0.00% of stream length has been stabilized
- 15.47 acres of inadequate vegetation within the 100 ft. buffer
- None of stream is within 50 ft. of the road
- There are four building structures located within the 100-year floodplain boundary





Stream Feature Inventory 2010 (Figure 1)

Management Unit Description

This management unit begins at a private bridge crossing near Station 54200 and continues 5,100 feet to a valley pinch point near Station 49100. The drainage area ranges from 4.60 mi^2 at the top of the management unit to 7.30 mi^2 at the bottom of the unit. The valley slope is close to 1.53%. The average valley width is 971.46 ft.

Summary of Recommendations West Branch Management Unit 13

Intervention Level	Assisted Restoration of eroding bank segments at Station 54080 (BEMS NWB13_54000) and Station 52525 (BEMS NWB13_52525). Passive restoration of eroding bank segment at Station 53250 (BEMS NWB13_53150). Preservation of braided wetland flats.
Stream Morphology	Protect and maintain sediment storage capacity and floodplain connectivity. Conduct baseline survey of channel morphology.
Riparian Vegetation	Potential riparian buffer improvement areas: From Stn 54200 to Stn 53650; See Figure 7 for additional information.
Infrastructure	None.
Aquatic Habitat	Fish population and habitat survey.
Flood Related Threats	Floodproofing as appropriate. http://www.fema.gov/library/viewRecord.do?id=1420
Water Quality	Maintain household septic systems.
Further Assessment	Include MU13 in comprehensive Local Flood Hazard Mitigation Analysis of Claryville MUs.

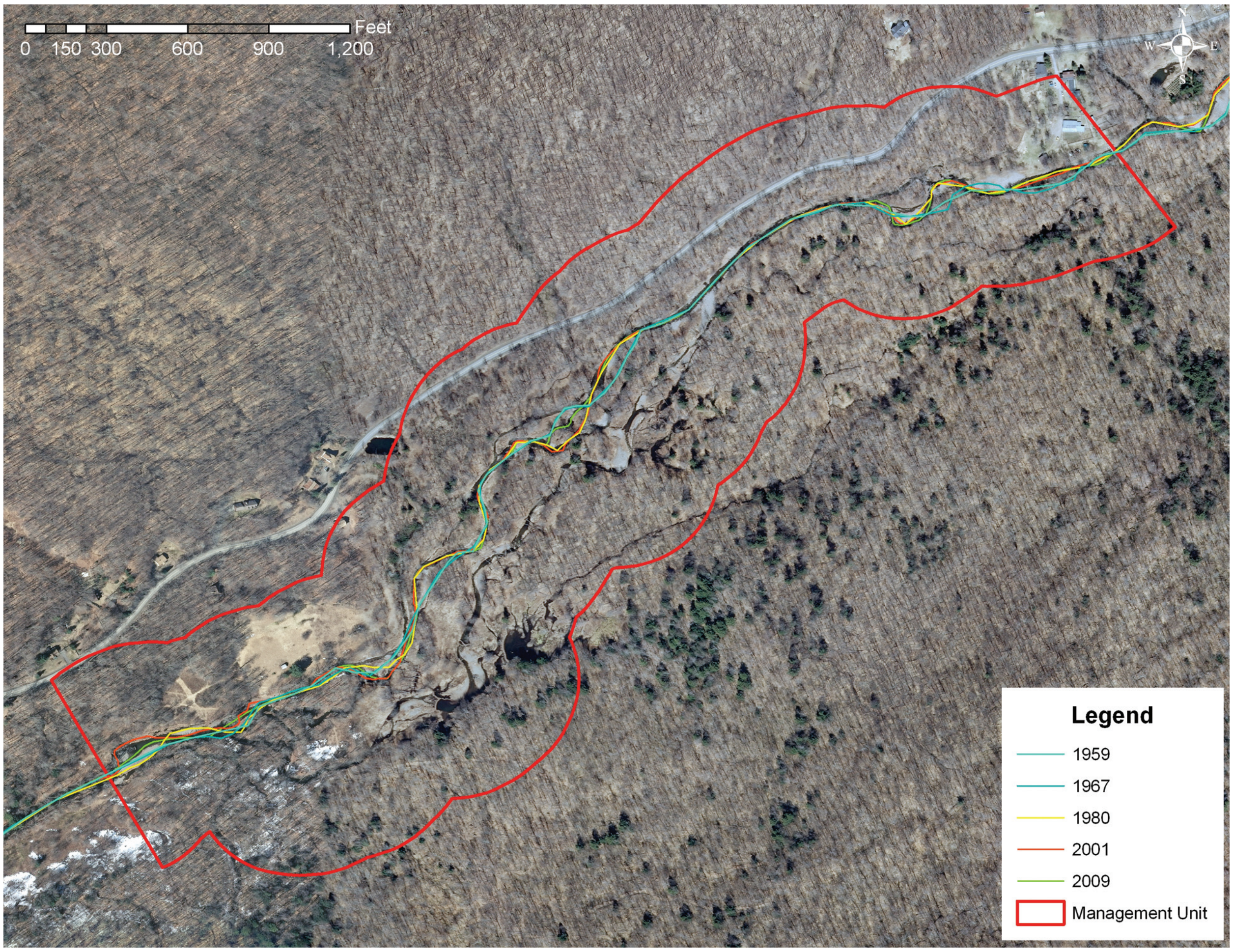
Historic Conditions

As the glaciers retreated about 12,000 years ago, they left their "tracks" in the Catskills. See Section 2.4 *Geology of Upper Neversink River,* for a description of these deposits. These deposits make up the soils in the high banks along the valley walls on the Neversink mainstem and its tributaries. These soils are eroded by moving water, and are then transported downstream by the River. During the periods when the forests of the Neversink watershed were heavily logged for bark, timber, firewood and to make pasture for livestock, the change in cover and the erosion created by timber skidding profoundly affected the Neversink hydrology and drainage patterns.

Excerpt from 1875 Beers Map (Figure 2)

The 1875 Beers Atlas of this area indicates that by that time, the stream had been harnessed for manufacturing, primarily saw mills, woodworking shops and tanneries *(Figure 2)*. Raceways were built in the floodplains to divert water to ponds for use as needed. Floodplains were profoundly altered in the process, as these watercourses also became areas of preferential channelized flow when floodwaters inundated the floodplains. When woody debris jams blocked the primary channels, these raceways sometimes eroded out to become major secondary channels, or even took over the full flow to become a new primary watercourse.

During large runoff events, floodplains adjacent to the confluence of major tributaries receive large slugs of material eroded out of the steep streams draining the valley walls. overwhelmed the Neversink's ability to transport it, creating an alluvial fan. Like changes in the floodplains made by humans, these episodes can result in catastrophic shifts in channel alignment. In the roughly one hundred and twenty centuries since the retreat of the glaciers, the position of Neversink River has moved back and forth across its floodplain numerous times in many locations. In this management unit, this process has resulted in a relatively low valley slope, and a large wetland flat in much of the unit, with extensive channel braiding and beaver dams. A comparison of historical channel alignments *(Figure 3, following page)* and in-stream observations made during a stream feature inventory in 2010 *(Figure 1, page 1)* indicate significant lateral channel instability. According to records available from the NYSDEC DART database no NYS Article 15 stream disturbance permits have been issued in this management unit. These permits pertain to activities which have the potential to significantly impact stream function, such as bank stabilization, stream crossings, habitat enhancement, and logging practices. database (**http://www.dec.ny.gov/cfmx/extapps/envapps/**).



Historical channel alignments from five selected years (Figure 3)

Stream Channel and Floodplain Current Conditions

The following description of stream morphology references stationing in the foldout Figure 4. "Left" and "right" references are oriented looking downstream, photos are also oriented looking downstream unless otherwise noted. Stationing references, however, proceed upstream, in feet, from an origin (Station 0) at the confluence with the Neversink Reservoir. Italicized terms are defined in the glossary. This characterization is the result of surveys conducted in 2010.

WBMU13 begins at a private timber footbridge that crosses the main channel near Station 52400 connecting an emu and ostrich farm on the right bank to the New York State land on the left bank. According to the landowner at the site, this bridge has washed out three times in the past ten years. This was corroborated by evidence of former bridge components (timbers and decking) in the banks and beds

Left bank actively eroding (B793)

Irrigation piping for nearby farm (B790)

Washed out bridge obstructing flow (A915)

downstream. Three of the structures associated with the farm complex are within the FEMA-mapped 100-year floodplain at this location.

150 feet downstream of the bridge a water intake pipe for farm operations was observed on the left bank directly upstream of an active 35-foot long eroding bank segment on the right bank (BEMS NWB13_54000). *(B793, B790)* This eroding bank segment was documented as active with undercut banks caused by hydraulic erosion. Although evidence of hardening and vegetation at the tow of the bank was observed, the lack of riparian buffer indicates that the erosion at the top of the bank will continue during high flow events. Recommendations for this site include *assisted restoration* using bioengineering techniques to stabilize the eroding bank and re-establish a healthy riparian buffer.

A sediment storage reach begins near Station 53800 with a cobble side bar continuing downstream to a series of woody obstructions and divergences of side channels that begin near Station 53550. There is a transverse bar located at Station 53600 directly upstream of timber debris from the washed-out footbridge upstream. On the left bank at Station 53550 a large downed tree was observed on the right bank that has cut off flow toward the right bank and forced movement of the main channel towards the left bank at this location. *(A915, A916)*

The 1959 stream alignment (Figure 3, above) in this location features fewer meander bends in the main channel, which was located near the left bank in this location. It is likely that the main channel has migrated throughout the valley floor in this location shaped by the sediment deposition pattern formed by flood events and large woody debris jams formed by the ample woody supply from the steep forest valley slopes upstream.

Large woody debris piles and sediment deposition areas were observed throughout the floodplain and side channels in this area indicating that the entire width of the valley floor is inundated and conveys flow during high flow events. This is further evidenced by an eroding bank segment observed on a side channel extending 150 feet from Station 53250 to Station 53150 (BEMS NWB13_53150). This bank site was documented as active with undercutting of trees on the top of the bank exposing stratified alluvial materials underneath a layer of sand and glacial till. This exposed sand was documented as a fine sediment source, although it is not a significant source of turbidity. *(A922)*

As evidenced by the adjustment in channel alignment throughout this segment of the river, this is a sediment storage reach, prone to extensive gravel deposits and lateral migration. In addition, this eroding bank segment is separated from the road by a thick forested bank and unlikely to be a major source of turbidity. It is recommended that this bank be allowed to revegetate and stabilize without treatment (*passive restoration*). However, it is recommended that this site be monitored for changes in condition.

The two side channels flowing through the right floodplain converge with the main channel near Station 53100. *(A926)* Approximately 200 feet downstream near Station 52900 an intermittent tributary joins the main conveying flow from Frost Valley Road and the right valley wall. An eroding bank segment was observed 300 feet downstream on the right bank extending 75 feet from Station 52600 to Station 52525 (BEMS NWB13_52525).

Downed tree cutting off flow to right bank (A916)

Stratified eroding bank (A922)

Two side channels converging with main channel (A926)

This eroding bank segment was documented as an active mass failure site caused by a combination of surficial piping and hydraulic erosion that is a likely source of fine source but not a significant source of turbidity.

Bank failure site (B808)

Recommendations for this site include further investigation of the cause of the bank failure, specifically an investigation of upslope drainage from Frost Valley Road and possible re-routing of drainage to converge with the main channel in a less sensitive location. Hardening and some vegetation was observed at the toe, so it likely that if the surficial piping is mitigated the bank will stabilize and revegetate without treatment (*passive restoration*). *(B808)*

The divergence of a dry cobble-bed side channel from the main channel was observed near Station 52420, slightly upstream of the transition from private land to New York State land, in "forever wild" status, at approximately Station 52260; no recommendations are made for lands in forever wild status. *(C100)*

Braided shrub wetlands in WBMU13, aerial view (C100)

Side channels forming forested shrub wetland (B819)

Downstream of this location the floodplain widens considerably as the main channel continues to flow adjacent to a terrace on the right bank and while multiple side channels diverge to the left, forming a forested shrub wetland braided with side channels, flood chutes, and woody debris piles formed during high flow events. *(B819, B826, A938)*

Woody debris pile (B826)

This channel form continues downstream onto Frost Valley YMCA land beginning at Station 51300, although the main channel meanders more towards the middle of the valley floor, resulting in the formation of braided shrub floodplains and emergent wetlands on both banks. A tributary was observed joining a side channel flowing adjacent to the left bank near Station 50400. The left floodplain in particular is riddled with control points formed by beaver dams, which lead to large open pools amongst shrubs and wetland vegetation. *(B840)*. The valley floor narrows near Station 49800 as the main channel crosses back onto New York State land. All of the side channels from both banks converge with the main channel near Station 49600. *(B850)*

Braided side channel (A938)

Beaver dam in left floodplain (B840)

Convergence of side channels with main channel (B850)

Root wad forming scour pool in main channel (A962)

Transverse bar directing flow towards bank (B961)

A transverse bar was observed at Station 49520 which was directing flow towards bank scour on the low bankfull bench slightly downstream, and a cobble side bar was observed on the left bank near Station 49230.

MUWB13 ends at Station 49100 with a root wad forming a scour pool in the main channel. *(A962, B961)*

Sediment Transport

Streams move sediment as well as water. Channel and floodplain conditions determine whether the reach aggrades, degrades, or remains in balance over time. If more sediment enters than leaves, the reach aggrades. If more leaves than enters, the stream degrades. (See Section 3.1 for more details on Stream Processes).

This management unit is largely a sediment storage reach where the river conveys flow in the main channel and via flood chutes and side channels braided across the entire valley floor. Storage reaches act as a "shock absorber", holding *bedload* delivered during large flow events in depositional bars and releasing it slowly over time in more moderate flood events. These depositional areas are very dynamic, with frequent lateral channel migration through bank erosion, *avulsions* and woody debris accumulations. The densely forested portion of the watershed within this management unit serves as a continuous source of large woody material that is transported downstream and deposited during flood events. This large woody debris often serves as an obstruction to sediment transport, resulting in the aggradation of bed material. Sediment storage reaches can result from natural conditions, like the widening valley floor and decreased channel slope as is the case in this management unit or as the unintended consequence of poor bridge design, check dams or channel overwidening. This is one process by which floodplains are created and maintained. Healthy undeveloped floodplains throughout the Neversink watershed like the floodplains and emergent wetlands formed throughout WBMU13, reduce the velocity of higher flows thereby mitigating the threat of stream bank erosion and property damage during flood events.

To better understand sediment transport dynamics of this section of the Neversink, a baseline survey of channel form and function is recommended for this management unit.

Riparian Vegetation

One of the most cost-effective methods for landowners to protect streamside property is to maintain or replant a healthy buffer of trees and shrubs along the bank, especially within the first 30 to 50 ft. of the stream. A dense mat of roots under trees and shrubs bind the soil together, and makes it much less susceptible to erosion under flood flows. Mowed lawn does not provide adequate erosion protection on stream banks because it typically has a very shallow rooting system. Interplanting with native trees and shrubs can significantly increase the working life of existing rock rip-rap placed on stream banks for erosion protection. Riparian, or streamside, forest can buffer and filter contaminants coming from upland sources or overbank flows. Riparian plantings can include a great variety of flowering trees and shrubs, native to the Catskills, which are adapted to our regional climate and soil conditions and typically require less maintenance following planting and establishment.

Some plant species that are not native can create difficulties for stream management, particularly if they are invasive. Japanese knotweed (Fallopia japonica), for example, has become a widespread problem in recent years. Knotweed shades out other species with it's dense canopy structure (many large, overlapping leaves), but stands are sparse at ground level, with much bare space between narrow stems, and without adequate root structure to hold the soil of stream banks. The result can include rapid stream bank erosion and increase surface runoff impacts. There were no occurrences of Japanese knotweed documented in this management unit during the 2010 inventory.

An analysis of vegetation was conducted using aerial photography from 2009 and field inventories *(Figure 5)*. In this management unit the predominant vegetation type within the riparian buffer is deciduous closed tree canopy (75.08 %) followed by herbaceous vegetation (10.95%). *Impervious* area makes up 1.93% of this unit's buffer. There are 13.38 acres of potential buffer improvement area in this management unit *(Figure 7)*. No occurrences of Japanese knotweed were documented in this management unit during the 2010 inventory.

There are 3.52 acres of wetland (3.69% of WBMU13 land area) within this management unit mapped in the National Wetland Inventory as three classifications (see Section 2.5, *Wetlands and Floodplains* for more information on the National Wetland Inventory and wetlands in the Neversink watershed). Wetlands are important features in the landscape that provide numerous beneficial functions including protecting and improving water quality, providing fish and wildlife habitats, storing floodwaters, and maintaining surface water flow during dry periods (See Section 2.5 for wetland A type descriptions and regulations). The wetland classified as Freshwater Forested Shrub is 2.37 acres in size, the wetland classified as Freshwater Pond is 0.13 acres in size, and the wetland classified as Freshwater Emergent is 1.02 acres in size.

Flood Threats

INUNDATION As part of its National Flood Insurance Program (NFIP), the Federal Emergency Management Agency (FEMA) performs hydrologic and hydraulic studies to produce Flood Insurance Rate Maps (FIRM), which identify areas prone to flooding. The upper Neversink River is scheduled to have its FIRMs updated with current surveys and hydrology and hydraulics analysis in the next few years, and the mapped boundaries of the 100-year floodplain are likely to change. There are four structures in WBMU13 within the 100-year floodplain as identified on the FIRM maps. FEMA provides guidance to homeowners on floodproofing at: **http://www.fema.gov/library/viewRecord.do?id=1420**

BANK EROSION Three areas of erosion were documented in the management unit during the stream feature inventory. An active 35-foot long eroding bank segment on the right bank near

Station 54080 (BEMS NWB13_54000). Recommendations for this site include *assisted restoration* using bioengineering techniques to re-establish a healthy riparian buffer and stabilize the eroding bank.

A second eroding bank segment was observed on a side channel extending 150 feet from Station 53250 to Station 53150 (BEMS NWB13_53150). This bank site was documented as active with undercutting of trees on the top of the bank exposing stratified alluvial materials underneath a layer of sand and glacial till. This exposed sand was documented as a fine sediment source, although it is not a significant source of turbidity. Due to the location of this site and conditions at the top of the bank, it is recommended that this bank be allowed to revegetate and stabilize without treatment (*passive restoration*). However, it is recommended that this site be monitored for changes in condition.

The final eroding bank segment in WBMU13 was observed on the right bank extending 75 feet from Station 52600 to Station 52525 (BEMS NWB13_52525). This eroding bank segment was documented as an active mass failure site caused by a combination of surficial piping and hydraulic erosion that is a likely source of fine source but not a significant source of turbidity. Recommendations for this site include further investigation of the cause of the bank failure, specifically an investigation of upslope drainage from frost Valley Road and possible re-routing of drainage to converge with the main channel in a less sensitive location.

INFRASTRUCTURE None of the stream bank length in this management unit has been treated with revetment and there were no berms documented in this management unit.

Aquatic Habitat

Aquatic habitat is one aspect of the Neversink River ecosystem. While ecosystem health includes a broad array of conditions and functions, what constitutes "good habitat" is specific to individual species. When we refer to aquatic habitat, we often mean fish habitat, and specifically trout habitat, as the recreational trout fishery in the Catskills is one of its signature attractions for both residents and visitors. Good trout habitat, then, might be considered one aspect of "good human habitat" in the Neversink River valley.

Even characterizing trout habitat is not a simple matter. Habitat characteristics include the physical structure of the stream, water quality, food supply, competition from other species, and the flow regime.

The particular kind of habitat needed varies not only from species to species, but between the different ages, or life stages, of a particular species, from eggs just spawned to juveniles to adults.

New York State Department of Environmental Conservation (DEC) classifies the surface waters in New York according to their designated uses in accordance with the Clean Water Act. The following list summarizes those classifications applicable to the Neversink River.

1. The classifications A, AA, A-S and AA-S indicate a best usage for a source of drinking water, swimming and other recreation, and fishing.
2. Classification B indicates a best usage for swimming and other recreation, and fishing.
3. Classification C indicates a best usage for fishing.
4. Classification D indicates a best usage of fishing, but these waters will not support fish propagation.

Waters with classifications AA, A, B and C may be designated as trout waters (T) or suitable for trout spawning (TS). These designations are important in regards to the standards of quality and purity established for all classifications. See the DEC Rules & Regulations and the Water Quality Standards and Classifications page on the NYSDEC web site for information about standards of quality and purity.

In general, trout habitat is of a high quality in the Neversink River. The flow regime above the reservoir is unregulated, the water quality is generally high (with a few exceptions, most notably low pH as a result of acid rain; see Section 3.1, *Water Quality*), the food chain is healthy, and the evidence is that competition between the three trout species is moderated by some *partitioning* of available habitat among the species. The mainstem in WBMU13 has been given a "C(T)" class designation with best usage for fishing, and indicating the presence of trout. Trout spawning likely occurs in this management unit, but has not yet been documented in the DEC classification.

Channel and floodplain management can modify the physical structure of the stream in some locations, resulting in the filling of pools, the loss of stream side cover and the homogenization of structure and hydraulics. As physical structure is compromised, inter-species competition is increased. Fish habitat in this management unit appears to be relatively diverse.

It is recommended that a population and habitat study be conducted on the Neversink River, with particular attention paid to temperature, salinity, riffle/pool ratios and quality and in-stream and canopy cover.

Water Quality

The primary potential water quality concerns in the Neversink as a whole are the contaminants contributed by atmospheric deposition (nitrogen, sulfur, mercury), those coming from human uses (nutrients and pathogens from septic systems, chlorides (salt) and petroleum by-products from road runoff, and suspended sediment from bank and bed erosion. Little can be done by stream managers to mitigate atmospheric deposition of contaminants, but good management of streams and floodplains can effectively reduce the potential for water quality impairments from other sources.

Storm water runoff can have a considerable impact on water quality. When it rains, water falls on roadways and flows untreated directly into the Neversink River. The cumulative impact of oil, grease, sediment, salt, litter and other unseen pollutants found in road runoff can significantly degrade water quality. There several piped outfalls that convey storm water runoff into the right floodplain of the Neversink River from Frost Valley Road in this management unit.

Sediment from stream bank and channel erosion pose a potential threat to water quality in the Neversink River. Clay and sediment inputs into a stream may increase *turbidity* and act as a carrier for other pollutants and pathogens. There are two bank erosion sites in WBMU13 that is a potential minor source of fine sediment. None of the sites represent a significant source of turbidity.

Nutrient loading from failing septic systems is another potential source of water pollution. Leaking septic systems can contaminate water making it unhealthy for swimming or wading. Four building structures are located in relatively close proximity to the stream channel in this management unit. These homeowners should inspect their septic systems annually to make sure they are functioning properly. Each household should be on a regular septic service schedule to prevent over-accumulation of solids in their system. Servicing frequency varies per household and is determined by the following factors: household size, tank size, and presence of a garbage disposal. Pumping the septic system out every three to five years is recommended for a three-bedroom house with a 1,000-gallon tank; smaller tanks should be pumped out more often.

The New York City Watershed Memorandum of Agreement (MOA) allocated 13.6 million dollars for residential septic system repair and replacement in the West-of-Hudson Watershed through 2002, and the program was refunded in 2007. Systems eligible included those that are less than 1,000-gallon capacity serving one-or-two family residences, or home and business combinations, less than 200 feet from a watercourse. Permanent residents are eligible for 100% reimbursement of eligible costs; second homeowners are eligible for 60% reimbursement. For more information, call the Catskill Watershed Corporation at 845–586–1400, or see **http://www.cwconline.org/programs/septic/septic_article_2a.pdf**.

Community Comments
Fall 2012

A headcut was noted at Station 53200.