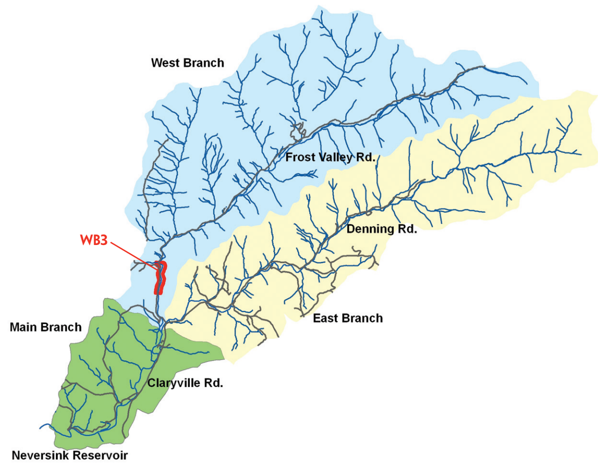
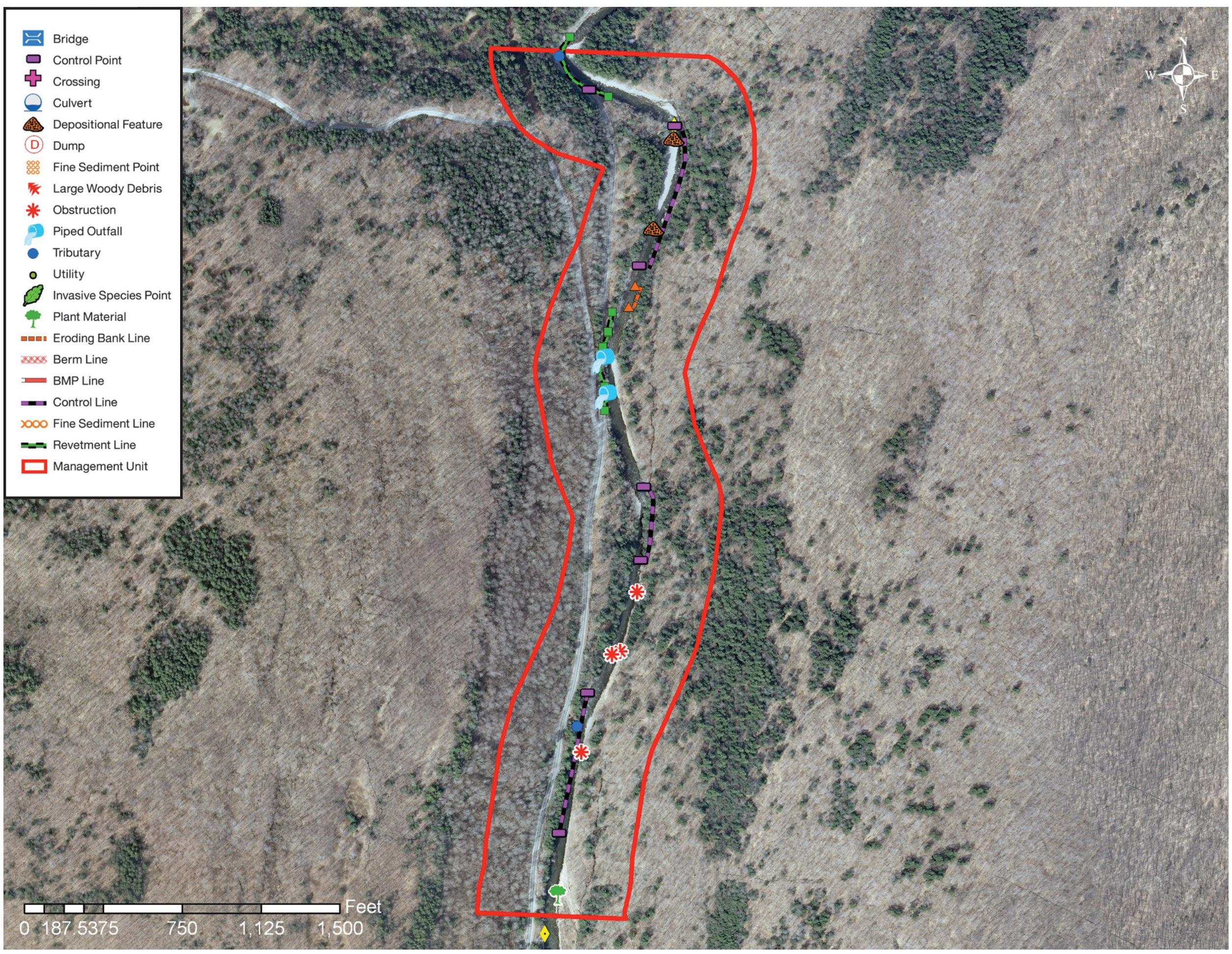
Neversink River West Branch

MANAGEMENT UNIT 3

STREAM FEATURE STATISTICS

- 1.00% of stream length is experiencing erosion
- 8.99% of stream length has been stabilized
- 6.15 acres of inadequate vegetation within the 100 ft. buffer
- 400 feet of stream is within 50 ft. of the road
- No building structures are located within the 100-year floodplain boundary





Stream Feature Inventory 2010 (Figure 1)

Management Unit Description

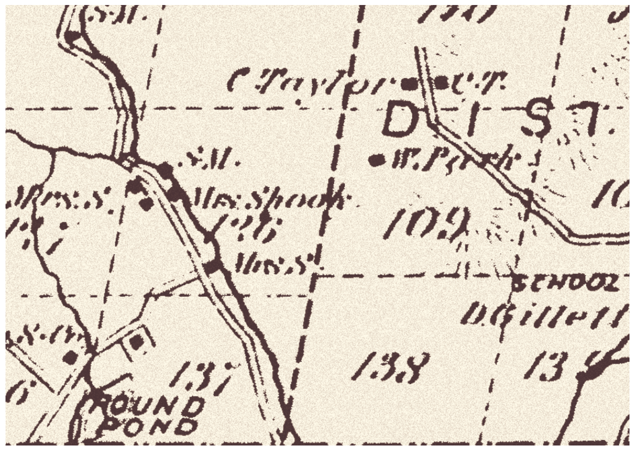
This management unit begins where at the confluence with Round Pond Brook near Station 10300, continuing approximately 4,500 ft. to a confined valley point slightly downstream of a stretch of exposed bedrock on the right bank near Station 5700. The drainage area ranges from 32.50 mi^2 at the top of the management unit to 33.50 mi^2 at the bottom of the unit. The valley slope is close to 1.04%. The average valley width is 340.26 ft.

Summary of Recommendations West Branch Management Unit 3

Intervention Level	Passive restoration of the bank erosion from Station 8800 to Station 8700. (BEMS NWB3_8700).
Stream Morphology	Protect and maintain sediment storage capacity and floodplain connectivity. Conduct baseline survey of channel morphology.
Riparian Vegetation	Investigate and evaluate 2.57 acres of potential riparian buffer improvement areas for future buffer restoration. Potential riparian buffer improvement areas were observed from Station 10300 to Station 10100 and Station 8470 to Station 8300 (Figure 7).
Infrastructure	Inspect revetment beginning at Station 10300 on the right bank for scour that could lead to structural instability.
Aquatic Habitat	Fish population and habitat survey.
Flood Related Threats	None.
Water Quality	Investigation of water quality impacts of water conveyed via piped outfalls at Station 8450 and Station 8280.
Further Assessment	Include MU3 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.

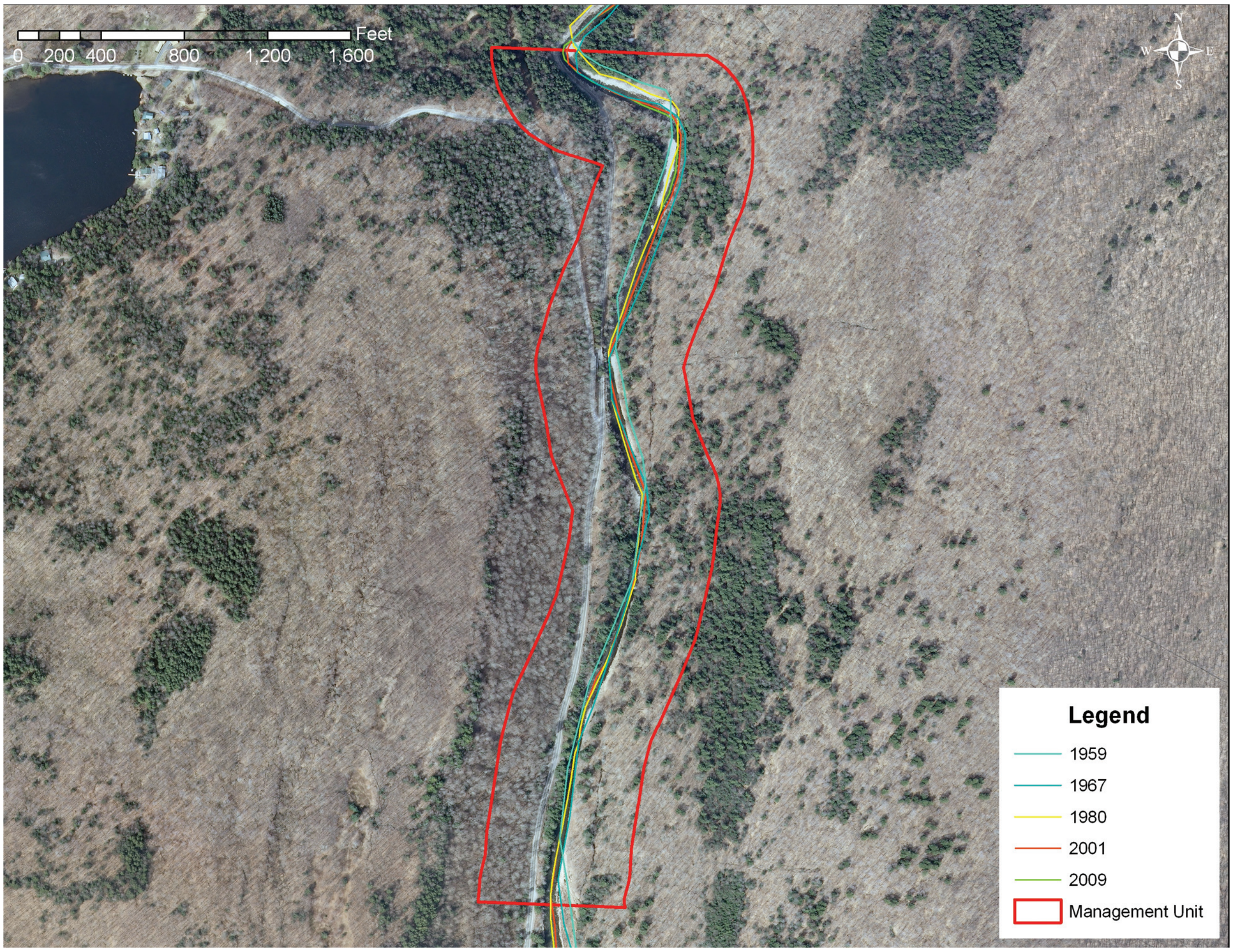


Excerpt from 1875 Beers Map (Figure 2)

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.

According to the map of Forest Industries in the Catskills and the associated descriptions included in *The Catskill Forest: A History* by Michael Kudish (Purple Mountain Press, 2000), Milton Shook owned a sawmill that was formerly located on the right bank slightly downstream of the Round Pond outlet brook.

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. 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 some lateral channel instability. According to records available from the NYSDEC DART database two 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.

WBMU3 begins as the main channel flows away from Frost Valley Road in a sharp meander toward the left valley wall. A stacked rock revetment was observed protecting Frost Valley Road for the first 330 feet of the management unit beginning near Station 10300 and continuing to Station 9970. Portions of this revetment were identified as potential riparian buffer improvement areas *(Figure 7)* The last 80 feet of the revetment is constructed of dumped stone and rip rap. The brook outlet from Round Pond is conveyed through two 48-inch diameter smooth steel pipes through this revetment near Station 10280. *(A282)* The revetment was documented in good structural and functional condition although deposition on the left bank appeared to be directing flow toward the revetment, which could be causing scour below the water level. It is recommended that this revetment be inspected for structural stability. *(A286)*

Stacked rock revetment protecting Frost Valley Road (A282)

Near Station 9620 the main channel begins to flow adjacent to the left valley wall. An intermittent tributary was observed joining the main channel at Station 9600 conveying flow from the left valley wall. A headcut was also observed near Station 9600. Downstream of the head cut the main channel takes a sharp turn to the west, flowing in a straight channel confined by the valley wall on both banks for most of the management unit. *(A291)*

Dumped stone and rip rap revetment (A286)

Exposed bedrock was observed forming a lateral and grade control on the left bed and bank of the main channel from Station 9640 to Station 8900. Across from the bedrock a 60-foot side cobble side bar was observed on the right stream bed, extending 450 feet to Station 9100. *(A293, A294)*

Headcut in main channel (A291)

Lateral and grade bedrock control (A293)

An inactive eroding bank segment was observed on the left bank terrace from Station 8800 to Station 8700. (BEMS NWB3_8700) This bank site was documented as originally caused by hydraulic erosion and fluvial entrainment but it has since been stabilized by hemlock and birch growth on the top of the bank. It is recommended that this bank be left to further revegetate and stabilize without treatment (*passive restoration*) and that the site be monitored for changes in condition. *(A300)*

Cobble side bar on right stream bed (A294)

At Station 8600 the main channel begins to flow within 50 feet of Frost Valley Road, eventually flowing directly adjacent to Frost Valley Road at Station 8450. A revetment constructed of varying materials on the right bank extends 500 feet from Station 8680 to Station 8180. The beginning 100 feet of the revetment are constructed of stone gabion baskets, and the remainder is constructed of stacked rock revetment on a concrete and bedrock foundation. The revetment was documented in good structural and functional condition. *(A302)* Portions of this revetment between Station 8470 and Station 8300 are potential riparian buffer improvement areas.

Inactive eroding bank segment on left bank terrace (A300)

Stacked rock revetment on concrete and bedrock foundation (A302)

Piped outfall conveying flow from right valley wall (A304)

Two piped outfalls conveyed flow from the right valley wall through the revetment wall to the main channel. The first, located near Station 8450, was constructed of a 12-inch diameter smooth steel pipe with a 4-foot outfall and good outfall protection. *(A304)* The second, located at Station 8280, is constructed of a 12-inch diameter plastic pipe with a 5-foot outfall and good outfall protection. *(A308)* It is recommended that the water quality impacts of this outfall be investigated to better understand and possibly mitigate the water quality implications of this conveyance.

Piped outfall conveying fall from right valley wall (A308)

Downstream of the revetment the main channel no longer flow adjacent to Frost Valley Road, with a this forested buffer between the road and the channel for the rest of WBMU3. Exposed bedrock was observed on the left bank from Station 7800 to Station 7460. This bedrock is acting as a planform control, constraining lateral migration of the main channel at this location. In intermittent tributary conveying flow from the left valley wall over the bedrock was observed near Station 7800. *(A310)* Two large boulder obstructions were observed in the main channel near Station 7000, and more exposed bedrock forming a planform

Exposed bedrock on left valley wall (A310)

Boulder and bedrock planform control (A318) control was observed on the right bank from Station 6800 to Station 6130. An intermittent seep was observed flowing over this exposed bedrock near Station 6620. *(A318, P7290172)*

The remainder of the main channel in WBMU3 is a relatively straight channel with some deposition with willow, sedge and grass growth on depositional bar on the left bank, and a thick riparian forest on the right bank between the main channel and the road.

WBMU3 ends at Station 5700.

Intermittent seep flowing over bedrock (P7290172)

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 contains both sediment storage reaches and sediment transport reaches where the confined channel conditions prevent sediment deposition. The 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 upstream of 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 near the meander at the top of WBMU3 reduce the velocity of higher flows thereby mitigating the threat of stream bank erosion and property damage during flood events.

The majority of the river in WBMU3 is confined by the bedrock or high banks on both sides leaving no accessible floodplain for sediment deposition and storage. These sections of the river act as transport reaches. Transport reaches are in a state of *dynamic equilibrium,* effectively conveying sediment supplied from upstream during each flow event.

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 (59.78 %) followed by mixed closed tree canopy (21.11%). *Impervious* area makes up 5.38% of this unit's buffer. No occurrences of Japanese knotweed were documented in this management unit during the 2010 inventory.

There are 2.84 acres of wetland (3.88% of WBMU3 land area) within this management unit mapped in the National Wetland Inventory as two distinct 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 Riverine is 1.15 acres in size and the wetland classified as Freshwater Forested Shrub is 1.69 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 no structures WBMU3 within the 100-year floodplain as identified on the FIRM maps.

BANK EROSION One area of erosion was documented in the management unit during the stream feature inventory.

An inactive eroding bank segment was observed on the left bank terrace from Station 8800 to Station 8700. (BEMS NWB3_8700) This bank site was documented as originally caused by hydraulic erosion and fluvial entrainment but it has since been stabilized by hemlock and birch growth on the top of the bank. It is recommended that this bank be left to further revegetate and stabilize without treatment (*passive restoration*) and that the site be monitored for changes in condition.

INFRASTRUCTURE A stacked rock revetment was observed protecting Frost Valley Road for the first 330 feet of the management unit beginning near Station 10300 and continuing to Station 9970. The last 80 feet of the revetment is constructed of dumped stone and rip rap. The brook outlet from Round Pond is conveyed through two 48-inch diameter smooth steel pipes through this revetment near Station 10280. The revetment was documented in good structural and functional condition although deposition on the left bank appeared to be directing flow toward the revetment, which could be causing scour below the water level. It is recommended that this revetment be inspected for structural stability.

A revetment constructed of varying materials on the right bank extends 500 feet from Station 8680 to Station 8180. The beginning 100 feet of the revetment are constructed of stone gabion baskets, and the remainder is constructed of stacked rock revetment on a concrete and bedrock foundation. The revetment was documented in good structural and functional condition.

No berms were 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 usses 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 WBMU3 has been classified as "C(T)" connoting 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 are two piped outfalls that convey storm water runoff directly into the Neversink River in this management unit through the revetment wall at the top of the management unit to the main channel. The first, located near Station 8450, was constructed of a 12-inch diameter smooth steel pipe with a 4-foot outfall and good outfall protection. The second, located at Station 8280, is constructed of a 12-inch diameter plastic pipe with a 5-foot outfall and good outfall protection. It is recommended that the water quality impacts of this outfall be investigated to better understand and possibly mitigate the water quality implications of this conveyance.

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 is one bank erosion site in WBMU3 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 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

"Serious concerns about the proximity of the road to the stream around Round Pond outlet"