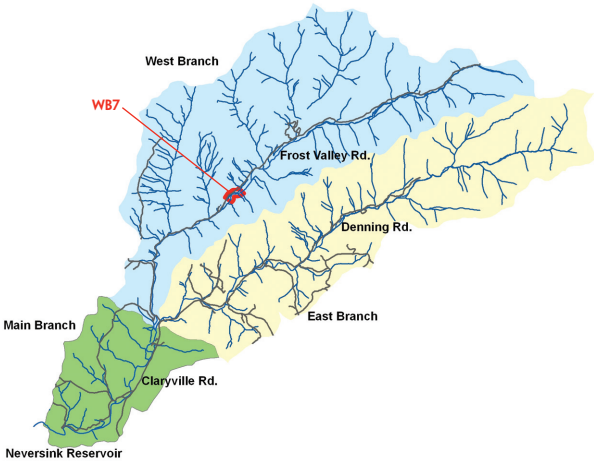
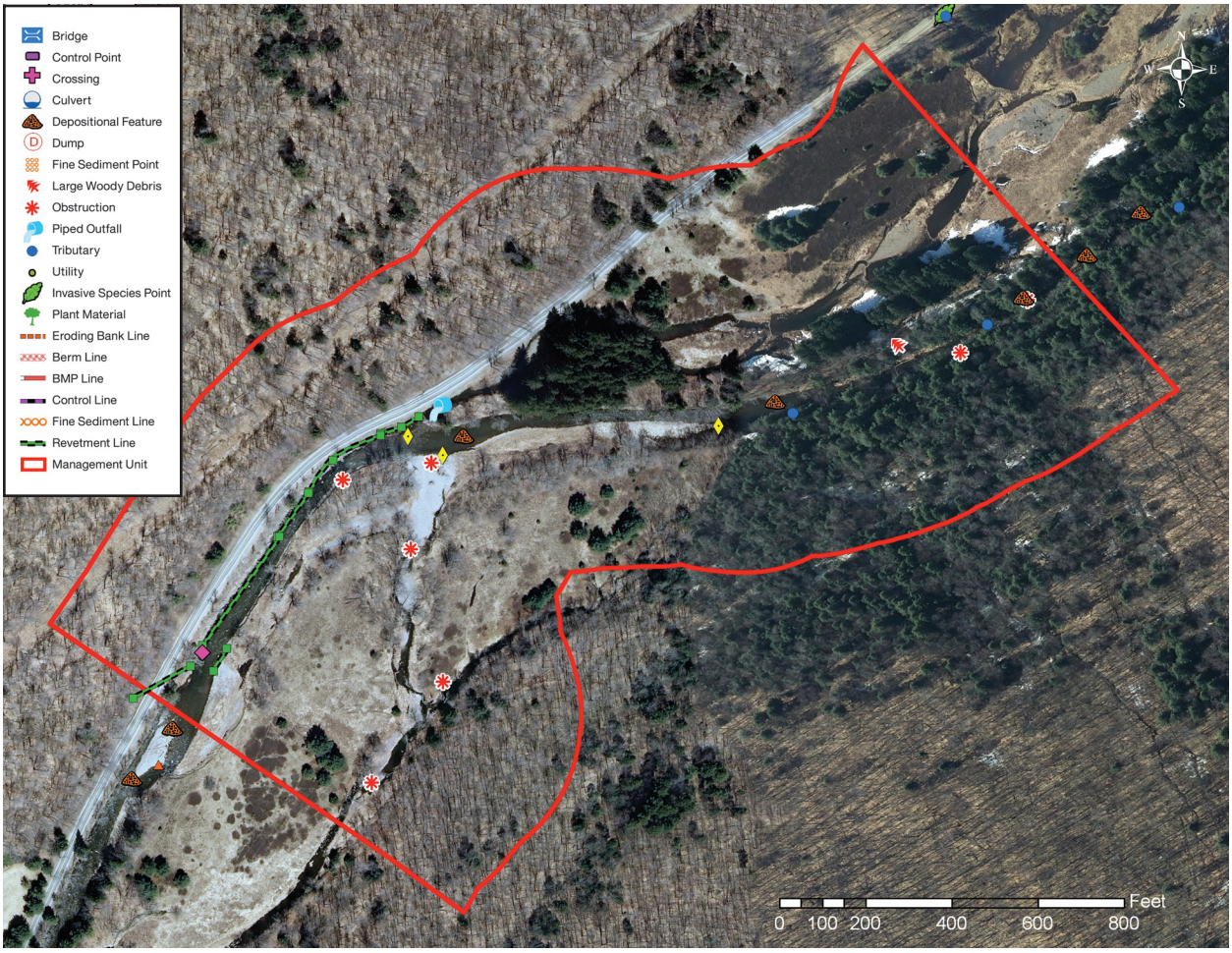
Neversink River West Branch

MANAGEMENT UNIT 7

STREAM FEATURE STATISTICS

- 0.00% of stream length is experiencing erosion
- 19.67% of stream length has been stabilized
- 4.74 acres of inadequate vegetation within the 100 ft. buffer
- 900 feet of stream is within 50 ft. of the road
- No structures are located within the 100-year floodplain boundary





Stream Feature Inventory 2010 (Figure 1)

Management Unit Description

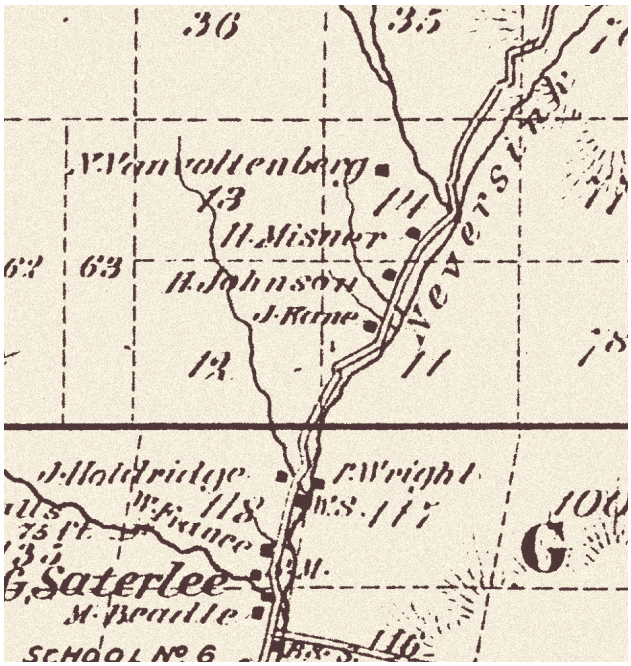
This management unit begins at a wide point in the valley slightly upstream of a reach where the river flows adjacent to Frost Valley Road at Station 27500, continuing approximately 2,400 ft. to the end of a revetment adjacent to Frost Valley Road at Station 25000. The drainage area ranges from 22.20 mi^2 at the top of the management unit to 22.90 mi^2 at the bottom of the unit. The valley slope is close to 1.28%. The average valley width is 672.83 ft.

Summary of Recommendations West Branch Management Unit 7

Intervention Level	Further investigation of past management of the management unit to better understand purpose and functionality of infrastructure.
Stream Morphology	Protect and maintain sediment storage capacity and floodplain connectivity. Conduct baseline survey of channel morphology.
Riparian Vegetation	Investigate and evaluate 3.50 acres of potential riparian buffer improvement areas for future buffer restoration. Potential riparian buffer improvement sites between Station 26500 and Station 25000 (Figure 7).
Infrastructure	Further investigation of the management history and possible restoration of the structures in the reach from Station 25330 to 25000 to ensure functionality.
Aquatic Habitat	Fish population and habitat survey.
Flood Related Threats	None.
Water Quality	Investigation of water quality impacts of piped outfall at Station 25900.
Further Assessment	Long-term monitoring of erosion sites.

Historic Conditions

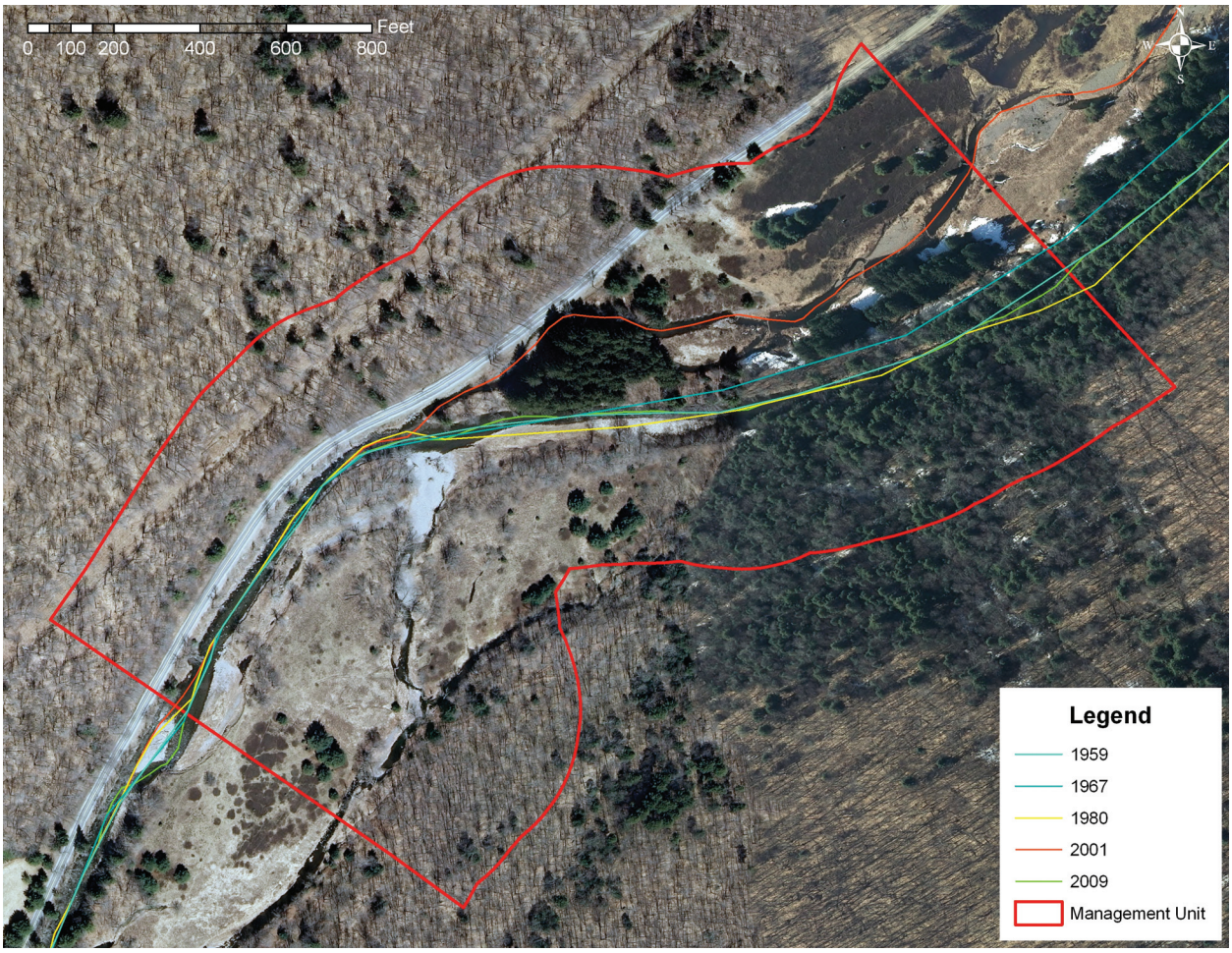
As the glaciers retreated about 12,000 years ago, they left their "tracks" in the Catskills. See Section 2.4 *Geology of Upper Neversink River,* for a description of these deposits. These deposits make up the soils in the high banks along the valley walls on the Neversink mainstem and its tributaries. 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. 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.

WBMU7 begins at Station 27500 where the main channel is flowing adjacent to the valley wall. The left bank for this management unit is New York State land in the Catskill Preserve in "forever wild" status and so are not managed. Similar to channel conditions in WBMU10, the river is semi-confined in this management unit with confinement on the left bank by the left valley wall and open floodplain with

riparian forest and wetland on the right bank. A side channel, recorded as the main channel in the 2001 channel alignment, which diverged from the main channel in WBMU8 continues to meander through the right floodplain for the majority of this management unit, converging with the main channel at Station 25800.

Upstream of this convergence the main channel is a sediment storage reach with several depositional features including a side bar on the right bed continuing from WBMU8 which ends at Station 27320 and full channel aggradation documented at Station 26700. *(A82)* Large woody debris piles were documented on the forest floodplain between in the main channel and the side channel near Station 27000, indicating that the floodplain likely conveys flow during high flow events. *(A83)*. An intermittent tributary conveying flow from the left valley wall joins the main channel near Station 26700.

Near Station 26550 the left valley wall curves to the south leaving some open forested floodplain on the left bank, and main channel splits around a vegetated center island with the majority of the flow on the right near Station 26550. *(A84)* The side channel continues south along a terrace on the left, continuing through the end of WBMU7. At Station 25900 another depositional bar was observed in the main channel and a dry side channel diverges into the floodplain on the left bank. This side channel converges with the channel flowing along the terrace approximately 500 feet downstream of the convergence, eventually flowing adjacent to the left valley wall through the end of WBMU7. There were some beaver dams observed acting as stream bed grade controls and forming pools throughout these side channels, and several large woody debris jams were observed throughout the left floodplain and these side channels

Side bar along right bed and full channel aggradation (A82)

Large woody debris piles in forest floodplain (A83)

Vegetated center island (A84)

Large woody debris jam (P7280018)

Beaver dam (P7280008)

Piped outfall conveying flow into side channel (A85)

indicated that the floodplain is innundated during high flow events. *(P7280018, P7280008)* Several sites consisting of herbaceous vegetation or bare soil between Station 26500 and Station 25000, particularly along the left bank, should be further investigated for the potential to improve the riparian buffer through planting efforts *(Figure 7)*.

The side channel (2001 channel alignment) converges with the main channel at Station 25850 as the main channel begins to flow directly adjacent to Frost Valley Road. Slightly upstream of the convergence, a piped outfall conveys flow from Frost Valley Road and the right valley wall to the side channel. The flow is conveyed in a 30-inch diameter smooth steel culvert with 1 foot of outfall and no headwall. The outfall protection was documented in fair condition. *(A85)* 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 piped outfall.

A revetment was observed on the right bank immediately adjacent to Frost Valley Road for the remaining 900 feet of channel in WBMU7. Rip-rap revetment in gabion baskets was observed for 100 feet beginning at Station 25900 in good structural and functional condition. *(A91)* The revetment was constructed of stacked rock with some vegetation from 220 feet downstream of Station 25800 documented in good structural and functional condition. *(A101)* Downstream of Station 25600 the stacked rock revetment is also in good structural and functional condition with toe protection provided by dumped rock and significant vegetation. *(A99)* The next segment of revetment continues 120 feet to Station 25480 where the revetment is composed of stacked rock with grassy and wildflower vegetation in good structural and functional condition for 310 feet. *(A106)* Across

Rip-rap and gabion baskets along right bank (A91)

Stacked rock revetment (A101)

Dumped rock and stacked rock revetment (A99)

from the revetment the left bank is a vegetated bankfull terrace with alluvial cobble exposed below the bankfull height.

The revetment ends briefly at Station 25130 where a lunker structure constructed of timber boards and logs was observed on the left bank. It is likely that this structure was designed to provide fish habitat in this otherwise straight reach. It appears to be in good functional condition as a deep pool was observed under the structure. *(A107)*

Vegetated stacked rock revetment (A106)

Timber board and log provided fish habitat (A107)

A short rip rap revetment was observed on the left bank across from the lunker structure constructed of log cribbing. The revetment was documented in good structural and functional condition although the purpose of the revetment in this location remains unclear. Recommendations for this reach include further investigation of the management history and possible restoration of the structures to ensure functionality. *(A111)*

Log cribbing rip-rap (A111)

The revetment continues on the right bank from Station 25100 through the end of the management unit. This revetment is constructed of dumped quarry stone with woody vegetation and was documented in good structural and functional condition. It appears to be designed to stabilize the bank below Frost Valley Road.

WBMU7 ends at Station 25100.

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 predominantly a sediment storage reach, with broad floodplains that are well-connected to the main channel. These 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 on both banks throughout WBMU7 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 (36.02 %) followed by shrubland (25.50%) and evergreen closed tree canopy (13.79%). *Impervious* area makes up 2.12% of this unit's buffer. There are 3.50 acres of potential buffer improvement area in this management unit (see Fig. 7). No occurrences of Japanese knotweed were documented in this management unit during the 2010 inventory.

There are 2.74 acres of wetland (5.09% of WBMU7 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 Freshwater Forested Shrub is 2.22 acres in size and the wetland classified as Freshwater Pond is 0.52 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 WBMU7 within the 100-year floodplain as identified on the FIRM maps.

BANK EROSION No areas of erosion were documented in the management unit during the stream feature inventory.

INFRASTRUCTURE A revetment was observed on the right bank immediately adjacent to Frost Valley Road for the last 900 feet of channel in WBMU7. Rip-rap revetment in gabion baskets was observed for 100 feet beginning at Station 25900 in good structural and functional condition. The revetment was constructed of stacked rock with some vegetation for 220 feet downstream of Station 25800, documented in good structural and functional condition. Downstream of Station 25600 the stacked rock revetment is also in good structural and functional condition with toe protection provided by dumped rock and significant vegetation. The next segment of revetment continues 120 feet to Station 25480 where the revetment is composed of stacked rock with grassy and wildflower vegetation in good structural and functional condition for 310 feet. Across from the revetment the left bank is a vegetated bankfull terrace with alluvial cobble exposed below the bankfull height.

A short rip rap revetment was observed on the left bank near Station 25200 constructed of log cribbing. The revetment was documented in good structural and functional condition although the purpose of the revetment in this location remains unclear. Recommendations for this reach include further investigation of the management history and possible restoration of the structures to ensure functionality.

Revetment continues on the right bank from Station 25100 through the end of the management unit. This revetment is constructed of dumped quarry stone with woody vegetation and was documented in good structural and functional condition. It appears to be designed to stabilize the bank below Frost Valley Road.

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 WBMU7 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 is one piped outfall that conveys storm water runoff directly into the Neversink River 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 were no bank erosion sites documented in WBMU7.

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**.