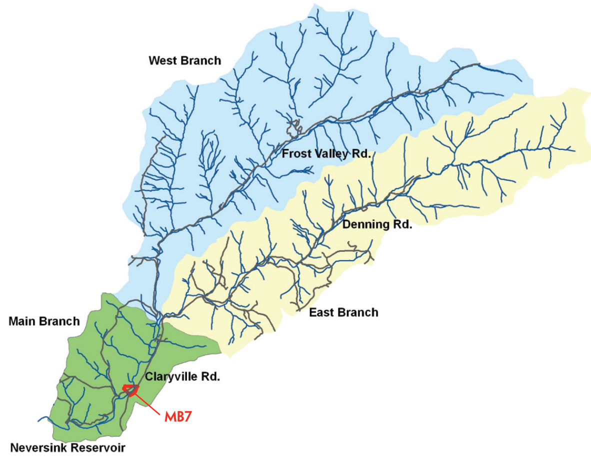
Neversink River Main Branch

MANAGEMENT UNIT 7

STREAM FEATURE STATISTICS

- 28 % of stream length is experiencing erosion
- 29.98 % of stream length has been stabilized
- 0.15 acres of inadequate vegetation within the 100 ft. buffer
- 555 ft. of stream is within 50 ft. of the road
- 0 structures located within the 100-year floodplain boundary



Stream Feature Inventory 2010 (Figure 1)

Management Unit Description

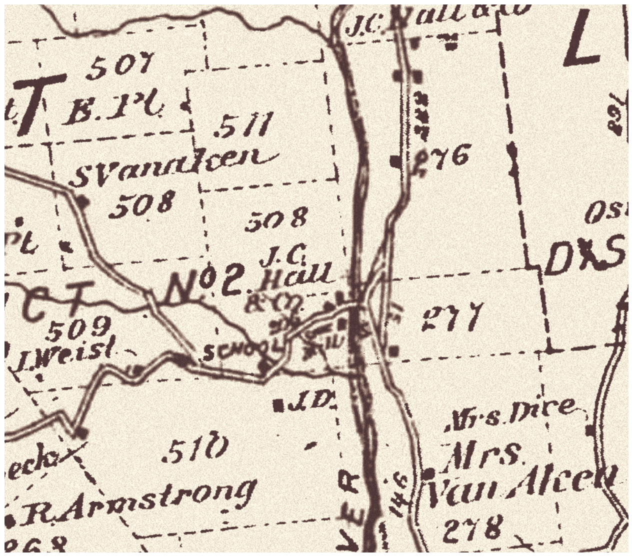
This management unit begins at a private bridge crossing, continuing approximately 1,353.86 ft. to a bridge crossing of Hunter Road. The drainage area ranges from 66.46 mi^2 at the top of the management unit to 66.60 mi^2 at the bottom of the unit. The valley slope is 0.06 %. The average valley width is 1416.52 ft.

Summary of Recommendations
Main Branch Management Unit 7

Intervention Level	Passive Restoration of the bank erosion site (BEMS NMB7_17900). Recommended Active Restoration via bioengineering site from Station 18300 to Station 17500.
Stream Morphology	Conduct baseline survey of channel morphology.
Riparian Vegetation	Improve riparian buffer along revetment between Station 180300 and Station 18000.
Infrastructure	Assess scour on right abutment of covered bridge.
Aquatic Habitat	Protect pool habitat including assessment of thermal impacts of stormwater outfall. Fish population and habitat survey.
Flood Related Threats	None.
Water Quality	None.
Further Assessment	Include MU7 in comprehensive Local Flood Hazard Mitigation Analysis of Claryville MUs.

Historic Conditions

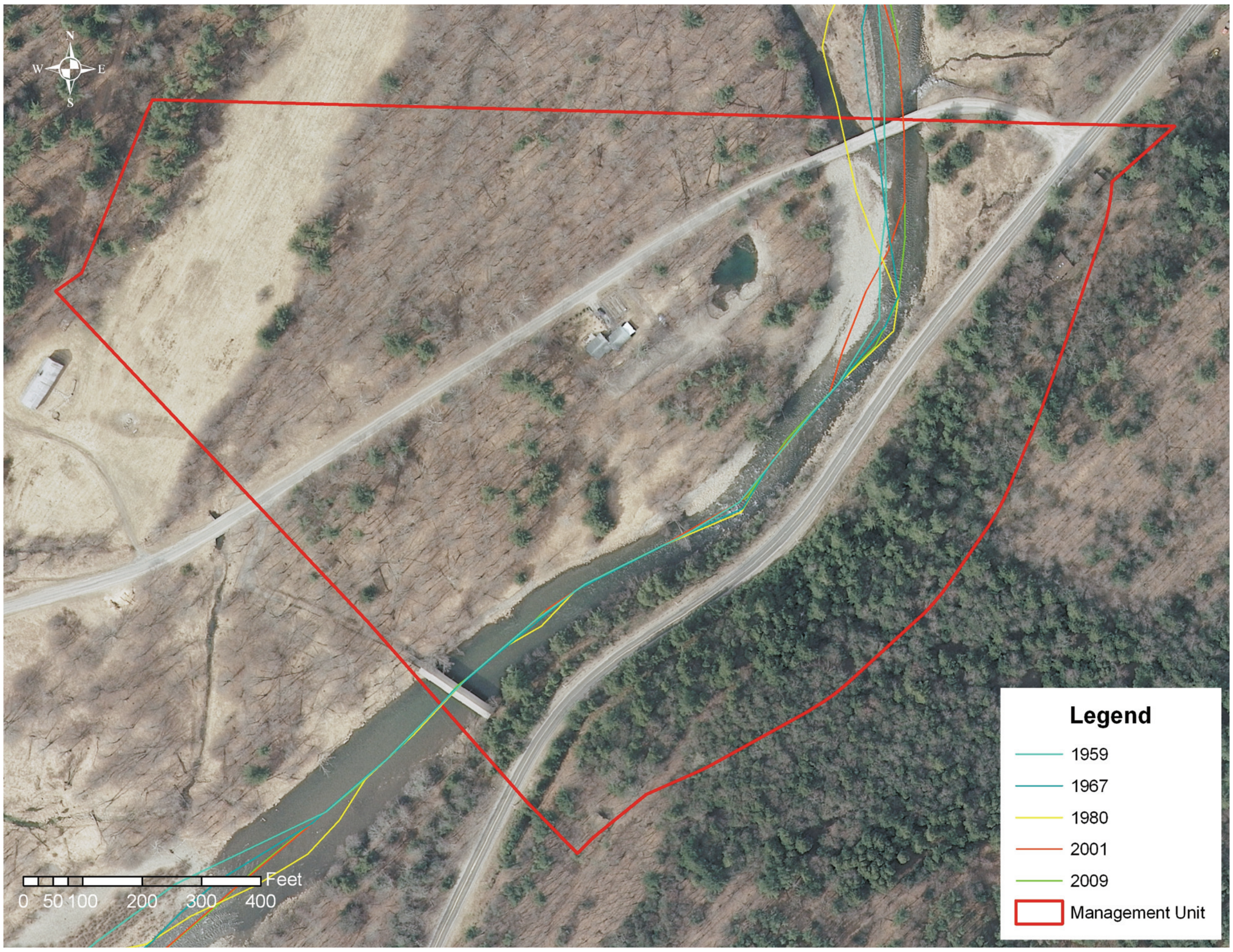
As the glaciers retreated about 12,000 years ago, they left their "tracks" in the Catskills. See Section 2.4 *Geology of Upper Neversink River,* for a description of these deposits. These deposits make up the soils in the high banks along the valley walls on the Neversink mainstem and its tributaries. 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. 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 no significant lateral channel instability, and no NYS Article 15 stream disturbance permits have been issued in this management unit, according to records available from the NYSDEC DART 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.

This management unit begins 50 feet downstream of the Hunter Road Bridge located at Station 18650. At this location a depositional point bar begins on the right bank at Station 18600. The cobble point bar is vegetated with willows and sedges and extends 450 feet downstream to Station 18150. *(A171)* Along the right bank on the inside of the point bar a 218-foot long segment of bank erosion (BEMS NMB7_17900) runs from approximately Station 18140 to Station 17920. Sedge has established at the toe of the eroding bank indicating that the bank is beginning to stabilize, although the alluvial materials higher in the bank continue to be entrained. *(A176)* It is anticipated that this bank will revegetate and stabilize without treatment (passive restoration) It is also recommended that this site be monitored for changes in condition.

The length of the Neversink River included in MBMU7 forms the apex of a gentle meander to the left, where Claryville Road runs along the left valley wall. In MBMU7 the channel runs directly adjacent to Claryville Road for approximately 300 feet from Station 18300 to Station 18000, with minimal riparian buffer between the river and the road. At this location Claryville Road is within the boundary of the 100-year floodplain, although local residents indicate that road flooding is rare. A placed rip-rap revetment protects the bank for this segment as well as further downstream for an additional 500 feet, stretching from Station 18300 to approximately Station 17500. At Station 18250 a piped outfall constructed of a 15-inch diameter steel pipe running through the revetment conveys runoff from the left valley wall under Claryville Road. *(B479)*

Recommendations for this segment of bank with minimal riparian buffer include *assisted restoration* of revetted bank using bioengineering techniques to inter-plant and further revegetate the eroding bank and provide additional stabilization. The willow growing on the side bar on the inside of this meander could provide a source of materials for the restoration effort.

Looking upstream at right bank cobble point bar (A171)

Sedge and alluvial material at right bank erosion point (A176)

Piped outfall and rip-rap on left bank adjacent to Claryville Road (B479)

Across from the end of the revetment at Station 17500 a relict timber structure was observed which was most likely designed to provide fish habitat. The structure is in poor structural condition but good functional condition as it appears to create a pool at this location. *(A182)* Behind the timber structure from Station 17900 to Station 17350, the right bank is littered with woody debris, indicating that this forested floodplain is inundated during flood events. *(A185)*

Timber structure creating pool for fish habitat (A182)

A covered bridge, located at Station 17320, was documented as in good functional condition and fair structural condition with scour documented behind the right abutment. The bridge has a normal and effective span of 108 feet, and encroaches two feet on the right bank and four feet on the left bank. It is constructed of wood timbers with bridge approaches supported by stone abutments. The bridge was identified as County Bridge 192C, and appears to be open for pedestrian traffic based on trails observed nearby and officially remains a town road. This bridge, known as the Halls Mills bridge locally, was in active use as the primary access point for all the residences on the west side of the river until the Hunter Road bridge upstream was constructed in 1962. *(B486)*

Woody debris on right bank flood plain (A185)

According to the Sullivan County Department of Public Works the bridge is scheduled for scour repair but the project is on hold due to lack of funding. In addition, bank retreat on the right bank indicates that the channel may be enlarging at this location

Halls Mills Bridge (B486)

as a consequence of increases in the magnitude of channel forming flows and increases in sediment supply from upstream. Further discussion of this process is included in the description of MBMU6. Assessment of this bridge abutment scour in conjunction with the baseline geomorphic assessment of this reach is recommended to assess the necessity of repairs.

It is recommended that this entire MU be included in a comprehensive Local Flood Hazard Mitigation Analysis to investigate hydraulics and sediment transport in the stream corridor, from Station 10500 on the East Branch, upstream of Sawmill Road through Station 14800 on the Mainstem, downstream of the Halls Mills covered bridge. The purpose of the analysis would be to develop a comprehensive solution for reducing flooding threats to this relatively dense population center of the Neversink Valley.

MUMB7 ends directly downstream of the covered bridge at Station 17200.

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 represents the continuation of a series of sediment storage reaches occasionally punctuated by short transport reaches from the confluence of the East and West Branches to a valley pinchpoint around Station 12000. Sediment is stored in the point bar at the top of the management unit and then is transported relatively effectively through the remainder of the unit. Transport reaches are in a state of *dynamic equilibrium,* effectively conveying sediment supplied from upstream during each flow event. 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. This is one process by which floodplains are created and maintained. Sediment storage reaches can result from natural conditions or as the unintended consequence of poor bridge design, check dams or channel overwidening. While such unpredictable conditions represent risks for nearby property owners, these dynamic disturbance regimes produce unique and diverse habitat patches, attracting equally diverse plant communities and wildlife.

To better understand sediment transport dynamics a baseline survey of channel form and function is recommended for this management unit in coordination with the geomorphic analysis that would be required for bridge renovation/replacement discussed in MBMU8.

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.

In MBMU7 the channel runs directly adjacent to Claryville Road for approximately 300 feet from Station 18300 to Station 18000, with minimal riparian buffer between the river and the road. Recommendations for this segment of bank include *assisted restoration* of revetted bank using bioengineering techniques to inter-plant and further revegetate the eroding bank and provide additional stablilization. The willow growing on the side bar on the inside of this meander could provide a source of materials for the restoration effort.

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 2001 and field inventories *(Figure 5)*. In this management unit, the predominant vegetation type within the 100 ft. riparian buffer is Deciduous Closed Tree Canopy (41%) followed by Herbaceous Vegetation (16%). *Impervious* area (6.2%) within this unit's buffer is primarily Claryville Road; six acres of potential riparian buffer improvement area were identified *(Figure 7)*.

There are 3.18 acres of wetland (9.6% of MBMU8 land area) within this management unit mapped in the National Wetland Inventory as one classification (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 type descriptions and regulations).
The wetland classified as Riverine is 3.18 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.

Due to the relatively low elevation of the left bank immediately adjacent to Claryville Road, the risk of flood inundation is high during very large flood events, threatening access of emergency service to residents. Local residents, however, report that flooding of this stretch of road is rare. A baseline survey of channel morphology and a sediment transport analysis should be conducted to determine feasible flood hazard mitigation options.

BANK EROSION One area of erosion was documented in MBMU7 during the stream feature inventory. This 218-foot long segment of bank erosion from approximately Station 18140 to Station 17920 (*BEMS* NMB7_17900), is the result of hydraulic erosion of the toe of the bank. It is anticipated that this bank will revegetate and stabilize without treatment (*passive restoration*). However, it is recommended that this site be monitored for changes in condition.

INFRASTRUCTURE 29.98% (812 ft.) of the stream bank length in this management unit has been treated with some form of stabilization. The revetment on the left bank from 18300 to approximately Station 17500 is in good functional condition and good structural condition, and appears to be placed rip-rap composed of native materials. Recommendations for this segment of bank with minimal riparian buffer include *assisted restoration* of revetted bank using bioengineering techniques to further revegetate and stabilize the eroding bank. The willow growing on the side bar on the inside of this meander could provide a source of materials for the restoration effort.

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 MBMU7 is classified as "B(T)", supporting swimming and 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 is characterized by predominantly pool habitat along the road revetment and the relict timber structure. This deep pool habitat is likely further augmented by both shade provided by canopy cover from the healthy riparian vegetation and additional groundwater inputs from the left valley wall along the road revetment from Station 17900 to the covered bridge.

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. One piped outfall that conveys storm water runoff directly into the Neversink River in this management unit, and the proximity of Claryville Road to the channel provides some risk of storm water runoff reaching the river during storm events.

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 MBMU7 but it is not a significant source of fine sediment.

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. No 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

Comment for 7–8: *"Rip rap washed away"*

"flooded 4-5 times since 1976"

"Interested in stream bank protection"

"flooded 5 times since 1977"

"Interested in stream bank protection, elevating my residence, channel maintenance, new FEMA flood maps, relocating my residence"