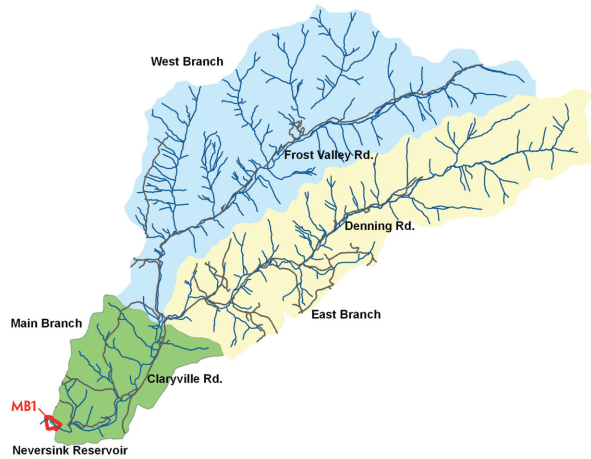
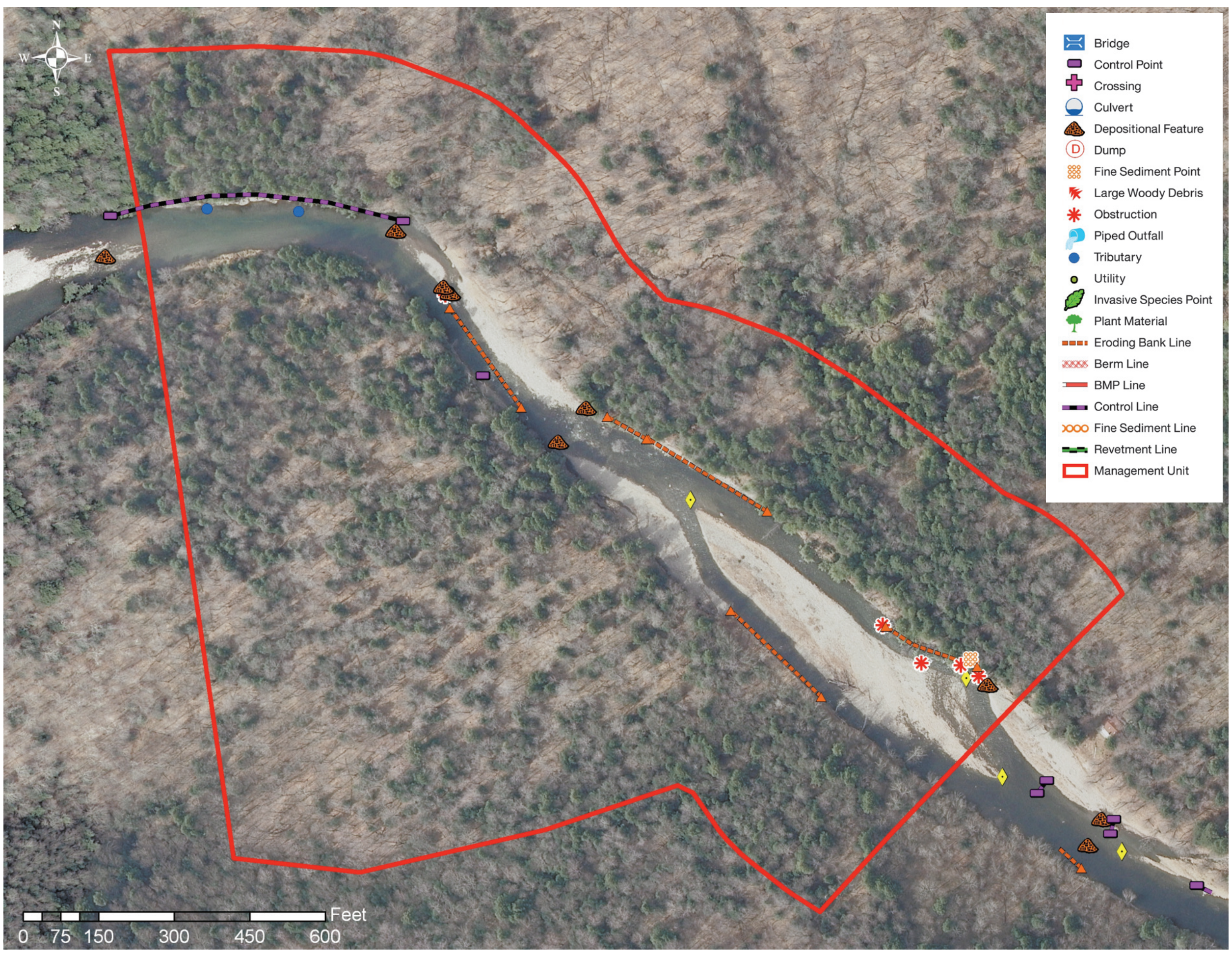
Neversink River Main Branch

MANAGEMENT UNIT 1

STREAM FEATURE STATISTICS

- None of the stream length is experiencing erosion
- None of stream length has been stabilized
- 0.15 acres of inadequate vegetation within the 100 ft. buffer
- None 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 where the stream flows into the Neversink Reservoir at Station 1000, continuing approximately 2,000 ft. to the end of property owned by NYCDEP at Station 3000. The drainage area ranges from 70.4 mi2 at the top of the management unit to 70.8 mi2 at the bottom of the unit. The valley slope is close to 0%. The average valley width is 1487.68 ft.

Summary of Recommendations
Main Branch Management Unit I

Intervention Level	Assisted restoration at BEMS NMB1_2700. Monitor BEMS NMB1_2400, BEMS NMB1_2100, BEMS NMB1_2000, and BEMS NMB1_1600 for changes in condition.
Stream Morphology	Conduct baseline survey of channel morphology.
Riparian Vegetation	None.
Infrastructure	None.
Aquatic Habitat	Fish population and habitat survey.
Flood Related Threats	None.
Water Quality	None.
Further Assessment	Include MU1 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. While 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/no lateral channel instability, X/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.

MBMU1 begins at Station 3000 as a side bar ends on the right bank. A 200-foot long segment of eroding bank was observed from Station 2900 to Station 2700 (BEMS NMB1_2700). This eroding segment was documented as active at 15 feet high adjacent to the main channel on the right bank, with hydraulic erosion exposing alluvial materials. There were woody debris aggravating scour along the bank, and although parts of the bank segment appear to be revegetating, there is glacial till exposed for 20 feet represented a minor source of fine sediments *(A299, A311)*. There is a headcut in the main channel at Station 2940 *(A301)*.

Recommendations for this segment of bank include *assisted restoration* of the bank using bioengineering techniques to revegetate the eroding bank and provide additional stabilization. The willows documented as plant sources throughout the watershed could provide a source of materials for the restoration effort.

A 247-foot segment of eroding bank was observed from Station 2730 to Station 2483 (BEMS NMB1_2400). This eroding bank segment on the left bank along a side channel appears to be revegetating and will likely stabilize without treatment *(passive restoration)*. It is recommended that this site be monitored for changes in condition. *(B558)*

Woody debris causing scour on right bank (A299)

Woody debris in stream channel (A311)

Left bank erosion appears to be restabilizing (B558)

Headcut in main channel at Station 2940 (A301)

At Station 2240 the side channel converges with the main channel; the channel remains wide and aggradation was observed. Two adjacent eroding bank segments were observed on the right bank near the confluence, extending 275 feet from Station 2400 to Station 2175 (BEMS NMB1_2100) and 90 feet from Station 2175 to Station 2035 (BEMS NMB1_2000). Although more scour and undercutting was observed at the second erosion segment, both appear to be revegetating and will likely stabilize without treatment *(passive restoration)*. It is recommended that both sites be monitored for changes in condition. (*A318 and A321)*

Downstream of these eroding bank segments a side bar is forming on the right bank centered at Station 1800. Across from the side bar a 242-foot long segment of eroding bank was observed on the left bank. This site was documented as active exposing glacial till via hydraulic erosion although it is not a significant source of turbidity. The slope was covered with recently downed trees during the stream survey. *(B575)* This bank appears to be revegetating and will likely stabilize without treatment *(passive restoration)*.

Erosion on right bank (A318)

Scour and undercutting on right bank (A321)

Eroding left bank (B575)

Planform and grade control on right bank (A331)

Tributary joining main channel (A335)

From Station 1450 to Station to Station 860 bedrock is providing both planform and grade control on the right bank. *(A331)* Two intermittent tributaries flow over this bedrock to join the main channel at Stations 1300 and 1100 *(A335)*.

MBMU1 ends at Station 1000 directly upstream of the Neversink Reservoir.

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 a sediment storage reach impacted by backwatering effects from the Neversink Reservoir. Storage reaches like this one 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. While there is little change in the channel alignment associated with these processes in this management unit, the depositional features present are very dynamic, releasing and storing significant volumes of bed load with each major flow event.

Sediment storage reaches can result from natural conditions—such as they are in this location, defined by larger topographic features—or as the unintended consequence of poor bridge design, check dams or channel over-widening.

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 2001 and field inventories *(Figure 5)*. In this management unit, the predominant vegetation type within the 100 ft. riparian buffer is mixed-closed tree canopy (58.44%) followed by evergreen-closed tree canopy (18.07%). There was no *Impervious* area documented within this unit's buffer. There are 2.6 acres of potential buffer improvement area in this management unit *(Figure 7)*.

There are 6.70 acres of wetland (14% of MBMU1 land area) within this management unit mapped in the National Wetland Inventory (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). All of the wetland in MBMU1 is classified as riverine wetland.

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 MBMU1 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 Due to the a number of conditions in MBMU1, the stream banks within the management unit are at a relatively high risk of erosion, primarily associated with ineffective sediment conveyance. The channel gradient is negligible in MBMU1, leading to bed aggradation. Aggrading conditions lead to channel widening via bank erosion. Five areas of erosion were documented in the management unit during the stream feature inventory.

A 200-foot long segment of eroding bank was observed from Station 2900 to Station 2700 (BEMS NMB1_2700). Recommendations for this segment of bank include *assisted restoration* of the bank using bioengineering techniques to revegetate the eroding bank and provide additional stabilization.

A 247-foot segment of eroding bank was observed from Station 2730 to Station 2483 (BEMS NMB1_2400), two adjacent eroding bank segments were observed on the right bank near the confluence, extending 275 feet from Station 2400 to Station 2175 (BEMS NMB1_2100) and 90 feet from Station 2175 to Station 2035 (BEMS NMB1_2000), and a 242-foot long segment of eroding bank was observed on the left bank from Station 1842 to Station 1600 (BEMS NMNB1_1600). Although they were documented in various stages of revegetation, these four sites appear to be revegetating and will likely stabilize without treatment (*passive restoration*).

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 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 MBMU1 has been given a "A(T)" class designation with best use as a source of drinking water, for use 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 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 no piped outfalls that convey 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 is one bank erosion site in MBMU1 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

"Interested in stream bank protection, channel maintenance and new FEMA flood maps"