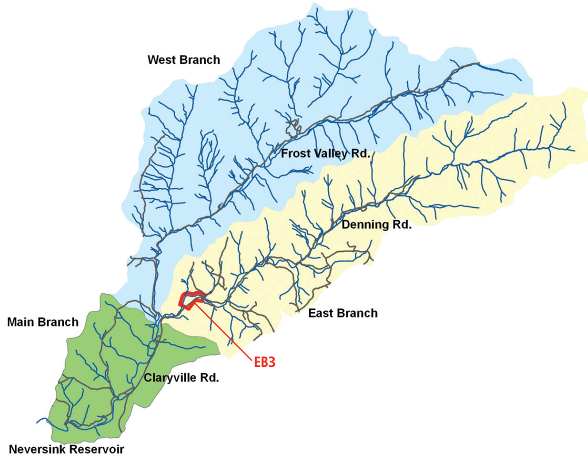
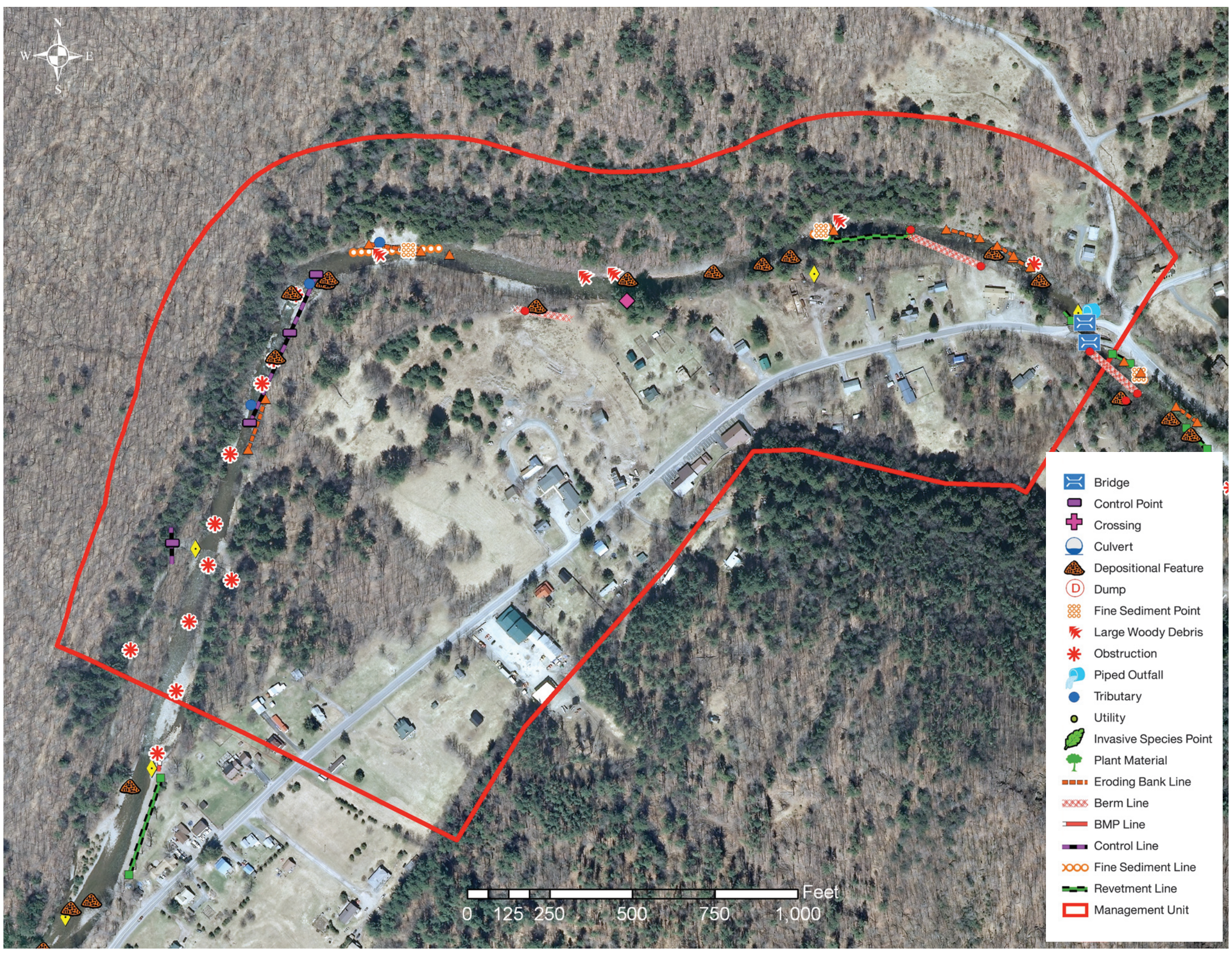
# Neversink River East Branch

## MANAGEMENT UNIT 3

### STREAM FEATURE STATISTICS

- 8% of stream length is experiencing erosion
- 3.82% of stream length has been stabilized
- 39.78 acres of inadequate vegetation within the riparian buffer
- 50 ft. of the stream length is within 50 ft. of the road
- 8 structures are located within the 100-year floodplain boundary




*Stream Feature Inventory 2010 (Figure 1)*

# Management Unit Description

This management unit begins at the border between Ulster and Sullivan Counties, continuing approximately 3,951 ft. before the stream is crossed by a bridge on Denning Road. The drainage area ranges from 25.20 $mi^2$ at the top of the management unit to 26.80 $mi^2$ at the bottom of the unit. The valley slope is 1.02%. The average valley width is 1188.51 ft.

# Summary of Recommendations East Branch Management Unit 3

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|---|---|
| **Intervention Level** | Passive Restoration of the bank erosion site between Station 8860 and Station 8800 (BEMS ID # NEB3_8800).<br>Passive Restoration of the bank erosion site between Station 8800 and Station 8740 (BEMS ID # NEB3_8700).<br>Passive Restoration of the bank erosion site between Station 8680 and Station 8580 (BEMS ID# NEB3_8500).<br>Passive Restoration of the bank erosion site between Station 8220 and Station 8195 (BEMS ID # NEB3_8200).<br>Full Restoration of the bank erosion site between Station 6950 and 6790 (BEMS ID # NEB3_6800).<br>Passive Restoration of the bank erosion site between Station 6200 and Station 6040 (BEMS ID# NEB3_6000). |
| **Stream Morphology** | Assess sediment deposition from the accumulation of large woody debris supplied by the watershed upstream.<br>Conduct baseline survey of channel morphology. |
| **Riparian Vegetation** | Investigate enhancement of riparian corridor in left floodplain throughout management unit. |
| **Infrastructure** | Investigate flood threats to Denning Road. |
| **Aquatic Habitat** | Fish population and habitat survey. |
| **Flood Related Threats** | Assess threats to building structures in 100-year floodplain. |
| **Water Quality** | Assess ability of culvert to effectively convey storm water runoff from Wildcat Road. |
| **Further Assessment** | Long-term monitoring of erosion sites. |

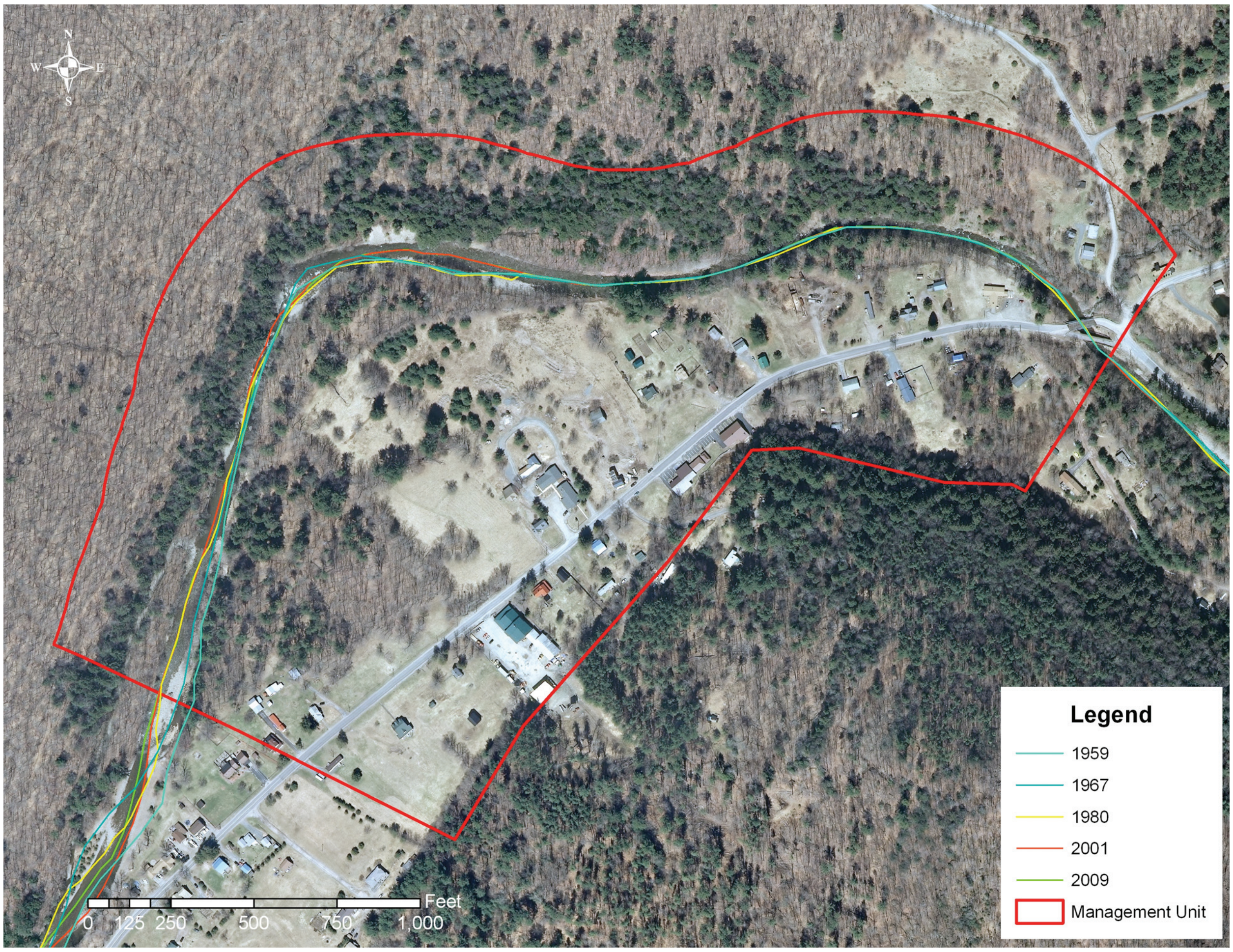
# Historic Conditions

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 some lateral channel instability and 2 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 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 just downstream of the two Denning Road bridge crossings. The stream flows close to the right valley wall for the entire management unit, restricting lateral channel movement to the right. The valley floor on the left side of the stream continues to widen throughout EBMU3, maintaining a well connected left floodplain. A significant amount of infrastructure development exists in this floodplain, often with a narrow vegetated riparian buffer. As a result, the buildings and roads in this area are at a very high risk of inundation during flood events and subsequent property damage.

An old cobble berm that began in EBMU4 continues into the first 60-feet of EBMU3, offering an attempt at flood mitigation for the infrastructure in the left floodplain. *(B265)* This berm is overgrown with vegetation and does not appear to have been maintained in recent years. Continuing downstream past the two bridges, the impact that these structures have on stream morphology becomes increasingly evident. It is likely that the bridge abutments are not spaced wide enough to accommodate large events, creating a bottle neck as flows are conveyed through. As a result, severe scour was documented around the abutments of the active bridge near Station 9100. This scour has created slow moving pools which continue for a short reach downstream of the structure. *(A326)* The slower velocities do not effectively transport sediment through the reach, resulting in a significant amount of aggradation under the bridge. The left bank is revetted with placed rip-rap beginning at the bridge abutment near Station 9060, continuing for approximately 50-feet until Station 9010. *(B276)*

Just downstream of the bridge along the right bank, a small tributary enters at Station 9080 from the direction of Taylor Road. The small perennial flow of this tributary is enhanced by a culvert that contributes road side drainage from Wildcat Road, making it a potential source for contaminants from road runoff. It is likely that the road drainage contributes chlorides (salt) and petroleum by-products from road runoff to the

*Old cobble berm in left floodplain (B265)*

*Aggradation under bridge (A326)*

*Left bank reveted with rip rap at bridge abutment (B276)*

*Drainage pipe from Wildcat Road (A313)*

*Cobble side bar along left bank (B278)*

*Fallen tree causing obstruction to flow on right bank (A329)*

*Stabilizing slope failure on right bank (A334)*

Neversink. *(A313)* This culvert is constructed from smooth steel which has rusted over time. There is no outfall or headwall protection present other than the stream cobbles which have deposited in the vicinity of the culvert.

EBMU3 could be largely characterized as a sediment storage reach, as several areas of aggradation were documented throughout the management unit. The first depositional area is a cobble side bar that begins along the left bank at Station 8900 and continues downstream before ending at Station 8740. *(B278)* Some grass and sedge species have established on this bar. Across from the bar, a fallen tree has deposited along the right bank and is causing an obstruction to high flows. *(A329)* Hydraulic erosion of the toe is causing the right bank to fail beginning at Station 8860, continuing for approximately 60-feet until Station 8800 (BEMS ID # NEB3_8800). Mature trees have begun to slide down this slope with their root wads still attached. In some cases these trees have been able to re-establish at a lower elevation on the slope. Although this bank does not appear to have reached an angle of repose, large cobbles have deposited along the toe of the slope, which along with the establishment of sedges has provided some stabilization to the eroding bank. With adequate toe stabilization it is possible that this site can continue to stabilize without treatment (passive restoration). However, it is recommended that it be monitored for future changes in condition. *(A334)*

The slope failure continues to be evident along the right bank for approximately 60-feet between Station 8800 and Station 8740, but appears to be at a more advanced stage of re-stabilization than the erosion site just upstream (BEMS ID # NEB3_8700. *(A337)* The toe of this slope is armored with large boulders and lush sedge clumps, and the bank appears to have reached an angle of repose. The healthy mature vegetation re-establishing itself on the slope suggests that this bank erosion site is steadily progressing towards stability (passive restoration). Recommendations for this site include monitoring for future changes in condition.

A larger re-vegetated slope failure begins at Station 8680 and continues for approximately 100-feet until Station 8580 (BEMS ID# NEB3_8500). *(A344)* Although exposed cobbles on this slope indicate a previous landslide, this bank has been naturally re-stabilized by the deposition of large boulders at the toe. A large percentage of the slope is now covered with mature vegetation, and all signs indicate that this bank will continue to stabilize without treatment (passive restoration).

In order to protect infrastructure, several attempts have been made to prevent the stream from connecting to its left floodplain during large events. A berm begins along the left bank behind the town hall at Station 8700 and continues until Station 8475. *(B288)* This berm mainly consists of cobbles, but also has large placed boulders interspersed. Near Station 8490 the berm transitions to a more

*Large boulders contributing to bank stablilization (A337)*

*Re-vegetated slope failure (A344)*

*Berm along left bank (B288)*

*Boulder revetment along left bank (B293)*

*Slope failure due to upland drainage (A358)*

*Cobble sidebar on left side of channel (B297)*

recently placed boulder revetment which continues downstream until Station 8210. *(B293)* This revetment has been washed out in some spots, but overall is in fair condition.

At Station 8220, water that is draining from upland sources through the bank is eroding and washing out finer soil particles (BEMS ID # NEB3_8200). The removal of these finer particles destabilized the bank, resulting in a failure of the hill slope which continues downstream for approximately 25-feet until Station 8195. *(A358)* Some silts and sands are exposed along this slope and could potentially be a source of fine sediment; however, they are not expected to be contributing to turbidity problems in the Neversink. A large percentage of the slope has re-vegetated naturally, suggesting that this bank has reached an angle of repose and will continue to stabilize without treatment (passive restoration). It is recommended that this site be monitored for future changes in condition.

Continuing downstream, the next 1000-feet of this management unit is characterized by a significant amount of sediment deposition. A cobble side bar begins along the left side of the channel at Station 8100, continuing downstream for approximately 100-feet until Station 8000. *(B297)* This depositional bar is free of debris or vegetation, indicating that it is frequently inundated during higher flows. Another side bar begins along the right side of the channel at Station 7850, spanning approximately 260-feet in length to Station 7590. *(A366)* Various species of herbaceous vegetation have established on this bar.

Large woody debris that has been deposited on the narrow right floodplain terrace illustrates the amount of power the stream has during flood events. At Station 7560 and Station 7460, large

*Vegetated side bar on right side of channel (A366)*

*Large woody debris deposited on right floodplain (A371)*

piles of tree trunks were documented significantly above the wetted channel width. *(A371)* Along the left bank, an access path has been mowed from the floodplain all the way down to the stream, removing all woody riparian vegetation at Station 7500. *(B301)* Removing significant amounts of vegetation from the riparian zone can reduce bank stability and lead to erosion. An intact riparian buffer including woody vegetation can strengthen the stream bank and slow erosive forces of higher flows during flood events, reducing the need for the installation of revetments and berms.

*Access path along left bank (B301)*

A berm begins along the left bank at Station 7400, continuing downstream for approximately 165-feet to Station 7235. *(B304)* This berm consists of large cobbles and is located where the narrowly forested portion of the riparian buffer transitions to open field. A construction site for a building structure was located in this field at the time that the inventory was conducted. This new development exists just outside of the delineated 100-year floodplain boundary, but is still at a very high risk of inundation and subsequent damage during flood events. A cobble bar begins along the left side of the stream in front of this berm

*Berm along left bank (B304)*

*Cobble bar forming along left side of stream (B302)*

*Severe slope failure on right bank (A384)*

*Bedrock grade control (A408)*

at Station 7300, continuing around the sharp bend for approximately 950-feet before ending at Station 6350. *(B302)*

As the channel approaches a hard left turn, there is a relatively severe slope failure that begins at Station 6950 and continues for approximately 160-feet until Station 6790 (BEMS ID # NEB3_6800). *(A384)* The glacial till that makes up this 70-foot high bank is exposed in most locations, indicating a source of fine sediment that can be entrained during high flows. The slope failure was most likely caused by a spring seepage that drains down through the bank, which continuously erodes the sediment particles that keep the slope intact. As the sediment particles become unstable, the bank fails under its own weight and large portions begin to slide down the slope. At the time of this inventory, several trees had either fallen to the base of the bank or were leaning with their root structures exposed. Due to the severe angle of this bank and the lack of scour protection at the toe, it is unlikely that this slope will stabilize without treatment. Remediation of this erosion site would likely have to be part of a full restoration of the channel in order to redirect the flow away from the bank.

The channel takes a sharp left turn against the left valley wall at Station 6650 and continues in a relatively straight reach for the remainder of the management unit. This straight reach is partially created by exposed bedrock in the stream bed and along the right bank. The bedrock provides both a grade and planform control that prevents the channel from migrating vertically or laterally to the right. This bedrock grade control continues downstream for approximately 490-feet before ending at Station 6160. *(A408)* A small perennial tributary enters from the right side at Station

6600. *(A401)* Small feeder streams such as this often play an integral role in ecosystem integrity, as they are a source of the cold and well oxygenated water that is necessary to support a diversity of aquatic life. Sediment is depositing on a center bar which begins at Station 6580 and continues downstream until Station 6500. At time of this inventory, flow was diverted to the left and right around this bar, allowing sedges to establish amongst the cobbles. *(A402)*

Large woody debris has accumulated with frequency in the next 600-foot stretch of the channel, resulting in obstructions to higher flows. Obstructions were documented along the left side of the stream at Station 6340 and Station 6250. *(B313)* These obstructions began as fallen trees, but are growing in size as they continue to gather woody debris as it is transported downstream. A series of woody debris obstructions begins along the right bank at Station 6020, continuing downstream until Station 5800. *(A413)* These obstructions have an effect on the ability of the stream to effectively transport sediment, resulting in sediment deposition throughout this reach.

*Small perennial tributary entering on left (A401)*

*Sedges establishing on center bar (A402)*

*Obstructions along left bank (B313)*

*Series of woody debris along right bank (A413)*

*Erosion on left bank (B319)*

*Obstructions along left bank (A416)*

The left bank begins to erode at Station 6200 and continues downstream for approximately 160-feet until Station 6040 (BEMS ID# NEB3_6000). *(B319)* This erosion site may be aggravated by the presence of large woody debris obstructions along the right side of the channel, which divert hydraulic pressure into the bank during high flows. The bank angle is not severe enough that it would indicate future failure, and large cobbles that have been exposed through the erosion process are now helping to armor the bank down to the toe. It appears that it is possible for this bank to stabilize without treatment (passive restoration). However, it is recommended that this site be monitored for changes in condition.

Continuing downstream, large woody debris obstructions continue to become evident as we approach the downstream end of EBMU3. Obstructions were documented along the left bank at Stations 5690 and 5500, and 5300. *(A416 and A418)* All of these obstructions are contributing to sediment deposition in this reach. The obstruction at Station 5300 is located on a well vegetated side bar that begins at Station 5320 and continues downstream into EBMU2.

*Obstructions along left bank (A418)*

*Divergence of flow into side channel (B327)*

*Bedrock along right valley wall  (B328)*

*Large obstructions in side channel  (B332)*

An obstruction along the right bank at Station 5700 has caused a divergence of flow into a side channel, significant during high flows. *(B327)* The side was mostly dry at the time of this inventory, but had received flow at some point this year as was evidenced by the lack of leaf debris on the channel substrate. This channel flows up against the right valley wall and continues to follow the course of this exposed bedrock before converging back with the main channel further downstream in EBMU2. *(B328)* Fallen trees are causing a large obstruction in the side channel at Station 5350. *(B332)*

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.

EBMU3 ends at Station 5270 at the border between Ulster and Sullivan Counties.

# Sediment Transport

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

This management unit is largely dominated by sediment storage reaches and occasionally punctuated by short transport reaches. The channel in EBMU3 is controlled on the right throughout the majority of the management unit by the valley wall, but does maintain a well connected, albeit developed, floodplain corridor on the left side. 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 is stored where large woody debris has accumulated in the management unit, and is transported relatively effectively in most other locations. 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 migrations 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. Unpredictable conditions created by changes in channel geomorphology represent risks for nearby property owners during flood events. However, these dynamic disturbance regimes produce unique and diverse habitat patches, attracting equally diverse plant communities and wildlife.

To better understand sediment transport and sediment transport dynamics 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 binds 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 which are native and therefore well-adapted to the Catskills climate and soil conditions, and as a result often require less maintenance following planting and establishment. Figure 4.4.1.5 shows areas in the stream corridor where vegetated buffer could be improved; these areas may, however, be providing important ecological functions in their current condition. Technical guidance is available from the Catskill Streams Buffer Initiative at the Rondout/Neversink Stream Management Program (for more information, see Section 2.6 Riparian Vegetation).

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.

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 herbaceous vegetation (34.32 %) followed by deciduous-closed tree canopy (24.16 %). *Impervious* area makes up 4.67% of this unit's buffer. No occurrences of Japanese knotweed were documented in this management unit during the 2010 inventory.

There are 6.58 acres of wetland (6.80% of EBMU3 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).

Freshwater-forested shrub is the largest wetland type in EBMU3, totaling 5.76 acres in size. The other wetland type in this management unit is Riverine (0.82 acres).

# 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. 8 building structures are located in the 100-year floodplain in EBM3. 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.

A large portion of Denning Road which runs through the left floodplain of this management unit falls just outside the 100-year floodplain boundary and is at high risk of inundation during flood events. There are also several building structures that fall just outside of the floodplain boundary, but could still be inundated during large floods. FEMA provides guidance to homeowners on floodproofing at: **http://www.fema.gov/library/viewRecord.do?id=1420**

**BANK EROSION** Due to a number of conditions, bank erosion was documented at 6 locations in this management unit. These erosion sites are recommended for a restoration category based on their severity and likelihood of stabilizing naturally. It is possible for 5 of these sites to stabilize without treatment; however, they should minimally be monitored for future changes in condition. Hydraulic erosion of the toe is causing the right bank to fail beginning at Station 8860, continuing for approximately 60-feet until Station 8800 (BEMS ID # NEB3_8800). A slope failure continues to be evident along the right bank for approximately 60-feet between Station 8800 and Station 8740, but appears to be at a relatively advanced stage of re-stabilization (BEMS ID # NEB3_8700). A larger re-vegetated slope failure begins at Station 8680 and continues for approximately 100-feet until Station 8580 (BEMS ID# NEB3_8500). At Station 8220, water that is draining from upland sources through the bank is eroding and washing out finer soil particles (BEMS ID # NEB3_8200). The removal of these finer particles destabilized the bank, resulting in a failure of the hills slope which continues downstream for approximately 25-feet until Station 8195. The left bank begins to erode at Station 6200 and continues downstream for approximately 160-feet until Station 6040 (BEMS ID# NEB3_6000). Full restoration is recommended for erosion along the slope failure that begins at Station 6950 and continues for approximately 160-feet until Station 6790 (BEMS ID # NEB3_6800). Due to the severe angle of this bank and the lack of scour protection at the toe, it is unlikely that this bank will stabilize ithout treatment.

**INFRASTRUCTURE** 3.82% (301 ft.) of the stream bank length in this management unit has been stabilized with revetments in two different locations. The first revetment is dumped rip rap located along the left bank at the bridge abutment near Station 9060, continuing for approximately 50-feet until Station 9010.

There were 3 berms documented in EBMU3, totaling 5.79 % (457.3 ft) of the total length of stream banks. These berms were all constructed from local stones and earthen materials.

# Aquatic Habitat

Aquatic habitat is an important aspect of the Neversink River ecosystem, providing recreational, aesthetic, and economic benefits to the community. 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 East Branch of the Neversink River been given a "C(T)" class designation, supporting 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 was one piped outfall documented during this stream feature inventory which conveys storm water runoff from Wildcat Road.

Sediment from stream bank and channel erosion pose a potential threat to water quality in the Neversink River. Clay and sediment inputs into a stream may increase *turbidity* and act as a carrier for other pollutants and pathogens. There are currently 6 documented bank erosion sites in EBMU3 that could be sources of fine sediment. One of these sites (BEMS ID # NEB3_6800) is a potential contributor to turbidity in the East Branch of the Neversink River.

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

On road at Cole property *"Undersized bridge hidden under the road"*

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