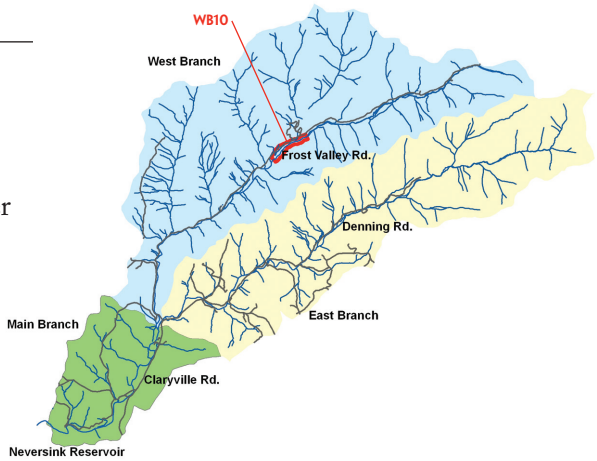
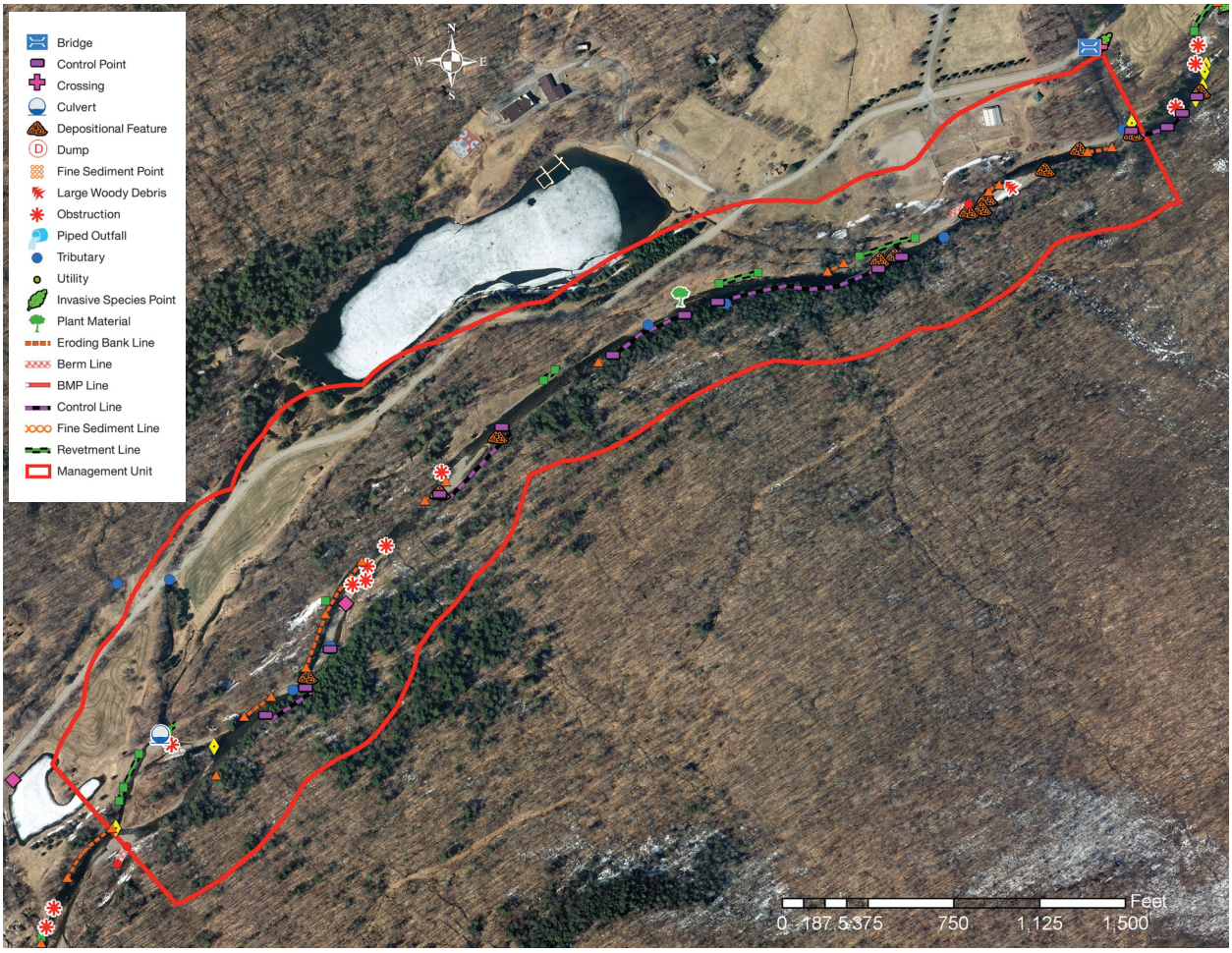
Neversink River West Branch

MANAGEMENT UNIT 10

STREAM FEATURE STATISTICS

- 9.00% of stream length is experiencing erosion
- 7.00% of stream length has been stabilized
- 27.61 acres of inadequate vegetation within the 100 ft. buffer
- None of stream is within 50 ft. of the road
- There are no building structures located in the 100-year floodplain boundary of the West Branch Neversink River.
- There are seven building structures located within the 100-year floodplain boundary of Biscuit Brook





Stream Feature Inventory 2010 (Figure 1)

Management Unit Description

This management unit begins where at the Biscuit Brook confluence at Station 40000, continuing approximately 5,700 ft. to the confluence of the outlet from Cole Lake on the Frost Valley YMCA Campus. The drainage area ranges from 9.40 mi^2 at the top of the management unit to 17.40 mi^2 at the bottom of the unit. The valley slope is close to 1.07%. The average valley width is 915.12 ft.

Summary of Recommendations West Branch Management Unit 10

Intervention Level	Assisted restoration of the bank erosion site between Station 35900 to Station 35450 (BEMS NWB10_354500). Passive restoration and monitoring of the bank erosion sites between Station 39850 and Station 39750 (BEMS NWB10_39750), Station 39300 and Station 39250 (BEMS NWB10_39250), Station 38505 to Station 38425 (BEMS NWB10_38425), Station 36470 to Station 36350 (BEMS NWB10_36350), and Station 35220 to Station 35075 (BEMS NWB10_35075)
Stream Morphology	Protect and maintain sediment storage capacity and floodplain connectivity. Conduct baseline survey of channel morphology.
Riparian Vegetation	Investigate and evaluate 23.04 acres of potential riparian buffer improvement areas for future buffer restoration. Potential riparian buffer improvement sites exist at several locations along the right bank between Station 39700 and Station 34300 (Figure 7).
Infrastructure	Further investigation of revetments at Station 38125, Station 37100, and extending 85 feet upstream and 220 feet downstream of the outlet from Lake Cole for past management activities; evaluation of site for potential riparian buffer improvement.
Aquatic Habitat	Fish population and habitat survey.
Flood Related Threats	Floodproofing as appropriate. http://www.fema.gov/library/viewRecord.do?id=1420
Water Quality	Investigate an alternative method of river crossing over Biscuit Creek to mitigate and prevent future water quality impairments from the livestock crossing. Maintain household septic systems.
Further Assessment	Long-term monitoring of erosion sites.

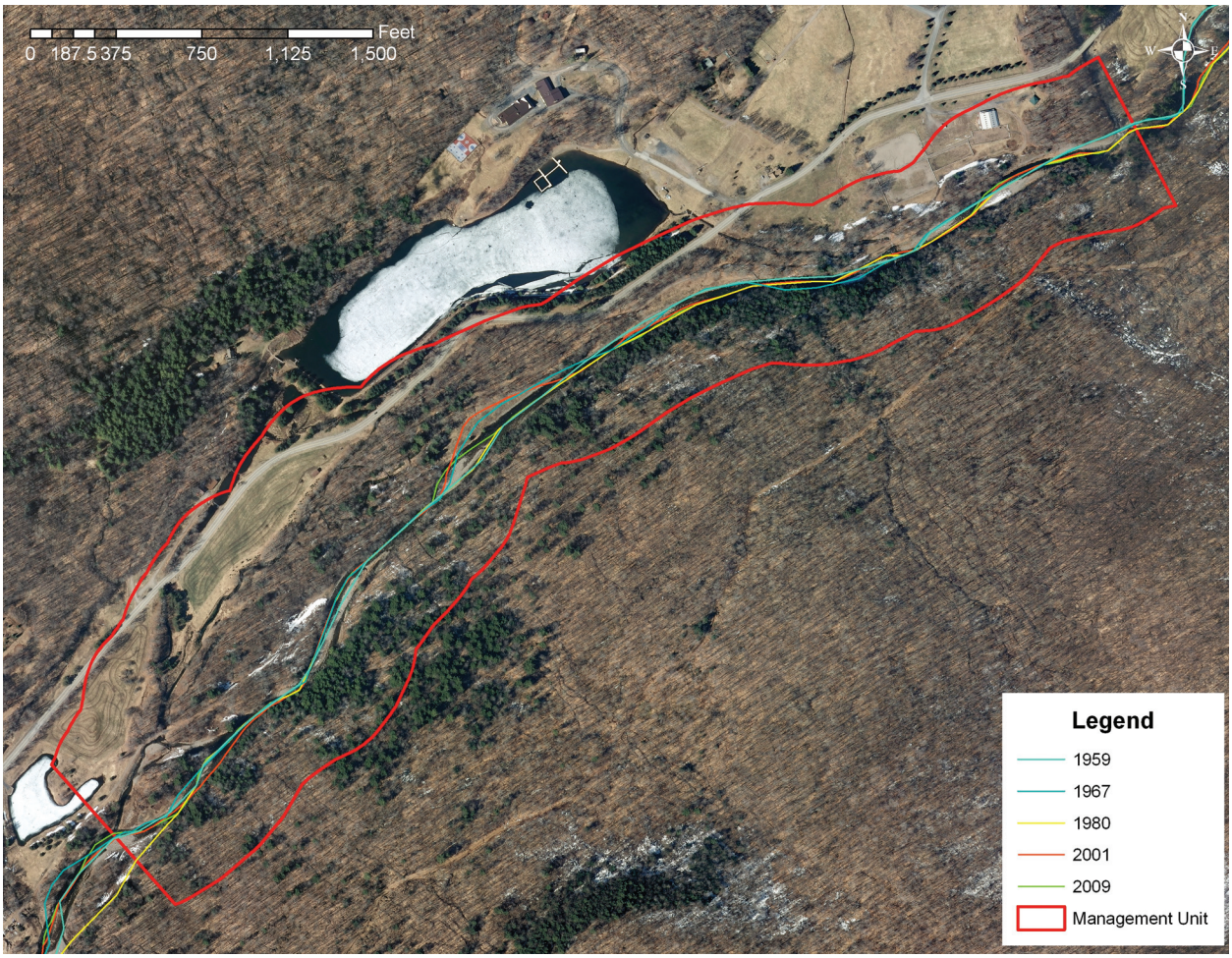
Historic Conditions

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. According to records available from the NYSDEC DART database, five 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.

The segment of the Neversink River included in WBMU10 flows adjacent to the Frost Valley YMCA West Campus which features many recreational facilities including constructed ponds and Lake Cole. In addition, the West Branch of the Neversink River is semi-confined for most of this management unit; the main channel flows adjacent to the left valley wall while maintaining access to the floodplain

on the right bank, which is largely owned and managed by Frost Valley. As a result, the current conditions and future management of the river in MUWB100 are contingent on the land use associated with this recreational and educational facility. Several large areas along the right floodplain between Station 39700 and Station 34300 consist of herbaceous vegetation or bare soil, and therefore should be further assessed for the potential of riparian buffer improvement through planting efforts *(Figure 7)*.

WBMU10 begins at the confluence of Biscuit Creek near Station 40000 *(B936)*. At the confluence with the West Branch of the Neversink Biscuit Creek has a drainage area of 9.5 square miles, conveying flow from both Pigeon Brook and Biscuit Creek which drain the slopes of Doubletop Mountain and Fir Mountain, respectively. Approximately 350 feet upstream of the convergence, Biscuit Creek flows under Frost Valley Road. Slightly downstream of the Frost Valley Road Bridge, a horse crossing through the creek and invasive Japanese barberry were observed. *(A673, A676)*

Livestock grazing areas, like the horse pasture in the right floodplain of the Neversink River in this management unit, can be nonpoint sources of pollution as manure and urine are deposited directly into or near surface waters where leaching and runoff can transport nutrients and pathogens into the water. Areas like this crossing provide direct transport of these pollutants into Biscuit Creek and the Neversink River. It is recommended that an alternative method of river crossing be investigated in this situation to mitigate and prevent future water quality impairments from the horse pasture.

Confluence of Biscuit Creek and West Branch (B936)

Horse crossing (A673)

Japanese Barberry site (A676)

Cobble side bar on right bed (B904)

Slightly upstream of the Bicuit Creek confluence a flood chute that conveys flows through the right floodplain during high flow events, which diverged in WBMU11, joins the main channel. Across from this convergence, the end of the exposed bedrock controlling both the river bed grade and planform grade on the left bank was observed, likely signaling the transition from a sediment transport reach to a sediment storage reach. This transition is further evidenced by a cobble sidebar observed on the right bed extending from Station 39700 to Station 39500. *(B940)* This bar had very little vegetation, indicating that movement of sediment is frequent in this location (both deposition from both Biscuit Creek and the main channel and transport during high flow events).

Re-vegetating hill slope failure (A1064)

Across from the depositional bar a mass failure was observed on the right bank extending approximately 100 feet from Station 39850 to Station 39750 (BEMS NWB10_39750). This site was documented as originally caused by a combination of surficial failure and hydraulic erosion, but no longer active as evidenced by thick woody vegetation growth on the slope of the failure. *(A1064)* It is likely that this bank will revegetate and stabilize without treatment (*passive restoration*). However, it is recommended that this site be monitored for changes in condition.

At the downstream extent of the mass failure of left bank and the depositional bar on the right bed, a recreation rope crossing was observed stretching over the main channel. Downstream of the rope crossing a cobble depositional bar was observed on the left stream bed with some grass and sedge vegetation and one woody debris jam. This depositional bar is across from a 200-foot long section of the right bank

Depositional bar along right bank (A1070)

Hydraulic erosion with undercut root wads (B946)

with no riparian vegetation, and extends 300 feet downstream. *(A1070)* A backwater channel was observed on the back side of the bar, which most likely conveys flow from the left valley wall to the main channel.

Transverse bar flowing towards left valley wall (A1078)

Near the downstream extent of the depositional bar on the left bed, an active eroding bank segment was observed on the right bank extending 50 feet from Station 39300 to Station 39250 (BEMS NWB10_39250). The site was documented as caused by hydraulic erosion leading to scour with exposed alluvial materials and undercut root wads. Some leaning trees from the forested riparian buffer at the top of the bank were also observed. *(B946)* While bank retreat can be expected in this area as the depositional bar on the left bed forces the main channel to migrate into this bank, the wide band of riparian forest between the main channel and the horse pasture will significantly slow erosion. Therefore, it is recommended that this bank be left to stabilize without treatment (*passive restoration*) and that the site be monitored for changes in condition.

A transverse bar was observed extending across the cobble stream bed for approximately 100 feet near Station 39150 which forces flow toward the left valley wall. *(A1078)* Downstream of the transverse bar a depositional bar composed of cobble with some grass vegetation was observed on the right bank extending approximately 300 feet from Station 39100 to 38800. Behind the depositional bar a stone berm was observed on the the right bank extending 85 feet from Station 39150 to Station 39065. *(B951)* The berm appeared to be designed to protect a dirt road on the right bank. Near Station 38950 an intermittent tributary joins the main channel conveying runoff from the left valley wall.

Stone berm on right bank (B951)

Sloped stone revetment (B959)

Water from the Neversink River is diverted to fill Cole Lake on the Frost Valley YMCA Campus. The diversion was observed near Station 38800 where it coveys flow through a culvert under a dirt road on the right bank and then through the riparian forest underneath Frost Valley Road to Lake Cole. A sloped stone revetment was observed protecting the dirt road along this section of the river with a sparse riparian buffer, from Station 38850 to Station 38600. The revetment was observed in fair structural and functional condition. *(B959, A1082)*

An eroding bank segment was observed on the right bank at the downstream end of the revetment extending 80 feet from Station 38505 to Station 38425 (BEMS NWB10_38425). This eroding bank is most likely caused by hydraulic erosion which is exposing alluvial materials and undercutting root wads of the forested riparian buffer at the top of the bank. Although the site was documented as actively eroding during high flow events, grasses and sedges were observed growing at the bank toe. Therefore it is likely that this bank will revegetate and stabilize without treatment (*passive restoration*). However, it is recommended that this site be monitored for changes in condition.

Water diversion to fill Cole Lake (A1082)

A constructed boulder grade control was observed across the main channel directly downstream of the diversion to Lake Cole.

Looking upstream at center bar and boulder dam (A1085)

The boulder control was documented in good structural and functional condition. A cobble center bar with thick grass and sedge vegetation was observed extending 100 feet downstream. The center bar was most likely caused by decreased sediment transport capacity in the main channel due to the diversion of flow to Lake Cole. *(A1085)*

At the end of the center bar, near Station 38680, exposed bedrock was observed controlling the stream bed grade and constraining lateral migration on the left bank. This natural control continued approximately 600 feet downstream with intermittent tributaries conveying flow from the left valley wall joining the main channel at both ends. The bedrock is then not visible for approximately 200 feet before it is exposed again and continues another 400 feet. *(A1104)*

Exposed bedrock on left bank (A1104)

Sloped stone revetment stabilizing bank (B976)

Potential willow harvest site (B979)

Depositional cobble center bar (A1113)

A 600-foot section of the right bank has only grass and sedge growth for a riparian buffer in this segment of the river, indicating a much wider floodplain than in similar reaches in this management unit. A sloped stone revetment was observed stabilizing the bank for this upstream 175 feet of this section, from Station 38125 to Station 38050. The revetment was documented in fair structural and functional condition. *(B976)*. A similar channel section was observed on the right bank from Station 37100 to Station 36500 with a stacked rock revetment extending 75 feet from Station 37100 to Station 37025. This revetment was documented in good functional condition and good structural condition.

It is recommended these two river segments be further investigated for past management activities and that the sites be evaluated for potential riparian buffer improvement. The willows documented growing on the right bank at Station 37800 could be a plant source for future restoration or riparian buffer improvement projects in this area. *(B979)*

Near Station 36800 the exposed bedrock grade and planform control is again visible for 400 feet until Station 36400. A depositional cobble center bar with grass and sedge vegetation and some large woody debris was observed on the stream bed for this 400-foot extent as well, ending at a large boulder near Station 36400. *(A1113, A1112)* Near the end of this depositional feature an eroding bank segment was observed on the right bank extending 120 feet from Station 36470 to Station 36350 (BEMS NWB10_36350).

This site was documented as active with hydraulic erosion causing scour that has exposed alluvial materials and undercut the roots of woody

Exposed bedrock grade and planform control (A1112)

Hydraulic erosion of bank (B992)

Deposition bar with sparse vegetation and woody debris (A1120)

riparian vegetation at the top of the bank. While bank retreat can be expected in this area as the depositional center bar forces the main channel to migrate into this bank, the wide band of riparian forest between the main channel and Frost Valley Road will significantly slow erosion. Therefore, it is recommended that this bank be left to stabilize without treatment *(passive restoration)* and that the site be monitored for changes in condition. *(B992)*

The aggradational trend continues for the remaining 1,600 feet of the main channel in WBMU10, with several depositional features on the left bed against the left valley wall with sparse vegetation (indicating frequent sediment transport) and many large woody debris deposits. *(A1120)*. Another potential area for riparian buffer improvement was observed on the right bank from Station 35900 to Station 35700, with an eroding bank segment observed from Station 35900 to Station 35450 (BEMS NWB10_35450). *(B998)* This site was documented as active with hydraulic erosion causing scour that has exposed alluvial materials. Bank retreat can be expected in this area as the left valley wall and the depositional bar on the

Eroding right bank (B998)

left bed extending the length of the eroding site force the main channel to migrate into this bank. Recommendations for this site include *assisted restoration* using bioengineering techniques to re-establish a healthy riparian buffer and stabilize the eroding bank.

Downstream of the erosion site the main channel flows adjacent to exposed bedrock on the left bank for 200 feet between Station 35330 and Station 35130 *(A1129)*. An eroding bank segment was observed on the right bank as the main channel meanders away from the bedrock control, extending 145 feet from Station 35220 to Station 35075 (BEMS NWB10_35075). This site was documented as active with hydraulic erosion causing scour that has exposed alluvial materials. *(B1013)* Although the site was documented as actively eroding during high flow events, grasses and sedges were observed growing at the bank toe. Therefore it is likely that this bank will revegetate and stabilize without treatment (*passive restoration*). However, it is recommended that this site be monitored for changes in condition.

Exposed bedrock on left bank (A1129)

Re-vegetating bank (B1013)

Convergence with outlet from Cole Lake (B1017)

Rip rap revetment (B1021)

Sloped stone revetment (A1137)

At Station 34900 a dry side channel diverges around a forested center island toward the right floodplain, converging with the outlet from Cole Lake near Station 34600. *(B1017)* A rip-rap revetment was observed extending 85 feet upstream of the Lake Cole outlet and a sloped stone revetment was observed extending 220 feet downstream of the oulet. Both revetments were documented in good structural and functional condition. The top of the banks at both revetments features a dirt road used for horseback riding in the summer and cross-country skiing in the winter with no riparian vegetation between the road and the bank. Recommendations for this site include *assisted restoration* using bioengineering techniques to re-establish a healthy riparian buffer which can aid in bank stability and control nutrient and sediment runoff from the dirt road. *(B1021, A1137)*

The side channel converges with the main channel at Station 34300, at the end of WBMU10.

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 mix of sediment storage reaches and sediment transport reaches. The storage reaches act as a "shock absorber", holding *bedload* delivered during large flow events in depositional bars and releasing it slowly over time in more moderate flood events. These depositional areas are very dynamic, with frequent lateral channel migration through bank erosion, *avulsions* and woody debris accumulations. The densely forested portion of the watershed 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 the right bank throughout WBMU10 reduce the velocity of higher flows thereby mitigating the threat of stream bank erosion and property damage during flood events.

In some locations in WBMU10 the river is confined by the left valley wall and high banks on the right bank leaving little accessible floodplain for sediment deposition and storage. These sections of the river act as transport reaches. Transport reaches are in a state of *dynamic equilibrium,* effectively conveying sediment supplied from upstream during each flow event.

To better understand sediment transport dynamics of this section of the Neversink, a baseline survey of channel form and function is recommended for this management unit.

Riparian Vegetation

One of the most cost-effective methods for landowners to protect streamside property is to maintain or replant a healthy buffer of trees and shrubs along the bank, especially within the first 30 to 50 ft. of the stream. A dense mat of roots under trees and shrubs bind the soil together, and makes it much less susceptible to erosion under flood flows. Mowed lawn does not provide adequate erosion protection on stream banks because it typically has a very shallow rooting system. Interplanting with native trees and shrubs can significantly increase the working life of existing rock rip-rap placed on stream banks for erosion protection. Riparian, or streamside, forest can buffer and filter contaminants coming from upland sources or overbank flows. Riparian plantings can include a great variety of flowering trees and shrubs, native to the Catskills, which are adapted to our regional climate and soil conditions and typically require less maintenance following planting and establishment.

Some plant species that are not native can create difficulties for stream management, particularly if they are invasive. Japanese knotweed (Fallopia japonica), for example, has become a widespread problem in recent years. Knotweed shades out other species with it's dense canopy structure (many large, overlapping leaves), but stands are sparse at ground level, with much bare space between narrow stems, and without adequate root structure to hold the soil of stream banks. The result can include rapid stream bank erosion and increase surface runoff impacts. There were no occurrences of Japanese knotweed documented in this management unit during the 2010 inventory.

An analysis of vegetation was conducted using aerial photography from 2009 and field inventories *(Figure 5)*. In this management unit the predominant vegetation type within the riparian buffer is deciduous closed tree canopy (43.34 %) followed by herbaceous vegetation (18.98%) and mixed closed tree canopy (13.09%). *Impervious* area makes up 2.32% of this unit's buffer. There are 23.0 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 6.31 acres of wetland (5.68% of WBMU10 land area) within this management unit mapped in the National Wetland Inventory as four distinct classifications (see Section 2.5, *Wetlands and Floodplains* for more information on the National Wetland Inventory and wetlands in the Neversink watershed). Wetlands are important features in the landscape that provide numerous beneficial functions including protecting and improving water quality, providing fish and wildlife habitats, storing floodwaters, and maintaining surface water flow during dry periods (See Section 2.5 for wetland A type descriptions and regulations). The wetland classified as Riverine is 4.26 acres in size, the wetland classified as Freshwater Forested Shrub is 1.59 acres in size, the wetland classified as Freshwater Pond is 0.39 acres in size, and the wetland classified as Freshwater Emergent is 0.07 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 building structures in WBMU10 within the 100-year floodplain of the West Branch and seven building structures within the 100-year floodplain of Biscuit Creek 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 semi-confined channel condition in WBMU10, the right stream bank within the management unit are at a relatively high risk of erosion as the thalweg of the main channel is frequently forced into the easily erodible alluvial materials on the right bank. Six areas of erosion were documented in the management unit during the stream feature inventory.

A mass failure was observed on the right bank extending approximately 100 feet from Station 39850 to Station 39750 (BEMS NWB10_39750). This site was documented as originally caused by a combination of surficial failure and hydraulic erosion, but no longer active as evidenced by thick woody vegetation growth on the slope of the failure.

An active eroding bank segment was observed on the right bank extending 50 feet from Station 39300 to Station 39250 (BEMS NWB10_39250). The site was documented as caused by hydraulic erosion leading to scour with exposed alluvial materials and undercut root wads. Some leaning trees from the forested riparian buffer at the top of the bank were also observed.

An eroding bank segment was observed on the right bank extending 80 feet from Station 38505 to Station 38425 (BEMS NWB10_38425). This eroding bank is most likely caused by hydraulic erosion which is exposing alluvial materials and undercutting root wads of the forested riparian buffer at the top of the bank.

An eroding bank segment was observed on the right bank extending 120 feet from Station 36470 to Station 36350 (BEMS NWB10_36350). This site was documented as active with hydraulic erosion causing scour that has exposed alluvial materials and undercut the roots of woody riparian vegetation at the top of the bank.

An eroding bank segment was observed on the right bank as the main channel meanders away from the bedrock control, extending 145 feet from Station 35220 to Station 35075 (BEMS NWB10_35075). This site was documented as active with hydraulic erosion causing scour that has exposed alluvial materials. Although the site was documented as actively eroding during high flow events, grasses and sedges were observed growing at the bank toe.

In most of these locations bank retreat can be expected as the confinement by the left valley wall and depositional features on the left bed force the main channel to migrate into the right bank. However, in most cases the wide band of riparian forest between the main channel and pasture or Frost Valley Road will significantly slow erosion. It is likely that these banks will revegetate and stabilize without treatment (*passive restoration*). However, it is recommended that this site be monitored for changes in condition.

An eroding bank segment observed from Station 35900 to Station 35450 (BEMS NWB10_354500). This site was documented as active with hydraulic erosion causing scour that has exposed alluvial materials. Because of the thin riparian buffer on this bank segment, recommendations for this site include *assisted restoration* using bioengineering techniques to re-establish a healthy riparian buffer and stabilize the eroding bank.

INFRASTRUCTURE Several revetments and a berm were observed in WBMU10, largely designed to protect and stabilize the right bank that is particularly susceptible to erosion in this management unit for reasons discussed above.

A sloped stone revetment was observed protecting a dirt road with a sparse riparian buffer from Station 38850 to Station 38600. The revetment was observed in fair structural and functional condition.

A sloped stone revetment was observed stabilizing the bank for 175 feet from Station 38125 to Station 38050. The revetment was documented in fair structural and functional condition. A second stacked rock revetment was observed extending 75 feet from Station 37100 to Station 37025 performing a similar function. This revetment was documented in good functional condition and good structural condition.

A rip-rap revetment was observed extending 85 feet upstream of the Lake Cole outlet and a sloped stone revetment was observed extending 220 feet downstream of the outlet. Both revetments were documented in good structural and functional condition. The top of the banks at both revetments features a dirt road used for horseback riding in the summer and cross-country skiing in the winter with no riparian vegetation between the road and the bank.

A stone berm was observed on the the right bank extending 85 feet from Station 39150 to Station 39065. The berm appeared to be designed to protect a dirt road on the right bank.

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 and tributaries in WBMU10 have been classified as "C(T)" with best usage for fishing, and indicating the presence of trout. Trout spawning likely occurs in this management unit, but has not yet been documented in the DEC classification.

Channel and floodplain management can modify the physical structure of the stream in some locations, resulting in the filling of pools, the loss of stream side cover and the homogenization of structure and hydraulics. As physical structure is compromised, inter-species competition is increased. Fish habitat in this management unit appears to be relatively diverse.

It is recommended that a population and habitat study be conducted on the Neversink River, with particular attention paid to temperature, salinity, riffle/pool ratios and quality and in-stream and canopy cover.

Water Quality

The primary potential water quality concerns in the Neversink as a whole are the contaminants contributed by atmospheric deposition (nitrogen, sulfur, mercury), those coming from human uses (nutrients and pathogens from septic systems, chlorides (salt) and petroleum by-products from road runoff, and suspended sediment from bank and bed erosion. Little can be done by stream managers to mitigate atmospheric deposition of contaminants, but good management of streams and floodplains can effectively reduce the potential for water quality impairments from other sources.

Storm water runoff can have a considerable impact on water quality. When it rains, water falls on roadways and flows untreated directly into the Neversink River. The cumulative impact of oil, grease, sediment, salt, litter and other unseen pollutants found in road runoff can significantly degrade water quality. There are no piped outfalls that convey storm water runoff directly into the Neversink River in this management unit, although the river flows adjacent to a dirt road on the right bank used for horseback riding and recreation in many locations.

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. The bank erosion sites in WBMU10 mostly exposed alluvial materials which are not a source of fine sediment or 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. Seven building structures are located in relatively close proximity to the Biscuit Creek 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**.