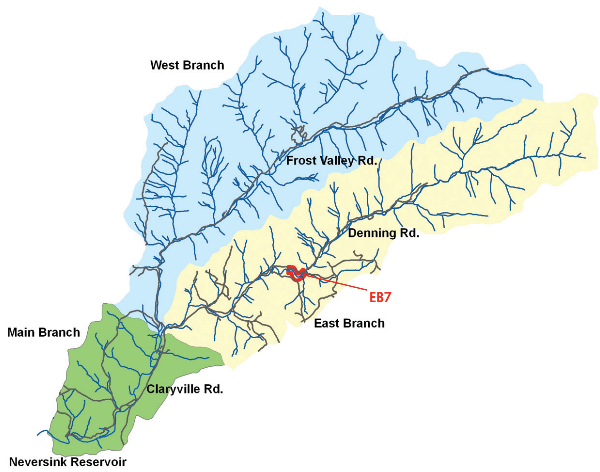
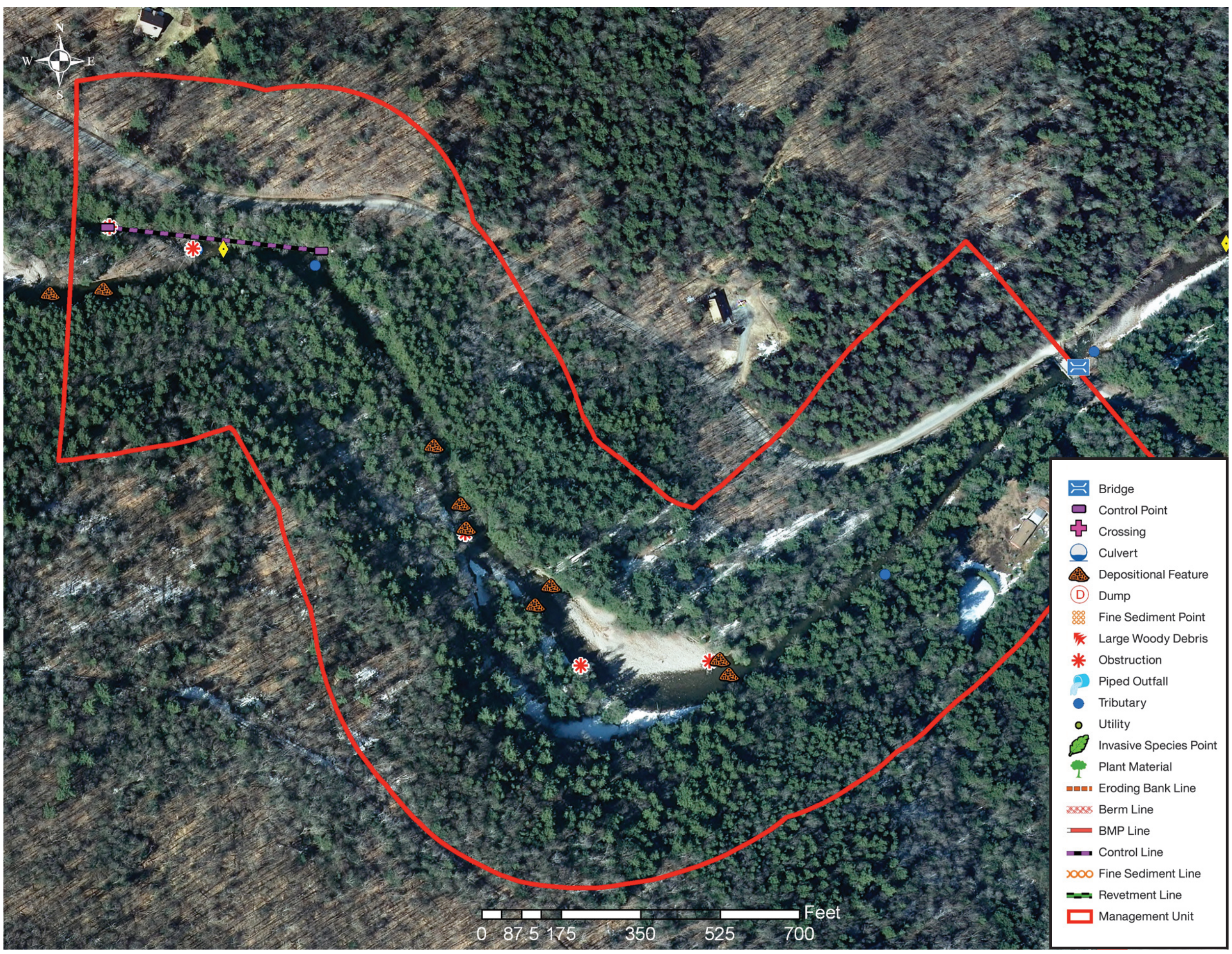
Neversink River East Branch

MANAGEMENT UNIT 7

- None of stream length is experiencing erosion
- None of stream length has been stabilized
- 3.23 acres of inadequate vegetation within the riparian buffer
- 1,550 ft. of the stream length is within 50 ft. of the road
- No structures are located within the 100-year floodplain boundary





Stream Feature Inventory 2010 (Figure 1)

Management Unit Description

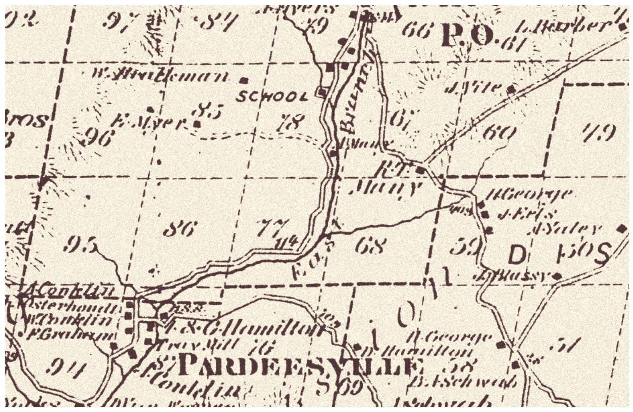
This management unit begins at a location where the valley floor begins to widen, continuing approximately 2,992 ft. to a bridge crossing of Denning Road. The drainage area ranges from 18.70 mi^2 at the top of the management unit to 19.90 mi^2 at the bottom of the unit. The valley slope is 0.86%. The average valley width is 720.67 ft.

Summary of Recommendations
East Branch Management Unit 7

Intervention Level	None.
Stream Morphology	Assess sediment deposition and channel migration from the accumulation of large woody debris supplied by the watershed upstream. Conduct baseline survey of channel morphology.
Riparian Vegetation	None.
Infrastructure	Assess flood threats to Denning Road.
Aquatic Habitat	Fish population and habitat survey.
Flood Related Threats	None.
Water Quality	None.
Further Assessment	Include MU7 in comprehensive Local Flood Hazard Mitigation Analysis of Claryville MUs.

Historic Conditions

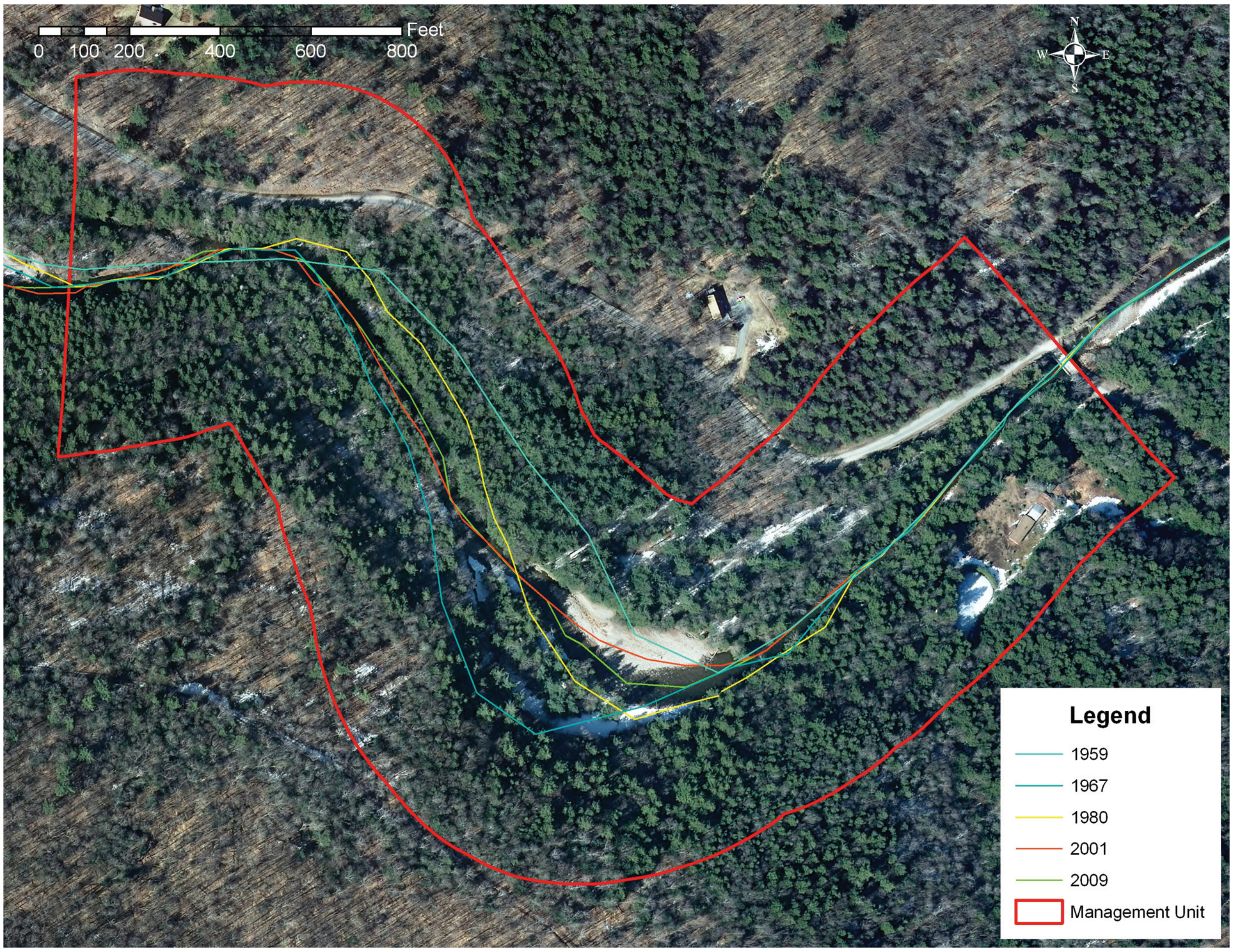
As the glaciers retreated about 12,000 years ago, they left their "tracks" in the Catskills. See Section 2.4 *Geology of Upper Neversink River,* for a description of these deposits. These deposits make up the soils in the high banks along the valley walls on the Neversink mainstem and its tributaries. These soils are eroded by moving water, and are then transported downstream by the River. During the periods when the forests of the Neversink watershed were heavily logged for bark, timber, firewood and to make pasture for livestock, the change in cover and the erosion created by timber skidding profoundly affected the Neversink hydrology and drainage patterns.



Excerpt from 1875 Beers Map (Figure 2)

The 1875 Beers Atlas of this area indicates that by that time, the stream had been harnessed for manufacturing, primarily saw mills, woodworking shops and tanneries *(Figure 2).* Raceways were built in the floodplains to divert water to ponds for use as needed. Floodplains were profoundly altered in the process, as these watercourses also became areas of preferential channelized flow when floodwaters inundated the floodplains. When woody debris jams blocked the primary channels, these raceways sometimes eroded out to become major secondary channels, or even took over the full flow to become a new primary watercourse.

During large runoff events, floodplains adjacent to the confluence of major tributaries receive large slugs of material eroded out of the steep streams draining the valley walls. overwhelmed the Neversink's ability to transport it, creating an alluvial fan. Like changes in the floodplains made by humans, these episodes can result in catastrophic shifts in channel alignment. In the roughly one hundred and twenty centuries since the retreat of the glaciers, the position of Neversink River has moved back and forth across its floodplain numerous times in many locations. A comparison of historical channel alignments *(Figure 3, following page)* and in-stream observations made during a stream feature inventory in 2010 *(Figure 1, page 1)* indicate significant lateral channel instability, 1 NYS Article 15 stream disturbance permit has 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.

The East Branch of the Neversink flows into EBMU7 under the Denning Road bridge at Station 28000, which is described in detail in EBMU8. The channel is confined in some locations, but for the most part does maintain a narrow floodplain that is relatively well forested. Denning Road continues runs through the right floodplain, coming within 50-feet of the stream for a stretch at the top of the management unit.

Tributary entering on left bank (B2)

Overwidening of channel due to aggradation (B5)

The majority of the property in EBMU7 is owned by the Frost Valley YMCA.

An unnamed tributary enters from the left at Station 27400, contributing a perennial flow that is significant even under low flow conditions. *(B2)* This tributary drains through a densely forested section of the valley and is likely well filtered through natural processes. 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.

Obstruction on right bank contributing to development of point bar (B11)

Continuing downstream, the deposition of large woody debris and sediment becomes evident at Station 27000 and continues until approximately Station 26060. Excessive amounts of sediment storage mark this reach in the form of depositional bars and full channel aggradation. At Station 27000, the entire width of the channel has become aggraded with cobble sized materials, causing overwidening of the channel as well as increased elevation of the stream bed. *(B5)* Along the right side of the stream in the same location a large tree has deposited, obstructing high flows and contributing to the development of a point bar along the right bank. *(B11)* This bar continues for approximately 480-feet until Station 26520. *(B6)* Aside from some sedges along the left side, this bar does not have established mature vegetation on it.

The stream meanders slightly to the left as it flows past the point bar but stays over 200-feet from contact with the left valley wall. A fallen tree is causing a flow obstruction at Station 26650. *(B17)* This tree spans 70-feet with its root ball still attached, which is facing upstream and directly into direct flow. During high

Point bar along right bank (B6)

Fallen tree causing flow obstruction (B17)

flows, this tree is forcing the water into the left bank, resulting in minor erosion just upstream of the obstruction. At Station 26500, a cobble side bar has formed on the left side of the stream which continues approximately 250-feet to Station 26250. *(B20)* This bar appears to be actively forming and has no established vegetation on it. Large woody debris has deposited as an obstruction at the downstream end of the bar, contributing to the backwater effect that has resulted in the development of this bar. *(A5)*

On the right side of the stream, another cobble side bar has formed at Station 26200. This bar is approximately 140-feet in length, ending at Station 26060. *(B28)*

The channel flows up against the right valley wall at Station 25600 before taking a sharp left turn and entering into a relatively straight reach for the remainder of EBMU7. Flow is laterally controlled on the right side by exposed bedrock from Station 25600 to Station 25100. *(A12)* A small unnamed tributary enters from the right bank at the start of the expose bedrock. *(A9)* This channel most likely carries storm drainage from the nearby portion of Denning Road.

Cobble sidebar on left side of stream (B20)

Obstruction contributing to side bar development (A5)

Cobble sidebar on right side of stream (B28)

Exposed bedrock controlling flow (A12)

Small tributary entering on right bank (A9)

Large woody debris jam causing divergence (A17)

Small tributary entering on right through bedrock (A19)

At Station 25390, large woody debris has deposited and is causing a divergence of a small portion of the flow into a side channel to the right. *(A17)* Although this side channel flows in the direction of Denning Road, the steep bedrock wall keeps it confined on the right side and prevents any potential flood threats. A small tributary drains in from the right through the bedrock wall near this same location. *(A19)*

EBMU7 ends at Station 25030 where the stream begins to move away from the valley walls and the floor opens up, representing a change in valley type and associated channel morphology. Like most of EBMU7, the downstream end of this management unit does not transport sediment effectively. Aggradation of the full channel with cobble sized materials was documented at Station 25100. *(B34)*

Full channel aggradation (B34)

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 EBMU7 is confined in some locations, but for the most part does maintain a narrow floodplain that is relatively well forested. 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 migration through bank erosion, *avulsions* and woody debris accumulations. This is one process by which floodplains are created and maintained. Sediment storage reaches can result from natural conditions or as the unintended consequence of poor bridge design, check dams or channel overwidening. While such unpredictable conditions represent risks for nearby property owners, these dynamic disturbance regimes produce unique and diverse habitat patches, attracting equally diverse plant communities and wildlife.

To better understand sediment transport 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 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.

An analysis of vegetation was conducted using aerial photography from 200 and field inventories *(Figure 5).* In this management unit, the predominant vegetation type within the riparian buffer is evergreen-closed tree canopy (51.50%) followed by mixed-closed tree canopy (31.42%). *Impervious* area makes up 2.58% of this unit's buffer. No occurrences of Japanese knotweed were documented in this management unit during the 2010 inventory.

There are 0.35 acres of wetland (0.67% of EBMU7 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). The only wetland type present in EBMU7 is Freshwater pond.

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. No building structures are located in the 100-year floodplain in EBMU7. 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.

Small portions of Denning Road at the top and bottom of this management unit fall within the 100-year floodplain boundary and are at high risk of inundation during flood events. Throughout most of EBMU7 the road falls just outside of the floodplain boundary, but could still be inundated during large floods.

BANK EROSION No active bank erosion was documented at the time of this inventory.

INFRASTRUCTURE None of the stream bank length in this management unit has been stabilized with revetment. There were no berms documented in EBMU7 during this inventory.

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 uses 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 were no piped outfalls documented during this stream feature inventory.

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 no documented bank erosion sites in EBMU7 that could be sources of fine sediment.

Nutrient loading from failing septic systems is another potential source of water pollution. Leaking septic systems can contaminate water making it unhealthy for swimming or wading. 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

"Tributary from up the mountain across the road is increasing in size by about 4–5 feet in 32 years."

"River is moving closer to house"

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