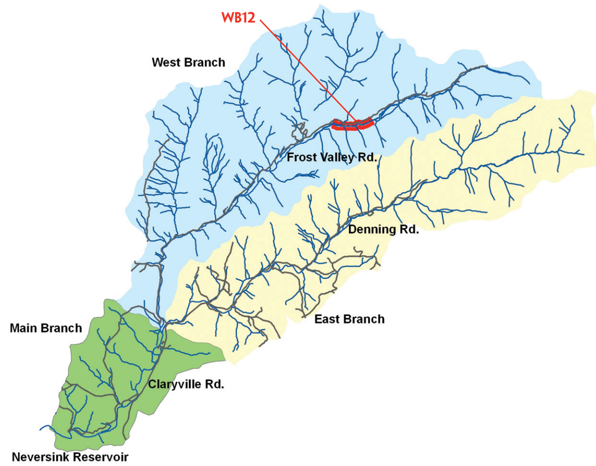
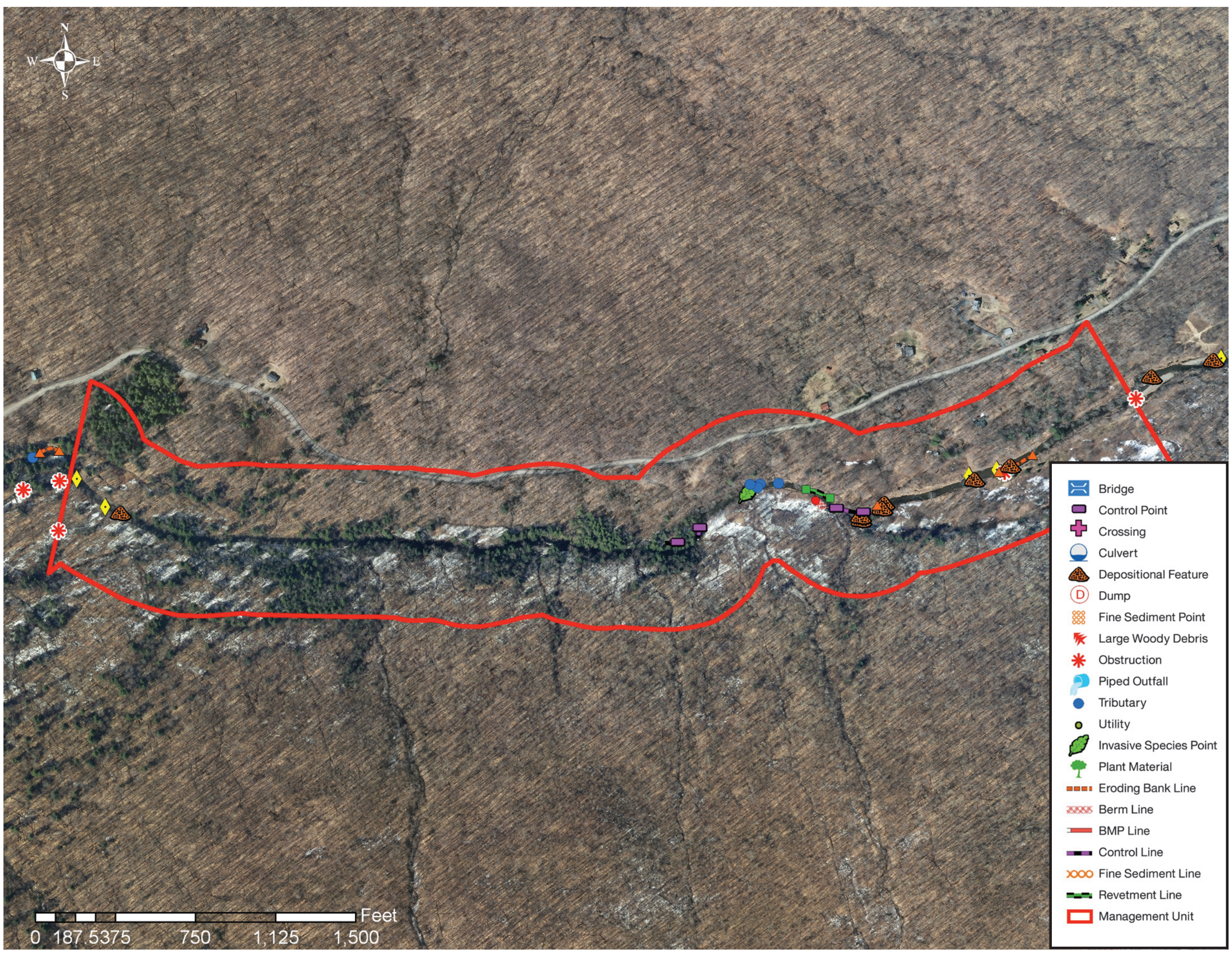
Neversink River West Branch

MANAGEMENT UNIT 12

STREAM FEATURE STATISTICS

- 2.00% of stream length is experiencing erosion
- 1.10% of stream length has been stabilized
- 3.41 acres of inadequate vegetation within the 100 ft. buffer
- None of stream is within 50 ft. of the road
- No structures are located within the 100-year floodplain boundary





Stream Feature Inventory 2010 (Figure 1)

Management Unit Description

This management unit begins at a valley pinch point near Station 49100 and continues 5,400 feet to the eastern boundary of the Frost Valley YMCA campus near Station 43700. The drainage area ranges from 7.30 mi^2 at the top of the management unit to 8.50 mi^2 at the bottom of the unit. The valley slope is close to 1.54%. The average valley width is 245.67 ft.

Summary of Recommendations West Branch Management Unit 12

Intervention Level	Preservation.
Stream Morphology	Protect and maintain sediment storage capacity and floodplain connectivity. Conduct baseline survey of channel morphology.
Riparian Vegetation	Investigate and evaluate 2.12 acres of potential riparian buffer improvement areas for future buffer restoration. Refer to Figure 7 for locations of riparian buffer improvement areas.
Infrastructure	None.
Aquatic Habitat	Fish population and habitat survey.
Flood Related Threats	None.
Water Quality	None.
Further Assessment	Include MU12 in comprehensive Local Flood Hazard Mitigation Analysis of Claryville MUs.

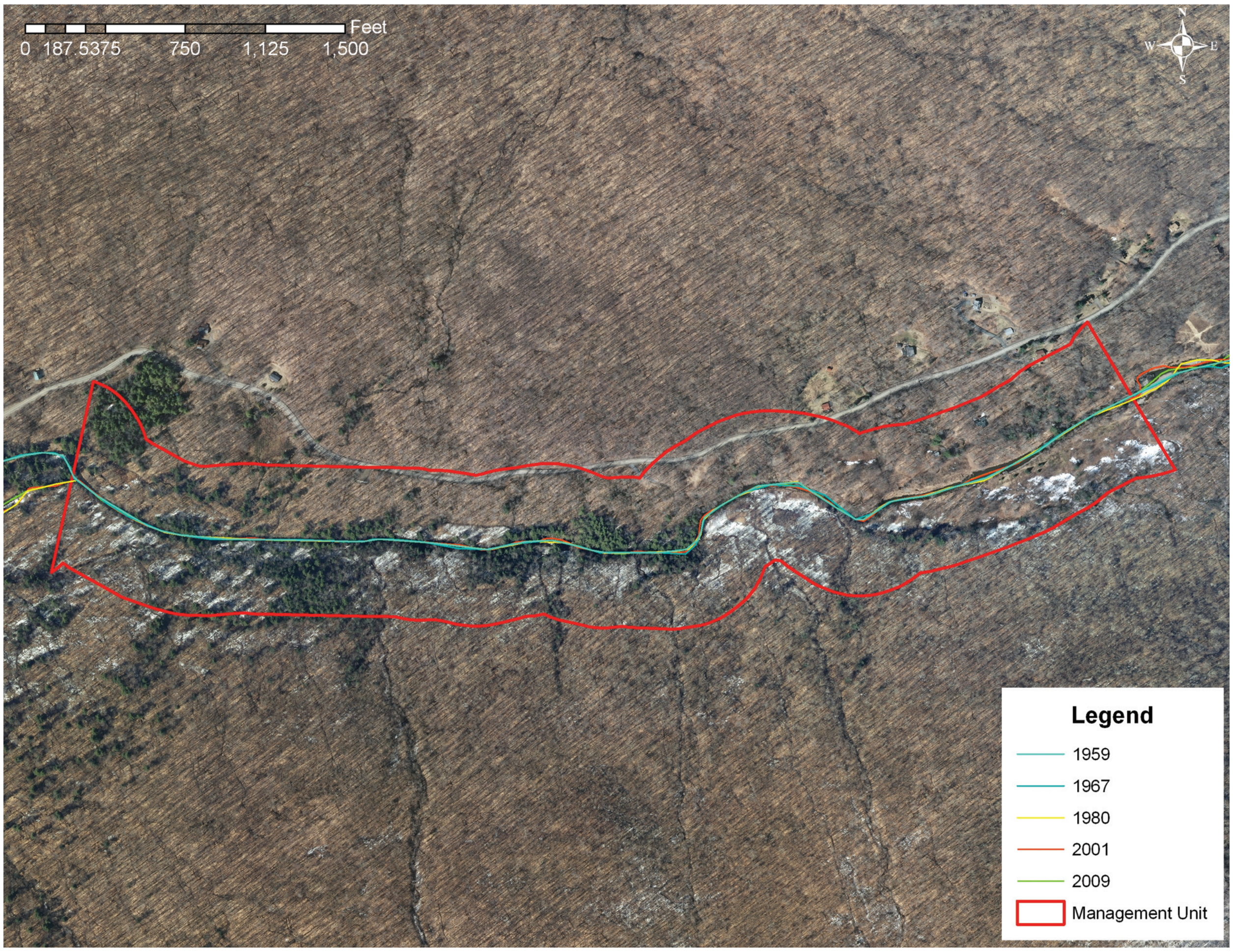
Historic Conditions

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. One such setting is evident in the middle of this management unit, where a significant tributary draining the ridge between Wildcat and Slide Mountains confluences with the West Branch of the Neversink. 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. However, 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 little lateral channel instability in this management unit, and according to records available from the NYSDEC DART database, no NYS Article 15 stream disturbance permits have been issued here.



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.

Aside from 150 feet on the right bank near Station 48300, both banks of the Neversink River in MBMU12 are on New York State land in the Catskill Preserve until Station 44800 where the river flows onto the Frost Valley YMCA campus. These lands are in "forever wild" status and so are not managed;

hence, while major features were inventoried to better understand the channel form and river processes in this location and are described briefly below, no recommendations were made for these reaches.

From Station 48580 to Station 48400 an eroding bank segment was observed on the left bank (BEMS NWB12_48400). Although large material is accumulating at the toe of the bank, hydraulic erosion during high flow events entrains fine sediments in the bank. An exposed root wad at the end of the eroding bank segment was contributing to formation of a deep scour pool downstream, followed by a depositional center bar composed of cobble and gravel. *(A963, A969)* A headcut was observed in the cobble bed of the main channel near Station 48300. The absence of bedrock control in this section of the stream suggests that this headcut could migrate upstream to the pool and bank scour segment.

This aggradational reach continues for 500 feet downstream, at which point the main channel meanders slightly to the left to flow adjacent to the left valley wall. The streambed in this reach becomes dominated by boulders, which provide some lateral and vertical stability. A significant unnamed tributary joins the main channel from the left valley wall, and a significant accumulation of boulders provide toe protection on the left bank here. A cobble side bar was observed on the right bank. *(A977, B853)* Depositional features, such as this side bar, often form upstream of where natural valley features form a pinch point, restricting flows that would otherwise effectively transport sediment.

The boulder control continues for 130 feet on the left bank, ending slightly downstream of Station 47600. At Station 47520 a 40-foot long

Left bank erosion (A963)

Root wad contributing to scour (A969)

Cobble side bar on right bank (A977)

Boulder toe protection on left bank (B853)

Stacked rock revetment protecting dirt road on right bank (B856)

Full channel aggradation (B884)

stone berm was observed on the left bank which appeared to be designed to protect a campsite on the left bank during high flow events. Across from the berm, stacked rock revetment was observed on the right bank extending 120 feet from Station 47520 to Station 47400. The revetment appeared to be designed to protect a dirt road on the right bank from erosion during high flow events, and was documented in good functional condition and fair structural condition. *(B856)*

Two hundred feet downstream of the revetment on the right bank, near Station 47200, several intermittent tributaries convey road drainage from Frost Valley Road through the forested right bank to the main channel.

Near Station 46800, the channel becomes entrenched, with high banks on both sides, and bedrock controls in bed and banks for the next two thousand feet, with occasional small waterfalls.

The river leaves NYS land near Station 44800, and the entrenched conditions begin to diminish. This reach of the river is straight until it begins a slight meander toward the right valley wall with full channel aggradation beginning at Station 44000 *(B884)* and a side channel diverging into the forested floodplain on the left bank near Station 43950.

WBMU12 ends near Station 43700 where the main channel turns to the south, flowing back toward the left valley wall, and an historic channel continues into the forested floodplain on the right bank.

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 has both 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.

Much of this management unit, however, is composed of sediment transport reaches, with relatively low channel sinuosity and narrow, bankfull stage floodplains of moderate entrenchment with mature vegetation. In some locations in WBMU12 the river is confined by the bedrock or high banks, with relatively little floodplain available for short-term sediment deposition and storage. Transport reaches, like the areas in WBMU12 with boulder or bedrock grade and planform control, are in a state of *dynamic equilibrium,* effectively conveying sediment supplied from upstream during each flow event. However, the densely forested floodplain still serves as a source of large woody material that that can be introduced into the channel during flood events. This large woody debris often serves as a local obstruction to sediment transport, resulting in the aggradation of bed material and the development of floodplains over the long-term. Healthy, undeveloped floodplains throughout the Neversink watershed like those in this management unit reduce the velocity of higher flows, thereby mitigating the threat of stream bank erosion and property damage during flood events.

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 (69.14 %) followed by evergreen closed tree canopy (11.90%). *Impervious* area makes up 1.36% of this unit's buffer. There are 2.1 acres of potential buffer improvement area in this management unit *(Figure 7)*. No occurrences of Japanese knotweed were documented in this management unit during the 2010 inventory.

There are 0.04 acres of wetland (0.05% of WBMU12 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 A type descriptions and regulations). All of the wetland in WBMU12 is classified as Freshwater Emergent wetland.

Flood Threats

INUNDATION As part of its National Flood Insurance Program (NFIP), the Federal Emergency Management Agency (FEMA) performs hydrologic and hydraulic studies to produce Flood Insurance Rate Maps (FIRM), which identify areas prone to flooding. The upper Neversink River is scheduled to have its FIRMs updated with current surveys and hydrology and hydraulics analysis in the next few years, and the mapped boundaries of the 100-year floodplain are likely to change. There are no structures WBMU12 within the 100-year floodplain as identified on the FIRM maps.

BANK EROSION One area of erosion was documented in the management unit during the stream feature inventory. From Station 48580 to Station 48400 an eroding bank segment was observed on the left bank (BEMS NWB12_48400). Although this site appeared to be hardening at the toe, hydraulic erosion during high flow events appeared to be continuing to dislodge fine sediments in the bank.

INFRASTRUCTURE At Station 47520 a 40-foot long stone berm was observed on the left bank which appeared to be designed to protect a campsite on the left bank during high flow events. Across from the berm, a stacked rock revetment was observed on the right bank extending 120 feet from Station 47520 to Station 47400. The revetment appeared to be designed to protect a dirt road on the right bank from erosion during high flow events, and was documented in good functional condition and fair structural condition.

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 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 mainstem in WBMU12 has been given a "C(T)" class designation 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 several piped outfalls that convey storm water runoff into the right floodplain of the Neversink River from Frost Valley Road in this management unit.

Sediment from stream bank and channel erosion pose a potential threat to water quality in the Neversink River. Clay and sediment inputs into a stream may increase *turbidity* and act as a carrier for other pollutants and pathogens. There are no bank erosion sites in WBMU12 that are 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

"Interested in stream bank protection and new FEMA flood maps"

Station 47700 *"Catskill Petroglyph Location"*

Station 45000 *"Culvert issues for road drainage"*