Management Unit 12

Ulster County - Town of Shandaken
Cross Section 147 to between Cross Section 149 & 150

Management Unit Description

This management unit begins at cross section 147 and continues approximately 870 ft. to between cross section 149 & 150. The drainage area ranges from 16.5 mi^2 at the top of the management unit to 16.7 mi^2 at the bottom of the unit. The valley slope is 1.6% and stream water surface slope is 1.5%.

Stream conditions in this management unit show signs of instability. However, trends of revegetation and morphological stabilization suggest that self-recovery potential in the management unit is very high. Management activities in this unit should focus on revegetation of overwide channel reaches and cut banks. Overhead cover in the unit is scarce, resulting in limited quality and availability of aquatic habitat for the target community.

Summary of Recommendations Management Unit 12	
Intervention Level	Assisted Self-Recovery
Stream Morphology	Encourage narrowing and deepening of channel through planting at identified site (PS #40)
Riparian Vegetation	Riparian plantings at identified planting site (PS #40)
Infrastructure	None
Aquatic Habitat	Enhance overhead cover through implementation of planting recommendations at planting site (PS #40)
Flood Related Threats	Resurvey National Flood Insurance Program (NFIP) maps to more accurately reflect the active stream channel
Water Quality	None
Further Assessment	None

Historic Conditions

As the glaciers retreated about 12,000 years ago, they left their "tracks' in the Catskills. Rubin (1996) mapped the presence of unconsolidated deposits along this entire section of the stream corridor (See Section 2.4, Geology of the Stony Clove Creek, for a description of these deposits). Unconsolidated deposits are not expected to contain significant amounts of clay that can impair water quality.

Figure 2
Excerpt from F.W. Beers 1875 Atlas of Ulster County

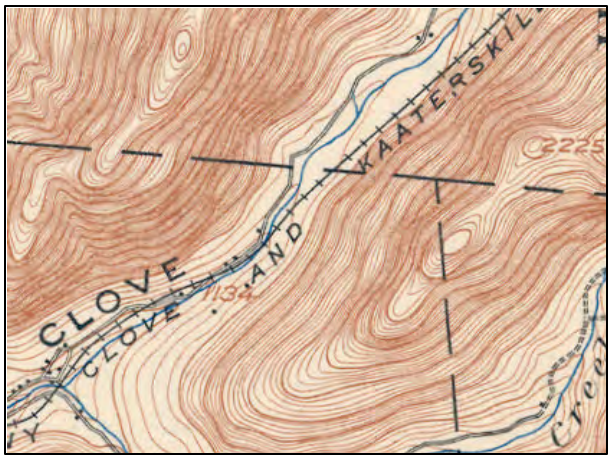


Figure 3 Excerpt from USGS topo map, 1903

As in the previous unit, the reaches in this management unit are characterized by the *"pinch point"* in the Stony Clove valley form, just downstream of the county line. The stream channel was further squeezed at this valley constriction by the development of the roadway and railroad lines during the second half of the 1800s.

As seen from the historical stream alignments, this management unit has experienced significant lateral channel shifting over the years (Fig. 4).

Between 1959 and 1980 this stream reach shifted approximately 200 ft to the left. This dramatic change most likely took place during a flood event. From 1980 to 2000, this reach adjusted its channel alignment slightly back to the right as a gravel bar has formed at the top of the management unit.

According to available NYS DEC records there have not been any stream disturbance permits issued in this management unit area.

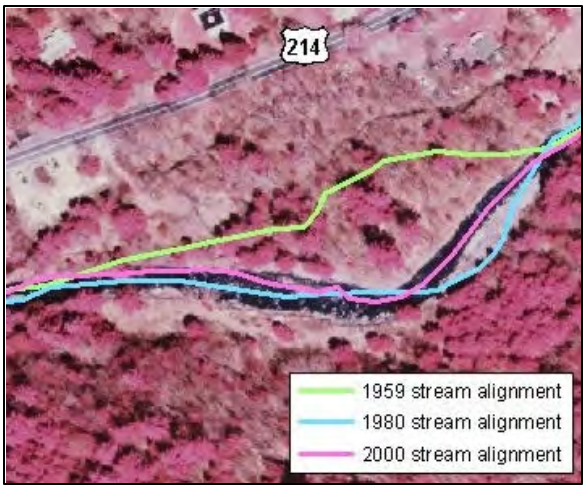


Figure 4 Historical stream channel alignments in Management Unit 12

Stream Channel and Floodplain Current Conditions

Revetment, Berms and Erosion

The 2001 stream feature inventory revealed that 0% of the stream banks exhibited signs of active erosion along 870 ft. of total channel length (Fig. 1). Revetment has been installed on 1% (19 ft.) of the stream banks. No berms were identified in this management unit at the time of the stream feature inventory.

Stream Morphology

The following description of stream morphology references insets in the foldout Figure 13. "Left" and "right" references are oriented looking downstream, photos are also oriented looking downstream unless otherwise noted. Italicized terms are defined in the glossary. This characterization is the result of a survey conducted in 2001.

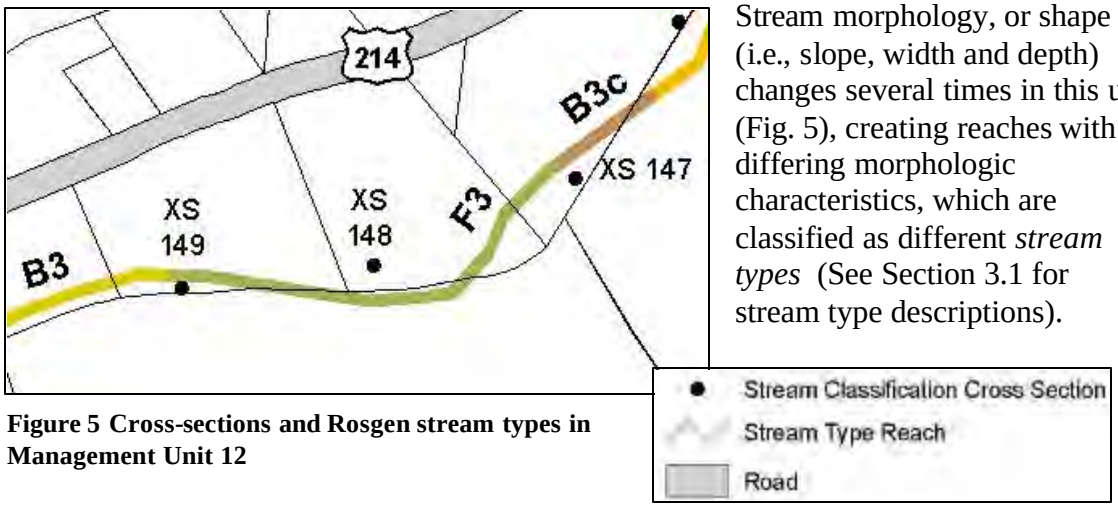


Figure 5 Cross-sections and Rosgen stream types in Management Unit 12

Stream morphology, or shape (i.e., slope, width and depth) changes several times in this unit (Fig. 5), creating reaches with differing morphologic characteristics, which are classified as different *stream types* (See Section 3.1 for stream type descriptions).

Entrenched and overwide conditions dominate most of this unit, with large cobble dominating bed material throughout. Unconsolidated glacial deposits within the unit appear to contribute significant amounts of larger cobble and boulder bedload. Channel slope is fairly flat at 1.5%.
Management unit #12 begins at cross section 147, with a short 25 ft. reach of B3c stream type (Inset D). This stream reach is moderately *entrenched*, or confined within the stream banks during high flow events. Stream channel slope is fairly flat at 1.6% and the dominant bed material is cobble.

As the stream becomes entrenched, stream type transitions to F3 for the next 784 ft. of stream reach (Fig. 6 & Inset C). This stream type dominates the management unit. The slope of this reach decreases to 1.2%.

Figure 6 Cross-section 148 Stream Type F3

At the top of this reach, a large gravel bar has formed on the left stream bank. Gravel bars help maintain channel stability during flood events. In stable streams, the bars will erode away while the channel is in flood stage. The bars then are rebuilt as flow decreases, helping the stream maintain its stability by reestablishing its pools and riffles. If gravel bars are removed, these processes do not occur and instead, the flood water often dissipates its energy by eroding banks and scouring the stream bed.

As the stream *meanders* to the right, the channel widens. This reach is overwide with no overhead vegetation. Deposition of bed materials is common in overwide channels because they lose their ability to transport the stream's *bedload* material. In this situation streams often *aggrade*, or rise in stream bed elevation due to excessive deposition. Although many large boulders have been deposited throughout this reach, dominant bed material remains cobble.

The left bank, at the outside of the meander bend, has experienced minor erosion in the past. Vegetation on this stream bank has been stripped away during high flow events, leaving the bank vulnerable to erosion. The slope of this bank is quite low, and as a result, vegetation has begun to reestablish. However, installation of vegetative treatments on the bank and in the channel at this site would accelerate its recovery and enhance aquatic habitat in this reach.

As the stream begins to narrow, a small unnamed tributary enters the creek from the right stream bank (Inset B). This tributary is not classified under the NYS DEC best usage classification system.

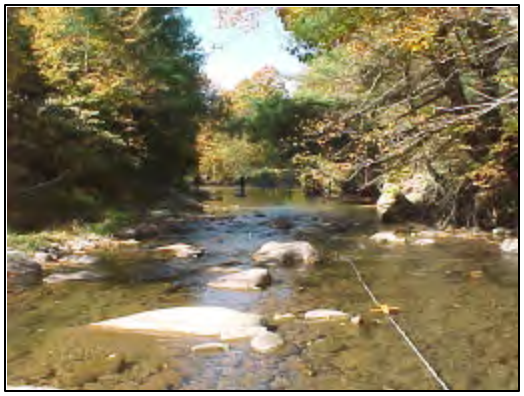


Figure 7 Cross Section 149
Stream Type B3

Once again the channel becomes moderately entrenched and changes back to a B3 stream type for the last 61 ft. of this management unit (Fig. 7). Channel slope of this reach increases to 1.9%.

At the top of this reach, at 19 ft. long stacked rock wall has been built along the right stream bank (Inset A).

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).

The bankfull channel through this reach is generally overwide and flat, and consequently showing signs of aggradation. Unconsolidated glacial deposits within the unit appear to

contribute significant amounts of larger cobble and boulder bedload, exacerbating the sediment transport deficiency. At higher flows however, the channel is somewhat entrenched, resulting in bank cutting and bed scour. Lateral bar development and trends of revegetation suggest that the management unit may recover its proper sediment transport function over time. Implementation of the planting recommendations for planting site #40 could accelerate this recovery. Native willows and sedges encourage narrowing of the stream channel by binding the soils and improving their resistance to erosion. While the channel narrows, it also tends to deepen, increasing the streams capacity to transport bedload during bankfull flows. Areas of the channel that become colonized with dense vegetation usually develop into floodplain, providing relief from entrenched conditions under larger flood events.

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. Grass does not provide adequate erosion protection on stream banks because it 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 streambanks 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. Native species are adapted to regional climate and soil conditions and typically require little maintenance following installation and establishment.

Plant species that are not native can create difficulties for stream management, particularly if they are invasive. Japanese knotweed (*Polygonum cuspidatum*), 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 streambanks. The result can include rapid streambank erosion and increased surface runoff impacts.

An analysis of vegetation was conducted using aerial photography from 2001 and field inventories (Fig. 8, Appendix A). Japanese knotweed occurrences were documented as part of the MesoHABSIM aquatic habitat inventory conducted during the summer of 2002 (Appendix B).

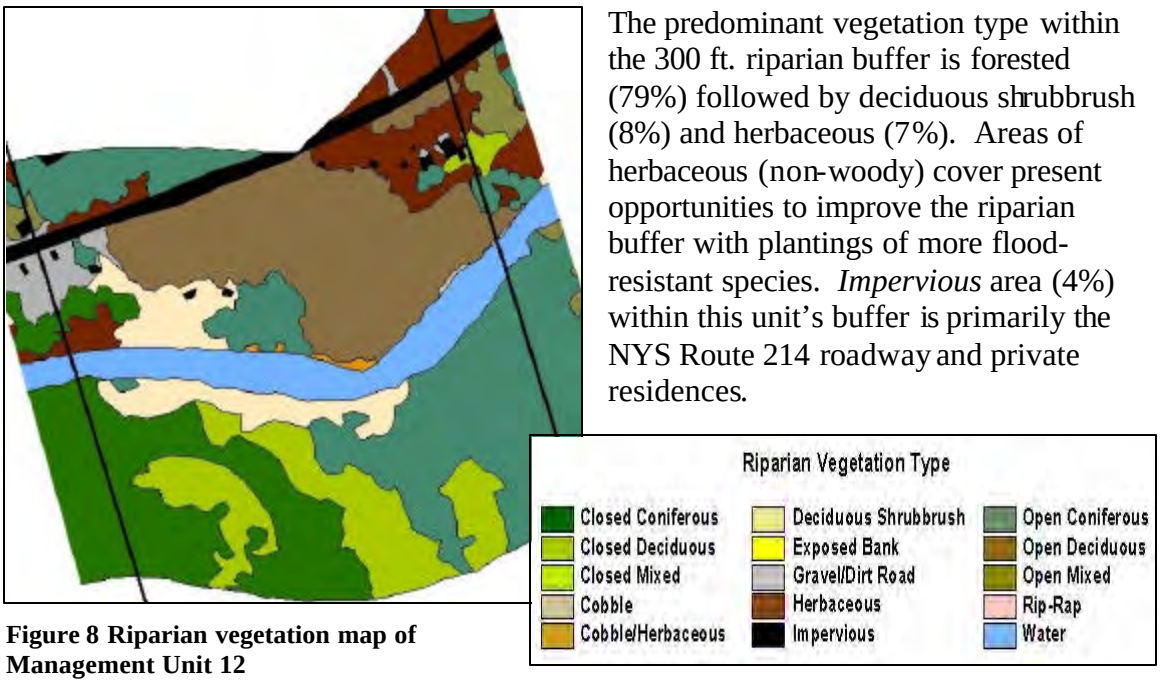


Figure 8 Riparian vegetation map of Management Unit 12

The predominant vegetation type within the 300 ft. riparian buffer is forested (79%) followed by deciduous shrubbrush (8%) and herbaceous (7%). Areas of herbaceous (non-woody) cover present opportunities to improve the riparian buffer with plantings of more flood-resistant species. *Impervious* area (4%) within this unit's buffer is primarily the NYS Route 214 roadway and private residences.

In June 2003, suitable riparian improvement planting sites were identified through a watershed-wide field evaluation of current riparian buffer conditions and existing stream channel morphology (Fig. 9). These locations indicate where plantings of trees and shrubs on and near stream banks can help reduce the threat of serious bank erosion, and can help improve aquatic habitat as well. In some cases, eligible locations include stream banks where rock rip-rap has already been placed, but where additional plantings could significantly improve stream channel stability in the long-term, as well as biological integrity of the stream and floodplain. Areas with serious erosion problems where the stream channel requires extensive reconstruction to restore long-term stability have been eliminated from this effort. In most cases, these sites can not be effectively treated with riparian enhancement alone, and full restoration efforts would include re-vegetation components. One appropriate planting site was documented within this management unit.

Figure 9 Planting site location map for Management Unit 12

Planting site #40 is located in the overwide reach at the middle of the management unit (Fig. 10 & Inset C). The left stream bank in the reach has experienced minor erosion which has stripped away most of its vegetation. The angle of this bank is quite low and can support vegetation establishment in its current condition. At the top of the bank is a large mowed grass area. Japanese Knotweed is present on both stream banks.

In-channel plantings of willow fascines and native sedges along the toe of the stream bank are recommended. These planting will encourage the stream to narrow into a more stable morphology. Native shrubs should also be installed on the face of the bank. There is a small amount of willows along the right bank, the tops of which could be harvested as cuttings, without damaging the root system, and used to revegetate the left stream bank. This practice actually increases the vigor of the parent willow, as the root system is strengthened and the crowns of the harvested willows will sprout new branches. The upland grass area should be converted to forest to improve the stream buffer and overhead cover. These plantings will help to stabilize this stream bank, while adding aquatic habitat value by improving shading, resulting in cooler water temperatures. Aggressive Japanese knotweed management is recommended throughout the unit, but particularly in those locations where treatments disturb and expose soil in the banks.

Figure 10 Planting Site #40

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. Initial identification for these maps was completed in 1976. Some areas of these maps may contain errors due to stream channel migration or infrastructure changes over time.

Figure 11 100-year floodplain boundary in Management Unit 12

To address the dated NFIP maps, the NYS DEC Bureau of Flood Protection is currently developing floodplain maps, using a new methodology called Light Detection And Ranging (LIDAR). LIDAR produces extremely detailed and accurate maps, which will indicate the depth of water across the floodplain under 100-year and other flood conditions. These maps should be completed for the Stony Clove Watershed in 2004.

According to NFIP maps, there are no houses located within the 100-year floodplain boundary in this management unit (Fig. 11). The current NFIP maps are available for review at the Greene and Ulster County Soil & Water Conservation District offices.

Bank Erosion

None of the stream banks in this unit were experiencing major erosion at the time of the stream feature inventory. The left stream bank in the middle of the management unit has experienced minor erosion in the past, but has begun to revegetate and shows evidence of self-recovery. Implementation of the recommended plantings for this site will accelerate this banks recovery and prevent future erosion. There are no monitored bank erosion sites within this management unit.

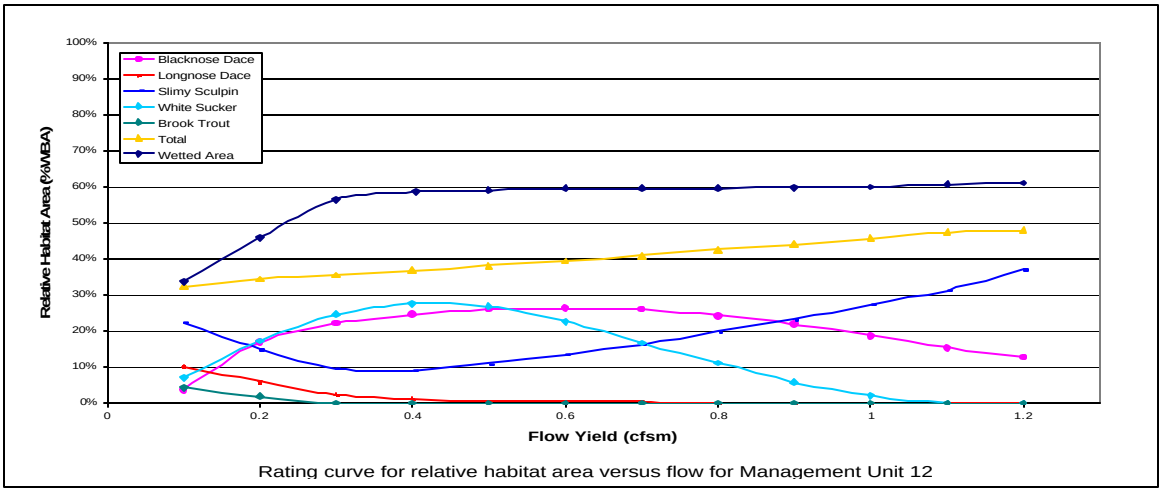
Infrastructure

There are no serious threats to infrastructure in this management unit. There are no lengths of NYS Route 214 within 50 ft. of the stream in this unit.

Aquatic Habitat

Aquatic habitat was analyzed for each management unit using Cornell University Instream Habitat Program's model called MesoHABSIM. This approach attempts to characterize the suitability of instream habitat for a *target community* of native fish, at the scale of individual stream features (the "meso" scale), such as riffles and pools. Habitat is mapped at this scale for a range of flows. Then the suitability of each type of habitat, for each species in the target community, is assessed through electrofishing. These are combined to predict the amount of habitat available in the management unit as a whole. The habitat rating curves in the figure below depict the amount of suitable habitat available at different flows. See Appendix B for a more detailed explanation of methods.

Management unit #12 has the highest diversity of *hydro-morphologic units* (HMUs) at 0.3 cfsm. As flow changes, the size and location of the HMUs change, but dominant types (ruffle, rapid, run) stay the same. Shallow margins are abundant throughout the management unit, and ample boulder cover is available. The *wetted area* almost doubles between flows of 0.1 cfsm and 0.3 cfsm and then stays constant, though with fewer and faster flowing HMUs. Suitable habitat within this management unit is relatively high. Slimy sculpin habitat lowers at around 0.3 cfsm, and then increases with flow. Blacknose dace and white sucker habitat peak before 1.0 cfsm and then decline. Longnose dace have some low quality habitat at low flows and then it disappears by 1.0 cfsm. Habitat for trout species however, is either unavailable or very poor. (See Section 6.6 general recommendations for aquatic habitat improvement)



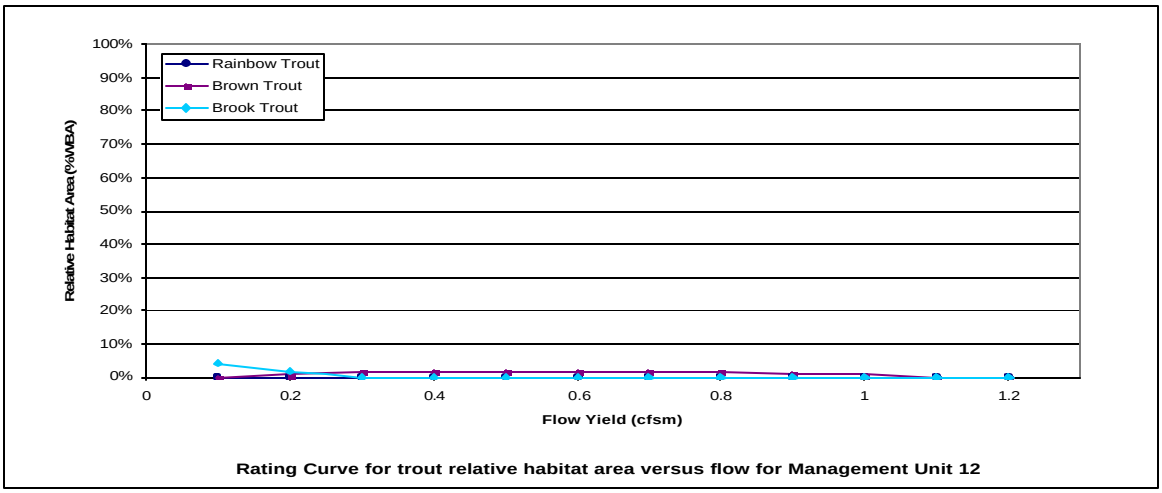


Figure 12 MesoHABSIM habitat rating curves for Management Unit 12

Water Quality

Clay exposures and sediment from stream bank and channel erosion pose a significant threat to water quality in Stony Clove Creek. Clay and sediment inputs into a stream may increase *turbidity* and act as a carrier for other pollutants and pathogens. At the time of the stream feature inventory, no clay exposures were identified in this management unit.

Stormwater runoff can also have a considerable impact on water quality. When it rains, water falls on roadways and flows untreated directly into Stony Clove Creek. The cumulative impact of oil, grease, sediment, salt, litter and other unseen pollutants found in road runoff can significantly impact water quality. There are no stormwater culverts in this management unit.

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. There are a few houses located in 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 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. Eligible systems included those that were less than 1,000-gallon capacity serving one- or two-family residences, or home and business combinations (CWC, 2003). One homeowner in this management unit made use of this program to replace or repair their septic system.