Management Unit 13

Ulster County - Town of Shandaken

Between Cross Section 149 & 150 to Cross Section 153

Management Unit Description

This management unit begins between cross section 149 & 150 and continues approximately 1,432 ft. to Cross Section 153. The drainage area ranges from 16.7 mi^2 at the top of the management unit to 16.8 mi^2 at the bottom of the unit. The valley slope is 1.6% and stream water surface slope is 1.5%.

A floodplain dump site near the upstream end of this management unit poses a potential water quality threat, which should be evaluated for possible cleanup. A hand-built dam at this site increases the inundation and contact time with possible contaminants, and should be removed. The remaining management issues in the unit are mainly associated with valley confinement and management of the Stony Clove Lane Bridge. Revetted stream banks, upstream and downstream of the bridge present opportunities for vegetative treatments to increase revetment strength and longevity while improving aquatic habitat. The bridge itself imposes no significant negative impacts on stream function.

Summary of Recommendations Management Unit 13	
Intervention Level	Assisted Self-Recovery
Stream Morphology	Removal of hand-built dam
Riparian Vegetation	Riparian plantings at two identified planting sites (PS #39 & 41)
Infrastructure	None
Aquatic Habitat	Enhance overhead cover by joint planting of rip-rap at identified sites (PS #39 & #41)
Flood Related Threats	Resurvey National Flood Insurance Program (NFIP) maps to more accurately reflect the active stream channel
Water Quality	Remove refuse from dumpsite
Further Assessment	Evaluate possible soil contamination at dumpsite

Historic Conditions

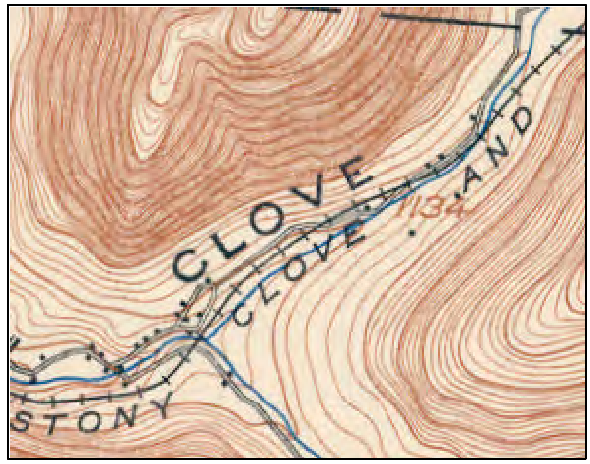


Figure 2 Excerpt from USGS 1903 topo

As the glaciers retreated about 12,000 years ago, they left their "tracks' in the Catskills. Rubin (1996) mapped the presence of unconsolidated glacial 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 3 Historical stream channel alignment in Management Unit 13

In this management unit, just downstream of Stony Clove Lane, the valley form begins to broaden at the confluence of the Stony Clove and Silver Hollow valleys. Little settlement of the unit is indicated on the 1903 Geological Survey map of the area (Fig. 2).

Historical channel alignments indicate that the *planform* of the stream has not changed to any significant degree since 1959, with the exception of the reaches directly upstream and downstream of the bridge at Stony Clove Lane (Fig. 3). Upstream of the bridge, the channel is confined by a *"pinch point"* in the valley form.

According to available NYS DEC records there have been seven stream disturbance permits issued in this management unit.

Figure 4 Bridge at Stony Clove Lane under construction, September 16, 1993

After the 1996 flood, an emergency permit was issued to Stuart Felberg to install rip-rap and remove wood debris and gravel from the flood event (Inset C). In 1999, another permit was issued to Stuart Felberg and Ellen Lerner, to install 110 ft. of rip-rap on the right stream bank. In 1993, the Ulster County Department of Public Works (DPW) was issued a permit to replace the bridge at Stony Clove Lane (Fig. 4 & Inset F). This project required of the removal of the existing deteriorated superstructure and left abutment, which at the time consisted of deteriorating laid-up timber cribbing. A new reinforced concrete abutment on the left bank, new multi-stringer superstructure and a laminated timber deck were installed. In 1994, the Ulster County DPW was issued another permit to perform minor excavation at the base of the stream embankments at either end of the left abutment in order to provide a level area to install a laid-up stone wall for the stabilization of the failing stream bank. This failure was threatening to undermine Stony Clove Lane. In 1996, the Ulster County DPW was issued a permit, in response to stream bank failure on the left stream bank downstream from the Stony Clove Lane Bridge, to install 15 ft. of steel sheet piling extending downstream from the left bridge abutment, backfill and grade the failed bank to the existing top of bank. Directly downstream from this bridge, in 1996, another permit was issued to Karen Selig to install 75 ft. of rip-rap and skim gravel to be used as backfill along the left stream bank. After the 1996 flood an emergency permit was issued to David Goldberg to install timber cribbing or rip-rap along 250 ft near the end of the management unit. There is currently no rip-rap or log cribbing found along this bank, indicating that the project was either never completed or that the revetment has been washed away.

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 1,432 ft. of total channel length (Fig. 1). Revetment has been installed on 36% (1,023 ft.) of the stream banks. The extensive revetment installations are indicative of significant historical bank erosion. 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 18. "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.

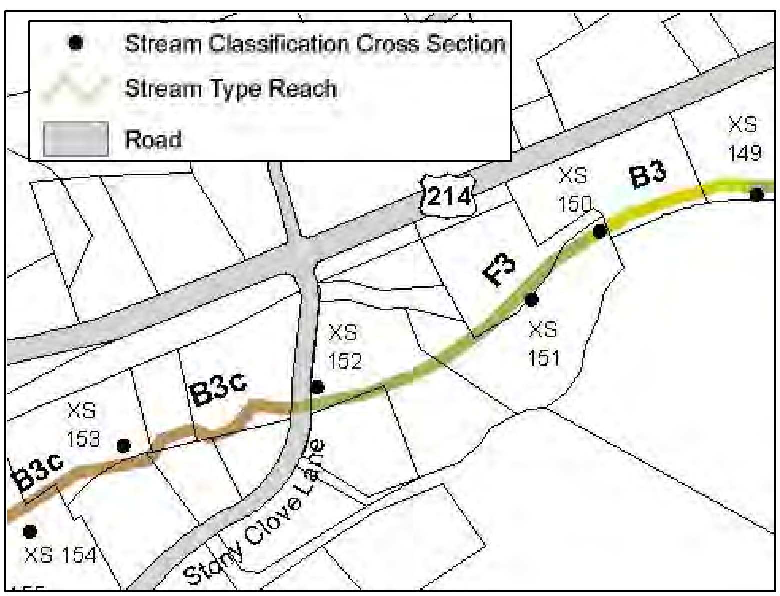


Figure 5 Cross-sections and Rosgen stream types in Management Unit 13

The 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).

The reaches upstream of the Stony Clove Lane bridge are characterized by entrenchment caused by a "pinch point" in the Stony Clove valley form. Downstream of the bridge, the creek enters into a section of broader valley form, and the channel regains floodplain access. These morphological conditions persist through most of the next management unit.

Management unit #13 begins with a 320 ft. reach of B3 stream type (Fig. 6). This stream reach is moderately *entrenched*, or confined within the stream banks during high flow events. Stream channel slope is 2.1% and the dominant bed material is cobble.

Figure 6 Cross-section 150
Stream Type B3 Looking Upstream

At the top of this management unit, a small dam made from stream material and plastic lining has been constructed across the stream (Inset H). These small dams are commonly built to create swimming or wading areas. This practice can be detrimental to aquatic habitat if they block fish passage. In this reach, the blockage could prevent fish migration from downstream up into the Hollow Tree Brook. Construction of these dams is generally not recommended, and requires a stream disturbance permit from the NYS DEC.

Immediately downstream from this dam, a small unnamed tributary enters the creek in several locations from the right stream bank after running through a small floodplain wetland. This tributary is not classified under the NYS DEC best usage classification system.

For the next 63 ft., the right stream bank and floodplain is composed of fill containing mixed refuse and large concrete slabs (Inset D). Dump sites in floodplains can contaminate ground and surface water. Removal of the refuse at this site is recommended. The stream bank is currently not vegetated but some sedge and other wetland species are growing near the toe of the stream bank. While not identified as a planting site for the Streamside Planting Program due to the possible presence of contaminants, plantings of willow and other native shrubs along the face of the stream bank and sedge along the base of the stream bank are recommended here to help prevent erosion and filter pollutants from potential upland sources.

Continuing downstream, the channel *meanders* to the left, becomes disconnected from its floodplain and widens, changing stream type to F3 for the next 728 feet (Fig. 7 & 8). Channel slope of this reach decreases to 1.3%.

Figure 7 Cross-section 150
Looking downstream into Stream Type F3

Rip-rap has been installed along approximately 387 ft. of the right stream bank, which begins on the outside of the meander bend and continues through the next bend, ending on the inside of the meander (Inset C). Stream bank erosion often occurs on the outside bank of bends, where the stream velocity is greatest during high flows. At the top of this bank are two private residences with grass lawns extending to the stream bank edge.

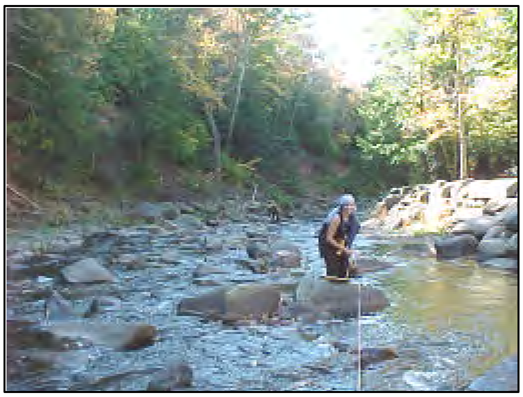


Figure 8 Cross-section 151
Stream Type F3

As the channel bends back to the right, the left stream bank, at the outside of the meander, is a high forested valley wall which contributes to the entrenchment of this reach. Rip-rap has been installed on 407 ft. of this bank, but appears to be compromised by erosion of the toe (Inset G). The revetment on the right bank exacerbates the entrenched condition of the channel, potentially accelerating erosion of the left bank.

The stream channel widens further as it approaches the Stony Clove Lane Bridge (Inset B). This bridge (BIN #3347250) is maintained by Ulster County and was last replaced in 1993. Three large floodplain culverts were installed through the right bridge abutment, to help reduce the obstruction to flood flows caused by the bridge approach (Fig. 9). Bridges often cause stream instability because they constrict stream flow through a small opening. These floodplain culverts protect the bridge abutment by allowing floodwaters to pass, reducing flood stages upstream and enhancing sediment transport continuity. As a result of the floodplain drainage provided by these culverts, the *aggradation* typically found upstream of bridges is not evident here.

Figure 9 Floodplain Culverts

As the stream emerges from under the bridge, it transitions to a B3c stream type for the remaining 384 ft. of this management unit (Fig. 10). This reach is overwide and shallow, probably due to channel grading associated with bridge and abutment maintenance, and the deposition of *bedload* due to the abrupt change in floodplain access and width. Deposition of bed materials is common in overwide channels because they lose their ability to transport the stream's bedload. In this situation streams often *aggrade*, or rise in stream bed elevation due to excessive deposition. Overwide channels also provide poor fish habitat due to the filling of pools and warmer water temperatures.

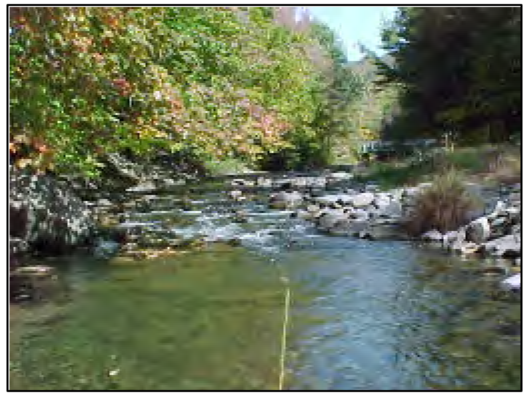


Figure 10 Cross-section 151
Stream Type B3c Looking Upstream

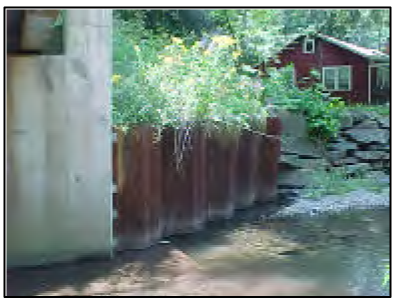


Figure 11 Sheet Piling

In response to repeated erosion which threatened Stony Clove Lane, the Ulster County DPW installed 13 ft. of sheet piling along the left stream bank downstream from the bridge. Immediately downstream of the sheet piling, the landowner has installed a 63 ft. stacked rock wall (Inset E) and 55 ft. of log cribbing (Inset A) to protect the left stream bank from erosion. At the top of this bank is a grass lawn extending to the stream bank edge.

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).

Generally the reaches upstream of the Stony Clove Lane Bridge appear to be effectively transporting sediment supplied from upstream. Downstream of the bridge, aggradation becomes evident as the overwidened channel conditions prevail. Aggradation is a common channel response to abrupt changes in floodplain width and connectivity, as found here.

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. 12, Appendix A). Japanese knotweed occurrences were documented as part of the MesoHABSIM aquatic habitat inventory conducted during the summer of 2002 (Appendix B).

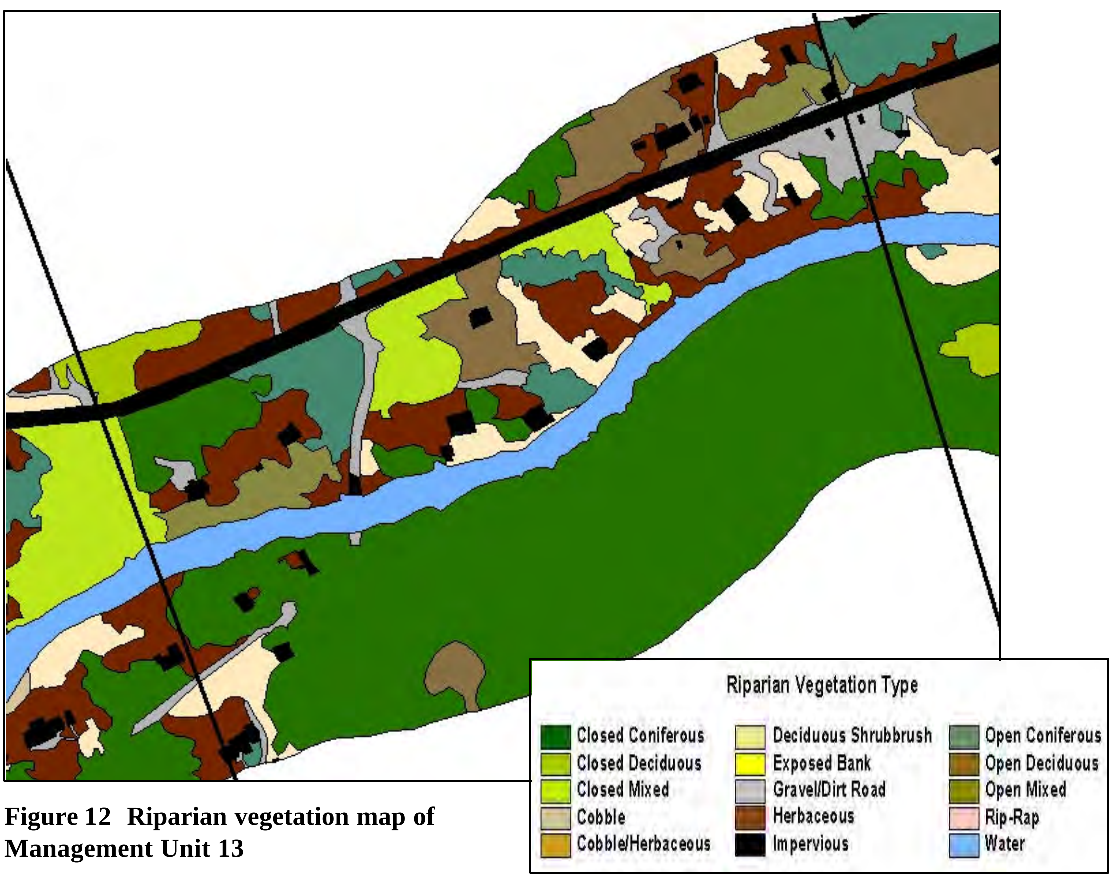


Figure 12 Riparian vegetation map of Management Unit 13

The predominant vegetation type within the 300 ft. riparian buffer is forested (71%) followed by herbaceous (14%) and deciduous shrubbrush (6%). Areas of herbaceous (non-woody) cover present opportunities to improve the riparian buffer with plantings of more flood-resistant species. *Impervious* area (6%) 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. 13). 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. Two appropriate planting sites were documented within this management unit.

Figure 13 Planting sites location map for Management Unit 13


Figure 14 Planting Site #39 looking upstream

Planting site #39 is located on two residential properties along rip-rap on the right stream bank upstream from the Stony Clove Lane Bridge (Fig. 14). This stream bank is heavily armored with rip-rap, with grass lawn mown to the edge of the stream bank (Inset C).

Recommendations for this site include *joint planting* the existing rip-rap, by inserting plantings into the soil between the rip-rap rocks. Joint planting will strengthen and increase the longevity of this rip-rap. These plantings will also improve the aquatic habitat by providing shade, which maintains cooler water temperatures. Upland plantings of native trees and shrubs in the mown areas will also improve the long-term stability of this bank and increase the buffer functionality.

Planting site #41 is located on three properties on the left and right stream bank, downstream from the Stony Clove Lane Bridge (Fig. 15). The left stream bank is stabilized with rip-rap and log cribbing (Inset E & A). The right stream bank has a low bench with disturbed vegetation, with herbaceous upland areas. Recommendations for this site include *joint planting* the existing rip-rap, by inserting plantings into the soil between the rip-rap rocks. Joint planting may be difficult at this site due to the steep slope of the stream bank. To increase bank stability willow *fascines* could be planted at the toe of this bank. Upland plantings of native trees and shrubs in the grass areas would also improve the stability of this bank and increase the buffer functionality. On the right stream bank, willows and other native shrubs should be planted on the low bench. Upland planting of hercaceous areas would improve buffer functionality at this site.

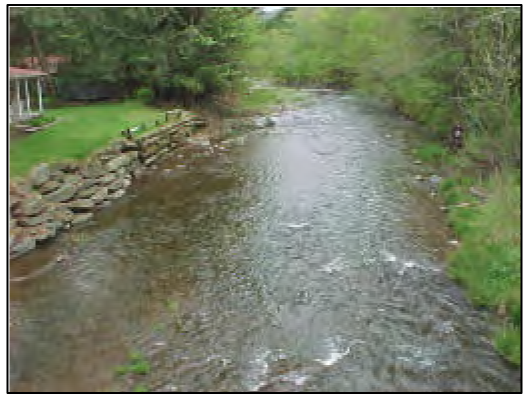


Figure 15 Planting Site #41 looking downstream

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 16 100-year floodplain boundary in Management Unit 13

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 the NFIP maps, there are four houses located within the 100-year boundary in this management unit (Fig. 16). The current NFIP maps are available for review at the Greene and Ulster County Soil & Water Conservation District offices.

Bank Erosion

Most of the stream banks within the management unit are stable, with no major erosion sites identified during the stream feature inventory. The limited bank erosion within this unit is misleading, as 36% of the stream banks have been hardened with revetment, predominantly in the entrenched reach.

While rip-rap and other hard controls may provide temporary relief from erosion, they are expensive to install, degrade habitat, and require ongoing maintenance or transfer erosion problems to upstream or downstream areas. Alternate stabilization techniques should be explored for these stream banks whenever possible.

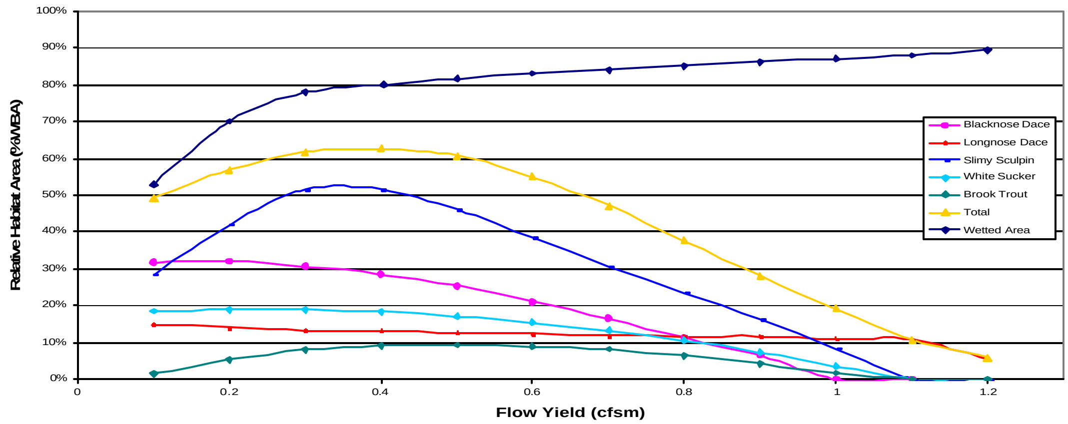
Infrastructure

There are no serious threats to infrastructure in this management unit. In the past, erosion during flood events at the Stony Clove Lane Bridge threatened this roadway. To relieve this threat a new bridge was installed in 1993 with three floodplain culverts. These floodplain culverts reduce the risk of erosion by allowing flood waters to dissipate energy over the floodplain area instead of eroding the bridge abutment.

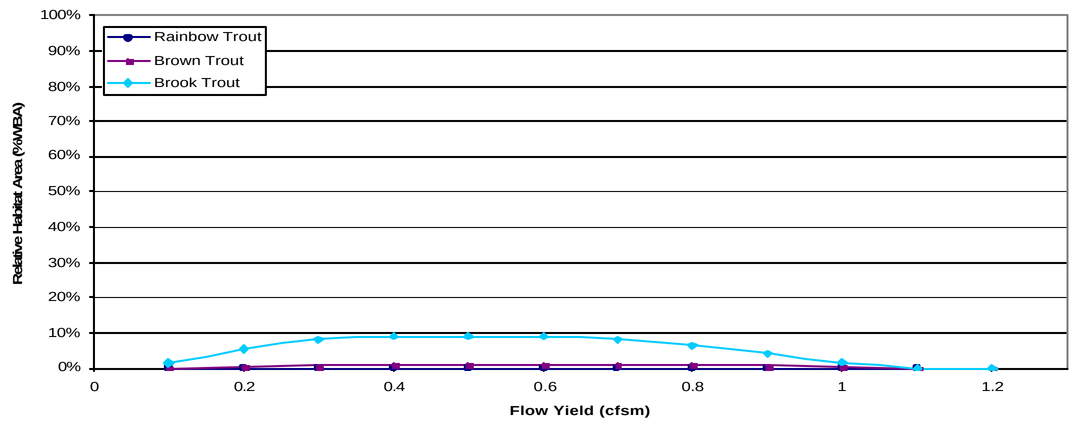
Aquatic Habitat

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 #13 is located very close to the road and has a habitat pattern somewhat similar to both management units #11 and #12, although more glides appear. At lower flows, a little more than half of the bankfull *wetted area* is covered with water, with extensive shallow margin areas and some rip-rap. The *hydro-morphologic units* (HMUs) decrease in number and enlarge in area when approaching 1.0 cfsm. Wetted area approaches the bankfull wetted area quickly. The proportion of suitable habitat reaches its peak around 0.35 cfsm and then declines substantially with increasing flows. The curve for slimy sculpin reflects the overall habitat-rating curve with a peak around 0.35 cfsm. Blacknose dace and white sucker start at stable habitat levels, but then lose all their habitat by 1.0 cfsm. Longnose dace habitat is also at low levels, but declines more slowly. Brook trout habitat increases to almost 10% around 0.5 cfsm, but then also declines to zero. The other two trout species have a negligible amount of usable habitat available. (See Section 6.6 general recommendations for aquatic habitat improvement)



Rating curve for relative habitat area versus flow for Management Unit 13



Rating curve for trout relative habitat area versus flow for Management Unit 13

Figure 17 MesoHABSIM habitat rating curves for Management Unit 13

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. No significant clay exposures were identified in this management unit at the time of the stream feature inventory.

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 many 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). Two homeowners in this management unit used this program to replace or repair their septic systems.