Management Unit 9

Greene County - Town of Hunter
Cross Section 131 to Cross Section 135

Management Unit Description

This management unit begins at cross section 131 and continues approximately 1,067 feet to slightly above cross section 135. The drainage area ranges from 15.3 mi^2 at the top of the management unit to 15.4 mi^2 at the bottom of the unit. The valley slope is 1.6% and water surface slope is 1.4%.

Generally, stream conditions in this unit appear stable. This unit, while highly entrenched, appears to convey flood waters and sediment without significant damage to the bed or banks. No bed and bank erosion problems were identified at the time of the stream feature inventory. Threats to aquatic habitat quality appear to be the most immediate problem in the management unit. Management efforts in this unit should focus on improvement of riparian buffer condition and enhancement of streamside vegetation. Overwide channel conditions, exacerbated by poor overhead cover, result in thermal impacts which degrade aquatic habitat. Vegetative treatments in this management unit would benefit both aquatic habitat and stream function.

Summary of Recommendations Management Unit 9	
Intervention Level	Assisted Self-Recovery
Stream Morphology	Encourage narrowing and deepening of channel through plantings at identified site (PS #33)
Riparian Vegetation	Riparian plantings at identified planting site (PS #33)
Infrastructure	None
Aquatic Habitat	Enhance overhead cover by joint planting of rip-rap and streamside plantings at identified planting site (PS #33)
Flood Related Threats	Resurvey National Flood Insurance Program (NFIP) maps to more accurately reflect the active stream channel
Water Quality	None
Further Assessment	Monitor identified clay exposures

Historic Conditions

Figure 2 Historical stream channel alignments of Management Unit 9

As the glaciers retreated about 12,000 years ago, they left their "tracks' in the Catskills. Rubin (1996) mapped the presence of glacial lake clay (either in the stream bank or beneath a thin layer of alluvial deposits in the stream bed) along this entire section of the stream (See Section 2.4, Geology of the Stony Clove Creek, for a description of these deposits).

This management unit is part of the Lanesville flats, which were settled and logged in the mid-1800s (see Management Unit #8 for more description).

As seen from the historical stream alignments, channel in this management unit has not exhibited significant lateral shifting in the period since 1959 (Fig. 2). There is some evidence of channel *incision*, or downcutting, in this part of the stream, however, with the elevation of the stream channel is considerably lower than the adjacent terrace to the right.

According to available NYS DEC records there has been one stream disturbance permit, issued in this management unit area. A permit was issued to Dean Close, after the 1996 flood event, to replace rip-rap (Inset C) on his property.

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 1,067 ft. of total channel length (Fig. 1). Revetment has been installed on 6% (129 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

12. "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.

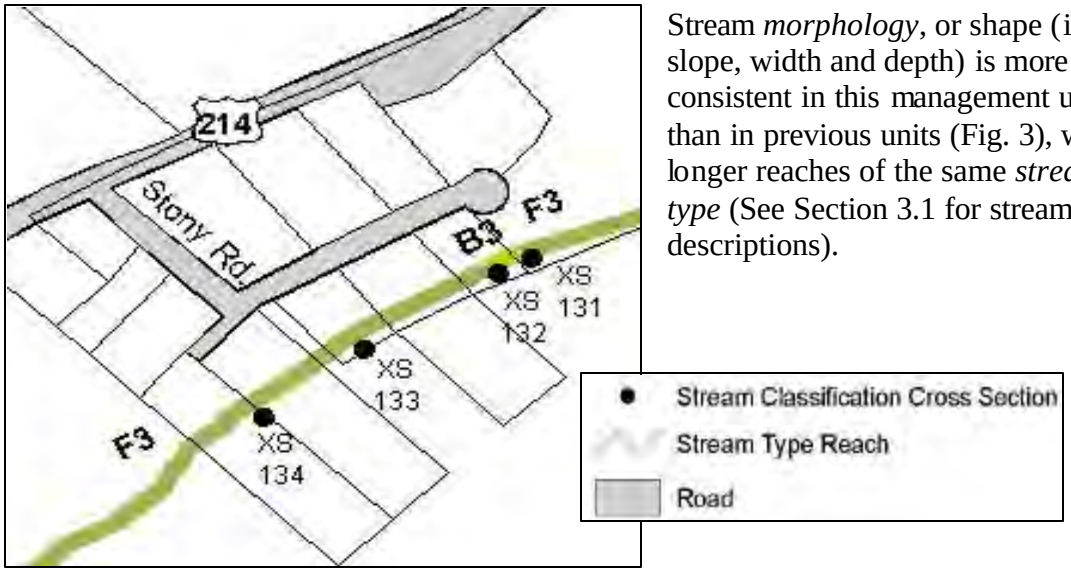


Figure 3 Cross-section and Rosgen stream types in Management Unit 9

Stream *morphology*, or shape (i.e., slope, width and depth) is more consistent in this management unit than in previous units (Fig. 3), with longer reaches of the same *stream type* (See Section 3.1 for stream type descriptions).

The predominant stream type in this unit is "F" channel, which are usually deeply *incised* with flat channel slopes, and subject to sediment supply fluctuations. This unit however appears to be relatively stable with minimal sediment yield from the bed and banks.

Management unit #9 begins downstream from cross-section 131, with a short 19 ft. reach of F3 stream type. This stream reach is *entrenched*, or it is confined within the stream banks during high flow events. Channel slope is fairly flat at 1.9% and the dominant bed material is cobble.

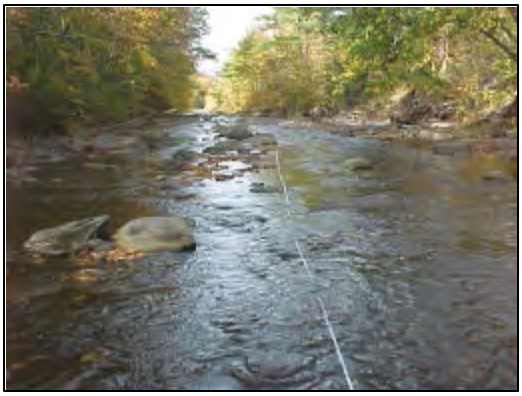


Figure 4 Cross-section 132 Stream Type B3

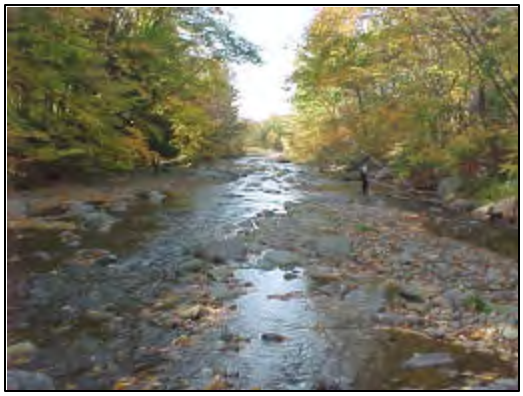


Figure 5 Cross-section 133 Stream Type F3

As channel entrenchment moderates, stream type changes to B3 for another short reach totaling 73 ft. in length. The slope of this reach increases significantly to 2.8%.

Continuing downstream, the channel once again becomes entrenched as it transitions back into a F3 stream type for the remaining 975 ft. of this management unit. The channel is overwide, shallow, and flat with a slope of 1.3%.

Figure 6 Cribwall

At the top of this reach, approximately 110 ft. of rip-rap has been installed along the right stream bank (Inset D). In the middle of this rip-rap is a cable suspended foot bridge used to access the land on the opposite side of the creek. At the top of right stream bank is a residence with mowed lawn to the stream's edge and a shed which is extremely close to the edge of the bank. At the toe of the right stream bank below this shed, the landowner has installed a wooden cribwall to protect the bank from erosion (Fig. 6).

Proceeding downstream, the channel remains fairly straight. On the left bank, near the end of this reach, is a clay exposure, which extends along approximately 70 ft. of this stream bank (Inset B). This stream bank experiences nominal erosion during high flow events. On the right bank there are smaller intermittent clay exposures along the toe of the stream bank. Clay inputs into a stream are a serious water quality concern because they increases *turbidity,* degrades fish habitat, and can act as a carrier for other pollutants or pathogens.

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).

While some central bars do exist in this management unit, overall, sediment transport appears to be in balance. The unit exhibits very little bank erosion, and bed scour, if any, is undetectable. The downstream reach of F3 channel is overwide, and sediment transport could be improved with the application of vegetative treatments focused within the bankfull channel. Plantings of native willow and sedge species would encourage narrowing and deepening of the channel, making it more capable of conveying *bedload* delivered from upstream, while also building a bankfull flood plain. If untreated, central bar development could accelerate and result in widespread bank erosion in the 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. 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.

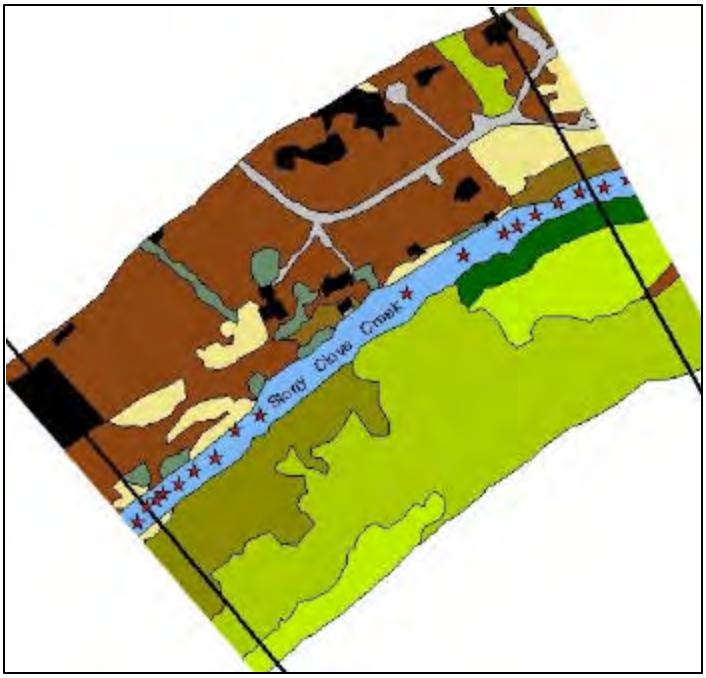


Figure 7 Riparian vegetation map for Management Unit 9

An analysis of vegetation was conducted using aerial photography from 2001 and field inventories (Fig. 7 & Appendix A). Japanese knotweed occurrences were documented as part of the MesoHABSIM aquatic habitat inventory conducted during the summer of 2002 (Appendix B).

The predominant vegetation type within the 300 ft. riparian buffer is forested (53%) followed by herbaceous (34%). 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. 8). 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. One appropriate planting site was documented within this management unit.

Figure 8 Planting site location map for Management Unit 9

Figure 9 Planting Site #33

Planting site #33 is located on six separate residential properties on the right stream bank, beginning along Stony Road (Fig. 9). Presently there is scattered vegetation along the stream and upland grass lawn areas on these properties. It is recommended to plant native tree and shrub species along the stream bank to increase the density of vegetation. It is also recommended to increase the upland buffer width as much as possible. This will increase the buffer functionality and improve stream bank stability while still allowing a lawn area.

Along the stream bank of the first property, approximately 110 ft. of rip-rap has been installed (Inset D). Inserting plant materials into the soil between rip-rap rocks, or *joint planting*, is recommended. Joint planting will strengthen and increase the longevity of this wall. These plantings will also improve the aquatic habitat by providing shade, thereby cooling water temperatures.

The stream channel along this reach is overwide. Planting native willow and sedge species along both sides of the stream is recommended. These plantings will encourage the stream channel to narrow, improving stream habitat and function.

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 10 100-year floodplain boundary in Management Unit 9

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 seven houses located within the 100-year floodplain boundary in this management unit (Fig. 10). 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 0% of the stream banks identified as experiencing significant erosion at the time of the stream feature inventory.

Infrastructure

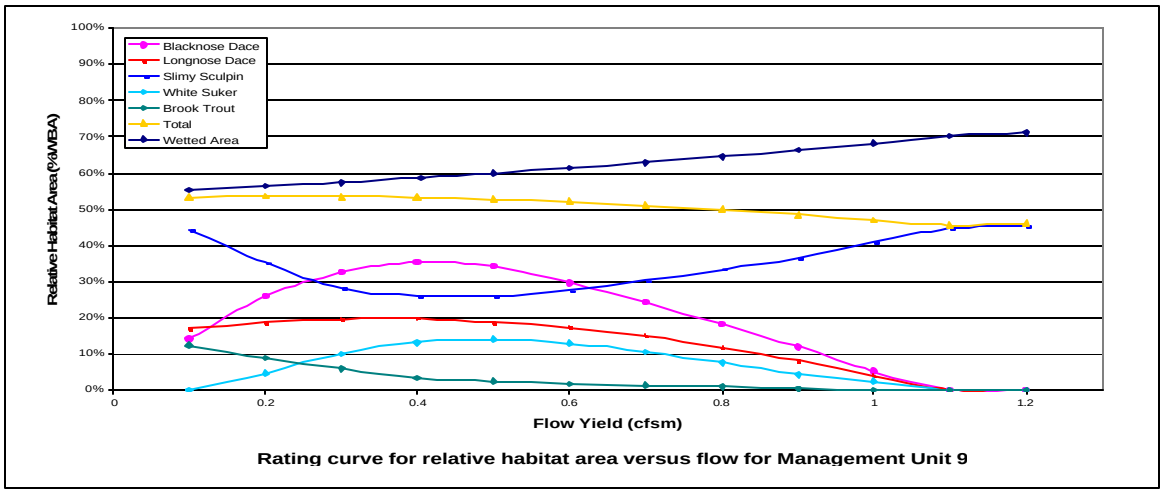
There are no infrastructure threats to roadways or bridges in this management unit. There is one section of rip-rap in this management unit which protects the stream bank at a cable suspended foot bridge behind a residential property (Inset D). This rip-rap appears to be in fair condition and provides adequate protection to the foot bridge. However, rip-rap and other hard controls are expensive to install, degrade habitat, and often fail or transfer erosion problems to upstream or downstream areas. Planting recommendations for this site would be most effective if installed before the condition of the rip-rap is further compromised.

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 #9 contains boulders, a small amount of overhanging vegetation, and substrate that is small in size. At investigated flows, the water covers from 55% to 80% of the bankfull *wetted area*. Wetted area increases steadily as flow increases, but hydro-morphological units change dramatically. This is reflected in the strong habitat suitability changes for individual species across the flows, even though the overall amount of habitat stays constant. Slimy sculpin loses habitat and then gains it back at higher flows. Both dace species and white sucker species show habitat increases until 0.3 cfsm, and then a complete loss above 1.0 cfsm. Brook trout has very little habitat except at very low flows, however, this habitat is probably useless due to thermal impacts. The brown trout has low levels of poor habitat and only rainbow trout shows a significant increase in habitat suitability at higher flow levels. Overall, this unit has poor habitat conditions due to constant hydro-morphological fluctuations and a lack of permanently available habitat.

Implementation of planting recommendations in this unit would provide significant benefit to habitat quality. These plantings would encourage deeper holding pools to develop while mitigating thermal impacts. (See Section 6.6 general recommendations for aquatic habitat improvement)



Rating curve for relative habitat area versus flow for Management Unit 9

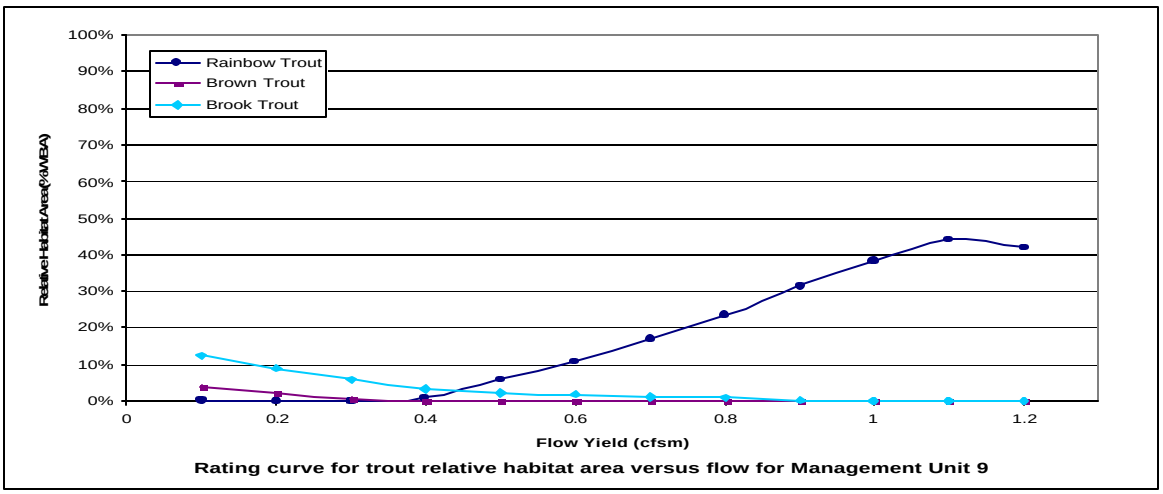


Figure 11 MesoHABSIM habitat rating curves for Management Unit 9

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. There are currently numerous clay exposures in this management unit, however, these exposures do not appear to contribute significant turbidity to the Stony Clove at this time. These clay exposures should be monitored for increases in size or turbidity contribution.

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). One homeowner in this management unit made use of this program to replace or repair their septic system.