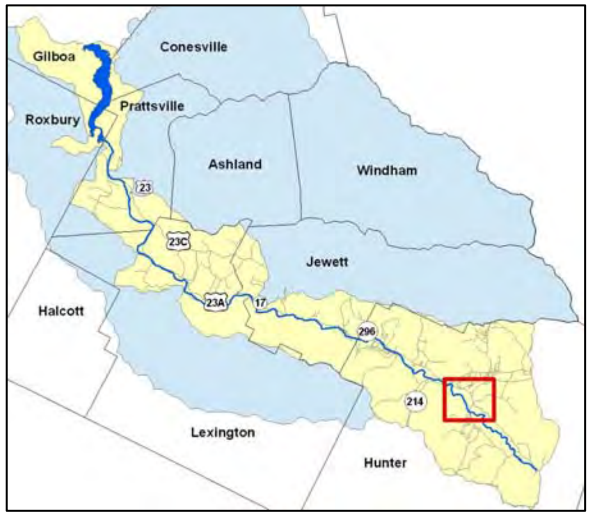
Schoharie Creek Management Unit 4

Town of Hunter - Station 138610 to Station 124311

This management unit begins at Station 138610, continuing approximately 14,299 ft. downstream to Station 124311 in the Town of Hunter.

2006 Stream Feature Statistics

7.1% of streambanks experiencing erosion
1% of streambanks have been stabilized
0% of streambanks have been bermed
163 feet of clay exposures
19 acres of inadequate vegetation
4,233 feet of road within 300ft. of stream
0 structures located in 100-year floodplain



Management Unit 4 location
see figure 4.0.1 for more detailed map

Summary of Recommendations Management Unit 4	
Intervention Level	Preservation, Passive, Self-Assisted Recovery
Stream Morphology	No recommendations at this time
Riparian Vegetation	Planting of herbaceous areas at Stations 134440 & 129200
Infrastructure	No recommendations at this time
Aquatic Habitat	Watershed Aquatic Habitat Study
Flood Related Threats	Mapping of floodway and floodplain
Water Quality	No recommendations at this time
Further Assessment	No recommendations at this time

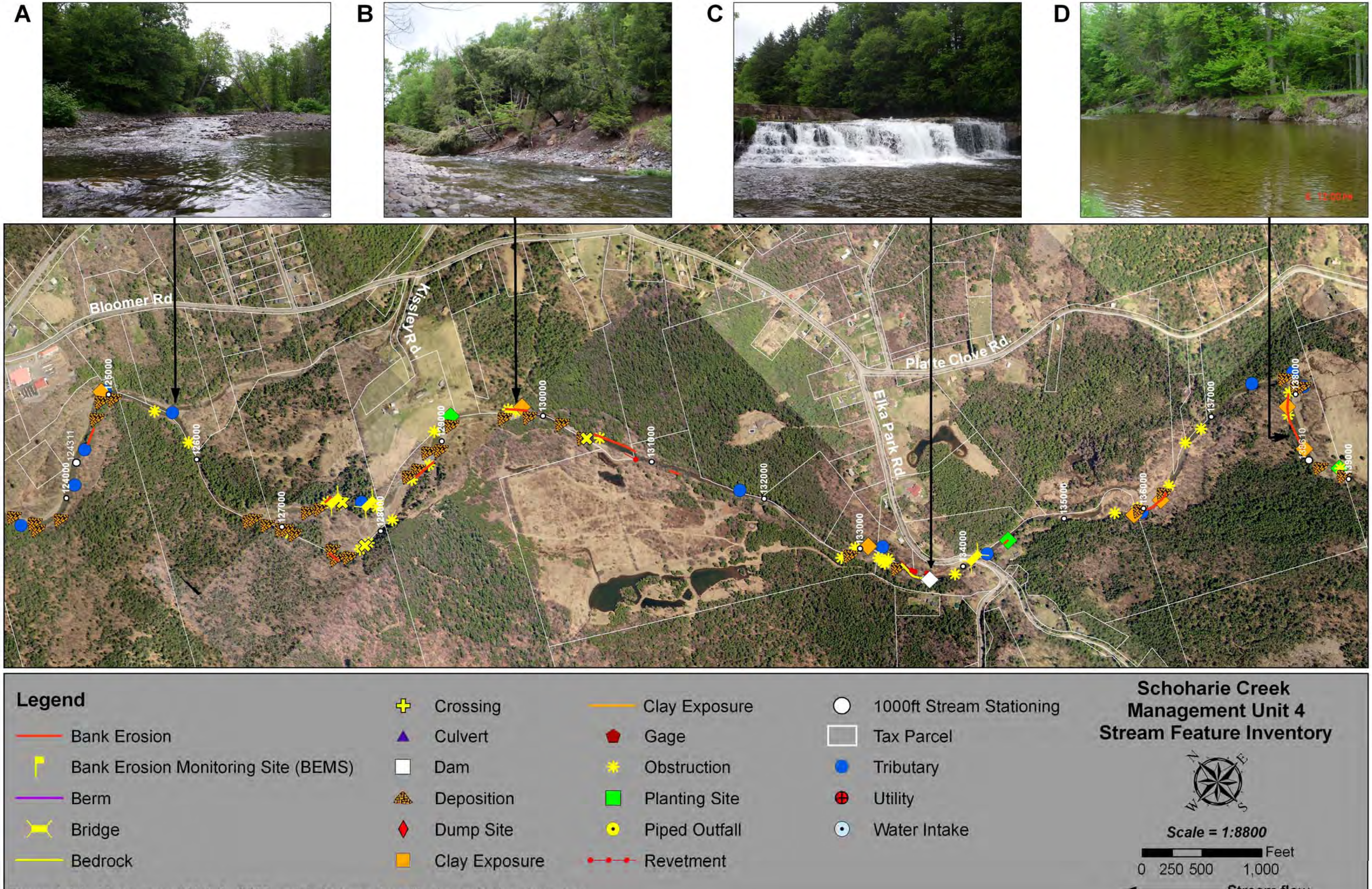


Figure 4.4.1 Management Unit 4 - 2006 aerial photography with stream feature inventory

Historic Conditions

As seen from the historical stream channel alignments (below), the channel alignment has not changed significantly since 1959.

Historic stream channel alignments overlayed with 2006 aerial photograph

As of 2006, according to available NYS DEC records dating back to 1996 there was one stream disturbance permit issued in this management unit. This permit was issued after the 1996 flood and allowed for the removal of accumulated woody debris, excavation of 100yd^3 of gravel to restore stream flows to pre-flood channel and the installation of rip-rap.

Due to its rural nature and headwater location in the watershed, the unit has had beaver activity. While beaver impoundments can sometimes be a nuisance, beavers have historically played a beneficial and ecologically important role in the stream system. Beaver activity adds organic debris (trees, leaves, etc. which provide the base of the food chain), reduces water velocities and flood-related hazards downstream, and creates wetland areas that filter sediment and release water to the stream and groundwater slowly throughout the year.

Stream Channel and Floodplain Current Conditions (2006)

Revetment, Berms and Erosion

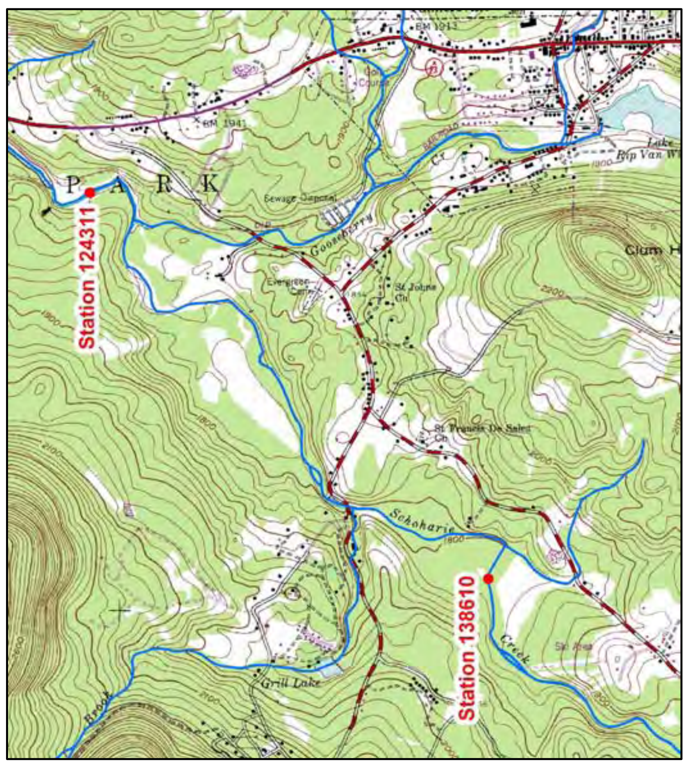
The 2006 stream feature inventory revealed that 7.1% (2,029 ft.) of the streambanks exhibited signs of active erosion along 28,598 ft. of total channel length (Fig. 4.4.1). The surface area of active erosion totaled approximately 19,343 ft^2. *Revetment* had been installed on 1% (285 ft.) of the streambanks. No *berms* were identified in this management unit at the time of the stream feature inventory.

Stream Channel Conditions (2006)

The following description of stream channel conditions references insets in foldout, Figure 4.4.1. Stream stationing presented on this map is measured in feet and begins at the Schoharie Reservoir. "Left" and "right" streambank 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 an assessment conducted in 2006.

Management unit #4 began at Station 138610. The drainage area ranged from 11.68 mi^2 at the top of the management unit to 27.04 mi^2 at the bottom of the unit. The valley slope was 1.15%.

Valley *morphology* in this management unit was mostly unconfined with a broad glacial and *alluvial* valley flat. However, the stream channel flowed up against the valley wall for much of the unit. The valley was confined for a 3,400ft reach beginning just upstream of the Elka Park Bridge (Station 134700-131300). Drainage area increased significantly near the end of the management unit at the confluence with Gooseberry Creek. Generally, stream conditions in this management unit were stable with the exception of a few erosional areas. Management efforts in this unit should focus on preservation of existing wetlands and forested areas as well as enhancement of the *riparian* buffer in recommended locations.



1980 USGS topographic map - Hunter Quadrangle contour interval 20ft

Wetland (Station 138700 - 137700 and 136900 - 134600)
Approximate wetland boundary delineated by NWI

The beginning of this management unit was dominated by two large palustrine wetlands (Station 138700 - 137700 and 136900 - 134600). 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. The first palustrine wetland was approximately 3.6 acres with forested vegetation (Station 138700 – 137700) (PFO1A); and the larger 28.6 acre wetland downstream had a mixture of forested and shrub-scrub vegetation (Station 136900 – 134600) (PFO1A, PFO4E, PSS1A, PSS1Eb) (see Section 2.6 for detailed wetland type descriptions).

Clay exposure and bank erosion at Station 138500

At the beginning of the unit the stream channel was wide and shallow. Approximately 500ft of the left streambank was experiencing scour during high flow events (Inset A, Station 138500). As a result two areas totaling 92ft^2 of glacial lake silt/clay had been exposed. Fine sediment inputs into a stream can be a serious water quality concern because they increase *turbidity*, degrade fish habitat, and can act as a transport mechanism for other pollutants and *pathogens*. This type of erosion is common and part of natural stream process. In stable watersheds, the rate of erosion is slow and a natural healing process usually follows.

From here, the stream channel flowed into the valley wall and took a sharp turn towards the northwest. At Station 136700, the *thalweg*, or deepest part of the stream channel flowed up against the left streambank causing scour along 258ft of the bank including a 20ft long glacial lake silt/clay exposure. Immediately downstream was a large debris jam which may exacerbate instability in this area.

Beginning at Station 134700, the stream channel became confined by the valley form. At Station 134440, there was an approximately 173 ft^2 area of scour on the left streambank of a residential property. The top of the bank consisted of mown lawn which does not provide as much resistance to streambank erosion as the deep and dense root structure found in streamside forest. Recommendations for this site include planting native trees and shrubs along the edge of the streambank and increasing the upland area buffer width by the greatest amount agreeable to the landowner. To provide protection from future erosion, native willows and sedges should be planted along the streambank toe.

Planting site at Station 134440

Cook Brook tributary confluence at Station 134200

Downstream, Cook Brook *tributary* entered the Schoharie Creek from the left streambank (Station 134200). This tributary drains the slopes of Plateau and Spruce Top Mountains. The New York State Department of Environmental Conservation classifies streams and rivers based on their "best use" (NYSDEC, 1994). The headwaters of this tributary was classified C(ts) by the NYS DEC, indicating that the best uses for this stream were supporting fisheries including trout spawning and other non-contact activities. As Cook Brook flowed into Grill Lake it was classified as B, signifying a best usage of swimming and other contact recreation. Downstream from Grill Lake to the Schoharie Creek confluence, the tributary was classified C(t) implying it was able to support fisheries including trout populations and other non-contact activities.

At Station 134100, the stream passed under the Elka Park Rd. Bridge (BIN 3201010). This bridge may constrict the floodplain at very high flows, but appeared to passes most flows effectively. The bridge appeared to be in both good structural and functional condition. Flood damage to bridges is typically caused by inadequate hydraulic capacity of the bridge, misaligned piers and/or abutments, or accumulation of debris. As bridges are replaced over time, these issues should be evaluated and adjusted if necessary to lessen the probability of flood damage by providing a more effective conveyance channel that promotes water and sediment flow through the bridge opening.

Bridge at Elka Park Road at Station 134100

Approximately 400ft downstream there was a failed dam across the Schoharie Creek (Inset C, Station 133700). According to a local landowner, a saw mill was built on this site in the late 1800's. Sometime prior to the 1920's the mill disappeared but the dam remained. Impounded water was used as part of the Village of Tannersville water supply, pumping water backwards through the water mains to supply water to the village. Around the 1980's an outbreak of Giardiasis struck the village, prompting the construction of the Village of Tannersville's water filtration plant. As part of the project, a raw water transmission line was installed so that water from the Schoharie Creek could be pumped directly up to the reservoir, allowing it to be filtered and sanitized before use. A flood event in the late 1980's broke the dam, but a large section of the concrete sill jutting out from the right streambank across approximately 75% of the active stream channel remained. Stream flow was forced to the left side of the stream channel before it flowed over the large bedrock waterfall.

Dam remnants at Station 133700

Downstream of the dam, the stream channel was fairly straight, confined by the valley form, and the streambanks appeared stable. There was a 1 acre palustrine wetland with shrub-shrub vegetation along the left streambank (Station 133400-132900) (PSS1A). Woody debris had accumulated in this area but did not seem to have caused any detrimental effects. The right streambank had experienced scour during high flow events, resulting in a 30ft long segment of exposed glacial lake silt/clay (Station 133100).

Wetland (Station 133400-132900)
Approximate wetland boundary delineated by NWI

At Station 130850 rip-rap had been installed along 119ft of the left streambank. While rip-rap and other hard controls may provide temporary relief from erosion, they are expensive to install, degrade habitat, and require ongoing maintenance and may transfer erosion problems to upstream or downstream areas. Alternate stabilization techniques should be explored for stream banks whenever possible. Interplanting of this rip-rap, by inserting native shrub plantings into the soil between the rocks, could strengthen and increase its longevity. These plantings would also improve the aquatic habitat by providing shade, resulting in cooler water temperatures. To provide protection against toe erosion, sedges or willows could be planted along the toe of the streambank.

Rip-rap at Station 130850

Beyond this rip-rap was another small palustrine wetland located on the left streambank (Station 130850-130500). This wetland encompassed approximately 0.7 acres with shrub-scrub vegetation (PSS1A). On the opposite bank from this rip-rap, the right streambank (Station 130850) was experiencing erosion along 388ft, exposing an area of 2230ft^2. This failure had begun to undermine several mature trees at the top of the bank.

Wetland (Station 130850-130500)
Approximate wetland boundary delineated by NWI

Downstream, the stream began to *meander*. There were many occurrences of bar development in the section, which is common in flat stream reaches such as this because flow velocities are slower and less capable of moving *bedload* than in steeper reaches. 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 are then 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.

On the outside of the first meander bend the right streambank there was a large *mass failure* totaling 4,315ft^2 in area (Inset B, Station 129865). Streambank erosion often occurs on the outside of meander bends where the stream velocity is greatest during high flows. As a result an area of 24ft^2 of lacustrine clay had been exposed and many mature trees had fallen into the stream. More of the riparian forest will be lost if this bank continues to erode.

As the land use on the right streambank changed from forested to residential, *herbaceous* vegetation replaced mature trees in the riparian zone (Station 129200). Mown lawn or pasture does not provide as much resistance to streambank

Planting site at Station 129200

erosion as a streamside forest. The complex root systems of trees may also act to filter nutrients and pollutants, if any, from the adjacent fields. Areas where the riparian zone has been maintained in pasture or lawn present opportunities to improve the streamside buffer with tree plantings in order to promote a more mature vegetative community along the streambank and in the floodplain. Recommendations for this site include planting native trees and shrubs along the edge of the streambank and the upland area. Buffer width should be increased by the greatest amount agreeable to the landowners, but increasing the buffer width by at least 100ft will increase the buffer functionality.

Downstream, the stream channel splits into two separate channels, both of which experienced erosion during high flow events. In the right stream channel a small private bridge had been destroyed (Station 128070). This bridge was undersized and could not convey flood flows. Gabion baskets had been installed as abutments. Rock-filled gabions are not generally recommended because have a tendency to be unsightly and when installed incorrectly, they frequently blow out of the bank and scatter rocks and cages downstream. Their correct use requires professional installation. Further downstream a smaller foot bridge had also been destroyed and was partially buried in the stream channel.

Bridge at Station 128070

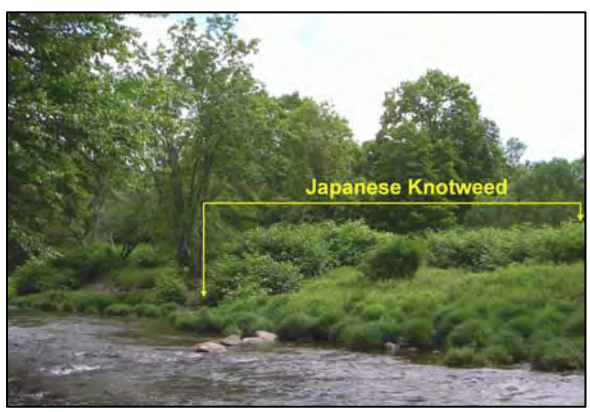
There were several wetlands in this area. The first wetland was a small 0.3 acre wetland classified as riverine upper perennial with an unconsolidated shore, signifying it was contained in the natural channel and characterized by a high gradient and fast water velocity (Station 129200-129020) (R3USA).

The large wetland between Station 128520 and 126600 was compromised of two wetland types. The upstream half, approximately 2 acres, was classified as riverine upper perennial with an unconsolidated shore (R3USA), while the lower 4 acre wetland was palustrine with forested vegetation (PFO1A). Another small riverine upper perennial wetland with an unconsolidated shore, approximately 0.5 acres in size, was located between Stations 125830-125680 (R3USA).

Wetland boundaries approximately delineated by NWI (Stations 129200-129020, 128520-126600, 125830-125680)

At Station 125500, a major tributary, Gooseberry Creek entered the Schoharie Creek on the right streambank. The headwaters of Gooseberry Creek begin in Tannersville, feeding Lake Rip Van Winkle, after which Sawmill Creek and Allen Brook converge with Gooseberry Creek before it entered the Schoharie Creek. Gooseberry Creek was classified C(ts) by the NYS DEC, indicating that the best use for this stream were supporting fisheries including trout spawning and other non-contact activities.

A large stand of Japanese knotweed (*Fallopia japonica*) had established along the right streambank upstream and downstream from the Gooseberry Creek confluence (Station 12600). Japanese knotweed is an invasive non-native species which does not provide adequate erosion protection due to its very shallow rooting system and also grows rapidly to crowd out more beneficial streamside vegetation. Although small Japanese Knotweed



Japanese Knotweed at Station 126000

plants were documented throughout the management unit, this large stand is of greater concern because this area is prone to scour during high flows and may act as a source to spread Japanese Knotweed downstream. Removal of this Japanese Knotweed plant is recommended to prevent the spread of this invasive species (See Section 2.7 Riparian Vegetation).

At the end of this management unit, a large palustrine wetland began and extended into the next unit (Station 124840-123300). This wetland was classified as palustrine with forested vegetation (PFO1A).

Wetland boundary approximately delineated by NWI (Stations 124840-123300)

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 upper half of the unit appeared to be conveying its sediment load effectively. In the downstream half the unconfined valley form and topography suggest that this unit was a sediment storage zone, mostly supplied by tributaries and active erosion. Sediment storage areas benefit the general health of the stream system by limiting bedload delivered to downstream reaches during large storm events. Sediment sinks, such as the downstream half of this management unit, and throughout the watershed should be preserved where adjacent land uses permit. Mature riparian vegetation is important in such settings to limit the extent of lateral channel migration and bank erosion.

Riparian Vegetation

One of the most cost-effective and self-sustaining methods for landowners to protect streamside property is to maintain or replant a healthy buffer of trees and shrubs along the banks and floodplain, especially within the first 50 to 100 ft. of the stream. A dense mat of roots under trees and shrubs bind the soil together, making it much less susceptible to erosion. Mowed lawn does not provide adequate erosion protection on stream banks because it typically has a very shallow rooting system and cannot reduce erosive forces as trees and shrubs do by slowing water velocity. One innovative solution is interplanting revetment with native trees and shrubs which can significantly increase the working life of existing rock rip-rap placed on streambanks for erosion protection while providing additional benefits to water, habitat, and aesthetic quality. *Riparian*, or streamside, forest can buffer and filter contaminants coming from upland sources, shallow groundwater or overbank flows and slow the velocity of floodwaters causing sediment to drop out and allowing for *groundwater recharge*. Riparian plantings can include a great variety of flowering trees, shrubs, and sedges, native to the Catskills, which are adapted to our regional climate and soil conditions and typically require less maintenance following planting and establishment. Two suitable riparian improvement planting sites were documented within this management unit (Stations 134440 & 129200).

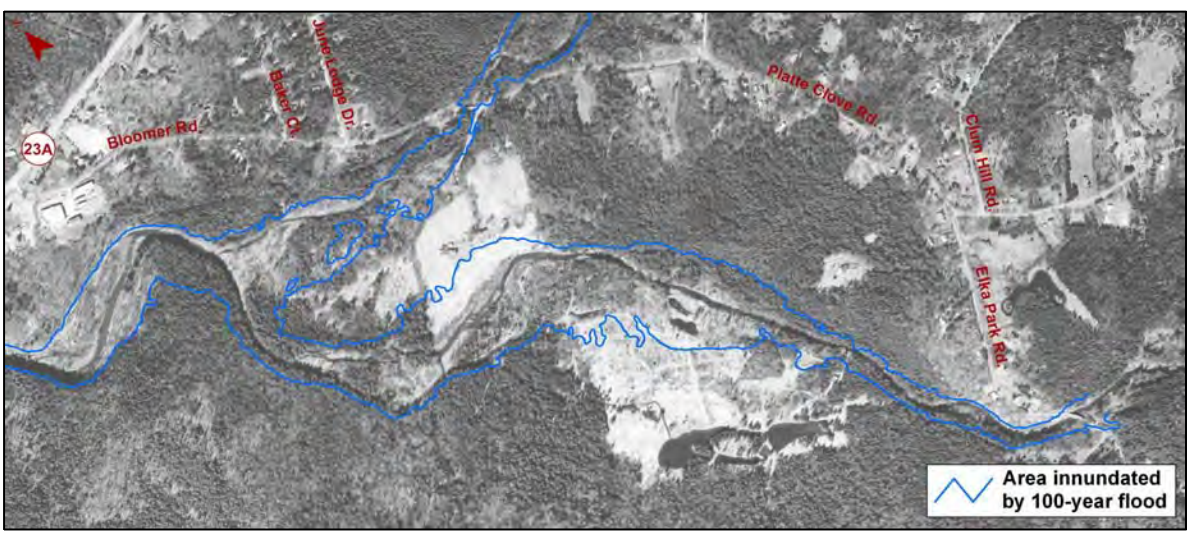
Some plant species that are not native can create difficulties for stream management, particularly if they are invasive. Japanese knotweed (*Fallopia japonica*), for example, has become a widespread problem in recent years. Knotweed shades out other species with its dense canopy structure (many large, 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 leading to a loss of valuable topsoil. In total, 16 Japanese knotweed occurrences along an estimated length of 547ft were documented in this management unit during the stream feature inventory. Japanese knotweed locations were documented as part of the stream feature inventory conducted during the summer of 2006 (Riparian Vegetation Mapping, Appendix B).

An analysis of vegetation was conducted using aerial photography from 2001 and field inventories (Riparian Vegetation Mapping, Appendix B). In this management unit, the predominant vegetation type within the 300ft riparian buffer is forested (75%) followed by shrubland (13%). *Impervious* area (1%) within this unit's buffer is primarily the local roadways, private residences and associated driveways. Areas of herbaceous (non-woody) cover may present opportunities to improve the riparian buffer with tree plantings, to promote a more mature vegetative community along the streambank and in the floodplain.

Flood Threats

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 NYS DEC Bureau of Program Resources and Flood Protection has developed new floodplain maps for the Schoharie Creek on the basis of recent surveys. The new FIRM hardcopy maps are available for viewing at County Soil & Water Conservation District Offices and most town halls. The FIRM maps shown in this plan are in draft form and currently under review. Finalization and adoption is expected by the end of 2007.

Floodplain maps are not available for the entire management unit (below). The FIRM maps for the Schoharie Creek begin at Elka Park Road and continue downstream to the Schoharie Reservoir. It is recommended that a hydraulic analysis be completed to create floodway and floodplain maps from Elka Park Road upstream to Prediger Road. In 2006, existing structures in this unit appeared to be situated out of the estimated 100-year floodplain. The 100-year floodplain is that area predicted to be inundated by floods of a magnitude that is expected to occur once in any 100-year period, on the basis of a statistical analysis of local flood record. Most communities regulate the type of development that can occur in areas subject to these flood risks.



100-year floodplain boundary map beginning at Elka Park Rd. bridge

Aquatic Habitat

Generally, habitat quality appeared to be good throughout this management unit. Canopy cover is adequate throughout most of the management unit. Woody debris within the stream channel was observed throughout the unit. This woody debris was providing critical habitat for fish and insects, and added essential organic matter that will benefit organisms downstream. In general dams effect streams by impeding or preventing the movement of fish; reducing sediment flow downstream due to deposition behind the dam; sediment deposition above dams smothers important habitats and sediment erosion below dams results in a loss of habitats; and dams increase water temperatures due to ponding of the stream, which also provides better habitat for pond dwelling animal and plant species. It is unclear what specific effects the dam in this management unit was having, but it should be analyzed in more detail to determine if conditions could be improved.

It is recommended that an aquatic habitat study be conducted on the Schoharie Creek with particular attention paid to springs, tributaries and other potential thermal refuge for cold water fish, particularly trout. Once identified, efforts should be made to protect these thermal refugia locations in order to sustain a cold water fishery throughout the summer.

Water Quality

Clay/silt exposures and sediment from stream bank and channel erosion pose a potential threat to water quality in Schoharie Creek. Fine sediment inputs into a stream increase *turbidity* and can act as a transport mechanism for other pollutants and pathogens. There were seven clay exposures in this management unit.

Stormwater runoff can also have a considerable impact on water quality. When it rains, water falls on roadways and parking areas before flowing untreated directly into Schoharie Creek. 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 stormwater culverts in this management unit.

Nutrient loading from failing septic systems can be another potential source of water pollution, though no evidence of this was noted during the 2006 stream feature inventory. Leaking septic systems can contaminate water with nutrients and pathogens making it unhealthy for drinking, 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. Servicing frequency varies per household and is determined by 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. To assist watershed landowners with septic system issues, technical and financial assistance is available through two Catskill Watershed Corporation (CWC) programs, The Septic Rehab and Replacement program and The Septic Maintenance program (See Section 2.12). Through December 2005, twelve homeowners within the drainage area of this management unit had made use of these programs to replace or repair a septic system.

References

NYSDEC, 1994. New York State Department of Environmental Conservation. Water Quality Regulations: Surface Water and Groundwater Classifications and Standards, NYS Codes, rules and regulations, Title 6, Chapter 10, Parts 700-705.