Schoharie Creek Management Unit 8

Town of Jewett – Station 91473 to Carr Road Bridge (Station 83957)

This management unit began at a private bridge (Station 91473) and continued approximately 7,515 ft to the Carr Road Bridge (Station 83957) in the Town of Jewett.

Stream Feature Statistics

16.8% of streambanks experiencing erosion
13.7% of streambanks have been stabilized
0% of streambanks have been bermed
632 feet of clay exposures
52 acres of inadequate vegetation
7,056 feet of road within 300ft of stream
25 structures located in 100-year floodplain

Management Unit 8 location
see Figure 4.0.1 for more detailed map

Summary of Recommendations Management Unit 8	
Intervention Level	Passive, Assisted Self-Recovery, Full Restoration
Stream Morphology	No recommendations at this time
Riparian Vegetation	Plantings for assisted self-recovery of eroding banks at Stations 91100, 88000, 88200 & 85750, enhancement of riparian buffer at Stations 90100, 88900 & 84700, and interplanting of rip-rap at Stations 91400, 87930 & 87200
Infrastructure	Remediate repetitive road wash out of Carr Road and improve emergency access during floods.
Aquatic Habitat	Watershed Aquatic Habitat Study
Flood Related Threats	Hydraulic analysis of Carr Road bridge and upstream floodplain to determine capacity to convey flood flows. Installation of floodplain drains at Carr Road bridge.
Water Quality	Relocation of septic system outside of floodplain for home at Station 84700
Further Assessment	Resurvey of bank erosion monitoring site at Station 88700 to assess erosion rate.

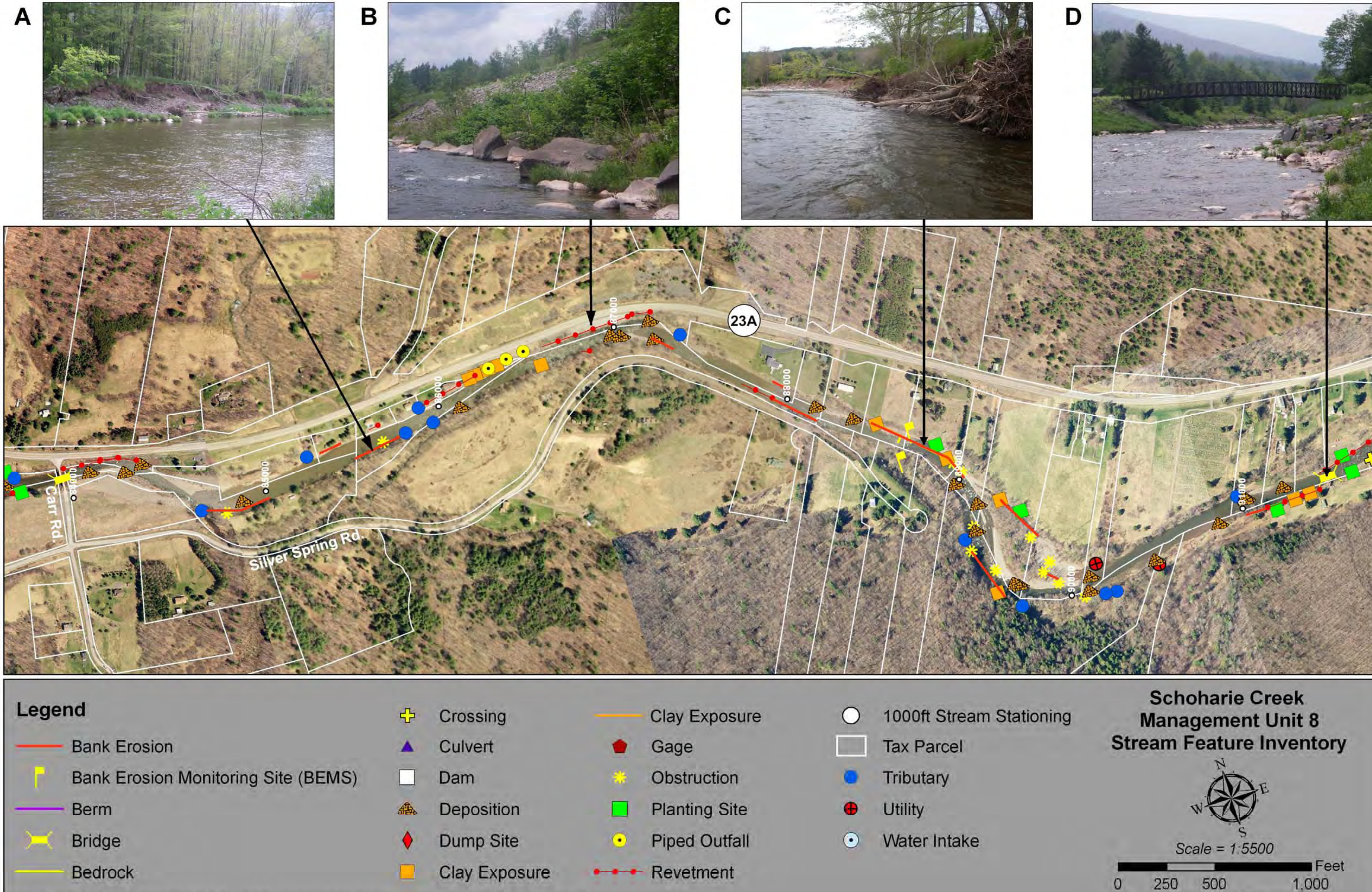


Figure 4.8.1 Management Unit 8 - 2006 aerial photography with stream feature inventory

Historic Conditions

As seen from the historical stream alignments (below), the *planform* of the channel has remained fairly stable 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 had been five stream disturbance permits issued in this management unit. Following the 1996 flood two permits were issued: one to a private landowner to repair approximately 120ft of rock rip-rap and the other to the Town of Jewett for debris removal and excavation of sand/gravel to restore stream flows to pre-flood channels upstream from the Carr Road bridge, including excavation of approximately 500 yd^3 of gravel from behind a residence on the right streambank and construction of a berm for protection as well as excavation of 2,000 yd^3 along the left streambank to be used to construct a new town road located outside of the floodplain. In 2004, a private landowner was issued a permit to place rip-rap on eroded portions of the streambank and to remove accumulated flood debris, including a 1800ft^2 gravel bar. In 2005, a private landowner was issued a permit to reduce flooding potential for a single family residence by removing a portion of a 15,000ft^2 gravel deposit in the Schoharie Creek that had aggraded across the channel. In addition, the landowner was granted permission to construct a 4-6ft high, 45ft long berm immediately upstream of the residence. In 2006, the Town of Jewett, was issued a permit to construct and remove a temporary ford in the Schoharie Creek to stage heavy equipment for road repair.

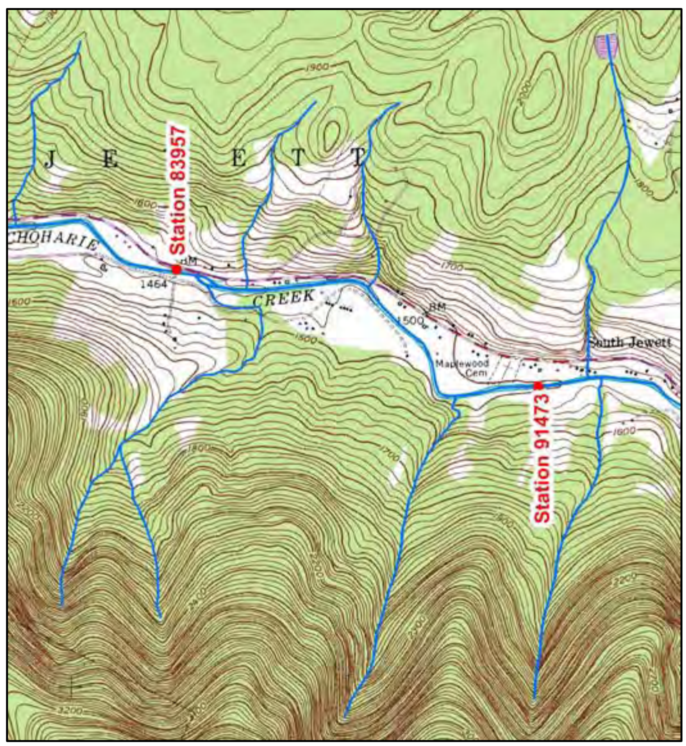
Stream Channel and Floodplain Current Conditions (2006)

Revetment, Berms and Erosion

The 2006 stream feature inventory revealed that 16.8% (2,524 ft) of the streambanks exhibited signs of active erosion along the 15,031 ft of total channel length in the unit (Figure 4.8.1). The total surface area of active erosion totaled approximately 28,031 ft^2. *Revetment* had been installed on 13.7% (2,060 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 4.8.1. 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.



1980 USGS topographic map - Lexington Quadrangle contour interval 20ft

Management unit #8 had a drainage area ranging from 47.21 mi^2 at the top of the management unit to 50.9 mi^2 at the bottom of the unit. The valley slope was 0.61%.

Valley *morphology* of this management unit was generally unconfined with a broad glacial and *alluvial* valley flat. However, at the downstream end of the unit the stream became confined on the right streambank by infrastructure and residential encroachment. Residences along the right streambank from Station 86200 downstream to Carr Road have suffered repetitive flooding. Management efforts in this unit should focus on addressing flooding issues created by the Carr Road bridge (Station 83957), as well as increase vegetation along the stream corridor. Generally, stream conditions in this management unit were unstable, although many of the erosion sites could be addressed with vegetative treatments and *bioengineered* bank stabilization.

Most of the stream channel within this management unit was designated as a wetland. At the upstream end was a 2 acre wetland classified as riverine lower perennial, signifying it was contained in the natural channel and characterized by a low gradient and slow water velocity (R2UBH, Station 91473-90600); this wetland was followed by another 3.8 acre riverine lower perennial wetland (R2USA, Station 90600-88900) (see Section 2.6 for detailed wetland type descriptions). 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.

Wetlands (Station 91473-90600 & 90600-88900)
Approximate wetland boundary delineated by NWI

This management unit began as the stream passed under a private bridge on an unpaved road (Inset D, Station 91473). This bridge, built in the mid 1990's, was in good structural condition and appeared to pass most flows effectively. However, during large flood events floodwaters have spread over the right abutment, causing erosion and deposition, then back into the stream channel downstream of the bridge. According to landowner accounts, maintenance of the road and bridge due to stream related problems has cost thousands of dollars. Installation of flood plain drainage, and/or regrading of the right streambank floodplain area to floodplain elevation, at or just above the bankfull stage, could reduce flooding. Leveling this area would decrease the local flow concentration that is currently causing erosion while still providing over bank access during flood flows. The riparian area throughout the reach, including the immediate terrace area should be vegetated with native trees and shrubs. An established riparian community could reduce erosion and flood velocities in the bridge and road access area and discourage further widening of the stream channel. With the exception of planting, in-depth survey and design would be required to implement these recommendations.

Directly downstream from the bridge, rip-rap had been installed along 290ft of the left streambank (Station 91400). This rip-rap was in poor condition, and at two locations where the rip-rap had failed clay/silt exposures were documented. Fine sediment inputs from these exposures can be a water quality concern because they increase *turbidity* and can act as a transport mechanism for other pollutants and pathogens. While rip-rap and other hard controls may provide temporary relief from erosion, they are expensive to install, degrade habitat, require ongoing maintenance or may transfer erosion problems to upstream or downstream areas. Alternate stabilization techniques should be explored for streambanks whenever possible. Native shrub and sedge species should be interplanted along the toe of this streambank to help strengthen the revetment, while enhancing aquatic habitat. A combination of trees and shrubs should also be planted along the streambank and adjacent *riparian* buffer to increase bank stability. At the downstream end of this rip-rap the left streambank had eroded along 108ft and had caused several mature trees to fall from the top of the bank (91100). The stability of this streambank could also be improved with plantings along the toe and bank.

Rip-rap and planting site at Station 91400

Downstream on the left streambank, an unnamed tr*ibutary* entered the Schoharie Creek (Station 90200). This tributary drains the steep slopes of Rusk Mountain, before it reaches the flatter topography of the valley floor where it enters the Schoharie Creek. As

Tributary at Station 90200 - looking upstream a result of this stream slope change, the tributary loses its ability to transport sediment gathered from the mountain slopes, and began to deposit sediment at its mouth and into the more gently sloped Schoharie Creek. This is a common feature of confluence areas, which often contain extensive sediment bars, function as important sediment storage areas, and are typically among the most dynamic and changeable areas in the stream system. The New York State Department of Environmental Conservation classifies streams and rivers based on their “best use” (NYSDEC, 1994). This tributary was classified as C, indicating that the best uses for this stream were the support of fisheries and other non-contact activities.

At Station 90100 there was a stream divergence on the right streambank which served mainly as a flood chute but some base flow was present. The flood chute is part of the *floodway*, or the land most severely affected by flooding and must be able to carry and discharge floodwaters. If this chute was cut off, it would reduce the available floodplain and likely increase erosion during high flow events. At the downstream end of the flood chute a 1926ft^2 area of the right streambank had scoured, including a small area of clay/silt. The riparian buffer beyond the erosion was comprised of agricultural field to the edge of the bank. Buffer width should be increased by the greatest amount agreeable to the landowners, but increasing the forested buffer width by at least 100 feet would increase buffer functionality, such as filtering nutrients and pollutants, if any, from the agricultural field. The streambank stability could also be improved with plantings of native shrubs and sedges along the toe and bank.

This reach, including the flood chute, serves as a storage area for excess sediment and woody debris supplied by upstream tributaries and streambank erosion. The resulting *aggradation* had shifted the erosional force of flood flows onto the left streambank of the main channel resulting in a large erosion area of approximately 5,343ft^2 and exposing a 270ft^2 area of clay (Station 89670). Due to the erosion, many mature trees have fallen into the stream adding to in-stream woody debris and sediment.

Bank erosion at Station 89670

As the stream *meandered* downstream, the *thalweg*, or deepest part of the stream channel, flowed up against the right streambank causing significant bank erosion (Station 89000, Inset C). Streambank erosion often occurs on the outside of meander bends where the stream velocity is greatest during high flows. A 9,013ft^2 area of streambank had been left unvegetated exposing a substantial amount glacial lake silt/clay (Station 889000).

Clay exposure at Station 88900

A bank erosion monitoring site (BEMS) was installed along this bank to study this erosion (Station 88700). A cross-section and longitudinal profile survey were conducted to collect baseline *morphology* data. In the future, this cross-section can be resurveyed to calculate the bank's erosion rate. If the erosion rate accelerates significantly, full restoration to address property loss and water quality threats should be considered for this site. This would likely involve establishment of a well-vegetated bench on the right bank with rock vanes to direct stream flows away from the bank, regrading and then revegetation of the bank face, and establishment of channel geometry throughout the unit to more effectively convey the *sediment load*. The riparian area at the top of the bank was covered by *herbaceous* vegetation and if left undisturbed should allow for native tree and shrub species to establish. To speed this process trees and shrubs could be planted. While enhancement to the riparian buffer is recommended for this site, alone it will not solve this erosion problem.

The downstream half of this management unit contained three federally designated wetlands (see photo below). The first was an 8.6 acre wetland classified as riverine lower perennial, signifying it is contained in the natural channel and characterized by a low gradient and slow water velocity (R2UBH, Station 88500-84850); and this was followed by another 2.5 acre riverine lower perennial wetland (R2USA, Station 84850-83957). Along the left streambank there was a 3 acre palustrine wetland with forested vegetation (PFO1C, Station 85900-84850).

Wetlands (Station 88500-84850 & 85900-84850 & 84850-83957)
Approximate wetland boundary delineated by NWI

Downstream, *shear stress* during high flow events had eroded the toe of the left streambank along the Silver Springs Road embankment (Station 88200). Rip-rap had been installed along the streambank downstream but was deteriorating (Station 87930). In efforts to prevent future erosion and possible road failure, plantings of willow *fascines* and sedges along the toe of the bank coupled with trees and shrubs along the bank is recommended.

Bank erosion and planting site at Station 88000

The right streambank had also been eroded with only herbaceous vegetation in the riparian zone (Station 88000). Mown lawn or pasture does not provide as much resistance to streambank erosion as the deep and dense root structure found in streamside forest. To promote a more mature vegetative community along the streambank and in the floodplain mowing to the stream edge should be stopped. Gradually, vegetation will begin to grow within the buffer but planting of native trees and shrubs can give the buffer a good head start. If it is important for the landowner to maintain a stream view, plantings of low growing vegetation could be installed. Plantings of shrubs and sedges along the streambank will also help to reduce erosion.

At Station 87300 an unnamed tributary entered the Schoharie Creek from the right streambank. Originating on mountain slopes north of County Route 23A, the stream then crossed under County Route 23A and joined the Schoharie Creek. This tributary was classified by the NYSDEC as C.

As the stream flowed directly towards the County Route 23A embankment, revetment including 581ft of rip-rap had been installed (Inset B, Station 87200). Interplanting of the existing rip-rap, by inserting plantings into the soil between the rocks may help to strengthen and increase the longevity of this rip-rap. These plantings will also improve the aquatic habitat by providing shade, resulting in cooler water temperatures.

From Station 86200 downstream to the end of the management unit at Carr Road, residences along the right streambank have suffered repeated flooding due to their location within the floodplain. To resolve flooding issues, the best solution would be to relocate these structures outside the 100-year floodplain to allow the stream to utilize its floodplain without causing property damage. However this option seems unlikely. Silver Spring Road was first built along the Schoharie Creek. After years of sustaining flood damage, the Town of Jewett working with landowners, relocated the road outside the floodplain to its present day location.

2006 aerial photograph with 100-year flood boundary represented by blue line

A 320ft stacked rock wall was installed to protect a home on the right streambank at the edge of the Schoharie Creek (Station 86250). A section of this wall had failed due to stormwater which flows over the edge of the bank. This problem may be corrected with grading at the top of the bank to redirect stormwater. The building of a well-vegetated bench within the stream channel could reduce flood water velocities near this bank and lessen its susceptibility to failure.

Stacked rock wall at Station 86250

Along the left streambank, 259ft of streambank had scoured threatening the tree stand located at the top of the bank (Inset A, Station 85750). Installation of willow *fascines* and sedges along the toe of the bank is recommended to provide protection against toe erosion. Native trees and shrubs, including willows should be planted on the face of streambank.

Flooding of residence at Station 84700

Downstream, floods regularly flow through the lower level of the home on the right streambank (Station 84700). To protect this home an upstream berm had been built. The berm was approximately 45ft in length and started at the existing high terrace, which the house sits upon, and ran perpendicular to the home towards the stream. The berm was roughly 20ft wide and 4-6ft high. Although this berm may protect the home from some flooding, additional flood proofing of the lower level is recommended. The septic system for this home poses a water quality threat and should be relocated outside of the floodplain. The homeowner is currently working with the Catskill Watershed Corporation (CWC) Septic Rehab and Replacement program to replace this septic system (See Section 2.12). Construction is expected by the end of 2007.

Opposite this home on the left streambank there was a large open field (Station 84700). This property should not be developed because of its location within the 100-year floodplain. Adding fill for development would raise flood stage, increasing flood damage on adjacent properties and infrastructure. The best use of this property would be forested or pasture with a minimum 100ft stream buffer. Plantings of native trees and shrubs in the riparian zone would help to slow the flow of run-off from the floodplain and allow sediment and its attached pollutants, if any, to settle out before reaching the stream. The increased vegetation would also slow flood waters and trap large woody debris. The owner may also consider obtaining a riparian conservation easement through the Greene County Land Trust. A conservation easement is a voluntary legal agreement between a landowner and a land trust or government agency that permanently limits uses of the land in order to protect its conservation values.

At the end of this management unit, the stream passed under Carr Road bridge. While *bankfull* flows appeared to flow freely through this bridge, higher flows overtop the bridge and flow over Carr Road rendering the bridge impassable. This bridge is the sole access residents have to cross the Schoharie Creek, and during floods residents are cut off from emergency services. Repeated repair of Carr Road after flood events has also been very costly. Installation of *floodplain drainage*, using culverts set at the floodplain elevation under the bridge approach, would increase hydraulic capacity of the bridge and help mitigate this problem. A hydraulic analysis of Carr Road bridge and upstream floodplain is the first step necessary to begin planning for remediation of flood concerns in this area.

Bridge at Carr Road (Station 83957)

Sediment Transport

Streams move sediment as well as water. Channel and floodplain conditions determine whether the reach aggrades, degrades, or remains in balance over time. If more sediment enters than leaves, the reach aggrades. If more leaves than enters, the stream degrades (See Section 3.1 for more details on Stream Processes).

This unit was characterized by an overwide stream channel and aggradational conditions. Sediment deposition has lead to lateral adjustments and associated bank erosion. These processes are confirmed by the high percentage of revetted banks and the multiple erosion sites in the unit.

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 floodplains, especially within the first 50 to 100 ft of the stream. A dense mat of roots under trees and shrubs binds the soil together, making it much less susceptible to erosion. Mowed lawn (grass) does not provide adequate erosion protection on stream banks because it typically has a very shallow rooting system and cannot reduce erosive forces by slowing water velocity as well as trees and shrubs. One innovative solution is the interplanting of revetment with native trees and shrubs which can significantly increase the working life of existing rock rip-rap, 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 while allowing for *groundwater recharge*. Riparian plantings can include a great variety of flowering trees, shrubs, and sedges native to the Catskills. Native species are adapted to our regional climate and soil conditions and typically require less maintenance following planting and establishment. Three suitable riparian improvement planting sites were documented within this management unit.

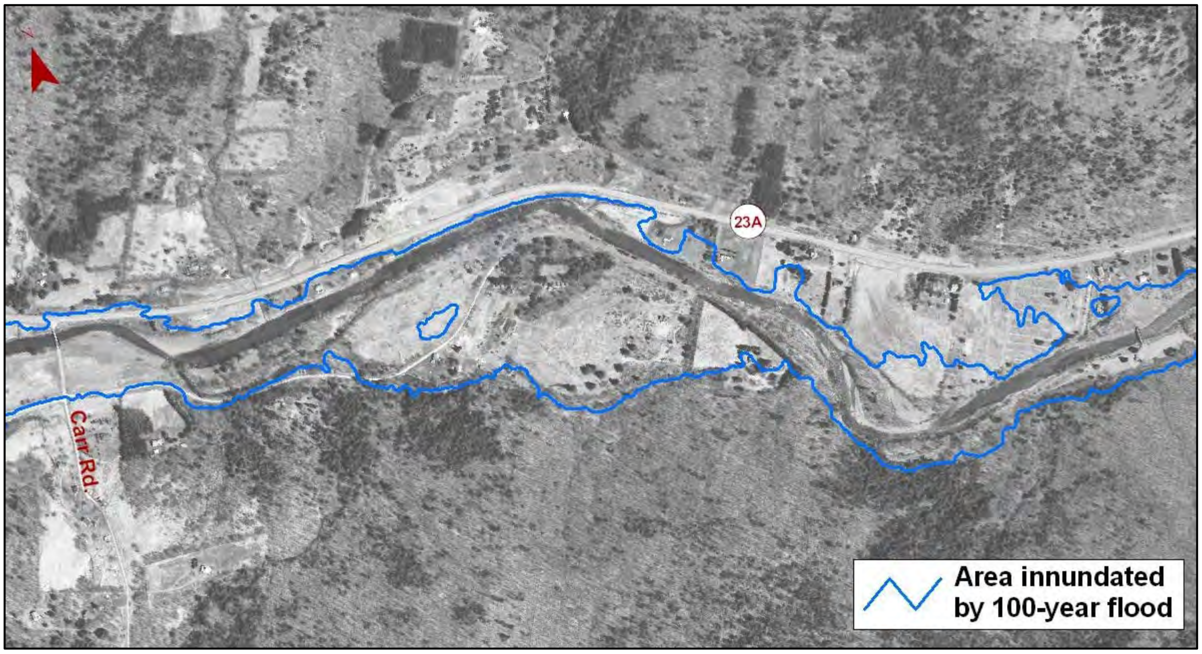
Some plant species that are not native can create difficulties for stream management, particularly if they are invasive. Japanese knotweed (*Fallopia japonica*), for example, has become a widespread problem in recent years. Knotweed shades out other species with its dense canopy structure (many large, 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, 60 Japanese knotweed occurrences along an estimated length of 2,987 ft 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 300 ft riparian buffer was herbaceous (43%), followed by forested (36%). Areas of herbaceous (non-woody) cover may present opportunities to improve the riparian buffer with tree plantings in order to promote a more mature vegetative community along the streambank and in the floodplain. *Impervious* area (6%) within this unit's buffer was primarily the local roadways, private residences and associated driveways.

<u>Flood Threats</u>

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.

According to the new floodplain maps (below), twenty-five existing structures in this unit appeared to be situated within 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

Aquatic Habitat

Generally, habitat quality appeared to be fair throughout this management unit. Canopy cover was inadequate along some streambanks and could be enhanced with plantings in the riparian zone. Some woody debris was observed within the stream channel throughout the unit. Woody debris provides critical habitat for fish and insects, and added essential organic matter that will benefit organisms downstream. This unit was characterized by an overwide stream channel and aggradational conditions. This aggradation may be acting to reduce in-stream flows available to fish and increase water temperatures in the summer months.

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 eight 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. In 2006, there were three 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 with nutrients and pathogens making it unhealthy for drinking, swimming, or wading. Homeowners with septic systems should inspect their 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, no 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.