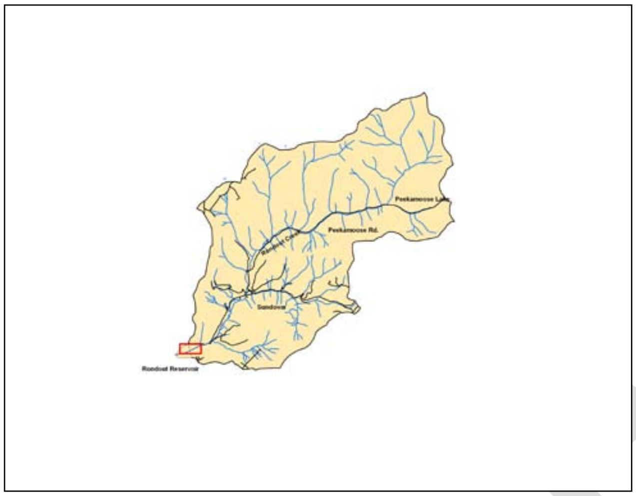
Rondout Creek Management Unit 2



<u>Stream Feature Statistics</u>

10 % of stream length is experiencing erosion

0% of stream length has been stabilized

1.40 acres of inadequate vegetation within the 100 ft. buffer

0 ft. of stream is within 50 ft. of the road

1 house located within the 100-year floodplain boundary

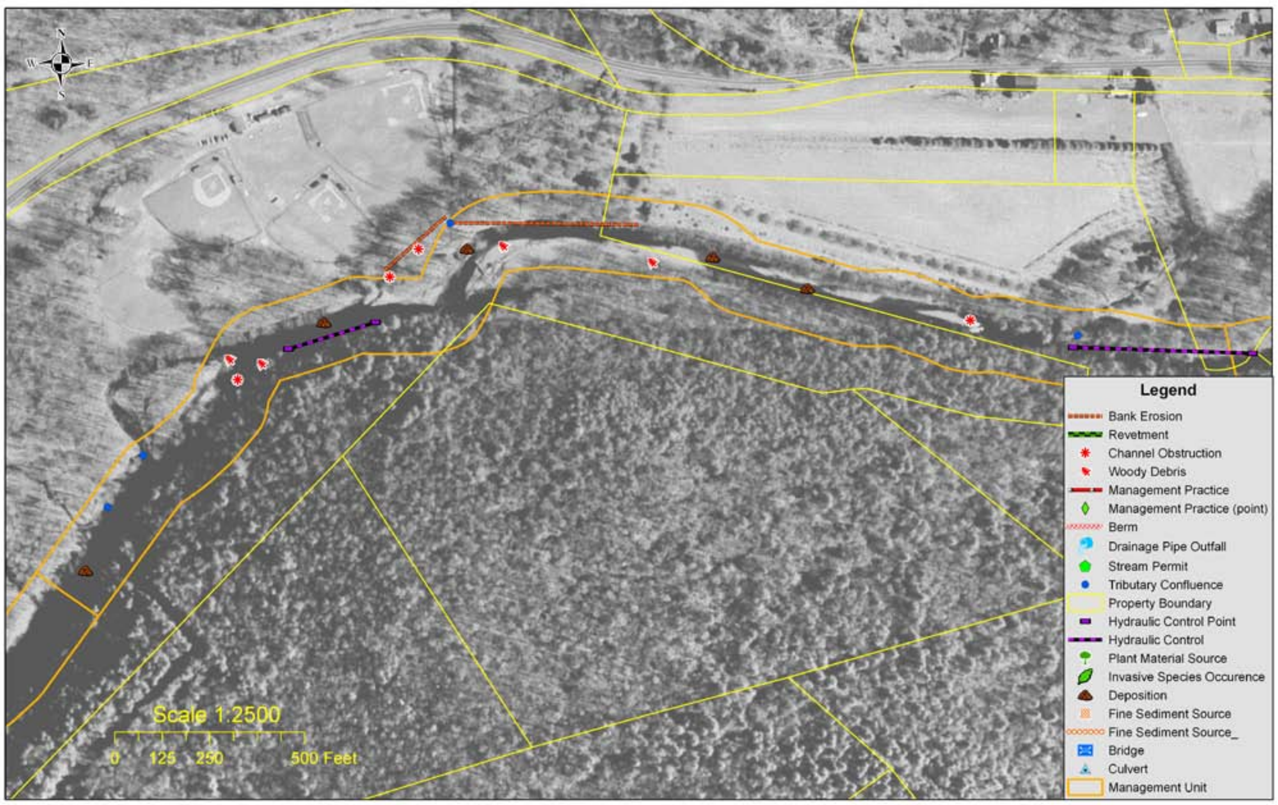


Figure 1 Management Unit 2 Stream feature inventory

Management Unit 2
Between Station 4700 and Station 1100

Management Unit Description

This management unit begins at a confluence with an unnamed tributary, continuing approximately 3,595 ft. to the confluence with Sugarloaf Brook. The drainage area ranges from 39.7 mi^2 at the top of the management unit to 39.1 mi^2 at the bottom of the unit. The valley slope is 0.46%. The average valley width is 919.7 ft.

Summary of Recommendations Management Unit 2	
Intervention Level	Assisted restoration from Stns 2400 to 3050
Stream Morphology	Stabilize and narrow channel with aggressive bioengineering treatments on banks and low floodplain areas
Riparian Vegetation	Plant low floodplains with willow and sycamore
Infrastructure	None
Aquatic Habitat	Watershed fisheries habitat study
Flood Related Threats	None
Water Quality	None
Further Assessment	Monitor aggradation and woody debris obstructions

Historic Conditions

As the glaciers retreated about 12,000 years ago, they left their "tracks" in the Catskills. See Section 2.4 *Geology of Upper Rondout Creek*, for a description of these deposits. These deposits make up the soils in the high banks along the valley walls on the Rondout mainstem and its tributaries, are eroded by moving water, and are then transported downstream by the creek. During the periods when the forests of the Rondout watershed were heavily logged for timber, firewood and to make pasture for livestock, the change in cover and the erosion created by timber skidding profoundly affected the Rondout hydrology and drainage patterns.

In Management Unit 2, the valley floor bends to the left, turned by the valley wall as it approaches the confluence of Sugarloaf Brook and Rondout Reservoir down valley. The slope of both valley and the channel are lower than upstream, due in part to aggradation resulting from the confluence of Sugarloaf Brook as well as backwatering from the reservoir. In the roughly one hundred and twenty centuries since the retreat of the glaciers, the position of Rondout Creek has moved back and forth across this narrow

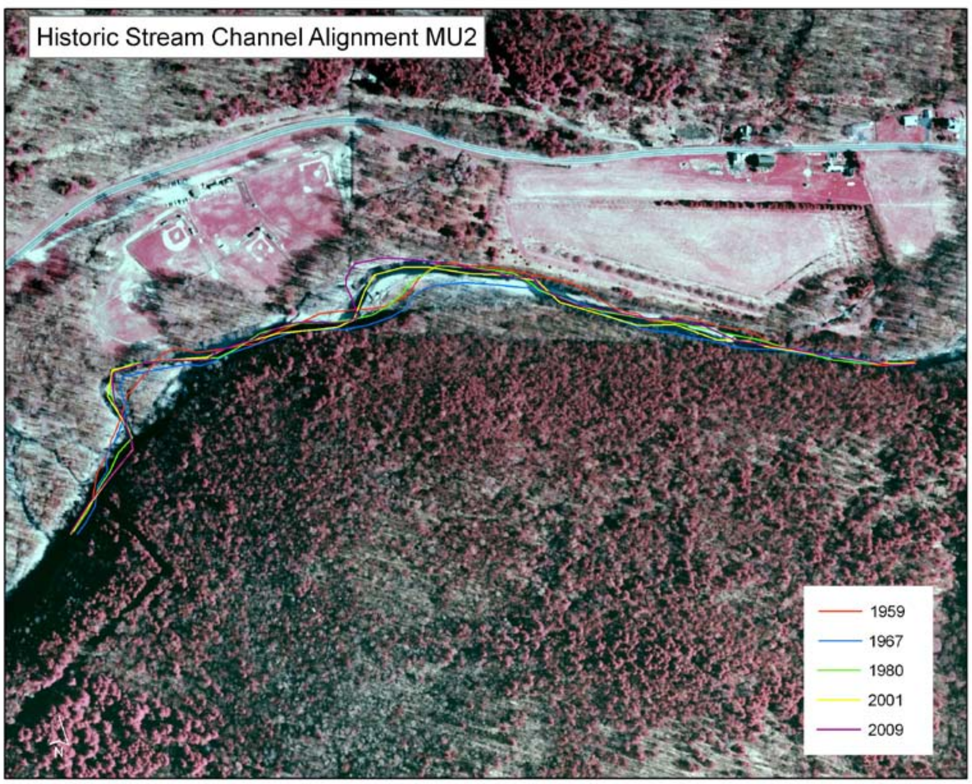


Figure 2 Historical channel alignments in MU2

valley floor floodplain numerous times. An analysis of historic aerial photography shows that, just since 1959, there has been significant channel shifting in this management unit (Fig. 2). There have been numerous Article 15 stream disturbance permits issued for work in this management unit (Fig. 1).

Stream Channel and Floodplain Current Conditions

Revetment, Berms and Erosion

The 2009 stream feature inventory revealed that 10% (703 ft.) of the stream length exhibited signs of active erosion along 3,595 ft. of total channel length (Fig. 1). Revetments have not been installed in this management unit. 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 14. “Left” and “right” references are oriented looking downstream, photos are also oriented looking downstream unless otherwise noted. Stationing references, however, proceed upstream, in feet, from an origin (Station 0) at the confluence with the Rondout Reservoir. Italicized terms are defined in the glossary. This characterization is the result of surveys conducted in 2008 and 2009.

Beginning at Station 4700, the Rondout runs along the left valley wall for about 450 ft. (Fig 3), to the confluence of an unnamed tributary on the right. Bedrock ledge outcroppings control the channel on the left and in the bed for much of this reach, with bedrock protrusions in the bed occasionally obstructing flows.

Figure 3 Bedrock ledge in channel bottom and left bank

Downstream of the tributary confluence, the channel is moderately entrenched for about 1000 ft. to approximately Station 3300, with evidence of historical incision to bedrock, and subsequent aggradation across the bed, and in lateral bars on the right, possibly due to historical channel management resulting in an over-widened channel. This reach, however, has mature vegetation on both banks, and appears to be quite stable owing to the bedrock control of left bank and bed.

Figure 4 Right bank, lateral bar, moderate entrenchment, Stn 3500

The channel gradually pulls away from the left valley through this reach, and beginning around Station 3300, the lateral bars on the right merge across the channel transversely into an extensive point bar and floodplain on the left, as the channel begins to meander at

Station 2700. The point bar has collected significant woody debris; it also has a small backchannel against the left valley wall. Across the channel on the right, at the outside of the meander, erosion is occurring from Station 2300 to Station 3050, adjacent to the Jerry Scanna Memorial Little League Field (Figs. 5-10). The alluvial soils in the right bank have a significant fraction of fine material. A Small, unnamed tributary confluences with the Rondout through the eroding bank. The bankfull channel width increases to 150 ft. in some parts of this reach; the equilibrium width is around 95 ft.

Because this location, just upstream of the confluence of Sugarloaf Brook and the Rondout Reservoir, experiences backwatering from waterbodies downstream, redimensioning the channel is unlikely to significantly improve sediment transport, and it is likely to remain an aggradational reach.

Figure 5 Point bar

Figure 6 Large woody debris on the left floodplain

Figure 7 Erosion on right bank, Stns 2300 - 3050

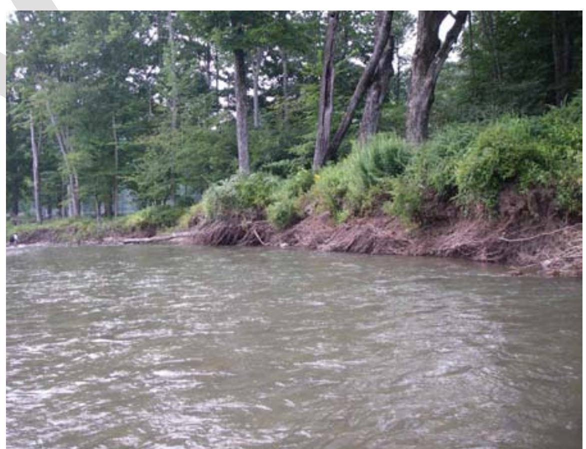


Figure 8 Bank erosion along the baseball field

The channel narrows and moves back against the left valley wall, controlled by ledge again, around Station 2400 for approximately 300 ft., before again encountering severe aggradation, multiple woody debris obstructions, and a headcut, which often occurs at the downstream end of an aggrading reach, at the point where the channel diverges into two threads (Figs 11-12).

Recommendations for this entire aggradational area include extensive soil bioengineering treatments to stabilize the right bank through the reach, and to narrow the floodplain on the left with plantings. Woody debris causing an obstruction to bankfull and larger flows (Fig. 9) should be removed or repositioned to increase floodplain stability.

Figure 9 Woody debris, an obstruction at higher flows

Figure 10 Aggradational areas adjacent to ball field

Figure 11 Main channel divergence

Figure 12 Headcut, both threads near convergence

Management Unit 2 ends at the confluence of Sugarloaf Brook, at Station 1100. This confluence will be discussed in Management Unit 1.

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 3.2 for more details on *Stream Processes*).

Figure 13 Sediment transport in Management Unit 2, controlled by downstream water bodies

For a number of reasons, Management Unit 2 is incompetent in terms of sediment transport for much of its length. Varying conditions of entrenchment, reaches with overly wide bankfull dimensions, bed and bank hydraulic control by bedrock setting the low gradient, and backwatering from the reservoir and tributary confluence just downstream combine to result in moderate channel aggradation in much of the unit. In some places, this discontinuity of sediment transport appears to be the result of historic channel management; in these locations, channel narrowing with appropriate bioengineering treatments and floodplain plantings, combined with woody debris management to reduce resistance to flow within the channel might increase velocities and improve sediment competence. These treatments have merit based on property protection and water quality objectives.

<u>Riparian Vegetation</u>

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. Mowed lawn does not provide adequate erosion protection on stream banks because it typically 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, which are adapted to our regional climate and soil conditions and typically require less maintenance following planting and establishment.

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 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 increase surface runoff impacts.

An analysis of vegetation was conducted using aerial photography from 2001 and field inventories (Fig. 15). In this management unit, the predominant vegetation type within the 100 ft. riparian buffer is mixed-closed tree canopy (35%) followed by deciduous-open tree canopy (20%). Very little *impervious* area is present in this management unit. 0 occurrences of Japanese knotweed were documented in this management unit during the 2009 inventory.

There are 3 wetlands within this management unit mapped in the National Wetland Inventory (see Section 2.5, *Wetlands and Floodplains* for more information on the National Wetland Inventory and wetlands in the Rondout watershed). 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 (See Section 2.5 for wetland type descriptions and regulations). The northernmost wetland is .3 acres in size, and is classified as riverine lower perennial, unconsolidated shore, and temporarily flooded (R2USA). Moving downstream, the next wetland is the largest at 2,029.5 acres, classified as lacustrine limnetic, unconsolidated bottom, and permanently flooded/diked/impounded (L1UBHh). The smallest of the wetlands is .45 acres in size, and is classified as palustrine forested, broad-leaved deciduous, and temporarily flooded (PFO1A).

Areas of herbaceous (non-woody) cover present opportunities to improve the riparian buffer with tree plantings, to promote a more mature vegetation community along the streambank and in the floodplains. Suitable riparian improvement planting sites were identified through a watershed-wide remote evaluation of current riparian buffer conditions and existing stream channel morphology (Fig. 16); additional sites may be identified through more detailed on the ground site survey and plans. 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 long-term stream channel stability, as well as biological integrity of the stream and floodplain. These are only *potential* planting sites, and landowners prefer to keep areas mowed or otherwise cleared for many reasons. In some cases, these sites may not be effectively treated with riparian enhancement alone, and full restoration efforts would include channel restoration components in addition to vegetative treatments. For technical and financial resources available to landowners to replant banks and floodplains, see Section 2.6, *Riparian Vegetation Issues in Stream Management*.

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. There is one house located in the 100-year floodplain near the top in this management unit, as currently mapped. The upper Rondout Creek is scheduled to have its FIRMs updated with current surveys and hydrology and hydraulics analysis in the next few years, and the mapped boundaries of the 100-year floodplain are likely to have changed.

Bank Erosion

Most of the stream banks within the management unit are considered stable, but 10 % (703 ft.) of the stream length is experiencing erosion.

Infrastructure

This management unit has not been treated with any form of revetment.

Aquatic Habitat

Aquatic habitat is one aspect of the Rondout Creek ecosystem. While ecosystem health is includes a broad array of conditions and functions, what constitutes “good habitat” is specific to individual species. When we refer to aquatic habitat, we often mean fish habitat, and specifically trout habitat, as the recreational trout fishery in the Catskills is one of its signature attractions for both residents and visitors. Good trout habitat, then, might be considered one aspect of “good human habitat” in the Rondout Creek valley.

Even characterizing trout habitat is not a simple matter. Habitat characteristics include the physical structure of the stream, water quality, food supply, competition from other species, and the flow regime. The particular kind of habitat needed varies not only from species to species, but between the different ages, or life stages, of a particular species, from eggs just spawned to juveniles to adults.

In general, trout habitat is of a high quality in the upper Rondout Creek. The flow regime of the Creek is unregulated, the water quality is generally high (with a few exceptions, most notably low pH as a result of acid rain; see Section 3.1, *Water Quality*), the food chain is healthy, and the evidence is that competition between the three trout species is moderated by some *partitioning* of available habitat among the species (M. Flaherty, personal communication). Management Unit 2 has been given an "A" class designation, supporting drinking water, swimming and fishing.

Historical channel and floodplain management, however, have modified the physical structure of the stream in some locations, resulting in the filling of pools, the loss of streamside cover and the homogenization of structure and hydraulics. As physical structure is compromised, interspecies competition is increased. It is recommended that a population and habitat study be conducted on the upper Rondout Creek, with particular attention paid to temperature, salinity, riffle/pool ratios and quality and in-stream and canopy cover.

<u>Water Quality</u>

The primary potential water quality concerns in the Rondout as a whole are the contaminants contributed by atmospheric deposition (nitrogen, sulfur, mercury), those coming from human uses (nutrients and pathogens from septic systems, chlorides (salt) and petroleum by-products from road runoff, and suspended sediment from bank and bed erosion. Little can be done by stream managers to mitigate atmospheric deposition of contaminants, but good management of streams and floodplains can effectively reduce the potential for water quality impairments from these other sources.

Storm water runoff can have a considerable impact on water quality. When it rains, water falls on roadways and flows untreated directly into the upper Rondout Creek. The cumulative impact of oil, grease, sediment, salt, litter and other unseen pollutants found in road runoff can significantly degrade water quality. Road drainage from Sundown Road in Management Unit 2 is carried by smaller channels that enter into the Rondout Creek in the middle of this management unit.

Sediment from stream bank and channel erosion pose a potential threat to water quality in the upper Rondout Creek. Clay and sediment inputs into a stream may increase *turbidity* and act as a carrier for other pollutants and pathogens. The bank erosion sites in MU2, however, are largely comprised of alluvial deposits, which in general contain a lower proportion of fine sediments than glacial till or lacustrine deposits, and represent a relatively low water quality concern.

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 is one house located in relatively 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 out 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, and the program was refunded in 2007. Systems eligible include those that are less than 1,000-gallon capacity serving one-or-two family residences, or home and business combinations, less than 200 feet from a watercourse. Permanent residents are eligible for 100% reimbursement of eligible costs; second homeowners are eligible for 60% reimbursement. For more information, call the Catskill Watershed Corporation at 845-586-1400, or see http://www.cwconline.org/programs/septic/septic_article_2a.pdf