

The Fall Kill Streamwalk

A Visual Assessment of the Fall Kill through its Watershed

November 2008



Conducted by the Fall Kill Watershed
Committee

With Support from:
Hudson River Sloop Clearwater Inc.
and
The NYS DEC Hudson River Estuary Program



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Data collection forms developed by the Lower Hudson Coalition of Conservation Districts can be found at: <http://www.lhccd.org/streamwalk2004.html>

The trash parameter used in the assessment was taken from “A Rapid Trash Assessment Method Applied to Waters of the San Francisco Bay Region” a complete copy of these methods including protocol and data sheets can be found at:

<http://www.swrcb.ca.gov/rwgcb2/docs/swamptrashreport.pdf>

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Executive Summary

The Fall Kill Watershed is located entirely in Dutchess County and is comprised of five municipalities: the Towns of Clinton, Hyde Park, Pleasant Valley and Poughkeepsie and the City of Poughkeepsie. The drainage area of the Fall Kill encompasses approximately 12, 476 acres and is home to over 28,500 people. The Fall Kill, including tributaries that feed into it, includes almost 40 miles of stream. Over half of the watershed area and nearly 65% of the stream length is found in the town of Hyde Park.

The Fall Kill watershed is a collection of diverse habitats and land use types. The northern reaches of the stream are rural and made up of complexes of small streams, wetlands and upland forested habitat. Moving south, the stream and watershed transform to a suburban setting with the stream flowing through residential and recreational areas. Finally, the landscape becomes urban as the watershed extends through the North Side of the City of Poughkeepsie. The final three miles of stream is almost entirely enclosed in New Deal Era stonewalls that channel water quickly through the city. After a dramatic increase in slope and velocity resulting in a series of waterfalls, the creek joins the Hudson River at the Poughkeepsie waterfront near the Mid-Hudson Children’s Museum, approximately 1 mile down river of the city’s source of drinking water.



The Fall Kill at Victory Lake Camp, Hyde Park.

In 2006, a management plan was produced for the Fall Kill watershed (Bean et al. 2006). The management plan identifies seven primary restoration objectives, describes current threats to the Fall Kill and suggests management practices for the urban and suburban areas of the watershed. In addition various water quality indicators were measured, including macroinvertebrates, fish, and nutrient and pollutant levels.

The following report is a visual assessment of the creek as it flows through its watershed. Although not inclusive of the entire length of the creek, it is a start to understanding the state of the creek throughout different land use types. When used in conjunction with the 2006 management plan, insights can be gained concerning streamside restoration, outreach needs and potential hot spots of pollution.

The Streamwalk was based upon methods developed by the Lower Hudson Coalition of Conservation Districts and The Pennsylvania State University Cooperative Wetlands Center. The project was volunteer based and provided education and insight to watershed issues throughout all phases of its completion. Eight segments of the Fall Kill were observed during the month of November 2008. Five of the segments were in the town of Hyde Park, one in the town of Poughkeepsie and two in the City of Poughkeepsie. Based on 12 parameters, each site was given a score between one and ten with low scores representing sites in poor condition and higher scores representing excellent condition. In addition, impairments at the sites were evaluated based on the presence of stressor indicators. Streamside buffers were scored based on vegetative cover moving away from the stream.



A bridge crossing over the Fall Kill at the Eleanor Roosevelt Center at Val-Kill, Hyde Park.

As can be expected, segment scores and buffer scores decreased and the number of impairments increased as the landscape became more developed and transitioned from suburban to urban. Individual segment scores ranged from a low of 3.6 in the City of Poughkeepsie to a high of 8.7 at Val-Kill in Hyde Park. None of the segments were classified as in excellent condition. Hydrologic modification was the most common impairment in both the floodplain and in the stream channel. This was generally in the form of bridge crossings. In addition, impoundments in the form of man-made dams, and stormwater pipes were seen along

many stretches of the creek. Additional in-stream impairments included evidence of sedimentation indicated by the presence of adjacent construction, excessively eroding banks and sediment deposits. Fifty percent of the sites also showed indicators of high levels of dissolved oxygen and the possible presence of contaminants in the stream channel. In the floodplain, besides hydrologic modification the next most common impairment was vegetation alteration, indicated by mowing up to the stream channel and the presence of invasive or aggressive plant species.

Overall, the Streamwalk has provided a snapshot of the current state of the Fall Kill. However, further work needs to be done. Increases in development, the runoff and discharge of pollutants and the uncontrolled dumping of trash in the creek are having increasingly negative impacts on water quality, flood retention capacity and the overall aesthetics of the stream. This study illustrates that there are areas in which the creek is in good condition and the potential exists to expand these areas to once again make the Fall Kill a clean and viable water resource to the communities in its watershed.

**RECOMMENDATIONS FOR IMPROVING THE CONDITION OF THE FALL KILL BASED
UPON THE 2008 STREAMWALK**

1. Conduct consistent and periodic water quality monitoring to quantify pollutants that may be entering the stream from surrounding land use practices.
2. Plant streamside buffers of native trees and shrubs in areas that have been previously cleared.
3. Manage invasive plant populations such as reed canary grass, phragmites and Japanese knotweed, that are prevalent along the Fall Kill's riparian corridor.
4. Participate in current efforts to control Canada geese populations.
5. Educate homeowners who live along the creek about the detrimental effects of mowing and applying fertilizers and pesticides to yards that border the stream. Discourage residents from dumping yard and household wastes into the buffers that border the stream. Reinforce awareness of septic system maintenance.
6. Encourage homeowners about the use of rain barrels, rain gardens and other ways to reduce runoff into the creek.
7. Clean up areas that are being used for dumping of household, construction and industrial waste. Inform businesses and homeowners of the proper way to discard of these materials. Put up signage to discourage future dumping.

The 2008 Fall Kill Streamwalk

The Fall Kill Streamwalk took place in early November of 2008 and was conducted using a combination of several stream assessment methods. The primary method used was developed by the Lower Hudson Coalition of Conservation Districts (LHCCD 2004). This method is very similar to the NRCS Stream Visual Assessment Protocol (NRCS 1998), and is a volunteer-based assessment. Volunteers participating in the assessment are encouraged to participate in a training class to learn about basic stream functioning and familiarize themselves with the parameters being assessed on the streamwalk. Parameters assessed in the LHCCD methods are: channel condition, hydrology, riparian vegetation, stream bank stability, water appearance, nutrient enrichment, barriers to fish movement, in-stream fish cover, the presence of deep pools, invertebrate habitat, canopy cover, and sediment embeddedness. Each parameter receives a score from one to ten and is then averaged to give a final score for each site. Sites receiving an average score <6.0 were ranked poor, 6.1-7.4 were fair, 7.5-8.9 were good, and > 9.0 were excellent. Due to the cooler temperatures experienced in November and dieback of vegetation during this time of year, nutrient enrichment was not assessed in this study. In addition, to gain an understanding of the trash and litter issues that plague the creek, a parameter was added assessing the level of trash at each site (Moore et al. 2007).

The LHCCD methods include an additional assessment of impaired sites. This assessment was substituted with a Stressor Checklist and Buffer Score developed by the Penn State Cooperative Wetlands Center (Brooks et. al. 2004, Appendix A). The stressor checklist visually identifies the presence or absence of specific characteristics at a site, each of which is an indicator of a specific category of impairment, or stressor category. The ten stressor categories are: hydrologic modification, sedimentation/erosion, dissolved oxygen, contaminant toxicity, vegetation alteration, eutrophication, acidification, turbidity, thermal alteration, and salinity. Streamside buffers are also visually evaluated based on an estimate of width of the vegetative cover types moving away from the stream banks. Width classes are 1-3 m, 3-10 m, 10-30 m, 30-100 m, and 100-300 m from the stream channel. An individual score is given to each width class, and then the five scores are added together. Final scores range between 0 and 60. A completely forested buffer on both sides of the stream up to 300 m from the stream bank would receive a high score of 60, and an unvegetated buffer would receive a score of zero.



Assessing embeddedness of the substrate.

The Fall Kill Streamwalk was conducted by volunteers from the Fall Kill Watershed Committee. Segment teams were made up of two to three people, with at least one member of the team trained in LHCCD methods. Scores were determined as a group to minimize subjective discrepancies. Eight segments were identified based upon surrounding land use and accessibility of the site. All sites were walked, except for segments 3 and 4, which were accessed using kayaks. In total, approximately 4.75 miles out of the 16 miles that make up the mainstem of the Fall Kill were assessed.

Summary of Results

Although the entire length of the stream was not assessed during the 2008 Fall Kill Streamwalk, the results of the assessment offer an important snapshot of the creek's current state (Figure 1). As can be expected, segment scores decreased as the landscape became more developed and transitioned from suburban to urban. Individual segment scores ranged from a low of 3.6 in the City of Poughkeepsie to a high of 8.7 at Val-Kill in Hyde Park. None of the segments were classified as in excellent condition.

Five of the eight sites assessed were located in Hyde Park, the municipality that encompasses most of the watershed. Hyde Park sites ranged from poor to good and included the two sites that received the highest scores. These two sites demonstrated excellent habitat for aquatic biota, little to no trash, low levels of sediment accumulation and stable banks with a good connection to an active vegetated floodplain. The one Hyde Park site that received a poor ranking was in close proximity to residential areas for a good portion of its length. Streambank modifications, eroding banks, poor habitat for fish and aquatic insects, and high levels of sedimentation were observed at this site. The one site assessed in the Town of Poughkeepsie, St. Peter's Cemetery, received a fair score. While having relatively good habitat for fish and aquatic insects as well as an intact canopy, this segment was greatly impacted by the adjacent land use affecting stream bank stability and functioning capability of the floodplain. Moving further down the watershed, the two sites located in the city of Poughkeepsie were both ranked poor. Characteristics such as little to no streamside buffer, high sedimentation, stream bank instability, high levels of trash and poor habitat contributed to these low scores.

Streamside buffers are an integral part of the stream system. Vegetation adjacent to the stream channel slows down the water during times of high flow, increasing infiltration and groundwater recharge. In addition, as the water velocity decreases sediment, road salt and other contaminants settle out of the water column. Vegetated buffers may also act as filters helping to remove some of the excess nutrients often present in runoff associated with suburban areas. All these actions help to decrease and prevent pollution of downstream water resources. In addition vegetated buffers help to prevent erosion of the stream channel during flood events. In general, a forested buffer is the most beneficial to water quality while lawns

are the least effective at protecting adjacent water resources. Buffer scores for the segments assessed ranged from a low of four along Verazzano Blvd in the City of Poughkeepsie to a high of 38 along the upper Val-Kill segment in the town of Hyde Park (Figure 2).

Impairments to the site were assessed by visually identifying indicators in 10 stressor categories in both the floodplain and in the stream channel. These indicators were not quantitatively measured; however characteristics observed at the site suggest that these issues may be a problem. Additional quantitative studies would help to confirm that these indicators are negatively affecting the stream system. Indicators were observed in both the floodplain and in the stream channel. Floodplain stressors were not assessed for Verazzano Blvd. since at this segment walls surround the creek and no floodplain exists. Table 1 highlights some of the indicators in the five common stressor categories observed during the assessment. The total number of stressor categories ranged from 0-10 (Figure 3 and 4). All of the segments had an indicator in at least one stressor category. In the stream channel, the segment along Verazzano Blvd. had six stressor categories represented at the site, the most of all the segments assessed. The highest number of categories represented in the floodplain was seen along Smith Street and at St. Peters Cemetery, each of which had four stressor categories represented.

Indicators of hydrologic modification were the most common impairment observed in both the floodplain and in the stream channel (Figure 5 and 6). This was generally in the form of bridge crossings. In addition, impoundments in the form of man-made dams, and stormwater pipes were seen along many stretches of the creek. Additional in-stream impairments included possible high levels of sediment indicated by the presence of adjacent construction, excessively eroding banks and sediment deposits. Fifty percent of the sites also showed indicators of high levels of dissolved oxygen and the possible presence of contaminants in the stream channel (Figure 5). In the floodplain, besides hydrologic modification the next most common impairment was vegetation alteration, indicated by mowing up to the stream channel and the presence of invasive or aggressive plant species (Figure 6).

Wetlands are vital to the overall health of the Fall Kill watershed. In total, eleven potential wetland areas were counted along the sections of the stream corridor that were walked. Wetlands play an important role in storing floodwaters, slowing the velocity of water as it moves downstream and filtering out sediment, nutrients and other contaminants. They help to maintain a diverse community of living things. Flooding and water quality are of high concern in the Fall Kill watershed. Protecting and maintaining wetlands is of primary concern in preventing these problems from escalating in the future.

Stressor Category	Observed Indicator
HYDROLOGIC MODIFICATION	Tile drain (outfalls)
	Impounded (by weir/dam)
	Stormwater inputs/culverts
	Road bed/crossings (bridges, fill with culverts, road, railroad)
SEDIMENTATION/ EROSION	Sediment deposits/plumes
	Excessively eroding bank slopes
	Active/recently active adjacent construction, plowing, forest harvesting
DISSOLVED OXYGEN	Excessive density of aquatic plants or algal mats
	Excessive deposition or dumping of organic waste (e.g. leaves, grass clippings)
CONTAMINANT TOXICITY	Obvious spills, discharges, plumes, odors
VEGETATION ALTERATION	Mowing
	Dominant presence of exotic or aggressive plant species

Table 1. Indicators of impairment observed in each of the five most common stressor categories along the Fall Kill.

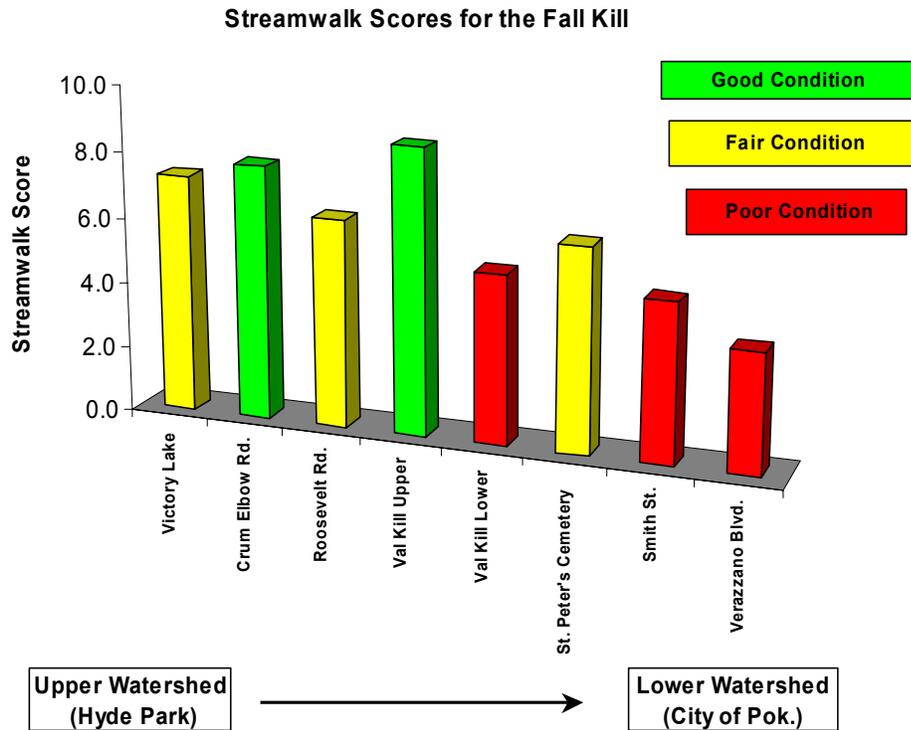


Figure 1. Final Streamwalk scores for the eight segments of the Fall Kill. Higher scores indicate better condition.

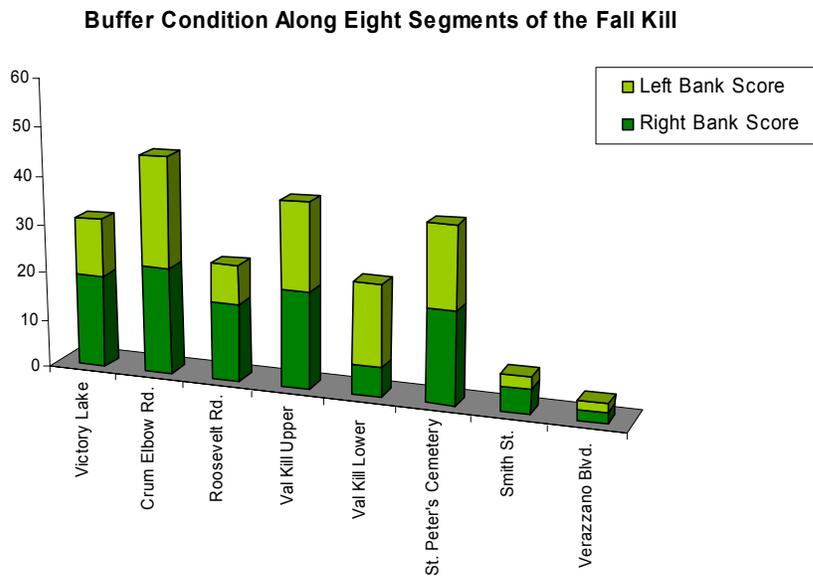


Figure 2. Buffer condition scores based on vegetative cover for eight segments of the Fall Kill.

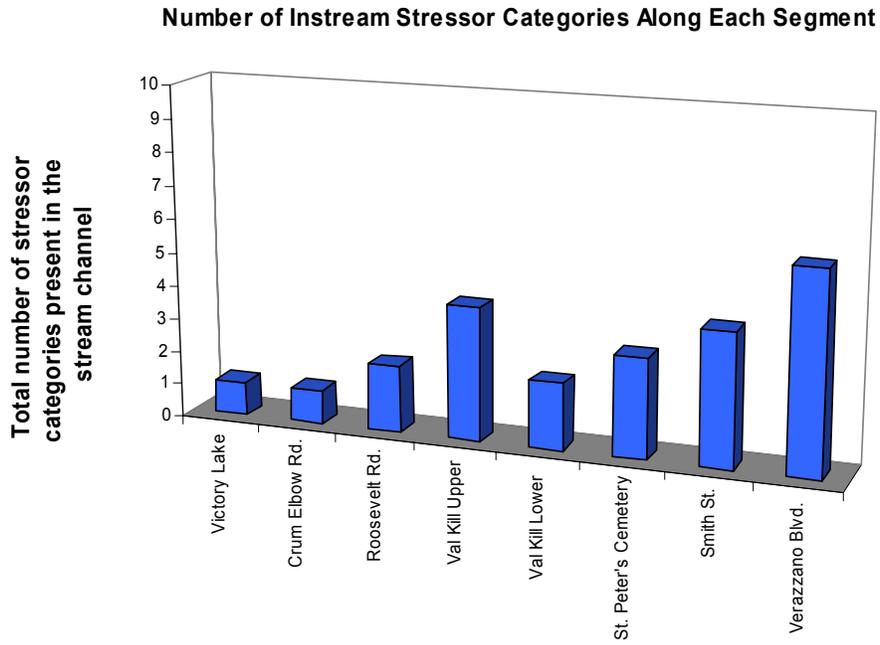


Figure 3. Total number of stressor categories observed in the stream channel for each of eight segments along the Fall Kill.

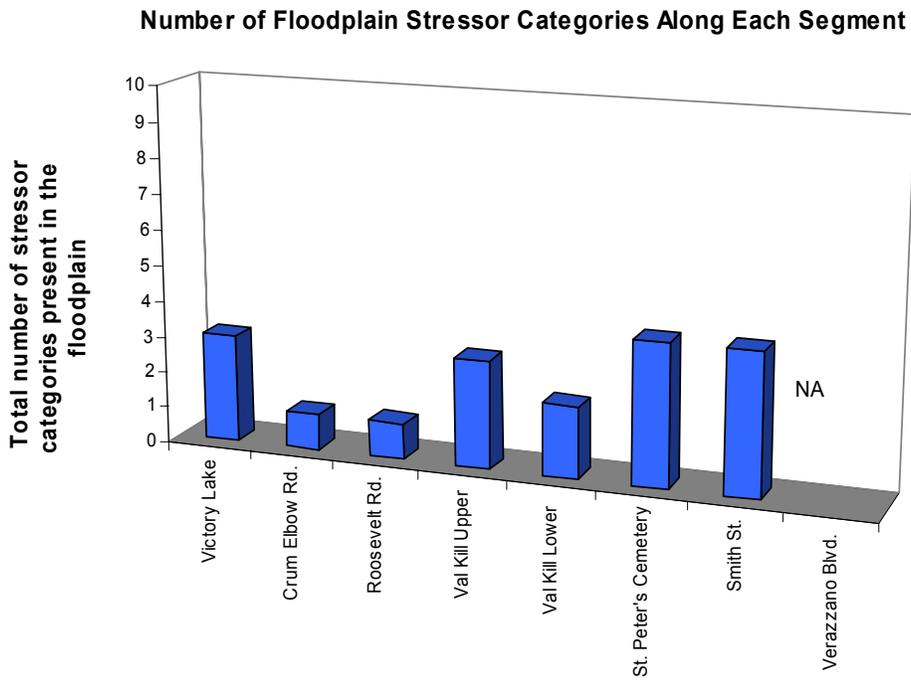


Figure 4. Total number of stressor categories observed in the floodplain for each of eight segments along the Fall Kill.

Common Instream Impairments of the Fall Kill

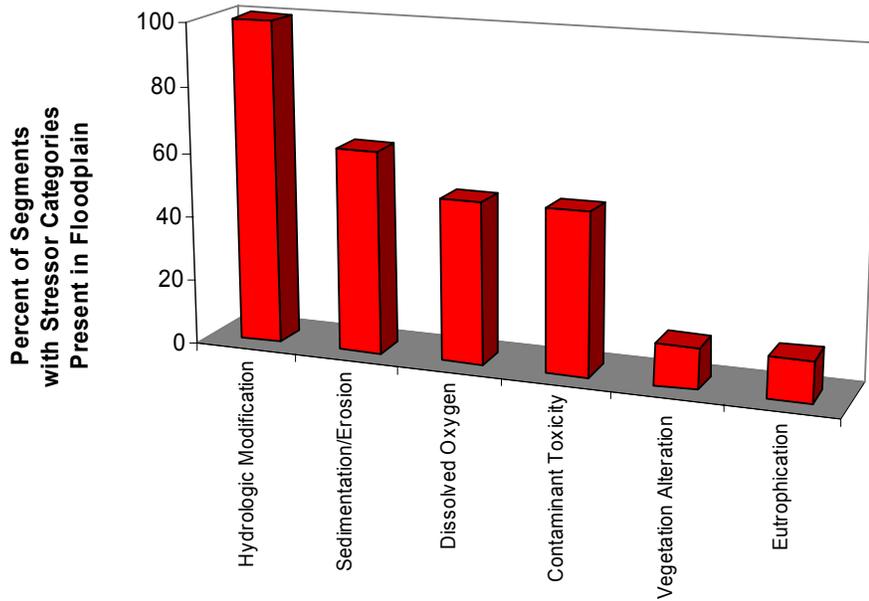


Figure 5. Percent of segments with indicators of the common impairments observed in the stream channel of the Fall Kill.

Common Floodplain Impairments of the Fall Kill

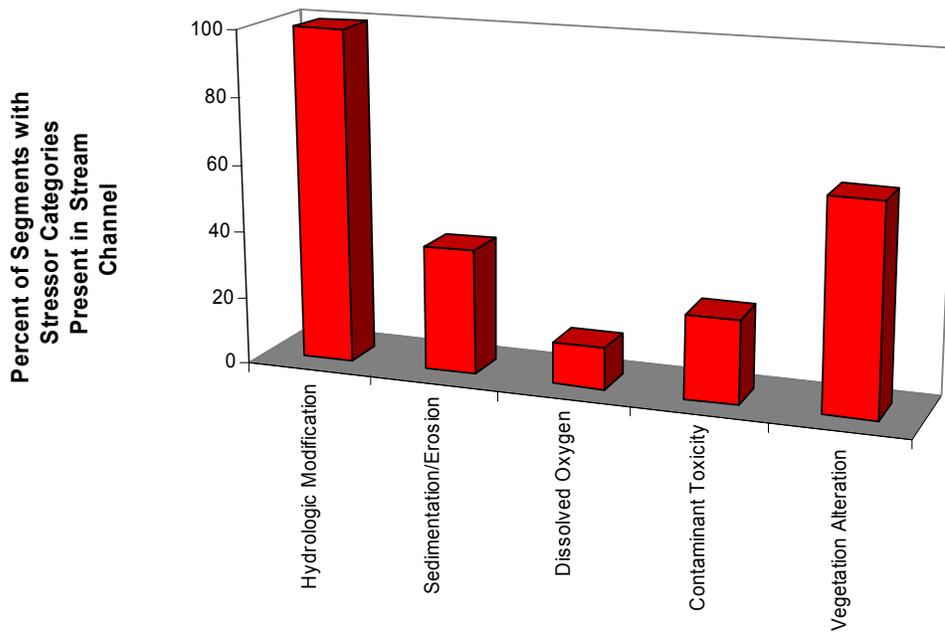


Figure 6. Percent of segments with indicators of the common impairments observed in the floodplain of the Fall Kill.

Conclusions

Overall, the Streamwalk has provided a snapshot of the current state of the Fall Kill. However, further work needs to be done. The creek would benefit from consistent water quality testing on a regular basis to monitor potential inputs of pollutants. Streamside planting would be an effective way to increase the quality and functioning of streamside buffers. Due to the close proximity of suburban and urban areas to the stream, general education and outreach to homeowners along the creek about actions they can take on their property would be a good start in improving habitat, reducing flooding effects, improving water quality, and reducing erosion. The trash problem through the City of Poughkeepsie needs to be addressed. Efforts need to be made by city officials to stop the dumping, and citizens need to learn the impacts of their actions. Communication about appropriate methods of disposing of large household items needs to be improved so that residents are aware of these options.

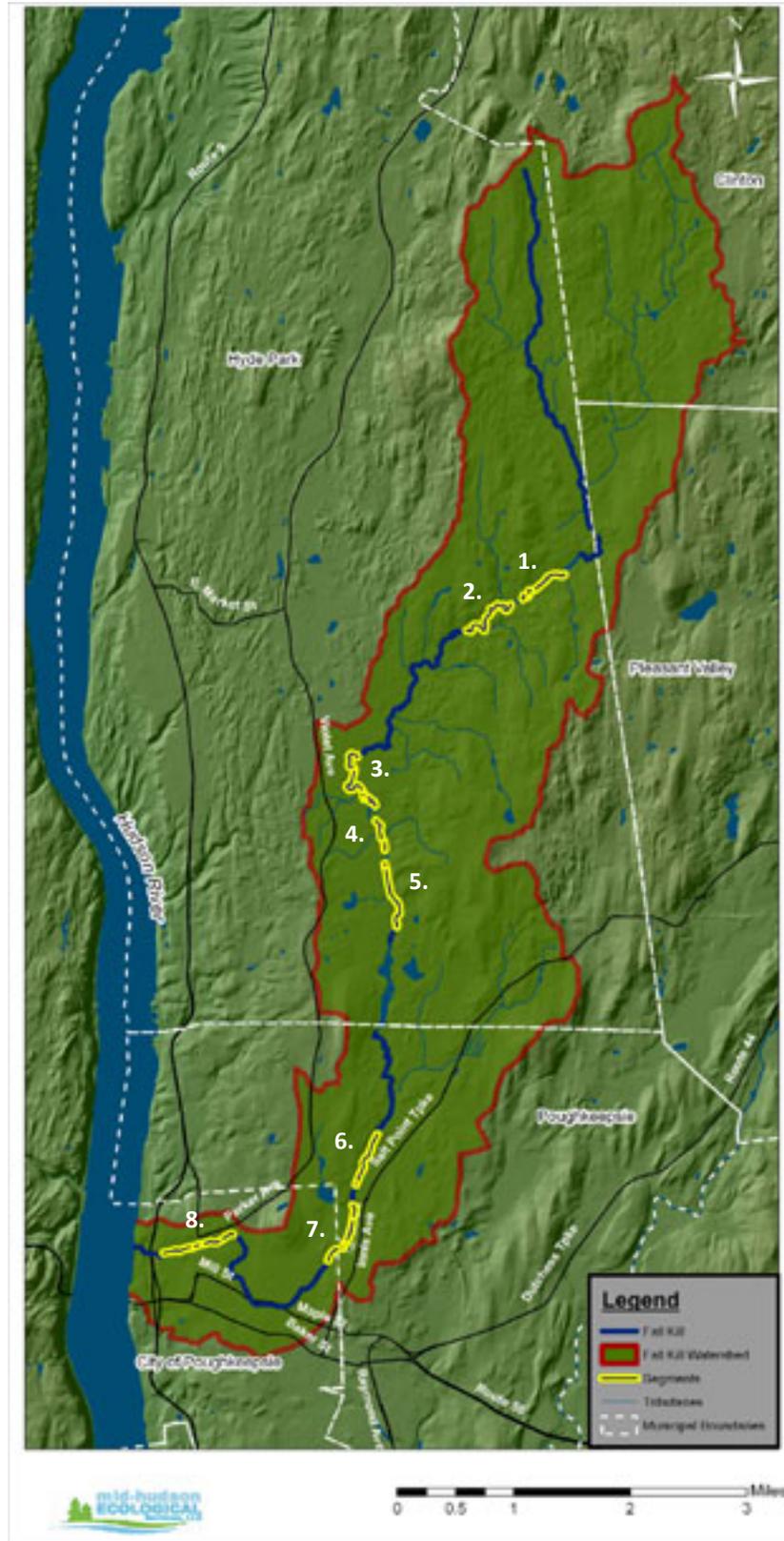
The state of the Fall Kill needs to be improved before it undergoes more degradation. Northern sections of the creek are in good condition; however an increase in development in the watershed, as well as modifications to the stream corridor, threaten to act as detrimental forces to the entire stream system. Water resources throughout the watershed such as wetlands and smaller tributaries, as well as the creek itself, need to be recognized as important resources that act to protect the surrounding communities from flooding and water quality problems. As the creek draws closer to the Hudson River, these conditions and threats increase and the creek's condition rapidly degrades. However, the potential still remains to turn things around in these lower stretches. The creek's proximity to urban areas and pedestrian traffic give it the opportunity to be an asset to the urban communities it flows through. The Fall Kill has the potential not only to be an important recreational resource, but also a source of pride for those who live in its watershed. Awareness of these assets first needs to be acknowledged by citizens of the surrounding communities as well as municipal officials to facilitate positive changes in the future.



A section of the creek in the City of Poughkeepsie.

Map of the Watershed with Segments Identified

- Segments**
1. Victory Lake
 2. Crum Elbow Rd.
 3. Roosevelt Rd.
 4. Val-Kill Upper
 5. Val-Kill Lower
 6. St. Peter's Cemetery
 7. Smith St.
 8. Verazzano Blvd.



Segment Results

SEGMENT 1. VICTORY LAKE **OVERALL ASSESSMENT SCORE: 7.6**

General Characteristics
Date: October 31, 2008
Length of Segment (km): 0.79
Average Width (meters): 4.3
Average Depth (cm): 36.0

Location	Lat	Long	Description
Start Point	41° 47' 33.51" N	73° 52' 04.81" W	Western end of pond at Victory Lake nursing home
End Point	41° 47' 20.58" N	73° 52' 36.61" W	Bridge crossing at Crum Elbow Rd.



Left: Beginning of Victory Lake segment showing existing dam.



Right: Active floodplain area, possible location for streamside plantings adjacent to Victory Lake Segment.

Survey Parameter	Score	Site Notes
Channel Condition	7	Alterations to channel present in the form of dams and culverts on either end of the segment, as well as an access road crossing the creek about half way along segment
Hydrology	8	Channels not incised; good access to floodplain
Riparian Zone	9	Natural vegetation on either side for most of the length
Bank Stability	10	No signs of erosion
Water Appearance	10	Water clear
Nutrient Enrichment	N/A	Not evaluated due to time of year
Barriers to Fish Movement	1	Dams on either end at least 3ft high, culverts present
Instream Fish Cover	8	Presence of woody debris, deep pools, overhanging vegetation, boulders and cobbles, riffles, undercut banks, and dense beds of emergent/floating leaf vegetation
Pools	3	Pools present but relatively shallow
Insect/Invertebrate Habitat	7	Presence of fine woody debris, submerged logs, undercut banks, and coarse gravel
Canopy Cover	8	Average width of the canopy is between 40-60%
Embeddedness	8	Gravel or cobble particles are 20-30% embedded in sediment
Level of Trash	8	On first glance no trash visible, however several larger pieces of trash were observed in the stream channel; including: tires, large piece of metal debris, and an old water tank

In-Stream Impairments

Stressor Category	Presence of Indicator
Hydrologic Modification	✓
Sedimentation/Erosion	
Dissolved Oxygen	
Contaminant Toxicity	
Vegetation Alteration	
Eutrophication	
Acidification	
Turbidity	
Thermal Alteration	
Salinity	
Total No. of Stressor Indicators	1

Floodplain Impairments

Stressor Category	Presence of Indicator
Hydrologic Modification	✓
Sedimentation/Erosion	✓
Dissolved Oxygen	
Contaminant Toxicity	
Vegetation Alteration	✓
Eutrophication	
Acidification	
Turbidity	
Thermal Alteration	
Salinity	
Total No. of Stressor Indicators	3

Buffer Score

Right Bank: 19
Left Bank: 12

Overall Description of Segment:

The segment, located in the Town of Hyde Park, begins and ends at two small, impounded lakes with the majority of the property owned by Victory Lake Camp. The camp accommodates both RVs and tents and is used on a seasonal basis. The dam at the start of the segment measured approximately 39.7 m wide and 2.36 m high. About 20 m downstream from the dam a gravel access road crosses the stream consisting of three culverts, each 1.39 m high and 2 meters wide. The access road leads to a water treatment plant and State Pollution Discharge Elimination System (SPDES) Site. Along the bank in the vicinity of the treatment plant, recent construction was observed with silt fencing in place along the creek's edge. A second gravel access road crossed the creek about 400 m downstream from the first. This road led to what appears to be a large storage building and was supported by two culverts approximately .85 m high and 1.15 m wide. This crossing was directly adjacent to a large wetland area that was dominated by thick shrubby vegetation.

In general, the west bank of the creek consists of a wide buffer dominated by a mixture of hardwood forest and shrubs. Several large wetlands were observed on this side of the creek. The east side of the creek has less of a buffer and is dominated by shrubby vegetation as well the invasive species, reed canary grass and phragmites. Thick shrubby vegetation was noted on both side of the stream in several spots to the extent that it completely enclosed the stream channel. As the stream leaves the Camp property it reaches the second impounded lake near the Reach Out Worship Center on Crum Elbow Rd. This lake is impounded by a dam approximately 1.35 m high and 12.5 m wide.

Overall, this segment of the creek has excellent connection with its floodplain. It has the potential to provide habitat for fish, invertebrates, birds and mammals due to its high level of cover, and vicinity near larger tracts of open space. The location of wetlands adjacent to the creek, as well as the wide, unobstructed floodplain, makes this segment an important water storage area during flood events. In addition, the two impounded lakes have water storage potential if they are managed appropriately.

Recommendations for the Site:

- Approximately 20 Canada geese were observed at the site. High concentrations of waterfowl can become a nuisance and have a detrimental effect on stream systems. They contribute to inputs of fecal coliform bacteria, and can quickly degrade the native herbaceous vegetation at a site. The Victory Lake Camp may benefit from the geese eradication program currently being implemented in Hyde Park.
- This site would greatly benefit from a riparian buffer planting and restoration in several areas along the camp side of the creek. With proper management of the invasive species these sections would make ideal sites for planting native riparian

trees and shrubs. In addition, a tree-planting event could serve as an educational opportunity to both camp managers and participants.

- The multiple culvert design of both crossings located in the segment may cause problems during flood events due to restricting the width of the stream channel and the formation of debris dams. If at all possible, reconstruction of both of these bridges would prevent future flooding, erosion and possible damage to both access roads.
- The potential management of the two impounded lakes to store water during flood events should be investigated, as flooding in downstream developments has been an increasing problem in recent years.

SEGMENT 2. CRUM ELBOW ROAD**OVERALL ASSESSMENT SCORE: 7.8****General Characteristics**

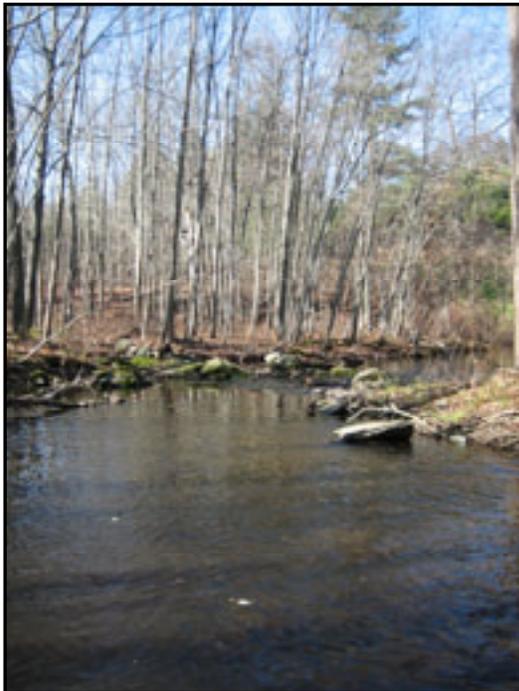
Date: November 11, 2008

Length of Segment (km): 1.01

Average Width (meters): 5.28

Average Depth (cm): 45.73

Location	Lat	Long	Description
Start Point	41° 47' 20.07" N	73° 52' 37.23" W	Bridge crossing at Crum Elbow Rd.
End Point	41° 47' 08.80" N	73° 53' 02.92" W	Bridge crossing at Cream St.



Above: Representative section of the creek along Crum Elbow Rd. with intact riparian buffer.



Above: A section of the creek near a mowed lawn with unstable banks.

Survey Parameter	Score	Site Notes
Channel Condition	8	Small section had bank stabilized with stone wall many years ago
Hydrology	9	Full access to floodplain, no incision noticed, Evidence of periodic flooding
Riparian Zone	9	Natural vegetation along banks throughout, only two small sections with lawn
Bank Stability	9	Small section of erosion where lawn extends to stream channel
Water Appearance	10	Very clear water
Nutrient Enrichment	NA	Not evaluated due to time of year
Barriers to Fish Movement	1	Dams present at beginning and end of segment
Instream Fish Cover	10	Presence of logs and large woody debris, deep pools, overhanging vegetation, boulders and cobbles, riffles, undercut banks, thick root mats, dense beds of emergent/floating leaf vegetation, and isolated/backwater pools
Pools	5	Many pools 2-3 feet deep, very clear water
Insect/Invertebrate Habitat	10	Presence of fine woody debris, submerged logs, undercut banks, cobble, boulders, and coarse gravel
Canopy Cover	8	Most of segment had 70% to 80% cover; small sections near homes had less
Embeddedness	7	Embeddedness ranged from 20-40%
Level of Trash	7	Litter present near road crossing; several larger pieces of debris present that appeared to have been carried to segment from upstream

In-Stream Impairments

Stressor Category	Presence of Indicator
Hydrologic Modification	✓
Sedimentation/Erosion	
Dissolved Oxygen	
Contaminant Toxicity	
Vegetation Alteration	
Eutrophication	
Acidification	
Turbidity	
Thermal Alteration	
Salinity	
Total No. of Stressor Indicators	1

Floodplain Impairments

Stressor Category	Presence of Indicator
Hydrologic Modification	✓
Sedimentation/Erosion	
Dissolved Oxygen	
Contaminant Toxicity	
Vegetation Alteration	
Eutrophication	
Acidification	
Turbidity	
Thermal Alteration	
Salinity	
Total No. of Stressor Indicators	1

Buffer Score
Right Bank: 22
Left Bank: 23

Overall Description of Segment:

This segment is within the Town of Hyde Park, beginning at the road crossing at Crum Elbow Road and ending at the road crossing at Cream Street. Both ends of the segment are impounded ponds, but the bulk of the segment is a natural, wooded setting with the stream in a relatively unmodified condition. The stream begins as a meandering, wooded stream with a defined channel. One tributary enters from across Crum Elbow Road. As the stream nears the pond at the Cream Street crossing, it slows and widens, with braided channels and adjacent wetlands.

Most of the segment is bordered by a wide area of forest, with some areas dominated by a thick understory. Overall, the stream has nearly complete canopy cover. The wooded area appeared relatively undisturbed. Some non-native species such as barberry, garlic mustard and multiflora rose were observed. Snails, a frog, mussel shells and deer tracks and droppings were observed.

There were two areas where the buffer had been removed. The section of the segment near Cream Street, there is lawn on the east side of the stream. The owner of this property stated that part of the lawn gets very wet in the spring and hosts many frogs and snakes. Further downstream, there is an area where the west side of the bank was at one time stabilized with a stone wall, and there is lawn bordering the stream in that area. A pump was observed, apparently drawing water out of the creek for an unknown purpose.

The water in the stream appeared very clear for the most part. There were multiple pools around 1-3' deep, and it was possible to see to the bottom of these pools. Sediment that was stirred up settled quickly. There was some trash (food wrappers, bottles, etc.) near both road crossings. Throughout the wooded section, trash was minimal, but there were large pieces of debris, such as tires, that appeared to have washed down from upstream.

Recommendations:

- Investigate the source of the tires/wheels that appeared to have washed down from upstream.

- Approach the landowner at the Crum Elbow end of the segment about re-establishing appropriate buffer/wetland plants where there is currently lawn.

SEGMENT 3. ROOSEVELT ROAD**OVERALL ASSESSMENT SCORE: 6.3****General Characteristics**

Date: November 9, 2008

Length of Segment (km): 0.35

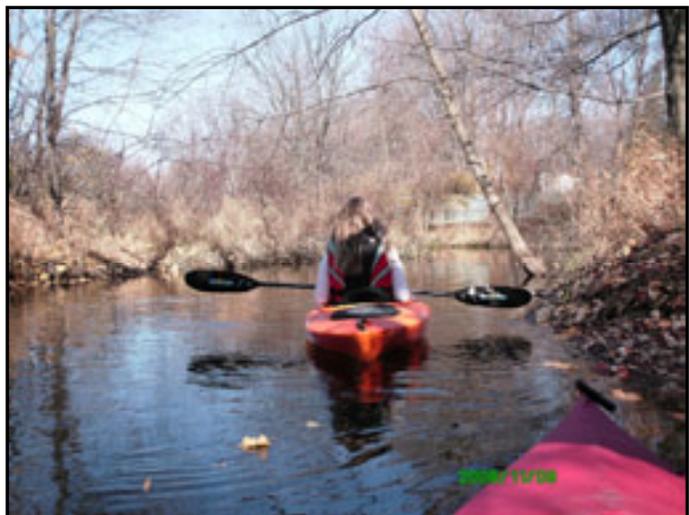
Average Width (meters): 4.27

Average Depth (cm): 45.72

Location	Lat	Long	Description
Start Point	41° 46' 06.09" N	73° 54' 11.75" W	Bridge at southern end of Roosevelt Rd.
End Point	41° 46' 14.54" N	73° 54' 12.78" W	Kayaked upstream until impassable



Left: Bridge crossing at beginning of segment, Roosevelt Rd. Hyde Park



Right: A volunteer kayaks the Fall Kill.

Survey Parameter	Score	Site Notes
Channel Condition	7	Channel is generally unaltered, older stone stabilization present in several small sections
Hydrology	10	Anecdotal evidence that stream has flooded at least 2 times in the past two years; excellent connection to the floodplain, no incision observed
Riparian Zone	5	Natural vegetated buffer present; small section near bridge has no vegetated buffer;
Bank Stability	7	Banks low, little erosion observed
Water Appearance	10	Water very clear
Nutrient Enrichment	NA	Not evaluated due to time of year
Barriers to Fish Movement	3	Dam present within 3 miles of segment
Instream Fish Cover	5	Presence of large woody debris, overhanging vegetation, riffles, and backwater pools
Pools	3	Several relatively shallow pools present
Insect/Invertebrate Habitat	3	Presence of fine woody debris and submerged logs
Canopy Cover	3	Floodplain area dominated by reed canary grass with few large canopy trees present
Embeddedness	10	Cobble less than 20% embedded with sediment
Level of Trash	10	No trash observed along segment

In-Stream Impairments

Stressor Category	Presence of Indicator
Hydrologic Modification	✓
Sedimentation/Erosion	✓
Dissolved Oxygen	
Contaminant Toxicity	
Vegetation Alteration	
Eutrophication	
Acidification	
Turbidity	
Thermal Alteration	
Salinity	
Total No. of Stressor Indicators	2

Floodplain Impairments

Stressor Category	Presence of Indicator
Hydrologic Modification	✓
Sedimentation/Erosion	
Dissolved Oxygen	
Contaminant Toxicity	
Vegetation Alteration	
Eutrophication	
Acidification	
Turbidity	
Thermal Alteration	
Salinity	
Total No. of Stressor Indicators	1

Buffer Score

Right Bank: 16
Left Bank: 8

Overall Description of Segment:

This segment began at the bridge crossing at the southern end of Roosevelt Rd. in the town of Hyde Park. The entire length of the segment is on private property, owned by multiple residents of the Harbour Hills neighborhood. Due to the constraint of gaining property owner permission, this segment of the stream was accessed with the use of kayaks. About half of the originally identified segment was completed before the team had to turn around due to vegetation obstructing the stream channel. This vegetation consisted primarily of alder shrubs and represented a healthy riparian buffer in this section.

The segment successfully kayaked appeared to be in good condition considering its proximity to homes and yards. There was a healthy stand of buttonbush observed; however the vegetation along the banks was dominated by the invasive species reed canary grass. The stream flowed at a relatively low gradient, and high levels of sediment were observed, with few rocks or gravel present in the substrate. Few riffles were present, but where they were, sediment embeddedness did not seem to be an issue.

Aerial photos of the remaining length of the segment show that the stream opens up into a wetland, still bordered by residential homes. In recent years, this neighborhood has experienced increased flood damage. Flood problems where intact wetlands are present may indicate that the wetland has exceeded its capacity to hold incoming water. It represents a common occurrence when upstream water volume levels increase due to increases in impervious surfaces in the watershed.

Recommendations for the Site:

- Because this segment flows directly through a residential area, the most significant recommendation would be education of the landowners whose homes border the stream. Inputs from yards, driveways and roads such as herbicides, fertilizers, pet waste and road salt can all have negative impacts on the health of the stream. Residents need to be encouraged to maintain a healthy buffer and discouraged from dumping yard waste in the riparian zone. They should be informed about directing runoff from their property away from storm drains by using alternative methods of water retention such as rain barrels and rain gardens. Reinforcing awareness about septic system maintenance would also be beneficial in these residential areas.

SEGMENT 4. VAL-KILL UPPER**OVERALL ASSESSMENT SCORE: 8.7****General Characteristics**

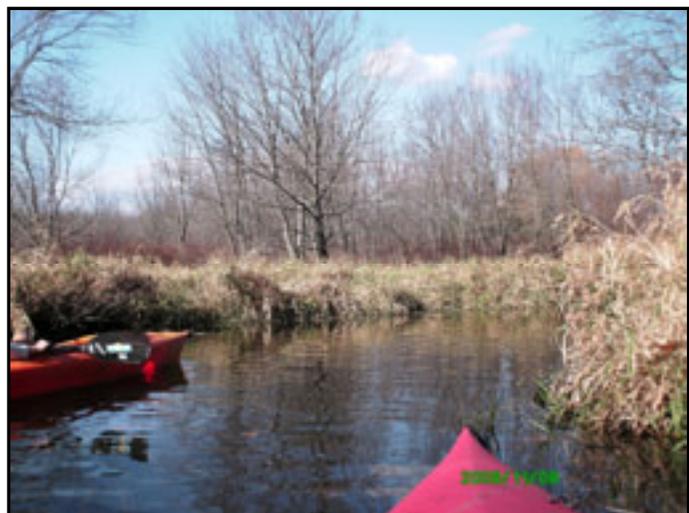
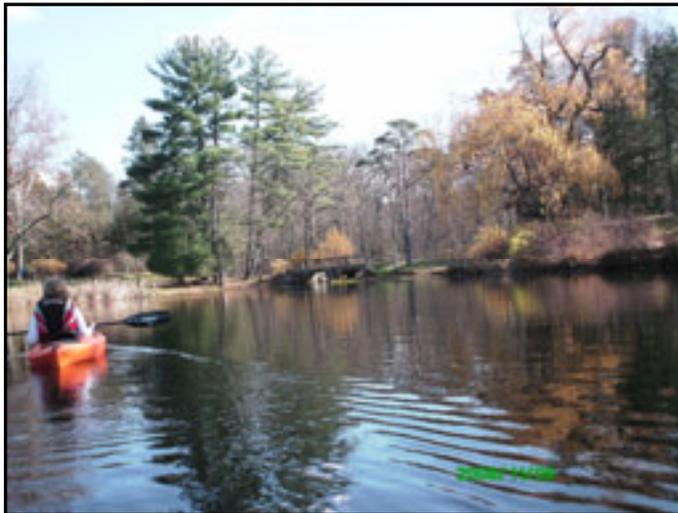
Date: November 9, 2008

Length of Segment (km): 0.98

Average Width (meters): 9.15

Average Depth (cm): 53.32

Location	Lat	Long	Description
Start Point	41° 46' 05.49" N	73° 54' 11.86" W	Bridge crossing at southern end of Roosevelt Rd. Kayaked downstream
End Point	41° 45' 44.31" N	73° 53' 59.20 W	Bridge crossing at Val-Kill



Right: A section of the creek on National Park Service property, buffer is dominated by the invasive species Reed-canary grass.

Survey Parameter	Score	Site Notes
Channel Condition	10	Channel was generally in natural condition for most of the segment
Hydrology	10	Anecdotal evidence of flooding, two times in the past two years. Channel not incised; good connection with floodplain
Riparian Zone	10	Natural wet meadow vegetation present in buffer; vegetation dominated by reed canary grass
Bank Stability	10	No erosion observed in segment
Water Appearance	10	Water very clear
Nutrient Enrichment	NA	Not evaluated due to time of year
Barriers to Fish Movement	1	Dam present at end of segment
Instream Fish Cover	10	Presence of logs/large woody debris, deep pools, overhanging vegetation, boulders and cobbles, riffles, undercut banks, thick root mats, dense beds of vegetation, and isolated/backwater pools
Pools	10	Deep and shallow pools abundant
Insect/Invertebrate Habitat	10	Presence of fine woody debris, submerged logs, undercut banks, cobble, boulders, and coarse gravel
Canopy Cover	NA	Emergent wet meadow present along most of the segment
Embeddedness	10	Less than 20% of gravel or cobble embedded in sediment
Level of Trash	10	Little to no trash observed

In-Stream Impairment

Stressor Category	Presence of Indicator
Hydrologic Modification	✓
Sedimentation/Erosion	✓
Dissolved Oxygen	✓
Contaminant Toxicity	✓
Vegetation Alteration	
Eutrophication	
Acidification	
Turbidity	
Thermal Alteration	
Salinity	
Total No. of Stressor Indicators	4

Floodplain Impairment

Stressor Category	Presence of Indicator
Hydrologic Modification	✓
Sedimentation/Erosion	✓
Dissolved Oxygen	
Contaminant Toxicity	
Vegetation Alteration	✓
Eutrophication	
Acidification	
Turbidity	
Thermal Alteration	
Salinity	
Total No. of Stressor Indicators	3

Buffer Score

Right Bank: 20
Left Bank: 18

Overall Description of Segment:

The segment began at the bridge crossing at the south end of Roosevelt Rd. and continued downstream to the bridge crossing at the Eleanor Roosevelt Center at Val-Kill. This segment was also accessed using kayaks. For the first 250 meters the stream is bordered on the east by residential homes and on the west side by National Park Service land. This first section represents the most impacted section of this otherwise good condition portion of the Fall Kill. In this area, lawns are mowed directly up to the stream edge, and there is evidence of dumping of yard waste in or near the stream channel. Despite this impact, the streambanks were generally intact with little erosion. The remaining portion of this segment flows through the National Park Service land. The main channel drains through a large wetland complex made up of several side channels and wet meadow habitat dominated by reed canary grass. The segment ends at a small impounded pond near the entrance of the Eleanor Roosevelt Center at Val-Kill. This large tract of open space serves as an important buffer to downstream reaches and surrounding developed areas, and functions to store floodwaters and retain sediment. Sediment levels were high, specifically in the impounded area just upstream from the dam at Val-Kill.

Considering that this site received the highest Stream Assessment score of all the sites sampled, it also had a relatively high number of stressor indicators in both the stream channel and the floodplain. This is important to note, since it points out that while indicators of impairment may be observed at the time this assessment was done, they had not yet become obvious problems that can be picked up in a simple visual assessment. It is also possible that their effects are minimized due to the large buffer of open space surrounding the stream in this area.

Recommendations for the Site:

- Education and outreach to property owners along the creek about effects that common home maintenance practices, such as fertilizers, mowing, dumping of yard waste, etc., have on the stream system.
- Further, more quantitative, studies would be beneficial to pinpoint possible impairments not documented in this visual assessment
- Geese were observed on the Val-Kill property. Participation in Hyde Park's geese eradication efforts would be beneficial.
- The Eleanor Roosevelt Center at Val-Kill offers the perfect venue for educational outreach programs about the creek and watershed issues. Collaboration between the National Park Service and the Fall Kill Watershed Committee would be beneficial for both groups.

SEGMENT 5. VAL-KILL LOWER**OVERALL ASSESSMENT SCORE: 5.2****General Characteristics**

Date: Novemeber 4, 2008

Length of Segment (km): 1.63

Average Width (meters): 30.02

Average Depth (cm): 41.5

Location	Lat	Long	Description
Start Point	41° 45' 44.31" N	73° 53' 59.20" W	Bridge crossing at Val-Kill
End Point	41° 44' 56.56" N	75° 53' 46.64" W	Bridge crossing at East Dorsey Lane



Left: Residential homes near an impounded section of the Fall Kill, Hyde Park.



Right: Signs of old beaver activity in one of the adjacent hardwood wetlands.

Survey Parameter	Score	Site Notes
Channel Condition	3	Bulkhead and riprap present along banks adjacent to residential property; several manmade and natural dams present
Hydrology	8	Anecdotal evidence that stream had flooded over banks twice in past year; good connection with floodplain
Riparian Zone	1	Mowed lawns up to edge along residential property
Bank Stability	5	Banks along residential property show indications of slight erosion
Water Appearance	9	Water clear but had a dark color
Nutrient Enrichment	NA	Not evaluated due to time of year
Barriers to Fish Movement	1	Dams present in segment
Instream Fish Cover	5	Presence of logs and large woody debris, deep pools, overhanging vegetation, and isolated/backwater pools
Pools	7	Several deep pools observed
Insect/Invertebrate Habitat	3	Presence of fine woody debris and submerged logs; stream generally lacking a rocky bottom for much of the segment.
Canopy Cover	10	Excellent canopy cover for most of the length, even residential lawns had large canopy trees present
Embeddedness	3	Segment generally lacking a rocky substrate, where present cobbles embedded about 50%
Level of Trash	7	Generally little trash present, except one specific area looked like it had been used as a dump in the past

In-Stream Impairment

Stressor Category	Presence of Indicator
Hydrologic Modification	✓
Sedimentation/Erosion	✓
Dissolved Oxygen	
Contaminant Toxicity	
Vegetation Alteration	
Eutrophication	
Acidification	
Turbidity	
Thermal Alteration	
Salinity	
Total No. of Stressor Indicators	2

Floodplain Impairment

Stressor Category	Presence of Indicator
Hydrologic Modification	✓
Sedimentation/Erosion	
Dissolved Oxygen	
Contaminant Toxicity	
Vegetation Alteration	✓
Eutrophication	
Acidification	
Turbidity	
Thermal Alteration	
Salinity	
Total No. of Stressor Indicators	2

Buffer Score
Right Bank: 6
Left Bank: 17

Overall Description of Segment:

Segment five is the last segment located in the Town of Hyde Park. It continues downstream from where segment four ended at the Eleanor Roosevelt Center at Val-Kill. The creek continues through National Park Service property for about 400 meters before it becomes bordered by private property. The Val-Kill property consists of over 200 acres of open space, much of which is dominated by hardwood forests interspersed with wetland habitat. The wetlands on this parcel are predominately associated with, and located adjacent to the Fall Kill. Old beaver activity was observed in one of the larger wetlands on the Park Service property and an old beaver dam had been recently dismantled at the time the Streamwalk was conducted. Team members did not see any new beaver activity along the creek. Just south of this large wetland, the creek opens up to a shrubby wetland dominated by red-osier dogwood. The open water increases and forms a small pond, impounded by a concrete dam 15.5 m in length and approximately 60 cm high. The pond is surrounded on the west side by residential homes with lawn directly up to the edge of the pond. Anecdotal accounts from one of the homeowners revealed that the pond becomes covered with aquatic vegetation during the summer months. In addition, the pond is used for recreational purposes including fishing and canoeing. The east side of the pond is also private property, but this large parcel is undeveloped upland hardwood forest.

As the creek leaves Park Service property, the adjacent land use becomes more residential, as homes that line Creek Road begin to encroach on the riparian buffer. While a decent buffer is maintained for some of this stretch due to the presence of riparian wetlands, in several cases these buffers are being used as areas for homeowners to deposit yard waste and other miscellaneous items. Further downstream, lawns directly abut the stream, and channel modifications have been made including stonewalls and riprap. As Creek Rd. turns away from the stream, a buffer is again established. One slope adjacent to the stream corridor did appear to have been used at one point as a dump, and significant quantities of trash were observed.

In the last 350 m of the stream the gradient increases and the substrate changes from a predominately gravel and sand bottom to cobbles. The only riffles seen along the segment were in this last stretch. The stream also became braided at this point with side channels, backwater pools and a small drainage pipe discharging water into the channel, possibly from a nearby driveway. Stonefly and caddisfly larva were observed on several of the rocks. The segment ends at the bridge crossing at East Dorsey Lane.

Recommendations for the Site:

- Education and outreach to property owners along the creek about effects that common home maintenance practices, such as fertilizers, mowing, dumping of yard waste, etc., have on the stream system. Efforts should be made to clean up areas that are or have been used as waste disposal sites.
- Maintaining the large tracts of upland forest that buffer the creek along this segment would be beneficial to maintaining water quality and biodiversity in the town of Hyde Park as well as downstream communities.

SEGMENT 6. ST. PETER'S CEMETERY**OVERALL ASSESSMENT SCORE: 6.2****General Characteristics**

Date: November 11, 2008

Length of Segment (km): 1.01

Average Width (meters): 8.88

Average Depth (cm): 48.5

Location	Lat	Long	Description
Start Point	41° 43' 04.13" N	73° 54' 10.57" W	Old railroad crossing at St. Peter's Cemetery
End Point	41° 43' 31.36" N	73° 53' 52.47" W	Small footpath bridge crossing creek at northern edge of cemetery property



Left: A section of the creek through St. Peter's Cemetery, Town of Poughkeepsie

Right: A representative section of the creek upstream from the active cemetery property.



Survey Parameter	Score	Site Notes
Channel Condition	5	Channel lined with stone walls and large cut stones, large piles of recently dumped fill along banks that would restrict flooding
Hydrology	9	Evidence of active flooding recently in floodplain
Riparian Zone	2	No riparian buffer along banks on cemetery side for most of the length; beyond the active cemetery and automotive dump, buffer increases and becomes young forest
Bank Stability	5	Slight erosion present in some areas with unstable banks
Water Appearance	5.5	Very clear water throughout except for one discharge area with murky water and strong odor
Nutrient Enrichment	NA	Not evaluated due to time of year
Barriers to Fish Movement	1	Dam at north end of segment
Instream Fish Cover	10	Presence of log and large woody debris, deep pools, overhanging vegetation, boulders and cobbles, riffles, undercut banks, thick root mats, and isolated/backwater pools
Pools	3	Several pools present less than 3 feet deep, much of the length was riffles and runs
Insect/Invertebrate Habitat	10	Presence of fine woody debris, submerged logs, undercut banks, cobble, boulders, and coarse gravel
Canopy Cover	7	Canopy cover between 40-60%; even where grass was mowed mature trees were present
Embeddedness	10	Cobbles less than 20% embedded with sediment
Level of Trash	7	Several large pieces of debris were present; including: tires, water heater, and plastic garbage pail; most debris seems to have been carried in from upstream sources

In-Stream Impairments

Stressor Category	Presence of Indicator
Hydrologic Modification	✓
Sedimentation/Erosion	
Dissolved Oxygen	✓
Contaminant Toxicity	✓
Vegetation Alteration	
Eutrophication	
Acidification	✓
Turbidity	
Thermal Alteration	
Salinity	
Total No. of Stressor Indicators	4

Floodplain Impairments

Stressor Category	Presence of Indicator
Hydrologic Modification	✓
Sedimentation/Erosion	
Dissolved Oxygen	✓
Contaminant Toxicity	✓
Vegetation Alteration	✓
Eutrophication	
Acidification	✓
Turbidity	
Thermal Alteration	
Salinity	
Total No. of Stressor Indicators	5

Buffer Score
Right Bank: 19
Left Bank: 17

Overall Description of Segment:

The majority of segment six is located on the property of St. Peter's Cemetery in the Town of Poughkeepsie. The segment began at the southern end of the cemetery property at the old railroad bridge crossing. Three very different land use types border the stream along this segment, the highly managed cemetery land, a junkyard consisting predominantly of old cars and car parts, and relatively unmanaged upland forest owned by Dutchess Community College.

Moving north from the starting point the east side of the stream was primarily dominated by property owned by St. Peter's Cemetery. For about ½ the segment length this side of the stream has only a narrow mowed grass buffer and paved road with several large mature trees. One storm drain was observed discharging directly into the stream. The remainder of the segment is not actively managed as a cemetery. There is a dirt access road following the stream with active dumping of fill material occurring between the road and the creek, encroaching directly on the floodplain. In addition, a drainage channel from a nearby large wetland, just northeast of the creek, is discharging directly into the stream channel. Further north there appears to be an old dumping site about 30 m from the stream channel. The floodplain along this section appears to have flooded recently, and an orange discharge appears to be leaching into the stream channel in the vicinity of this area.

Opposite the cemetery the west side of the segment is initially bordered by an automotive junkyard for about 300 meters. A narrow buffer of shrub and trees exists on a steep slope and borders the stream for much of the length of the junkyard. The remainder of the segment on the west side is relatively unmanaged upland hardwood forest. The segment ends at a small footbridge that crosses the creek over a small impoundment. There is evidence of human activity, with fishing line in the trees and shrubs, and an old fire pit and broken glass.

Recommendations for the Site:

- The automotive dump on the west bank of the creek poses some potential concern for pollutants leaching into the stream channel. Water quality tests at this point would be beneficial to monitor the status and identify any sources of potential polluted runoff.
- The cemetery should be approached with the suggestion of leaving a more substantial buffer along the stream bank. Leaving an unmowed swath of natural vegetation along the edge of the stream would be beneficial. The grassy area would be an excellent candidate for a streamside planting and can be done in an attractive

way with flowering shrubs and wild flowers to satisfy cemetery patrons. In addition, the use of fertilizers and pesticides on the lawn could be addressed if necessary.

- The dumping of fill directly up to the edge of the creek by the cemetery should be discouraged.
- Police patrols should occur on the access road periodically to discourage loitering and dumping in the more remote sections of the cemetery property.

SEGMENT 7. SMITH ST.**OVERALL ASSESSMENT SCORE: 4.8****General Characteristics**

Date: Novemeber 1, 2008

Length of Segment (km): 0.82

Average Width (meters): 6.14

Average Depth (cm): 57.15

Location	Lat	Long	Description
Start Point	41° 42' 51.44" N	73° 54' 14.00" W	Bridge crossing at Smith St.
End Point	41° 42' 28.30" N	73° 54' 28.15" W	South of City DPW bridge crossing



Left: A debris dam and excessive growth of duckweed indicating possible nutrient inputs.

Right: A section of the creek upstream from the City of Poughkeepsie DPW bridge crossing.



Survey Parameter	Score	Site Notes
Channel Condition	3	Fill and other structures along banks from adjacent industrial businesses, City DPW and parking lots
Hydrology	8	Channel not incised but disconnected from floodplain due to manmade structures, no evidence of recent flooding
Riparian Zone	3	Some shrubby vegetation along most of the segment, narrow riparian buffer
Bank Stability	5	No obvious signs of erosion; banks steep with fill present in some areas
Water Appearance	5	Water dark; visibility poor, may be attributed to the time of year and high amounts of leaf litter in creek
Nutrient Enrichment	NA	Not evaluated due to time of year
Barriers to Fish Movement	3	Dams present within 3 miles
Instream Fish Cover	4	Presence of logs and large woody debris, deep pools, overhanging vegetation; trash such as bricks, cinder blocks and tires may be used as fish habitat
Pools	7	Several deep pools at least 3 feet deep; channel straight, not meandering
Insect/Invertebrate Habitat	7	Presence of fine woody debris and submerged logs; trash such as cinder block and bricks can provide habitat for invertebrates
Canopy Cover	8	Cover between 40-75% due to a narrow vegetated buffer
Embeddedness	2	Few riffles; high amounts of sediment; soft substrate
Level of Trash	3	High amounts of litter as well as large debris; including: tires, water heater, and construction material

In-Stream Impairments

Stressor Category	Presence of Indicator
Hydrologic Modification	✓
Sedimentation/Erosion	✓
Dissolved Oxygen	✓
Contaminant Toxicity	✓
Vegetation Alteration	✓
Eutrophication	
Acidification	
Turbidity	
Thermal Alteration	
Salinity	
Total No. of Stressor Indicators	5

Floodplain Impairments

Stressor Category	Presence of Indicator
Hydrologic Modification	✓
Sedimentation/Erosion	✓
Dissolved Oxygen	
Contaminant Toxicity	✓
Vegetation Alteration	✓
Eutrophication	
Acidification	
Turbidity	
Thermal Alteration	
Salinity	
Total No. of Stressor Indicators	4

Buffer Score
Right Bank: 5
Left Bank: 2.5

Overall Description of Segment:

Located along the border of the Town and City of Poughkeepsie, segment seven shows indications of becoming an urban stream. The segment begins at the bridge crossing at Smith Street and is bordered immediately by a parking area and small strip mall. Large quantities of trash and litter from businesses in this commercial establishment as well as from the road are apparent on the stream banks. The buffer on the west side of the stream is steep and narrow and dominated by the invasive species Japanese knotweed. Approximately 85 meters from the bridge crossing is a large culvert 102 cm high. The culvert is discharging a small tributary that flows under the adjacent parking lot and begins on the other side of the nearby street, Fallkill Ave. The channel coming from the culvert to the mainstem of the Fall Kill is highly incised and appears to have a heavy layer of clay lining its banks.

Walking downstream, the west side of the creek is bordered by industrial businesses with fill consisting of gravel, cinder blocks and other miscellaneous construction material dumped in the riparian buffer. This industrial buffer continues for about 150 meters on the west side of the stream. The eastern buffer consists of what appears to be a manmade berm made up of piles of rocks and other building material. The berm appears to be quite old as small trees and shrubs have become established. It separates the creek from a small wetland. Overall the creek has been completely disconnected from the floodplain along this stretch.

Approximately 230 m from the bridge crossing, the City of Poughkeepsie DPW site begins on the eastern side of the main channel of the creek. There is a long stretch consisting entirely of dumped material such as construction material and tires. This area is labeled "Outfall" by the DPW. The outfall area separates the mainstem of the Fall Kill from a side channel that is bordered by a buffer of small trees and shrubs leading upslope to a residential area. Past the outfall, the City DPW parking lot and garages border the stream. No buffer exists on this side of the stream, but the western bank consists of a 50 m buffer made up of upland forest habitat for about 120 meters of stream length. A bridge going into the City DPW site then crosses the stream.

Approximately 40 m downstream from the DPW bridge the slope on the western side of the stream increases substantially and the buffer on both sides remains active DPW property. Several discharge pipes were observed along this steep slope coming from the DPW parking lot. Once past the City DPW property the habitat and stream quality increase substantially. A wide forested buffer of at least 30 m and up to 75 meters exists on both sides of the stream for the remainder of the segment. The eastern side of the stream becomes relatively flat and for a short distance appears to have a good connection with its floodplain which is made up of mature hardwood trees with an understory of shrubs and herbaceous vegetation consisting of

the invasive species reed canary grass and Japanese knotweed. The western side of the stream is a steep forested slope leading up to a fairly large area used to store what appears to be mulch and compost. This storage facility is located on an 8.5 acre parcel of city property that is predominately open space consisting of hardwood forest habitat.

Recommendations for the Site:

- The high frequency of industrial business as well as City DPW property along this segment could be detrimental to the water quality of the creek. If not already occurring, this segment would benefit from regular water quality monitoring to pinpoint possible sources of pollutants.
- The small wetland just downstream from the Smith St. bridge is performing important water retention and filtration functions. This area should be maintained as a natural retention basin.
- Undeveloped forested areas along this segment, specifically the level floodplain on the east bank downstream from the City DPW, perform the important functions of reducing water velocity, filtering sediment and other particulates, and reducing water levels during flood events. It would be beneficial to consider protecting these areas from future development and degradation.
- Litter and garbage along the segment adjacent to the strip mall and near the bridge crossing could be deterred with signage, as well as periodic police patrols of the area. Outreach opportunities exist with businesses located in the strip mall, promoting education about the consequences of littering.

SEGMENT 8. VERAZZANO BLVD.**OVERALL ASSESSMENT SCORE: 3.6****General Characteristics**

Date: November 5, 2008

Length of Segment (km): 1.03

Average Width (meters): 6.63

Average Depth (cm): 24.0

Location	Lat	Long	Description
Start Point	41° 42' 30.50" N	73° 53' 06.99" W	Bridge crossing near Mt. Carmel Church
End Point	41° 42' 38.85" N	73° 55' 26.23" W	Bridge crossing at Garden St.



Left: Evidence of dumping in the Fall Kill in the City of Poughkeepsie.

Right: A section of the creek where the stone walls are falling in and stormwater inputs are evident, The City of Poughkeepsie.



Survey Parameter	Score	Site Notes
Channel Condition	1	Stream channelized along entire segment by stone walls
Hydrology	1	No apparent flooding, however there have been unconfirmed reports that the creek has risen above the walls during recent flooding events
Riparian Zone	1	Narrow grass buffer in some areas at best, mostly sidewalk and street
Bank Stability	NA	Banks are mostly protected from erosion due to walls, however walls are badly undercut and falling into creek in some areas
Water Appearance	3	Odor of sewage in some areas; heavy green film present on rocks
Nutrient Enrichment	NA	Not evaluated due to time of year
Barriers to Fish Movement	3	Waterfalls directly downstream of segment with greater than 1 foot drop
Instream Fish Cover	5	Presence of large logs and woody debris, cobbles, riffles, as well as cinder blocks, bricks and other garbage that can be considered fish habitat
Pools	1	No deep pools present
Insect/Invertebrate Habitat	7	Presence of submerged logs, cobble, boulders, coarse gravel as well as cinder blocks, bricks and other garbage that can be considered invertebrate habitat
Canopy Cover	8	Between 40-80% canopy cover; large mature street trees line creek in some stretches of the segment
Embeddedness	9	Cobbles 20% embedded
Level of Trash	1	High levels of litter and large debris

In-Stream Impairments

Stressor Category	Presence of Indicator
Hydrologic Modification	✓
Sedimentation/Erosion	✓
Dissolved Oxygen	✓
Contaminant Toxicity	✓
Vegetation Alteration	✓
Eutrophication	✓
Acidification	
Turbidity	
Thermal Alteration	
Salinity	
Total No. of Stressor Indicators	6

Floodplain Stressors – Not applicable to site due to urban location and lack of natural floodplain.

Buffer Score
Right Bank: 2
Left Bank: 2

Overall Description of Segment:

Segment eight begins at the bridge crossing at Mount Carmel Place in the City of Poughkeepsie, just before it drops to the first of several falls on its way to the Hudson River. The most urban of all the segments observed in this study, it is enclosed completely in New Deal era stone walls that are between 3-5 m high for the length of the segment. Due to their age they have been undercut in many areas and are eroding and falling in along much of this segment in particular. The walls along a stretch of about 40 m along Verazzano Blvd have completely fallen in, allowing access to the stream channel. Reinforcement for the walls was observed near the bridge crossing at Washington Street. Significant amounts of garbage and litter were seen along the segment, including large pieces of wood and furniture causing debris dams. The buffer along the entire segment consists of a narrow strip of mowed lawn at best; in some areas sidewalk and street are directly adjacent to the stream. However, starting at the bridge crossing at Washington St. and going upstream, large sycamores were planted in the narrow buffer for about 250 meters along Brookside Ave. and the buffer continues, made up of mixed species of trees and shrubs until the bridge at Garden St. These trees provide canopy cover and shade which helps maintain cooler water temperatures. A total of 14 discharge pipes were observed along the segment. The Creek is completely disconnected from the floodplain for the entire length of the segment and is underground for 100 m along Verazzano Blvd.

Recommendations for the Site:

- Water quality monitoring should occur on a regular basis to monitor pollutants that may be entering the stream from adjacent roads and through the many discharge pipes entering the stream.
- The severe dumping problem in the creek through the city needs to be addressed. This can be accomplished through educational programs through local community groups, signage placed at bridge crossings and other problem areas, and frequent police patrols to catch perpetrators.
- The length of stream along Verazzano Blvd. and Brookside Ave. has the potential to be an asset to the community. The historic stone walls, mature trees and location near pedestrian areas gives it the potential to become a walking trail that can be used to raise community awareness about the creek and the watershed.

References Cited

Brooks, R.P., D.H. Wardrop, J.A. Bishop. 2004. Assessing wetland condition on a watershed basis in the Mid-Atlantic region using synoptic land-cover maps. *Environmental Monitoring and Assessment*. 94(1-3): 9-22.

Bean, P., T. R. Lynch, D. Burns. 2006. A Watershed Management Plan for the Fall Kill, Dutchess County, New York. Fall Kill Watershed Committee.

Lower Hudson Coalition of Conservation Districts (LHCCD) 2004. Streamwalk Program, Westchester County Department of Planning , Westchester County Soil and Water Conservation District. White Plains, NY. <http://www.lhccd.org/streamwalk2004.html>

Moore, S.M., M. R. Cover, A. Senter. 2007. A Rapid Trash Assessment Method Applied to Waters of the San Francisco Bay Region: Trash Measurement in Streams, Regional Water Quality Control Board, San Francisco Bay Region, Surface Water Ambient Monitoring Program. <http://www.swrcb.ca.gov/rwqcb2/docs/swamptrashreport.pdf>

Natural Resource Conservation Service (NRCS). 1998. Stream Visual Assessment Protocol. NWCC-TN-99-1. West Technology Support Center, Portland, OR.

Appendix A (continued)

Penn State Cooperative Wetlands Center - Stressor Checklist and Buffer Scoring Worksheet

			<30m	>30-100 m		<30m	>30-100 m	
Category: Dissolved Oxygen	STREAM	FLOODPLAIN			OTHER WETLANDS			
excessive density of aquatic plants or algal mats								
excessive deposition or dumping of organic waste (e.g. leaves, grass clippings)								
direct discharges of organic wastewater or material (e.g. milkhouse waste, food-processing waste, other wastewater sources)								
other:								
TOTAL ITEMS:								
Category: Contaminant Toxicity	STREAM	FLOODPLAIN			OTHER WETLANDS			
obvious spills, discharges, plumes, odors								
fish and wildlife impacts (e.g. tumors, fungi, abnormalities)								
adjacent industrial sites, proximity of railroad								
severe vegetation stress								
other:								
TOTAL ITEMS:								
Category: Vegetation Alteration	STREAM	FLOODPLAIN			OTHER WETLANDS			
mowing								
grazing (livestock)								
tree harvesting/cutting (>50% canopy, woody vegetation within past 5 yrs)								
brush cutting, mechanized removal of shrubs/saplings								
excessive herbivory (wildlife)								
chemical defoliation (utility lines, road side, right of way)								
crops (annual row crops)								
forest plantations								
aquatic weed control (mechanical or herbicide)								
dominant presence of exotic or aggressive plant species (e.g. uniform stands of exotic or aggressive species).								% Cover (circle one): 5-20%, >20-50%, >50%
removal of dead and down woody vegetation/debris								
other:								
TOTAL ITEMS:								

Appendix A (continued)

Penn State Cooperative Wetlands Center - Sressor Checklist and Buffer Scoring Worksheet

			<30m	>30-100 m		<30m	>30-100 m	
Category: Eutrophication	STREAM	FLOODPLAIN			OTHER WETLANDS			
direct discharges from agricultural feedlots, manure pits, aquaculture etc.								
direct discharges from septic or sewage treatment systems								
Heavy or moderately heavy formation of algal mats								
other:								
TOTAL ITEMS:								
Category: Acidification	STREAM	FLOODPLAIN			OTHER WETLANDS			
acid mine drainage discharges								
adjacent mined land/spoil piles								
ancillary information (yes or no)								known acid deposition region
								excessively clear water
								absence of expected biota
other:								
TOTAL ITEMS:								
Category: Turbidity (if high concentration, check both boxes)	STREAM	FLOODPLAIN			OTHER WETLANDS			
moderate concentration of suspended solids in water column, obvious sediment plumes								
other:								
TOTAL ITEMS:								
Category: Thermal Alteration (e.g., power plant or industrial heated discharges, if high temperature, check both boxes)	STREAM	FLOODPLAIN			OTHER WETLANDS			
significant increase in water temperature								
recent human-induced canopy removal								
other:								
TOTAL ITEMS:								
Category: Salinity	STREAM	FLOODPLAIN			OTHER WETLANDS			
obvious increase in concentration of dissolved salts								
other:								
TOTAL ITEMS:								

Buffer Scoring Worksheet

Describe condition of land-use adjacent to stream within each width class					
Land use (RIGHT side of stream)					
Cover Type	Land-use Width (meters)				
	100-300m	30-100	10-30	3-10	0-3
Natural Forest	6	6	6	6	6
Shrubs/Sapling	4	4	4	4	4
Perennial Herb	2	2	2	2	2
Other	0	0	0	0	0
Land use (LEFT side of stream)					
Cover Type	Land-use Width (meters)				
	100-300m	30-100	10-30	3-10	0-3
Natural Forest	6	6	6	6	6
Shrubs/Sapling	4	4	4	4	4
Perennial Herb	2	2	2	2	2
Other	0	0	0	0	0