Cornell University
Cooperative Extension
Dutchess County

Results of the 2011 Hunns Lake Creek Streamwalk

Conducted by Cornell Cooperative Extension Dutchess County

With funding provided by the New York State Department of Environmental Conservation (DEC) from the Environmental Protection Fund through the Hudson River Estuary Program.

Hudson River Estuary

Introduction:

The Hunns Lake Creek watershed covers 5,407 acres of land within the northeastern portion of the Wappinger Creek watershed. Located entirely within the Town of Stanford, the Hunns Lake Creek watershed is one of the smallest subwatersheds within the Wappinger Creek Watershed, comprising approximately 4% of the watershed. According to the Wappinger Creek Watershed Management Plan[1], the predominant land use in the watershed is forested land (51%) followed by agriculture (32%), and residential (13%).

The Hunns Lake Creek is classified by the New York State Department of Environmental Conservation (NYSDEC) as a Class B and Class C(T) stream. This indicates that the stream is regulated in some areas to support swimming and is limited to fishing in others. The T that follows the classification C(T) indicates that this stream is regulated to support trout fishing. At one time a 3 mile segment of the creek was listed on the NYSDEC Priority Waterbodies List due to high biological demand thought to be the result of an agricultural operation. The creek is no longer on this list.

The headwaters of the Hunns Lake Creek originate and discharge from Hunns Lake. Hunns Lake is designated as a class B waterbody (suitable for swimming) and is currently listed on the NYSDEC Priority Waterbodies List as *Needs Verification*. The report states that recreational uses and aesthetics have been reported as being effected by excessive algal growth likely due to inadequate and/or failing septic systems and runoff from agricultural activities.

In a 2010 study, conducted by CCEDC staff and enrolled volunteers, Hunns Lake Creek was found to have the lowest stream temperature on average (between the months of July – October) of the Wappinger Creek tributaries that were monitored. The goal of the 2010 study was to identify tributaries of the Wappinger Creek that were cold enough for trout refuge and spawning. Trout species require cool, well-oxygenated waters.

Purpose:

The purpose of the 2011 Hunns Lake Streamwalk was to conduct a visual stream assessment of Hunns Lake Creek, to identify areas impacting water quality and needing improvement. Knowing this information will help identify areas for future conservation and restoration projects in the watershed that would help improve the overall health and water quality of the Hunns Lake Creek.

[1] Land Use Land Cover data for the Wappinger Creek Watershed Management Plan was calculated using 1995 aerial photographs

Methods:

To determine the general health and the condition of the Hunns Lake Creek a visual assessment of the creek was conducted during the Fall of 2011 using the assessment method developed by the Lower Hudson Coalition of Conservation Districts (LHCCD) (Appendix A). This method is very similar to both the Natural Resource Conservation Service (NRCS) Stream Visual Assessment Protocol (NRCS 1998) and New York State Council of Trout Unlimited (NYSCTU) Stream Visual Assessment Protocol and was designed to facilitate the use of volunteers in stream assessments. Users of the method do not require scientific expertise to gain useful information about the state and health of the stream. Like the USDA Stream Visual Assessment Protocol the LHCCD method uses metrics, or "assessment elements", to provide an overall assessment score of the stream based primarily on physical conditions. In 2004 the LHCCD method was used to study 16 miles of the Fishkill Creek mainstem. In 2007 the LHCCD method was utilized once again in Dutchess to access the health of the Jackson Creek, a tributary of the Fishkill Creek.

The LHCCD Streamwalk assessment method looks at 12 different characteristics: Channel condition, hydrology, riparian zone, bank stability, water appearance, nutrient enrichment, barriers to fish movement, instream fish cover, pools, insect/invertebrate habitat, canopy cover, and embeddedness. Each characteristic was rated with a value of 1 to 10, with 10 implying the healthiest score and 1 being the poorest score. If a score varied within a segment, the lowest score observed was assigned to that segment.

With the LHCCD method, segments are assigned based on accessibility, distance, and having a clear starting and ending location. Therefore segments often begin and end at major road crossings, dams and/or other easily identifiable features. Segments were typically three quarters of a mile to approximately one mile in length. A score was determined for each characteristic in several locations of each segment referred to as sites. A total of 15 sites were assessed along Hunns Lake Creek. These site scores, of each characteristic, were collected in each segment at approximately equal distances from each other along the segment were permission to enter the property was granted (or the stream was visible from the road.) The overall score for each of the 12 characteristics measured within the segment was determined by taking the lowest of the scores recorded in that segment. An overall segment score was then calculated by averaging the characteristic scores for that segment. Segments with scores of 9.0 or higher are then classified as excellent, 7.5-8.9 as good, 6.1-7.4 as fair, and less than 6.0 are classified as poor.

Segments with overall scores under 3 for Channel Condition, Riparian Zone, Bank Stability, or Barriers to Fish Movement are classified as impaired sites with this method. In addition if there is excessive sedimentation, algae or litter, or if significant pipe discharges, high water temperature, or other obvious impairments (such as cattle present in the stream) were present at a site it is considered impaired. When a site is considered impaired, the LHCCD visual stream assessment method gathers further details on the assessment elements through additional assessments of the impaired sites. At each location that scores were collected, a measurement of

water depth and wetted width were estimated using a meter tape and meter stick. A latitude and longitude reading was also collected at each of these sites using a GPS unit. In addition measurements of air temperature, and water temperature were collected.

The Hunns Lake Creek streamwalk was conducted by staff of Cornell Cooperative Extension Dutchess County (CCEDC), CCEDC enrolled volunteers, and Mid-Hudson Trout Unlimited volunteers. Members of the streamwalk team were trained by CCEDC staff in using the LHCCD Streamwalk assessment method. Segments were walked and scored as a group in order to reduce subjective discrepancies.

Segment descriptions

Hunns Lake Creek was divided into 5 segments (Attachment B). Segment 1 began at the mouth of Hunns Lake Creek, where it meets the Wappinger Creek, to a very large dam approximately 1.1 miles upstream. Segment 2 began at this same large dam and ends at the downstream edge of the former Roseland Ranch property. Segment 3 began at the lower (downstream) edge of the former Roseland Ranch property and runs until Ohland Road. (Ohland Road does not actually intersect Hunns Lake Creek but joins Hunns Lake Creek Road in a section where the road is directly adjacent to the creek.) The fourth segment began at Ohland Road and ran until just downstream of a large impoundent approximately 0.7 miles upstream (roughly 0.3 miles downstream of Hunns Lake.) The fifth and final segment began at the impoundment and ran until it the creek meets Hunns Lake, approximately 0.3 miles upstream.

Landowner permission & visibility from the road

The entire length of Hunns Lake Creek runs through privately-owned properties. Using Geographic Information Systems (GIS) and tax parcel boundaries data obtained from the Dutchess County Real Property Tax Service Agency, we identified all properties along the creek, as well as their owners and mailing addresses. Letters were sent to all landowners that own property along the Hunns Lake Creek asking for permission to enter their property and encouraging them to join us during the visual stream assessment Permission was received from 38 out of the 101 land owners contacted. Large portions of segments 2 and 3 were visible from Hunns Lake Road therefore scores could be collected without having to enter a property where permission was not granted.

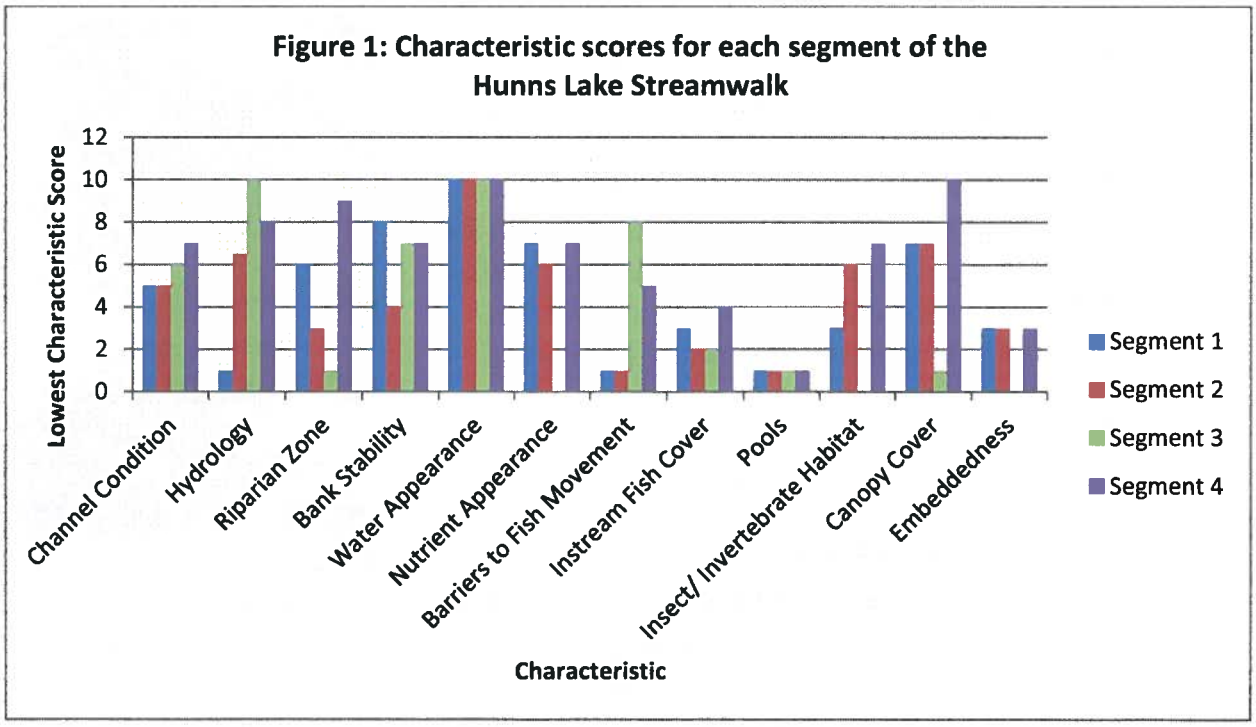
Segment 5 was the only segment in which we were unable to secure permission from any landowners and no part of the segment was visible from Hunns Lake Road. Therefore no part of segment 5 was accessed.

Results

Segments of the Hunns Lake Creek scored as either poor or fair (Table 1). The absence of deep or shallow pools and in-stream fish cover throughout much of the creek, along with the presence of dams in 2 out of the 4 segments and stream embeddedness, led to consistently low scores for the assessment of Hunns Lake Creek (Figure 1).

Table 1. Segment descriptions and the score for the Hunns Lake Streamwalk.

Segment #	Segment description	Segment condition	Segment score
1	Mouth of Hunns Lake creek to large dam	POOR	5.6
2	Upstream of large dam to downstream edge of former Roseland Ranch property	POOR	4.1
3	Former Roseland Ranch property to Ohland Road	POOR	5.1
4	Ohland Road to impoundment	FAIR	6.8
5	Upstream of the impoundment to Hunns Lake	Not surveyed	Not surveyed



Discussion

Segment 1

Segment 1 had 7 characteristics that scored a 5 or below, with barriers to fish movement, hydrology, and receiving the lowest scores, all receiving a 1. A segment automatically receives a score of 1 for barriers to fish movement if a dam is present anywhere within the segment.

Segment 1 had two dams located within the segment, one approximately 15 – 20 feet tall (Figure 2) and the second over 30 feet tall (Figure 3). The 30-foot dam also was large enough to effectively disconnect the stream from the floodplain downstream of the dam, which causes hydrology to receive a score of 1. Pools were present in areas of segment 1 but there were several sites assessed within the segment that had absolutely no pools present. This was actually true for the entire portion of Hunns Lake Creek evaluated for this assessment and is not uncommon to find in many other local smaller headwater streams. Segment 1 was classified as impaired according to LHCCD streamwalk method because it received a score of 3 or lower for barriers to fish movement.

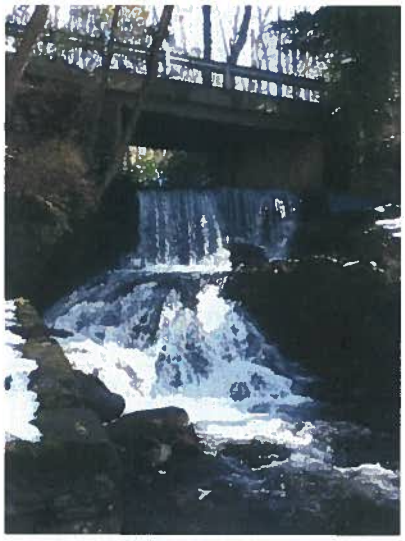


Figure 2. A 15- 20 foot tall dam found in Segment 1 of Hunns Lake Creek.

Instream fish cover, insect/invertebrate habitat, and embeddedness all received a score of 3 for segment 1. Instream fish cover was low throughout the entire creek and may be partly due to the lack of pools and woody debris found in the creek (the presence of both at a site lead to an increased score.) The recent storms from Hurricane Irene and Tropical Storm Lee, which occurred a month before the visual assessment, may have flushed a lot of woody debris out of the stream and also increased the embeddedness of the section by transporting and depositing large amounts of sediment that were stored behind upstream dams. Channel condition received a score of 5 at several sites within this segment due to channelization and straightening of several areas

Figure 3. A greater than 30 foot tall dam located at the end of Segment 1 of Hunns Lake Creek.

Segment 2

Segment 2 had seven characteristics that scored a 5 or below, with the lowest scores once again being pools and barriers to fish movement. The 30 foot dam (Figure 3) at the upstream end of segment 1 also marked the beginning of segment 2. Therefore its presence gave the segment a score of 1 for barriers to fish movement. Instream fish cover and embeddedness once again received low scores, 2 and 3 respectively. The presence of the dam was also a factor that led to low scores for riparian zone and bank stability for segment 2. The area just upstream of the dam looked as if an impoundment may have once existed there. The creek appeared to have cut through layers of fine sediment (Figure 4). The absences of any vegetation directly adjacent to the stream made the banks very unstable and erodible. Nutrient

Enrichment was also visible for the first time in segment 2 (Figure 5). Segment 2 was also classified as impaired due to a score lower than 3 for barriers to fish movement.

Figure 4. Area just upstream of the large dam.

Figure 5. Evidence of nutrient enrichment found in sections of segment 2.

Segment 3

Scores for segment 3 were all collected by viewing the creek from Hunns Lake Road. Therefore nutrient enrichment , insect/invertebrate habitat, and embeddedness could not be evaluated at any of the sites within this segment, and instream fish cover, water appearance, and pools were only evaluated at one location. Three of the 8 characteristics that could be evaluated for segment 3 received a score lower than 5. Instream fish cover and pools once again received low scores, 2 and 1 respectively. The other characteristic that scored low was riparian zone with a score of 1. This was due to the complete lack of any vegetation (besides grass) located at the former horse ranch property that the creek runs through.

Segment three was also classified as impaired due to a score of 3 or lower for canopy cover in the riparian zone.

Figure 6. Dam at the beginning of segment 5.

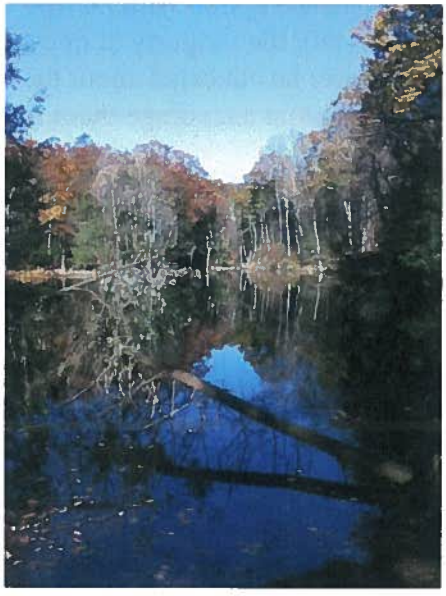


Figure 7. Part of the impoundment behind the dam in segment 5.

Segment 4

Segment 4 received the highest score of the streamwalk: fair (6.8). Barriers to fish movement, instream fish cover, pools and embeddedness all scored 5 or below once again. The barrier to fish movement in segment 4 was a small dam 2 – 3 foot dam that crossed the creek.

Segment 5

Segment 5 was not scored because the team did not receive permission to enter any of the properties adjacent to the

segment and the creek was no longer visible from the road. The team was able to get permission to quickly take a look at the large dam and impoundment behind it, which marks the beginning of segment 5 (Figures 6 & 7).

Conclusions & Recommendations:

Results of the Hunns Lake Streamwalk indicate that there are several characteristics of the creek that are being impacted by its surrounding watershed. Three of the 4 segments were classified as impaired and need further assessment to determine the degree of impairment. The streamwalk team intends to revisit these sites in the Spring and reach out to property owners to provide them with education on best management practices.

The following best management practices should be considered and implemented throughout the watershed to improve water quality in the creek and address issues leading to impairment of the creek.

Vegetated streamside buffer zones or riparian buffers:

Vegetated riparian buffers play a key role in improving water quality. The roots of plants help hold on to soil and reduce the erosion of stream banks. As groundwater travels past the roots of these plants they have the ability of filter out excess nutrients and pollutants like heavy metals that may be in the groundwater due to land use. Particularly during the spring and summer months when leaves are out on trees and photosynthesizing, these plants can reduce the volume of water moving through our streams and also slow the movement of stormwater runoff so that the flow of water in our streams becomes less flashy. The shade provided by plants in the riparian buffer cools water temperatures, which is especially important during the summer to fish species like trout. Leaves are also an important food source for stream life.

Riparian buffers were predominantly healthy throughout much of Hunns Lake Creek. Segment 3 was the exception with no riparian vegetation existing along a large stretch of the stream. Currently the property in question is in foreclosure. It is important that any new owner of the property be educated about the importance of riparian buffers and resources are made available to them that encourage them to restore health vegetation to the streamside of Hunns Lake Creek.

Municipalities can work to protect riparian zones by passing ordinances that create a "buffer zone" around the creek to protect vegetation, such as trees and shrubs, ensure that residents maintain these beneficial plants. Municipalities can also encourage residents to restore vegetation to these areas by educating residents about their benefits. Finally, municipalities can also take advantage of programs like the NYS DEC Hudson River Estuary Program's "Trees for Tribs" initiative, which provides free native trees and shrubs for streamside buffer planting projects within the Hudson River Estuary watershed. For more information about the "Trees for Tribs" imitative visit: http://www.dec.ny.gov/lands/43668.html

Nutrient enrichment:

Growth of algae in an aquatic ecosystem is an indicator of excess nutrients, such as nitrate and phosphate, and often indicative of pollution from a man-made source. These nutrients can enter waterways from failing and/or leaky septic systems, degrading sewer infrastructure, fertilizers, and animal or pet waste. The particular stretch of Hunns Lake Creek where nutrient enrichment was the most evident (Figure 5) was at least a mile long and just downstream of the old Roseland Ranch property. The ranch is no longer in operation, and there were no other visible agricultural properties immediately upstream, therefore the source a nutrient enrichment is not likely animal waste. This particular area of Hunns Lake Creek is residential. Therefore, the source of nutrients may be failing and/or leaky septic systems.

Proper maintenance of septic systems, including pumping every 3-5 years, will ensure a system is working properly and help identify issues leading to failure before they happen. Not only does this protect water quality but it is also more affordable to regularly maintain a system than replace a failing one. Municipalities can encourage residents to properly maintain their septic systems through education and the passing of ordinances that require property owners to have them regularly pumped and inspected. Ordinances can also protect streamside buffers and water quality by preventing livestock from entering streams through fences and other structures.

Barriers to fish movement/Dams:

Barriers to fish movement, specifically dams, prevent the movement of fish species throughout a waterbody. Dams can have many benefits (e.g. diverting water for powering mills, storing water for livestock, storing water for drinking supplies) but many of the small dams typically found on streams like the Hunns Lake Creek have out-lived their original purpose. The financial burden of maintaining these structures and the safety issues that arise from structures that are not properly maintained can often outweigh the benefits of keeping them. Removal of these small dams not only restores the natural flow regimes for fish species and other aquatic organisms, but can also improve water quality, remove a maintenance headache, and eliminate a potential public safety hazard.

Removing a dam is not a simple or inexpensive task. Assessments and studies must be conducted to ensure the benefits far outweigh any potential cost to removing the dam. If improperly done, sediment stored behind the dam can be released downstream creating negative impacts to water quality. Homeowners cannot typically afford the large cost of an extensive dam removal projects. There are sources of funding available for dam removal projects and typically require the involvement of several partnering local and state agencies.

Streamwalk Program

SEGMENT SURVEY SHEET

Insert your logo here

Segment Code: _____ **Stream Name**_____

************All observations are to be made while walking UPSTREAM.************

Section A: General Characteristics

Name: _____ Time: _____
Phone: _____Temperature: (Air)_____°C (Water)_____ °C
Date: _____ Weather: _____
Past 48 hour weather conditions:_____

GPS Location (using UTM NAD83 Datum): START Waypoint # ___ 18 T 5 _ _ _ _ _
UTM **4** _ _ _ _ _ _
FINISH Waypoint # ___ **18 T 5** _ _ _ _ _
UTM **4** _ _ _ _ _ _

1. **Describe location and extent of segment (i.e. from _____ to _____). Indicate any landmarks or roads that would help locate your segment:**

   _____

   _____

2. **Measure the depth and the width of the stream at four points along the segment. Record the values in the chart below. Then add the values and divide by 4 to find your averages.**

Location	Depth (in feet)	Width (in feet)
Point 1		
Point 2		
Point 3		
Point 4		
	Average	*Average*

Average Stream Depth (from above)_____ft.

Average Stream Width (from above)_____ft.

Streamwalk Program

SEGMENT SURVEY SHEET

Insert your logo here

******KEEP TRACK OF THE FOLLOWING DURING YOUR STREAMWALK******

3. **Estimate the number of: (talley as you do your streamwalk)**

   Small Ponds_____ Dams_____

   Discharge Pipes (Estimate the size if possible) _____

   Vehicle Crossings_____

4. **Describe the existing land uses surrounding your segment (rate from 1-10 where 1=most and 10=least):**

   _____High Density Residential (<50ft/du) ***du = dwelling unit**

   _____Medium Density Residential (50-200ft/du)

   _____Low Density Residential (>200ft/du)

   _____Recreational _____Agriculture _____Industrial

   _____Forest _____Commercial _____School

   _____Non-Residential Roads

5. **Are there visible human activities taking place along the segment (as evidenced by litter, bike & hiking trails, roads, camping areas, etc.)?**

   If yes, describe activities: _____

   _____

   If yes, is the area publicly or privately owned?_____

   _____

6. **List and estimate the number of waterfowl on the segment (Wood Ducks, Mallards, Canada Geese, etc.):** _____

   _____

Streamwalk surveys developed by Westchester County from multiple sources including the Natural Resources Conservation Services (NRCS)

Section B: Scoring Descriptions

WALK THE ENTIRE SEGMENT AND MAKE NOTES ON EACH CHARACTERISTIC IN THE SPACES PROVIDED. RATE EACH PARAMETER AFTER COMPLETING THE ENTIRE STREAMWALK ON YOUR SEGMENT.

*******Words in bold type can be found in the glossary*******

EACH ASSESSMENT ELEMENT CAN BE RATED WITH A VALUE OF 1 TO 10. RATE ONLY THOSE ELEMENTS APPROPRIATE TO THE STREAM SEGMENT YOU ARE ASSESSING. USE THE *SEGMENT SURVEY SCORE SHEET* TO RECORD THE SCORE THAT BEST FITS THE OBSERVATIONS YOU MAKE BASED ON THE NARRATIVE DESCRIPTIONS PROVIDED. UNLESS OTHERWISE DIRECTED, ASSIGN THE LOWEST SCORE THAT APPLIES.

Streamwalk Program

SEGMENT SURVEY SHEET

Insert your logo here

1. **CHANNEL CONDITION**

What to do: Evaluate if the channel is in it's 'natural' state, or if there has been some alteration.

What to look for: Signs of channelization or straightening of the stream may include an unnaturally straight section of the stream, high banks, berms, or lack of flow diversity (i.e. if an area only has one type of flow, such as **riffles** throughout the entire segment, no pools or slow moving sections). Drop structures, irrigation diversions, culverts, bridge abutments, and **riprap** also indicate changes to the stream channel.

Natural channel; no structures, dikes. No evidence of **downcutting** or excessive lateral cutting.	Evidence of past channel alteration, but with significant recovery of channel and banks.	Altered channel: <50% of the length having **riprap** and/or **channelization**. Excess **aggradation**; braided channel. Structures present restrict **flood plain** width.	Channel is actively **dowcutting** or widening. >50% of the reach with **riprap** or channelization. Structures prevent access to the **flood plain**.	Can not evaluate OR Not applicable
10	7	3	1	N/A

Score _____

NOTES: _____

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2. **HYDROLOGY**

What to do: Estimate the flooding frequency for your segment. You may know your segments flood habits just from your knowledge of your local stream.

What to look for: Evidence of flooding includes high water marks (such as water lines on trees or structures located in the buffer), sediment deposits or stream debris on stream banks or within the **floodplain**.

Flooding every 1.5 to 2 years. No evidence of dams, dikes or other structures limiting the stream's access to the **flood plain**. Channel is not **incised**.	Flooding occurs only once every 3 to 5 years; limited channel incision.	Flooding occurs only once every 6 to 10 years; channel deeply **incised**.	No flooding; channel deeply **incised** or structures prevent access to **flood plain** or dam operations prevent flood flows.	Can not evaluate OR Not applicable
10	7	3	1	N/A

Score_____

NOTES:_____

3. RIPARIAN ZONE

What to do: Examine both sides of the stream and note where vegetation does and does not exist.

What to look for: Compare the width of the **riparian** zone to the **active channel width**. A common problem is lack of shrubs and understory trees. Another common problem is lack of regeneration (presence of only mature vegetation and lack of seedlings).

Natural Vegetation extends at least two **active channel widths** on each side. (i.e. if stream is 2 ft. wide, the natural vegetation is 4 ft. wide on each bank.)	Natural vegetation extends one **active channel width** on each side. OR If less than one width, covers entire **flood plain.**	Natural vegetation extends half of the **active channel width** on each side.	Natural vegetation extends a third of the **active channel width** on each side.	Natural vegetation less than a third of the **active channel width** on each side. OR Lack of regeneration	Can not evaluate OR Not applicable
10	8	5	3	1	N/A

Score_____

NOTES:_____

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4. **BANK STABILITY**

What to do: Estimate the size or area of the bank affected by erosion relative to the total bank area in your segment.

What to look for: Signs of erosion include unvegetated stretches, exposed tree roots, or scalloped edges. Evidence of construction, vehicular, or animal paths near banks suggests conditions that may lead to the collapse of banks. This may be hard to evaluate during high water.

Banks are stable; banks are low (at elevation of active flood plain): outside bends that are eroding are 33% or more protected with roots that extend to the **base-flow**	Moderately stable; banks are low (At elevation of active flood plain): less than 33% of eroding surface area of banks in outside bends is protected by roots that extend to the **base-flow** elevation.	Moderately unstable; banks may be low, but typically are high (flooding occurs 1 year out of 5 or less frequently): outside bends are actively eroding (overhanging vegetation at top of bank, some mature trees falling into stream, some slope failures apparent).	Unstable; banks may be low, but typically are high; some straight reaches and inside edges of bends are actively eroding as well as outside bends (overhanging vegetation at top of bare bank, numerous mature trees falling into stream, numerous slope failures apparent).	Can not evaluate OR Not applicable
10	7	3	1	N/A

Score_____

NOTES:_____

5. **WATER APPEARANCE**

What to do: Evaluate the clarity of the water.

What to look for: The deeper an object in the water can be seen, the lower the amount of **turbid**ity. Use the depth that objects are visible only if the stream is deep enough to evaluate turbidity using this approach. If the water is clear, but only 1 foot deep, do not rate as if an object became obscured at a depth of 1 foot. This measure should be taken after a stream has had the chance to "settle" after a storm event.

Very clear or clear but tea-colored; objects visible at depth 3 to 6 ft. No oil sheen on surface; no noticeable film on submerged objects or rocks.	Occasionally cloudy, especially after storm event, but clears rapidly: objects visible at depth 1.5 to 3 ft.; may have slightly green color; no oil sheen on water surface.	Considerable cloudiness most of the time; objects visible to depth 0.5 to 1.5 ft.; slow sections may appear pea-green; bottom rocks or submerged objects covered with heavy green or olive-green film. OR Moderate odor of ammonia or rotten eggs	Very **turbid** or muddy appearance most of the time: objects visible to depth <0.5 ft; slow moving water may be bright green; other obvious water pollutants; floating algal mats, surface scum, sheen or heavy coat of foam on surface; OR Strong odor of chemicals, oil, sewage, other pollutants.	Can not evaluate OR Not applicable
10	7	3	1	N/A

Score_____

NOTES:_____

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6. **NUTRIENT ENRICHMENT**

What to do: Evaluate the amount of aquatic vegetation present.

What to look for: Some aquatic vegetation is normal and indicates a healthy stream. Excess nutrients cause excess growth of algae and aquatic plants, which can create a greenish color to the water. Clear water and a diverse aquatic plant community without dense plant populations are optimal for this characteristic.

Clear water along entire segment; diverse aquatic plant community includes low quantities of many species of aquatic plants; little algal growth present.	Fairly clear or slightly greenish water along entire segment; moderate algal growth on stream substrates.	Greenish water along entire segment; overabundance of lush green aquatic plants; abundant algal growth, especially during warmer months.	Pea green, gray, or brown water along entire reach; dense stands of aquatic plants clog stream; severe algal blooms create thick algal mats in stream.	Can not evaluate OR Not applicable
10	7	3	1	N/A

Score_____

NOTES:_____

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7. **BARRIERS TO FISH MOVEMENT**

What to do: Look for barriers within the stream segment that potentially can block fish passage through the segment.

What to look for: Some barriers are natural, such as waterfalls and boulder dams. Note the presence of human developed barriers, their size and whether provisions have been made for fish passage. Beaver dams generally do pose a problem for fish migration. Also look for structures that may not involve a drop, but still present a hydraulic barrier. Small culverts or large ones with insufficient water depth and slopes may cause high water velocities that prevent fish passage.

No barriers	Seasonal low water levels inhibit movement within the stream segment.	Drop structures, culverts, dams, or diversions (<1 ft. drop) within the stream segment.	Drop structures, culverts, dams, or diversions (>1 ft. drop) within 3 miles of the segment.	Drop structures, culverts, dams, or diversions (>1 foot drop) anywhere within the stream.	Can not evaluate OR Not applicable
10	8	5	3	1	N/A

Score_____

NOTES:_____

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8. **INSTREAM FISH COVER**

What to do: Observe the number of different habitat and cover types within a representative section of your segment. Each type must be present in appreciable amounts to score.

Habitat Types to look for: Logs/large woody debris, deep pools, overhanging vegetation, boulders/**cobble**, riffles, undercut banks, thick root mats, dense beds of emergent/floating leaf vegetation, isolated/backwater pools, other:_____

Greater than 7 habitat types available.	6 to 7 habitat types available.	4 to 5 habitat types available.	2 to 3 habitat types available.	None to 1 habitat types available.	Can not evaluate OR Not applicable
10	8	5	3	1	N/A

Score_____

NOTES:_____

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9. **POOLS**

What to do: Look for deep and shallow pools existing within your stream segment.

What to look for: Pool diversity and abundance are estimated based on walking the stream or probing from the streambank with a stick. You should find deep pools on the outside of meander bends. In shallow, clear streams a visual inspection may provide an accurate estimate. In deep streams or streams with low visibility, this assessment characteristic may be difficult to determine and should not be scored.

Deep and shallow pools abundant; greater than 30% of the pool bottom is obscure due to depth, or the pools are at least 5 feet deep.	Pools present, but not abundant; from 10 to 30% of the pool bottom is obscure due to depth, or the pools are at least 3 feet deep.	Pools present, but shallow; from 5 to 10% of the pool bottom is obscure due to depth, or the pools are less than 3 feet deep.	Pools absent, or the entire bottom is visible.	Can not evaluate OR Not applicable
10	7	3	1	N/A

Score_____

NOTES:_____

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10. **INSECT/INVERTEBRATE HABITAT**

What to do: Observe the number of different types of habitat and cover within a representative section of your segment. Each cover type must be present in appreciable amounts to score.

Habitat Types to look for: Fine woody debris, submerged logs, undercut banks, cobble, boulders, coarse **gravel,** other:_____

At least 5 types of habitat available. Habitat is at a stage to allow full insect colonization (woody debris and logs not freshly fallen).	3 to 4 types of habitat. Some potential habitat exists, such as overhanging trees, which will provide habitat, but have not yet entered the stream.	1 to 2 types of habitat. The substrate is often disturbed, covered, or removed by high stream velocities and scour or by sediment deposition.	None to 1 type of habitat.	Can not evaluate OR Not applicable
10	7	3	1	N/A

Score_____

NOTES:_____

11. **CANOPY COVER (if applicable)**

What to do: Try to estimate how much of the river's corridor has tree canopy (cover). Do not assess this element if the **active channel width** is greater than 50 feet. Do not assess this element if woody vegetation is naturally absent (e.g. wet meadow).

What to look for: Estimate areas with no shade, poor shade, and shade. The relative amount of shade is estimated by assuming that the sun is directly overhead and the vegetation is in full leaf-out condition.

The stream corridor has >60% canopy cover.	Average width of canopy cover is between 40 - 60%.	Average width of canopy covers between 30 and 40% of the stream channel.	Tree canopy covers <30% of the stream corridor.	Can not evaluate OR Not applicable
10	7	3	1	N/A

Score_____

NOTES:_____

_____

_____

12. **EMBEDDEDNESS**

What to do: Do not assess this element unless **riffles** are present or they are a natural feature that should be present. This characteristic should be used only in **riffle** areas and in streams where this is a natural feature. Estimate what percent of bottom particles are buried in sediment in the **riffle** areas.

What to look for: The measure is the depth to which objects are buried in the sediment. This is made by picking up particles of **gravel** or **cobble** with your fingertip at the fine sediment layer. Test for complete burial of a streambed by probing with a stick.

Gravel or cobble particles are less than 20% embedded.	Gravel or cobble particles are 20 to 30% embedded.	Gravel or cobble particles are 30 to 40% embedded.	Gravel or cobble particles are greater than 40% embedded.	Stream bottom is completely embedded.	Can not evaluate OR Not applicable
10	8	5	3	1	N/A

Score_____

NOTES:_____

_____

_____

Streamwalk Program

SEGMENT SURVEY SHEET

Insert your logo here

Please transfer the scores recorded onto the Segment Survey Score Sheet provided in your packet.

1. Did you walk this whole section of the stream? YES_____ NO_____

2. Would you be interested in doing more hands-on testing on your segment? (for example: chemical analysis or looking for macroinvertebrates (stream insects))? YES_____ NO_____

3. Other comments/concerns:_____

_____

_____

_____

_____

Appendix B: Hunns Lake Creek Streamwalk Segments

Stanford, New York