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Introductory and Advanced Habitat Survey of the Woodens River Watershed

Prepared by the Woodens River
Monitoring Technicians

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Organization:

**Nova Scotia Department of the Environment–Nova Scotia Youth
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Note about the document

I inherited this document when I assumed the “water quality file” for WRWEO in 2009. (In early 2012, another board member took over the file.) The document was scanned simply as received. I believe a large map referred to in the document is missing, however, I think most of the sampling sites could be relocated from the information given in the document.

Potentially, the document provides valuable baseline data on habitat status for both the lower and upper parts of the Woodens River system.

David Patriquin

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ACKNOWLEDGEMENTS:	3
1.0 INTRODUCTION	4
2.0 MATERIALS AND METHODS	5
2.1 MODULE 1: INTRODUCTORY STREAM HABITAT SURVEY	5
2.2 MODULE 2: ADVANCED STREAM HABITAT SURVEY	5
2.3 pH MONITORING	5
2.4 MODULE 4: STREAM INVERTEBRATES SURVEY	6
2.5 MODULE 11: JUVENILE FISH TRAPPING AND IDENTIFICATION	6
3.0 RESULTS	6
3.1 MODULE 1: INTRODUCTORY STREAM HABITAT SURVEY	6
3.1.1 Stream A; Five Island Lake Run	6
3.1.2 Stream B; Flake Brook	7
3.1.3 Stream C; Frederick to Five Island Lake	7
3.1.4 Stream D; Sheldrake to Five Island Lake	7
3.1.5 Stream E; Hubley Big to Long Lake	7
3.1.6 Stream F; Birch Hill Lake Feeder Stream	8
3.1.7 Stream G; Black Point to Fredrick Lake	8
3.1.8 Stream H; Arnold's Little Lake to St. Margaret's Bay	8
3.1.9 Stream I; Dolly's and Old Mill Pond	9
3.1.10 Stream J; Old Mill Pond to Albert Bridge Lake	9
3.1.11 Stream K; Gates and Millyard Lake	9
3.1.12 Stream L; Crouchers and Gates Lake	10
3.1.13 Stream M; Long to Crouchers Lake	10
3.2 MODULE 2: ADVANCED HABITAT SURVEY	10
3.3 pH MONITORING	11
3.4 MODULE 4 STREAM INVERTEBRATE SURVEY	11
3.5 MODULE 11: JUVENILE FISH TRAPPING & IDENTIFICATION	12
4.0 PUBLIC RESPONSE	12
4.1 GENERAL RESPONSE FROM PUBLIC	12
4.2 PRESENTATIONS	12
5.0 DISCUSSION AND RECOMMENDATIONS	12
6.0 CONCLUSIONS	14
7.0 APPENDIXES	14
7.1 APPENDIX A; MAP OF WATERSHED	15
7.2 APPENDIX B; MODULE 1	16
7.3 APPENDIX C; MODULE 2	16
7.4 APPENDIX D; pH MONITORING	16
7.5 APPENDIX E; pH MONITORING (ORDERED)	16
7.6 APPENDIX F; MODULE 4	16
7.7 APPENDIX G; MODULE 11	16

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1.0 Introduction

In the summer of 2000, the Woodens River Watershed Environmental Organization (WRWEO) employed three youth to conduct baseline habitat and water quality studies of streams throughout the watershed. Funding was supplied through the Nova Scotia Youth Conservation Corps, a program within the Department of the Environment, councilors Reg Rankin and Jack Mitchell, and the Three Brooks Development Corporation.

The Woodens River watershed consists of an area of 65 Hectors (16000 acres) and encompasses 19 connected lakes. These lakes extend from Cranberry and Upper Sheldrake, down through Long and Crouchers lakes and it continues until it drains into St. Margaret's Bay at Woodens Cove in Seabright (refer to appendix A for map of the watershed).

The WRWEO's community management plan consists of "promoting environmentally responsible and economically sustainable development of the watershed"¹. This project will help to facilitate this plan by providing data that will be used as a starting point for future habitat and water quality monitoring. In addition, the project will provide valuable information in order to help make informed decisions about current and future actions in the watershed including residential development, logging, and recreation.

One of the project goals was to provide primary and advanced habitat assessments to provide current information on the health of the streams in the watershed. By doing these baseline studies now, the impact from human practices and development can be monitored through future studies. The second project goal was water quality monitoring. Monitors set up permanent monitoring stations to test pH, where it can continue to be tested in the future. Fish and invertebrate surveys were conducted in several streams to give a further indication of water quality. The last goal was to provide community education and awareness concerning human impacts on the watershed.

The project was carried out through the use of the Pacific Streamkeepers Federation Handbook, which was issued by Department of Fisheries and Oceans in British Columbia. The handbook provided detailed survey instructions for each module. The modules used in this project included the Introductory Stream Habitat Survey (Module 1), the Advanced Stream Habitat Survey (Module 2), the Stream Invertebrate Survey (Module 4) and the Juvenile Fish Trapping and Identification Module (Module 11). This surveying package was used because it required in depth analysis of the watershed and was directed to volunteer organizations. Additional information on the streams was also collected through use of the stream survey form (7.13) that is provided through the Adopt-A-Stream program.

¹ WRWEO Management Plan; <http://www.chebucto.ns.ca/~wrweo/>

2.0 Materials and Methods

2.1 Module 1: Introductory Stream Habitat Survey

Module 1 consisted of an introductory stream habitat survey. Information pertaining to various streams in the watershed was collected. Important features as well as habitat problems and opportunities for habitat improvement were noted.

Thirteen streams were surveyed. The streams were identified using a Topographical Map (11 D/12) with a 1:50 000 scale. Stream codes were assigned alphabetically in the order that they were surveyed (refer to appendix 1 for watershed map). The stream was surveyed by selecting a start point at the downstream end and measuring the distances to significant landmarks (bridges, culverts and roads) as well as other notable features (logging activity, heavily impacted areas and garbage). Two to four channel dimensions of typical cross sectional areas of the stream were measured following the criteria set forth in Module 1. These measurements were taken in order to determine the average channel dimensions to be further used in Module 2 for the longitudinal survey. The dimensions (bankfull & wetted channel width and depth) were taken using a 60 m measuring tape and a meter stick. An upstream end point was determined and the precise directions to the start and end points were recorded. The start and end points were marked in association to a fixed landmark, so they could be located in future years. Unmapped features were recorded and identified on the Stream Feature Description Checklist-(appendix 3 of Streamkeepers Module 1) and the surveying data was recorded on the data sheets that were provided with the module.

2.2 Module 2: Advanced Stream Habitat Survey

Module 2, was performed on seven of the thirteen surveyed streams (C, E, G, H-K). This module was undertaken in order to elaborate on important stream conditions and habitat information, which was already collected in the previous survey. One reference site from each stream was chosen as a benchmark and marked using flagging tape, a marker, and a nail. The precise directions to the benchmark were recorded on the data sheets provided. At each site, cross sectional and longitudinal surveys were conducted as well as stream discharge and a general habitat assessment according to the directions in module 2. Data was collected and recorded on the field data sheets provided in Module 2.

2.3 pH Monitoring

Permanent monitoring stations were selected at various streams. After initial pH measurements, additional measurements were taken following a substantial change in weather conditions (ie. heavy rainfall). Other factors recorded included: time, air & water temperature, weather conditions, stream flow and stream color.

2.4 Module 4: Stream Invertebrates Survey

Module 4 was conducted on four streams: A, C, G and K. This survey was performed in order to assess the overall health of the stream. This survey was a good indicator of water quality because certain species thrive in streams with low pollution levels (mayflies, stoneflies and caddisflies), while other species (leaches, blackfly larvae and aquatic worms) are pollution tolerant. Therefore the presence or absence of specific species give an extremely good indication of the current water quality. Three invertebrate samples were collected within the longitudinal survey section of module 2 using a 30.48 x 30.48 cm Surber Sampler-Net (563 μm) with a one square foot sampling area. The net was placed facing upstream and the rocks within the sampling area were scrubbed clean, while the current carried the invertebrates into the net. Upon completion, the contents of the net were transferred into a pan and sorted into ice-cube trays for identification. Species were identified to the family level through use of the taxonomic key provided. The locations of the sampling areas as well as the number of invertebrate families were recorded. Additional calculations in the field sheets were completed according to the module.

2.5 Module 11: Juvenile Fish Trapping and Identification

Module 11 was carried out in four locations throughout the top of the watershed in stream A, F and Cranberry & Frederick Lake. Fish were trapped in stream F using a small minnow trap, which had bread as bait. The trap was set overnight in a shaded part of the stream. Since the minnow trap was found to be inadequate at the other three locations, a curtain with poles at each end was used to herd fish. The fish were placed in water in a shaded area, measured and identified using the keys provided in the module. Since the taxonomic key was limited to salmonids, only trout species could be positively identified; however, detailed pictures were drawn of the other species and descriptions of these fish were taken. After all the information was recorded the fish were then released back into the streams.

3.0 Results

3.1 Module 1: Introductory Stream Habitat Survey

3.1.1 Stream A; Five Island Lake Run

Stream A, Five Island Lake Run (refer to appendix A for stream location) was surveyed on July 7th and 8th, 2000. The start point was located downstream at a marked tree on Hubley Big Lake. The total length surveyed was 1232.9m. The end point was located at a marked tree on Five Island Lake. Important landmarks identified during the introductory survey included a road bridge on Oak Ridge Road, two footbridges and a culvert on Granite Cove Drive. Other notable features from this stream included: minor garbage such as beer and pop bottles and a possible log placement in-stream. The

riparian zone for this section consisted mostly of woody areas and occasionally of marshland. The lower section had very large pools.

3.1.2 Stream B; Flake Brook

Stream B, Flake Brook (refer to appendix A for stream location) was surveyed on July 10th, 2000. The start point was located downstream, at the mouth of Hubley Big Lake. A rock on the right side of the stream marked the position. The total length surveyed was 1237.9m. The end point was located on a rock found on the right side of the stream, at Birch Hill Lake. Important landmarks identified during the introductory survey included: three dams, a footbridge and a broken bridge. The downstream section of the stream was flowing very slowly, silty and exhibited only runs and pools. The upstream section of this stream had more riffles as the slope increased. The riparian zone for this section alternated between woody areas and brushy fields. The areas with bushy fields had small ditches perpendicular to the stream flow, which were a few meters in length. These could easily be used as off channel habitat for fish.

3.1.3 Stream C; Fredrick to Five Island Lake

Stream C, the stream connecting Fredrick to Five Island Lake (refer to appendix A for stream location) was surveyed on July 18th, 2000. The start point was located downstream on a large rock at Five Island Lake. The total length surveyed was 1353.7m. The end point was located at the top of the stream at Fredrick Lake. Notable features identified during the introductory survey included a campsite and a footbridge. This stream contained much more gravel than the previous streams. There was much more human impact, due to higher levels of garbage, such as plastic, lumber, and bottles as well as some house lots cleared down to the stream edge. The riparian zone for this section was woody areas, for the most part.

3.1.4 Stream D; Sheldrake to Five Island Lake

Stream D, the stream connecting Sheldrake to Five Island Lake (refer to appendix A for stream location) was surveyed on July 19th, 2000. The start point was located at Sheldrake Lake on the upstream side of the culvert. Ribbon was placed on a tree, which was located on the left side of the stream. The total length surveyed was 966.3m. The end point was located at the mouth of the stream at Five Island Lake. Notable features identified during the introductory survey included: three culverts, two bridges, a partial dam consisting of wood, property with scrap piles on the left side of the stream, a grassed in ATV trail, a water pump in a small side channel and a motor boat launch. This stream was very flat and consisted of runs and pools. The streambed was mainly boulders and mud which had an anoxic hydrogen sulfide smell. There was very little canopy and riparian zone due to a road along the stream. The riparian zone that was present consisted mainly of bushes and it was marshy for the last 100m approximately.

3.1.5 Stream E; Hubley Big to Long Lake

Stream E, the stream connecting Hubley Big Lake to Long Lake (refer to appendix A for stream location) was surveyed on July 24th, 2000. The start point was located at the top of Middle Mink Hole on the left. The total length surveyed was 878.8m. The end point was located at a pond just below Hubley Big Lake. Notable features identified during the introductory survey included a bridge and a small pond with a feeder channel. The spring fed feeder channel at the top of the stream that enters into the small pond was 28.8m long. This stream was formed mainly of boulders with some gravel and pebbles. Dirt from the trail was seeping through cracks in the bridge and down the banks. Excluding the impacts along the bridge, this stream had minimal impact. It was well vegetated (woody area) in the riparian zone and had a good overhead canopy.

3.1.6 Stream F; Birch Hill Lake Feeder Stream

Stream F, which is an unmapped, spring-fed brook connected to Birch Hill Lake (refer to appendix A for stream location), was surveyed on July 25th, 2000. The start point was located at the mouth of the left side of stream by Birch Hill Lake. The total length surveyed was 331.4m. The end point was located at the marsh at the top of the watershed. Notable features identified during the introductory survey included an old footbridge covered with moss, a four-meter long feeder channel and newly cut path next to power lines. This stream was formed mainly of cobble and gravel with a few boulders, at the lower half, and became silty toward the marshy areas. The upper section of this stream became very braided and difficult to follow. This stream had minimal impact. It was well vegetated in the riparian zone and had a good overhead canopy. This stream was also very shallow and narrow (~1 m throughout).

3.1.7 Stream G; Black Point to Fredrick Lake

Stream E, the stream connecting Black Point Lake and Frederick Lake (refer to appendix A for stream location) was surveyed on July 26th, 2000. The start point was located at the mouth of stream on the right side at Frederick Lake. The total length surveyed was 272.3m. The end point was located at Black Point Lake. The only notable feature identified during the introductory survey was a footbridge. This stream was formed mainly of boulders and cobbles with some gravel and pebbles. At the upstream section of this stream the riparian zone has been cleared and is now a manicured lawn. The downstream section is composed of a marshy area with a large pool. All other sections were composed of woody areas. Aside from the manicured lawn, the rest of the stream was well vegetated in the riparian zone and had a good overhead canopy.

3.1.8 Stream H; Arnold's Little Lake to St. Margaret's Bay

Stream H, Woodens River between St. Margaret's Bay and Arnold's Little Lake (refer to appendix A for stream location) was surveyed on August 1st, 2000. The start point was located at the downstream end of the bridge on the #333 highway. The total length surveyed was 419.2m. The end point was located at Arnold's Little Lake. Notable features identified during the introductory survey included a road bridge on the 333 highway, which had some tar dripping from the lumber into the stream, and a old stone

bridge. There was also a large amount of garbage both in and out of the stream (metal pipes & sheets, plastic, bottles and a car battery). This stream consisted mainly of boulders and cobbles. It had a well-vegetated riparian zone on the left side; however, the right side had a limited amount due to a dirt road that was parallel to the stream. Due to this lack of vegetation on the right, this section exhibited poor overhead canopy. The gravel and dirt from the road was also running off of the steep short banks throughout the lower section.

3.1.9 Stream I; Dolly's and Old Mill Pond

Stream I, Woodens River between Dolly's Pond and Old Mill Pond (refer to appendix A for stream location) was surveyed on August 1st, 2000. The start point was located at the central braid at the top of Dolly's Pond on the right. The total length surveyed was 829.3m. The end point was located at Old Mill Pond at a bridge. Notable features identified during the introductory survey included a ½ inch thick, steel cable wrapped around three trees, which extends across the stream and the bridge located at the end point. This stream contained many boulders and had lots of large woody debris, uprooted trees and rooted cutbanks. It seemed as though there was logging along the right side, between the stream and the road, but it was still well vegetated along the stream bank. In two places logs extended across the stream, which may potentially cause a jam in the future. It had a well-vegetated riparian zone (woody area). There was poor overhead canopy.

3.1.10 Stream J; Old Mill Pond to Albert Bridge Lake

Stream J, Woodens River between Old Mill Pond and Albert Bridge Lake (refer to appendix A for stream location) was surveyed on August 9th, 2000. The start point was located at a tree on the right at Old Mill Pond. The total length surveyed was 351.0m. The end point was located on the right of the bridge at Albert Bridge Lake. Notable features identified during the introductory survey included a skidder trail, which crossed the stream and a footbridge for a camp. At the skidder trail, the stream is filled in with boulders about ¾ of the way across and is three meters wide. This stream consisted mainly of cobbles with some boulders. It had a well-vegetated riparian zone (woody area). There was good overhead canopy.

3.1.11 Stream K; Gates and Millyard Lake

Stream K, Woodens River between Gates Lake and Millyard Lake (refer to appendix A for stream location) was surveyed on August 15th, 2000. The start point was located at a tree on the right at Millyard Lake. The total length surveyed was 660.4m. The end point was located at a pond just below Gates Lake. Notable features identified during the introductory survey included a clear cut on the right side, a group of trees laying across the stream, a steel girder bridge, a broken down siltation screen along the road, and a footbridge for a camp. The steel bridge consisted of two I-beams that were placed on top of boulders. The boulders on the right side were covered with silty sand, which was not contained. Since it was not contained, the sand was running off into the stream. Two

siltation screens along the road had fallen over allowing runoff to enter the stream. This stream consisted mainly of cobble and boulders. It had a well-vegetated riparian zone (woody area) on the left side; however, the right side riparian zone was low in some areas due to the logging and road. In some areas, the road ran directly by the stream, causing runoff.

3.1.12 Stream L; Crouchers and Gates Lake

Stream L, Woodens River between Crouchers Lake and Gates Lake (refer to appendix A for stream location) was surveyed on August 15th, 2000. The start point was located on a fir tree at Gates Lake. The total length surveyed was 145.6 m. The end point was located at Croucher's Lake on a tree on the left. This stream was a very short run. There was a short riffle at the upstream end until the slope dropped. The stream then continued as a deep, slow run. There was a large log crossing the stream, near a camp on the right. This stream consisted mainly of cobbles and boulders, but had plenty of gravel at the mouth entering into Gates Lake. It had a well-vegetated riparian zone on both sides, an average overhead canopy.

3.1.13 Stream M; Long to Crouchers Lake

Stream M, Woodens River between Long Lake and Crouchers Lake (refer to appendix A for stream location) was surveyed on August 22nd, 2000. The start point was located within an inlet. A ribbon was placed on a small tree next to a large boulder on the left side of the stream. The total length of the stream surveyed was 1393.3 m. The end point was located on a tree on the left on Long Lake. Notable features identified during the introductory survey included a small pond with 10-12 inch brook trout, a potential logjam, a waterfall, a narrow tributary, a cabin and a log bridge extending over the stream with a cable wire. This downstream section of this stream was very bouldery and braided with a wide channel width and low water level. However, as the stream went further up it narrowed and started to exhibit typical conditions (medium to fast flowing water and riffles, runs & pools instead of boulder based.). The riparian zone was well vegetated and had a good overhead canopy.

NOTE:

The distance to stream features, their parameters, and channel dimensions (bankfull & wetted width and depth) can be found in appendix B.

3.2 Module 2: Advanced Habitat Survey

The advanced habitat surveys indicated the streams were in the good or acceptable range. The majority of the streams had an acceptable overhead canopy, with good riparian zone and stable banks. The stream between Gates to Millyard Lake (K), had a steel girder bridge which had silty-sand running off into the stream. Erosion of the banks was also taking place at this site. Most streams were mainly composed of cobble and boulders. All data collected on the streams for this module can be found in appendix C.

3.3 pH Monitoring

The pH monitoring stations were visited anywhere between one and three times throughout the summer. The pH ranged from 3.9 (in a tributary extending off of the stream connecting Crouchers Lake to Long Lake), to 5.8 (in a feeder stream to Hubley Big Lake & on the downside of the culvert located of the railroad tracks on Cranberry Lake). One unusual pH measurement found this summer was taken on both sides of the culvert at Cranberry Lake. Observed was a ten-fold decrease in the hydrogen ion concentration (4.8 to 5.8 approximately 10m apart) along with a large amount of fish found on the downside. The upside of the culvert seemed to be shallower, and had algae along its banks. The color of the water did not seem to have an effect on the pH levels as different areas with the same color water had variable pHs. The pH also tended to lower as the summer went on (refer to appendix D). There also seemed to be a general trend of the pH lowering as you got further down in the watershed. (refer to appendix E). The water temperature ranged form 12.2°C to 24.4°C and the air temperature ranged from 15.6°C to 26.4°C.

3.4 Module 4 Stream Invertebrate Survey

Invertebrate surveys were conducted at streams A, C, G, K. The predominant taxon found was the yellow caddisfly, except for stream C, which had blackfly larvae as the predominant. Other invertebrates found included: mayflies, riffle beetles, fishfly larvae, cranefly larvae, damselfly, dragonfly, aquatic worms and water mites. Stream K had the most species diversity. It was the only one that contained stonefly larvae and water pennies. Beetle Larva were found in each stream survey, however, this common name is not found on the field data sheet while it is found in the taxonomic key of module 4.

After species were counted, calculations were done according to module 4, (refer to Table 1). The stream assessments were on a range of poor to good in the module; however, the streams that were surveyed were in the acceptable to good range. Additional information that was collected can be found in appendix F.

Table 1. Site Assessment Rating for Water Quality According to the Stream Invertebrate Surveys

Stream	Predominant Taxon	Pollution Tolerance Index	EPT Index	EPT to Total Ratio	Overall Site Assessment
A	Yellow Caddisfly	Acceptable	Acceptable	Acceptable	Acceptable/ Good
C	Blackfly Larvae	Acceptable	Acceptable	Marginal	Good
G	Yellow Caddisfly	Acceptable	Marginal/ Acceptable	Good	Acceptable/ Good
K	Yellow Caddisfly	Good	Acceptable	Acceptable/ Good	Acceptable/ Good

3.5 Module 11: Juvenile Fish Trapping & Identification

Fish were caught in streams A & F as well as Frederick & Cranberry Lake. The brook trout caught in stream F ranged from 5 to 6cm. The additional fish that were caught in the other water bodies were most likely minnows / shiners. Their sizes ranged from 3.5 to 10.5cm. (refer to appendix G).

4.0 Public Response

4.1 General Response from Public

While performing habitat surveys various members of the community were encountered. Most of the concerns harbored around the PCB contamination and if this project was directly involved. There was also some concern about current activities at the junkyard (discarding lead and antifreeze into the watershed). When people were informed about the habitat surveys being performed, they mainly stated interest in the loss of fish and mayfly population from the watershed. Many stories were told about the large abundance of mayflies that used to inhabit the lakes and now are only found in the stream systems. The public views for the reasons of the mayfly disappearance included PCBs in the watershed, the development of Bayers lake (dynamite blasting which may have opened faults and exposed acidic bedrock), and the use of pesticides. Other issues brought up included increased development on the lakes, the clear cutting in the lower half of the watershed (very close to the stream, increasing the amount of siltation into the stream).

4.2 Presentations

Generally, there was not much environmental concern at the presentation (minimization of human impacts on the watershed). However, 1/3 of the people who passed by showed some interest. Questions and concerns involved the current state of the PCB situation and lakes (Sheldrake oxygenation project, clearing house lots to the water edge, accidental dumping of lime into the water). It was also discovered that a small percentage of people in the surrounding communities, still catch and consume the fish present in the watershed, despite of the current ban. These people did not seem overly concerned about consuming the fish because it did not affect their current state of health. One remark clearly indicated the lack of concern, "I still eat the fish, do you see my eye glowing?" It was also noted that there was a misconception about fish migration. Some thought fish were unable to travel from lake to lake. Therefore, some deemed it acceptable to consume fish from the lower parts of the watershed.

5.0 Discussion and Recommendations

There seemed to be a conflict in the community concerning what was best for the streams. The community members who were concerned seemed to be either misinformed or uneducated about how they could help. For example the idea that removing woody debris from a stream would be beneficial for the overall health of the stream, when actually it is good to have woody debris in the stream for shade and protection. To help inform the public on their current and future impacts, a new web site should be formed (possibly a link to the current WRWEO website) which would include information on impact minimization, general environmental information and tips on what a healthy river requires. In addition to the website, community presentations should be offered in order to get more people from the community aware of potential problems.

By sight alone, most of the thirteen rivers surveyed did not seem to be that impacted. Only in a few locations was erosion and siltation observed (J, K and M). These streams were in the lower part of the watershed and were impacted mainly because of the improper building and maintenance of bridges and logging use (clear cutting and road placement). Two-siltation traps (K) were broken down and should be replaced. A large amount of garbage was also observed in the lower watershed (H) and in a few streams in the upper watershed (C). Both of which will require a clean up.

Along trails and roads, there was a large amount of discarded appliances, cars and junk piles (The Woodens River Road, the Joshua Slocum Trail, Sams Lane and the Hubley Glen Margaret Trail). According to some community members and the Department of Environment, there has seemed to be an increase in private dumping, due to the high cost of proper disposal.

Water quality testing was completed through pH monitoring and invertebrate sampling. The pH showed a tendency to become more acidic as it got further down the watershed (refer to appendix E) and increased in acidity as the summer went on (refer to appendix D). As the water travels from the top of the watershed to the bottom, it passes through many cranberry bogs. Since the soil in cranberry bogs is very acidic, when water flows through these areas, its acidity intensifies. In addition to the cranberry bogs, acid rain is continuously mixing with the water throughout the summer, subsequently increasing the acidity. The bedrock in this area is very acidic, and when the water comes in contact with it, the pH is also lowered. The pH tolerance for trout is approximately 5.3. Data collected over the course of this summer indicated that the lower section of the watershed was too acidic for trout species. However, 10-12 inch trout were observed in stream M, which showed a pH of 4.7. Is there a possibility with this pH to have a good trout fishery? More monitoring in these areas is required to determine this.

An unusual observation occurred at Cranberry Lake, on the old train tracks off of Highway 103. The tenfold decrease in hydrogen ions (pH of 5.8 to 4.8) on either side of the culvert. This may have been due to something present inside of the culvert; however, more inquires should be made to determine the exact cause of the change in acidity.

All invertebrate surveys included some of the main pollution intolerant species. This gave a very good indication that the water quality was acceptable. The invertebrate study

was only completed in four of the thirteen streams, in the summer. The module indicates that invertebrate surveys should be performed in the spring and fall. Therefore, more studies should be performed during these times.

On stream K, the invertebrate samples were taken at increased distances from the bridge, which was allowing siltation. It was observed that the further away the surveys were from the impacted area, the more invertebrates were present in the sample. This clearly showed that the siltation here might be a problem. However, in order to be positive, more surveys should be taken of this area.

Many different terrestrial wildlife were observed including: beavers, ducks, squirrels, snakes, blue herons and other bird species. Other signs of terrestrial wildlife included: rabbit scat and deer tracks. Aquatic wildlife included fish, invertebrates, eels, salamanders and frogs. Since a wide variety of species were observed, it is very important to consider the preservation of this habitat.

6.0 Conclusions

- ◆ Increase public education and awareness
- ◆ Perform clean ups on streams C, and H
- ◆ Perform clean-ups on various trails
- ◆ Perform more intense fish surveys
- ◆ Continue pH monitoring
- ◆ Fix siltation screens and bridge (K)
- ◆ Perform more invertebrate surveys in spring and fall

7.0 Appendixes

7.1 Appendix A; Map of Watershed

Map of the Woodens River Watershed, including stream codes.

7.2 Appendix B; Module 1

Module 1: Information collected during the introductory stream habitat survey for stream A to M. Information includes directions to the stream, start and end points, landmarks and important features.

7.3 Appendix C; Module 2

Module 2: Information collected during the advanced habitat surveys for streams C, E, G and H-K. Information includes benchmark location, cross sectional survey, stream discharge, longitudinal survey (measurements and habitat quality) and habitat assessment.

7.4 Appendix D; pH Monitoring

The pH monitoring of various locations throughout the watershed

7.5 Appendix E; pH Monitoring (ordered)

The pH monitoring of various locations as it travels down the watershed

7.6 Appendix F; Module 4

Module 4: Information collected during the stream invertebrates survey for streams A, C, G and K). Information includes identified families, invertebrate density, abundance, water quality assessment, predominant taxon, diversity assessment and a site assessment rating.

7.7 Appendix G; Module 11

Module 11 Information collected during the juvenile fish trapping and identification for streams A, F, Cranberry Lake and Fredrick Lake. Information includes, species identification and length.

7.1 Appendix A; Map of Watershed

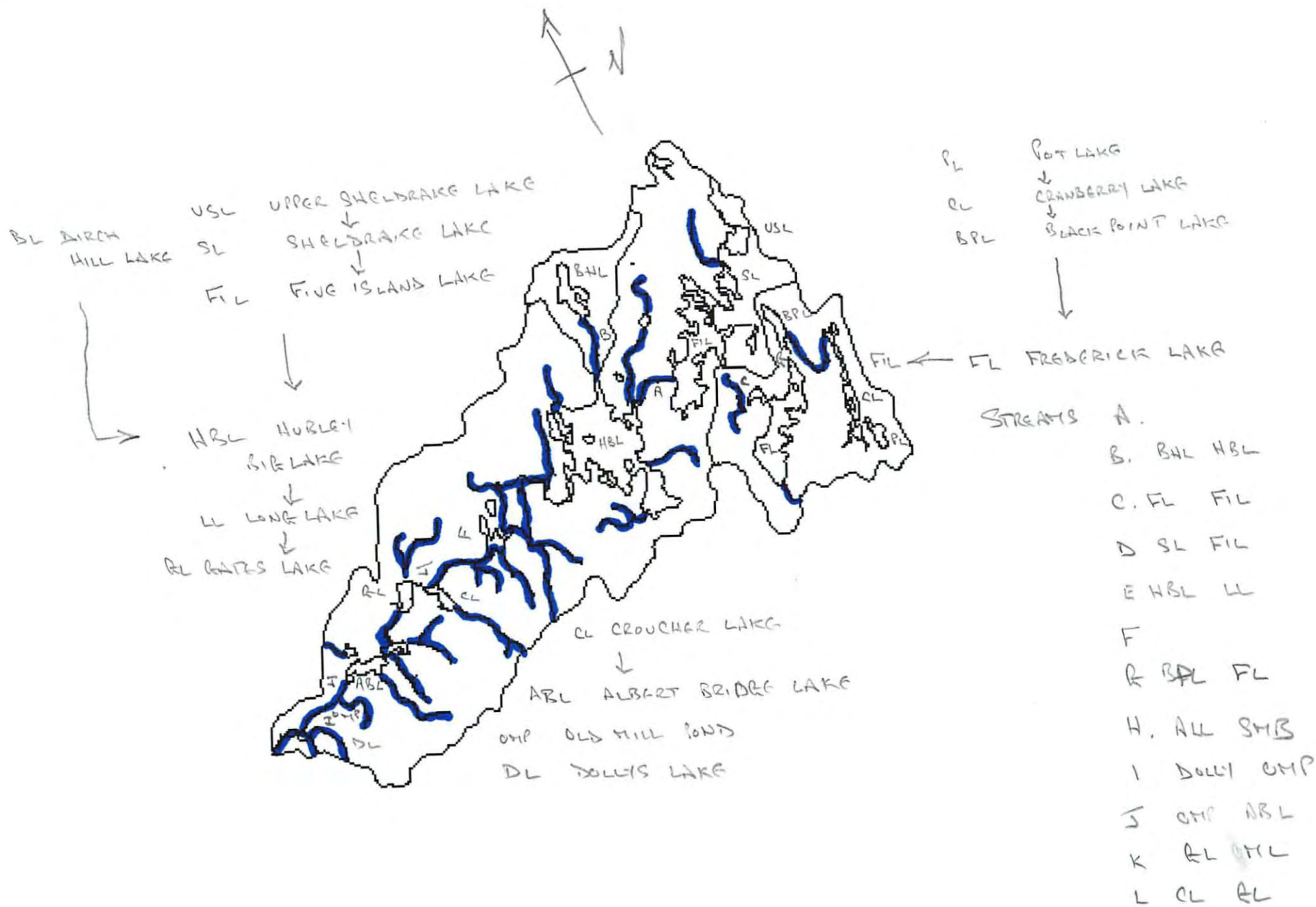
Map of the Woodens River Watershed, including stream codes



7.1 Appendix A; Map of Watershed

Map of the Woodens River Watershed, including stream codes





Woodems River Watershed Environmental Organization
**PH Monitoring **

River Name

Five Island Lake Run

Five Island Lake Run

Five Island Lake Run

Flake Brook

Flake Brook

Stream Connecting Fredrick to Five Island Lake

Stream Connecting Fredrick to Five Island Lake

Stream Connecting Fredrick to Five Island Lake

Stream Connecting Sheldrake to Five Island Lake

Stream Connecting Sheldrake to Five Island Lake

Stream Connecting Albert Bridge Lake to Old Mill Pond

Feeder Stream to Hubley Big Lake

Feeder Stream to Hubley Big Lake

Feeder Stream to Hubley Big Lake

River Name

Birch Hill Lake Brook

Stream Connecting Cranberry to Black Point Lake

Cranberry Lake

Cranberry Lake

Cranberry Lake

Cranberry Lake

Cranberry Lake

Directions to Site

1km down Granite Cove Drive; 33.5m upstream from bridge

1km down Granite Cove Drive; 33.5m upstream from bridge

1km down Granite Cove Drive; 33.5m upstream from bridge

End of Hubleys Lake Road; ~50m on trail, 1m downstream of footbridge

End of Hubleys Lake Road; ~50m on trail, 1m downstream of footbridge

Down trail on Hawkins Drive; ~3m upstream of footbridge

Down trail on Hawkins Drive; ~3m upstream of footbridge

Down trail on Hawkins Drive; ~3m upstream of footbridge

On Sams Lane ~250m down; ~15m from Sams Lane

On Sams Lane ~250m down; ~15m from Sams Lane

Monitoring site at Bench Mark for Module 2

5.5m upstream from bridge on Three Brooks Drive

5.5m upstream from bridge on Three Brooks Drive

5.5m upstream from bridge on Three Brooks Drive

Directions to Site

#3 highway onto Joshua Slocum rd. by Lewis Lake We cut through a private property about 10 houses up until we found a survey marked trail that led us to the brook; 44.5m upstream from lake

1/2 hour walk down left hand side of old train tracks (lake of the Woods Subdivision) to the first culvert/downstream side

40 min walk down left hand side of old train tracks (lake of the Woods) by culvert (facing larger part of lake, opposite highway; southern side)

40 min walk down left hand side of old train tracks (lake of the Woods) by culvert (facing larger part of lake, opposite highway; southern side)

40 min walk down left hand side of old train tracks (lake of the Woods) by culvert (facing highway; northern side of trail)

40 min walk down left hand side of old train tracks (lake of the Woods) by culvert (facing larger part of lake, opposite highway; southern side)

40 min walk down left hand side of old train tracks (lake of the Woods) by culvert (facing larger part of lake, opposite highway; southern side)

GPS	River Code	Date	Time	Air Temp (oC)	Water Temp (oC)	pH	Weather
20T 0435538; UTM 4945385	A	20/07/1933	14:30	26.4	21.7		5.4 sunny
20T 0435538; UTM 4945385	A	31/07/2000	13:30	24.4	21.7		5.3 sunny (rained on weekend)
20T 0435538; UTM 4945385	A	21/08/2000	15:00	21.7	20.6		5 partly cloudy(20mm on weekend)
	B	31/07/2000	14:20	23.3	20.6		5.3 sunny (rained on weekend)
	B	21/08/2000	15:10	20.6	17.8		4.4 partly cloudy (20mm on weekend)
	C	20/07/2000	15:30	21.1	17.8		5.1 sunny
	C	31/07/2000	9:00	18.3	18.9		5 sunny (rained on weekend)
	C	21/08/2000	15:48	20.6	20.6		4.6 partly cloudy (20mm on weekend)
20T 0436575; UTM 4946994	D	20/07/2000	15:20	18.9	24.4		5.4 sunny
20T 0436575; UTM 4946994	D	31/07/2000	11:15	23.9	21.1		5 sunny (rained on weekend)
	J	09/08/2000	10:30	21.7	22.2		4.7 sunny
20T 0434648; UTM 4945067	#	20/07/2000	14:45	25.3	16.7		5.2 sunny
20T 0434648; UTM 4945067	#	31/07/2000	14:00	25	17.2		5.8 sunny (rained on weekend)
20T 0434648; UTM 4945067	#	21/08/2000	15:05	21.1	18.3		4.4 partly cloudy (20mm on weekend)
GPS	River Code	Date	Time	Air Temp (oC)	Water Temp (oC)	pH	Weather
	F	25/07/2000	10:00	16.7	14.2		5.7 partly cloudy/warm
	#	25/07/2000	11:15		21.1		5.6 sunny/clear
	#	25/07/2000	11:30		23.9		4.9 sunny/clear
	#	31/07/2000	16:15	22.2	23.3		4.2 sunny/clear (rained on weekend)
	#	25/07/2000	11:45		23.9		5.8 sunny/clear
	#	31/07/2000	16:00	22.2	23.3		5.3 sunny/clear (rained on weekend)
	#	02/08/2000	11:30	23.3	22.2		5.8 sunny

Flow	Color	Comments
fast	clear	
fast	clear	
fast	clear	
slow	lgt yellow	
slow-med	lgt yellow	
med-fast	clear	
med	clear	
fast	lgt yellow	
slow-med	lgt yellow	
slow-med	clear	
fast	clear	
slow	yellow	boulder based stream; water flow mainly under boulders
slow	yellow	boulder based stream; water flow mainly under boulders
medium	yellow	boulder based stream; water flow mainly under boulders, lots of perenial vegetation in middle of stream
Flow	Color	Comments
slow	yellow	spring fed stream
slow	lgt yellow	almost choked with lillies and bank lined with juniper and cat tails; two drainage pipes
lake		
lake	clear	
lake		more fish on this side of culvret; deeper; 10 fold increase in hydrogen ions
lake	clear	
lake	clear	day we caught fish

Black Point to Fredrick Lake
Black Point to Fredrick Lake
Black Point to Fredrick Lake

Fredrick Lake

Millyard Run

Gates Brook
Gates Brook

Run from Couchers to Gates Lake
Run from Couchers to Gates Lake

River Name
Couchers Lake
Couchers Lake

Run from Crouchers Lake Long Lake
Run from Crouchers Lake Long Lake

Tributary Runnint into run from Crouchers to Long Lake
Tributary Runnint into run from Crouchers to Long Lake

~3m upstream from Tributary on run from Crouchers Lake to Long Lake
~3m upstream from Tributary on run from Crouchers Lake to Long Lake

#3 highway into Lake of the Woods subdivision, about 2km down main road to a trail on the left side that leads to the stream; 130m upstream from start point
#3 highway into Lake of the Woods subdivision, about 2km down main road to a trail on the left side that leads to the stream; 130m upstream from start point
#3 highway into Lake of the Woods subdivision, about 2km down main road to a trail on the left side that leads to the stream; 130m upstream from start point

In Cambrians Cove, turn right at end of kenley walk by unfinished house down trail to lake at white post

Somewhere along run; at bridge structure that isn't completed

20 min down new logging trail off the Old Halifax Road; 1st road on the left; pH taken downstream of gated bridge

20 min down new logging trail off the Old Halifax Road; 1st road on the left; pH taken downstream of gated bridge

20 min down new logging trail off the Old Halifax Road; 1st road on the left; 15 minute walk down dirt road; ph taken at old log over river ~ 123.5m upstream from mod 1 start point at Gates Lake

20 min down new logging trail off the Old Halifax Road; 1st road on the left; 15 minute walk down dirt road; ph taken at old log over river ~ 123.5m upstream from mod 1 start point at Gates Lake

Directions to Site

20 min down new logging trail off the Old Halifax Road; 1st road on the left; 15 minute walk down dirt road; follow side of lake until at mouth of run between couchers lake and long lake; pH taken at bottc

20 min down new logging trail off the Old Halifax Road; 1st road on the left; 15 minute walk down dirt road; follow side of lake until at mouth of run between couchers lake and long lake; pH taken at bottc

205.3 m upstream from start point on Crouchers Lake

205.3 m upstream from start point on Crouchers Lake

1014.4 m upstream from start point on Crouchers Lake; ~1m upstream of tributary

1014.4 m upstream from start point on Crouchers Lake; ~1m upstream of tributary

1014.4 m upstream from start point on Crouchers Lake; ~3m upstream from tributary in center of river M

1014.4 m upstream from start point on Crouchers Lake; ~3m upstream from tributary in center of river M

GPS

G	25/07/2000	~1:00			24.4	5.1	sunny/clear
G	31/07/2000	8:30	18.3	21.1 on 27th		5.3	sunny (rained on weekend)
G	17/08/2000		20.0		20.6	5	showers/overcast(20mm on weekend)
#	25/07/2000	afternoon			25.0	5.1	sunny/clear
#	03/08/2000	morning	n/a	n/a			overcast (rained previous day/thunder showers)
#	03/08/2000	morning	21.1		15.0	4.8	overcast (rained previous day/thunder showers)
#	21/08/2000	8:30	15.6		12.2	4.2	clear (20mm on weekend)
L	03/08/2000	morning	21.1		21.7	4.7	overcast (rained previous day/thunder showers)
L	21/08/2000	8:45	16.7		17.8	4.7	clear (20mm on weekend)
	River Code	Date	Time	Air Temp (oC)	Water Temp (oC)	pH	Weather
#	03/08/2000	morning	19.4		21.1	4.5	overcast (rained previous day/thunder showers)
#	21/08/2000	8:50	21.1		18.9	4.7	clear (20mm on weekend)
M	03/08/2000	morning	22.2		20.6	4.7	overcast (rained previous day/thunder showers)
M	21/08/2000	9:25	17.8		17.8	4.7	clear (20mm on weekend)
#	03/08/2000	morning	22.2		13.9	4.1	overcast (rained previous day/thunder showers)
#	21/08/2000	11:00	21.1		12.2	3.9	clear (20mm on weekend)
M	03/08/2000	morning	22.2		21.1	4.9	overcast (rained previous day/thunder showers)
M	21/08/2000	11:00	21.1		19.4	4.9	clear (20mm on weekend)

slow	clear	some ducks and spruce pollen on river/lilies
medium	lgt yellow	
med-fast	lgt yellow	

lake		some lilly pads/lots of fish
------	--	------------------------------

?

slow	orange
slow-med	drk yellow

medium	lgt yellow	
fast	lgt yellow	
Flow	Color	Comments
lake	greenish (lots of algae in cove)	
lake	lgt yellow	

low	lgt yellow	in a pool with several brook trout/~7-10 inches and a school of minnows/ lots of dead fish upstream/ possibly Gaspereau!
medium	lgt yellow	in a pool with several brook trout/~7-10 inches and a school of minnows/ lots of dead fish upstream/ possibly Gaspereau!

v. slow	yellow	full of leaves
v. slow	yellow	

med-fast	clear
fast	clear

Woodems River Watershed Environmental Organization

PH Monitoring 2

Date	River		Time	Air	Water	pH	Flow	Color
	Code	River Name		oC	oC			
CRANBERRY LAKE CULVRETS								
25/07/2000	#	Cranberry Lake	11:30		23.9	4.9 lake		
31/07/2000	#	Cranberry Lake	16:15	22.2	23.3	4.2 lake		clear
25/07/2000	#	Cranberry Lake	11:45		23.9	5.8 lake		
31/07/2000	#	Cranberry Lake	16:00	22.2	23.3	5.3 lake		clear
02/08/2000	#	Cranberry Lake	11:30	23.3	22.2	5.8 lake		clear
CRANBERRY LAKE TO BLACK POINT LAKE								
25/07/2000	#	Stream Connecting Cranberry to Black Point Lake	11:15		21.1	5.6 slow		lgt yellow
BLACK POINT LAKE TO FREDRICK LAKE								
25/07/2000	G	Stream Connecting Black Point and Fredrick Lake	1:00		24.4	5.1 slow		clear
31/07/2000	G	Stream Connecting Black Point and Fredrick Lake	8:30	18.3	21.1	5.3 medium		lgt yellow
17/08/2000	G	Stream Connecting Black Point and Fredrick Lake	9:40	20.0	20.6	5 med-fast		lgt yellow
FREDRICK LAKE								
25/07/2000	#	Fredrick Lake	after		25.0	5.1 lake		
FREDRICK LAKE TO FIVE ISLAND LAKE								
20/07/2000	C	Stream Connecting Fredrick to Five Island Lake	15:30	21.1	17.8	5.1 med-fast		clear
31/07/2000	C	Stream Connecting Fredrick to Five Island Lake	9:00	18.3	18.9	5 med		clear
21/08/2000	C	Stream Connecting Fredrick to Five Island Lake	15:48	20.6	20.6	4.6 fast		lgt yellow
SHEKDRAKE LAKE TO FIVE ISLAND LAKE								
20/07/2000	D	Stream Connecting Sheldrake to Five Island Lake	15:20	18.9	24.4	5.4 slow-med		lgt yellow
31/07/2000	D	Stream Connecting Sheldrake to Five Island Lake	11:15	23.9	21.1	5 slow-med		clear
FIVE ISLAND LAKE TO HUBLEY BIG LAKE								
20/07/1933	A	Five Island Lake Run	14:30	26.4	21.7	5.4 fast		clear
31/07/2000	A	Five Island Lake Run	13:30	24.4	21.7	5.3 fast		clear
21/08/2000	A	Five Island Lake Run	15:00	21.7	20.6	5 fast		clear
BIRCH HILL LAKE FEEDER STREAM								
25/07/2000	F	Birch Hill Lake Brook	10:00	16.7	14.2	5.7 slow		yellow
BIRCH HILL LAKE TO HUBLEY BIG LAKE								
31/07/2000	B	Flake Brook	14:20	23.3	20.6	5.3 slow		lgt yellow
21/08/2000	B	Flake Brook	15:10	20.6	17.8	4.4 slow-med		lgt yellow
FEEDER STREAM TO HUBLEY BIG LAKE								
20/07/2000	#	Feeder Stream to Hubley Big Lake	14:45	25.3	16.7	5.2 slow		yellow
31/07/2000	#	Feeder Stream to Hubley Big Lake	14:00	25	17.2	5.8 slow		yellow
21/08/2000	#	Feeder Stream to Hubley Big Lake	15:05	21.1	16.1	4.4 medium		yellow
HUBLEY BIG LAKE TO MINK HOLE								
08/08/2000	E	Stream Connecting Hubley big Lake to Mink Hole	9:30	20.6	21.1	4.6 med-fast		
TRIBUTARY UPPER PART WOODENS RIVER								
03/08/2000	M	~3m upstream from Tributary	mom	22.2	21.1	4.9 med-fast		clear
21/08/2000	M	~3m upstream from Tributary	11:00	21.1	19.4	4.9 fast		clear
03/08/2000	#	Tributary Runnint into Woodens River	mom	22.2	13.9	4.1 v. slow		drk yellow
21/08/2000		Tributary Runnint into Woodens River	11:00	21.1	12.2	3.9 v. slow		drk yellow
LONG LAKE TO CROUCHER LAKE								
03/08/2000	M	Run from Couchers to Long Lake	mom	22.2	20.6	4.7 low		lgt yellow
21/08/2000	M	Run from Couchers to Long Lake	9:25	17.8	17.8	4.7 medium		lgt yellow

Weather	Comments
sunny/clear sunny/clear (rained on weekend)	
sunny/clear sunny/clear (rained on weekend) sunny	more fish on this side of culvret; deeper; 10 fold increase in hydrogen ions day we caught fish
sunny/clear	chocked with lillies & bank linned with juniper &cattails; two drainage pipes
sunny/clear sunny (rained on weekend) showers (20mm on weekend)	some ducks and spruce pollen on river/lillies
sunny/clear	some lilly pads/lots of fish
sunny sunny (rained on weekend) partly cloudy(20mm on weekend)	
sunny sunny (rained on weekend)	
sunny sunny (rained on weekend) partly cloudy(20mm on weekend)	
partly cloudy/warm	spring fed stream
sunny (rained on weekend) partly cloudy (20mm on weekend)	
sunny sunny (rained on weekend) partly cloudy (20mm on weekend)	boulder based stream; water flow mainly under boulders boulder based stream; water flow mainly under boulders
overcast (5mm rain night before)	
overcast (rained previous day) clear (20mm on weekend) overcast (rained previous day) clear (20mm on weekend)	full of leaves
overcast (rained previous day) clear (20mm on weekend)	pool, 7-10" brook trout, minnows/dead fish upstream possibly Gaspereau pool with several brook trout ~7-10" and a school of minnows

TOP OF CROUCHERS LAKE						
03/08/2000	#	Couchers Lake	morn	19.4	21.1	4.5 lake greenish
21/08/2000	#	Couchers Lake	8:50	21.1	18.9	4.7 lake lgt yellow
CROUCHERS LAKE TO GATES LAKE						
03/08/2000	L	Run from Couchers to Gates Lake	morn	21.1	21.7	4.7 med lgt yellow
21/08/2000	L	Run from Couchers to Gates Lake	8:45	16.7	17.8	4.7 med-fast lgt yellow
FEEDER STREAM TO GATES LAKE						
03/08/2000	#	Gates Brook	morn	21.1	15.0	4.8 slow orange
21/08/2000	#	Gates Brook	8:30	15.6	12.2	4.2 slow-med drk yellow
GATES LAKE TO MILLYARD LAKE						
03/08/2000	#	Stream from Gates Lake to Millyard Lake	morn	n/a	n/a	5 ?
ALBRET BRIDGE LAKE TO OLD MILL POND						
09/08/2000	J	Stream from Albert Bridge Lake to Old Mill Pond	10:30	21.7	22.2	4.7 fast clear

overcast (rained previous day)
clear (20mm on weekend)

lots of algae in pool

overcast (rained previous day)
clear (20mm on weekend)

overcast (rained previous day)
clear (20mm on weekend)

overcast (rained previous day)

sunny

Woodens River Watershed Environmental Organization
Channel Width and Depth Measurements
Topographical Map# 11 D/12 Scale - 1:50 000

Date	Stream	River Code	Length (m)	Bank	Bank	Wetted Width (m)	Wetted Depth (m)	Weather	Survey Point	
				Full Width (m)	Full Depth (m)					
06/07/2000	Five Island Lake Run	A	1232.9	7.5	0.55	6.5	0.27	clear	78.1m up from Large Rock	
06/07/2000	Five Island Lake Run	A	1232.9	5.35	0.55	5.3	0.35	clear	148.82m up from Start Point	
06/07/2000	Five Island Lake Run	A	1232.9	9.3	1.3	8.2	0.38	clear	223.1m start point; 79.3m upstream	
			Avg.	7.38	0.80	6.67	0.33		from bridge main rd.	
10/07/2000	Flake Brook	B	1237.9	5.1	0.55	4.56	0.25	shower (1-2.5 cm in 24 hr)	711.1m from start point	
			Avg.	5.1	0.55	4.56	0.25			
18/07/2000	Fredrick to Five Island Lake	C	1360	6.9	0.64	5	0.24	overcast/shower (1-2.5 cm 24 hr)	119m downstream bridge	
18/07/2000	Fredrick to Five Island Lake	C	1360	6.8	0.46	5.9	0.24	overcast/shower (1-2.5 cm 24 hr)	493.3m in from start point; 258.4m	
			Avg.	6.85	0.55	5.45	0.24		downstream from bridge	
19/07/2000	Sheldrake to Five Island Lake	D	966.3	no riffle present, big run					clear/shower (1-2.5cm in 24 hr)	
24/07/2000	Hubley to Long Lake	E	878.8	7.5	0.62	7.00	0.35	Clear	551.6m upstream from start pt.	
			Avg.	7.5	0.62	7	0.35			
25/07/2000	Birch Hill Brook (Not on Map)	F	331.4	1.9	0.17	0.7	0.025	Clear	76.4m upstream of Birch Hill Lake	
25/07/2000	Birch Hill Brook (Not on Map)	F	331.4	1.4	0.325	0.4	0.05	Clear	48.1m from head of Birch Hill Lake	
			Avg.	1.65	0.25	0.55	0.04			
26/07/2000	Black Point to Frederick Lake	G	272.3	4.3	0.36	2.6	0.15	Clear	195.1m upstream of Frederick Lake	
26/07/2000	Black Point to Frederick Lake	G	272.3	4.7	0.22	2.9	0.12	Clear	168.6m upstream of Frederick lake	
			Avg.	4.5	0.29	2.75	0.14			
01/08/2000	Dolly's Pond to	H	419.2	13	0.7	9.7	0.37	Clear	~15m downstream old rock bridge	
01/08/2000	St. Margaret's Bay	H	419.2	16.8	0.87	14.1	0.6	Clear	~30m upstream of 2nd log dam	
			Avg.	14.9	0.79	11.9	0.49			
01/08/2000	Old Millyard to Dolly's Pond	I	829.3	10.8	1.16	10.7	0.81	Clear	445.3m upstream from start pt.	

01/08/2000	Old Millyard to Dolly's Pond	I	829.3	10.4	0.82	10.3	0.43	Clear	567.5m upstream from start pt.
			Avg.	10.6	0.99	10.5	0.62		
09/08/2000	Albert Bridge Lake to	J	351	15	0.82	14	0.5	Clear	22.5m upstream of boulder trail
09/08/2000	Old Millyard Lake	J	351	15.7	0.5	15.1	0.3	Clear	45.1m downstream of boulder trail
09/08/2000		J	351	18.4	0.66	16.4	0.48	Clear	116.8 downstream of boulder trail
			Avg.	16.37	0.66	15.17	0.43		
15/08/2000	Gates to Millyard Lake	K	660.4	15.4	0.73	14.5	0.32	overcast/shower (1-2.5 cm 24 hr)	84m from start pt.
				8.2	1.05	8.3	0.02	overcast/shower (1-2.5 cm 24 hr)	135.3m from start pt.
				9.7	0.65	8.8	0.41	overcast/shower (1-2.5 cm 24 hr)	279.5m from start pt.
				12.1	0.62	12	0.35	overcast/shower (1-2.5 cm 24 hr)	572.8m from start pt.
			Avg.	11.35	0.76	10.9	0.28		
15/08/2000	Croucher to Gates Lake	L	145.6	8.1	0.88	0.65	0.62	overcast/shower (1-2.5 cm 24 hr)	11.1m from end pt.
			Avg.	8.1	0.88	0.65			
22/08/2000	Long to Crouchers Lake	M	1332.3	39.9	0.74	34.8	0.32	Sunny	395.6m upstream of start pt.
				14.7	0.7	13.5	0.32	Sunny	615.8m upstream of start pt.
				8.85	0.58	8.65	0.35	Sunny	899m upstream of start pt.
				7.95	0.74	6.65	0.36	Sunny	1252m upstream of start pt.
			Avg.	17.85	0.69	15.9	0.34		

Woodens River Watershed environmental Organization
Advance Stream Habitat Survey Field Data Sheet (Module 2)

Date
Stream
River Code

10/08(2000)
 Between Dolly's Pond & St. Margaret's Bay
 H

1. Benchmark Location

Up Woodens River Rd. in Seabright
 ~80m upstream of the guard rail.

2. Cross-Sectional Survey

BF Width (m) 10.2
Wetted Width (m) 9
Avg. BF Depth (m) 0.4
Avg. Wetted Depth (m) 0.19

3. Stream Discharge

Cross-section Area of Wetted Stream (m²) 1.71
Trials (sec) 16 22 46 64 15
Avg. Time (sec) 32.6
Avg. Velocity (m/sec) 0.31
Correction Factor 0.8
Avg. Stream Discharge (m³/sec) 0.42

4.1 Longitudinal Survey, Measurements

Length of Survey Site (m) 220
Upstream Survey Boundary (u of BM) (m)* 104
Downstream Survey Boundary (d of BM) (m)* 116
 * distance upstream (u) or Downstream (d)

Habitat Type (pool / riffle)

	pool	riffle	pool	riffle
Top of Habitat Unit (m)	104.2 (u)	38.2 (u)	46.0 (d)	63.9 (d)
Bottom of Habitat Unit (m)	38.2 (u)	46.0 (d)	63.9 (d)	116 (d)
Length of Habitat unit (m)	65.8	84.2	17.9	52.1
% Slope	n/a	n/a	n/a	n/a

4.2 Longitudinal Survey, Habitat Quality

1. Streambed Material 16
% Fines (<0.2cm) 20
% Gravel (0.2-5cm) 12
% Cobble (5-25cm) 48
% Boulder (25cm) 20
%Bedrock 0

2. Percent Embeddedness 0 19

3. Instream Cover 18
Pieces LWD 7
Pieces LWD / Channel Width 0.69
Rooted Cutbanks 0

# Rooted Cutbanks / Channel Width	0	
4. Percent Pool Habitat		6
Survey Site Slope	4	
Total Length of Pools (m)	83.7	
Total Length of Reference Site (m)	220	
% pool habitat	38.05	
5. Off Channel Habitat		2
Present / Absent	absent	
Description		
6. Bank Stability		12
Active Bank Erosion	0	
Bank Stabilization	0	
# Slides	0	
7. Length of Bank with no Veg (m)		8
Left Bank	0	
Right Bank	0	
8. Overhead Canopy	10	2
9. Riparian Zone		5
# Channel Widths	<1	
Coniferous Trees	Many	
Deciduous Trees	Many	
Shrubs	Many	
Grasses	Few	
Adjacent Land Use and Impacts	Rd. 5m from Rt side of river, & 40 section has gravel slide from rd to bank.	
5. Habitat Assessment Score		
Total Score		88
		Acceptable

Woodens River Watershed environmental Organization
Advance Stream Habitat Survey Field Data Sheet (Module 2)

Date 10/08/2000
Stream Run from Old Mill Pond to Dollys Pond
River Code I

1. Benchmark Location Up woodens river road ~300m upstream of Dollys pond. Walk up trail ~10 minutes past last house, turn right in woods where at fork in road.

2. Cross-Sectional Survey

BF Width (m) 7.8
Wetted Width (m) 7.6
Avg. BF Depth (m) 0.58
Avg. Wetted Depth (m) 0.33

3. Stream Discharge

Cross-section Area of Wetted Stream (m²) 2.51
Trials (sec) 15 16 22 20 31
Avg. Time (sec) 20.8
Avg. Velocity (m/sec) 0.48
Correction Factor 0.8
Avg. Stream Discharge (m³/sec) 0.96

4.1 Longitudinal Survey, Measurements

Length of Survey Site (m) 127.2
Upstream Survey Boundary (u of BM) (m)* 63
Downstream Survey Boundary (d of BM) (m)* 82.2
 * distance upstream (u) or Downstream (d)

Habitat Type (pool / riffle)

	riffle	pool
Top of Habitat Unit (m)	>63 (u)	28.4 (d)
Bottom of Habitat Unit (m)	28.4 (d)	82.2(d)
Length of Habitat unit (m)	91.4 +	53.8

% Slope

4.2 Longitudinal Survey, Habitat Quality

1. Streambed Material

% Fines (<0.2cm) 10
% Gravel (0.2-5cm) 32
% Cobble (5-25cm) 36
% Boulder (25cm) 22
%Bedrock

2. Percent Embeddedness

0

3. Instream Cover

Pieces LWD 17
Pieces LWD / Channel Width 2.18
Rooted Cutbanks 17

Rooted Cutbanks / Channel Width

2.18

4. Percent Pool Habitat

Survey Site Slope

Total Length of Pools (m)

53.8

Total Length of Reference Site (m)

145.2

% pool habitat

37.0523416

5. Off Channel Habitat

Present / Absent

Absent

Description

6. Bank Stability

Active Bank Erosion

0

Bank Stabilization

0

Slides

0

7. Length of Bank with no Veg (m)

Left Bank

0

Right Bank

0

8. Overhead Canopy (%)

75

9. Riparian Zone

Channel Widths

> 2

Coniferous Trees

many

Deciduous Trees

many

Shrubs

none

Grasses

none

Adjacent Land Use and Impacts

some logging on the right side
of the stream

5. Habitat Assessment Score

Total Score

97 (Acceptable)

Woodens River Watershed environmental Organization
Advance Stream Habitat Survey Field Data Sheet (Module 2)

Date 07/08/2000
Stream Albert Bridge Lake to Old Mill Pond
River Code J

1. Benchmark Location 159.3 m upstream of Old Mill Pond,
 ribbon and nail in tree on Rt.
 (Up Woodens River Rd. in Seabright)

2. Cross-Sectional Survey

BF Width (m) 20.3
Wetted Width (m) 20.1
Avg. BF Depth (m) 0.39
Avg. Wetted Depth (m) 0.2

3. Stream Discharge

Cross-section Area of Wetted Stream (m²) 4.02
Trials (sec) 24 22 25 21 18
Avg. Time (sec) 22
Avg. Velocity (m/sec) 0.45
Correction Factor 0.8
Avg. Stream Discharge (m³/sec) 1.46

4.1 Longitudinal Survey, Measurements

Length of Survey Site (m) 216.1
Upstream Survey Boundary (u of BM) (m)* 118.1
Downstream Survey Boundary (d of BM) (m)* >98
 * distance upstream (u) or Downstream (d)

Habitat Type (pool / riffle)	riffle	pool	riffle	run
Top of Habitat Unit (m)	28.3 (u)	51 (u)	89.6 (u)	118.1 (u)
Bottom of Habitat Unit (m)	>98 (d)	28.3 (u)	51 (u)	89.6 (u)
Length of Habitat unit (m)		22.7 (u)	38.8 (u)	28.5 (u)
% Slope	n/a	n/a	n/a	n/a

4.2 Longitudinal Survey, Habitat Quality

1. Streambed Material 17

% Fines (<0.2cm)	4
% Gravel (0.2-5cm)	8
% Cobble (5-25cm)	50
% Boulder (25cm)	38
%Bedrock	

2. Percent Embeddedness 0 15

3. Instream Cover 20

# Pieces LWD	10
# Pieces LWD / Channel Width	0.49
# Rooted Cutbanks	9

# Rooted Cutbanks / Channel Width	0.44	
4. Percent Pool Habitat		1
Survey Site Slope	~4	
Total Length of Pools (m)	22.7	
Total Length of Reference Site (m)	216.1	
% pool habitat	10.50	
5. Off Channel Habitat		1
Present / Absent	Absent	
Description		
6. Bank Stability		15
Active Bank Erosion	n/a	
Bank Stabilization	n/a	
# Slides	n/a	
7. Length of Bank with no Veg (m)		9
Left Bank	1 Trail that crosses river	
Right Bank	1	
8. Overhead Canopy	20%	5
9. Riparian Zone		8
# Channel Widths	1	
Coniferous Trees	many	
Deciduous Trees	many	
Shrubs	many	
Grasses	many	
Adjacent Land Use and Impacts	Logging Trail ~20m from rt of stream & 3/4 of stream filled in for crossing in upper part of stream	
5. Habitat Assessment Score		
Total Score		91 Acceptable

Woodens River Watershed environmental Organization
Advance Stream Habitat Survey Field Data Sheet (Module 2)

Date 28/08/2000
Stream Gates to Millyard Lake
River Code K

1. Benchmark Location End Old Halifax rd. down logging trail. Past Gates Lake to steel girder bridge, downstream 68m.

2. Cross-Sectional Survey

BF Width (m) 11.4
Wetted Width (m) 10.7
Avg. BF Depth (m) 0.427
Avg. Wetted Depth (m) 0.223

3. Stream Discharge

Cross-section Area of Wetted Stream (m²) 2.38
Trials (sec) 55 43 25 40 39
Avg. Time (sec) 40.4
Avg. Velocity (m/sec) 0.248
Correction Factor 0.8
Avg. Stream Discharge (m³/sec) 0.471

4.1 Longitudinal Survey, Measurements

Length of Survey Site (m) 168.9
Upstream Survey Boundary (u of BM) (m)* 71
Downstream Survey Boundary (d of BM) (m)* 97.9
 * distance upstream (u) or Downstream (d)

Habitat Type (pool / riffle) riffle
Top of Habitat Unit (m) 71+ (u)
Bottom of Habitat Unit (m) 83.5 (d)
Length of Habitat unit (m) 154.5+
% Slope ~8%

4.2 Longitudinal Survey, Habitat Quality

1. Streambed Material 20

% Fines (<0.2cm) 4
% Gravel (0.2-5cm) 0
% Cobble (5-25cm) 56
% Boulder (25cm) 40
%Bedrock 0

2. Percent Embeddedness 10-15 17

3. Instream Cover 20

Pieces LWD 16
Pieces LWD / Channel Width 1.40
Rooted Cutbanks 24

# Rooted Cutbanks / Channel Width	2.11	
4. Percent Pool Habitat		0
Survey Site Slope	n/a	
Total Length of Pools (m)	n/a	
Total Length of Reference Site (m)	n/a	
% pool habitat	n/a	
5. Off Channel Habitat		10
Present / Absent	present	
Description	Between island and bank there is a channel year round.	
6. Bank Stability		10
Active Bank Erosion	right bank due to steel girder bridge	
Bank Stabilization	n/a	
# Slides	right bank due to steel girder bridge	
7. Length of Bank with no Veg (m)		9
Left Bank	-	
Right Bank	at bridge ~5m	
8. Overhead Canopy	75	9
9. Riparian Zone		9
# Channel Widths	1-2	
Coniferous Trees	many	
Deciduous Trees	many	
Shrubs	none	
Grasses	few	
Adjacent Land Use and Impacts	Logging on right side & at the bridge silty sand is not contained.	
5. Habitat Assessment Score		
Total Score		104 Good

Woodens River Watershed environmental Organization
Advance Stream Habitat Survey Field Data Sheet (Module 2)

Date ##### 27 07 2000
Stream Between Black Point to Fredrick Lake
River Code G

1. Benchmark Location 15.7 m upstream from the bridge

2. Cross-Sectional Survey

BF Width (m) 5.6
Wetted Width (m) 3.7
Avg. BF Depth (m) 0.34
Avg. Wetted Depth (m) 0.06

3. Stream Discharge

Cross-section Area of Wetted Stream (m²) 0.23
Trials (sec) 58 66 50 60 85
Avg. Time (sec) 63.8
Avg. Velocity (m/sec) 0.16
Correction Factor 0.9
Avg. Stream Discharge (m³/sec) 0.03

4.1 Longitudinal Survey, Measurements

Length of Survey Site (m) 54
Upstream Survey Boundary (u of BM) (m)* 27
Downstream Survey Boundary (d of BM) (m)* 27
 * distance upstream (u) or Downstream (d)

Habitat Type (pool / riffle)

	riffle	pool	riffle	pool
Top of Habitat Unit (m)	5.5 (u)	13.5 (u)	15.1 (u)	27 (u)
Bottom of Habitat Unit (m)	27 (d)	5.5 (u)	13.5 (u)	15.1(u)
Length of Habitat unit (m)	32.5	8	1.6	11.9
% Slope	4	2	1	1

4.2 Longitudinal Survey, Habitat Quality

1. Streambed Material

% Fines (<0.2cm) 8
% Gravel (0.2-5cm) 32
% Cobble (5-25cm) 54
% Boulder (25cm) 6
%Bedrock

2. Percent Embeddedness 0

3. Instream Cover

Pieces LWD 1
Pieces LWD / Channel Width 0.18
Rooted Cutbanks 15

# Rooted Cutbanks / Channel Width	2.68
4. Percent Pool Habitat	
Survey Site Slope	2
Total Length of Pools (m)	8
Total Length of Reference Site (m)	54
% pool habitat	14.81
5. Off Channel Habitat	
Present / Absent	Present
Description	Short side channel by the benchmark (seasonal); side channel by pond (braided & year round)
6. Bank Stability	
Active Bank Erosion	0
Bank Stabilization	0
# Slides	0
7. Length of Bank with no Veg (m)	
Left Bank	0
Right Bank	0
8. Overhead Canopy (%)	75
9. Riparian Zone	
# Channel Widths	>24
Coniferous Trees	many
Deciduous Trees	many
Shrubs	few
Grasses	few
Adjacent Land Use and Impacts	House on right side of stream ~10m from it; lack of riparian zone here
5. Habitat Assessment Score	
Total Score	118 (Good)

Woodens River Watershed environmental Organization
Advance Stream Habitat Survey Field Data Sheet (Module 2)

Date 07/31/00
Stream Frederick Lake to Five Island Lake
River Code C

1. Benchmark Location 258.4 m downstream from bundle of logs
(In Lake of Woods, 5 Island Rd, Lt. Kenleys Rd,
Rt. Hawkins Drive ~300m, Trail on Rt.)

2. Cross-Sectional Survey

BF Width (m) 5.15
Wetted Width (m) 4.35
Avg. BF Depth (m) 0.385
Avg. Wetted Depth (m) 0.197

3. Stream Discharge

Cross-section Area of Wetted Stream (m²) 0.86
Trials (sec) 63 65 45 52 62
Avg. Time (sec) 57.40
Avg. Velocity (m/sec) 0.17
Correction Factor 0.80
Avg. Stream Discharge (m³/sec) 0.12

4.1 Longitudinal Survey, Measurements

Length of Survey Site (m) 82.2
Upstream Survey Boundary (u of BM) (m)* 39.6
Downstream Survey Boundary (d of BM) (m)* 42.6
* distance upstream (u) or Downstream (d)

Habitat Type (pool / riffle)	pool	riffle
Top of Habitat Unit (m)	11.5 (d)	39.6 (u)
Bottom of Habitat Unit (m)	42.6 (d)	11.5 (d)
Length of Habitat unit (m)	31.1	51.1
% Slope	1%	6%

4.2 Longitudinal Survey, Habitat Quality

1. Streambed Material		12
% Fines (<0.2cm)	20	
% Gravel (0.2-5cm)	30	
% Cobble (5-25cm)	6	
% Boulder (25cm)	32	
%Bedrock	4	
2. Percent Embeddedness	0	20
3. Instream Cover		3
# Pieces LWD	5	
# Pieces LWD / Channel Width	0.97	
# Rooted Cutbanks	12	

# Rooted Cutbanks / Channel Width	2.3	
4. Percent Pool Habitat		17
Survey Site Slope	~7	
Total Length of Pools (m)	31.1	
Total Length of Reference Site (m)	82.2	
% pool habitat	37.83	
5. Off Channel Habitat		7
Present / Absent	Absent	
Description		
6. Bank Stability		15
Active Bank Erosion	n/a	
Bank Stabilization	n/a	
# Slides	n/a	
7. Length of Bank with no Veg (m)		10
Left Bank	0	
Right Bank	0	
8. Overhead Canopy	70%	10
9. Riparian Zone		10
# Channel Widths	>2	
Coniferous Trees	many	
Deciduous Trees	many	
Shrubs	few	
Grasses	none	
Adjacent Land Use and Impacts	n/a	
5. Habitat Assessment Score		
Total Score		104 Good

Woodens River Watershed environmental Organization
Advance Stream Habitat Survey Field Data Sheet (Module 2)

Date 08/08/2000
Stream Stream connecting Hubly Big Lake to Mink Hole
River Code E

1. Benchmark Location 39 m downstream of main bridge on Jimmys Roundup trail

2. Cross-Sectional Survey

BF Width (m) 7.5
Wetted Width (m) 7
Avg. BF Depth (m) 0.49
Avg. Wetted Depth (m) 0.245

3. Stream Discharge

Cross-section Area of Wetted Stream (m²) 1.72
Trials (sec) 25 19 14 35 39
Avg. Time (sec) 26.4
Avg. Velocity (m/sec) 0.38
Correction Factor 0.80
Avg. Stream Discharge (m³/sec) 0.52

4.1 Longitudinal Survey, Measurements

Length of Survey Site (m) 90
Upstream Survey Boundary (u of BM) (m)* 53.4
Downstream Survey Boundary (d of BM) (m)* 49.1
 * distance upstream (u) or Downstream (d)

Habitat Type (pool / riffle)	riffle	pool	riffle
Top of Habitat Unit (m)	>53.4 (u)	32.5 (d)	39.5 (d)
Bottom of Habitat Unit (m)	32.5 (d)	39.5 (d)	49.1 (d)
Length of Habitat unit (m)		7	9.6
% Slope	5	1	4

4.2 Longitudinal Survey, Habitat Quality

1. Streambed Material

% Fines (<0.2cm) 4
% Gravel (0.2-5cm) 10
% Cobble (5-25cm) 46
% Boulder (25cm) 40
%Bedrock

2. Percent Embeddedness 0

3. Instream Cover

Pieces LWD 1
Pieces LWD / Channel Width 0.13
Rooted Cutbanks 12

# Rooted Cutbanks / Channel Width	1.6	
4. Percent Pool Habitat		
Survey Site Slope		
Total Length of Pools (m)	7	
Total Length of Reference Site (m)	107.5	
% pool habitat	7	
5. Off Channel Habitat		
Present / Absent	Present	
Description	At bottom end of survey site river starts to braid; it is dry now	
6. Bank Stability		
Active Bank Erosion	1m on left and right bank due to sand from bridge	
Bank Stabilization	0	
# Slides	1 m on left and right due to sand from bridge	
7. Length of Bank with no Veg (m)		
Left Bank	~5m at bridge	
Right Bank	~5m at bridge	
8. Overhead Canopy (%)	85	
9. Riparian Zone		
# Channel Widths	> 2	
Coniferous Trees	many	
Deciduous Trees	many	
Shrubs	few	
Grasses	few	
Adjacent Land Use and Impacts		
5. Habitat Assessment Score		
Total Score	94	Acceptable River