Field Assessment Report:
Summer of 2011

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In association with the Hunter-Clyde Watershed Group and the Wheatley River Improvement Group

INTRODUCTION

Streams connect larger bodies of water to the land, and it is thus absolutely critical that their health is assessed and monitored. The buffer of plants that surround streams can act as a filter of contaminants, and provide a corridor in which wildlife can access food, water, and shelter. In order to assess the health of a stream, two things must be considered: facilitation of fish passage and riparian zone health. In this report, these components of the Hunter-Clyde and Wheatley River watershed basins will be examined in two parts: a culvert inventory and a riparian health assessment. These will provide the ability to target which areas of the watershed are in need of attention, and which are currently able to sustain themselves without human intervention. Because the watersheds are closely related, both politically and geographically, they would present an excellent opportunity to study the effects of land use (as discussed in the conclusions). It was hypothesized that the Hunter-Clyde watershed would be in better ecological condition than the Wheatley River watershed, and results demonstrate that this is true… to a degree. Further study is needed to fully compare and contrast the effect of land use in Central Northern Prince Edward Island.

In the summer of 2011, fourteen kilometers of stream were assessed in the Wheatley River watershed, while thirty-six kilometers were assessed in the Hunter-Clyde watershed. Each assessment consisted of evaluating a ‘reach’ in each stream. A reach is defined as an area encompassing similar features including, but not limited to, stream width, depth, sediment depth, abundance of plants providing cover, the presence of beavers, land use on the uplands, presence and condition of stream crossings (culverts, bridges, etc.), and amount of visible gravel. These parameters were used to determine the health of a stream (i.e. its ability to provide clean water and sustain populations of fish and wildlife).

METHODS

Culvert Inventory

As stream and riparian assessments were being carried out, an in-depth inventory of culverts and crossings were also kept. The crossing's ability to maintain natural stream flow and fish passage was based on a standardized set of questions examining the crossing's materials used, condition, length, and if there was a change in velocity due to its presence (thus representing its effect on the stream). Numbers were assigned to the answers of these questions; a high number signalling a healthy crossing, and a low number drawing attention to those in need of repair or replacement. Waypoints were taken at each crossing location, and this culvert inventory report will summarize the data creating a ranking of those most in need of attention. Photos of the worst ranked crossing are provided on page 4 for Hunter-Clyde, and (unfortunately) none were taken of the worst in Wheatley River, as it was a training day.

Riparian Health Assessment

Riparian health assessment results were based on a standardized questionnaire that was completed for each reach. By dividing the streams into reaches instead of uniform lengths, specific stream characteristics could be picked up on in an area. The questions were based on numerical values; for most questions a value of 6 would indicate health, while a 0 would indicate a problem. The values for each question were entered into Microsoft™ Excel and were added together out of a possible total of 57. The score was then divided by 57, giving a percentage. A reach with a percentage under 60 was deemed 'unhealthy', between 60 and 80 was considered 'healthy with problems', and a reach score higher than 80 was deemed 'healthy'. Each result will later be entered into the MapInfo™ database, and given a colour to visually represent these results (red, yellow or green).

RESULTS: Culvert Inventory

Waypoint	Location	Score	Δ Velocity	X-ing Length	Notes
65	Rennies Rd	1	1	5	Beavers built around culvert (pond). Possibility of another culvert under the visible culvert.
14 (2)	Snowie Rd	4	-0.75	6	Three small culverts beside each other, all three looked blocked off at the upstream end as water was trickling down through the top.
233	Rte 13	5	0.75	4	Water velocity is high, the culvert is hanging, and it is creating a deep onion.
15 (1)	Snowie Rd	6	0.75	10	
130	Rte 13	3	-0.1	5	
234	Rte 13	5	N/A	9	Large culvert, hanging slightly. There is a wide and deep onion formed downstream.
112	Rte 13	5	N/A	N/A	Large onion.
137	Rte 13	6	-0.8	15	Downstream of the culvert, there is an onion.
124	Rte 13	8	0	4	The crossing is rotting and collapsing (made of what looks like old railway tie wood).
102	Rte 13	11	0.8	35	Crossing with baffling (cement flat bottom).
62	North Rustico	9	0	10	
77	Estuary	11	0	100	
105	Rte 13	8.5	0	7	
108	Rte 13	8	0.05	7	Culvert is beginning to form a natural bottom with rocks and mud.
125	Rte 13	6	0	7	This reach is a man-made pond.
143	Rte 13	8	GIS	GIS	
174	Hazel Grove	4	0	N/A	
78	Clyde Rd	12	0	5	There is a bridge made of wood, but does not affect the stream.
131	Rte 13	8	0	4	Dried up.
165	Fredericton St	8	0	N/A	Dried up.

Table 1: An inventory of culverts in the Hunter-Clyde watershed that were assessed during the summer of 2011; ranked in order of severity beginning with the worst case.

Waypoint 65:

Waypoint	Location	Score	Δ Velocity	X-ing Length	Notes
8	Rte 226	2	0.5	6	Unable to get reliable velocities for x-ing (twigs and moss in culvert causing obstruction). The culvert is hanging about 0.5 m above ground, and has created an onion.
55	Stead Rd (South)	8	0	50	Culvert (circle) beginning to become 'hanging'. Also, there is a mass of fallen trees before the culvert (obstruction).
59	Stead Rd (South)	9	1.5	6	Upstream of the reach, there is garbage, and at this wp, the culvert is hanging about 35 cm from the ground. Contact landowners for permission to access upper part of stream, and clean.
42	Stead Rd (North)	4	0.05	5	The culvert is collapsing due to rust and heavy rocks are beginning to fall into it.
50	Crooked Creek	4	0.5	20	A lot of dead fall and there is a clear path to which cattle have been accessing the stream (a lot of photos).
12(1)	Stead Rd (East)	4	0	0	Stream bed is dried up on the Eastern end.
30	Stead Rd (North)	3	0.25	3	Some dead fall in stream. Banks are eroding in some areas… looks recent (also silted in). Rockpile under culvert may help.
35	Stead Rd (North)	6	0	30	Near the road, and this culvert spans the length of the road.
1	Crooked Creek	13	0	6	A lot of siltation.
32	Crooked Creek	6	-0.1	7	Small grass buffer.
34	Crooked Creek	6	0.5	8	No trees or shrubs in buffer zone.
35	Crooked Creek	8	0	6	Large culvert (hanging) with chunks of cement. Banks are severely eroded in some areas of reach.
45	Crooked Creek	11	0	7	Crossing made of wood with pieces interjecting at angles inside. Downstream portion is hanging (about 2.5"). Clear path of runoff from road.
52	Crooked Creek	8	-0.05	10	Mostly grown in with some traces of water.
218	Crooked Creek	5	0.15	8	Culvert is too small, it is creating a large onion downstream of it.

Table 2: An inventory of culverts in the Wheatley River watershed that were assessed during the summer of 2011; ranked in order of severity beginning with the worst case.

RESULTS: Riparian Health Assessments

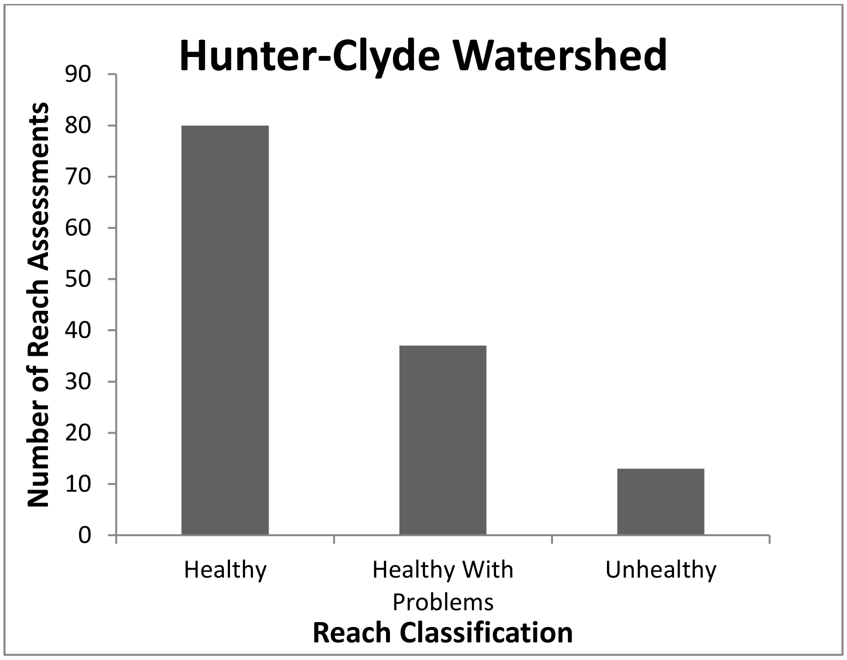

Figure 1: Classifications given to the various reaches assessed in the summer of 2011 in the Hunter-Clyde area.

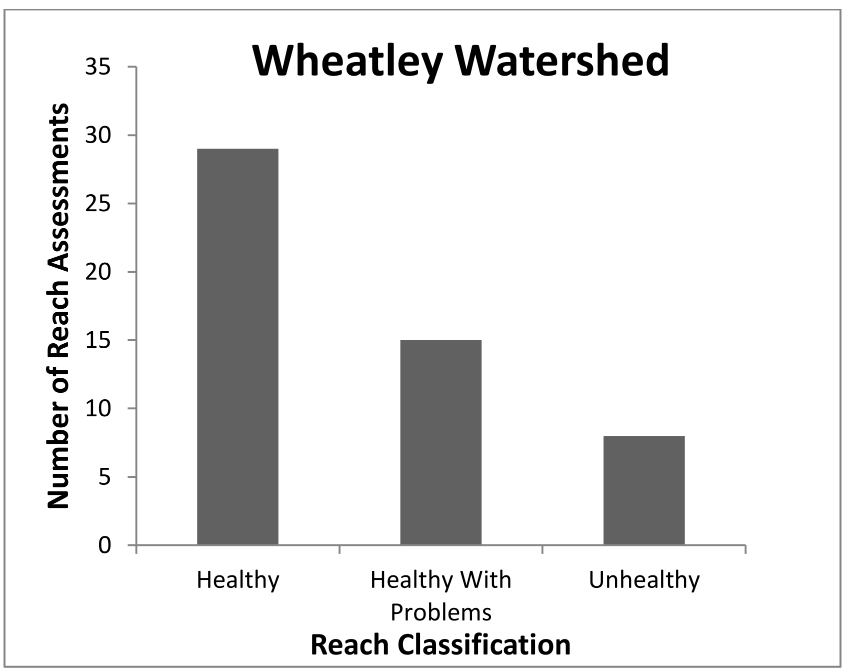

Figure 2: Classifications given to the various reaches assessed in the summer of 2011 in the Wheatley River area.

American Crow
Bald Eagle
Belted Kingfisher
Black Bellied Plover
Black Duck
Black-Capped Chickadee
Blue Jay
Bonaparte's Gull
Brown Creeper
Common Tern
Cormorant
Downy Woodpecker
Eastern Wood Pewee
Great Black-Backed Gull
Great Blue Heron
Greater Yellow Legs
Lesser Yellow Legs
Mallard
Northern Flicker
Osprey
Purple Finch
Red-Winged Blackbird
Red-Winged Blackbird
Rock Pigeon
Ruddy Turnstone
Semipalmated Plover
Semipalmated Sandpiper
Song Sparrow

Table 3: Positively identified birds in the Hunter-Clyde and Wheatley River watersheds through the summer of 2011.

CONCLUSIONS

Results from both watersheds demonstrate that, for the most part, streams and their respective buffer zones can be deemed as healthy in these regions. Wheatley River has a slightly higher percentage of unhealthy streams, and I can attest to this from personal experience in the field.

Streams in Wheatley River were most often crowded by excessive alder growth and sedimentation, making human passage extremely difficult. Anoxic puddles were also noted in Wheatley River, and interestingly enough, none were found in the Hunter-Clyde watershed in the 2011 assessments. Further studies for Wheatley River should include more water sampling, with a focus on dissolved oxygen, oxygen demands, nitrates and coliform counts. Coliform counts may indicate that the sources of pollution are of agricultural origin. The watershed group's current GIS software does not have land use maps for Wheatley River, and the future acquisition of these maps may help in understanding why oxygen levels are low. The assessment field sheet contains notes on each reach, and those highlighted in green are sites which would be good candidates for tree planting. In Wheatley River, I noted six sites that should be focused on in 2012 by summer work crews. Fish passage obstruction coordinates were also noted in the assessment field sheet.

In the Hunter-Clyde watershed, the main issues are also sedimentation and excessive alder growth. In general, however, the Hunter-Clyde watershed is quite healthy (with the exception of the 13 streams deemed 'unhealthy' in the results). Yew was found in both watersheds, but in noticeably larger numbers in the Hunter-Clyde watershed. Expanses of old forest growth were found in many sites, which included many large hemlock trees. There were, however, some sites with severe bank erosion and riparian zones free of woody vegetation, thus twelve sites were noted as good tree planting candidates for 2012.

The current system of classifying reaches into categories (healthy, healthy with problems or unhealthy) could use some revision, in my opinion. There was one stream in particular (in Wheatley River) that was deemed as ‘healthy’, but in my experience, this stream easily hosted the most abundant stock of fish passage obstruction. Perhaps in the future, the assessment field sheet could add a question about the number of obstructions in a reach and have a space to write in GPS coordinates. Currently, these memos are found in the ‘notes’ section of the assessment sheets, and are thus overlooked in the data analysis.

The dissimilarity between total kilometers assessed in each watershed can be attributed to the assessor’s need for signed permission forms from landowners, in order to access the streams. This is often a slow process, and it is advisable that mail-outs be carried out through the off season, thus allowing the assessor to focus solely on performing the assessments. With any extra time the assessor may have in between assessments, animal and plant identification skills can be improved. In a revised version of the assessment questionnaire, a space allowing for the description of fauna and flora (for example, describing the plants that make up the understory or canopy) may be worthwhile.

When high trophic level predator species such as Bald Eagles and Osprey can be sustained in an area, it is seen as a positive signal of ecosystem health. As seen in tables 3, both of these watersheds are home to many species of birds, but as far as fish go, only brook trout species were identified in the freshwater streams. CAMP assessments identified Mummichugs, Sticklebacks, Flounders, Shrimp and other common fish, but the algal blooms witnessed in August may negatively affect these estuarine species.

An effort by Bormann and Likens (1967) helped in understanding the functioning properties of a watershed ecosystem by developing the ‘small watershed concept’. This concept helps explain the relationship that meteorological/biological inputs have on geological/biological outputs. The net difference between inputs and outputs are caused by biological, physical and chemical processes within the watershed ecosystem (Hall 2003). To ensure that the watersheds have the similar baseline variables, % of impervious surface, size, precipitation, water hardness/alkalinity, pH, nitrates, and phosphates could be assessed. The expected differences would be visible in the % forested area versus % developed area (urban and agricultural) in each watershed (using MapInfo® software). The results from a relevant and specific study like this could help Islanders understand how their actions affect stream systems.

In conclusion, both watersheds are in relatively good health at this moment. There is always room for improvement, and from my experience, most landowners are devoted to positive change. There is an abundance of wildlife currently living in these sensitive ecosystems, and it is everyone’s duty to ensure that they remain functional. We have a lot to lose if they don’t.

LITERATURE CITED

Bormann, F.H., and Likens, G.E. 1967. Nutrient cycling: small watersheds can provide invaluable information about terrestrial ecosystems. Science 155: 424-429

Hall, R.O. 2003. A stream's role in watershed nutrient export. PNAS 100:10137-38