citizen scientists news

MONITORING • EDUCATION • VOLUNTEERING

2008 in review...

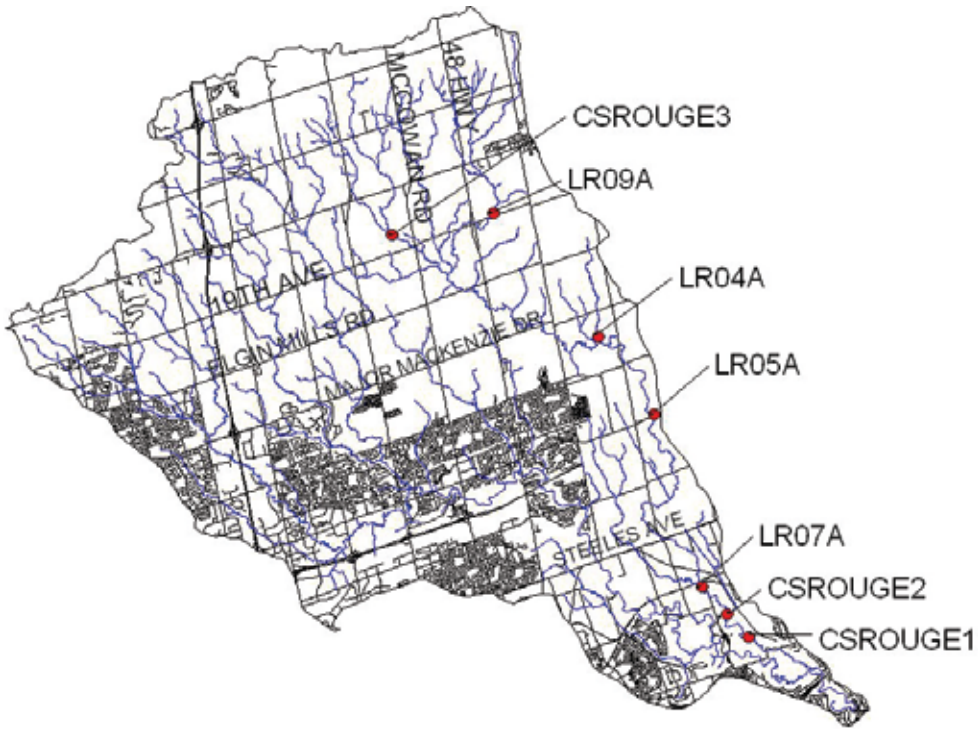
In 2008 Citizen Scientists:

- Successfully recruited **37 NEW AND EAGER VOLUNTEERS**.
- Conducted **OVER 1,700 HOURS** of monitoring and related work.
- Sent 3 new volunteers to the Ministry of Natural Resources' **ONTARIO STREAM ASSESSMENT PROTOCOL (OSAP)** Training Course.
- **COLLECTED OSAP DATA** at each of our 7 sites in the Little Rouge Subwatershed.
- **COLLECTED FISH DATA** by **ELECTROFISHING** and **SEINING** at LR09A to assess the impact of a chemical spill in 2007.
- **COLLECTED FISH DATA** by **ELECTROFISHING** at LR04A to assess the health of a stream that flows intermittently.
- **COLLECTED TEMPERATURE DATA** at all 7 monitoring locations over 5 months to monitor impacts or changes in thermal regime.
- **CONDUCTED** a **DETAILED PEBBLE COUNT** at LR09A to examine habitat changes from development upstream in Whitchurch-Stouffville.
- Assisted in the development and evaluation of the Toronto Zoo's Project Crayfish, **CRAYFISH IDENTIFICATION GUIDE**.
- Gave several presentations on fish, invertebrate and mussel identification, as well as ecological analysis and a presentation to the Durham Aquarium Society.
- Continuing to work with a University of Toronto Ph.D. student by supplying data to help contribute to the development of a redside dace predictive habitat model.
- Conducted a **VERNAL POOL EDUCATIONAL HIKE** with the Ontario Vernal Pools Association in Silver Creek Conservation Area, Halton Hills.
- Launched new citizenscientists.ca website.
- **OBTAINED FUNDING** from Rouge Park to continue our studies in 2008.

monitoring sites

Rouge Stream and Habitat Monitoring Project

To the right is a map showing our monitoring sites within the Rouge River Watershed. There are 7 sites in total to date and they range in location from McCowan Road and 19th Avenue to Meadowvale Road and Sheppard Ave. East. Sites are being monitored for key ecological parameters, including geomorphology, benthic invertebrates, fish and temperature, which will provide data for evaluating and interpreting water quality, stream habitat and changes in stream morphology.




CSROUGE 3


LR09A


LR04A


LR05A


LR07A


CSROUGE2


CSROUGE1

temperature results

2008 Summary

In 2008 we collected temperature information at all of our monitoring locations using continuous data loggers. Temperature information for this year was not significantly different than in previous years, even though there has been a wide range of environmental conditions over the past three. In 2006 we saw very warm weather, in 2007 we saw the second driest year on record, and this year we saw one of the wettest years on record. One interesting result from this year's information was the fact that we saw some one of the northern sites CSROUGE3 decrease in overall temperature, now falling within the coldwater temperature range. While no brook trout have been seen this low in the watershed for a number of years, during colder or wetter seasons there is a chance that brook trout populations may be able to expand their range into unoccupied habitats in this area. We shall conducted fisheries surveys in subsequent years to attempt to document this range expansion. However, the ability of brook trout to move into this new habitat easily is greatly reduced by dams along this watercourse. Finally in 2008 one temperature logger (LR07A) had a physical error, luckily with the tech support from Hoskin Scientific, data was retrieved illustrating the importance of having both redundancy and other data available for comparison.

2008 OSAP Thermal Classification, July 1 - September 10, 2008

Site	Maximum Temperature	Average Temperature	Minimum Temperature	Stability Rating
CSROUGE1	28.1ºC	20.9ºC	15.3ºC	UNSTABLE
CSROUGE2	28.0ºC	20.7ºC	15.1ºC	UNSTABLE
LR07A	28.6ºC	20.4ºC	13.9ºC	UNSTABLE
LR05A	28.3ºC	20.5ºC	14.4ºC	UNSTABLE
LR04A	23.6ºC	18.3ºC	12.8ºC	MODERATE
LR09A	22.1ºC	18.4ºC	14.1ºC	MODERATE
CSROUGE3	21.2ºC	18.2ºC	15.3ºC	MODERATE

2008 Thermal Habitat Classification, July 1 - 21, 2008

Site	Maximum Average Temperature	Minimum Average Temperature	Week Average Temperature	Fish Community Composition	Fluctuation Capacity
CSROUGE1	27ºC	17.7ºC	22.5ºC	WARM	EXTREME
CSROUGE2	27ºC	17.5ºC	22.1ºC	WARM	EXTREME
LR07A	27.8ºC	17.2ºC	22.0ºC	WARM	EXTREME
LR05A	27.6ºC	17.7ºC	22.2ºC	WARM	EXTREME
LR04A	22.8ºC	14.9ºC	19.3ºC	COOL	MODERATE
LR09A	21.5ºC	16.1ºC	19.1ºC	COOL	MODERATE
CSROUGE3	20.3ºC	17.1ºC	18.8ºC	COLD	STABLE

sampling results

100 Bug Count Results[1] for 2008

In 2008 the greatest changes observed occurred in the percent of the dominant species at each site. There was a dramatic increase in this indicator, and may be reflective of species expansion in a very wet, relatively stress free year as compared to the previous two. This condition will be investigated in the full benthic taxonomy. Overall there has not been a substantial change in any of the metrics that would indicate either an improvement or decrease in the health of the aquatic ecosystem in the areas that are being monitored, with the HBI indicator generally falling within the "good" range. However, CSROUGE3 shows a slightly elevated score compared to the other sites but this is not surprising with the site falling next to a horse farm and downstream from other agricultural operations.

Site	% Worm	% Midge	% Sowbug	% Snail	% Diptera	% Insects	% EPT	# of Groups	% Dominant Group	HBI
CSRouge1	0	31	0	0	38	95	34	10	31	**4.93**
CSRouge2	1	16	0	2	26	83	35	12	28	**5.14**
LR07A	1	18	1	0	19	75	33	11	21	**5.08**
LR05A	1	12	0	2	12	73	48	12	35	**5.09**
LR04A	1	17	9	8	17	80	46	10	42	**4.09**
LR09A	4	35	1	2	35	81	20	12	40	**5.57**
CSRouge3	2	64	0	0	65	98	17	10	66	**6.05**

Biotic Index (HBI)	Water Quality	Degree of Organic Pollution
0.00 – 3.50	Excellent	No apparent organic pollution
3.51 – 4.50	Very good	Possible slight organic pollution
4.51 – 5.50	Good	Some organic pollution
5.51 – 6.50	Fair	Fairly significant organic pollution
6.51 – 7.50	Fairly poor	Significant organic pollution
7.51 – 8.50	Poor	Very significant organic pollution
8.51 – 10.00	Very poor	Severe organic pollution

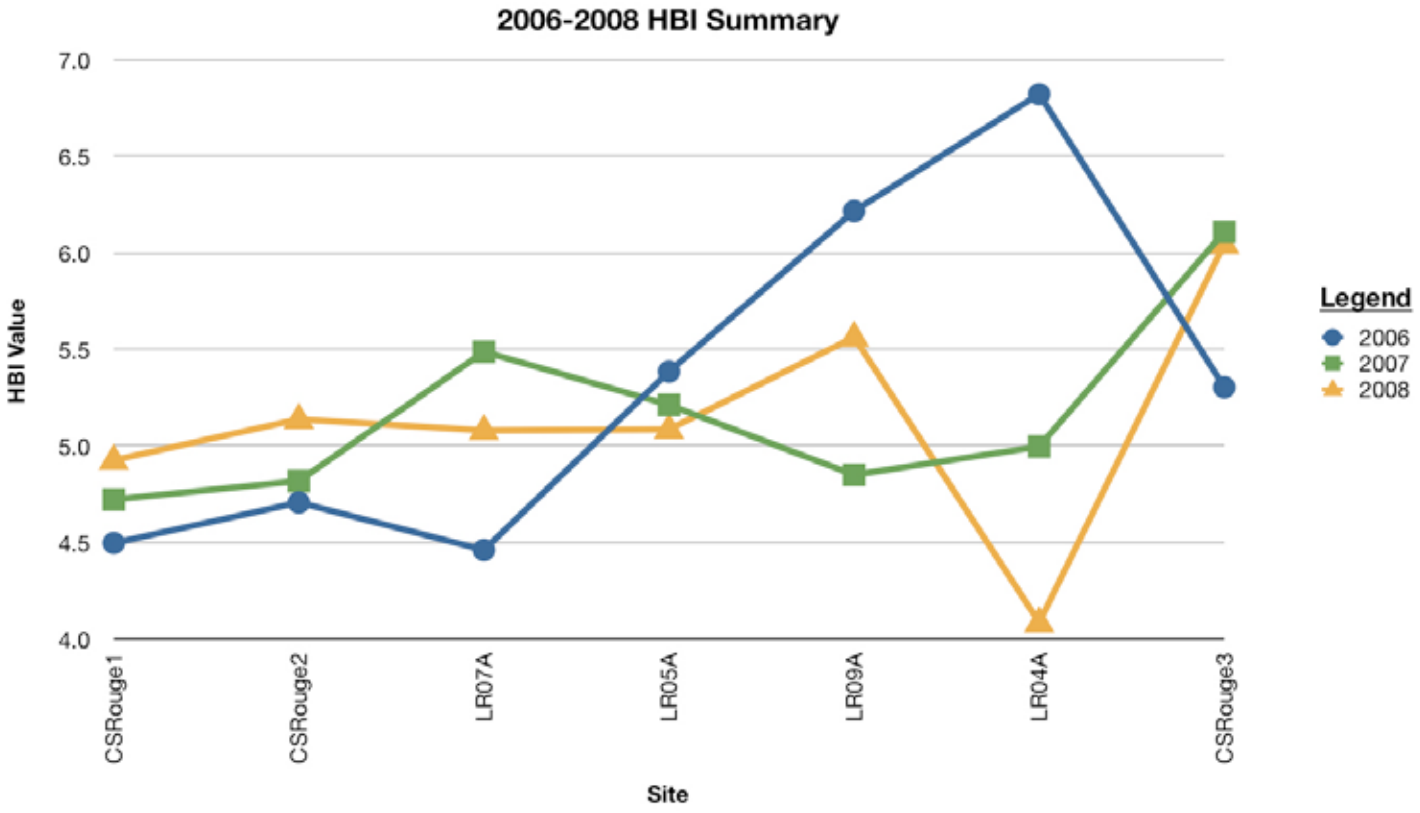
Although the HBI index is the most well known benthic invertebrate index for assessing stream quality, other indices can be used to augment our understanding of a site's condition. (The table above lists some of the other indicies used for assessing stream quality.)

The chart to the left indicates the degree of organic pollution suggested by HBI scores the are noted in the table above.

1 Please note that the current interpretation of results was carried out based on data obtained over a limited period of time. Further interpretation and conclusive trends can be obtained through the collection of long term data, which is the mandate at Citizen Scientists.

HBI Summary Comparison

Although the HBI value is not a very sensitive indicator for change the two sites that show the greatest variation over the last three year period are those two sites which have experienced the most stress, with LR04A experiencing intermittent water flow and LR09A having been impacted by a chemical spill in 2007. More emphasis will be placed on examining the full taxonomy at these two sites. One interesting note for LR04A is the extremely high number of stoneflies found at the site this year, an order of invertebrate associated with healthy stream conditions.



sampling results


Rock Bass

Fish Results[1] for 2008

There were three different surveys conducted this year each with a different rationale for why the work was undertaken. The most northern site to be assessed was LR09A and was undertaken in response to a chemical spill in 2007. The second site to be assessed was LR04A, which is located on a stream that has been periodically dry for several of the previous years. The final site to be assessed was an area of stream habitat just north of site CSROUGE1. This work was undertaken in order to begin a regular attempt to detect round goby moving up from the lake environment.

Site LR09A

In May of 2007 there was a large chemical spill of urea ammonium nitrate that occurred in this watercourse wiping out a large majority of the fish in the stream. This ecological impact to the watercourse has gone largely unquantified to this point in time, so this sampling event is being used to provide some insights into how the stream ecology has responded to this event. Additionally because this river provides habitat to redside dace, a species at risk, it was considered important to check to see if this species was still present at this location following the spill.

LR09A was the most northern site sampled in 2008 and was a sampling event that is being used to help quantify the impact of change observed in the stream ecosystem from the 2005 sampling events that occurred here. The two sampling events conducted here in 2005 were independent of each other, one event was conducted by our organization to follow up on sampling conducted at this site in 2000 by the Toronto and Region Conservation Authority (TRCA). The second sampling event was conducted by MNR as a part of a redside dace sampling technique study. The MNR sampling event used a triple-pass depletion technique that allows for a fish population assessment to be generated for the site. All of the other sampling events at this site used a single pass electrofishing technique and were used to survey for the presence/absence of particular fish species and to generate an Index of Biotic Integrity (IBI) score.

The fisheries survey conducted in 2008 has been compared to both previous sampling events that occurred in 2005 to provide and indicator of aquatic ecosystem health and to provide some indication of the species abundance, composition and relative population size of the fish community at this site. These findings have been summarized in the tables and figures to the right.

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Index of Biotic Integrity Assessment

Station	2005	# Fish	%	2008	# Fish	%
LR09A	rainbow trout	18	5.0	rainbow trout	3	1.2
	brook stickleback	2	0.6	brown trout	2	0.8
	white sucker	11	3.1	white sucker	12	4.7
	common shiner	5	1.4	common shiner	1	0.4
	bluntnose minnow	4	1.1	bluntnose minnow	3	1.2
	brown bullhead	1	0.3	fathead minnow	1	0.4
	blacknose dace	187	52.4	blacknose dace	54	21.1
	longnose dace	18	5.0	longnose dace	3	1.2
	creek chub	51	14.3	creek chub	65	25.4
	central stoneroller	2	0.6	central stoneroller	50	19.5
	rainbow darter	3	0.8	rainbow darter	31	12.1
	johnny darter	27	7.6	johnny darter	15	5.9
	mottled sculpin	21	5.9	mottled sculpin	16	6.3
	largemouth bass	2	0.6			
	pearl dace	1	0.3			
	redside dace	4	1.1			
IBI Score	**37**	**357**	**100.0**	**33**	**256**	**100.0**
IBI Quality	**Good**			**Good**		
# of Species	**16**			**13**		

Fish Population Assessment

2005	Numbers		Biomass (g)		2008	Numbers		Biomass (g)	
Species	**all passes**	**%**	**all passes**	**%**	**Species**	**all passes**	**%**	**all passes**	**%**
rainbow trout	38.0	7.8	263.5	9.4	rainbow trout	3.0	0.7	74.0	3.6
white sucker	21.0	4.3	571.5	20.5	brown trout	3.0	0.7	144.0	7.0
creek chub	141.0	28.8	902.0	32.3	white sucker	22.0	4.8	143.0	6.9
johnny darter	25.0	5.1	44.0	1.6	common shiner	1.0	0.2	3.0	0.1
rainbow darter	8.0	1.6	27.0	1.0	bluntnose minnow	3.0	0.7	6.1	0.3
longnose dace	55.0	11.2	243.0	8.7	fathead minnow	1.0	0.2	6.0	0.3
blacknose dace	185.0	37.8	585.0	21.0	blacknose dace	90.0	19.8	230.7	11.2
mottled sculpin	10.0	2.0	62.0	2.2	longnose dace	8.0	1.8	30.0	1.5
rock bass	3.0	0.6	73.5	2.6	creek chub	130.0	28.6	578.0	28.1
redside dace	**2.0**	**0.4**	**11.0**	**0.4**	central stoneroller	82.0	18.0	569.0	27.6
pumpkinseed	1.0	0.2	7.0	0.3	rock bass	1.0	0.2	15.0	0.7
					rainbow darter	51.0	11.2	80.1	3.9
					johnny darter	30.0	6.6	50.6	2.5
					mottled sculpin	30.0	6.6	131.0	6.4
total	**489.0**	**100.0**	**2789.5**	**100.0**	**total**	**455.0**	**100.0**	**2060.5**	**100.0**
		Population Estimate		**(95% C.I.)**			**Population Estimate**		**(95% C.I.)**
		646		**18.2 (+/-)**			**570**		**6.1 (+/-)**

sampling results

Site LR09A (continued)

While the health of the site remains good there has been a decrease in both the population numbers and the overall biomass at the site from the sampling conducted in 2005. There is also perhaps a lower diversity of fish species than in the past; now being largely composed of those which are generalist species rather than habitat specialist. This indicates a degraded stream condition from previous sampling in 2005. The fish species composition at this site appears to be transitioning from a coldwater fish community to a warm water fish community. Typically coldwater streams such as this should be lower in overall diversity and productivity. The fact that there has been evidence of both increasing diversity and abundance until the spill, as well as the presence of warm water species, represents a shift away from the stream's natural state, which can be considered a sign of degradation. However, the apparent fast recovery of the system after the spill indicates the aquatic ecosystem maintains a relatively high level of resiliency, which still reflects a healthy ecosystem.

This was the first survey conducted at this site, which did not find redside dace. The absence of redside dace may indicate that the population within the watercourse has been significantly impacted by the chemical spill in 2007. It is highly recommended that there be a follow up survey that is more comprehensive and covers a more significant area of suitable habitat. This survey would be undertaken to better define where the species persists and to provide some indication of relative numbers and critical remaining habitats.

With the significant level of urban development that is occurring in the upstream reaches of Whitchurch-Stouffville there is likely going to be continued changes to the watercourse, both to its morphology and to its fish and benthic invertebrate communities. Monitoring shall be continued over the comings years to track any changes to this headwater aquatic ecosystem.

The index of biotic integrity (IBI) is a measure of fish community associations that are used to identify the general health of the broader upstream ecosystem. It can also be used to effectively monitor changes that occur at a site over time. To calculate the IBI, nine measures of fish community composition are grouped into four general categories: species richness, local indicator species, trophic composition, and fish abundance. IBI scores can be poor, fair, good or very good.

IBI Rating	Stream Quality
Poor	9-20
Fair	21-27
Good	28-37
Very Good	38-45

Site LR04A

Citizen Scientists have been monitoring this stream since 2004 and it has displayed characteristics of an intermittent watercourse. It usually flows for most of the year but drys up for a couple of months, ranging from July-October based on the amount of precipitation it receives. There is quite a bit of previous fisheries monitoring that has occurred along this watercourse, and all events have always found fish. However, these years do correspond with years that had higher precipitation events.

This year was the first year we have been able to conduct fisheries monitoring in this watercourse ourselves. The purpose of the monitoring is to track the recolonization of this watercourse by other fish from the nearby main channel of the little rouge river. After being periodically dry for the past four years this is the first chance that fish have had to recolonize this habitat for an entire year. The results of this survey are listed below.

Index of Biotic Integrity Assessment

Station	2008	# Fish	%
LR04A	unknown small minnows	72	43.9
	rainbow trout	2	1.2
	blacknose dace	51	31.1
	creek chub	1	0.6
	central stoneroller	8	4.9
	brook stickleback	16	9.8
	rainbow darter	13	7.9
	johnny darter	1	0.6
IBI Score	**23**	**164**	**100.0**
IBI Quality	**Fair**		
# of Species	**8**		

Fish Population Assessment

2008	Numbers		Biomass (g)	
Species	**all passes**	**%**	**all passes**	**%**
rainbow trout	4.0	2.9	0.4	0.3
blacknose dace	55.0	40.4	22.4	15.7
creek chub	1.0	0.7	6.0	4.2
central stoneroller	14.0	10.3	80.0	56.1
brook stickleback	27.0	19.9	4.5	3.2
rainbow darter	34.0	25.0	28.3	19.8
johnny darter	1.0	0.7	1.0	0.7
total	**136.0**	**100.0**	**142.6**	**100.0**
		Population Estimate		**(95% C.I.)**
		149		**4.6 (+/-)**

sampling results


White Sucker

Round Goby Survey 2008

The known distribution of round goby continues to expand within the Toronto area watersheds, with the species now pushing north into the riverine ecosystems (e.g. Humber River and Etobicoke Creek) it was deemed important to make an attempt to survey for this particular species in 2008. This survey was conducted this year because there were no other known fisheries surveys being conducted in the lower Little Rouge River watershed this year. It is important that the species is detected early if there is to be any kind of management response to contain its potential range expansion north, possibly into the headwaters of the Little Rouge River. This range expansion is possible because there are no physical barriers that would limit this species spread north until the area around 19th Avenue in the headwater habitats, where dams are present.

This survey targeted only larger pool habitats where it was felt that larger adult round gobies were more likely to be found. This is based on the work and early findings of Jason Barnucz, Jeff McNeice (monitoring the expansion of round goby (neogobius melanostomus) into Great Lake tributaries; closing the knowledge gap for fisheries managers). Essentially large individuals of the species appear to invade new habitats first, and seem to occupy larger and deeper pool habitats. This is followed by an increased overall abundance of the species in the next two or three years after the initial colonization. This makes early detection that much more important, if there is to be any type of management that is to be employed to help limit the rate, or distribution of habitat that the species can colonize in the rouge watershed.

The survey was conducted on one day in the fall of 2008 and was only conducted in four pools just north of our long-term monitoring site at CSROUGE1 (see map on next page). No round gobies were found during the survey, however, only an extremely limited amount of habitat was covered during this survey. It is also important to note that the aquatic habitat of the lower little rouge river makes it incredibly difficult to sample for gobies because of the large boulder substrates, which interferes with netting and affords the species many good hiding places.

The Toronto and Region Conservation Authority will be conducting fisheries surveys in more habitats that are more extensive in both the main Rouge and the Little Rouge River in 2009. Based on the findings of this work we shall make determinations about sampling these habitats for round goby in 2010.

2008 Round Goby Survey Results

Site	Common_Name	Length Ranges	Number of Fish
1	white sucker	555	1
1	hornyhead chub	126	1
1	common shiner	91-155	9
1	longnose dace	96-116	3
1	creek chub	140-155	4
1	central stoneroller	92-104	4
1	pumpkinseed	73-98	2
1	rainbow darter	50-58	4
2	white sucker	173-187	2
2	hornyhead chub	121	1
2	common shiner	81-134	3
2	creek chub	212	1
2	central stoneroller	74-95	8
2	pumpkinseed	76-100	3
2	smallmouth bass	92	1
2	yellow perch	118	1
2	rainbow darter	42-60	4
2	logperch	118	1
3	chinook salmon	995	1
3	white sucker	132-180	2
3	common shiner	90-141	3
3	rainbow darter	38-45	5
3	johnny darter	56	1
4	common shiner	56-96	5
4	longnose dace	57-88	6
4	creek chub	204	1
4	central stoneroller	51-61	3
4	rainbow darter	37-60	8
4	logperch	113	1

Survey Locations

sampling results

Pebble Count Results[1] for 2008

Pebble counts were conducted at LR09A to provide information on localized habitat changes that are anticipated to occur over the coming years from upstream development in Whitchurch-Stouffville. The work was also conducted to illustrate microhabitat differences between two similar habitat types within an individual site. On the following page there are two figures: one illustrating an upstream riffle and one illustrating a downstream riffle. The upstream riffle illustrating lower quality spawning habitat for salmonid species, and potentially redside dace, than the lower riffle - represented by the Fredle Index number (higher numbers correspond to more porosity and therefore better spawning habitat). We will continue to monitor habitat changes at this site over the coming years and relate it to changes observed in the fish and invertebrate communities. The changes will be monitored in part by examining the distribution of particles (pebbles) on the stream bed illustrated by the D50 value or mean particle size in millimetres.

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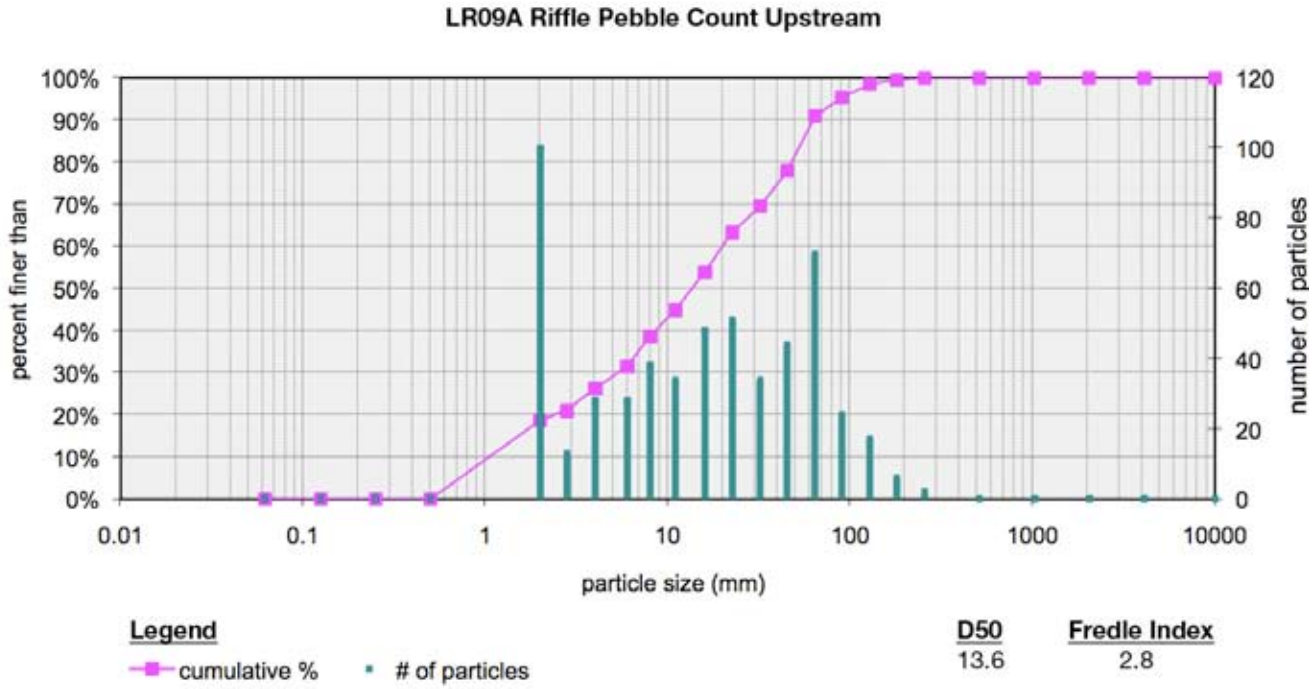
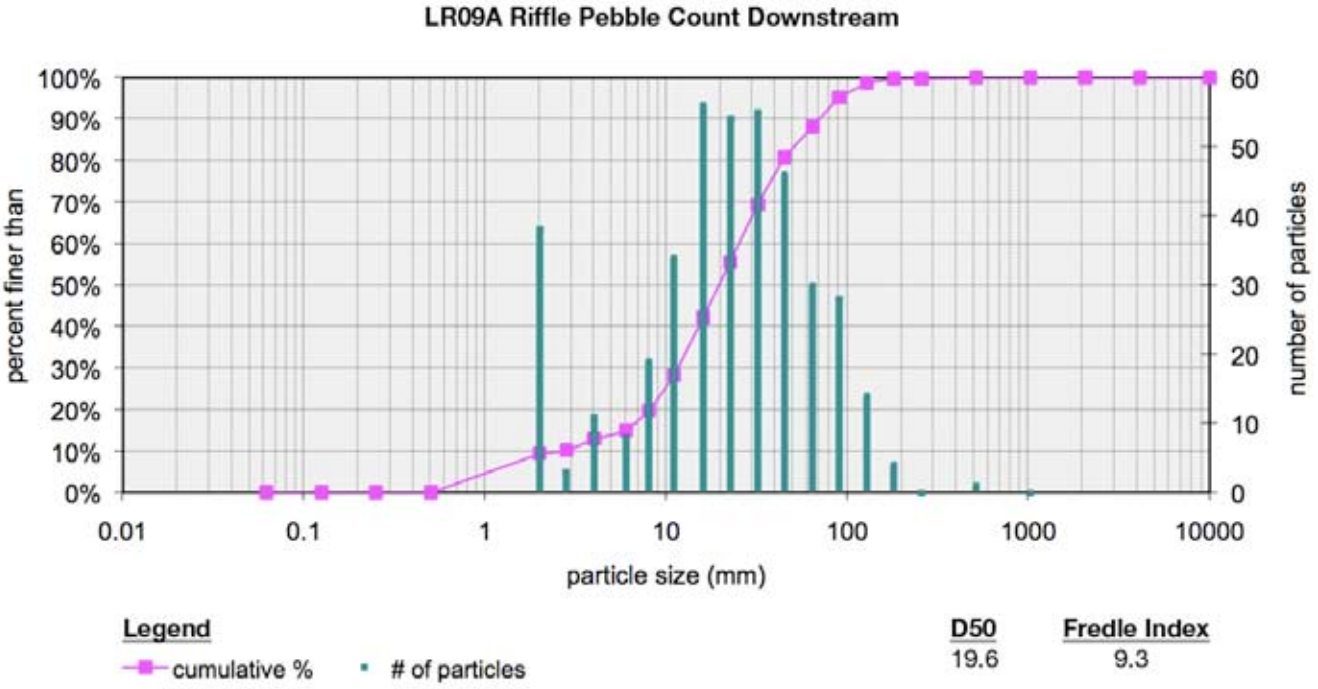

LR09A Riffle Pebble Count Upstream
percent finer than
number of particles
particle size (mm)
0.01
0.1
1
10
100
1000
10000
Legend
cumulative %
# of particles
D50
13.6
Fredle Index
2.8


LR09A Riffle Pebble Count Downstream
percent finer than
number of particles
particle size (mm)
0.01
0.1
1
10
100
1000
10000
Legend
cumulative %
# of particles
D50
19.6
Fredle Index
9.3

new for 2009...

citizenscientists.ca

We've updated our website! Visit citizenscientists.ca to find out more information about our group, how to volunteer, our work and partners and a link to donate to us via CanadaHelps.org.

At CanadaHelps.org, you can donate to Citizen Scientists, through the Rouge Valley Foundation, click on "I am a donor", search word "Rouge", and click on "Rouge Valley Foundation".

how to reach us...

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Rouge Park