Central
Lake Ontario
Conservation

2009

Aquatic Monitoring Report

What we do on the land is mirrored in the water

Working In Partnership:

Durham Region

Conservation Ontario
Natural Champions

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1.0 INTRODUCTION

In order to make sound, science-based management decisions about local **watersheds**, the Central Lake Ontario Conservation Authority (CLOCA) conducts long-term watershed health monitoring. This information helps CLOCA understand current conditions, identify ecological trends, provides a strong basis to measure the effectiveness of stewardship activities and also provides guidance in making informed land-use decisions. Typical components of the watershed are monitored: aquatic habitat (e.g. habitat assessments and temperature monitoring); fish and benthic macroinvertebrates (benthos); terrestrial habitat (e.g. riparian and tableland vegetation, wildlife); and, water quality and quantity of both surface water and groundwater. This report focuses on the Aquatic Monitoring Program, specifically Spawning Surveys, Stream Temperature, Biological Water Quality and Fisheries Sampling.

To ensure that monitoring is done using standardized protocols, whenever possible, CLOCA participates in national, provincial or municipal networks. Our partners include Environment Canada (EC), Fisheries and Oceans Canada (DFO), Ministry of Environment (MOE), Ministry of Natural Resources (MNR) and other Conservation Authorities.

Located east of Toronto within the Region of Durham (Figure 1), the Authority's jurisdiction encompasses 638 square kilometres and is defined by the area drained by fifteen watersheds (Figure 2). Local municipalities located within the jurisdiction, in whole or in part, include the cities of Oshawa and Pickering, the towns of Ajax and Whitby, the Municipality of Clarington, and the townships of Scugog and Uxbridge.

While every effort has been made to accurately present the findings reported in this chapter, factors such as significant digits and rounding, and processes such as computer digitizing and data interpretation may influence results. For instance, in data tables no relationship between significant digits and level of accuracy is implied, and as a result values may not always sum to the expected total.

Figure 1: Location of CLOCA Jurisdiction (highlighted in green).

A **watershed** is defined as an area drained by a river or creek and its tributaries.

Figure 2: CLOCA Jurisdiction

2.0 SPAWNING SURVEY

2.1 Introduction

Sampling methods for capturing fish are sometimes not suitable for obtaining all data needed about a fishery. Many limiting factors may prevent a species of fish from reproducing successfully (producing young). These include poor water quality, migration barriers, temperature, water levels, illegal works etc. Spawning surveys provide useful information for identifying critical spawning habitat. This information is complimentary to standard fish community surveys and is a beneficial component when describing the health of a watershed.

A spawning survey involves observing indicators of spawning, in a specific watershed. These indicators include: the presence of adult fish in a likely spawning area (e.g., Rainbow Trout), the occurrence of active spawning (e.g., fish present on redds) and signs that spawning has taken place (i.e., spawning depressions or **redds)**. “Not all fish species bury their eggs in substrate: some lay eggs on material, others broadcast their eggs into the water column. Salmonids, both true Salmon and Trout (*Salmo* and *Oncorhynchus*) as well as char (i.e. Brook Trout, *Salvelinus fontinalis*) build depressions in the bottom of streams and then lay their eggs into these depressions or redds.” (Imhof, 1997).

redd - the gravel nest of salmonid fishes.

Spawning locations are not evenly distributed within a watershed. Therefore, collecting information consistently over 3-5 years will identify where important reproduction areas exist and are consistently used by Salmonid populations (Imhof, 1997).

Spawning surveys within the CLOCA jurisdiction typically are conducted in both the spring and fall. The spawning periods for the fishes most commonly targeted by CLOCA are listed in Table 1.

Table 1: Salmonid spawning periods for southern Ontario.

Brown Trout	mid-October to late November
Brook Trout	late-October to mid-December
Rainbow Trout	mid-April to late-June
Chinook Salmon	late-September to early-October

[1] - Imhof, J. Salmonid Spawning Survey - Methodology.
[2] - Scott, W. B., and E. J. Crossman. 1973. Freshwater fishes of Canada. *Fish. Res. Bd. Canada Bull.* 184:184-191

2.2 Results (Spring)

Spawning surveys targeting migratory adult Rainbow Trout and White Sucker were conducted on various watersheds including:

- Lynde Creek
- Pringle Creek
- Harmony Creek
- Robinson Creek
- Tooley Creek
- Darlington Creek.

Survey locations and fish observations are shown in Figure 3. Specific locations and significance are outlined below and within Table 5:

2.2.1 Lynde Creek

Kinsale

Within the Kinsale subwatershed, White Sucker were observed north (upstream) of Taunton Rd.

Main Branch

Within the Main Branch subwatershed, Rainbow Trout were only observed at Dundas St. (Hwy #2) and White Sucker were observed within the Town of Brooklin south (downstream) of Winchester Rd.

Heber Down

Within the Heber Down subwatershed, Rainbow Trout and White Sucker were observed as far upstream as Heber Down Conservation Area.

Ashburn and Myrtle Station

No migratory fishes or evidence of spawning was observed within the Ashburn and Myrtle Station subwatersheds. Although migratory adult Rainbow Trout were not observed by CLOCA staff within these subwatersheds; young-of-year Rainbow Trout were captured in both subwatersheds at or near Myrtle Rd. Staff at the Royal Ashburn Golf Club (located at Myrtle Rd. West in the Ashburn subwatershed) observed adult Rainbow Trout within the golf course during the spring. This is a good example of why multiple survey techniques are required to assess fish communities.

It should be noted that more effort was spent on surveying the lower sections of Lynde Creek. Most of the headwater survey locations were roadside observations compared to extensive surveys that included walking large stretches of stream.

2.2.2 Pringle Creek

Rainbow Trout were observed north (upstream) of Rossland Rd while White Sucker were observed north (upstream) of Taunton Rd.

In recent years and historically, CLOCA has observed both migratory Rainbow Trout and Chinook Salmon during the respective spring and fall runs. Although these spawning adult fishes have been observed within the creek, no young-of-year fishes have been captured through recent fisheries sampling.

2.2.3 Harmony Creek

Rainbow Trout were observed at Rossland Rd. while White Sucker were only observed as far north (upstream) as Adelaide Ave.

2.2.4 Robinson Creek

No migratory fishes were observed although this is likely due to low effort i.e., too few sampling sites. Although no migratory fishes were observed through CLOCA spawning surveys, young-of-the-year Rainbow Trout which is a coldwater fish (Coker et al., 2001), were captured in this watershed during 2009 upstream (north) of Baseline Rd. near the CNR tracks during fisheries sampling (site R1, Sept 3rd) conducted by AECOM as part of the Robinson Creek and Tooley Creek Watershed Plan (Municipality of Clarington, 2010).

2.2.5 Tooley Creek

Unlike 2008, no migratory fishes were observed although this is likely due to low effort i.e., too few sampling sites. Although no migratory fishes were observed through CLOCA spawning surveys, young-of-the-year Rainbow Trout which is a coldwater fish (Coker et al., 2001), were captured in this watershed during 2009 upstream (north) of Highway 401 near Courtice Rd. during fisheries sampling (site T2, June 25) conducted by AECOM as part of the Robinson Creek and Tooley Creek Watershed Plan (Municipality of Clarington, 2010).

2.2.6 Darlington Creek

Only White Sucker was observed downstream of Baseline Rd. It's likely that Rainbow Trout were not documented due to low effort i.e., too few sampling sites. During 2008, two Rainbow Trout and one White Sucker were observed at the first crossing north of Baseline Rd. on Holt Rd.

2.3 Results (Fall)

No fall spawning surveys were conducted.

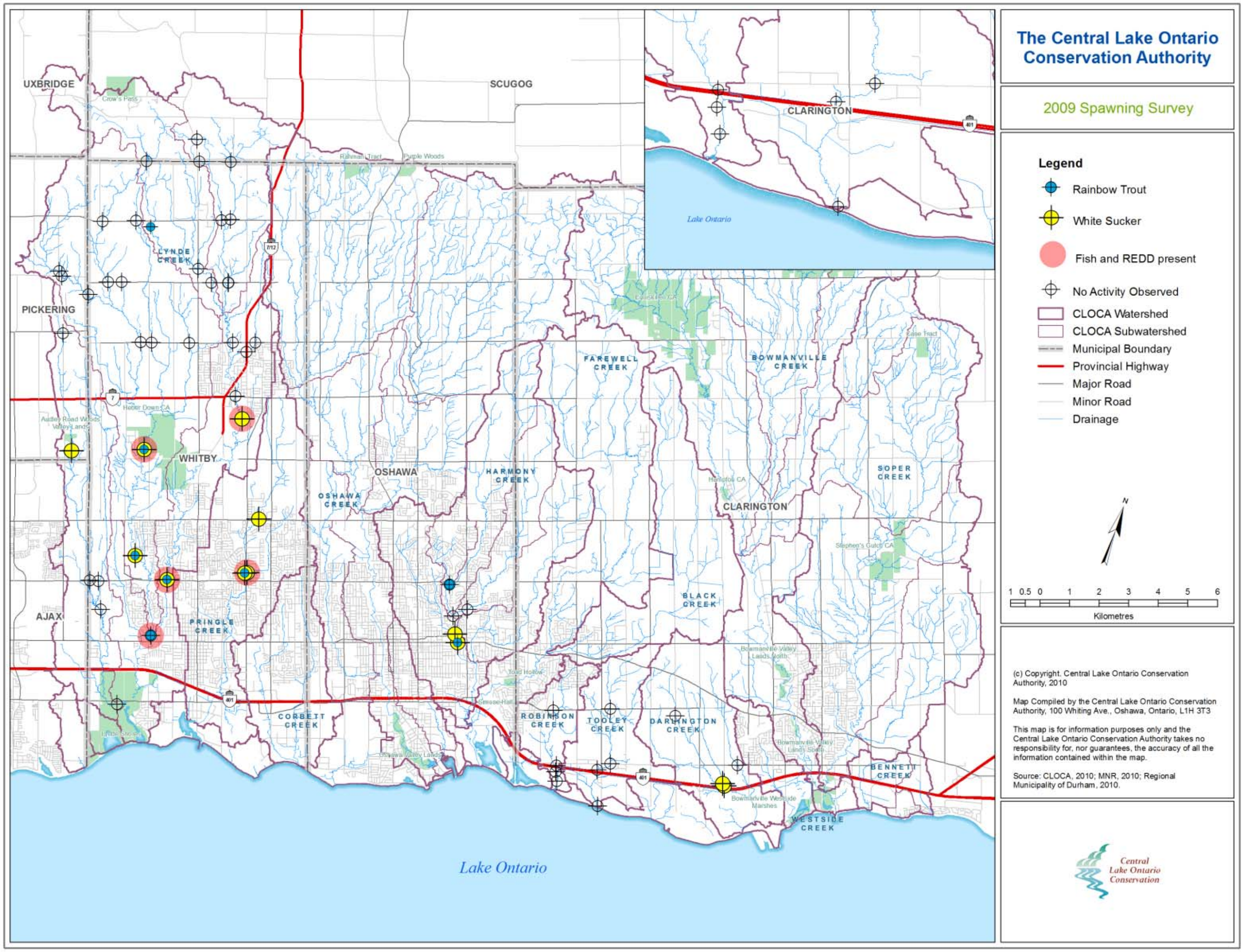


Figure 3: Location of 2009 migratory Rainbow Trout and White sucker observations.

3.0 BIOLOGICAL WATER QUALITY

3.1 Introduction

CLOCA monitors surface water quality through both chemical and biological sampling. In general, sampling for chemical and physical parameters measures stressors (e.g., environmental contamination), whereas biological sampling measures ecological effects. Biological surveys involve sampling creatures, such as benthic macroinvertebrates ("aquatic bugs"; see photos below) and fish, found living within the aquatic environment. Benthic macroinvertebrates or benthos, make good health indicators of aquatic ecosystems for a number of reasons:

- they generally have limited mobility that makes them vulnerable to many creek stresses that may occur;
- they have short life cycles;
- they are easily collected and identified;
- they are relatively inexpensive to sample;
- and they exist almost everywhere (Ontario Benthos Biomonitoring Network, 2005).

Similar to other biological communities, certain species of invertebrates have specific tolerances to various stresses and are referred to as indicator species. Therefore, the presence or absence of these indicator species can be related to the quality of the water.

In the past, CLOCA sampled benthos following two separate protocols. The primary protocol for assessing water quality was through BioMAP (Griffiths, 1998). The second protocol is part of the OSAP and is a coarse measure of water quality, which uses the Hilsenhoff Index. In order to harmonize long-term monitoring efforts, CLOCA is now a partner in the Ontario Benthos Biomonitoring Network (OBBN) coordinated by the MOE and EC. This provincial network allows practitioners to follow a standardized methodology, share resources and receive technical support.

One method to test whether an aquatic system has been impaired by human activity uses a reference condition approach to compare benthos at “test sites” (where biological condition is in question) to benthos from multiple, minimally impacted “reference sites”. A portion of sampling effort each season should focus on collecting reference sites (OBBN, 2005).

The online database warehoused by MOE has been undergoing upgrades and analysis tools are not yet functional. Currently, site information (i.e., identified species) has been entered into the provincial database and the results, i.e. Whether a site is impaired or not, will be available once this upgrade is complete.

Another method to quantify whether an aquatic system has been impaired by human activity is to compare the percentage of three Orders of sensitive benthos; Ephemeroptera (Mayflies), Plecoptera (Stoneflies) and Trichoptera (Caddisflies) or otherwise referred to as EPT. These orders are typically only present and abundant in undisturbed areas, often inhabited by sensitive coldwater fishes like Trout and Sculpins

3.2 Results

During May 2009, CLOCA staff sampled 17 OBBN sites in total throughout 3 watersheds (Figure 4). Four of the sites sampled were reference sites and the remaining 13 sites were test sites, generally at long-term monitoring sites. This was the fifth season that CLOCA has sampled benthos using the OBBN protocol.

3.2.1 2009 OBBN Sampling

Aquatic monitoring effort was primarily focused in the Lynde Creek watershed and some time was spent sampling within the Stephens Gulch Conservation Area (CA), Long Sault CA and Cane Tract during 2009 (Figure 4). A consistent trend is evident showing higher EPT percentages in the northern sections of these watersheds. Although sites were limited, differences in water quality were observed between sites dominated by urban and agricultural land uses and those dominated by natural land cover types. This was indicated by macroinvertebrate communities characteristic of high water quality areas.

Riparian buffers are important in preserving stream water quality, as the stream bank vegetation filters out pollutants from water run-off. In the subwatersheds of Lynde Creek, only 29% to 38% of stream length has sufficient riparian buffers (CLOCA/MNR 2007). Riparian buffers alone, however, cannot ensure good water quality, since impaired sites have been found in areas with riparian vegetation. Ground water is also an important source of clean water, and contributes to the maintenance of good water quality within a stream.

Encouraging results were evident within the Stephen's Gulch CA, Long Sault CA and Cane Tract all of which are located in the Bowmanville and Soper watershed. This is not surprising considering the amount of natural cover. Overall Bowmanville and Soper watershed has approximately 41% and 31% natural cover respectively (CLOCA, 2010).

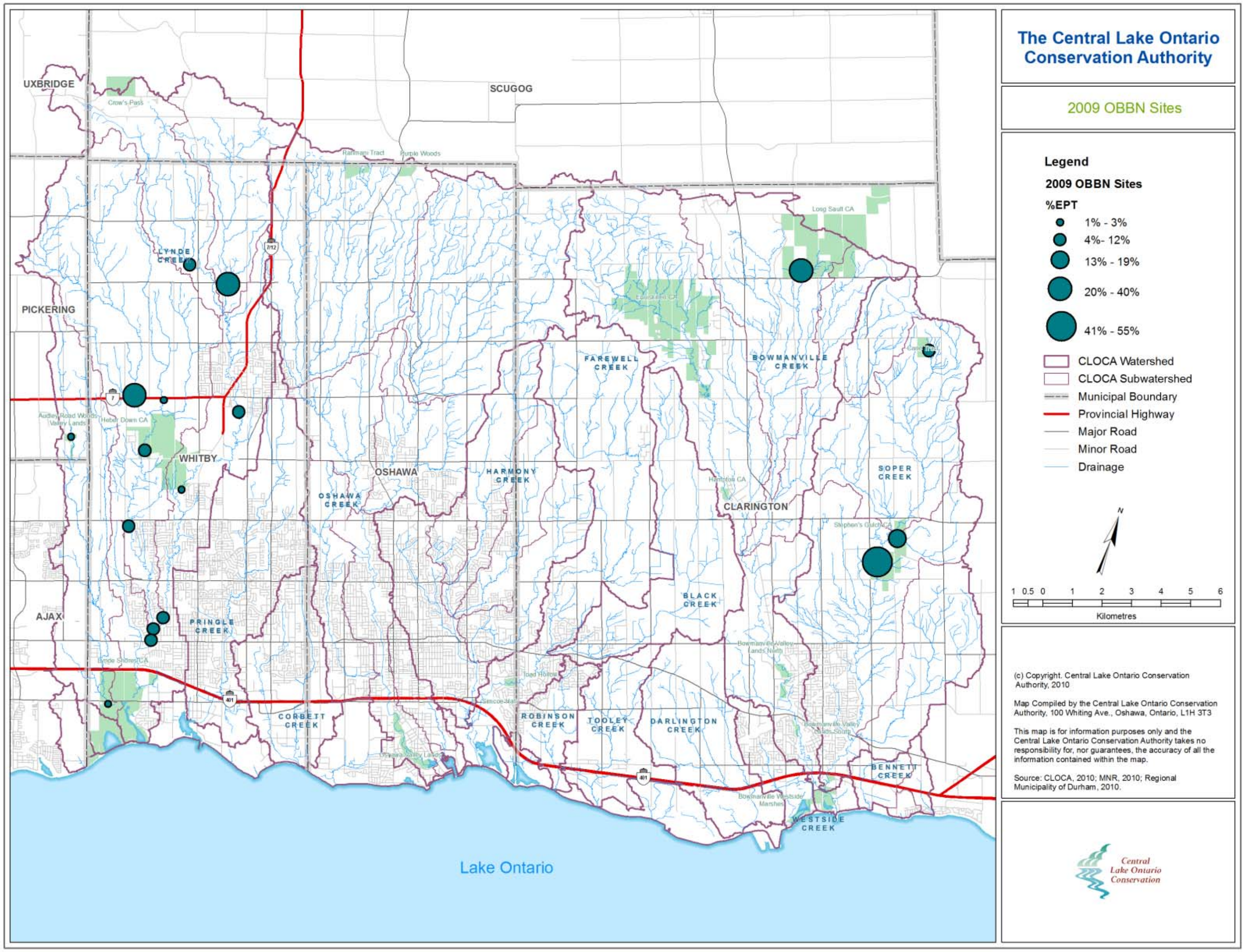


Figure 4: Percent EPT from OBBN site locations sampled during 2009.

4.0 WATER TEMPERATURE

4.1 Introduction

Temperature is considered a controlling factor with respect to habitat suitability for fish. For species such as Slimy Sculpin or Brook Trout, summer stream temperature is considered the single most important factor influencing distributions (Jenkins and Burkhead, 1993; MacCrimmon and Campbell, 1969). Temperature monitoring provides a good indicator of habitat suitability and allows one to assess the impacts of landscape changes on stream health. CLOCA relies on quality stream temperature data for use in plan review, watershed management plans, aquatic resource management Plans, fisheries management plans, etc.

Temperature monitoring was conducted generally between May and December of 2009. This sampling period allows CLOCA to capture stream temperature during the critical summer months when sensitive fish species are vulnerable to warm weather. In addition, by leaving the temperature loggers in the streams until winter, CLOCA staff are able to detect the relative contribution of groundwater in the stream. Groundwater temperature is moderated by the sub-surface ground temperature. Depending on the amount of groundwater entering a stream it has the ability to moderate the stream temperature. If enough groundwater enters a stream it will have more of an influence than the air temperature and prevent the stream from freezing.

In total, 76 portable temperature loggers (Figure 5) were installed throughout the CLOCA jurisdiction in 2009 (Figure 6). Of the 76 loggers, 5 were part of the Stephen's Gulch Conservation Area Management Plan. All of the loggers, with the exception of two older loggers within Soper Creek, were programmed to collect water temperature every half-hour generally between May and December.

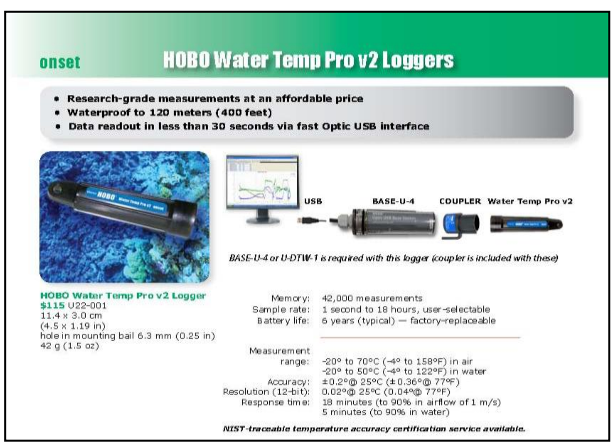


Figure 5: Attributes of one of the temperature logger models used by CLOCA.

Classification of stream temperature was divided into three categories: coldwater, coolwater and warmwater (Coker et al., 2001). The thermal classification for each site was determined by analyzing data summarized through the Stream Temperature Analysis Tool and Exchange (STATE) (Table 7; Jones and Chu, 2007). It should be noted that stream temperature classification can be confusing. Historically in Ontario only two thermal classification categories were used, coldwater and warmwater. Coldwater fishes such as Trout and Salmon can be found in both coldwater and coolwater temperature zones and so these zones represent coldwater streams in the traditional sense (Bowlby, 2008).

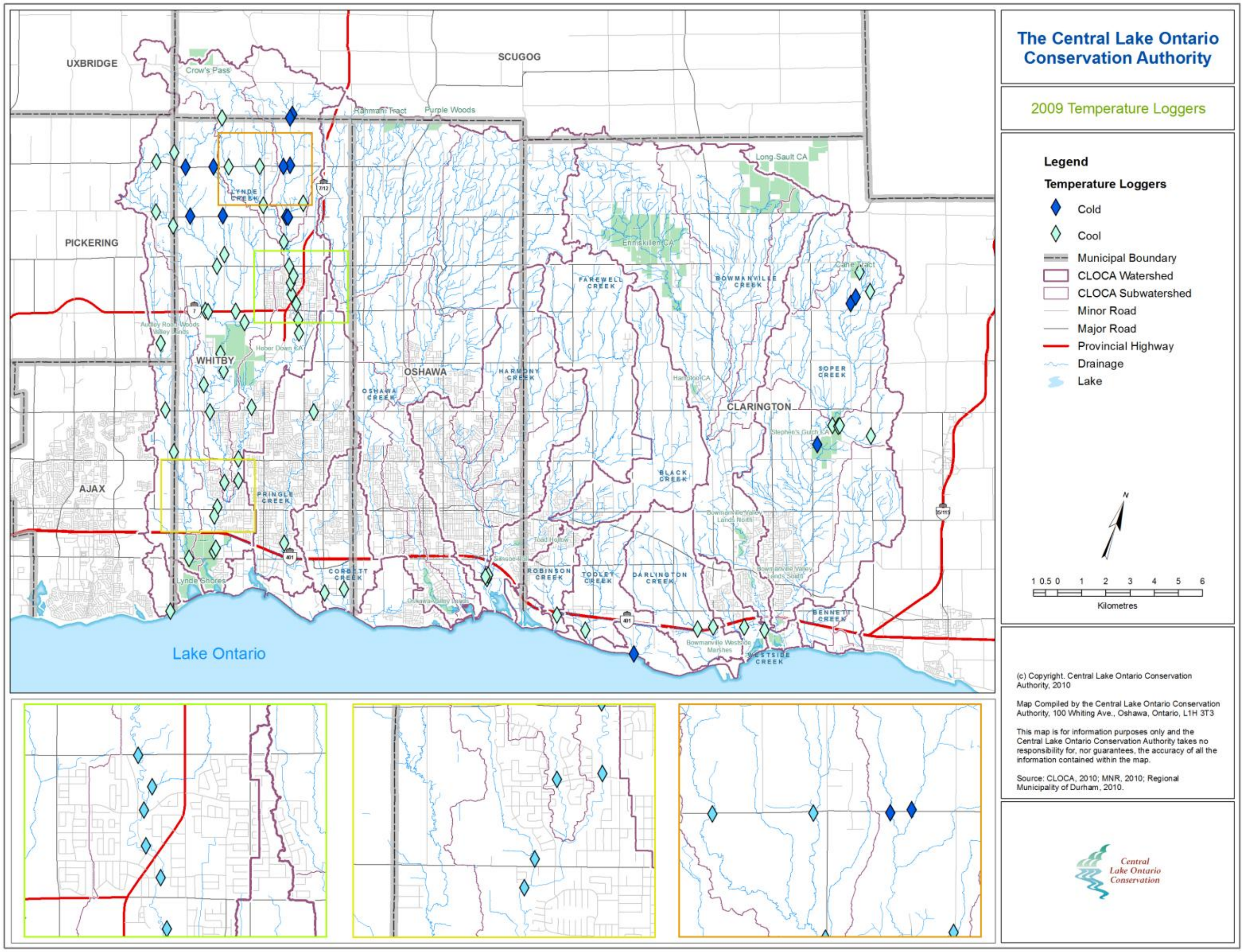


Figure 6: Location and thermal classification of stream temperature loggers during 2009.

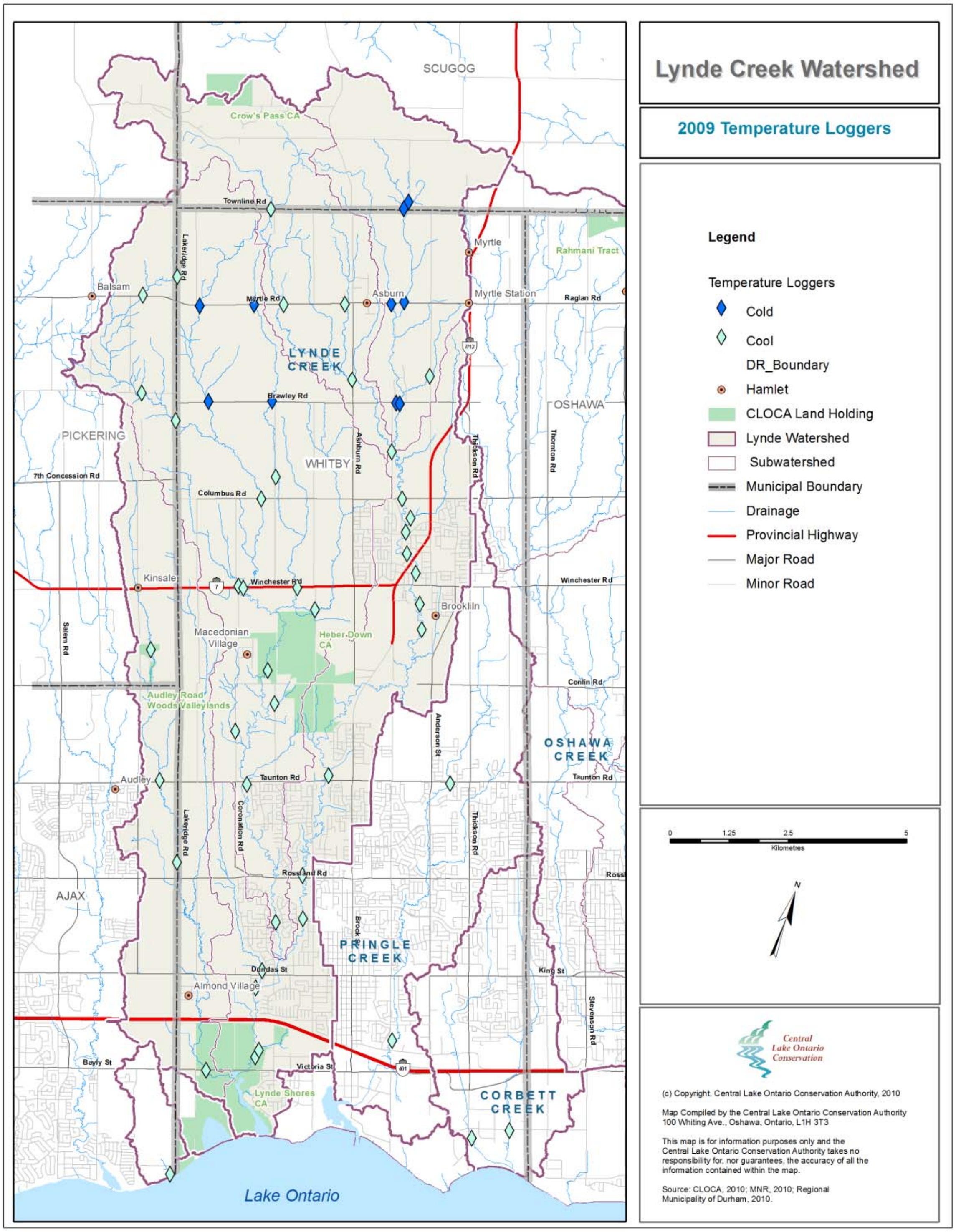


Figure 7: Location and thermal classification of stream temperature loggers within the Lynde Creek Watershed in 2009.

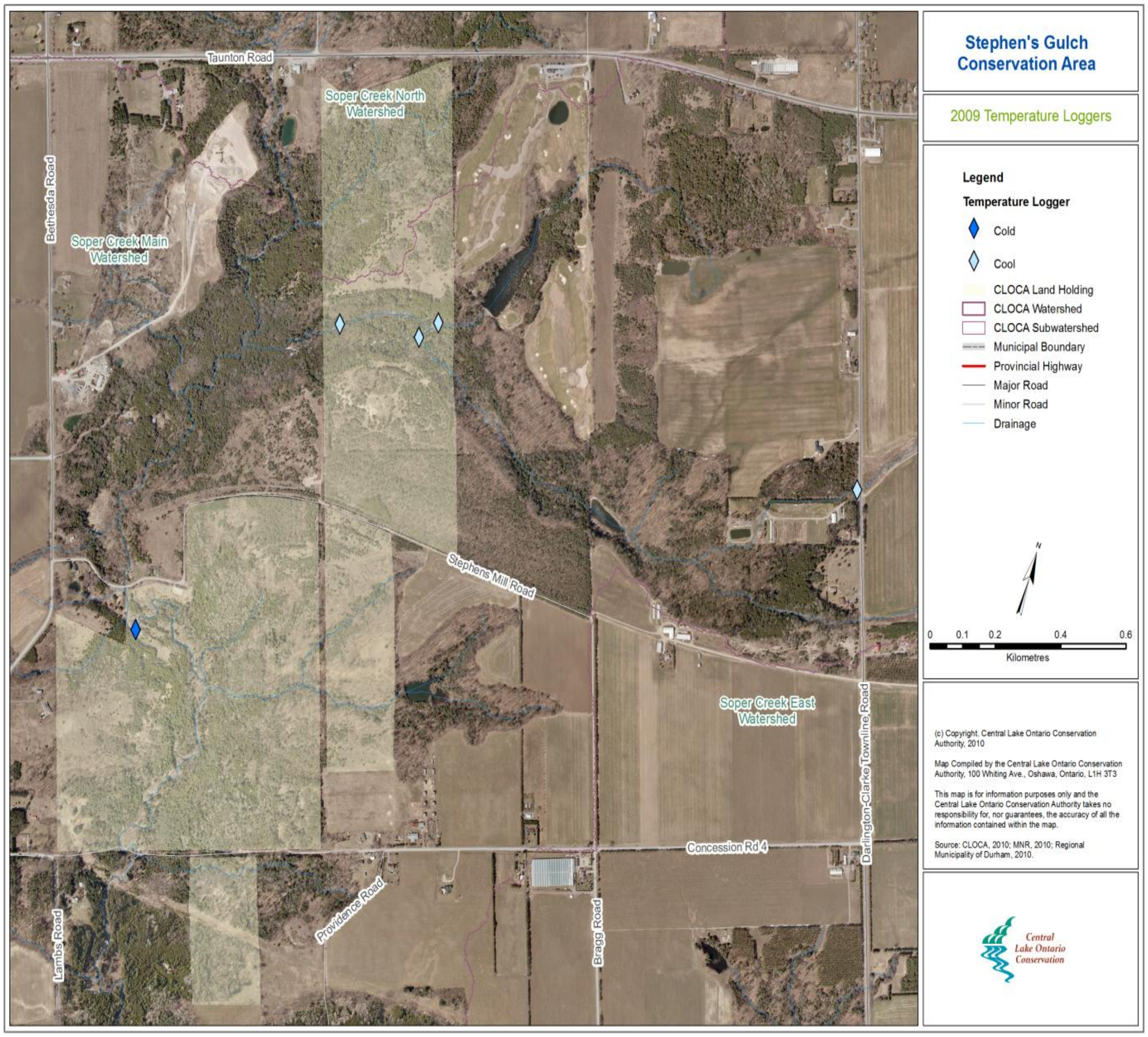


Figure 8: Location and thermal classification of stream temperature loggers within or in close proximity to the Stephen's Gulch Conservation Area during 2009.

4.2 Results

Please refer to Table 7 in **Appendix III – Stream Temperature** regarding temperature logger data discussion below.

4.2.1 Lynde Creek watershed

A total of 52 temperature loggers were installed in Lynde Creek in 2009 (Figure 7). Of these loggers, data from only 10 indicated a coldwater regime. The remaining loggers were classified as coolwater but no locations resulted in a warmwater classification. It is interesting to note that through the 2006 and 2007 Aquatic Monitoring Reports it is evident that both Oshawa Creek and Bowmanville and Soper Creek watersheds support colder temperatures much further south than Lynde Creek watershed does.

4.2.2 Soper Creek watershed

A total of five temperature loggers were deployed within or in close proximity to Stephen's Gulch CA; two of which were also sampled in 2006 (Figure 8). Both the main branch and a small tributary of Soper Creek were sampled. Data from 2006 and 2009 indicates that coldwater habitat dominates the main branch of Soper Creek (TLSOP04, Table 11) while the small tributary located east of the main branch is dominated by coolwater habitat.

The small tributary sub-watershed originates approximately 1.5 km north of Taunton Rd., flows south of Taunton Rd. crossing Darlington-Clarke Townline Rd. and drains west approximately 2 km before converging with the main branch of Soper Creek. This sub-watershed contains numerous on-line ponds and likely some bypass and off-line ponds as well. An on-line pond is built by digging-out or dredging an area within an existing watercourse or by damming a watercourse. "On-line ponds cause water temperature to increase, sometimes beyond levels tolerable to resident fish species.", (Fish habitat and constructing ponds, Fisheries and Oceans). The various ponds upstream of the Stephen's Gulch CA and to a lesser degree the lack of riparian cover are likely contributing to warmer temperatures downstream. Historically, this small tributary was likely dominated by coldwater habitat. Unfortunately, due to a lack of resources, a full assessment of these ponds and their impacts on the downstream temperature was not possible.

In 2005 two loggers (TLSOP09 and TLSOP10) were purchased by Irv Harrell for his stewardship property (Hawkridge Farm) located within Soper Creek watershed (Gibb Rd./Con. Rd. 7). A section of Soper Creek flows through Hawkridge Farm and data from 2005 to 2009 indicates that it is coldwater. No cool or warmwater days have been recorded during this time. During 2009 both loggers recorded a maximum temperature of 19.0° Celsius, which is the highest to date. This is a considerable increase from an average of approximately 16° Celsius.

Two loggers (TLSOP14 and TLSOP15) were installed within the Cane Tract which resulted in coolwater classifications. These are located just upstream of Hawkridge Farm.

4.2.3 Pringle Creek watershed

A total of two temperature loggers were installed in Pringle Creek in 2009. They were located at Taunton Rd. and upstream (north) of Hwy 401 approximately 500 metres. Data indicates that both of these sites are coolwater habitat.

4.2.4 Farewell and Harmony Creek watersheds

A total of three temperature loggers were installed in Farewell and Harmony Creeks and downstream of their confluence in the vicinity if Colonel Sam Drive. The data indicates that all three were coolwater.

4.2.5 Darlington Creek watershed

A total of two temperature loggers were installed in Darlington Creek in 2009. Both temperature loggers were installed just north (upstream) of the Hwy 401 in Clarington. The data indicates that both of these sites are coolwater habitat, although TLDN01 recorded the highest maximum temperature to date (31.0° Celsius) and TLDN02 had the lowest recorded maximum temperature (22.7° Celsius).

4.2.6 Robinson Creek watershed

A total of one temperature logger (TLROB02) was installed in Robinson Creek in 2009 at the north end of Darlington Provincial Park. Data from 2006 and 2009 indicate that this is a coolwater (coldwater) creek with the maximum recorded temperature reaching 23.8° Celsius in 2009.

This is further supported by the fact that young-of-the-year Rainbow Trout which is a coldwater fish (Coker et al., 2001), were captured in this watershed during 2009. They were captured upstream (north) of Baseline Rd. near the CNR tracks during fisheries sampling (site R1, Sept 3rd) conducted by AECOM as part of the Robinson Creek and Tooley Creek Watershed Plan (Municipality of Clarington, 2010). They have also been caught during CLOCA sampling in 2003.

4.2.7 Westside Creek watershed

A total of two temperature loggers were installed in Westside Creek in 2009. The data indicates that both were coolwater habitat.

4.2.8 Corbett Creek watershed

A total of two temperature loggers were installed in Corbett Creek in 2009. Both were located south of Wentworth Avenue in the south end of Whitby. One temperature logger was located on the East Branch and the other one on the West Branch. Data indicates that both of these sites are coolwater habitat. Data was also collected at these locations during 2005 and 2006 resulting in warmwater and coolwater classifications respectively. Even though 2005 data resulted in warmwater classifications, only two warmwater days were recorded and no Above Upper Lethal Days were recorded for Rainbow Trout which is a coldwater fish (Coker et al., 2001). This shows the value of collecting data over multiple years as this watershed appears to be a coolwater system most years.

4.2.9 Warbler Creek watershed

A total of one temperature logger was installed in Warbler Creek in 2009. The logger was installed just upstream (north) of Lake Ontario and data indicates that it is coolwater habitat.

4.2.10 Tooley Creek watershed

A total of one temperature logger was installed in Tooley Creek in 2009. The logger was installed in the south end of the watershed approximately 650 metres north (upstream) of Lake Ontario. Data indicates that this creek is coolwater habitat. Data was also collected at this location during 2005 and 2006 resulting in a warmwater and coolwater classification respectively. Even though 2005 data resulted in a warmwater classification, only five warmwater days were recorded and no Above Upper Lethal Days were recorded for Rainbow Trout which is a coldwater fish (Coker et al., 2001). This shows the value of collecting data over multiple years as this watershed appears to be a coolwater system most years.

This is further supported by the fact that young-of-the-year Rainbow Trout were caught in 2009. They were captured upstream (north) of Highway 401 near Courtice Rd. during fisheries sampling (site T2, June 25) conducted by AECOM as part of the Robinson Creek and Tooley Creek Watershed Plan (Municipality of Clarington, 2010). They have also been caught during CLOCA sampling in 1997 and 2003.

4.2.11 Osbourne Creek watershed

A total of one temperature logger was installed in Osbourne Creek in 2009. This was the first time that temperature data has been collected from this watershed by CLOCA. The logger was installed only a few meters upstream (north) from the Lake Ontario beach. Data indicates that this creek is coldwater with only one day out of 62 (July 1st-August 31st) recording coolwater temperatures.

5.0 FISHERIES SAMPLING (STREAMS)

5.1 Introduction

Fish are one of our most valued natural resources from ecological, economic, social and cultural perspectives. Healthy fish and environments result from protecting and/or restoring aquatic ecosystems (Draft Terms of Reference, 2005). In order to help determine aquatic ecosystem health and monitor it over time CLOCA conducts fisheries assessments in various watersheds each season. Ongoing annual aquatic monitoring is recommended in the Central Lake Ontario Fisheries Management Plan (CLOFMP; CLOCA/MNR 2007). Information collected during these programs supports the goals and objectives of the CLOFMP and allows for an adaptive management approach.

Historically, watersheds within the Central Lake Ontario Conservation Authority supported healthy coldwater fish communities and a strong Brook Trout and Atlantic Salmon fishery. With increasing urbanization and changing land-use patterns, many of the coldwater streams have become cool or warmwater systems. The Atlantic Salmon fishery has since collapsed and has been supplemented by stocking of Pacific Salmon and Trout species. In CLOCA's jurisdiction, the distribution of Brook Trout has typically been reduced to the undeveloped headwater reaches in the natural settings of the Oak Ridges Moraine (CLOCA/MNR, 2007).

While there have been many changes to the fish communities and fish habitat within CLOCA's jurisdiction, the watersheds are still home to a diverse array of fishes including cold-, cool- and warm-water species. Some of these watersheds, like the Lynde Creek, support diverse fish communities including cold-, cool- and warm-water species. Angling opportunities include Rainbow Trout and White Sucker during the spring and resident Brook Trout during the spring and summer; all during the regular season. Anglers also take advantage of fishing popular warm-water species like Bass, Sunfish and Carp in the coastal areas (CLOCA/MNR, 2007).

Generally, CLOCA conducts fisheries sampling in streams using a common sampling method called **electrofishing** (see photo on right). On occasion, when electrofishing is not a suitable technique, other sampling methods, such as seine nets, fyke nets, dip nets and minnow traps, are utilized. Backpack electrofishing, is conducted, for the most part, according to the Ontario Stream Assessment Protocol (OSAP) published by the MNR (Stanfield, 2005).

Electrofishing is a sampling method that temporarily immobilizes fish in water using electricity. Once immobilized, they can be captured with nets and fisheries staff can collect biological information (e.g., species, length, weight) before releasing them.

5.2 Monitoring Results and Fisheries Management

During 2009, 48 OSAP sites were sampled by CLOCA as part of the annual aquatic monitoring program and another five were sampled through the OSAP Training Course in the Oshawa Creek watershed (Figure 9). Fish species that were captured are listed in Table 9, Table 10, Table 10, Table 12, and Table 12.

5.2.1 Lynde Creek watershed

The draft Central Lake Ontario Fisheries Management Plan (MNR/CLOCA, 2007) outlines watershed and subwatershed-based goals and objectives for the fisheries resource and habitat within Lynde Creek, and identifies target species and fish communities for management. CLOCA's annual aquatic monitoring helps to assess these goals and objectives and is consistent with the management recommendations made within the Plan. Further, it allows for an adaptive management approach.

Migratory trout use Lynde Creek for spawning and rearing habitat, while resident trout use the watershed for all their life-stages. Brook Trout are the only remaining native trout species within the watershed; however, their habitat is easily impacted by land use changes. As stream temperatures increase and riparian vegetation is removed, habitat quality for Brook Trout may be degraded to such an extent that populations in the watershed are compromised. As future land use development occurs, management precautions must be taken to ensure that cold-water habitat is not compromised. In addition to Brook Trout, other salmonids using Lynde Creek require cold and cool-water habitat. Management actions taken to protect Brook Trout will also benefit other salmonids.

Within the Lynde Creek watershed 45 OSAP sites were sampled in 2009 and an interesting observation was noted when comparing Rainbow Trout catch data to 2001 (Table 2). It appears that more young-of-year Rainbow Trout were present per site in 2001 compared to 2009. This was not the case with Rainbow Trout parr as it appears that more were present per site in 2009 compared to 2001. It should be noted that during 2001, all of the sites were sampled in June compared to July and August during 2009. Further, it should be noted that this observation does not necessarily imply a trend, given that the data only represents two sampling events. Also, the distribution of sampling sites in 2009 differed from 2001 due to permitting restrictions; see Redside Dace discussion below. Both of these variables could bias the data.

parr - life stage of salmonid fishes, usually in first or second year (Scott W.B. and E.J. Crossman 1973.).

Table 2: Comparing Rainbow Trout catch data from 34 sites sampled both in 2001 and 2009.

	2001			2009		
	No. of Sites	% of Sites	Average per Site	No. of Sites	% of Sites	Average per Site
Rainbow Trout (young-of-year)	11	32	19.2	13	38	3.9
Rainbow Trout (parr)	6	18	1.2	19	56	3.6

No. of Sites represents the number of sites where individuals were caught.
% of Sites represents the percentage of sites where individuals were caught in comparison to the total number of sites sampled.
Average per Site represents the average number of individuals caught per site.

Of particular interest was the fact that a Rainbow Trout and a Northern Pike were both caught in the upper part of the Kinsale Subwatershed near Hwy 7 and upstream (north) of Taunton Rd. respectively. This observation is of interest for several reasons. First, 2009 marks the first year in recent history where Rainbow Trout has been observed in the Kinsale Branch. The FMP identifies migratory salmonids in the fish community objectives for this subwatershed so this finding satisfies a management goal. Second, while anecdotal evidence exists, 2009 marks the first confirmed catch of Northern Pike on record in the Kinsale Branch and provides proof of their use of the lower reaches of Lynde Creek. Lastly, this is of interest due to the fact that this subwatershed is known to experience intermittent flow during extended periods of drought. This shows that tributaries that occasionally have low flow conditions are still a valued and integral part of the fishery.

The results of the 2009 CLOCA Aquatic Monitoring are consistent with the goals and objectives of the FMP. The main branches of Lynde Creek are still inhabited by migratory Rainbow Trout and Brook Trout are found in the upper headwater areas and both should remain managed as such. Lynde Creek receives a run of migratory Rainbow Trout as shown through spawning surveys and there is evidence of recruitment as indicated by young-of-the-year. As such, Lynde Creek should remain managed for migratory Rainbow Trout and resident Brook Trout and efforts to improve habitat in the watershed should be supported.

Redside Dace is a species which is designated as endangered, both federally by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and provincially by the Committee on Status of Species at Risk in Ontario (COSSARO). The distribution of Redside Dace is limited to only a few watersheds in southern Ontario (Andersen 2002). This species is particularly sensitive to habitat changes, specifically turbidity and water temperature. As a result of increased land development within the Greater Toronto Area (GTA), the availability of suitable habitat for Redside Dace has declined significantly (Holm and Crossman, 1986; RSD Recovery Team, 2009). This trend of habitat loss has also been observed in the Lynde Creek watershed (CLOCA 2006, 2009), as has a decline in species occurrence (Andersen 2002). **Through 2009 CLOCA sampling, Redside Dace were discovered in a small tributary where they haven't been documented previously and this fact demonstrates the value of continued monitoring.** *Although it appears that Redside Dace numbers and distribution have declined in 2009 compared to 2001 sampling, this observation does not necessarily imply a trend but rather may be reflective of differences in sampling site distribution, effort, timing of sampling, or simply reflect the* *natural variation in catch at any given location. Due to sampling restrictions related to Endangered Species Act permitting, not all of the previously sampled CLOCA sites from 2001 were re-visited. This was unfortunate as CLOCA will not re-sample Lynde Creek watershed until 2014.*

In an attempt to further CLOCA's knowledge of Redside Dace numbers and distribution, staff were assisted by David Lawrie from the Toronto Region Conservation Authority. During three days of field work, Dave shared his experience and equipment regarding two less commonly used sampling techniques; dip netting and high resolution underwater video. While no Redside Dace were observed using the underwater video camera, this species was caught later in the season using the rapid dip netting approach in a previously undocumented tributary. This initiative proved to be a valuable experience and these techniques, in particular the dip netting which collected good species distribution information with minimal effort, will likely be used in the future.

There appears to be a decline in Rosyface Shiner numbers and distribution when comparing 2001 and 2009 data (Figure 11). It should be noted that this observation does not necessarily imply a trend, given that the data only represents two sampling events. Nonetheless, this observation is of interest due to the fact that like Redside Dace, this habitat specialist species is sensitive to disturbance (Carmine Shiner Recovery Team, 2007).

As with all CLOCA watersheds, aquatic invasive species are present within Lynde Creek watershed. It is unknown at this time whether Round Goby (Figure 14) are present in the Lynde Creek watershed. To date, they have not been captured in the creek or receiving coastal wetland. Based on 2007 and 2008 Round Goby monitoring results in neighbouring watersheds, and the similar habitat that exists in the lower reaches of Lynde Creek, it is probable that Round Goby are present but were not detected due to low abundance or low sampling effort. Given the multitude of changes occurring in CLOCA watersheds including the ongoing introduction of invasive species, this project supports the recommendations in the CLOFMP to:

1) Continue ongoing annual aquatic monitoring throughout the watershed, particularly targeting the lower reaches, for invasive species;
2) participate in public outreach and education programs to raise awareness about the threat of invasive species; and,
3) investigate measures to control the introduction and spread of invasive species.

5.2.2 Soper Creek watershed

As part of the Stephen's Gulch Conservation Area (CA) management plan, CLOCA staff conducted fish community monitoring within or in close proximity to the CA in order to supplement historical sampling. A total of five electrofishing sites were sampled with three located in the CA.

Through 2006 and 2009 sampling, twelve fish species have been caught within the CA (Table 11), while these species have various thermal preferences; they are representative of a healthy coldwater fish community. The presence of sensitive species including Brook Trout, Brown Trout, Rainbow Trout, Chinook and Coho Salmon shows that the habitat is high-quality. Amongst the catch, many young-of-year (YOY) trout and salmon were observed, which is evidence of natural recruitment (successful spawning and survival of young into the fishery). All of the species and life history stages listed above have also been observed at the sites immediately upstream and downstream of the CA.

One site (SD05) was also sampled within the recently acquired Cane Tract (Concession 8 and Gibbs Road) although no fish were documented at the site.

5.2.3 Minnow Traps

Two locations were surveyed using minnow traps during 2009; Darlington Creek and Farewell Creek (Figure 9).

Darlington Creek was sampled in one location (MTDAR22) approximately 1.0 km south of Bloor St. on Solina Rd. using one minnow trap set for one, 24-hour period. Five Brook Stickleback were captured which is a coolwater fish (Coker et al., 2001). This marks the most upstream location that CLOCA has observed fish within this tributary of Darlington Creek watershed.

Farewell Creek was sampled in two locations (MTFAR01 and MTFAR02) approximately 1.8 km and 1.6 km respectively south of Taunton Rd. on Solina Rd. Site MTFAR01 was sampled using one minnow trap set for two, 24-hour periods. Five Green Sunfish and one Fathead Minnow were captured during the second set which are both warmwater fishes (Coker et al., 2001). Site MTFAR02 resulted in a no catch during one 24-hour period.

5.2.4 OSAP Training Course

The 2009 OSAP Training Course was held from June 8-12 at Durham College/UOIT. This was the third year that as part of the training program a selection of 5 CLOCA ARMP sites within Oshawa Creek watershed was sampled. Due to the fact that this is a training exercise with participants taking turns in order to gain practical sampling experience, abundance data is not reported (Table 12).

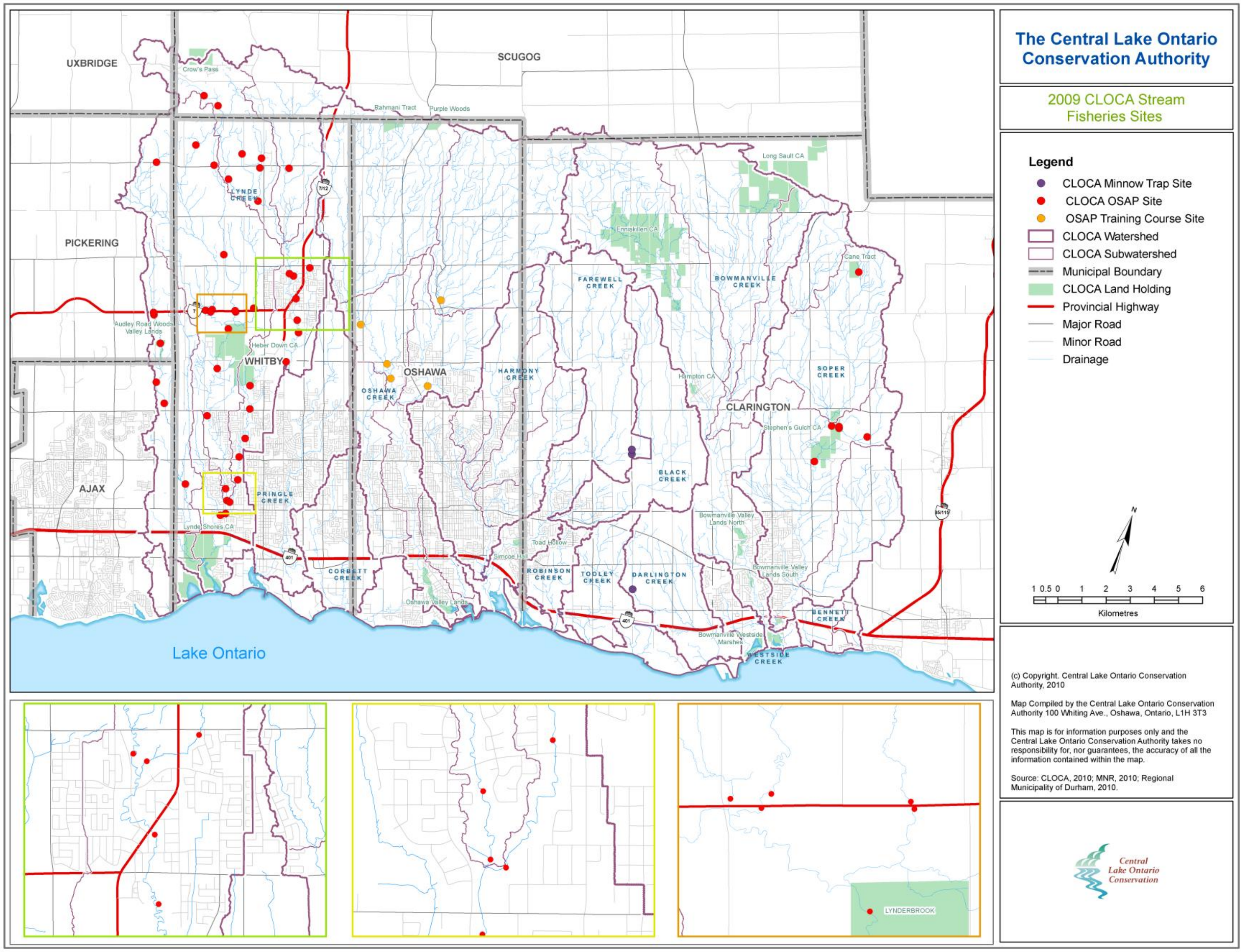


Figure 9: 2009 stream fisheries site locations.

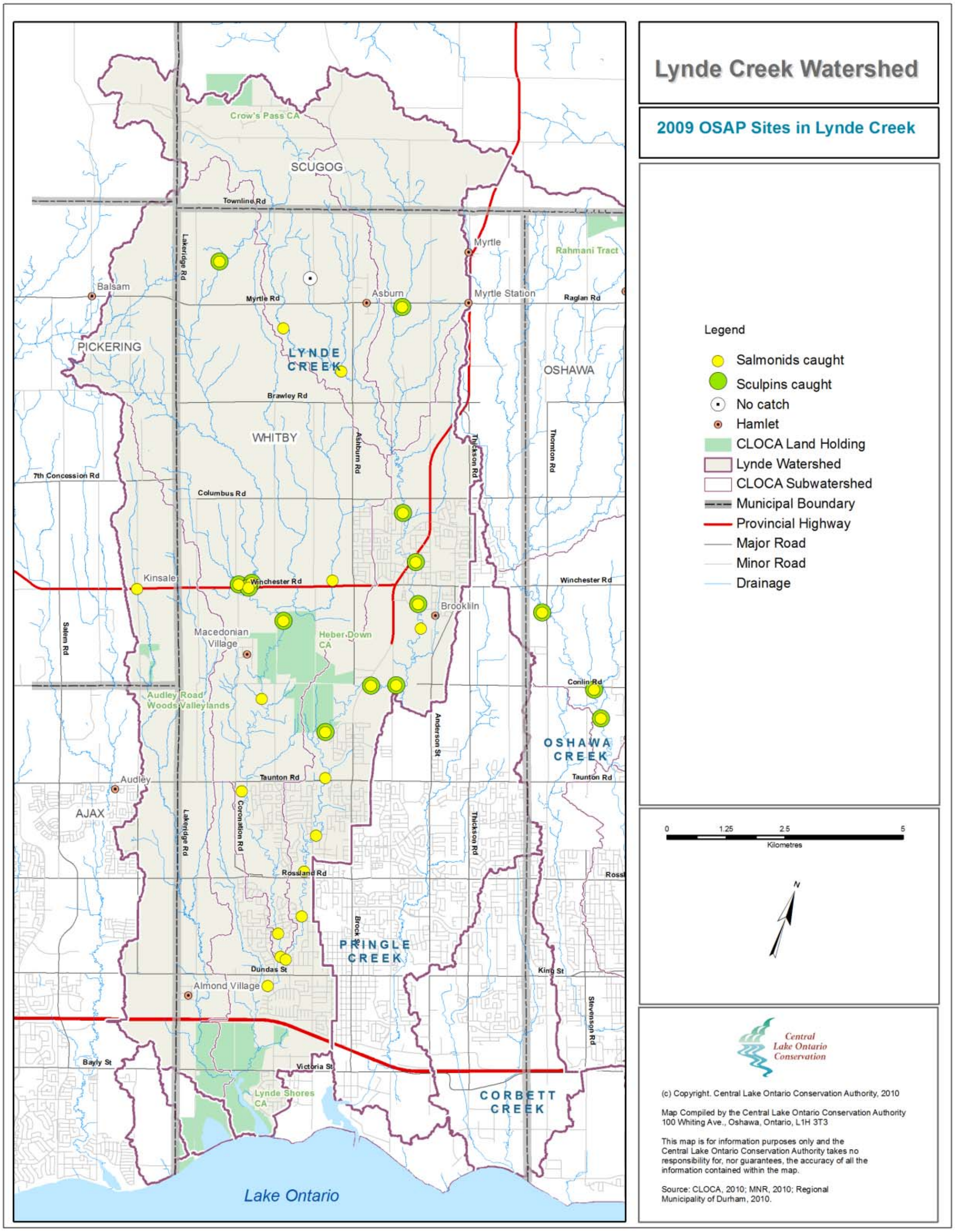


Figure 10: Locations where Salmonid and Sculpin species were caught during 2009 fisheries sampling in Lynde Creek watershed.

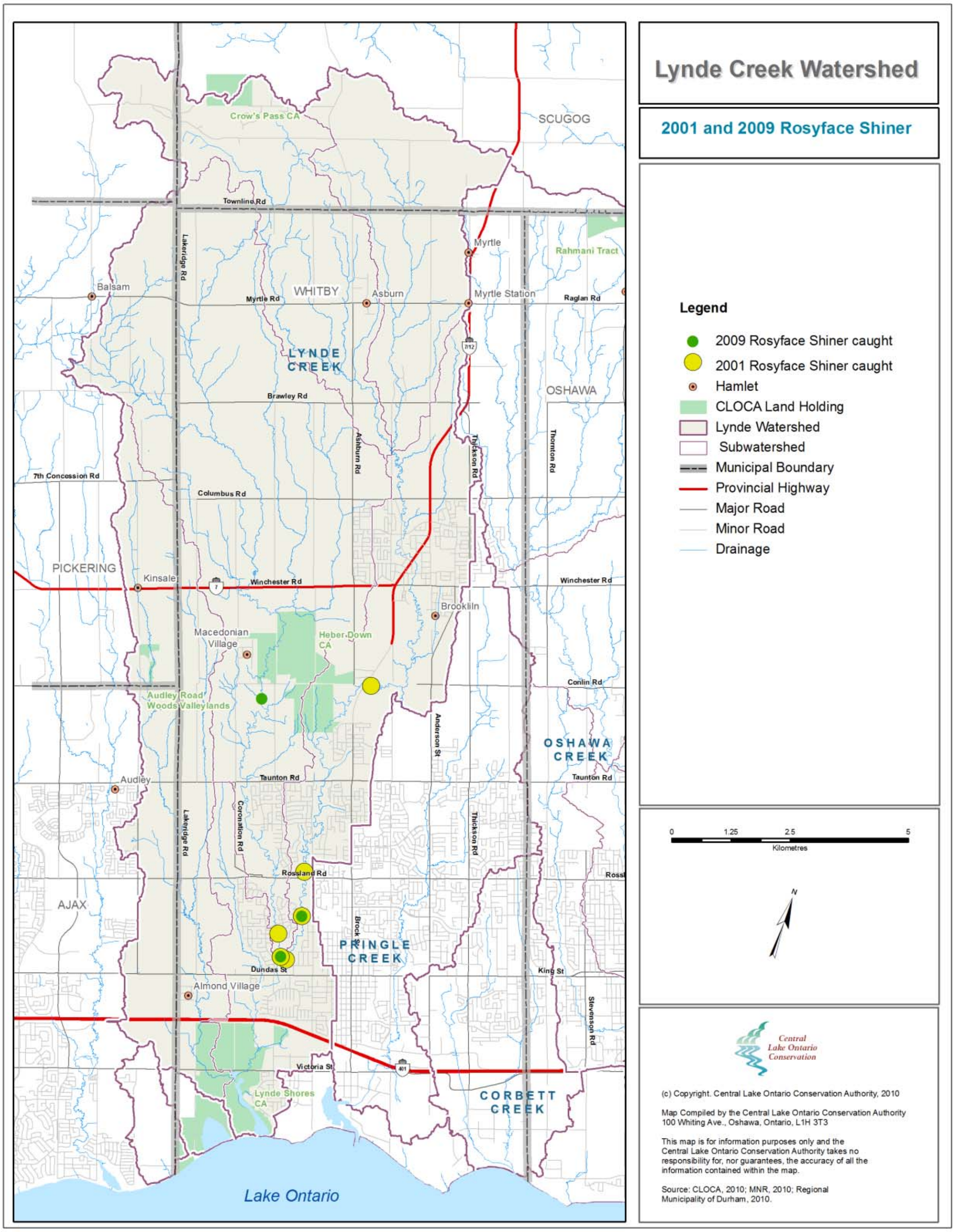


Figure 11: Locations where Rosyface Shiner were caught during 2009 and 2001 fisheries sampling in Lynde Creek watershed.

6.0 FISHERIES SAMPLING (COASTAL WETLANDS)

6.1 Introduction

Great Lakes coastal wetlands are a unique wetland type that have formed at the mouths of streams and rivers where they empty into the lakes, or in open or protected bays along the shoreline.

Lake Ontario's water level has been regulated since 1960 to accommodate increased demand for shipping and hydroelectric power. Natural water level variability has been diminished, reducing the biological diversity of coastal wetlands that depend on water level fluctuations to maintain diverse vegetation communities (Environment Canada and Central Lake Ontario Conservation Authority, 2004a).

The Durham Region Coastal Wetland Monitoring Program (DRCWMP) is designed to be a long-term monitoring program that enables reporting on the condition of coastal wetlands in the Region (Figure 12). The project was initiated in 1999 and monitoring began in 2002. Partners involved include Environment Canada, Central Lake Ontario Conservation Authority, Toronto Region Conservation Authority (TRCA) and Ganaraska Region Conservation Authority (GRCA) (Environment Canada and Central Lake Ontario Conservation Authority, 2004b).

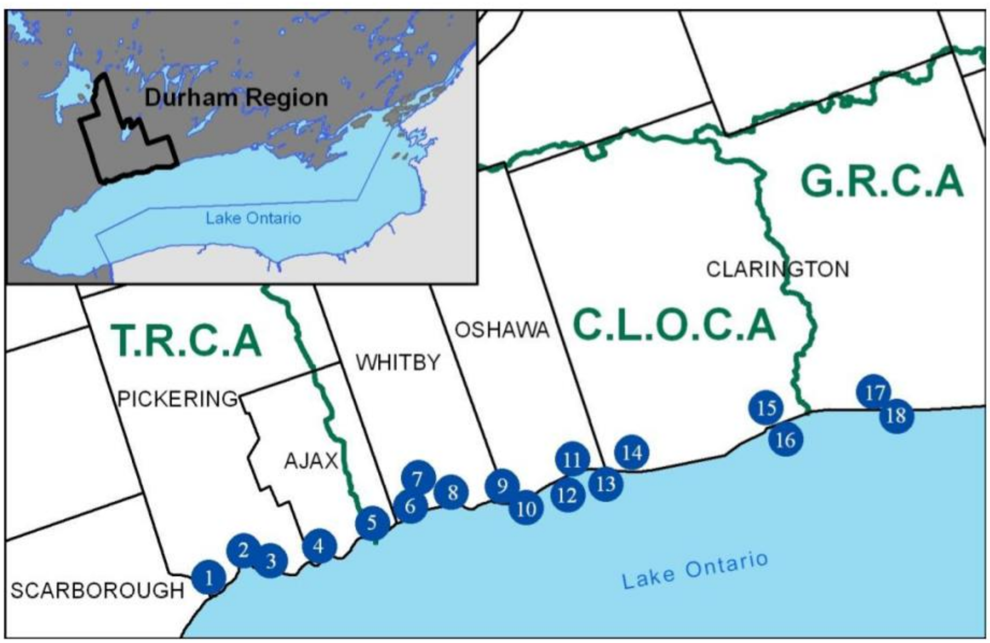


Figure 12: Location of Durham Region coastal wetlands. Wetland information is listed in Table 3.

Table 3: Durham Region coastal wetlands.

Wetland Name	Keymap Number	Wetland Type*	Conservation Authority
Rouge River Marsh	1	DR	TRCA
Frenchman's Bay Marsh	2	BB	TRCA
Hydro Marsh	3	BB	TRCA
Duffins Creek Marsh	4	DR	TRCA
Carruthers Creek Marsh	5	DR	TRCA
Cranberry Marsh	6	BB	CLOCA
Lynde Creek Marsh	7	DR	CLOCA
Whitby Harbour Marsh	8	DR	CLOCA
Corbett Creek Marsh	9	DR	CLOCA
Gold Point Marsh	10	DR	CLOCA
Oshawa Creek Marsh	11	DR	CLOCA
Pumphouse Marsh	12	BB	CLOCA
Oshawa Second Marsh	13	BB	CLOCA
McLaughlin Bay Marsh	14	BB	CLOCA
Westside Marsh	15	BB	CLOCA
Bowmanville Marsh	16	DR	CLOCA
Wilmot Creek Marsh	17	DR	GRCA
Port Newcastle Marsh	18	DR	GRCA

* DR = drowned river mouth; BB = barrier beach lagoon

As part of the DRCWMP, fish communities in wetlands are assessed using a sampling method called boat electrofishing (see photo on right; see page 18 for a definition of electrofishing). In order to have consistent sampling effort, fish are sampled within the DRCWMP wetlands using the same electrofishing boat, owned and operated by CLOCA. Boat electrofishing is conducted according to DRCWMP fish sampling protocol (Environment Canada and Central Lake Ontario Conservation Authority, 2003).

The relative condition of the fish community at each wetland and over multiple years is compared using an Index of Biotic Integrity (IBI). IBIs, which are multi-metric indices, were first developed for use with stream fish communities by James Karr in central Illinois and Indiana (Karr, 1981). Metrics, or attributes, appropriate to Lake Ontario coastal wetland fish communities were selected and tested for suitability in the IBI based on a significant ($p<0.05$) or moderate ($p<0.20$) response to disturbances of the wetland. Six metrics were found to correlate either negatively or positively with disturbance and were, thus, retained for use in this IBI (Table 4). Each wetland receives an IBI score between 0 and 100 each year/time that it is sampled (Table 18) (Environment Canada and Central Lake Ontario Conservation Authority, 2004b).

Table 4: Six metrics used in DRCWMP IBI.

1	Number of native species (SNAT),
2	Number of centrarchid species (SCEN),
3	Percent piscivore biomass (PPIS),
4	Number of native individuals* (NNAT),
5	Percent non-indigenous biomass* (PBNI),
6	Biomass (g) of Yellow Perch (BYPE).

*Metric was corrected for site-specific interaction.

6.2 Durham Results

6.2.1 Lynde Creek Marsh

This is the eighth season that Lynde Creek Marsh has been sampled through the DRCWMP using CLOCA's boat electrofisher. Sampling resulted in an IBI score of 38 which is fairly consistent with past year's sampling. Interesting results include the presence of an adult Gizzard Shad (see photo on right), and a Smallmouth Bass (see photo below/left). Smallmouth Bass are not commonly found within this wetland through the DRCWMP (Table 13).

6.2.2 Whitby Harbour Wetland Complex

Fish Sampling was conducted for the third year as part of the DRCWMP within the Whitby Harbour Wetland Complex. Results again showed poor catch numbers and diversity. Interesting results include the presence of numerous adult Common Carp (see photo below/left) which are not native to Ontario and tolerant of poor water quality. White Suckers (see photo below/right) were also found for the second time in this marsh. The IBI scores from 2007 and 2008 were low at 9 and 29 respectively, and

the IBI score decreased to 6 in 2009. Since this is only the third time that the marsh has been sampled, no data trends or conclusions can be made. Consistent sampling efforts have provided very different results over the last three years. In 2007, 34 fish were caught, with 189 fish in 2008 and only 9 fish in 2009. These results indicate that habitat degradation is a likely cause for the poor catch (see historical summary below).

Below is a summary of some historical sampling within the Whitby Harbour area:

> *High levels of Dioxins and Furans have been found in soils, sediment and biota collected from the Study Area. Contamination in Whitby Harbour was first investigated by Environment Canada in the late 1970's. Studies by the Ministry's Environmental Monitoring and Reporting Branch from the mid 1990's through 2006 have delineated Dioxins and Furans contamination in the creek and harbour sediments, soils on the creek floodplain, and in areas where dredgate has been deposited. Elevated levels of Dioxins and Furans have also been found in the tissues of juvenile and sport fish and caged mussels from the creek and harbour.*
>
> *Historically, Whitby Harbour was an active industrial port which has been gradually redeveloped for mainly recreational uses including 2 marinas, adjacent parkland and sports facilities. There is evidence that dredgate and lake fill were historically used as fill for the development of the harbour lands and since the late 1970's, the routine dredging of Whitby Harbour has used confined disposal cells to manage the dredgate. In contrast, Pringle Creek and Pringle Creek floodplain, south of Watson Street, remain largely undeveloped and include natural wetland*

areas. Pringle Creek widens as it flows into Whitby Harbour at Brock Street and the sediment deposits at the creek mouth are seasonally exposed during summer low flow conditions.

(MOE, 2009)

6.2.3 Corbett Creek Marsh

This is the sixth season that Corbett Creek Marsh has been sampled through the DRCWMP using CLOCA's boat electrofisher. Although this marsh has not typically scored well in the past, this year's IBI score of 21 is the lowest score to date. Interesting results include the fact that only ten individual fish were captured. Possible explanations for low catch and poor water quality over the years may include the fact that a large proportion of this watershed is developed with a lack of stormwater management, and the increased rain events during June and July of 2009 which may have also influenced monitoring results (Table 13). In addition to traditional sampling locations within the marsh, one supplemental site was completed in Lake Ontario along the barrier beach. While no Round Goby floated high enough to be captured it was estimated that 5 Gobies/m^2 were present. Although no Round Goby have been caught in the marsh, it is possible that they have invaded or will in the near future.

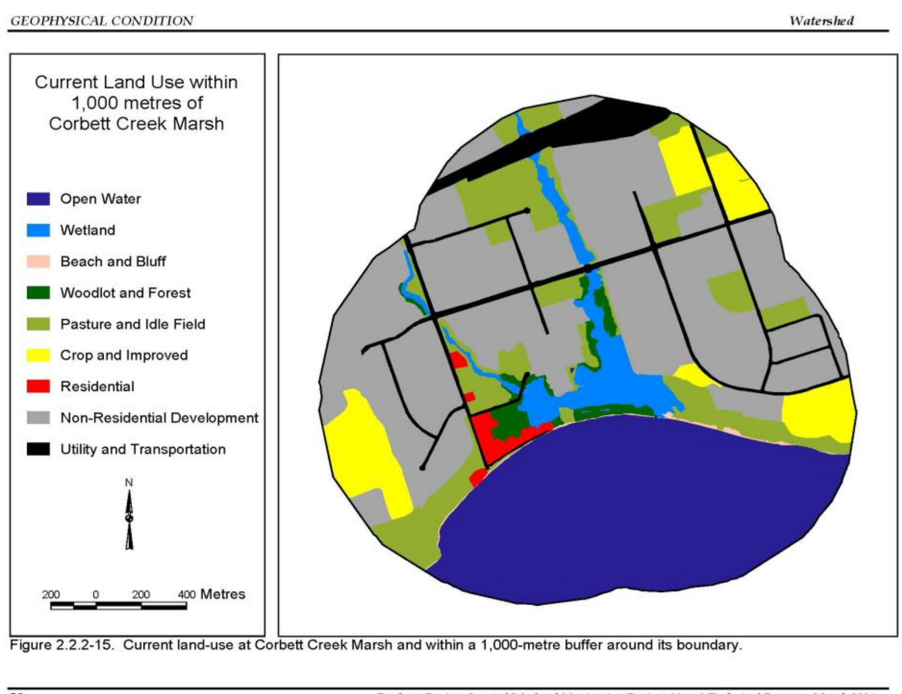


Figure 13: Current land-use at Corbett Creek Marsh within a 1000-metre buffer around its boundary.

6.2.4 Pumphouse Marsh

The summer of 2007 had very little precipitation and as a result, Pumphouse Marsh was completely dry by August. It is unlikely that any fish survived this event as no refuge pools were observed by CLOCA staff. During 2009 sampling, Fathead Minnow counts increased as well as invasive species such as, Common Carp and Goldfish, were captured at various locations within the marsh. A fourth species, Pumpkinseed was also found for the first time since 2006. Although more fish were caught this year the addition of invasive species being found decreased the 2009 IBI to 16.

It is unknown how fishes were able to re-populate Pumphouse Marsh, explanations include:

1. Fishes may have been able to access Pumphouse Marsh from Lake Ontario through the main outlet that drains onto the barrier beach via a culvert located on the west side of the Region of Durham Water Filtration Plant (see photos below). As the photos show, this connection to Lake Ontario may

   only be available at certain times of the year i.e., high flow events. Upstream of the main outlet there is also a concrete control structure designed to control the marsh water level through simple stop-log adjustments (see right photo). Some culvert information taken from Gartner Lee Ltd., 2005.

2. Another outlet culvert exists west of the first location but part of it appears to be completely buried within the barrier beach creating a permanent barrier to fish movement (see bottom right photo showing marsh side).
3. A third outlet culvert also exists on the southwest part of the marsh but its condition is unknown.
4. Another option is that someone may have released fishes into Pumphouse Marsh from another source e.g., bait bucket.

6.2.5 Oshawa Creek Coastal Wetland Complex

For the second time as part of the DRCWMP, fish sampling was conducted within the Oshawa Creek Coastal Wetland Complex. Sampling resulted in an IBI score of 37 with 10 different species of fishes being caught. This was a decrease from an IBI score of 52 in 2008 with 13 species caught. Interesting new species that were caught this year include Largemouth Bass (bottom left) and Round Goby. Gizzard Shad (see photo bottom/right) were caught again this year but in slightly lower numbers.

Northern Pike (see photo top/right) were caught for the second year in a row but declined from nine caught in 2008 to two in 2009. Since this is only the second time Oshawa Creek Coastal Wetland Complex has been sampled, no long-term trends can be determined.

6.2.6 Oshawa Second Marsh

This is the sixth season that this marsh has been sampled through the DRCWMP using CLOCA's boat electrofisher. Sampling resulted in an increased IBI score of 45 with 8 different fish species. Last year 10 fish species were found but total counts of fish increased from 77 in 2008 to 239 in 2009. Pumpkinseed (see right photo) a native warmwater species, were caught in high quantities again this year.

Since sampling began, Goldfish (see photo below/left) have been consistently captured in high numbers. Indigenous to eastern Asia they are a non-native species that has been introduced by the release of aquarium pets. This is an ongoing problem as Goldfish compete with native species for food and habitat, contribute to turbidity and damage vegetation (Richardson et al., 1995). Goldfish often find suitable conditions in various wetlands and ponds.

All fishes that enter or leave the marsh must pass through a water-level control structure that connects Oshawa Second Marsh to Farewell Creek. An adjustable grate is used to manage fish passage allowing for control of undesirable fish species such as Common Carp (see photo above/right) which is part of the

Goldfish family. Unfortunately, this grate can also exclude desirable fishes such as adult Northern Pike if not positioned correctly. Managers are able to make informed decisions regarding the grate setting by using data collected through the DRCWMP fish sampling each year. This method of decision making is often referred to as adaptive management.

6.2.7 McLaughlin Bay Marsh

This was the 6th year that McLaughlin Bay Marsh was sampled through DRCWMP. It scored its lowest ever IBI score at 21 dropping only slightly from the previous year score of 24. Interestingly the fish count and number of species both increased from last year. There were 12 different species caught, which equals the highest variety for this wetland (Table 14). Possible reasons for the low IBI score could be because of the 18 White Perch (see photos middle/left/right) that were caught that season. White Perch are native to Atlantic Canada and invaded the Great Lakes through the Erie Canal in the 1950s (Scott and Crossman, 1973). White Perch have been found in McLaughlin Bay previously but in fewer numbers. Common carp (see photo bottom/right) were also caught and could contribute to the lower IBI score.

6.2.8 Westside Marsh

This is the fifth season that Westside Marsh has been sampled through the DRCWMP for fish. Sampling resulted in an IBI score of 25, which is the lowest score recorded to date. Total fish caught decreased from previous years but total species caught actually increased slightly (Table 14). Interesting catches include; Black Crappie (see photo top/left), Northern Pike (see photo middle/right), and Largemouth Bass (see photo bottom/left). Both Northern Pike and the Largemouth Bass young-of-year were caught showing that the marsh is a suitable habitat for both spawning and juveniles.

The barrier beach was open during sampling (see photo top/right) allowing passage for any fish to either enter or exit the marsh.

6.2.9 Bowmanville Marsh

This is the eighth season that Bowmanville Marsh has been sampled through the DRCWMP using CLOCA's boat electrofisher for fish. Sampling resulted in an IBI score of 46 with 10 different fish species caught. The IBI score dropped from 63 in 2008 but 2009 did have the highest number of fish species caught at this site. Species caught included Brown Bullhead (see photo below/left) and Emerald Shiner (see photo below/right), which are regularly caught in this marsh. The Emerald Shiner is well known by many fishers as a common bait fish as it is an important food source for many different predators. (Holm et al., 2009)

6.2.10 Wilmot Creek Marsh

This is the sixth season that Wilmot Creek Marsh has been sampled through the DRCWMP using CLOCA's boat electrofisher for fish. Sampling resulted in an IBI score of 29, which is a large decrease from last year's score of 73. Interesting results include catching both a Brown Trout (see photo below/left) and Round Goby for the first time in this marsh. This was also the first year that yellow perch was not caught at this site. Three Northern Pike (see photo below/right) were also caught on one transect. An interesting observation included seeing an adult Chinook Salmon with a Sea Lamprey attached.

6.2.11 Port Newcastle Marsh

2009 sampling results were consistent with the previous year's results. IBI score, species total, and total fish caught all remained constant. Brown Bullhead was the most abundant species caught with 71 individuals. Other interesting results include Largemouth Bass and Round Goby (see photo on right). Round Goby were caught for the 3rd time in 4 years indicating that they are well established in this area. Round Goby are an invasive species from Eastern Europe that were first discovered in the St. Clair River in 1990. It is believed that they were introduced through ballast water from ships (Ontario Federation of Anglers and Hunters, 2007). Round Goby distribution in Ontario, as of 2008, is shown in Figure 14.

6.2.12 Frenchman's Bay Marsh

In Frenchman's Bay Marsh total fish caught decreased significantly but number of species as well as IBI stayed consistent. IBI score was likely improved by the presence of two predator fish not caught in this marsh previous to 2009; Northern Pike and Bowfin. Round Goby were caught again making it four years in a row that they have been found at this site. The first year they were caught in a supplemental site along the barrier beach but since then they have established throughout the entire marsh.

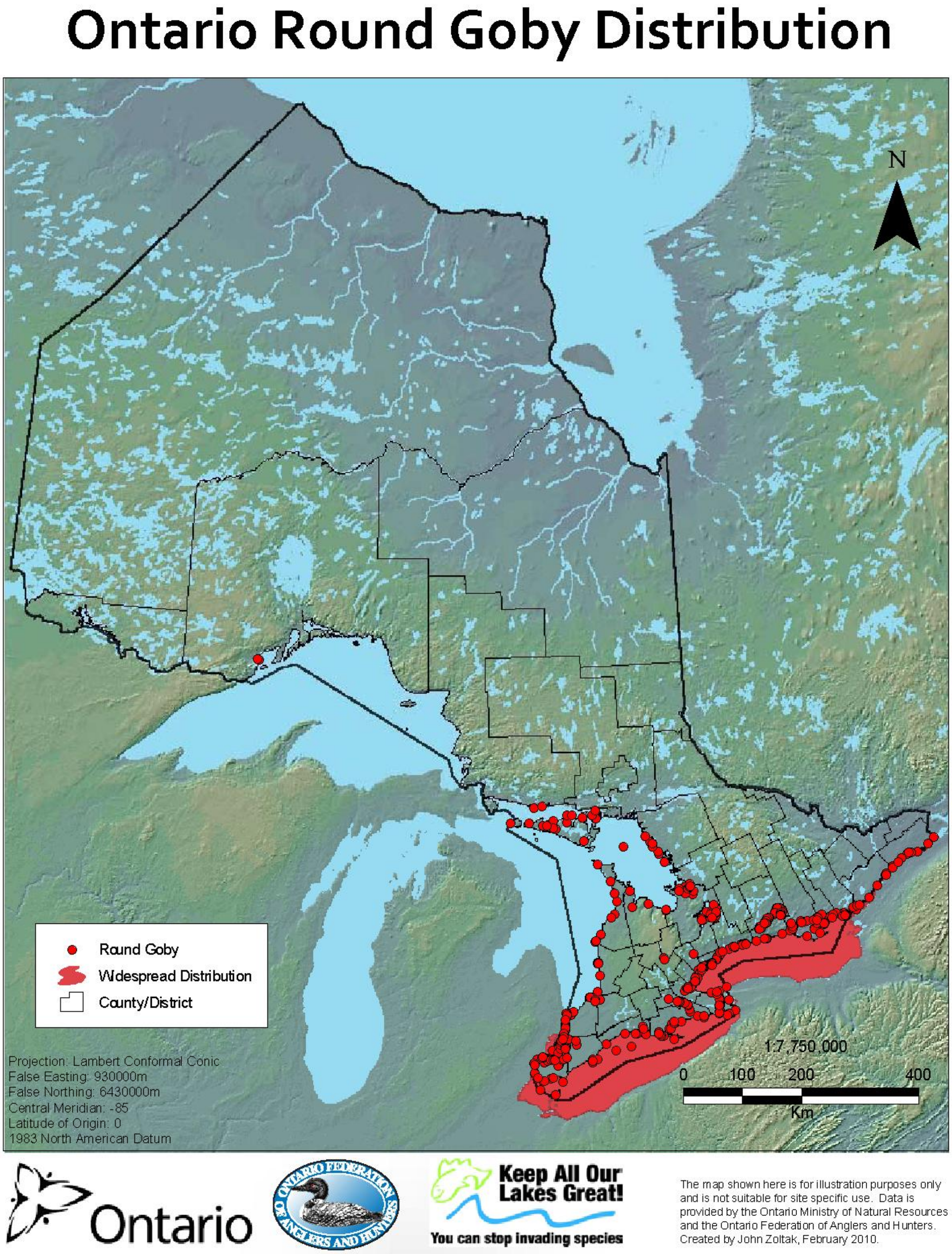


Figure 14: Round Goby distribution in Ontario as of February 2010 (OFAH 2010).

Bay of Quinte RAP

6.2.13 Introduction

Fish sampling through the DRCWMP in the Bay of Quinte and surrounding area first took place in 2003 with the sampling of two wetlands followed by an additional five in 2005. Data from these wetlands helped to strengthen the Durham project and other EC initiatives.

In 2008 CLOCA partnered with the Bay of Quinte Remedial Action Plan (BQRAP) to sample approximately 15 wetlands over a 3-year period. See below for details regarding the BQRAP.

> ***Great Lakes Water Quality Agreement (GLWQA):***
> *An international treaty made between Canada and the United States in 1978. The purposes of this agreement were:*
>
> *1) To provide measurable goals to restore, protect and maintain the environment quality of the Great Lakes Ecosystem.*
>
> *2) To identify Areas of Concern where the environmental quality does not meet international standards.*
>
> ***Area of Concern (AOC):*** *An area where the environmental quality does not meet international standards set out by the GLWQA. Each AOC is required by the GLWQA to have a Remedial Action Plan. Currently there are 17 AOC's in Ontario.*
>
> ***Remedial Action Plan (RAP):*** *Under the GLWQA, each AOC is required to have a Remedial Action Plan to enforce an "ecosystem approach" to improving water quality so that international standards can eventually be met.*

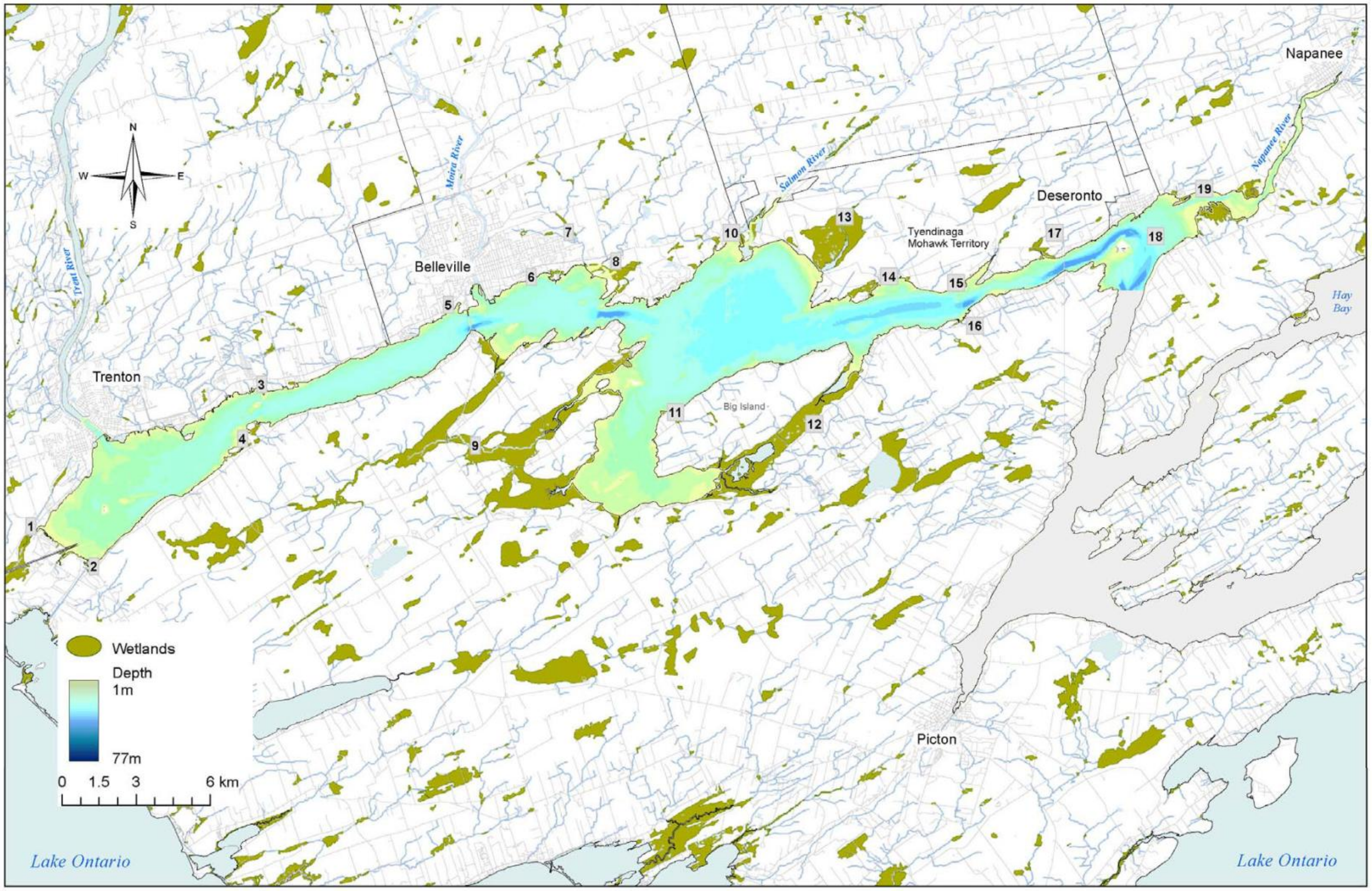
Bay of Quinte RAP – The Big Cleanup, (www.bqrap.ca)

6.2.14 Results

This past summer, fisheries sampling as part of the BQRAP began on August 17th and finished September 2nd with five Quinte wetlands being sampled (for marsh locations refer to Figure 15):

1. Robinson Cove
2. Carnachan Bay
3. Carrying Place
4. Sawguin Creek Marsh (Ditched)
5. Blessington Creek Marsh

Of the five marshes, Robinson Cove had the lowest IBI score of 67 with Blessington Creek Marsh receiving the highest score of 85 (Table 17). Winds combined with long commutes and mechanical problems caused some delays, which could have attributed to low scores in Robinson Cove. Quinte continues to produce a high diversity of predator species as well as smaller forage fish. Interesting results include catching young-of-year Grass Pickerel (see photo next page/middle/left), which is listed as Special Concern both provincially and federally (Ontario Ministry of Natural Resources, 2008).



Coastal wetlands in the upper bay of the Bay of Quinte:

1. Dead Creek Marsh
2. Carrying Place Marsh
3. Bayside Wetland
4. Pine Point Marsh
5. Belleville Treatment Plant Marsh
6. Belleville Marsh
7. Bell Creek Marsh
8. Blessington Creek Marsh
9. Sawguin Creek Marsh
10. Lower Salmon River
11. Robinson's Cove Marsh
12. Big Island Marsh
13. Big Marsh
14. Bluff Point Marsh
15. Lower Sucker Creek
16. Northport Swamp
17. Airport Creek Marsh
18. Forester's Island
19. Lower Napanee River

Figure 15: Map of the upper Bay of Quinte showing wetlands and depth contours (Bay of Quinte Remedial Action Plan, 2007)

7.0 RECOMMENDATIONS

Section	Results	Recommendations
2.0 Spawning Survey	During 2009, spawning surveys targeting migratory adult Rainbow Trout and White Sucker were conducted on various CLOCA watersheds: 1. Lynde Creek 2. Pringle Creek 3. Harmony Creek 4. Robinson Creek 5. Tooley Creek 6. Darlington Creek Fishes were observed within all watersheds surveyed with the exception of Robinson and Tooley Creek, which was likely due to low sampling effort. Although no migratory fishes were observed within these two watersheds through CLOCA spawning surveys, young-of-the-year Rainbow Trout which is a coldwater fish (Coker et al., 2001), were captured in these two watersheds during 2009 fisheries sampling conducted by AECOM as part of the Robinson Creek and Tooley Creek Watershed Plan (Municipality of Clarington, 2010).	Overall stream monitoring efforts during the 2010 season will be focused in the Small Watersheds. It is recommended that spawning surveys continue as this information is complimentary to standard fish community surveys.

Section	Results	Recommendations
3.0 Biological Water Quality	During May 2009, CLOCA staff sampled 17 OBBN sites in total throughout 3 watersheds (Figure 4). Four of the sites sampled were reference sites and the remaining 13 sites were test sites, generally at long-term monitoring sites. This was the fifth season that CLOCA has sampled benthos using the OBBN protocol.	Overall stream monitoring efforts during the 2010 season will be focused in the Small Watersheds. In order to complement this, it is recommended that the OBBN test site locations be selected with regard to OSAP site locations.
4.0 Stream Temperature	In total, 76 portable temperature loggers (Figure 5) were installed throughout the CLOCA jurisdiction in 2009 (Figure 6).	Overall stream monitoring efforts during the 2010 season will be focused in the Small Watersheds. In order to complement this, it is recommended that the majority of stream temperature loggers that are not dedicated to long-term sites be installed at or near OSAP site locations.
	Data indicates that coolwater and coldwater habitat dominates the areas surveyed with no warmwater sites recorded during 2009 (Figure 6).	Continue to monitor and report on the thermal regimes within these sites over the long-term following the CLOCA Aquatic Monitoring Schedule.
	Fisheries staff coordinated logger sites with engineering staff as their respective programs complement each other i.e., thermal impacts of stormwater ponds on fish and fish habitat.	It is also recommended that fisheries staff continue to coordinate logger sites with engineering staff.
	Eight new temperature loggers were acquired from the MTO.	It is also recommended that additional temperature loggers be acquired as needed to replenish aging stock.
	As recommended in the 2008 Aquatic Resource Monitoring Report temperature loggers continued to collect minimum temperature data in order to validate groundwater modeling.	It is also recommended that temperature loggers continue to collect minimum temperature data in order to validate groundwater modeling.

Section	Results	Recommendations
5.0 Fisheries - Streams	During 2009, 48 OSAP sites were sampled by CLOCA as part of the annual aquatic monitoring program and another five were sampled through the OSAP Training Course in the Oshawa Creek watershed. Fish species that were captured are listed in Table 9, Table 10, Table 11, Table 12, and Table 12.	Overall stream monitoring efforts during the 2010 season will be focused in the Small Watersheds. It is recommended that a selection of CLOCA fisheries sites (OSAP) first sampled in 1996, 1997 and 2003 be re-sampled.
	The results of the 2009 CLOCA Aquatic Monitoring are consistent with the goals and objectives of the FMP. The main branches of Lynde Creek are still inhabited by migratory Rainbow Trout and Brook Trout are found in the upper headwater areas and both should remain managed as such. Lynde Creek receives a run of migratory Rainbow Trout as shown through spawning surveys and there is evidence of recruitment as indicated by young-of-the-year at 17 sites. As such, Lynde Creek should remain managed for migratory Rainbow Trout and resident Brook Trout and efforts to improve habitat in the watershed should be supported.	It is recommended that the Aquatic Monitoring Program continue to acknowledge and support the goals and recommendations of the CLOCA FMP.

Section	Results	Recommendations
5.0 Fisheries – Streams con't	Redside Dace is a species which is designated as endangered, both federally by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and provincially by the Committee on Status of Species at Risk in Ontario (COSSARO). The distribution of Redside Dace is limited to only a few watersheds in southern Ontario (Andersen 2002). This species is particularly sensitive to habitat changes, specifically turbidity and water temperature. As a result of increased land development within the Greater Toronto Area (GTA), the availability of suitable habitat for Redside Dace has declined significantly (Holm and Crossman, 1986; RSD Recovery Team, 2009). This trend of habitat loss has also been observed in the Lynde Creek watershed (CLOCA 2006, 2009), as has a decline in species occurrence (Andersen 2002). **Through 2009 CLOCA sampling, Redside Dace were discovered in a small tributary where they haven't been documented previously and this fact demonstrates the value of continued monitoring.** *Although it appears that Redside Dace numbers and distribution have declined in 2009 compared to 2001 sampling, this observation does not necessarily imply a trend but rather may be reflective of differences in sampling site distribution, effort, timing of sampling, or simply reflect the natural variation in catch at any given location. Due to sampling restrictions related to Endangered Species Act permitting, not all of the previously sampled CLOCA sites from 2001 were re-visited. This was unfortunate as CLOCA will not re-sample Lynde Creek watershed until 2014*	It is also recommended that supplemental sites be conducted to further explore Redside Dace and Slimy Sculpin range within Lynde Creek.

Section	Results	Recommendations
5.0 Fisheries – Streams con't	As with all CLOCA watersheds, aquatic invasive species are present within Lynde Creek watershed. It is unknown at this time whether Round Goby (Figure 14) are present in the Lynde Creek watershed. To date, they have not been captured in the creek or receiving coastal wetland. Based on 2007 and 2008 Round Goby monitoring results in neighbouring watersheds, and the similar habitat that exists in the lower reaches of Lynde Creek, it is probable that Round Goby are present but were not detected due to low abundance or low sampling effort.	It is recommended that fisheries monitoring be conducted annually in the lower section of the major watersheds to help detect change over the long-term e.g., invasion of Round Goby. Currently these areas are only monitored once every five years.
	In an attempt to further CLOCA's knowledge of Redside Dace numbers and distribution, staff were assisted by David Lawrie from the Toronto Region Conservation Authority. During three days of field work, Dave shared his experience and equipment regarding two less commonly used sampling techniques; dip netting and high resolution underwater video. While no Redside Dace were observed using the underwater video camera, this species was caught later in the season using the rapid dip netting approach in a previously undocumented tributary. This initiative proved to be a valuable experience and these techniques, in particular the dip netting which collected good species distribution information with minimal effort, will likely be used in the future.	It is recommended that we continue to explore other methods of sampling, such as rapid dip netting, as a supplemental technique. Dip netting provided good species distribution data with minimal effort and is a useful technique to help fill in data gaps. It is recommended that we continue the use of dip netting as a supplemental sampling method because of its ability to collect good species distribution data with minimal effort.

Section	Results	Recommendations
5.0 Fisheries – Streams con't	There appears to be a decline in Rosyface Shiner numbers and distribution when comparing 2001 and 2009 data (Figure 11). It should be noted that this observation does not necessarily imply a trend, given that the data only represents two sampling events. Nonetheless, this observation is of interest due to the fact that like Redside Dace, this habitat specialist species is sensitive to disturbance (Carmine Shiner Recovery Team, 2007).	It is recommended that the possible decline of Rosyface Shiner be explored further.

Section	Results	Recommendations
6.0 Fisheries - Wetlands	In Durham, fisheries sampling was conducted within 15 coastal wetlands through the Durham Region Coastal Wetland Monitoring Project (DRCWMP), (Table 14, Table 15, Table 16, and Table 16).	Sampling through the DRCWMP in 2010 will include all wetlands in the project.
	This past summer, fisheries sampling as part of the BQRAP began on August 17th and finished September 2nd with five Quinte wetlands being sampled: 1. Robinson Cove 2. Carnachan Bay 3. Carrying Place 4. Sawguin Creek Marsh (Ditched) 5. Blessington Creek Marsh	Sampling in the Bay of Quinte area in 2010 through the DRCWMP will include 5 different BQRAP wetlands.
	As recommended in the 2008 Aquatic Resource Monitoring Report Round Goby locations (i.e., Frenchman's Bay Marsh and Port Newcastle Marsh) were monitored to track changing population trends.	It is also recommended that currently known Round Goby locations (i.e., Frenchman's Bay Marsh and Port Newcastle Marsh) continue to be monitored to track any changing population trends.

Section	Results	Recommendations
6.0 Fisheries – Wetlands con't	As recommended in the 2008 Aquatic Resource Monitoring Report the barrier beach at McLaughlin Bay Marsh was monitored for breakages to help better understand fish utilization of the marsh.	It is also recommended that the barrier beach at McLaughlin Bay Marsh continue to be monitored for breakages to help better understand fish utilization of the marsh.
	As recommended in the 2008 Aquatic Resource Monitoring Report the currently known Goldfish locations (i.e., Rouge River Marsh, Corbett Creek Marsh, Pumphouse Marsh and Oshawa Second Marsh) were monitored to track any changing population trends.	It is also recommended that currently known Goldfish locations (i.e., Rouge River Marsh, Corbett Creek Marsh, Pumphouse Marsh and Oshawa Second Marsh) continue to be monitored to track any changing population trends. Public education regarding the harmful effects of releasing non-native species into waterways should continue through the DRCWMP and public outreach events in which CLOCA is involved.
	Gold Point Coastal Wetland was not sampled for fish as part of the 2009 DRCWMP.	It is recommended that the Gold Point Coastal Wetland be added to the DRCWMP fish sampling component in 2010.

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9.0 APPENDIX I – SPAWNING SURVEYS

Table 5: 2009 Spawning Survey observations.

Site	Number of Times Surveyed	Type of Survey	Observed			
			Rainbow Trout	White Sucker	Redd	Spawning
SSDAR04	1	Creek Walk				
SSDAR06	1	Creek Walk				
SSDAR07	1	Creek Walk		✓		
SSDAR08	1	Creek Walk		✓		
SSHAR06	2	Creek Walk	✓			
SSHAR09	1	Creek Walk				
SSHAR10	2	Creek Walk	✓	✓		✓
SSHAR11	1	Creek Walk				
SSHAR12	1	Creek Walk		✓		✓
SSLYN01	2	Creek Walk	✓	✓	✓	
SSLYN02	2	Creek Walk	✓	✓		✓
SSLYN03	6	Creek Walk	✓		✓	
SSLYN04	1	Roadside				
SSLYN05	1	Creek Walk		✓	✓	
SSLYN06	1	Creek Walk	✓	✓	✓	✓
SSLYN07	1	Creek Walk				
SSLYN08	1	Creek Walk		✓		
SSLYN09	1	Creek Walk				
SSLYN10 – SSTLN26	1	Roadside				
SSLYN27	2	Roadside				
SSLYN28-SSLYN34	1	Roadside				
SSPRI01	3	Creek Walk			✓	
SSPRI04	1	Creek Walk		✓		
SSPRI08	1	Creek Walk		✓	✓	
SSPRI09	1	Creek Walk	✓	✓		
SSROB01	1	Creek Walk				
SSROB02	1	Creek Walk				
SSROB03	1	Creek Walk				
SSTLY01	1	Roadside				
SSTLY02	1	Creek Walk				
SSTLY03	1	Creek Walk				
SSTLY04	1	Roadside				
SSTLY05	1	Creek Walk				

Roadside survey is observations made at the intersection of the road and Creek Walk has a start point and an end point over a larger area

10.0 Appendix II – Biological Water Quality

Table 6: Percent EPT for OBBN sites sampled between 2005 and 2009.

	Site Code	Date (mm/dd/yy)	Methodology	%EPT	Family Richness
1	BOWOB03	05/27/05	Combined	24.0	9
2		05/27/06	Riffle 1	27.2	7
			Riffle 2	62.8	10
			Pool 1	42.3	10
3		08/05/07	Riffle 1	59.6	11
			Riffle 2	48.7	7
			Pool 1	14.3	8
4		05/24/08	Riffle 1	40.4	10
			Riffle 2	46.5	7
			Pool 1	2.9	8
5		05/20/09	Riffle 1	11.9	9
			Riffle 2	53	8
			Pool 1	21	10
6	LYOB01	05/26/05	Combined	5.8	10
7		05/13/09	Riffle 1	11.7	8
			Riffle 2	2.9	7
			Pool 1	4.2	12
8	LYOB02	05/19/05	Combined	8.0	9
9		05/19/09	Riffle 1	4.8	6
			Riffle 2	17.6	6
			Pool 1	7.6	8
10	LYOB03	05/26/05	Combined	1.9	9
11		05/19/09	Riffle 1	9.8	6
			Riffle 2	1.0	12
			Pool 1	20.6	8
12	LYOB04	05/20/09	Riffle 1	16.0	7
			Riffle 2	10.4	6
			Pool 1	2.9	8
13	LYOB05	05/22/09	Riffle 1	0.9	6
			Riffle 2	1.0	6
			Pool 1	0.0	6
14	LYOB06	05/26/09	Riffle 1	13.6	7
			Riffle 2	4.6	11
			Pool 1	2.9	9
15	LYOB07	05/22/09	Riffle 1	12.1	13
			Riffle 2	11.1	10
			Pool 1	13.4	9
16	LYOB08	05/25/09	Riffle 1	0.0	9
			Riffle 2	9.6	8
			Pool 1	0.0	6
17	LYOB09	05/26/09	Riffle 1	5.0	9
			Riffle 2	2.0	5
			Pool 1	2.7	4
18	LYOB10	05/26/09	Riffle 1	6.9	12

	Site Code	Date (mm/dd/yy)	Methodology	%EPT	Family Richness
	LYOB10 con't		Riffle 2	10.6	9
			Pool 1	4.6	11
19	LYOB11	06/02/09	Riffle 1	0.7	9
			Riffle 2	4.3	5
			Pool 1	4.2	8
20	LYOB12	06/05/09	Riffle 1	29.9	8
			Riffle 2	21.0	10
			Pool 1	32.4	11
21	LYOB13	06/05/09	Riffle 1	70.6	8
			Riffle 2	13.0	8
			Pool 1	37.6	11
22	SOPOB02	05/17/05	Combined	66.0	9
23		05/25/06	Riffle 1	30.0	6
			Riffle 2	31.7	9
			Pool 1	22.7	6
24		05/02/09	Riffle 1	65.2	10
			Riffle 2	60.2	10
			Pool 1	38.7	10
25	SOPOB05	06/03/09	Riffle 1	19.8	13
			Riffle 2	16.0	8
			Pool 1	20.8	13
26	SOPOB06	06/04/09	Riffle 1	15.7	9
			Riffle 2	14.6	13
			Pool 1	0.5	6

11.0 Appendix III – Stream Temperature

Table 7: Summary of temperature logger data collected from CLOCA jurisdiction during 2009 with comparison to some 2005-2008 data.

	Site Code	Year	Logger Serial No.	Period of Record	Cold	Cool	Warm	Max. (°C)	Min. (°C)	Days Above Upper Lethal					Classification
									Entire Data Set	Atlantic salmon (> 23 °C)	brook trout (> 24 °C)	brown trout (> 24 °C)	Chinook salmon (> 25 °C)	rainbow trout (> 26 °C)	
1		2005	842239	June 24, 2005 to August 31, 2005	0	67	2	34.5	0	23	14	14	2	0	**Warmwater**
2	TLCE01	2006	905535	July 1, 2006 to August 31, 2006	9	53	0	24.6	1.1	3	0	0	0	0	**Coolwater**
3		2009	2312947	July 4, 2009 to August 31, 2009	29	30	0	23.7	0	0	0	0	0	0	**Coolwater**
4		2005	787473	June 23, 2005 to August 31, 2005	1	67	2	29.7	0.2	21	10	10	2	0	**Warmwater**
5	TLCW01	2006	877053	July 1, 2006 to August 31, 2006	3	57	2	28.9	0.4	18	9	9	2	0	**Coolwater**
6		2009	2312946	July 4, 2009 to August 31. 2009	23	36	0	24.1	0	1	0	0	0	0	**Coolwater**
7		2005	842237	June 24, 2005 to August 31, 2005	36	33	0	27.4	0	0	0	0	0	0	**Coolwater**
8	TLDN01	2006	842237	July 1, 2006 to August 31, 2006	33	27	2	30.1	0	5	3	3	2	0	**Coolwater**
9		2009	2312951	July 3, 2009 to August 31, 2009	20	39	1	31.0	0	5	4	4	1	0	**Coolwater**
10		2005	842236	June 24, 2005 to August 31, 2005	7	62	0	27.9	0	11	3	0	0	0	**Coolwater**
11	TLDN02	2006	842236	July 1, 2006 to August 31, 2006	25	35	2	28.5	0.3	10	4	4	2	0	**Coolwater**
12		2009	2312946	July 2, 2009 to August 31, 2009	33	27	0	22.7	0.2	0	0	0	0	0	**Coolwater**
13	TLFA01	2008	1134281	June 1, 2008 to August 31, 2008	54	38	0	25.2	0	0	0	0	0	0	**Coolwater**
14		2009	1135910	July 1, 2009 to August 31, 2009	38	24	0	25.3	0	1	0	0	0	0	**Coolwater**
15	TLFA02	2008	1134288	June 1, 2008 to August 31, 2008	59	33	0	25.1	0	0	0	0	0	0	**Coolwater**
16		2009	1135912	July 1, 2009 to August 31, 2009	44	18	0	24.3	0	0	0	0	0	0	**Coolwater**
17	TLHA01	2008	1134275	June 1, 2008 to August 31, 2008	48	44	0	25.7	0	0	0	0	0	0	**Coolwater**
18		2009	1135918	June 25, 2009 to August 31, 2009	30	32	0	25.4	0	2	0	0	0	0	**Coolwater**
19	TLLY01	2009	1134295	July 1, 2009 to August 31, 2009	33	29	0	24.8**	0	2	0	0	0	0	**Coolwater**
20	TLLY02	2009	1134286	July 1, 2009 to August 31, 2009	46	16	0	23.6	0	0	0	0	0	0	**Coolwater**
21	TLLY03	2009	1134288	July 1, 2009 to August 31, 2009	29	33	0	26.5	0	1	0	0	0	0	**Coolwater**

	Site Code	Year	Logger Serial No.	Period of Record	Cold	Cool	Warm	Max. (°C)	Min. (°C)	Days Above Upper Lethal					Classification
									Entire Data Set	Atlantic salmon (> 23 °C)	brook trout (> 24 °C)	brown trout (> 24 °C)	Chinook salmon (> 25 °C)	rainbow trout (> 26 °C)	
22	TLLY04	2009	1134280	July 1, 2009 to August 31, 2009	24	38	0	27.1	0	2	1	1	0	0	**Coolwater**
23	TLLY05	2009	1134291	July 1, 2009 to August 31, 2009	31	31	0	25.6	0	1	0	0	0	0	**Coolwater**
24	TLLY06	2009	1134278	July 1, 2009 to August 31, 2009	32	30	0	25.9	0	1	0	0	0	0	**Coolwater**
25	TLLY07	2009	1134275	July 1, 2009 to August 31, 2009	25	37	0	27.9	0	2	0	0	0	0	**Coolwater**
26	TLLY08	2009	2000185	July 1, 2009 to August 31, 2009	26	36	0	26.2	0	2	1	1	0	0	**Coolwater**
27	TLLY09	2009	1019281	July 1, 2009 to August 31, 2009	35	27	0	26.7☼*	0	2	0	0	0	0	**Coolwater**
28	TLLY10	2009	1020772	July 1, 2009 to August 31, 2009	28	34	0	26.1	0	1	0	0	0	0	**Coolwater**
29	TLLY11	2009	2000178	July 1, 2009 to August 31, 2009	49	13	0	23.8	0	0	0	0	0	0	**Coolwater**
30	TLLY12	2009	1017277	July 1, 2009 to August 31, 2009	62	0	0	22.8	0	0	0	0	0	0	Coldwater
31	TLLY13	2009	2001402	July 1, 2009 to August 31, 2009	62	0	0	21.2	0	0	0	0	0	0	Coldwater
32	TLLY14	2009	1019280	July 1, 2009 to August 31, 2009	48	14	0	23.6☼	0	0	0	0	0	0	**Coolwater**
33	TLLY15	2009	1134285	July 1, 2009 to August 31, 2009	42	20	0	25.2	0	0	0	0	0	0	**Coolwater**
34	TLLY16	2009	2001410	July 1, 2009 to August 31, 2009	43	19	0	24.1	0	0	0	0	0	0	**Coolwater**
35	TLLY17	2009	1134282	July 1, 2009 to August 31, 2009	46	16	0	24.1	0	0	0	0	0	0	**Coolwater**
36	TLLY18	2009	2013208	July 1, 2009 to August 31, 2009	54	8	0	22.4	0	0	0	0	0	0	**Coolwater**
37	TLLY19	2009	1134281	July 1, 2009 to August 31, 2009	56	6	0	21.6	0	0	0	0	0	0	**Coolwater**
38	TLLY20	2009	1134292	July 1, 2009 to August 31, 2009	47	15	0	24.1	0	0	0	0	0	0	**Coolwater**
39	TLLY21	2009	1019270	July 1, 2009 to August 31, 2009	53	9	0	23.7	1.5	0	0	0	0	0	**Coolwater**
40	TLLY22	2009	1134274	July 1, 2009 to August 31, 2009	59	3	0	21.6	0	0	0	0	0	0	Coldwater
41	TLLY23	2009	2000174	July 1, 2009 to August 31, 2009	62	0	0	19.3	0.8	0	0	0	0	0	Coldwater
42	TLLY24	2009	2013209	July 1, 2009 to August 31, 2009	49	13	0	24.7	0	0	0	0	0	0	**Coolwater**
43	TLLY25	2009	1134279	July 1, 2009 to August 31, 2009	50	12	0	23.3	0	0	0	0	0	0	**Coolwater**
44	TLLY26	2009	1134271	July 1, 2009 to August 31, 2009	53	9	0	22.5☼	0	0	0	0	0	0	**Coolwater**

	Site Code	Year	Logger Serial No.	Period of Record	Cold	Cool	Warm	Max. (°C)	Min. (°C)	Days Above Upper Lethal					Classification
									Entire Data Set	Atlantic salmon (> 23 °C)	brook trout (> 24 °C)	brown trout (> 24 °C)	Chinook salmon (> 25 °C)	rainbow trout (> 26 °C)	
45	TLLY27	2009	2013204	July 1, 2009 to August 31, 2009	62	0	0	19.6	0	0	0	0	0	0	Coldwater
46	TLLY28	2009	1134284	July 1, 2009 to August 31, 2009	62	0	0	20.0	0.2	0	0	0	0	0	Coldwater
47	TLLY29	2009	2013228	July 1, 2009 to August 31, 2009	60	2	0	23.0	0	0	0	0	0	0	**Coolwater**
48	TLLY30	2009	1019261	July 1, 2009 to August 31, 2009	21	41	0	23.9	0	1	0	0	0	0	**Coolwater**
49	TLLY31	2009	2013207	July 1, 2009 to August 31, 2009	57	5	0	22.0	0	0	0	0	0	0	**Coolwater**
50	TLLY32	2009	2013240	July 1, 2009 to August 31, 2009	62	0	0	18.9	0.1	0	0	0	0	0	Coldwater
51	TLLY33	2009	1135921	July 1, 2009 to August 31, 2009	62	0	0	18.0	0.5	0	0	0	0	0	Coldwater
52	TLLY34	2009	1134283	July 1, 2009 to August 31, 2009	32	30	0	25.8	0.1	0	0	0	0	0	**Coolwater**
53	TLLY35	2009	1135847	July 1, 2009 to August 31, 2009	62	0	0	19.4	0.1	0	0	0	0	0	Coldwater
54	TLLY36	2009	1135914	July 1, 2009 to August 31, 2009	62	0	0	17.5	0	0	0	0	0	0	Coldwater
55	TLLY37	2009	2373163	July 1, 2009 to August 31, 2009	54	8	0	22.3	0	0	0	0	0	0	**Coolwater**
56	TLLY38	2009	2373156	July 1, 2009 to August 31, 2009	52	10	0	22.321	0	0	0	0	0	0	**Coolwater**
57	TLLY39	2009	2373159	July 1, 2009 to August 31, 2009	50	12	0	23.1	0	0	0	0	0	0	**Coolwater**
58	TLLY40	2009	2373158	July 1, 2009 to August 31, 2009	57	5	0	22.8	0	0	0	0	0	0	**Coolwater**
59	TLLY41	2009	2373161	July 1, 2009 to August 31, 2009	54	8	0	22.3	0	0	0	0	0	0	**Coolwater**
60	TLLY42	2009	2373162	July 1, 2009 to August 31, 2009	49	13	0	23.0	0	0	0	0	0	0	**Coolwater**
61	TLLY43	2009	2373160	July 1, 2009 to August 31, 2009	46	16	0	23.4	0	0	0	0	0	0	**Coolwater**
62	TLLY44	2009	1135919	July 1, 2009 to August 31, 2009	56	6	0	22.3	0	0	0	0	0	0	**Coolwater**
63	TLLY45	2009	1135916	July 1, 2009 to August 31, 2009	44	18	0	24.6	0	0	0	0	0	0	**Coolwater**
64	TLLY46	2009	1135913	July 1, 2009 to August 31, 2009	39	23	0	28.4	0	1	0	0	0	0	**Coolwater**
65	TLLY47	2009	1135917	July 1, 2009 to August 31, 2009	54	8	0	22.4	0	0	0	0	0	0	**Coolwater**
66	TLLY48	2009	1135489	July 1, 2009 to August 31, 2009	58	4	0	21.3	0	0	0	0	0	0	**Coolwater**
67	TLLY49	2009	1135922	July 1, 2009 to August 31, 2009	55	7	0	21.9	0	0	0	0	0	0	**Coolwater**
68	TLLY50	2009	1135920	July 1, 2009 to August 31, 2009	27	35	0	26.6	0.2	2	0	0	0	0	**Coolwater**
69	TLLY51	2009	1135848	July 1, 2009 to August 31, 2009	58	4	0	22.2	0	0	0	0	0	0	**Coolwater**

	Site Code	Year	Logger Serial No.	Period of Record	Cold	Cool	Warm	Max. (°C)	Min. (°C)	Days Above Upper Lethal					Classification
									Entire Data Set	Atlantic salmon (> 23°C)	brook trout (> 24°C)	brown trout (> 24°C)	Chinook salmon (> 25°C)	rainbow trout (> 26°C)	
70	TLLY52	2009	2312941	July 2, 2009 to August 31, 2009	46	14	0	23.7	0	0	0	0	0	0	**Coolwater**
71	TLOSB01	2009	2312942	July 1, 2009 to August 31, 2009	61	1	0	20.3	0	0	0	0	0	0	**Coldwater**
72	TLPR01	2005	842230	No Data – Logger Missing											
73		2006	842229	May 24, 2006 to Jan 4, 2007	154	72	0	25.7	0.4	7	3	3	0	0	**Coolwater**
74		2007	1134283	July 1, 2007 to August 31, 2007	14	47	1	28.5	0	7	4	4	1	0	**Coolwater**
75		2008	877053	June 1, 2008 to August 31, 2008	34	58	0	25.1	0	0	0	0	0	0	**Coolwater**
76		2009	1134294	July 1, 2009 to August 31, 2009	29	33	0	25.9	0	2	0	0	0	0	**Coolwater**
77	TLPR15	2009	1134276	July 1, 2009 to August 31, 2009	47	15	0	22.8	0	0	0	0	0	0	**Coolwater**
78	TLROB02	2006	905538	July 1, 2009 to August 31, 2009	29	33	0	23.4	0.3	0	0	0	0	0	**Coolwater**
79		2009	2312950	July 1, 2009 to August 31, 2009	45	17	0	23.7	0	0	0	0	0	0	**Coolwater**
80	TLSOP04	2006	787477	May 26, 2006 to Dec 21, 2006	210	0	0	20.1	0.1	0	0	0	0	0	**Coldwater**
81		2009	2000184	June 1, 2009 to August 31, 2009	62	0	0	18.8	4.3*	0	0	0	0	0	**Coldwater**
82	TLSOP06	2006	1019261	July 20, 2006 to Dec 21, 2006	141	14	0	24.1	0	0	0	0	0	0	**Coolwater**
83		2009	2000191	June 1, 2009 to August 31, 2009	85	7	0	21.2	4.2*	0	0	0	0	0	**Coolwater**
84	TLSOP09	2005	739513	July 1, 2005 to August 31, 2005	62	0	0	17.5	2.9†	0	0	0	0	0	**Coldwater**
85		2006	739513	June 1, 2006 to Nov 13, 2006	166	0	0	16.0	4.6†	0	0	0	0	0	**Coldwater**
86		2007	739513	July 1, 2007 to August 31, 2007	62	0	0	15.6	1.2†	0	0	0	0	0	**Coldwater**
87		2008	739513	July 1, 2008 to August 31, 2008	62	0	0	16.0	0	0	0	0	0	0	**Coldwater**
88		2009	739513	July 3, 2009 to August 31, 2009	60	0	0	19.0	0	0	0	0	0	0	**Coldwater**
89	TLSOP10	2005	739517	July 1, 2005 to August 31, 2005	62	0	0	17.9	3.7†	0	0	0	0	0	**Coldwater**
90		2006	739517	June 10, 2006 to Nov 22, 2006	166	0	0	16.8	4.2†	0	0	0	0	0	**Coldwater**
91		2007	739517	July 1, 2007 to August 31, 2007	62	0	0	16	2.5†	0	0	0	0	0	**Coldwater**
92		2008	739517	July 1, 2008 to August 31, 2008	62	0	0	16.0	0	0	0	0	0	0	**Coldwater**

	Site Code	Year	Logger Serial No.	Period of Record	Cold	Cool	Warm	Max. (°C)	Min. (°C)	Days Above Upper Lethal					Classification
									Entire Data Set	Atlantic salmon (> 23°C)	brook trout (> 24°C)	brown trout (> 24°C)	Chinook salmon (> 25°C)	rainbow trout (> 26°C)	
93	TLSOP10	2009	739517	July 2, 2009 to August 31, 2009	60	0	0	19.0	0	0	0	0	0	0	**Coldwater**
94	TLSOP11	2009	2000176	June 1, 2009 to August 31, 2009	88	4	0	24.5	6.8*	0	0	0	0	0	**Coolwater**
95	TLSOP12	2009	2000190	June 1, 2009 to August 31, 2009	74	18	0	22.5	4.3*	0	0	0	0	0	**Coolwater**
96	TLSOP13	2009	2001401	June 1, 2009 to August 31, 2009	48	44	0	22.8	7.0*	0	0	0	0	0	**Coolwater**
97	TLSOP14	2009	2000187	June 1, 2009 to August 31, 2009	92	0	0	19.2	7.4*	0	0	0	0	0	**Coldwater**
98	TLSOP15	2009	2000177	June 1, 2009 to August 31, 2009	92	0	0	20.1	4.6*	0	0	0	0	0	**Coldwater**
99	TLTY01	2005	842238	June 29, 2005 to August 31, 2005	2	57	5	30.0	0	22	9	9	5	0	**Warmwater**
100		2006	905536	July 1, 2006 to August 31, 2006	22	40	0	27.5	0	3	0	0	0	0	**Coolwater**
101		2009	2312943	July 1, 2009 to August 31, 2009	38	24	0	28.4	0	2	0	0	0	0	**Coolwater**
102	TLWA02	2009	1135911	July 4, 2009 to August 31, 2009	41	18	0	24.2	0	0	0	0	0	0	**Coolwater**
103	TLWS01	2009	2312948	June 30, 3009 to August 31, 2009	11	50	1	26.5	0	12	3	3	1	0	**Coolwater**
104	TLWS02	2009	2312945	June 30, 2009 to August 31, 2009	29	33	0	25.4	0	1	0	0	0	0	**Coolwater**

Maximum temperature generally occurs during July or August but is reported from entire data set

Minimum temperature is reported from entire data set which generally also includes cold-weather conditions i.e., sampling period in December

†Minimum temperature does not completely reflect cold-weather conditions since the Period of Record ended mid-November

*Minimum temperature does not completely reflect cold-weather conditions since the Period of Record ended mid-October

** Maximum temperature taken from July 1st to August 31st as it appears that September data is erroneous e.g., out of water condition

☼Maximum temperature occurred during June

12.0 Appendix IV – Fisheries Sampling (Stream)

Table 8: Number of fish species and individuals caught at OSAP sites within the Lynde Creek watershed (Main Branch/A-Branch) during 2009 sampling compared to historical sampling results (where available).

	LA01		LA02		LA03		LA04		LA05		LA07		LA08		LA13		LA15		LA16		LA18	LA20	LA21	LA22	LAS2		LAS3	
Fish Species (common name)	2001	2009	2001	2009	2001	2009	2001	2009	2001	2009	2001	2009	2001	2009	2001	2009	2001	2009	2001	2009	2009	2009	2009	2009	2001	2009	2001	2009
Blacknose Dace			1		1	6	1	5	2	9	79	17	134	16	52	41	97	7	186	8	37	31	11		107	26	281	47
Bluntnose Minnow	1	1	1	12	10	3	14		2				3												6			
Brook Stickleback							2	8								1					14		5		1	2		1
Brook Trout (YOY)																												
Brook Trout																				2		1						
Brown Bullhead															2													
Common Shiner			59	7		5	18	2	8	1	48	2	23	1	64	11	2		1			1		6	64	13	48	7
Creek Chub		8	6	13		33	5	20	3	17	17	5	77	12	66	22	38		114	9	6	18	6	2	27	11	197	19
Fathead Minnow	1	2	1	4	1	2	6	5	2		2	1			1		33				7		1		4		3	
Green Sunfish																												
Johnny Darter	19	20	26	5	10	33	26	34	6	8	2	2	13	2	11	6	8	1	11	5		14		7	11	13	72	4
Largemouth Bass								2																				
Logperch	3		3			1																						
Longnose Dace	15		20	63	40	22	10	2	1	33	89	55	72	84	20	24	44	26	27			25		15	114	71	101	35
Mottled Sculpin														1		1	16	22	3	25		23			2	27	3	9
Northern Redbelly Dace																	1		1	1	1							
Pumpkinseed		1	4		5									1		1				6					2			
Raindow Darter	48	20	17	92	69	57	9	12	20	63	28	27	19	32	1	10	24	51	9	8		18		28	21	29	83	22
Rainbow Trout (YOY)										1	8		95	19	4	15	158	13	76			1				3	20	
Rainbow Trout		1		1		10		1		8	1	4		5	3	3		3		21		7			24	2	7	7
Redside Dace																			2									
Rock Bass	1		8	1		1	4		3															2	1			
Rosyface Shiner			3		7	5	2								2													
Smallmouth Bass			2					1																				
Spotfin Shiner																												
Stonecat		1		1	1	1					2																	
White Sucker	52	18	18	1	101	21	83	21	2	3	2		15	1	34	7			15	14		7	1	3	26	5	36	12
Grand Total	140	72	169	197	245	200	180	113	49	142	278	113	451	174	260	142	421	123	445	99	65	146	24	63	410	200	851	156
Species Total	8	9	14	11	10	14	12	12	10	7	10	8	8	10	11	11	10	6	11	10	5	10	5	7	14	10	10	10
Effort (s/m^2)	4.2	2.1	3.6	3.0	3.7	2.4	3.7	4.5	4.6	2.6	6.3	3.6	4.6	2.6	5.4	3.5	7.4	6.0	4.9	4.0	6.2	5.5	--	2.6	--	4.2	--	5.0

Note: YOY or young-of-the-year refers to fishes that are in their first year of life, i.e., < 100 mm.

Table 9: Number of fish species and individuals caught at OSAP sites within the Lynde Creek watershed (Kinsale/B-Branch and Heber Down/C-Branch) during 2009 sampling compared to historical sampling results (where available).

	LB01		LB04		LB05		LB09		LB10	LB11	LC01		LC02		LC04		LC06		LC07		LC09		LC10		LC13		LC15	
Fish Species (common name)	2001	2009	2001	2009	2001	2009	2001	2009	2009	2009	2001	2009	2001	2009	2001	2009	2001	2009	2001	2009	2001	2009	2001	2009	2001	2009	2001	2009
Blacknose Dace	66	6	38	2		7	73	57	19	36			38	5	30	15	158	122	224	30	103	10	30	2	33	1	2	
Bluntnose Minnow	1										19	3	106		3		1											
Brook Stickleback	3		9	11	4	50	23	11	6	14								1								8	13	3
Brook Trout (YOY)																												
Brook Trout																				1								
Common Shiner											58	11	34	1			43	14	2									
Creek Chub		31	29		1	18	4	1	14	1		12	18	3			53	107	59	17	1			5	5	10		
Fathead Minnow	2		3			21	132	3	12	7	5					1	2	29	8	2								1
Green Sunfish																												
Johnny Darter	2			9	1						10	23	217	3	62	48	32	104	11	10			2					
Largemouth Bass																				1								
Logperch											2																	
Longnose Dace					26			3			24	18	12	33	58	77	46	37	19	112			38	27				
Mottled Sculpin																				23		4	2	24				
Northern Pike						1																						
Northern Redbelly Dace							2		1	3																		
Pumpkinseed						6							1	1				4	9	2		1						
Rainbow Darter											24	34	32	59	102	120	23	105	2	64			5	13				
Rainbow Trout (YOY)														2	21	1	26	13	146	32	1	3	88	17				
Rainbow Trout									1			2			3	15		17	2	9				2				
Redside Dace																	1		1	2								
Rock Bass											1	3	1	1														
Rosyface Shiner											196	3	2					1										
Sand Shiner													5															
Sea Lamprey											1																	
White Sucker		6	1	19	1	15					23	4	152	1	120	11	15	63	10	6				3				
Grand Total	74	43	80	41	33	118	234	75	53	61	363	112	618	109	399	288	400	617	493	312	105	18	165	72	38	19	15	4
Species Total	5	3	5	4	5	7	5	5	6	5	11	10	12	10	8	8	11	13	12	14	3	4	6	8	2	3	2	2
Effort (s/m^2)	1.2	4.0	14.2	3.8	8.5	4.9	6.15	5.9	--	7.2	4.2	3.2	2.9	2.8	3.5	3.6	--	5.2	5.3	5.3	7.8	9.7	4.4	4.1	16.7	6.5	10.6	6.5

Note: YOY or young-of-the-year refers to fishes that are in their first year of life, i.e., < 100 mm.

Table 10: Number of fish species and individuals caught at OSAP sites within the Lynde Creek watershed (Heber Down/C-Branch, Ashburn/D-Branch and Myrtle Station/E-Branch) during 2009 sampling compared to historical sampling results (where available).

	LC16		LC19		LC20	LC21	LC22	LCS3		LD03		LD05		LD06		LD07		LD09		LD10	LDS3		LE02	
Fish Species (common name)	2001	2009	2001	2009	2009	2009	2009	2001	2009	2001	2009	2001	2009	2001	2009	2001	2009	2001	2009	2009	2001	2009	2001	2009
Blacknose Dace		25			5	101	4	116	37	59	25	68	88	52	82			33	19	137	16			1
Bluntnose Minnow																					6	43		
Brook Stickleback						7		3	1	1		37	2	11		1								
Brook Trout (YOY)				6																			30	1
Brook Trout			45	16																			20	5
Brown Bullhead								9																
Common Shiner																								
Creek Chub		10			8	119	6	276	6	42	5	45	20	23	64			23	18	11	57	26		
Fathead Minnow						9	10	148		8			1		6				2	13				
Johnny Darter											1									9				
Largemouth Bass	NO FISH										1						NO FISH					1		
Mottled Sculpin			20	10	1																		1	8
American Brook Lamprey																								1
Northern Redbelly Dace								1		31			9		31			2	14		8	2	1	2
Pumpkinseed								7	2	1										11		3		
Rainbow Trout (YOY)					3	2					5									17				8
Rainbow Trout				2	2						5									5				6
Redside Dace							1	25		1														
White Sucker					3	7		32	1	4		1	3		1						27	29		
Yellow Perch																						1		
Grand Total	0	35	65	34	22	245	21	1663	47	147	42	149	123	86	184	1	0	58	53	203	112	103	52	34
Species Total	0	2	2	3	5	6	4	9	5	8	5	4	6	3	5	1	0	3	4	6	5	7	3	6
Effort (s/m^2)	5.6	6.3	--	6.3	--	2.7	--	--	--	20.6	9.7	11.8	7.8	50.1	13.5	3.6	19.0	50.9	11.1	7.3	--	7.4	5.3	5.8

Note: YOY or young-of-the-year refers to fishes that are in their first year of life i.e., < 100 mm.

Table 11: Number of fish and individuals caught at OSAP sites within Stephen's Gulch Conservation Area in 2009 compared to historical results (where applicable).

	Sites								
	SB13			SB15		SB18		SB21	SB22
Fish Species (common name)	1998	2006	2009	1999	2009	2006	2009	2009	2009
American Brook Lamprey		2		NO FISH					
Blacknose Dace					12	13	20	19	21
Brook Trout (YOY)									
Brook Trout									
Brown Trout (YOY)	1	3	1				2		
Brown Trout	14	17	6			2	1		
Chinook Salmon (YOY)	5		2						
Coho Salmon (YOY)		7	1			4	7	3	
Creek Chub					6	13	6	2	1
Fathead Minnow									1
Lamprey*	7								
Mottled Sculpin	35	68	9						
Northern Redbelly Dace								32	7
Rainbow Trout (YOY)	99	59	71			4	5		
Rainbow Trout	25	5	9				1		
White Sucker	1								
Grand Total	187	161	99	0	18	36	42	56	30
Species Total	6	7	5	0	2	5	5	4	4
Effort (seconds/m^2)	4.4	9.7	5.9	4.2	3.5	14.6	7.5	6.0	9.3

* - undetermined identification; possibly American Brook Lamprey or Sea Lamprey
Note: YOY or young-of-the-year refers to fishes that are in their first year of life i.e., < 100 mm.

Table 12: Number of species caught at OSAP Training Course sites within Oshawa Creek watershed in 2009 compared to historical results (where applicable).

	Sites														
	OA09	OA10	OA12			OA13			OA15		OE04			OE07	
Fish Species (common name)	2007	2007	2007	2008	2009	2007	2008	2009	2008	2009	2007	2008	2009	2008	2009
Brook Trout (YOY)															
Brook Trout														✓	
Rainbow Trout (YOY)					✓			✓					✓		✓
Rainbow Trout	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	
Brown Trout (YOY)															
Brown Trout	✓		✓			✓	✓	✓		✓		✓		✓	
Chinook Salmon (YOY)					✓			✓							
Creek Chub	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓	✓		
Western Blacknose Dace	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓		
Longnose Dace	✓	✓		✓	✓	✓	✓	✓	✓		✓	✓	✓		
Fathead Minnow												✓	✓		
Common Shiner						✓									
Bluntnose Minnow															
Northern Redbelly Dace															
White Sucker	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Largemouth Bass															
Smallmouth Bass	✓						✓	✓							
Salmon Family	✓		✓							✓		✓			
Sculpin	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Green Sunfish															
Rock Bass	✓	✓	✓					✓							
Pumpkinseed		✓				✓									
Johnny Darter	✓	✓	✓	✓		✓	✓	✓	✓	✓					
Brook Stickleback															
Coho Salmon (YOY)										✓					
Fantail Darter		✓													
Rainbow Darter															
Lamprey							✓		✓	✓		✓		✓	✓
Minnow Family												✓			
Phoxinus sp. (Minnow)											✓				
Etheostoma (Perch)											✓				
Grand Total	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Species Total	11	10	6	7	7	10	9	11	7	10	8	10	7	5	3
Effort (s/m^2)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Note: YOY or young-of-the-year refers to fishes that are in their first year of life i.e., < 100 mm.
✓ - site was not sampled with consistent effort therefore only presence information is reported.

13.0 Appendix V – Fisheries Sampling (Coastal Wetland)

Table 13: Number of fish and species caught at CLOCA coastal wetlands from 2002 – 2009.

	Lynde Creek Marsh									Whitby Harbour Wetland Complex			Corbett Creek Marsh						Pumphouse Marsh				
Fish Species Common Name	**2002**	**2003**	**2004[1]**	**2004[2]**	**2005**	**2006**	**2007**	2008	2009	**2007**	2008	2009	**2003**	**2005**	**2006**	**2007**	2008	2009	**2003**	**2006**	**2007**	**2008**	**2009**
Alewife		1	1	1		12					6										Marsh Completely Dry		
Banded Killifish													1			2							
Black Crappie	4			1		4	1													3			
Bluegill														5						6			
Bluntnose Minnow		3		7		1	1		1	2	4												
Bowfin	1																						
Brook Stickleback														1									
Brown Bullhead	12	18	11	118	19	9	56	2	5			2	6	55	32	4	2	7	5	5		1	
Central Mudminnow																			32				
Common Carp	2			4	5	1	1			5	9	5	3	6	2								2
Common Shiner					1		5	2															
Emerald Shiner			2	31		11	2		15	2	157												
Fathead Minnow	46	24	1	2		4	4	20		1	3		21	3	15	9			484	10		25	73
Gizzard Shad		10	6		30	4	1	38	1	19	4												
Golden Shiner		6	1	2		1	2	2	1					17									
Goldfish															1				37	60			4
Johnny Darter				2						1													
Largemouth Bass				1				1	1														
Logperch			3	6					1	1													
Northern Pike					3	1		1						1	1								
Pumpkinseed	92	38	6	26	45	11	7	1			3		8	23	3	13	3	3		36			1
Smallmouth Bass	2					1			1														
Spotfin Shiner																							
Spottail Shiner	23	18	1		1	6		1			1												
Walleye		1		1							1												
White Perch								1															
White Sucker				5		1	5			3		2											
Yellow Perch	1		1		9	3	13	4	2		4			1		2	1						
Grand Total	**183**	**119**	**33**	**207**	**113**	**70**	**98**	**73**	**28**	**34**	**189**	**9**	**39**	**112**	**54**	**30**	**6**	**10**	**558**	**120**	**--**	**26**	**70**
Species Total	**9**	**9**	**10**	**14**	**8**	**15**	**12**	**11**	**9**	**8**	**10**	**3**	**5**	**9**	**6**	**5**	**3**	**2**	**4**	**6**	**--**	**2**	**4**
IBI Score	**--**	**41**	**34**		**60**	**48**	**50**	**42**	**38**	**9**	**29**	**6**	**27**	**66**	**31**	**40**	**23**	**21**	**27**	**34**	**--**	**24**	**16**

Table 14: Number of fish and species caught at CLOCA coastal wetlands from 2002 – 2009 con'd.

	Oshawa Second Marsh						McLaughlin Bay Marsh						Westside Marsh					Bowmanville Marsh									Oshawa Harbour	
Fish Species Common Name	**2002**	**2005**	**2006**	**2007**	**2008**	**2009**	**2003**	**2005**	**2006**	**2007**	**2008**	**2009**	**2005**	**2006**	**2007**	**2008**	**2009**	**2002**	**2003**	**2004(1)**	**2004(2)**	**2005**	**2006**	**2007**	**2008**	**2009**	**2008**	**2009**
Alewife								1										6	1	2				1			2	
Banded Killifish		28	1	2	3																							
Black Crappie				1			13	2	12	7		1	1		1	10	2											
Bluegill					13	37								1														
Bluntnose Minnow						2		3						2					4	1		9		2		1		
Brook Stickleback		4																										
Brown Bullhead	3	22	49	67	12	62	17	16	4	8		8	23	5	99	5	12	2	13	1	6	24	1	16		29	3	
Chinook Salmon																											1	
Common Carp						3	1	2	3	4		2	3	1			3				1		3				3	4
Common Shiner																									2			
Emerald Shiner																1	7			12	12				1	1	22	
Fathead Minnow	154	167	12	1	4	13						1	17	7							1	3		15	1	2		
Freshwater Drum								3																				
Gizzard Shad								212	36	19	8	21	37	5	11	33	1	1				8	1	13	1		4	2
Golden Shiner					1							1	1					2	16	1	3	33		12	30	3		
Goldfish	10	69	30	67	18	32																						
Johnny Darter																			1									
Largemouth Bass										1		1		1	1		2											1
Logperch																												5
Northern Pike					1											5	1						1				9	2
Pumpkinseed		50	97	24	23	94	6	24	4	6	1	6	7	18	24	8	3	11	28	23	13	42		88	18	25	12	10
Rock Bass																											2	
Round Goby																												5
Smallmouth Bass																					1						1	1
Spottail Shiner								1				1	1						7	10	9	2	1	31	1	9	2	
Walleye																				1								
White Perch								4		1	2	18																
White Sucker		1			1			1				1			1	1				1						1	3	13
Yellow Perch	20		4	**1**	**1**	**2**	5	11	5	5	6	2	2	4	7	8	1		5			1	1	1	15	7	5	1
Sunfish																										14		
Grand Total	**187**	**341**	**193**	**163**	**77**	**239**	**42**	**280**	**64**	**51**	**17**	**63**	**92**	**44**	**144**	**71**	**32**	**22**	**75**	**52**	**46**	**122**	**8**	**179**	**69**	**78**	**69**	**44**
Species Total	**4**	**7**	**6**	**7**	**10**	**8**	**5**	**12**	**6**	**8**	**4**	**12**	**9**	**9**	**7**	**8**	**9**	**5**	**8**	**9**	**8**	**8**	**6**	**9**	**8**	**10**	**13**	**10**
IBI Score	**--**	**46**	**41**	**27**	**36**	**45**	**36**	**57**	**30**	**35**	**24**	**21**	**30**	**35**	**52**	**42**	**25**	**--**	**44**	**36**		**49**	**26**	**60**	**63**	**46**	**54**	**37**

Table 15: Number of fish and species caught at GRCA coastal wetlands from 2002 – 2009.

	Wilmot Creek Marsh							Port Newcastle Marsh					
Fish Species Common Name	2003	2004(1)	2004(2)	2006	2007	2008	2009	2003	2005	2006	2007	2008	2009
Alewife											16		1
Banded Killifish												1	
Black Crappie						1							
Bluntnose Minnow	2	26	10	1	1				8	1	3	14	
Bowfin					1								
Brown Bullhead	12	3	10	26	1	2	8		2	16	102	1	71
Brown Trout							1						
Chinook Salmon		3	3			1						2	
Common Carp	5	3	10	37	3			1	9	2	1	2	4
Common Shiner					2				3	14	2	1	3
Emerald Shiner		31	20	1							3		1
Fathead Minnow			1	5					3	1		1	
Gizzard Shad									4	3	3	4	5
Golden Shiner	2			6	2	20			97	1			
Goldfish													
Johnny Darter	19	1	3	8		13	3	4	1	3			
Largemouth Bass	1		1						1			1	2
Logperch											1		
Northern Pike	4	2			1	5	3						
Pumpkinseed	31	4		11	25	16	12	24	85	12	46	12	6
Rock Bass	1				1				5		2		
Round Goby							1			✓		4	1
Smallmouth Bass											2		1
Spottail Shiner	1	2			1	1				3	3		2
Walleye						1						1	
White Sucker	2	7	50	11	6	3	5	1	1	1	3	8	2
Yellow Perch	3	3	2	9	1	13		3	6	8	4	62	16
Grand Total	**85**	**85**	**110**	**115**	**45**	**76**	**32**	**33**	**225**	**65**	**191**	**114**	**115**
Species Total	**12**	**11**	**10**	**10**	**12**	**11**	**7**	**5**	**13**	**12**	**14**	**14**	**14**
IBI Score	**56**	**45**		**36**	**47**	**73**	**29**	**26**	**52**	**31**	**56**	**50**	**46**

Table 16: Number of fish and species caught at TRCA coastal wetlands from 2002 – 2009.

	Rouge River Marsh						Frenchman's Bay Marsh						Hydro Marsh						Duffins Creek Marsh									Carruthers Creek Marsh					
Fish Species Common Name	2003	2005	2006	2007	2008	2009	2003	2005	2006	2007	2008	2009	2003	2005	2006	2007	2008	2009	2002	2003	2004[1]	2004[2]	2005	2006	2007	2008	2009	2002	2003	2006	2007	2008	2009
Alewife							11			41			4		3						5					13						Not Sampled	14
Black Crappie						2							1			1					1							5		3	1		
Bluegill							4																						2				
Bluntnose Minnow	2		2				7	6		4	3	1		2			4	1	31	6	10			5	1	3	6	37	6	3			
Bowfin			2									1																					
Brown Bullhead	64	21	14	33	1		2		9		2	2	66			33	2		38	1	1	4			1	3	2	12	8	1	31		1
Chinook Salmon																										2							
Common Carp	3	1	5	1			5	1	1		5		3	3		6	4			3		1		2				7	7	1	12		
Common Shiner	1	1	18	3										2			18		41	14	1		4	1				32					
Emerald Shiner	5	1			4		35	9	1	20	9	1			4					1	2	6			4	6			1				
Fathead Minnow	2		3	2					6		1		22		18					13		17		29		6			37	12	48		1
Freshwater Drum							1																										
Gizzard Shad	3	10	7	3	13	2	1	23	6		1	1	1	3	24		1		59	12	4	1	13	20	24			87	6	1	158		
Golden Shiner				2	2	4				28	33		5	18	7	1	3				3												
Goldfish			1																														
Johnny Darter							1												5	1					1			6					6
Largemouth Bass		2					5	4	4	12	16	13		1	1	7	6	2	4									4			1		1
Logperch																				5		1											
Northern Pike			1									1					2				1				1	3							1
Pumpkinseed	8	58	22	16	14	43	57	36	3	12	14	12	4	15	20	54	4	2	45	8	6	1		5	3	7	1	66	31	12	16		2
Rock Bass										2									91	1													
Round Goby						1			6	12	9	6																					
Smallmouth Bass							2							1																			
Spotfin Shiner							5																										
Spottail Shiner			1					1											36	2	23	1			17		2						
White Perch										2																							
White Sucker			1				1		1	2					1	1				1	10	15		2		2							
Yellow Perch	9	6	3		16	5	2	50		6	12	2		4	2	5	17	6	2	5	1	1	6	2	7	1		5		1	6		
Grand Total	**97**	**100**	**80**	**60**	**50**	**57**	**139**	**130**	**37**	**141**	**105**	**40**	**106**	**49**	**80**	**108**	**61**	**11**	**352**	**73**	**68**	**48**	**26**	**66**	**59**	**46**	**11**	**270**	**98**	**34**	**273**	**--**	**26**
Species Total	**9**	**8**	**13**	**7**	**6**	**6**	**15**	**8**	**9**	**11**	**11**	**10**	**8**	**9**	**9**	**8**	**10**	**4**	**10**	**14**	**13**	**9**	**3**	**8**	**9**	**10**	**4**	**10**	**8**	**8**	**8**	**--**	**7**
IBI Score	**32**	**50**	**49**	**25**	**40**	**38**	**45**	**56**	**30**	**49**	**54**	**52**	**17**	**47**	**48**	**52**	**45**	**47**	**--**	**26**	**32**		**38**	**23**	**49**	**46**	**21**	**--**	**30**	**33**	**47**	**--**	**36**

Table 17: Number of fish and species caught at Quinte coastal wetlands compared to historical sampling results (where available).

	Carnachan Bay	Robinson Cove Marsh		Carrying Place	Blessington Creek Marsh	Sawguin Ditched
Fish Species Common Name	**2009**	**2005**	**2009**	**2009**	**2009**	**2009**
Banded Killifish	1	4		2		
Blackchin Shiner					5	
Blacknose Shiner						13
Black Crappie	1	3				
Bluegill	12	19	24	50	23	19
Bluntnose Minnow				42		
Bowfin	3	2	1			1
Brook Stickleback						7
Brown Bullhead	4	3				
Central Mudminnow				5	20	310
Common Carp	2		1			
Golden Shiner	19	2		2	16	2
Grass Pickerel				2	2	
Largemouth Bass	7	9	7	9	7	4
Logperch				1		
Northern Pike	1				1	
Pumpkinseed	59	50	11	6	14	3
Rock Bass	1			1		
Round Goby			1			
Yellow Perch	34	25	26	48	44	9
Grand Total	**144**	**117**	**71**	**168**	**132**	**368**
Species Total	**12**	**9**	**7**	**11**	**9**	**9**
IBI Score	**75**	**85**	**67**	**80**	**85**	**83**

Table 18: IBI results of DRCWMP Fish Sampling from 2003 – 2009.

	2009 Metrics						IBI Score						
Wetlands Name	SNAT	SCEN	PPIS	NNAT	PBNI	BYPE	2009	2008	2007	2006	2005	2004	2003
Parrott's Bay	-	-	-	-	-	-	-	-	-	-	-	-	85.4
Hay Bay South Marsh	-	-	-	-	-	-	-	90.9	-	-	78.5	-	-
Hay Bay North Marsh	-	-	-	-	-	-	-	76.9	-	-	84.5	-	-
Big Island East Marsh	-	-	-	-	-	-	-	86.2	-	-	99.9	-	-
Big Island West Marsh	-	-	-	-	-	-	-	96.3	-	-	-	-	-
Robinson's Cove Marsh	8.00	6.27	10.00	6.53	2.19	7.03	67.3	-	-	-	84.6	-	-
Sawguin Creek Central Marsh	-	-	-	-	-	-	-	55.4	-	-	70.4	-	-
Huyck's Bay Marsh	-	-	-	-	-	-	-	-	-	-	-	-	74.0
Port Newcastle Marsh	6.11	5.72	2.64	3.33	2.10	7.55	45.8	50.4	55.6	31.0	52.0	-	26.4
Wilmot Creek Marsh	3.98	2.45	5.01	1.40	4.67	0.00	29.2	73.3	46.8	35.9	-	45.4	56.5
Bowmanville Marsh	7.17	5.52	0.00	2.63	10.00	2.06	45.6	62.5	59.7	26.5	49.0	36.3	43.7
Westside Marsh	3.59	5.52	0.54	0.98	3.21	1.13	24.3	42.2	51.5	35.1	30.1	-	-
McLaughlin Marsh	5.58	4.09	0.13	1.29	0.00	1.30	20.7	23.8	35.3	30.5	57.1	-	36.0
Oshawa Second Marsh	6.64	10.00	0.00	10.00	0.00	0.24	44.8	36.1	26.5	40.9	45.6	-	-
Oshawa Creek Costal Wetland	3.26	4.01	10.00	0.86	4.11	0.09	37.2	54.2	-	-	-	-	-
Pumphouse Marsh	2.99	1.84	0.00	5.00	0.00	0.00	16.4	23.6	-	34.4	-	-	26.6
Corbett Creek Marsh	1.33	0.82	0.00	0.30	10.00	0.00	20.7	23.4	40.2	31.1	65.9	-	27.1
Whitby Harbour Wetland	0.80	0.00	0.00	0.09	2.89	0.00	6.3	29.0	9.4	-	-	-	-
Lynde Creek Marsh	2.87	1.47	6.44	0.76	10.00	1.26	38.0	41.9	50.0	47.6	59.8	34.3	40.7
Carruthers Creek Marsh	3.07	2.10	10.00	0.46	5.71	0.00	35.6	-	47.3	32.9	-	-	29.5
Duffins Creek Marsh	1.49	0.92	0.00	0.37	10.00	0.00	21.3	45.6	49.0	23.2	37.6	32.4	26.0
Hydro Marsh	2.39	3.15	8.90	0.42	10.00	3.16	46.7	44.9	52.4	47.5	47.3	-	17.2
Frenchman's Bay Marsh	4.35	7.36	10.00	0.83	7.83	0.87	52.1	53.8	48.7	30.0	56.4	-	44.9
Rouge River Marsh	3.82	6.62	0.00	1.51	9.86	0.67	37.5	40.1	25.0	48.7	49.9	-	31.5
Carnachan Bay	9.82	10.00	5.35	4.29	8.16	7.35	75.0	-	-	-	-	-	-
Carrying Place	8.37	10.00	9.95	4.96	9.98	5.01	80.4	-	-	-	-	-	-
Blessington Creek Marsh	8.04	10.00	10.00	3.24	10.00	10.00	85.5	-	-	-	-	-	-
Sawguin Ditched	8.60	10.00	9.96	10.00	10.00	1.11	82.8	-	-	-	-	-	-