



St. Clair Region Conservation Authority

# Watershed Report Card 2013



“working together for a better environment”

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# Watershed Report Card 2013

## Executive Summary

The St. Clair Region Conservation Authority (SCRCA) has prepared Watershed Report Cards to help watershed residents, agency staff and directors measure environmental health in the region. These cards assess and grade surface water quality and forest condition in 14 watersheds, and compare them with previous Report Card findings.

Each Report Card also includes a summary of watershed features, local solutions that will improve environmental conditions, and highlights of progress since 2005.

Since the first Report Cards were produced in 2008, many environmental projects have been implemented, new issues have developed, and more information has become available. The 2013 Report Cards use the guidelines and updated grading system recommended by Conservation Ontario (Conservation Ontario, 2011). Surface water quality indicators include Total Phosphorus, benthic invertebrates, and bacteria (*E. coli*). Forest condition indicators include the percent forest cover, percent forest interior, and the percent of the riparian zone that is forested. The 2011 guidelines are more stringent to provide province-wide standards and result in generally lower grades in the St. Clair Region and in most of southwestern Ontario, compared with previous grading systems.

Surface water quality grades for the St. Clair Region range from C to D. Since the 2008 Report Cards, overall water quality has improved in three watersheds, stayed steady in seven watersheds, and declined in two watersheds. There are insufficient data in two watersheds to describe a trend. Overall the Sydenham Headwaters and Lower East Sydenham have the best water quality grade, followed by the Upper Sydenham River, Middle East Sydenham, and Brown Creek. The poorest water quality grades are found in Cow and Perch Creeks, St. Clair River Tributaries, and Lake St. Clair Tributaries.

Forest condition grades range from C to F, with a C grade in Lambton Shores Tributaries, most watersheds receiving a D grade, and an F grade in Cow and Perch Creeks, Lower East Sydenham, and Lake St. Clair Tributaries. Apparent changes in forest cover and forest interior since the previous Report Cards are considered to be due to improved mapping accuracy, rather than an actual gain or loss.

The 2013 Report Cards include examples of projects contributing to improved environmental health. Highlights of these positive contributions include stewardship projects by individuals, groups and municipalities. Since 2005, private landowners have completed over 120 stewardship projects, community-based groups have implemented projects in each watershed, and over 220,000 trees and shrubs have been planted by SCRCA staff.

## Acknowledgements

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# Section 1: Indicators and Analysis

## Introduction

The St. Clair Region Watershed Report Card presents the results of monitoring the health of the region's natural features. Grades are assigned to specific surface water quality and forest condition indicators. The report also includes information on features of the watershed. When citizens, industries, agencies and government staff understand the environmental health of their regions, they can take actions to protect or enhance those features.

The first Report Card for the St. Clair Region was released in 2008. It included analysis of five surface water quality and forest condition indicators for 14 watersheds. It described features of the individual watersheds, actions that could be taken by individuals or agencies to improve the watershed conditions, and many stewardship activities that have been implemented by private landowners and municipalities.

The 2013 Report Card is the second Report Card for this area and the analysis and degree of accuracy has evolved. For both water quality and forest condition, the guidelines have been revised since 2008. Ontario's Conservation Authorities set the grades relative to current scientific standards and optimize the grading system for the range of environmental conditions across the province. For a watershed to achieve an A grade in 2013 for water quality or forest condition, the watershed must be healthy compared to the conditions that have been reported by other Conservation Authorities across southern Ontario.

The Report Card analysis is based on water quality data collected by St. Clair Conservation staff, and Geographic Information System (GIS) mapping. The water quality information is collected at individual sites that are judged to reflect the subject watershed. The forest evaluation has been completed at a landscape level from analysis of aerial photographs.

In addition to indicators, the Report Card is an opportunity to compile information on the conditions and resources of the watershed. All of the watershed features data are summarized in **Section 2**.

Recognition of local actions that improve the watershed health is very important. Examples of positive contributions are included in each watershed Report Card. The dozens of projects that have been completed through the Clean Water Programs and Habitat Stewardship are also summarized.

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## Watersheds

The area covered by this Report Card is 4,130 square kilometres. The largest drainage area, the Sydenham River, is subdivided into nine watersheds. The St. Clair Region also has many smaller watercourses which have been grouped into five watersheds. The resulting 14 watersheds are appropriately sized for residents to identify with their local communities. They are presented in **Table 1** and illustrated in **Map 1**.

## Indicators

Watershed health indicators include surface water quality and forest condition. Each of these indicators can be graded with specific parameters and these grades have been defined from A to F, as Excellent to Very Poor. The groundwater information for this region remains very limited and has not been graded for this Report Card.

## Surface Water Quality

The water quality of the St. Clair Region is affected by land use, weather and soils. Surface water quality can change in response to human activities, including changes in agricultural practices, urban sewage treatment, and stormwater management.

The SCRCA Watershed Report Cards summarize the current water quality over a relatively short time period of five years. This is compared with the 2008 Report Cards. The water quality varies from year to year and the indicators may vary independently of each other. The information is a general assessment of surface water quality indicators in the watershed, with sampling information from one location used to reflect the general conditions of the watershed.

The longer term analysis of water quality in this region is available in the Watershed Characterization Report (SCRCA 2007) completed as part of the Drinking Water Source Protection program.

## Forest Condition

The forests of the St. Clair Region reflect the human impact on this landscape over the last 150 years. Surveyors' records indicate that in the early 1800s almost 70% of the Sydenham River watershed was forested. Extensive clearing for agriculture and settlements removed the majority of the woodlands. Current watershed residents are concerned that the remaining woodlands are further reduced by mortality from invasive species such as Emerald Ash Borer and from warmer, drier climate conditions.

This Report Card describes the woodland layer through analysis by St. Clair Region staff using the 2010 aerial photography. The previous Report Card considered the woodland layer analysis from the Ontario Ministry of Natural Resources (OMNR) using aerial photography from 2000 to 2007. As the analysis techniques and the photography layers are different, changes in the forest condition values may be due to more accurate analysis rather than the removal or establishment of woodlands.

## Groundwater Quality

The Provincial Groundwater Monitoring Network (PGMN) is a partnership between MOE and conservation authorities. The network provides background monitoring information on groundwater levels and quality. The water analysis includes basic chemistry, metals, nitrate and fluoride. As of May 2007, the SCRCA has nine monitoring wells that are sampled once a year. Water level data are collected four times a year in each of the PGMN wells.

There are not enough data to include an assessment or grading of groundwater quality in this report. Initial monitoring indicates

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the water has a strong saline influence. This is likely caused by a bedrock source of saline water; however, there could be road salt influences.

A few chemical parameters are above health related Ontario Drinking Water Standards including fluoride, boron and selenium. Sodium, iron and manganese levels are also above the aesthetic objectives for the provincial standards. In general, these are considered to be naturally-occurring.

There are no active municipal drinking water supply systems in the SCRCA that are using a groundwater source.

## Surface Water Quality Methods

Three select indicators are used to assess surface water quality on a watershed scale:

- Total Phosphorus;
- *Escherichia coli* (*E. coli*); and
- Benthic Macroinvertebrates.

These three indicators reflect key issues related to surface water quality across the province: nutrients, bacteria/waste, and aquatic health. The select indicators can help measure the influence of factors such as both urban and rural land uses, soil types, and weather on the surface water quality in the St. Clair Region.

### Total Phosphorus

Conservation Ontario recommends Total Phosphorus as the key water quality indicator. Phosphorus, a nutrient commonly applied as fertilizer, adheres to soil and is readily transported to streams with eroding soil. Elevated levels of phosphorus can cause algal fouling, fish kills, taste and odour problems in drinking water, and other adverse effects.

The 75<sup>th</sup> percentile concentration of Total Phosphorus was calculated for all samples collected within each watershed from 2006 to 2010 inclusive. The 75<sup>th</sup> percentile is the value below which 75% of the values fall. This value reflects the water condition for the majority of the time. The 75<sup>th</sup> percentile value was converted into a score and a grade, following the Conservation Ontario guidelines (**Table 2**).

### *E. coli*

The second water quality indicator of choice, *E. coli*, is fecal bacteria found in human and animal waste. *E. coli* is broadly accepted as the key indicator of fecal contamination in rivers and the presence of potential pathogens (Water Management, MOEE, 1994). Long-term ambient *E. coli* data indicate areas with higher concentrations of fecal contamination in a watershed, and can be compared to land use activities.

The concentration of *E. coli* can range from very low (less than 30 colony-forming units in 100 ml of water or CFU/100ml) up to over 1,000 CFU/100ml. The average value would inflate the conditions which typically occur, therefore the geometric mean or geomean is calculated. The geomean is calculated as the  $n^{\text{th}}$  root of the product of  $n$  numbers. Following the Conservation Ontario guidelines, the five-year geomean was calculated for the monitoring sites which are available within each watershed.

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## Benthic Macroinvertebrates

The third surface water quality indicator which Conservation Ontario selected is based on the invertebrate organisms living on the bottom of the watercourse at a representative site in the watershed. Benthic refers to the bottom of a watercourse; macro refers to items large enough to see without a microscope, and invertebrates are organisms without a backbone, such as insects, worms and crustaceans. Benthic monitoring indices are a popular indicator of the quality of the water where these organisms live. The Family Biotic Index or FBI (Hilsenhoff 1988; Mandaville 2002) assigns a score to each family of benthic macroinvertebrates so the number and type of invertebrates found in each benthic sample relate to the water quality where they are collected. The larger the score, the more polluted the watercourse. A healthy aquatic environment is dominated by pollution intolerant species. For the Watershed Report Card process, the 2011 guidelines adopt the Hilsenhoff 1988 Family Biotic Index as modified by Smith *et al.* 2009.

Extreme weather, stream morphology, and local site disturbance are some of the key factors beyond surface water quality that can affect the benthic macroinvertebrate assemblages from year to year. In order to account for natural year-to-year variability, it is recommended that Report Card grades are based on an average FBI value from samples taken annually over five years. Grouping data in this fashion generates an accurate estimate of surface water quality on a subwatershed basis.

## Data collection and sampling

The location of water quality and benthic macroinvertebrate sampling sites within the St. Clair Region is shown in **Map 2**.

Bacteria analysis has occurred at eight sites in the St. Clair Region through a cooperative program with the Middlesex-London Health Unit. These data provide information for calculating grades for seven subwatersheds of the Sydenham River. Lambton Shores has financed a private consultant for monthly surface water sampling and this provides information for the Lambton Shores Tributaries and the Plympton Shoreline Tributaries. Five watersheds do not have bacteria monitoring: Cow and Perch Creeks, St. Clair River Tributaries, Lake St. Clair Tributaries, Brown Creek, and the Lower North Sydenham.

Surface water quality samples have been collected in the St. Clair Region since the 1960s under the Provincial Water Quality Monitoring Network (PWQMN), a cooperative program between the SCRCA and the Ontario Ministry of the Environment. PWQMN sample station locations varied over the years, but since 2002 the eight existing stations have remained consistent. Starting in 2004, funding under the Canada Ontario Agreement (COA) on Great Lakes Water Quality also supported St. Clair Conservation's water sampling program. In 2005, the COA funding doubled the amount of sampling conducted in the St. Clair Region. Like the PWQMN stations, the COA sampling locations have varied. To maximize program coverage, Brown Creek and Lower North Sydenham were sampled bi-monthly rather than monthly during ice-free periods. Lambton Shores Tributaries and Plympton Shoreline Tributaries had monthly sampling financed by Lambton Shores while the COA sampling was only bi-monthly. The sites with larger sample sizes were used for this analysis.

The data used to determine the Surface Water Quality grades are summarized in **Table 3**. Information from 15 water chemistry sites and nine bacteria sites was used to calculate the grade of the whole St. Clair Region.

In order to accurately represent the subwatershed being graded, Conservation Ontario guidelines recommend that the water quality conditions be reported from the outlet of each catchment area. Outlet sampling is possible for most water chemistry and bacteria stations in the Sydenham watersheds, but not for the benthic indicators. An exception is water chemistry and bacterial stations on the Sydenham Headwaters which is located above the town of Strathroy, therefore excluding the urban influence from the Report Card grade calculation. Another exception is the Black Creek water quality station which is located about 20 kilometres upstream of the outlet. In the catchments outside the Sydenham River watershed including the Lake St. Clair Tributaries, St. Clair

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River Tributaries, Lambton Shores Tributaries, Plympton Shoreline Tributaries, and Cow and Perch Creeks, water chemistry is monitored in the largest watercourse. In the Cow and Perch Creeks area, Perch Creek is monitored at the second lowest bridge, as it experiences less backwater dilution from Lake Huron than the lower bridge.

St. Clair Conservation has monitored aquatic benthic macroinvertebrates since 1999. Benthic communities are strongly influenced by the substrate conditions in addition to water chemistry and water flow regimes. All three variables change between, and in some cases within watersheds in the St. Clair region. One representative benthic sampling station for each of the 14 subwatersheds is collected in the spring of each year. There were no benthic data collected in 2007 due to shortfalls in core resources.

Benthics must be sampled in a wadeable watercourse (i.e., less than 1 metre depth). The outlets of many watersheds are too deep, therefore the samples are taken higher in the watershed or in tributaries of the main watercourse. In watersheds with more than one watercourse (e.g. St. Clair River Tributaries) the largest watercourse (e.g. Clay Creek) is chosen for water chemistry sampling. There were no benthic samples collected in the Lambton Shores or Plympton Shoreline Tributaries watersheds until 2008 so only three samples have been collected in each.

## Surface Water Quality Results

The Surface Water Quality scores and grades are summarized in **Table 4** and illustrated in **Map 3**. Five of the 14 watersheds score a C grade for their surface water quality, including the four upper reaches of the East Sydenham River. Nine watersheds score a D grade. Since the 2008 Report Card, overall water quality has improved in three watersheds and has declined in two (**Table 5**). The greatest improvements are in the Sydenham Headwaters and Black Creek, which each has improved in two of the three indicators. The greatest decline is in Cow and Perch Creeks which has declined in two indicators. It is worthwhile to note that the 2011 provincial guidelines have more demanding grading systems than the guidelines used previously. Lower grades tend to be in extreme southwestern Ontario regions with intensive land use, such as the St. Clair Region.

### Total Phosphorus

Total Phosphorus exceeds the provincial guidelines in all watersheds, by between two and eight times the provincial water quality objective. Results from the Provincial Water Quality Monitoring Network indicate similar exceedances across urbanized watersheds of southern Ontario, particularly southwest of an area from Toronto to Goderich.

Total Phosphorus is highest in Cow and Perch Creeks (0.24mg/L), Bear Creek Headwaters (0.22mg/L), and Lower Bear Creek (0.19mg/L). The lowest Total Phosphorus is in the four watersheds of the East Sydenham River, with the headwater measuring only 0.06mg/L. The Lower North Sydenham also has low values, but this may be due to backflow from Lake St. Clair or the St. Clair River as the lower reaches of the Sydenham are at the same elevation as these larger water bodies.

Concentrations of phosphorus are increased in erodible soils such as clay, as phosphorus binds to soil particles. The highest readings of phosphorus are recorded in watersheds in the clay plains of western Lambton County. The lower readings in the upper Sydenham may be due to a smaller catchment area and may also reflect loam and sand soils that are less erodible than clay.

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## *E. coli*

Seven of the watersheds have a C grade for *E. coli* values. Only the Lower East Sydenham station has a value within the MOE guidelines for recreational use of the water. This B grade probably reflects dilution rather than better water quality in the lower Sydenham watershed. The lower reaches of the Sydenham River are at the same elevation as Lake St. Clair; consequently, backflow from that larger water body or the St. Clair River can affect water in the lower Sydenham River.

The *E. coli* concentrations are not known for five of the St. Clair Region watersheds.

## **Benthic Macroinvertebrates**

Six of the watersheds have D and two have F benthic grades indicating substantial pollution, and six watersheds have C grades indicating fairly substantial pollution likely. These low grades are typical of watersheds in southwestern Ontario, including the abutting Upper Thames River.

The score indicating the best benthic conditions is in the Sydenham Headwaters. The Sydenham Headwaters is less impacted than subwatersheds further downstream as there is less opportunity for pollutants to enter the system in a smaller catchment basin. The FBI score went from 5.64 for the 2001-2005 sampling period to 5.40 for 2006-2010, showing some improvement over time.

The Middle East Sydenham shows the greatest improvement in FBI value and benthic grade of the 14 watersheds evaluated for this report when the 2001-2005 period is compared to 2006-2010. The FBI has improved from 6.35 (D grade) to 5.53 (C grade). St. Clair's Healthy Stewardship Program has targeted this watershed for riparian planting, livestock exclusion fencing, and other stewardship projects for over 10 years. It is very positive to see water quality improving in this area where efforts have been focused.

The most impacted benthic scores are recorded in the Lake St. Clair Tributaries. Land use in the area is probably one of the most significant influences on surface water quality. This watershed has a high percentage of organic soils, is drained and intensely cropped, and has the lowest percent riparian buffer of the 14 watersheds. The substrate at the benthic station has 20 to 40 cm of muck which supports only pollution-tolerant invertebrates. The watershed is largely tiled and drained into channelized watercourses. The watercourses are managed as municipal drains that are controlled by pump works and therefore hold standing water much of the year, allowing the fine sediments to settle.

## **Surface Water Quality Discussion**

Three of the water chemistry monitoring sites (Lower North Sydenham, Lower East Sydenham, and Lake St. Clair Tributaries) appear to be influenced by Great Lakes waters.

*E. coli* monitoring would be valuable in more watersheds as the grades for five of the watersheds are calculated without this information. If the *E. coli* values for these watersheds were grade C, a typical *E. coli* grade for the St. Clair Region, the grades for these watersheds would not have changed.

The watersheds which appear to have the best water quality are the Sydenham Headwaters and Brown Creek. These are both headwater reaches with small catchment areas, better than average forest cover, and shallow unconfined aquifers.

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The poorest water quality conditions for benthic macroinvertebrates are found in the St. Clair River Tributaries and Lake St. Clair Tributaries. In the St. Clair River Tributaries, the forest cover is concentrated in two areas (Aamjiwnaang and Bickford Oak Woods); 80% of the soils are silt and clay, and the only aquifer is at bedrock and does not influence surface water quality. The Lake St. Clair Tributaries have even less forest cover and very low riparian cover. The largest watercourses in this watershed are municipal drains that are controlled by pump works and therefore hold standing water for much of the growing season. The poorest water quality, based on water chemistry, is in Cow and Perch Creeks and the two Bear Creek watersheds.

## Forest Condition Methods

Three indicators are used to assess forest condition on a watershed scale:

- Percent Forest Cover
- Percent Forest Interior
- Percent Riparian Buffer Forested

These indicators reflect important issues related to ecosystem health as they provide terrestrial habitats for native plants and animals that contribute to aquatic habitats, species diversity, and water quality and can be measured across the province.

### Forest Cover

This Report Card reports on the woodland layer that has been observed by St. Clair Conservation staff during careful desk-top review of the 2010 aerial photography of the complete St. Clair Region. The terms *forest*, *woodland* and *woodlot* are used interchangeably for areas that are more than 60 percent covered in trees and are more than 2 m in height. Woodland has been interpreted to include deciduous, coniferous and mixed plantations and does not include young plantations (less than 2 m in height), hedgerows or street trees. The minimum area that has been considered as a forest is 0.5 ha.

In the previous Report Card, woodland cover was based on the SOLRIS woodland layer provided by OMNR with respect to the 2000 to 2007 aerial photography. In addition, the SOLRIS mapping included woodland “cut-outs” where woodlands were mistakenly dissected around narrow features that were less than 20 m wide. The OMNR Natural Heritage Manual (2010) indicates woodland areas are considered continuous even if they are intersected by narrow gaps 20 m or less in width between crown edges. Narrow gaps due to watercourses, non-woody vegetation classes, and private driveways were therefore closed in during the SCRCA analysis, but gaps due to a road or railway were retained. This results in more accurate assessment of the total woodland cover and woodland interior in the region.

Recent natural heritage studies in Middlesex and Huron Counties have identified several vegetation communities to be excluded from the woodlands layer. The excluded communities are: wooded hedgerows that are less than 30 m in width; woody riparian buffers that are less than 30 m in width; and young plantations, where the individual trees or rows of trees are discernible at a scale of 1:2000.

Closing in the “cut-outs” results in an apparent increase in woodland cover, and excluding hedgerows, narrow riparian buffers, and young plantations results in an apparent decrease in woodland cover. Therefore, changes in apparent forest cover between the 2008 Report Card analysis and the 2013 Report Card analysis are considered to be largely due to improved mapping accuracy rather than changes in the landscape.

The percent forest cover was converted into a score and grade, following the Conservation Ontario guidelines (**Table 6**).

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## Forest Interior

The second forest condition indicator, "Forest Interior," refers to that portion of the woodland that remains when a 100 m buffer is removed from the forest perimeter. Forest interior refers to the protected core area that some species need to breed successfully. Area-sensitive bird species, such as the Scarlet Tanager or Pileated Woodpecker, require a relatively large forest patch within which to reproduce successfully. The outer 100 m is edge habitat where plants are prone to sun and wind damage, and alien species invasion and bird species experience increased nest parasitism, predation and other disturbance.

The forest interior of the woodland layer was calculated for the subject Report Card. The analytical change of closing in the "cut-outs" and complexing woodlands that were 20 m apart produces an apparent increase in forest interior. This change is due to analytical technique rather than increased forest interior in the landscape.

The percent forest interior was converted into a score and grade, following Conservation Ontario guidelines.

## Riparian Buffer

The third forest condition indicator is the percentage of the area within 30 m of the edge of an open watercourse that is forested. The Environment Canada document "How Much Habitat is Enough? A Framework for Guiding Habitat Rehabilitation in Great Lakes Areas of Concern" (Environment Canada, 2013) provides science-based guidelines for habitat conservation and restoration. A key recommendation of that report is that 75% of a stream length be naturally vegetated (30 m wide on both sides). This buffer provides a breeding, feeding and migration corridor for many species. In addition, it contributes to aquatic health by filtering nutrients, buffering temperatures and evaporation, and also contributing to the food web and habitat diversity in the watercourse.

In the St. Clair Region, we analyzed a more conservative buffer in the 2008 Report Card of 15 m woody riparian buffer on both sides of an open watercourse, and included this feature in the first individual Report Cards. Provincial Conservation Authorities agreed in 2010 (Conservation Ontario, 2011) to use the 30 m woody riparian buffer as a guideline to set targets for this decade. Only the forested streamside area, also known as the forested riparian zone, is used because across the province the watershed analyses do not include non-forested natural cover such as meadows.

For the 2013 Report Card, we calculate the percentage of the 30 m riparian buffer which is wooded. This may include wooded areas which are narrower than 30 m. This percentage is graded as an indicator of current watershed health.

## Forest Condition Results

In the St. Clair Region, forest cover is limited and is primarily constrained to land unsuitable for agriculture or development. Lambton Shores Tributaries is the only watershed with a C grade overall. Ten watersheds have a D grade and three have an F grade including Cow and Perch Creeks, Lower East Sydenham, and Lake St. Clair Tributaries.

The Forest Condition values and grades are summarized in **Table 7** and illustrated in **Map 4**.

The observed changes in Forest Condition scores between the first Report Card and the current Report Card are considered largely due to changes in analysis rather than changes in the forest condition on the landscape.

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## Forest Cover

Forest cover for the entire St. Clair Region is 11.4%, a D grade, while 30% cover is recommended for a healthy watershed. This low grade is not surprising in a highly developed portion of southern Ontario. When compared with abutting watersheds, this value is similar to the Upper Thames watershed and lower than the Ausable Bayfield watershed.

Lambton Shores Tributaries has the highest percent cover in the region of 17.3% (C grade). A significant percentage of this woodland, 568 ha or 26%, is within Kettle and Stony Point First Nation land. The St. Clair River Tributaries and Lake St. Clair Tributaries watersheds also have a significant portion of their woodland cover within a First Nation.

The Upper Sydenham River is the only other watershed that has a C grade for forest cover. Three of the largest woodland patches in this watershed are associated with significant wetlands. There are also extensive woodlands along the Sydenham River in Southwest Middlesex.

Three of the watersheds with the highest forest cover are upper watersheds of the East Sydenham River.

Twelve watersheds have a D grade for forest cover. The lowest cover value of 5.4% is recorded in the Lake St. Clair Tributaries and the Lower East Sydenham watersheds. Seventy-nine percent of the woodlands in the Lake St. Clair Tributaries are on Walpole Island First Nation.

## Forest Interior

Forest interior for the entire St. Clair Region is 2.0% (F grade), due to the high number of small and narrow woodlots. Four watersheds have a D grade and ten have an F grade. More than 10% interior is recommended for a healthy watershed. When compared with abutting watersheds, this region has more interior forest than the Upper Thames watershed and less than the Ausable Bayfield watersheds.

The watersheds with the most interior forest include Lambton Shores Tributaries and St. Clair River Tributaries. These watersheds include large tracts of forest on First Nations land. Two other watersheds with high forest interior values are the Lower Bear Creek and Middle East Sydenham, where the relevant woodland patches are along the river floodplain. The lowest percentage forest interior is recorded in the Lower East Sydenham watershed, which has very low forest cover and over 20% of the woodlands are less than 5 ha in size.

Developmental pressures typically create fragmented forest habitats. In the SCRCA, a measure of habitat fragmentation can be seen in the large number of woodlands smaller than 5 ha. About 55% of woodlots in the watershed are smaller than 5 ha. These areas of smaller woodlands result in lower species diversity due to increased edge effects, if compared to the same area of larger sized woodlands.

## Riparian Buffer

The forested riparian buffer coverage for the entire St. Clair Region is 21.2%, a D grade. Four watersheds have a C grade: Sydenham Headwaters, Upper Sydenham, Lower Bear Creek, and Lambton Shores Tributaries. These watersheds have among the higher forest cover values for the St. Clair Region.

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Three watersheds with the lowest grade, F, are the Lower East Sydenham, Cow and Perch Creeks, and Lake St. Clair Tributaries. These watersheds have the lowest forest cover values for the St. Clair region.

### Forest Condition Discussion

The majority of the St. Clair Region has poor forest conditions. The watershed with the best overall forest condition is Lambton Shoreline Tributaries, which has an overall grade of C and the highest percentage of all the watersheds in forest cover and forest interior and second best for riparian cover. Lambton Shores includes part of a significant woodland, wetland, and beach dune complex (approximately 20,000 ha) that extends along Lake Huron from the Kettle and Stony Point First Nation lands through the Ipperwash and Port Franks Dunes and Wetland complex to Pinery Provincial Park.

The Upper Sydenham River also has a D grade overall with similar percentages of forest cover and riparian cover. There is much less forest interior in Upper Sydenham than in Lambton Shores, as many of the Upper Sydenham woodlands are associated with watercourses and are long and relatively narrow. The Sydenham Headwaters has the highest percentage of forested riparian buffer.

Three watersheds, Lower East Sydenham River, Cow and Perch Creeks, and Lake St. Clair Tributaries, have very poor forest conditions, and an F grade. Each of these watersheds has low values for all three forest condition indicators. The Lower East Sydenham and Lake St. Clair Tributaries watersheds include the most intensely worked agricultural land in the St. Clair Region and most of the natural cover has been removed. The Cow and Perch Creeks watershed has been cleared for residential, commercial and industrial development associated with Sarnia, the largest urban centre in the SCRCA. Many of the watercourses are actively maintained as municipal drains and the land within 30 m of the open water is cleared and cropped.

### Wetland Cover

Environment Canada recommends that at least 10% of each major watershed and 6% of each subwatershed should be wetlands, to sustain water balance and biodiversity functions (Environment Canada, 2013).

The majority of the wetlands that are known from the St. Clair Region have been evaluated by OMNR using the Ontario Wetland Evaluation System. Since the last Report Card, SCRCA staff has completed a detailed analysis to identify any un-evaluated wetlands. This required a desk-top review of the aerial photos, particularly examining areas where the soil types, groundwater discharge mapping or proximity to evaluated wetlands increased the likelihood of observing previously un-mapped wetlands. Sites were then ranked by the certainty of wetland presence and approximately 343 ha are considered potential SCRCA Wetlands (**Table 8**).

Wetlands cover less than 1% of the St. Clair Region. (It is important to note that the First Nations lands have not been included in the assessment of wetland cover.) The Sydenham Headwaters and Upper Sydenham River have the highest wetland coverage, with 4.5 and 2.6% respectively. Seven watersheds have less than 0.5% wetland cover. Wetland restoration and enhancement should be strongly encouraged in all watersheds.

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## Watershed Features and Actions for Improvement

In addition to the data used to calculate grades, additional Watershed Features information is included in each Report Card. This information may indicate why a watershed experiences good or poor conditions, and why there have been changes since the last report. For example, higher amounts of precipitation and of flow have been recorded, which may increase bacteria readings and improve benthic conditions. The analysis of woodlot area sizes indicates that the largest woodlot in the St. Clair Region is in the Lake St. Clair Tributaries, and 68% of the woodlot coverage in that watershed is concentrated in 17 woodlots. Many other features have been summarized to provide benchmarks for the next Report Card.

Many landowners are actively working to improve the health of the watershed. Other landowners are interested in greater involvement in stewardship activities, recognizing that the condition of their region influences their quality of life. Actions range from volunteering to plant tree seedlings on public lands, to implementing conservative Woodlot Management Plans, completing and implementing Environmental Farm Plans and even donating properties for conservation. Recent partnership projects are summarized in **Tables 9 and 10** and recognized in individual Report Cards.

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## Section 2: Tables and Maps

**Table 1: Summary of Watershed Areas in St. Clair Region**

WATERSHED	Watershed Area km <sup>2</sup>	%
Sydenham Headwaters	224	5.4
Upper Sydenham River	229	5.6
Brown Creek	155	3.8
Middle East Sydenham	538	13.0
Lower East Sydenham	397	9.6
Bear Creek Headwaters	379	9.2
Lower Bear Creek	253	6.1
Black Creek	324	7.9
Lower North Sydenham	253	6.1
Lambton Shores Tributaries	127	3.1
Plympton Shoreline Tributaries	239	5.8
Cow and Perch Creeks	266	6.4
St. Clair River Tributaries	262	6.4
Lake St. Clair Tributaries	484	11.7
<b>Total</b>	<b>4,130</b>	<b>100</b>
<b>Average</b>	<b>295</b>	

**Table 2: Surface Water Quality Scoring and Overall Grade Calculation**

Total Phosphorus (mg/L)	<i>E. coli</i> (#/100mL)	Benthic Score	Point Score	Grade	Overall Surface Water Quality Grade	
					Final Points	Final Grade
< 0.020	0 - 30	0.00 - 4.25	5	A	>4.4	A
0.020 - 0.030	31 - 100	4.26 - 5.00	4	B	3.5 - 4.4	B
0.031 - 0.060	101 - 300	5.01 - 5.75	3	C	2.5 - 3.4	C
0.061 - 0.180	301 - 1,000	5.76 - 6.50	2	D	1.5 - 2.4	D
> 0.180	> 1,000	6.51 - 10.00	1	F	<1.5	F

Source: Conservation Ontario, 2011.

**Table 3: Data Used to Determine Surface Water Quality Grades**

Watershed	Site	Total Phosphorus		<i>E. coli</i>		Benthic Representative Site		
		Year of data	# of samples	Year of data	# of samples	Site	Year of data	# of samples
<b>Sydenham Headwaters</b>	East Sydenham River at Hickory Drive	2006-10	37	2006-10	37	East Sydenham River at Coldstream Road	2006, 2008-10	4
<b>Upper Sydenham River</b>	East Sydenham River at Shiloh Line	2006-10	36	2006-10	37	East Sydenham River at Sexton Road	2006, 2008-10	3.5*
<b>Brown Creek</b>	Brown Creek at Rokeby Line	2006-10	27	ND	ND	Brown Creek at Rokeby Line	2006, 2008-10	4
<b>Middle East Sydenham</b>	East Sydenham River at Lambton Line	2006-10	36	2006-10	37	East Sydenham River east of Mawlam Road	2006, 2008-10	4
<b>Lower East Sydenham</b>	Main Sydenham River at McNaughton Ave	2006-10	36	2006-10	37	East Sydenham River at Dawn Mills Road	2006, 2008-10	4
<b>Bear Creek Headwaters</b>	Bear Creek at Marthaville Road	2006-10	35	2006-10	37	Bear Creek at Kingscourt Road	2006, 2008-10	4
<b>Lower Bear Creek</b>	Bear Creek at Bickford Line	2006-10	34	2006-10	37	Bear Creek at Telfer Road	2006, 2008-10	4
<b>Black Creek</b>	Black Creek at Marthaville Road	2006-10	35	2006-10	37	Black Creek at Mandaumin Road	2006, 2008-10	4
<b>Lower North Sydenham</b>	North Sydenham River at Lambton Line	2006-10	27	ND	ND	West Otter Creek Drain at Charlemont Line	2006, 2008-10	4
<b>Lambton Shores Tributaries</b>	Shshawanda at Thomson Line	2006-10	39	2006-10	39	Shshawanda at Kinnaird Road	2008-10	3
<b>Plympton Shoreline Tributaries</b>	Hickory Creek at Brush Road	2008-10	41	2006-11	40	Hickory Creek at Forest Road	2006, 2008-10	4
<b>Cow and Perch Creeks</b>	Cow Creek at Lakeshore Road	2006-10	37	ND	ND	Cow Creek at Mandaumin Road	2006, 2008-10	4
<b>St. Clair River</b>	Clay Creek at White Line near C&O railroad	2006-10	37	ND	ND	Clay Creek at White Line near Hwy 40	2008-10	3
<b>Lake St. Clair</b>	Little Bear Creek at Bear Line Road	2006-10	36	ND	ND	Rankin Creek at Bear Line Road	2006, 2008-10	4

Notes: \* Riffle sample for 2010 not included.  
 ND = No data

**Table 4: Surface Water Quality Grades, 2005 and 2010**

Watershed	Phosphorus			Bacteria			Benthic Score			2010 Final Grade			
	2005 Result	2010 Result	2010 Grade	Status	2005 Result	2010 Result	2010 Grade	Status	2005 Result	2010 Result	2010 Grade	Status	Grade
Sydenham Headwaters	0.09	0.06	C	Improving	297	206	C	Improving	5.64	5.40	C	Steady	C
Upper Sydenham River	0.09	0.08	D	Steady	152	202	C	Declining	5.89	5.75	C	Steady	C
Brown Creek	0.09	0.15	D	Declining	ND	ND	ND	--	5.45	5.52	C	Steady	C
Middle East Sydenham	0.08	0.08	D	Steady	101	179	C	Declining	6.35	5.53	C	Improving	C
Lower East Sydenham	0.13	0.08	D	Improving	86	50	B	Steady	5.50	5.53	C	Steady	C
Bear Creek Headwaters	0.22	0.22	F	Steady	147	184	C	Declining	5.74	5.74	C	Steady	D
Lower Bear Creek	0.23	0.19	F	Improving	216	215	C	Steady	5.51	5.81	D	Declining	D
Black Creek	0.21	0.14	D	Improving	219	145	C	Improving	6.06	5.83	D	Steady	D
Lower North Sydenham	0.15	0.14	D	Steady	ND	ND	ND	--	6.40	6.21	D	Steady	D
Lambton Shores Tributaries	ND	0.12	D	--	ND	201	C	--	ND	5.77	D	--	D
Plympton Shoreline Tributaries	ND	0.13	D	--	ND	357	D	--	5.73	5.97	D	Steady	D
Cow and Perch Creeks	0.15	0.24	F	Declining	ND	ND	ND	--	5.69	6.02	D	Declining	D
St. Clair River Tributaries	0.18	0.16	D	Steady	ND	ND	ND	--	7.03	6.83	F	Steady	D
Lake St. Clair Tributaries	0.08	0.09	D	Steady	ND	ND	ND	--	7.24	7.02	F	Steady	D
<b>St. Clair Region</b>	<b>0.14</b>	<b>0.13</b>	<b>D</b>	<b>Steady</b>	<b>181</b>	<b>169</b>	<b>C</b>	<b>Steady</b>	<b>6.1</b>	<b>5.92</b>	<b>D</b>	<b>Steady</b>	<b>D</b>

Notes: \* Data Sources (2006-2010): Ministry of the Environment, Middlesex-London Health Unit, BM Ross, and SCRCA. ND=no data

2005 Result is based on data from 2001 - 2005 and used in the 2008 Report Card.

2010 Result is based on data from 2006 - 2010 and is used in the 2013 Report Card.

**Table 5: Watersheds Sorted by Surface Water Quality and Forest Condition Grades and Ranking**

Surface Water Quality - Grades and Point Scores				
A	B	C	D	F
		Sydenham Headwaters (3.0)	Bear Creek Headwaters (2.3)	
		Lower East Sydenham (3.0)	Black Creek (2.3)	
		Upper Sydenham River (2.7)	Lambton Shores Tributaries (2.3)	
		Middle East Sydenham (2.7)	Lower Bear Creek (2.0)	
		Brown Creek (2.5)	Lower North Sydenham (2.0)	
			Plympton Shoreline Tributaries (2.0)	
			Cow and Perch Creeks (1.5)	
			St. Clair River Tributaries (1.5)	
			Lake St. Clair Tributaries (1.5)	
Forest Condition - Grades and Point Scores				
A	B	C	D	F
		Lambton Shores Tributaries (2.7)	Upper Sydenham River (2.3)	Lower East Sydenham (1.3)
			Lower Bear Creek (2.3)	Cow and Perch Creeks (1.3)
			Sydenham Headwaters (2.0)	Lake St. Clair Tributaries (1.3)
			Middle East Sydenham (2.0)	
			St. Clair River Tributaries (2.0)	
			Brown Creek (1.7)	
			Lower North Sydenham (1.7)	
			Bear Creek Headwaters (1.7)	
			Black Creek (1.7)	
			Plympton Shoreline Tributaries (1.7)	

**Table 6: Forest Condition Scoring and Overall Grade Calculation**

					Overall Forest Condition	
% Forest Cover	% Forest Interior	% Riparian Zone Forested	Point Score	Grade	Final Points	Final Grade
> 35.0	> 11.5	> 57.5	5	A	> 4.4	A
25.1 - 35.0	8.6 - 11.5	42.6 - 57.5	4	B	3.5 - 4.4	B
15.1 - 25.0	5.6 - 8.5	27.6 - 42.5	3	C	2.5 - 3.4	C
5.0 - 15.0	2.5 - 5.5	12.5 - 27.5	2	D	1.5 - 2.4	D
< 5.0	< 2.5	< 12.5	1	F	< 1.5	F

Source: Conservation Ontario, 2011.

**Table 7: Forest Condition Indicators and Grades**

Watershed	Forest Cover		Forest Interior		Riparian Buffer Forested		Final Grade
	%	Grade	%	Grade	%	Grade	Grade
Sydenham Headwaters	14.3	D	1.6	F	37.8	C	D
Upper Sydenham River	16.0	C	2.4	F	30.9	C	D
Brown Creek	12.6	D	2.2	F	25.4	D	D
Middle East Sydenham	14.7	D	2.7	D	26.1	D	D
Lower East Sydenham	5.4	D	0.4	F	12.3	F	F
Bear Creek Headwaters	11.7	D	1.8	F	23.6	D	D
Lower Bear Creek	14.5	D	2.7	D	30.4	C	D
Black Creek	13.5	D	2.3	F	22.4	D	D
Lower North Sydenham	9.8	D	1.4	F	14.1	D	D
Lambton Shores Tributaries	17.3	C	4.1	D	32.4	C	C
Plympton Shoreline Tributaries	10.8	D	1.6	F	22.5	D	D
Cow and Perch Creeks	8.0	D	1.1	F	12.3	F	F
St. Clair River Tributaries	14.3	D	3.9	D	18.8	D	D
Lake St. Clair Tributaries	5.4	D	1.8	F	3.0	F	F
<b>St. Clair Region</b>	<b>11.4</b>	<b>D</b>	<b>2.0</b>	<b>F</b>	<b>21.2</b>	<b>D</b>	<b>D</b>

Source: The indicators are measured using Geographical Information Systems (GIS) and 2010 Aerial Photography.

**Table 8: Wetland Cover**

Watershed	Watershed Area ha	Potential SCRCA Wetlands		OMNR Wetlands		Wetland Total	
		Area ha	% of Watershed	Area ha	% of Watershed	Area ha	% of Watershed
<b>Sydenham Headwaters</b>	22,391	43	0.2	962	4.3	1,005	4.5
<b>Upper Sydenham River</b>	22,917	95	0.4	505	2.2	600	2.6
<b>Brown Creek</b>	15,525	20	0.1	48	0.3	68	0.4
<b>Middle East Sydenham</b>	53,843	96	0.2	409	0.8	505	0.9
<b>Lower East Sydenham</b>	39,670	4	0	0	0	4	0.0
<b>Bear Creek Headwaters</b>	37,869	53	0.1	97	0.3	150	0.4
<b>Lower Bear Creek</b>	25,251	12	0	127	0.5	139	0.6
<b>Black Creek</b>	32,425	19	0.1	50	0.2	69	0.2
<b>Lower North Sydenham</b>	25,255	0	0	53	0.2	53	0.2
<b>Lambton Shores Tributaries</b>	12,665	0	0	141	1.1	141	1.1
<b>Plympton Shoreline Tributaries</b>	23,863	0	0	20	0.1	20	0.1
<b>Cow and Perch Creeks</b>	26,628	1	0	59	0.2	59	0.2
<b>St. Clair River Tributaries</b>	26,237	0	0	330	1.3	330	1.3
<b>Lake St. Clair Tributaries</b>	48,409	0	0	335	0.7	335	0.7
<b>Total</b>	<b>412,980</b>	<b>343</b>	<b>0.1</b>	<b>3,136</b>	<b>0.8</b>	<b>3,479</b>	<b>0.9</b>

Notes: OMNR Wetlands = areas identified by the Ontario Ministry of Natural Resources NRVIS mapping, March 2012.

**Table 9: Trees and Shrubs Planted by SCRCA (2006-2010)**

<b>Watershed</b>	<b>Number of Projects</b>	<b>Number of Trees and Shrubs Planted</b>
Sydenham Headwaters	53	26,820
Upper Sydenham River	17	9,450
Brown Creek	34	33,640
Middle East Sydenham	30	10,530
Lower East Sydenham	13	3,170
Bear Creek Headwaters	17	8,830
Lower Bear Creek	38	23,730
Black Creek	17	11,780
Lower North Sydenham	30	27,340
Lambton Shores Tributaries	1	1,300
Plympton Shoreline Tributaries	1	unknown
Cow and Perch Creeks	12	23,130
St. Clair River Tributaries	23	36,860
Lake St. Clair Tributaries	7	5,150
<b>Total</b>	<b>293</b>	<b>221,730</b>

Notes: Includes plantings on private lands and corporate lands by SCRCA under the Conservation Services program. Does not include trees planted by SCRCA under the Memorial Forest program on municipal, SCRCA and other public properties.

**Table 10: Memorial Forest and Conservation Area Tree Plantings (1988-2012)**

<b>Watershed</b>	<b>Number of Projects</b>	<b>Number of Trees</b>
Sydenham Headwaters	8	44,358
Upper Sydenham River	2	6,382
Brown Creek	0	0
Middle East Sydenham	3	11,473
Lower East Sydenham	1	84
Bear Creek Headwaters	4	18,084
Lower Bear Creek	1	10,736
Black Creek	0	0
Lower North Sydenham	4	120,682
Lambton Shores Tributaries	0	0
Plympton Shoreline Tributaries	4	3,023
Cow and Perch Creeks	2	59,945
St. Clair River Tributaries	10	307
Lake St. Clair Tributaries	0	0
<b>Total</b>	<b>39</b>	<b>275,074</b>

Notes: Memorial Forest program supports tree planting on public lands owned by local municipalities, counties or the SCRCA.

**Table 11: Watersheds within each Municipality and First Nation**

Municipality / First Nation	Watersheds within each Municipality in Declining Order of Area (km <sup>2</sup> )					
<b>Adelaide-Metcalf</b>	Upper Sydenham (111)	Middle East Sydenham (51)	Brown Creek (33)	Sydenham Headwaters (29)	Bear Creek Headwaters (1)	
<b>Brooke-Alvinston</b>	Middle East Sydenham (130)	Brown Creek (69)	Bear Creek Headwaters (67)	Black Creek (30)	Upper Sydenham (17)	
<b>Chatham-Kent</b>	Lake St. Clair Tributaries (337)	Lower East Sydenham (245)	Lower North Sydenham (49)	Middle East Sydenham (10)	St. Clair River Tributaries (5)	
<b>Dawn-Euphemia</b>	Middle East Sydenham (181)	Lower East Sydenham (150)	Black Creek (73)	Lower North Sydenham (45)		
<b>Enniskillen</b>	Black Creek (162)	Bear Creek Headwaters (89)	Lower Bear Creek (81)	Cow and Perch Creeks (7)		
<b>Lambton Shores</b>	Lambton Shores Tributaries (110)	Plympton Shoreline Tributaries (3)				
<b>Middlesex Centre</b>	Sydenham Headwaters (115)					
<b>Newbury</b>	Middle East Sydenham (2)					
<b>Oil Springs</b>	Black Creek (8)					
<b>Petrolia</b>	Bear Creek Headwaters (10)	Lower Bear Creek (3)				
<b>Point Edward</b>	St. Clair River Tributaries (3)					
<b>Plympton-Wyoming</b>	Plympton Shoreline Tributaries (181)	Cow and Perch Creeks (86)	Bear Creek Headwaters (47)	Lower Bear Creek (10)	Lambton Shores Tributaries (2)	
<b>Sarnia</b>	Cow and Perch Creeks (141)	St. Clair River Tributaries (27)				
<b>Southwest Middlesex</b>	Middle East Sydenham (165)	Upper Sydenham River (10)				
<b>St. Clair</b>	St. Clair River Tributaries (215)	Lower North Sydenham (159)	Lower Bear Creek (159)	Black Creek (51)	Cow and Perch Creeks (33)	Lower East Sydenham (2)
<b>Strathroy-Caradoc</b>	Upper Sydenham (92)	Sydenham Headwaters (79)				
<b>Warwick</b>	Bear Creek Headwaters (166)	Plympton Shoreline Tributaries (54)	Brown Creek (54)	Lambton Shores Tributaries (6)		
<b>Aamjiwnaang First Nation</b>	St. Clair River Tributaries (12)	Cow and Perch Creeks (1)				
<b>Kettle and Stony Point First Nation</b>	Lambton Shores Tributaries (9)					
<b>Walpole Island First Nation</b>	Lake St. Clair Tributaries (146)					

Notes: The area of land in square kilometres in each municipality is shown in brackets ().

**Table 12: Municipalities and First Nations within each Watershed**

Watershed	Municipalities within each Watershed in declining order of area (km <sup>2</sup> )	%	Total
<b>Sydenham Headwaters</b>	Middlesex Centre (115)	51	224
	Strathroy-Caradoc (79)	35	
	Adelaide -Metcalf (29)	13	
<b>Upper Sydenham River</b>	Adelaide-Metcalf (111)	48	229
	Strathroy-Caradoc (92)	40	
	Brooke-Alvinston (17)	7	
	Southwest Middlesex (10)	4	
<b>Brown Creek</b>	Brooke-Alvinston (69)	44	155
	Warwick (54)	35	
	Adelaide-Metcalf (33)	21	
<b>Middle East Sydenham</b>	Dawn-Euphemia (181)	34	538
	Southwest Middlesex (165)	31	
	Brooke-Alvinston (130)	24	
	Adelaide-Metcalf (51)	10	
	Chatham-Kent (10)	2	
	Newbury (2)	<1	
<b>Lower East Sydenham</b>	Chatham-Kent (245)	62	397
	Dawn-Euphemia (150)	38	
	St. Clair (2)	1	
<b>Bear Creek Headwaters</b>	Warwick (166)	44	379
	Enniskillen (89)	24	
	Brooke-Alvinston (67)	18	
	Plympton (47)	12	
	Petrolia (10)	3	
	Adelaide-Metcalf (1)	<1	
<b>Lower Bear Creek</b>	St. Clair (159)	63	253
	Enniskillen (81)	32	
	Plympton-Wyoming (10)	4	
	Petrolia (3)	1	
<b>Black Creek</b>	Enniskillen (162)	50	324
	Dawn-Euphemia (73)	22	
	St. Clair (51)	16	
	Brooke-Alvinston (30)	9	
	Oil Springs (8)	3	
<b>Lower North Sydenham</b>	St. Clair (160)	63	253
	Chatham-Kent (49)	19	
	Dawn-Euphemia (45)	18	

Watershed	Municipalities within each Watershed in declining order of area (sq. km.)	%	Total
<b>Lambton Shores Tributaries</b>	Lambton Shores (110)	87	127
	Kettle and Stony Point (9)	7	
	Warwick (6)	5	
	Plympton-Wyoming (2)	<1	
<b>Plympton Shoreline Tributaries</b>	Plympton-Wyoming (181)	76	239
	Warwick (54)	23	
	Lambton Shores (3)	1	
<b>Cow and Perch Creeks</b>	Sarnia (141)	53	266
	Plympton-Wyoming (86)	32	
	St. Clair (33)	12	
	Enniskillen (7)	2	
	Aamjiwnaang (1)	< 1	
<b>St. Clair River Tributaries</b>	St. Clair (215)	82	261
	Sarnia (27)	10	
	Aamjiwnaang (12)	4	
	Chatham-Kent (5)	2	
	Point Edward (3)	1	
<b>Lake St. Clair Tributaries</b>	Chatham-Kent (337)	70	483
	Walpole Island First Nation (146)	30	

Notes: The area of land in square kilometres in each municipality or First Nation is shown in brackets (). The percent is the fraction that each municipality or First Nation makes up of the particular watershed.

**Table 13: Significant Natural Areas**

Watershed	Provincially Significant Wetland	Locally Significant Wetland	Significant Natural Area/Environmentally Significant Area*	Provincial Life Science ANSI	Regional Life Science ANSI	Provincial Earth Science ANSI
<b>Sydenham Headwaters</b>	(1) Sydenham River Wetlands (SC 8)	(1) Gold Creek Wetland	Coldstream Woodlot		Telfer Woodlot	
	(2) Komoka/South Strathroy Creek Wetlands (SC 9)	(2) Sinker Drain Wetland (SC 53)	Vanneck Woods		Ivan Woodlot	
	(3) South Ilderton Heronry Wetlands and Woodlot (SC 12)	(3) Hyde Park Wetland (SC 55)	Ivan Woods			
	(4) Telfer Woods and Wetland	(4) Harford Wetland (AB 9)	Caradoc North Woods			
	(5) Duncrief Wetland	(5) Telfer Woodlot (SC 11)				
		(6) Lamont Drive Wetland				
<b>Upper Sydenham River</b>	(1) Longwoods Woods and Wetland Complex (SC 6)	(1) Melwood Wetland	Brooke Township Sydenham Woods		Kerwood Woods	
	(2) Sydenham River Wetlands (SC 8)	(2) Scotchmere Drive Wetlands				
	(3) Kerwood Swamp	(3) Napier Swamp (SC 16)				
	(4) Komoka/South Strathroy Creek Wetlands (SC 9)					
<b>Brown Creek</b>	(1) Walnut Heronry Woods	(1) Kerwood Bluff	Walnut Hickory Woods		Brown Creek Woods	
	(2) Brown Creek Woods and Wetland	(2) Hardy Creek Swamp (SC 14)			Walnut Woods	

Watershed	Provincially Significant Wetland	Locally Significant Wetland	Significant Natural Area/Environmentally Significant Area*	Provincial Life Science ANSI	Regional Life Science ANSI	Provincial Earth Science ANSI
<b>Middle East Sydenham</b>	(1) Skunks Misery (LT22) (in part)	(1) West Newbury Wetland (SC 1)	Sydenham River Corridor Carolinian Canada Site	Skunk's Misery	Oakdale Woods	
	(2) Bobcat Swamp Wetland Complex (SC 2)	(2) McPhail Woodland and Wetland	Shetland Heronry			
	(3) McCreedy Woods and Wetland (SC 22)		Shetland Kentucky Coffee-tree Grove Carolinian Canada Site			
	(4) Grape Fern Woods and Wetland		Knapdale Woods			
	(5) Melbourne Marsh (SC 3)		Newbury Woods			
	(6) Euphemia #3 (Cairo Wetland)		Cairo Woods			
			County Line Woods			
			Cottonwood Swamp			
			Fansher Creek Natural Area			
			Shield Woods			
			A. W. Campbell Conservation Area			
		Sinclair Management Area				
<b>Lower East Sydenham</b>			Deyo's or Dare's Woods		Thamesville Moor	
			Langbank Woods		Oakdale Woods	
			Huff's Corners Woods			
			Rutherford Woods			
<b>Bear Creek Headwaters</b>	(1) Warwick Conservation Area Wetlands	(1) Bear Creek Source Woods and Wetland	Little Bear Creek Natural Area		Brown Creek Woods	
		(2) Bridgeview (Petrolia) Conservation Area Wetland (SC 37)	Highway 402 Woods		Bear Creek South of Wyoming	
		(3) West Warwick Woods (SC 54)	Bear Creek Woodlot #1		Walnut Woods	
<b>Lower Bear Creek</b>	(1) Moore Wildlife Management Area (Bear Creek Woods #4) and Wetland	(1) Bear Creek Woods #3 and Wetland	Waubuno Woods	Bear Creek Floodplain	Clay Creek Woodland	
	(2) Burton Drain Woods #3 and Wetland	(2) Brigden Crown Game Reserve Wetland	Nichol Creek Woods			
	(3) Bickford Oak Woods Wetland Complex (SC 50)	(3) Henderson Conservation Area (Bear Creek Woods #2) and Wetlands (SC 34)	Burton Drain Woods #2			

Watershed	Provincially Significant Wetland	Locally Significant Wetland	Significant Natural Area/Environmentally Significant Area*	Provincial Life Science ANSI	Regional Life Science ANSI	Provincial Earth Science ANSI
<b>Black Creek</b>	(1) Walnut Heronry Woods	(1) Plum Creek Woods and Wetland	Bickford Line Woods	Plum Creek	Black Creek	
		(2) Black Creek Woods #1 (Fox Creek Woods) and Wetland	Black Creek Natural Area #2	Bear Creek Floodplain	Walnut Woods	
<b>Lower North Sydenham</b>	(1) Snye River Marshes (SC 17)	(1) Chicken Island Wetland (SC 19)	Wallaceburg Woods		Duthill Woodlot	
	(2) Reid Conservation Area (Duthill Woods #2) and Wetlands	(2) McKeough C.A. and Grant's Wetland	Terminus Woods			
	(3) Bickford Oak Woods Wetland Complex (SC 50)	(3) Bray's Swamp	Combine Woods			
			Wilkesport Woods			
			McKeough Conservation Area (Duthill Woods #1) and Floodway			
<b>Lambton Shores Tributaries</b>	(1) South Kettle Point Lakeshore Marshes (SC 49)		Cedar Point	Former Ipperwash Provincial Park	Gustin Grove Marsh / Shashawandah Creek	Former Ipperwash Provincial Park
	(2) Ipperwash Inner Dunal Complex (SC 48)		Ipperwash Natural Areas	Kettle Point		
			Shashawandah Creek/Lakeshore Marsh complex	Port Franks Wetlands and Forested Dunes		
			Jericho Creek/Mud Creek Woods			
			Port Franks Natural Areas			
<b>Plympton Shoreline Tributaries</b>		(1) Uttoxeter Swamp (SC 41)	Aberarder Creek Woods			
		(2) Plympton/West Warwick Woods and Wetland (SC 54)	Esli Dodge Conservation Area			
		(3) West Warwick Woods (SC 54)	McEwen Conservation Area			
			Highland Creek Conservation Area			
			Blue Point Woods			
			Egremont Road Woods			

Watershed	Provincially Significant Wetland	Locally Significant Wetland	Significant Natural Area/Environmentally Significant Area*	Provincial Life Science ANSI	Regional Life Science ANSI	Provincial Earth Science ANSI
<b>Cow and Perch Creeks</b>	(1) Wawanosh Conservation Area Wetlands (SC 46)	(1) Perch Creek (Sarnia Landfill) Wetland (SC 40)	402 Woods			
			Dennis Rupert Prairie			
			Brights Grove Lagoons			
			Reeces Corners Gravel Pits			
			Camlachie Woods			
			Jackson Drive Woods			
			Deptford Pink Woods			
			Saredeca Woods			
			Logans Pond			
			Mandaumin Nature Reserve			
			Blackwell Prairie/Howard Watson Nature Trail			
			Suncor Natureway			
			Perch Creek Wildlife Management Area and Wetland			
<b>St. Clair River Tributaries</b>	(1) Stag Island Natural Area and Wetland (SC 52)	(1) McKeough C.A. and Grant's Wetland	Aamjiwnaang First Nation	Walpole Island	Duthill Woodlot	
	(2) Marshy Creek Marsh (SC 35)	(2) Upper Clay Creek Wetland Complex (SC 52)	Sassafras Woods		Clay Creek Woodland	
	(3) Bickford Oak Woods Wetland Complex (SC 50)	(3) Bickford Oak Woods Wetland Complex (SC 50)	Sombra Sycamore Woods			
			Upland Plover Woods			
			Spice Bush Woods			
			Fertilizer Plant Woods			
			Bickford Oak Woods (Clay Creek Woods)			
			Indian Pipe Woods			
			Payne Woods			
			Hydro Plant Woods			
<b>Lake St. Clair Tributaries</b>	(1) Chenal Ecarte Marshes (SC 18)		Walpole Island First Nation	Walpole Island	Chenal Ecarte Prairie	
	(2) Deyo's Woodlot		Chenal Ecarte Prairie	Lake St. Clair Marshes		
	(3) St. Clair Marsh Complex					
	(4) Snye River Marshes (SC 17)					

Notes: \*Wording varies by county.

**Table 14: Land Use by Watershed**

Watershed	% Agricultural	% Forest *	% Urban/Industrial	% Other/Not Mapped
Sydenham Headwaters	81	11	7	0.3
Upper Sydenham River	84	14	0.8	0.6
Brown Creek	87	13	0.4	0.1
Middle East Sydenham	85	14	0.6	0.4
Lower East Sydenham	91	6	2	0.9
Bear Creek Headwaters	85	11	3	0.2
Lower Bear Creek	85	12	3	0.8
Black Creek	84	13	2	0.4
Lower North Sydenham	88	11	1	0.5
Lambton Shores Tributaries	77	19	3	0.8
Plympton Shoreline Tributaries	86	11	2	0.8
Cow and Perch Creeks	79	6	14	1
St. Clair River Tributaries	68	9	23	0.4
Lake St. Clair Tributaries	66	1	1	32
<b>Average</b>	<b>82</b>	<b>11</b>	<b>4</b>	<b>3</b>

Notes: This table provides a broad overview of landuse within the watersheds. Updated forest area analysis using 2010 aerial photography is within Table 7: Forest Condition Indicators and Grades. Source: GIS derived from "Agriculture Resource Inventory", Ontario Ministry of Agriculture and Food, 1983.

**Table 15: Soil Type (Percent Area by Watershed)**

Watershed	Bottom Land and Beach	Loam	Sand Loam	Silt and Clay	Silt and Clay Loam	Organic	Not Mapped	Fine Sand	Water
<b>Sydenham Headwaters</b>	11.2	14.7	20.4	40.8	8.9	0.1	3.3	0.6	
<b>Upper Sydenham River</b>	8.1	9.7	42.4	37.3		0.2	0.2	2.1	
<b>Brown Creek</b>	4.6	4.1	1.7	64.3	25.1		0.2		
<b>Middle East Sydenham</b>	5.2	3.4	34.5	53.5	2.9		0.5		
<b>Lower East Sydenham</b>	3.5	7.0	18.1	63.2	5.6		1.8	0.3	0.7
<b>Bear Creek Headwaters</b>	4.1	4.9	1.9	83.9	5.3				
<b>Lower Bear Creek</b>	3.6	0.2	1.1	94.5	0.6				
<b>Black Creek</b>	3.4	0.2		95.9	0.5				
<b>Lower North Sydenham</b>	1.7	2.7	1.0	93.0	0.5		0.8		0.4
<b>Lambton Shores Tributaries</b>	3.1	5.6	2.1	79.8	9.5				
<b>Plympton Shoreline Tributaries</b>	3.3	3.2	3.5	90.0					
<b>Cow and Perch Creeks</b>	0.9	1.0	3.3	90.6	2.7	0.9	0.6		
<b>St. Clair River Tributaries</b>	0.8	7.4	3.2	79.8	5.0		3.8		
<b>Lake St. Clair Tributaries</b>		5.5	35.8	30.9	7.1	16.5	3.8	0.2	0.2

Notes: Figures represent the percentage of the watershed area in each soil type.

Water = open waterbodies within subwatersheds.

Not Mapped = mainly urban/built-up areas.

Source: Derived using GIS and soil maps from the Ontario Ministry of Agriculture and Food, Soils Ontario Version 1.0.

**Table 16: Physiography**

Watershed	Spillways	Till Moraines	Clay Plains	Sand Plains	Till Plains Undrumlined	Beaches and Shorecliffs	Bevelled Till Plains	Peat and Muck
Sydenham Headwaters	1.7	23.9	0.9	44.7	28.8			
Upper Sydenham River		1.2	56.3	42.5				
Brown Creek		23.1	50.1		22.6	1.2	2.9	
Middle East Sydenham			32.6	43.0			24.4	
Lower East Sydenham			20.7	37.0			42.2	0.1
Bear Creek Headwaters		15.7		3.9	10.3	0.2	70.0	
Lower Bear Creek		6					94	
Black Creek							100.0	
Lower North Sydenham			36.9	0.8			62.3	
Lambton Shores Tributaries		26		20.1			53.9	
Plympton Shoreline Tributaries		37.0					63.0	
Cow and Perch Creeks		3.9		5.4		1.4	83.8	5.6
St. Clair River Tributaries			27.9	5.6		0.7	65.9	
Lake St. Clair Tributaries			36.1	62.2				1.8

Notes: Figures represent the percentage of the watershed area in each physiographic unit.

Source: GIS derived from Chapman, L.J & D.F. Putnam, 1973.

**Table 17: Stream Flow**

Watershed	Station Name	Station ID	Mean Annual Flow (cubic metres per second)										
			2003	2004	2005	2006	2007	2008	2009	2010	Mean 2003-2010	Mean 2003-2005	Mean 2006-2010
<b>Sydenham Headwaters</b>	Strathroy	02GG005	1.65	1.90	1.86	3.13	1.67	3.04	2.23	1.54	2.13	1.80	2.32
<b>Upper Sydenham River</b>	Strathroy	02GG005	1.65	1.90	1.86	3.13	1.67	3.04	2.23	1.54	2.13	1.80	2.32
<b>Brown Creek</b>													
<b>Middle East Sydenham</b>	Alvinston	02GG002	5.79	6.98	7.65	10.7	5.64	12.3	8.62	5.10	7.85	6.81	8.47
	Florence	02GG003	8.57	11.9	12.2	18.6	9.73	19.6	12.80	7.46	12.61	10.89	13.64
<b>Lower East Sydenham</b>	Dresden	02GG007	11.40	11.10	22.30	21.68	18.74	27.30	13.55	8.33	16.80	14.93	17.92
<b>Bear Creek Headwaters</b>	Petrolia	02GG006	2.25	2.03	2.97	3.85	1.89	5.30	2.96	2.01	2.91	2.42	3.20
<b>Lower Bear Creek</b>	Petrolia	02GG006	2.25	2.03	2.97	3.85	1.89	5.30	2.96	2.01	2.91	2.42	3.20
	Brigden	02GG009	3.80	4.31	6.78	8.47	4.00	9.91	6.14	3.82	5.90	4.96	6.47
<b>Black Creek</b>	Black Creek	02GG013	n/a	n/a	n/a	3.21 <sup>1</sup>	2.10	4.57	2.61	1.58	n/a	n/a	2.72
<b>Lower North Sydenham</b>													
<b>Lambton Shores Tributaries</b>													
<b>Plympton Shoreline Tributaries</b>													
<b>Cow and Perch Creeks</b>	Perch Creek	02FF012	0.634	0.674	0.536 <sup>2</sup>	1.19	0.668	1.27	0.84	0.77	0.82	0.61	0.95
<b>St. Clair River Tributaries</b>													
<b>Lake St. Clair Tributaries</b>													
<b>Average</b>			<b>4.87</b>	<b>5.56</b>	<b>7.76</b>	<b>8.85</b>	<b>5.55</b>	<b>10.41</b>	<b>6.22</b>	<b>3.83</b>			

Notes: Station Name = relevant stream gauge station for watershed.

<sup>1</sup> Mean Annual Flow based on 9 months of data.

<sup>2</sup> Mean Annual Flow based on 10 months of data.

**Table 18: Average Annual Precipitation, 2002-2010**

Watershed	Station Name*	Annual Precipitation (mm)									Average 2002-2010	Average 2002-2005	Average 2006-2010
		2002	2003	2004	2005	2006	2007	2008	2009	2010			
Sydenham Headwaters	Strathroy	682	765	980	913	971	804	1,241	1,003	895	917.11	835.00	982.80
Upper Sydenham River	Strathroy	682	765	980	913	971	804	1,241	1,003	895	917.11	835.00	982.80
Brown Creek	Strathroy	682	765	980	913	971	804	1,241	1,003	895	917.11	835.00	982.80
Middle East Sydenham	Strathroy	682	765	980	913	971	804	1,241	1,003	895	917.11	835.00	982.80
Lower East Sydenham	Wallaceburg	768	963	887	749	848	880	1,022	921	947	887.22	841.75	923.60
Bear Creek Headwaters	Petrolia	773	889	942	837	1,080	760	1,131	962	927	922.33	860.25	972.00
Lower Bear Creek	Petrolia	773	889	942	837	1,080	760	1,131	962	927	922.33	860.25	972.00
Black Creek	Petrolia	773	889	942	837	1,080	760	1,131	962	927	922.33	860.25	972.00
Lower North Sydenham	Wallaceburg	768	963	887	749	848	880	1,022	921	947	887.22	841.75	923.60
Lambton Shores Tributaries	Sarnia	707	765	980	834	1,080	640	1,006	822	697	836.78	821.50	849.00
Plympton Shoreline Tributaries	Sarnia	707	765	980	834	1,080	640	1,006	822	697	836.78	821.50	849.00
Cow and Perch Creeks	Sarnia	707	765	980	834	1,080	640	1,006	822	697	836.78	821.50	849.00
St. Clair River Tributaries	Sarnia	707	765	980	834	1,080	640	1,006	822	697	836.78	821.50	849.00
Lake St. Clair Tributaries	Wallaceburg	768	963	887	749	848	880	1,022	921	947	887.22	841.75	923.60
<b>Average</b>		<b>733</b>	<b>846</b>	<b>947</b>	<b>833</b>	<b>995</b>	<b>771</b>	<b>1,100</b>	<b>927</b>	<b>867</b>			

Notes: Station name = relevant stream gauge station for watershed.  
 Yearly average calculated using each station's annual data once.

**Table 19: Average Annual Temperature, 2002-2010**

Watershed	Station Name*	Average Annual Air Temperatures (degrees Celsius)									Average 2002-2010	Average 2002-2005	Average 2006-2010
		2002	2003	2004	2005	2006	2007	2008	2009	2010			
<b>Sydenham Headwaters</b>	Strathroy	9.10	7.62	8.16	8.73	9.42	8.87	8.16	8.11	9.35	8.61	8.40	8.78
<b>Upper Sydenham River</b>	Strathroy	9.10	7.62	8.16	8.73	9.42	8.87	8.16	8.11	9.35	8.61	8.40	8.78
<b>Brown Creek</b>	Strathroy	9.10	7.62	8.16	8.73	9.42	8.87	8.16	8.11	9.35	8.61	8.40	8.78
<b>Middle East Sydenham</b>	Strathroy	9.10	7.62	8.16	8.73	9.42	8.87	8.16	8.11	9.35	8.61	8.40	8.78
<b>Lower East Sydenham</b>	Wallaceburg	10.53	9.19	9.56	10.19	10.25	10.93	10.16	10.06	11.44	10.26	9.87	10.57
<b>Bear Creek Headwaters</b>	Petrolia	9.80	8.30	8.87	8.79	9.82	8.94	8.32	8.03	9.53	8.93	8.94	8.93
<b>Lower Bear Creek</b>	Petrolia	9.80	8.30	8.87	8.79	9.82	8.94	8.32	8.03	9.53	8.93	8.94	8.93
<b>Black Creek</b>	Petrolia	9.80	8.30	8.87	8.79	9.82	8.94	8.32	8.03	9.53	8.93	8.94	8.93
<b>Lower North Sydenham</b>	Wallaceburg	10.53	9.19	9.56	10.19	10.25	10.93	10.16	10.06	11.44	10.26	9.87	10.57
<b>Lambton Shores Tributaries</b>	Sarnia	9.08	7.60	8.12	8.82	9.82	8.95	8.38	8.03	9.64	8.72	8.41	8.96
<b>Plympton Shoreline Tributaries</b>	Sarnia	9.08	7.60	8.12	8.82	9.82	8.95	8.38	8.03	9.64	8.72	8.41	8.96
<b>Cow and Perch Creeks</b>	Sarnia	9.08	7.60	8.12	8.82	9.82	8.95	8.38	8.03	9.64	8.72	8.41	8.96
<b>St. Clair River Tributaries</b>	Sarnia	9.08	7.60	8.12	8.82	9.82	8.95	8.38	8.03	9.64	8.72	8.41	8.96
<b>Lake St. Clair Tributaries</b>	Wallaceburg	10.53	9.19	9.56	10.19	10.25	10.93	10.16	10.06	11.44	10.26	9.87	10.57
<b>Average</b>		<b>9.6</b>	<b>8.2</b>	<b>8.7</b>	<b>9.1</b>	<b>9.8</b>	<b>9.4</b>	<b>8.8</b>	<b>8.6</b>	<b>10.0</b>			

Notes: Station Name = relevant stream gauge station for watershed.  
Yearly average calculated using each station's annual data once.

**Table 20: Agricultural Tileage**

Watershed	Total Area km <sup>2</sup>	Unknown Drainage km <sup>2</sup>	Randomly Tiled km <sup>2</sup>	System- atically Tiled km <sup>2</sup>	Unknown Drainage %	Randomly Tiled %	System- atically Tiled %
<b>Sydenham Headwaters</b>	224	164	26	34	73	11	15
<b>Upper Sydenham River</b>	229	142	38	49	62	17	21
<b>Brown Creek</b>	155	50	33	72	32	21	47
<b>Middle East Sydenham</b>	539	226	105	208	42	19	39
<b>Lower East Sydenham</b>	397	75	87	235	19	22	59
<b>Bear Creek Headwaters</b>	379	113	46	220	30	12	58
<b>Lower Bear Creek</b>	253	78	79	96	31	31	38
<b>Black Creek</b>	325	98	22	205	30	7	63
<b>Lower North Sydenham</b>	253	57	20	176	22	8	70
<b>Lambton Shores Tributaries</b>	127	55	15	57	43	12	45
<b>Plympton Shoreline Tributaries</b>	239	74	32	133	31	13	56
<b>Cow and Perch Creeks</b>	266	100	37	129	38	14	49
<b>St. Clair River Tributaries</b>	263	132	47	84	50	18	32
<b>Lake St. Clair Tributaries</b>	484	173	35	276	36	7	57
<b>Total</b>	<b>4,133</b>	<b>1,536</b>	<b>622</b>	<b>1,975</b>			
<b>Average</b>					<b>39</b>	<b>15</b>	<b>46</b>

**Table 21: Watercourse Length by Type (Natural, or Open or Buried Municipal Drain)**

Watershed	Total Length km	Natural Watercourse km	Municipal Drain			Natural Watercourse %	Municipal Drain		
			Open km	Buried km	Unclassified km		Open %	Buried %	Unclassified %
<b>Sydenham Headwaters</b>	342	73	124	68	77	21	36	20	23
<b>Upper Sydenham River</b>	417	75	156	27	159	18	37	6	38
<b>Brown Creek</b>	329	49	95	90	95	15	29	27	29
<b>Middle East Sydenham</b>	973	105	528	46	294	11	54	5	30
<b>Lower East Sydenham</b>	594	108	402	6	78	18	68	1	13
<b>Bear Creek Headwaters</b>	685	114	323	152	97	17	47	22	14
<b>Lower Bear Creek</b>	333	104	166	6	58	31	50	2	17
<b>Black Creek</b>	580	94	343	20	123	16	59	3	21
<b>Lower North Sydenham</b>	275	37	204	0	34	13	74	0	12
<b>Lambton Shores Tributaries*</b>	156								
<b>Plympton Shoreline Tributaries</b>	330	56	171	46	57	17	52	14	17
<b>Cow and Perch Creeks</b>	369	36	196	18	119	10	53	5	32
<b>St. Clair River Tributaries</b>	276	36	149	2	90	13	54	1	33
<b>Lake St. Clair Tributaries</b>	521	0	432	5	84	0	83	1	16
<b>Total</b>	<b>6,179</b>	<b>887</b>	<b>3,288</b>	<b>485</b>	<b>1,364</b>				
<b>Average</b>						<b>15</b>	<b>54</b>	<b>8</b>	<b>23</b>

Notes: Total km = Total length of inland watercourses in kilometres. Great Lakes connecting channels and watercourses on Walpole Island First Nation lands are not included.

Natural = Watercourse not identified as a Municipal Drain.

Buried = Watercourse buried underground in pipes.

Source: SCRCA Municipal Drain Classification 2004 except for Lambton Shores, where watercourses were assessed by Ausable Bayfield Conservation Authority (ABCA).

\*All watercourses in Lambton Shores were classified by ABCA as Open (Type A,B,C,D,E,F) or Buried (Type T), whether they were a Natural Watercourse or a Municipal Drain.

Of the 156km of watercourses in Lambton Shores, 142km (91%) are open, 9km (6%) are buried, and 5km (3%) are unclassified.

**Table 22: Dams and Barriers to Fish Movement**

Watershed	Total # of Dams or Barriers	# of Private Dams and Barriers	# of Public Dams and Barriers	Names of Public Dams and Barriers
Sydenham Headwaters	10	7	3	Cuddy Woods Dam, Coldstream CA Dam, Strathroy CA Dam
Upper Sydenham River	6	5	1	Wright CA Dam
Brown Creek	4	4	0	
Middle East Sydenham	3	1	2	Campbell CA Dams
Lower East Sydenham	2	1	1	VanderVeeken Dam
Bear Creek Headwaters	5	3	2	Petrolia CA Dam, Warwick CA Dam
Lower Bear Creek	7	3	4	Henderson CA Weir 1, Weir 2, and Weir 3, Marthaville HMA Dam
Black Creek	0	0	0	
Lower North Sydenham	2	1	1	McKeough CA Dam
Lambton Shores Tributaries	2	2	0	
Plympton Shoreline Tributaries	4	3	1	Dodge CA Dam
Cow and Perch Creeks	0	0	0	
St. Clair River Tributaries	1	0	1	McKeough CA Drop Structure
Lake St. Clair Tributaries	5	1	4	Bay Lodge Dam, Hind Relief Dam, Rankin Creek Dam
<b>Total</b>	<b>51</b>	<b>31</b>	<b>20</b>	
<b>Average</b>	<b>4</b>	<b>2</b>	<b>1</b>	

Source: SCRCA Dam and Barrier Inventory, 2007.

**Table 23: Sewage Treatment Plant Facilities**

Watershed	Wastewater Treatment Plants or Lagoons	Receiving Watershed within SCRCA	Plant Discharging outside SCRCA	Receiving Watercourse
<b>Sydenham Headwaters</b>	Ilderton WWTP		Ilderton WWTP	Oxbow Creek, a tributary of Thames River
	Strathroy WWTP	Sydenham Headwaters		East Sydenham River
<b>Upper Sydenham River</b>				
<b>Brown Creek</b>	Kerwood Facility	Brown Creek		
<b>Middle East Sydenham</b>	Alvinston WWTP	Middle East Sydenham		East Sydenham River
	Newbury WWTP	Middle East Sydenham		Dolby Drain
<b>Lower East Sydenham</b>	Dresden WWTP	Lower East Sydenham		East Sydenham River
	Wallaceburg WWTP	Lower East Sydenham		East Sydenham River
<b>Bear Creek Headwaters</b>	Watford Lagoons	Bear Creek Headwaters		Moffatt Drain, a tributary of Bear Creek
<b>Lower Bear Creek</b>	Petrolia WWTP	Lower Bear Creek		Bear Creek
	Wyoming WWTP	Lower Bear Creek		Bear Creek
	Brigden Lagoons	Lower Bear Creek		one annual seasonal outfall to Bear Creek
<b>Black Creek</b>	Oil City Lagoons	Black Creek		seasonal outfall to Fox Creek Drain, a tributary of Black Creek
	Oil Springs Lagoons	Black Creek		seasonal outfall to Black Creek
<b>Lower North Sydenham</b>				
<b>Lambton Shores Tributaries</b>				
<b>Plympton Shoreline Tributaries</b>	Plympton-Lakeshore WWTP		Plympton-Lakeshore WWTP	Lake Huron
	Forest Lagoons	Plympton Shoreline Tributaries		Hickory Creek
<b>Cow and Perch Creeks</b>	Brights Grove Lagoons	Cow and Perch Creeks		
<b>St. Clair River Tributaries</b>	Point Edward WWTP		Point Edward WWTP	St. Clair River
	Sarnia WWTP		Sarnia WWTP	St. Clair River
	Sombra Lagoons	St. Clair River Tributaries		seasonal outfall spring and fall to Meyers Drain
	Courtright WWTP		Courtright WWTP	St. Clair River
	Port Lambton Lagoons	St. Clair River Tributaries		Marshy Creek Drain
<b>Lake St. Clair Tributaries</b>	Mitchell's Bay Lagoons	Lake St. Clair Tributaries		Rankin Creek Drain

Notes: WWTP = Wastewater Treatment Plant.

**Table 24: Woodlot Size**

Watershed	Number of Woodlots			Total Woodlot Area			Percentage of Woodlot Area			Largest Woodlot					
	< 5 ha	5-10 ha	10-30 ha	>30 ha	Total	<5 ha	5-10 ha	10-30 ha							
Sydenham Headwaters	214	63	59	25	361	380	474	922	1,421	3,196	12	15	29	44	150
Upper Sydenham River	206	55	53	31	345	381	365	921	2,009	3,676	10	10	25	55	177
Brown Creek	84	22	22	18	146	166	157	410	1,222	1,956	9	8	21	62	157
Middle East Sydenham	339	131	114	72	656	657	952	1,988	4,319	7,916	8	12	25	55	138
Lower East Sydenham	209	60	54	10	333	446	433	824	436	2,139	21	20	39	20	60
Bear Creek Headwaters	168	60	71	43	342	336	445	1,151	2,504	4,436	8	10	26	56	137
Lower Bear Creek	161	37	43	38	279	316	266	763	2,313	3,658	9	7	21	63	171
Black Creek	196	66	70	40	372	394	449	1,187	2,345	4,374	9	10	27	54	155
Lower North Sydenham	138	39	53	22	252	297	291	867	1,010	2,464	12	12	35	41	79
Lambton Shores Tributaries	79	22	36	11	148	155	164	595	1,274	2,188	7	8	27	58	249
Plympton Shoreline Tributaries	125	46	46	25	242	250	339	767	1,219	2,575	10	13	30	47	96
Cow and Perch Creeks	170	39	50	11	270	312	284	919	629	2,145	15	13	43	29	133
St. Clair River Tributaries	167	46	47	34	294	337	321	818	2,284	3,761	9	9	22	61	262
Lake St. Clair Tributaries	153	23	21	17	214	315	161	360	1,803	2,638	12	6	14	68	353
<b>Total</b>	<b>2,409</b>	<b>709</b>	<b>739</b>	<b>397</b>	<b>4,254</b>	<b>4,741</b>	<b>5,100</b>	<b>12,493</b>	<b>24,787</b>	<b>47,120</b>	--	--	--	--	--
<b>Average</b>	<b>172</b>	<b>51</b>	<b>53</b>	<b>28</b>	<b>304</b>	--	--	--	--	--	<b>11</b>	<b>11</b>	<b>27</b>	<b>51</b>	--

**Table 25: Species of Concern and At Risk**

Watershed	Common Name	Scientific Name	Type	COSEWIC 2012	SARA 2012	SARO 2012
Sydenham Headwaters	American Chestnut	<i>Castanea dentata</i>	Plant	END	Schedule 1, Endangered	END
	Butternut	<i>Juglans cinerea</i>	Plant	END	Schedule 1, Endangered	END
	Crooked-stem Aster	<i>Symphyotrichum prenanthoides</i>	Plant	THR	Schedule 1, Threatened	THR
	Drooping Trillium	<i>Trillium flexipes</i>	Plant	END	Schedule 1, Endangered	END
	Green Dragon	<i>Arisaema dracontium</i>	Plant	SC	Schedule 3, Special Concern	SC
	Willowleaf Aster	<i>Symphyotrichum praealtum</i>	Plant	THR	Schedule 1, Threatened	THR
	Wood-poppy	<i>Stylophorum diphyllum</i>	Plant	END	Schedule 1, Endangered	END
	Snapping Turtle	<i>Chelydra serpentina</i>	Reptile	SC	Schedule 1, Special Concern	SC
	Spiny Softshell Turtle	<i>Apalone spinifera</i>	Reptile	THR	Schedule 1, Threatened	THR
	Blanding's Turtle	<i>Emys blandingii</i>	Reptile	THR	Schedule 1, Endangered	THR
	Eastern Hog-nosed Snake	<i>Heterodon platirhinos</i>	Reptile			
	Bobolink	<i>Dolichonyx oryzivorus</i>	Bird	THR	No schedule, No Status	THR
Upper Sydenham River	American Chestnut	<i>Castanea dentata</i>	Plant	END	Schedule 1, Endangered	END
	Blue Ash	<i>Fraxinus quadrangulata</i>	Plant	SC	Schedule 1, Special Concern	
	False Hop Sedge	<i>Carex lupuliformis</i>	Plant	END	Schedule 1, Endangered	END
	Green Dragon	<i>Arisaema dracontium</i>	Plant	SC	Schedule 3, Special Concern	SC
	Riddell's Goldenrod	<i>Solidago riddellii</i>	Plant	SC	Schedule 1, Special Concern	SC
	Blanding's Turtle	<i>Emys blandingii</i>	Reptile	THR	Schedule 1, Endangered	THR
	Snapping Turtle	<i>Chelydra serpentina</i>	Reptile	SC	Schedule 1, Special Concern	SC
	Spiny Softshell Turtle	<i>Apalone spinifera</i>	Reptile	THR	Schedule 1, Threatened	THR
	Kidneyshell	<i>Ptychobranthus fasciola</i>	Mussel	END	Schedule 1, Endangered	END
	Rayed Bean	<i>Villosa fabalis</i>	Mussel	END	Schedule 1, Endangered	END
	Round Pigtoe	<i>Pleurobema sintoxia</i>	Mussel	END	Schedule 1, Endangered	END

Watershed	Common Name	Scientific Name	Type	COSEWIC 2012	SARA 2012	SARO 2012
Brown Creek	Blue Ash	<i>Fraxinus quadrangulata</i>	Plant	SC	Schedule 1, Special Concern	
	Green Dragon	<i>Arisaema dracontium</i>	Plant	SC	Schedule 3, Special Concern	SC
	Northern Map Turtle	<i>Graptemys geographica</i>	Reptile	SC	Schedule 1, Special Concern	SC
	Snapping Turtle	<i>Chelydra serpentina</i>	Reptile	SC	Schedule 1, Special Concern	SC
	Spiny Softshell Turtle	<i>Apalone spinifera</i>	Reptile	THR	Schedule 1, Threatened	THR
	American Badger	<i>Taxidea taxus jacksoni</i>	Mammal	END	Schedule 1, Endangered	END
	Bobolink	<i>Dolichonyx oryzivorus</i>	Bird	THR	No schedule, No Status	THR
	Cerulean Warbler	<i>Dendroica cerulea</i>	Bird	END <sup>1</sup>	Schedule 1, Special Concern	THR <sup>1</sup>
	Eastern Sand Darter	<i>Ammocrypta pellucida</i>	Fish	THR	Schedule 1, Threatened	END <sup>1</sup>
Middle East Sydenham	American Chestnut	<i>Castanea dentata</i>	Plant	END	Schedule 1, Endangered	END
	Blue Ash	<i>Fraxinus quadrangulata</i>	Plant	SC	Schedule 1, Special Concern	
	Butternut	<i>Juglans cinerea</i>	Plant	END	Schedule 1, Endangered	END
	Climbing Prairie Rose	<i>Rosa setigera</i>	Plant	SC	Schedule 1, Special Concern	SC
	Eastern Flowering Dogwood	<i>Cornus florida</i>	Plant	END	Schedule 1, Endangered	END
	Green Dragon	<i>Arisaema dracontium</i>	Plant	SC	Schedule 3, Special Concern	SC
	Kentucky Coffee-tree	<i>Gymnocladus dioicus</i>	Plant	THR	Schedule 1, Threatened	THR
	Large Whorled Pogonia	<i>Isotria verticillata</i>	Plant	END	Schedule 1, Endangered	END
	Riddell's Goldenrod	<i>Solidago riddellii</i>	Plant	SC	Schedule 1, Special Concern	SC
	Blanding's Turtle	<i>Emys blandingii</i>	Reptile	THR	Schedule 1, Endangered	THR
	Northern Map Turtle	<i>Graptemys geographica</i>	Reptile	SC	Schedule 1, Special Concern	SC
	Snapping Turtle	<i>Chelydra serpentina</i>	Reptile	SC	Schedule 1, Special Concern	SC
	Spiny Softshell Turtle	<i>Apalone spinifera</i>	Reptile	THR	Schedule 1, Threatened	THR
	Acadian Flycatcher	<i>Empidonax virescens</i>	Bird	END	Schedule 1, Endangered	END
	Bobolink	<i>Dolichonyx oryzivorus</i>	Bird	THR	No schedule, No Status	THR
	Cerulean Warbler	<i>Dendroica cerulea</i>	Bird	END <sup>1</sup>	Schedule 1, Special Concern	THR <sup>1</sup>

Watershed	Common Name	Scientific Name	Type	COSEWIC 2012	SARA 2012	SARO 2012
Middle East Sydenham	Hooded Warbler	<i>Wilsonia citrina</i>	Bird	NAR <sup>2</sup>	Schedule 1, Threatened	SC <sup>2</sup>
	King Rail	<i>Rallus elegans</i>	Bird	END	Schedule 1, Endangered	END
	Prothonotary Warbler	<i>Protonotaria citrea</i>	Bird	END	Schedule 1, Endangered	END
	Red-headed Woodpecker	<i>Melanerpes erythrocephalus</i>	Bird	THR <sup>1</sup>	Schedule 1, Threatened	SC
	Eastern Sand Darter	<i>Ammocrypta pellucida</i>	Fish	THR	Schedule 1, Threatened	END <sup>1</sup>
	Spotted Sucker	<i>Minytrema melanops</i>	Fish	SC	Schedule 1, Special Concern	SC
	Kidneyshell	<i>Ptychobranthus fasciola</i>	Mussel	END	Schedule 1, Endangered	END
	Mapleleaf	<i>Quadrula quadrula</i>	Mussel	THR	Schedule 1, Threatened	THR
	Mudpuppy Mussel	<i>Simpsonaias ambigua</i>	Mussel	END	Schedule 1, Endangered	END
	Northern Riffleshell	<i>Epioblasma torulosa rangiana</i>	Mussel	END	Schedule 1, Endangered	END
	Rainbow	<i>Villosa iris</i>	Mussel	END	Schedule 1, Endangered	THR
	Rayed Bean	<i>Villosa fabalis</i>	Mussel	END	Schedule 1, Endangered	END
	Round Pigtoe	<i>Pleurobema sintoxia</i>	Mussel	END	Schedule 1, Endangered	END
	Snuffbox	<i>Epioblasma triquetra</i>	Mussel	END	Schedule 1, Endangered	END
Lower East Sydenham	Butternut	<i>Juglans cinerea</i>	Plant	END	Schedule 1, Endangered	END
	Dense Blazingstar	<i>Liatris spicata</i>	Plant	THR	Schedule 1, Threatened	THR
	Eastern Flowering Dogwood	<i>Cornus florida</i>	Plant	END	Schedule 1, Endangered	END
	Kentucky Coffee-tree	<i>Gymnocladus dioicus</i>	Plant	THR	Schedule 1, Threatened	THR
	Purple Twayblade	<i>Liparis liliifolia</i>	Plant	THR <sup>2</sup>	Schedule 1, Endangered	THR <sup>2</sup>
	Snapping Turtle	<i>Chelydra serpentina</i>	Reptile	SC	Schedule 1, Special Concern	SC
	Spiny Softshell Turtle	<i>Apalone spinifera</i>	Reptile	THR	Schedule 1, Threatened	THR
	Northern Map Turtle	<i>Graptemys geographica</i>	Reptile	SC	Schedule 1, Special Concern	SC
	Bobolink	<i>Dolichonyx oryzivorus</i>	Bird	THR	No schedule, No Status	THR
	Blackstripe Topminnow	<i>Fundulus notatus</i>	Fish	SC	Schedule 1, Special Concern	SC
	Eastern Sand Darter	<i>Ammocrypta pellucida</i>	Fish	THR	Schedule 1, Threatened	END <sup>1</sup>

Watershed	Common Name	Scientific Name	Type	COSEWIC 2012	SARA 2012	SARO 2012
Lower East Sydenham	Pugnose Minnow	<i>Opsopoeodus emiliae</i>	Fish	THR	Schedule 1, Special Concern	SC
	Spotted Sucker	<i>Minytrema melanops</i>	Fish	SC	Schedule 1, Special Concern	SC
	Kidneyshell	<i>Ptychobranhus fasciola</i>	Mussel	END	Schedule 1, Endangered	END
	Mapleleaf	<i>Quadrula quadrula</i>	Mussel	THR	Schedule 1, Threatened	THR
	Mudpuppy Mussel	<i>Simpsonaias ambigua</i>	Mussel	END	Schedule 1, Endangered	END
	Northern Riffleshell	<i>Epioblasma torulosa rangiana</i>	Mussel	END	Schedule 1, Endangered	END
	Rayed Bean	<i>Villosa fabalis</i>	Mussel	END	Schedule 1, Endangered	END
	Round Hickorynut	<i>Obovaria subrotunda</i>	Mussel	END	Schedule 1, Endangered	END
	Round Pigtoe	<i>Pleurobema sintoxia</i>	Mussel	END	Schedule 1, Endangered	END
	Snuffbox	<i>Epioblasma triquetra</i>	Mussel	END	Schedule 1, Endangered	END
	Threehorn Wartyback	<i>Obliquaria reflexa</i>	Mussel	THR	No schedule, No Status	
Bear Creek Headwaters	Green Dragon	<i>Arisaema dracontium</i>	Plant	SC	Schedule 3, Special Concern	SC
	Butternut	<i>Juglans cinerea</i>	Plant	END	Schedule 1, Endangered	END
	Kentucky Coffee-tree	<i>Gymnocladus dioicus</i>	Plant	THR	Schedule 1, Threatened	THR
	Bobolink	<i>Dolichonyx oryzivorus</i>	Bird	THR	No schedule, No Status	THR
	Loggerhead Shrike	<i>Lanius ludovicianus</i>	Bird	END	Schedule 1, Endangered	END
	Blackstripe Topminnow	<i>Fundulus notatus</i>	Fish	SC	Schedule 1, Special Concern	SC
	Spotted Sucker	<i>Minytrema melanops</i>	Fish	SC	Schedule 1, Special Concern	SC
	Round Pigtoe	<i>Pleurobema sintoxia</i>	Mussel	END	Schedule 1, Endangered	END
Lower Bear Creek	Blue Ash	<i>Fraxinus quadrangulata</i>	Plant	SC	Schedule 1, Special Concern	SC
	Green Dragon	<i>Arisaema dracontium</i>	Plant	SC	Schedule 3, Special Concern	SC
	Kentucky Coffee-tree	<i>Gymnocladus dioicus</i>	Plant	THR	Schedule 1, Threatened	THR
	Spiny Softshell Turtle	<i>Apalone spinifera</i>	Reptile	THR	Schedule 1, Threatened	THR
	Bobolink	<i>Dolichonyx oryzivorus</i>	Bird	THR	No schedule, No Status	THR
	Blackstripe Topminnow	<i>Fundulus notatus</i>	Fish	SC	Schedule 1, Special Concern	SC
	Spotted Sucker	<i>Minytrema melanops</i>	Fish	SC	Schedule 1, Special Concern	SC
	Mapleleaf	<i>Quadrula quadrula</i>	Mussel	THR	Schedule 1, Threatened	THR

Watershed	Common Name	Scientific Name	Type	COSEWIC 2012	SARA 2012	SARO 2012
Black Creek	Blue Ash	<i>Fraxinus quadrangulata</i>	Plant	SC	Schedule 1, Special Concern	
	Kentucky Coffee-tree	<i>Gymnocladus dioicus</i>	Plant	THR	Schedule 1, Threatened	THR
	Spiny Softshell Turtle	<i>Apalone spinifera</i>	Reptile	THR	Schedule 1, Threatened	THR
	Bobolink	<i>Dolichonyx oryzivorus</i>	Bird	THR	No schedule, No Status	THR
	Blackstripe Topminnow	<i>Fundulus notatus</i>	Fish	SC	Schedule 1, Special Concern	SC
Lower North Sydenham	Blue Ash	<i>Fraxinus quadrangulata</i>	Plant	SC	Schedule 1, Special Concern	
	Climbing Prairie Rose	<i>Rosa setigera</i>	Plant	SC	Schedule 1, Special Concern	SC
	Dense Blazingstar	<i>Liatris spicata</i>	Plant	THR	Schedule 1, Threatened	THR
	Kentucky Coffee-tree	<i>Gymnocladus dioicus</i>	Plant	THR	Schedule 1, Threatened	THR
	Shumard Oak	<i>Quercus shumardii</i>	Plant	SC	Schedule 3, Special Concern	SC
	Swamp Rosemallow	<i>Hibiscus moscheutos</i>	Plant	SC	Schedule 1, Special Concern	SC
	Butler's Gartersnake	<i>Thamnophis butlerii</i>	Reptile	END <sup>1</sup>	Schedule 1, Threatened	END <sup>1</sup>
	Spiny Softshell Turtle	<i>Apalone spinifera</i>	Reptile	THR	Schedule 1, Threatened	THR
	Bobolink	<i>Dolichonyx oryzivorus</i>	Bird	THR	No schedule, No Status	THR
	Blackstripe Topminnow	<i>Fundulus notatus</i>	Fish	SC	Schedule 1, Special Concern	SC
	Pugnose Minnow	<i>Opsopoeodus emiliae</i>	Fish	THR	Schedule 1, Special Concern	SC
	Spotted Sucker	<i>Minytrema melanops</i>	Fish	SC	Schedule 1, Special Concern	SC

Watershed	Common Name	Scientific Name	Type	COSEWIC 2012	SARA 2012	SARO 2012
Lambton Shores Tributaries	Bluehearts	<i>Buchnera americana</i>	Plant	END	Schedule 1, Endangered	END
	Broad Beech Fern	<i>Phegopteris hexagonoptera</i>	Plant	SC	Schedule 3, Special Concern	SC
	Dense Blazingstar	<i>Liatris spicata</i>	Plant	THR	Schedule 1, Threatened	THR
	Green Dragon	<i>Arisaema dracontium</i>	Plant	SC	Schedule 3, Special Concern	SC
	Shumard Oak	<i>Quercus shumardii</i>	Plant	SC	Schedule 3, Special Concern	SC
	Blanding's Turtle	<i>Emys blandingii</i>	Reptile	THR	Schedule 1, Endangered	THR
	Eastern Ribbonsnake	<i>Thamnophis sauritus</i>	Reptile	SC	Schedule 1, Threatened	SC
	Milksnake	<i>Lampropeltis triangulum</i>	Reptile	SC	Schedule 1, Special Concern	SC
	Snapping Turtle	<i>Chelydra serpentina</i>	Reptile	SC	Schedule 1, Special Concern	SC
	Acadian Flycatcher	<i>Empidonax virescens</i>	Bird	END	Schedule 1, Endangered	END
	Bobolink	<i>Dolichonyx oryzivorus</i>	Bird	THR	No schedule, No Status	THR
	Hooded Warbler	<i>Wilsonia citrina</i>	Bird	NAR <sup>2</sup>	Schedule 1, Threatened	SC <sup>2</sup>
	Plympton Shoreline Tributaries	Blue Ash	<i>Fraxinus quadrangulata</i>	Plant	SC	Schedule 1, Special Concern
Shumard Oak		<i>Quercus shumardii</i>	Plant	SC	Schedule 3, Special Concern	SC
Butler's Gartersnake		<i>Thamnophis butlerii</i>	Reptile	END <sup>1</sup>	Schedule 1, Threatened	END <sup>1</sup>
Bobolink		<i>Dolichonyx oryzivorus</i>	Bird	THR	No schedule, No Status	THR
Loggerhead Shrike		<i>Lanius ludovicianus</i>	Bird	END	Schedule 1, Endangered	END
Cow and Perch Creeks	Riddell's Goldenrod	<i>Solidago riddellii</i>	Plant	SC	Schedule 1, Special Concern	SC
	Butler's Gartersnake	<i>Thamnophis butlerii</i>	Reptile	END <sup>1</sup>	Schedule 1, Threatened	END <sup>1</sup>
	Bobolink	<i>Dolichonyx oryzivorus</i>	Bird	THR	No schedule, No Status	THR
	Rusty-patched Bumble Bee	<i>Bombus affinis</i>	Insect	END	Schedule 1, Endangered	END

Watershed	Common Name	Scientific Name	Type	COSEWIC 2012	SARA 2012	SARO 2012
St. Clair River Tributaries	Blue Ash	<i>Fraxinus quadrangulata</i>	Plant	SC	Schedule 1, Special Concern	
	Butternut	<i>Juglans cinerea</i>	Plant	END	Schedule 1, Endangered	END
	Climbing Prairie Rose	<i>Rosa setigera</i>	Plant	SC	Schedule 1, Special Concern	SC
	Dense Blazingstar	<i>Liatris spicata</i>	Plant	THR	Schedule 1, Threatened	THR
	Showy Goldenrod (Great Lakes Plains population)	<i>Solidago speciosa</i>	Plant	END	No schedule, No Status	END
	Shumard Oak	<i>Quercus shumardii</i>	Plant	SC	Schedule 3, Special Concern	SC
	Swamp Rosemallow	<i>Hibiscus moscheutos</i>	Plant	SC	Schedule 1, Special Concern	SC
	White Prairie Gentian	<i>Gentiana alba</i>	Plant	END	Schedule 1, Endangered	END
	Blanding's Turtle	<i>Emys blandingii</i>	Reptile	THR	Schedule 1, Endangered	THR
	Butler's Gartersnake	<i>Thamnophis butlerii</i>	Reptile	END <sup>1</sup>	Schedule 1, Threatened	END <sup>1</sup>
	Snapping Turtle	<i>Chelydra serpentina</i>	Reptile	SC	Schedule 1, Special Concern	SC
	Bobolink	<i>Dolichonyx oryzivorus</i>	Bird	THR	No schedule, No Status	THR
	Northern Bobwhite	<i>Colinus virginianus</i>	Bird	END	Schedule 1, Endangered	END
	Peregrine Falcon	<i>Falco peregrinus</i>	Bird	SC	Schedule 1, Special Concern	THR
	Channel Darter	<i>Percina copelandii</i>	Fish	THR	Schedule 1, Threatened	THR
	Grass Pickerel	<i>Esox americanus</i>	Fish	SC	Schedule 1, Special Concern	SC
	Northern Brook Lamprey	<i>Ichthyomyzon fossor</i>	Fish	SC	Schedule 1, Special Concern	SC
	Spotted Sucker	<i>Minytrema melanops</i>	Fish	SC	Schedule 1, Special Concern	SC

Watershed	Common Name	Scientific Name	Type	COSEWIC 2012	SARA 2012	SARO 2012
Lake St. Clair Tributaries	Climbing Prairie Rose	<i>Rosa setigera</i>	Plant	SC	Schedule 1, Special Concern	SC
	Common Hoptree	<i>Ptelea trifoliata</i>	Plant	THR	Schedule 1, Threatened	THR
	Dense Blazingstar	<i>Liatris spicata</i>	Plant	THR	Schedule 1, Threatened	THR
	Eastern Prairie White-fringed Orchid	<i>Plantanthera leucophaea</i>	Plant	END	Schedule 1, Endangered	END
	Gattinger's Agalinis	<i>Agalinis gattingeri</i>	Plant	END	Schedule 1, Endangered	END
	Kentucky Coffee-tree	<i>Gymnocladus dioicus</i>	Plant	THR	Schedule 1, Threatened	THR
	Pink Milkwort	<i>Polygala incarnata</i>	Plant	END	Schedule 1, Endangered	END
	Purple Twayblade	<i>Liparis liliifolia</i>	Plant	THR <sup>2</sup>	Schedule 1, Endangered	THR <sup>2</sup>
	Riddell's Goldenrod	<i>Solidago riddellii</i>	Plant	SC	Schedule 1, Special Concern	SC
	Showy Goldenrod (Great Lakes Plains population)	<i>Solidago speciosa</i>	Plant	END	No schedule, No Status	END
	Skinner's Agalinis	<i>Agalinis skinneriana</i>	Plant	END	Schedule 1, Endangered	END
	Small White Lady's-slipper	<i>Cypripedium candidum</i>	Plant	END	Schedule 1, Endangered	END
	Swamp Rosemallow	<i>Hibiscus moscheutos</i>	Plant	SC	Schedule 1, Special Concern	SC
	White Prairie Gentian	<i>Gentiana alba</i>	Plant	END	Schedule 1, Endangered	END
	Willowleaf Aster	<i>Symphotrichum praealtum</i>	Plant	THR	Schedule 1, Threatened	THR
	Blanding's Turtle	<i>Emys blandingii</i>	Reptile	THR	Schedule 1, Endangered	THR
	Butler's Gartersnake	<i>Thamnophis butlerii</i>	Reptile	END <sup>1</sup>	Schedule 1, Threatened	END <sup>1</sup>
	Northern Map Turtle	<i>Graptemys geographica</i>	Reptile	SC	Schedule 1, Special Concern	SC
	Snapping Turtle	<i>Chelydra serpentina</i>	Reptile	SC	Schedule 1, Special Concern	SC
	Spiny Softshell Turtle	<i>Apalone spinifera</i>	Reptile	THR	Schedule 1, Threatened	THR

Watershed	Common Name	Scientific Name	Type	COSEWIC 2012	SARA 2012	SARO 2012
Lake St. Clair Tributaries	Black Tern	<i>Clidonias niger</i>	Bird	NAR		SC
	Bobolink	<i>Dolichonyx oryzivorus</i>	Bird	THR	No schedule, No Status	THR
	King Rail	<i>Rallus elegans</i>	Bird	END	Schedule 1, Endangered	END
	Least Bittern	<i>Ixobrychus exilis</i>	Bird	THR	Schedule 1, Threatened	THR
	Northern Bobwhite	<i>Colinus virginianus</i>	Bird	END	Schedule 1, Endangered	END
	Channel Darter	<i>Percina copelandii</i>	Fish	THR	Schedule 1, Threatened	THR
	Grass Pickerel	<i>Esox americanus</i>	Fish	SC	Schedule 1, Special Concern	SC
	Lake Chubsucker	<i>Erimyzon sucetta</i>	Fish	END <sup>1</sup>	Schedule 1, Endangered	THR
	Pugnose Minnow	<i>Opsopoeodus emiliae</i>	Fish	THR	Schedule 1, Special Concern	SC
	Pugnose Shiner	<i>Notropis anogenus</i>	Fish	END	Schedule 1, Endangered	END
	Silver Chub	<i>Macrhybopsis storeriana</i>	Fish	END	No schedule, No Status	SC
	Spotted Sucker	<i>Minytrema melanops</i>	Fish	SC	Schedule 1, Special Concern	SC
	Eastern Pondmussel	<i>Ligumia nasuta</i>	Mussel	END	No schedule, No Status	END
	Kidneyshell	<i>Ptychobranhus fasciola</i>	Mussel	END	Schedule 1, Endangered	END
	Round Hickorynut	<i>Obovaria subrotunda</i>	Mussel	END	Schedule 1, Endangered	END
	Round Pigtoe	<i>Pleurobema sintoxia</i>	Mussel	END	Schedule 1, Endangered	END
Wavyrayed Lampmussel	<i>Lampsilis fasciola</i>	Mussel	SC <sup>2</sup>	Schedule 1, Endangered	THR <sup>2</sup>	

Notes: COSEWIC = Committee on the Status of Endangered Wildlife in Canada.

SARA 2012 = Species at Risk Act, Species status as of 2012.

SARO 2012 = Species At Risk of Ontario, designated by the Ontario Ministry of Natural Resources (OMNR) in accordance with the provincial Endangered Species Act; Species status as of 2012.

END = Endangered; THR = Threatened; SC = Special Concern; NAR = Not At Risk.

<sup>1</sup> In a higher risk category since the 2008 Watershed Report Card.

<sup>2</sup> In a lower risk category since the 2008 Watershed Report Card.

Source: OMNR Natural Heritage Information Centre (NHIC) data and SCRCA, 1990 to 2010 occurrences.

**Table 26: Fish Species Occurrences**

Common Name	Sydenham Headwaters	Upper East Sydenham River	Brown Creek	Middle East Sydenham	Lower East Sydenham	Bear Creek Headwaters	Lower Bear Creek	Black Creek	Lower North Sydenham	Lambton Shores Tributaries *	Plympton Shoreline Tributaries	Cow and Perch Creeks	St. Clair River Tributaries	Lake St. Clair Tributaries
Bigmouth Buffalo				X	X			X						
Black Bullhead	X	X	X	X	X	X		X	X		X	X	X	X
Black Crappie		X		X	X			X		X			X	
Blacknose Dace	X	X		X		X								
Blacknose Shiner													X	
Blackside Darter		X	X	X	X	X		X	X		X			
Blackstripe Topminnow				X	X		X	X	X					
Bluegill	X	X		X	X	X	X		X				X	X
Bluntnose Minnow	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Brassy Minnow		X										X		
Brindled Madtom		X		X	X									
Brook Silverside					X			X		X			X	
Brook Stickleback	X	X		X		X					X	X	X	
Brown Bullhead		X				X	X					X		
Central Mudminnow	X	X		X		X		X		X	X	X	X	X
Channel Catfish				X	X			X					X	
Common Carp NN	X	X	X	X	X	X	X	X		X	X	X	X	X
Common Shiner	X	X	X	X	X	X		X		X	X	X	X	
Creek Chub	X	X	X	X	X	X		X		X	X	X	X	
Eastern Sand Darter		X		X	X									
Emerald Shiner				X	X			X					X	
Fantail Darter		X		X	X									
Fathead Minnow	X	X	X	X		X				X	X	X	X	
Freshwater Drum				X	X			X					X	
Ghost Shiner				X	X									
Gizzard Shad		X		X	X		X	X	X	X			X	
Golden Redhorse	X	X	X	X	X	X		X						
Golden Shiner		X					X						X	X
Grass Pickerel														X
Greater Redhorse		X		X	X									
Green Sunfish	X	X	X	X	X	X	X	X	X		X	X	X	X
Greenside Darter		X		X	X	X		X						
Hornyhead Chub		X											X	
Hybrid Sunfish	X													

Common Name	Sydenham Headwaters	Upper East Sydenham River	Brown Creek	Middle East Sydenham	Lower East Sydenham	Bear Creek Headwaters	Lower Bear Creek	Black Creek	Lower North Sydenham	Lambton Shores Tributaries *	Plympton Shoreline Tributaries	Cow and Perch Creeks	St. Clair River Tributaries	Lake St. Clair Tributaries
Iowa Darter		X											X	
Johnny Darter	X	X	X	X	X	X		X	X	X	X		X	X
Lake Sturgeon													X	
Lamprey													X	
Largemouth Bass	X	X		X	X	X	X	X					X	X
Least Darter		X		X							X			
Logperch		X		X	X	X		X	X				X	
Longear Sunfish	X	X		X	X	X	X	X						
Longnose Gar				X	X	X		X					X	
Mimic Shiner		X		X	X	X		X		X	X		X	
Minnows	X													
Mottled Sculpin	X	X												
Northern Hog Sucker		X		X	X									
Northern Madtom					X								X	
Northern Pike		X		X	X			X		X	X		X	X
Northern Redbelly Dace	X	X		X		X				X	X		X	
Pearl Dace	X	X												
Pumpkinseed	X	X		X	X	X		X	X	X	X	X	X	X
Quillback		X		X	X			X						
Rainbow Darter											X	X	X	
Rainbow Trout NN	X	X												
Redfin Shiner		X	X	X	X	X	X	X						X
Rock Bass	X	X		X	X	X		X		X	X		X	X
Rosyface Shiner					X									
Round Goby NN												X	X	X
Sea Lamprey													X	
Shorthead Redhorse		X		X	X			X						
Silver Bass														
Silver Redhorse		X		X	X			X					X	
Smallmouth Bass		X		X	X					X	X			
Spotfin Shiner		X		X	X	X		X	X	X	X	X	X	
Spottail Shiner					X					X		X	X	
Spotted Sucker								X					X	
Stonecat		X		X	X			X						
Striped Shiner		X		X	X			X				X		

Common Name	Sydenham Headwaters	Upper East Sydenham River	Brown Creek	Middle East Sydenham	Lower East Sydenham	Bear Creek Headwaters	Lower Bear Creek	Black Creek	Lower North Sydenham	Lambton Shores Tributaries *	Plympton Shoreline Tributaries	Cow and Perch Creeks	St. Clair River Tributaries	Lake St. Clair Tributaries
<b>Tadpole Madtom</b>				X		X		X	X					X
<b>Trout-Perch</b>		X		X	X									
<b>Tube-nose Goby NN</b>													X	
<b>Walleye</b>				X	X									
<b>White Bass</b>				X	X			X						
<b>White Crappie</b>	X	X			X	X		X						
<b>White Perch</b>				X	X	X	X							
<b>White Sucker</b>	X	X	X	X	X	X	X	X	X	X	X	X	X	X
<b>Yellow Bullhead</b>	X		X	X	X			X					X	X
<b>Yellow Perch</b>				X			X	X				X	X	
<b>Total</b>	<b>28</b>	<b>51</b>	<b>13</b>	<b>54</b>	<b>51</b>	<b>30</b>	<b>14</b>	<b>41</b>	<b>13</b>	<b>20</b>	<b>21</b>	<b>19</b>	<b>43</b>	<b>18</b>

Notes: There are 79 species in total, including 4 non-native species.

NN = non-native species for the watershed.

Source: Based on sampling records from Mark Poos, Department of Fisheries and Oceans and SCRC (2000-2010) except for Lambton Shores where records are from OMNR and Royal Ontario Museum (1976-1982).

**Table 27: Freshwater Mussel Species Occurrences**

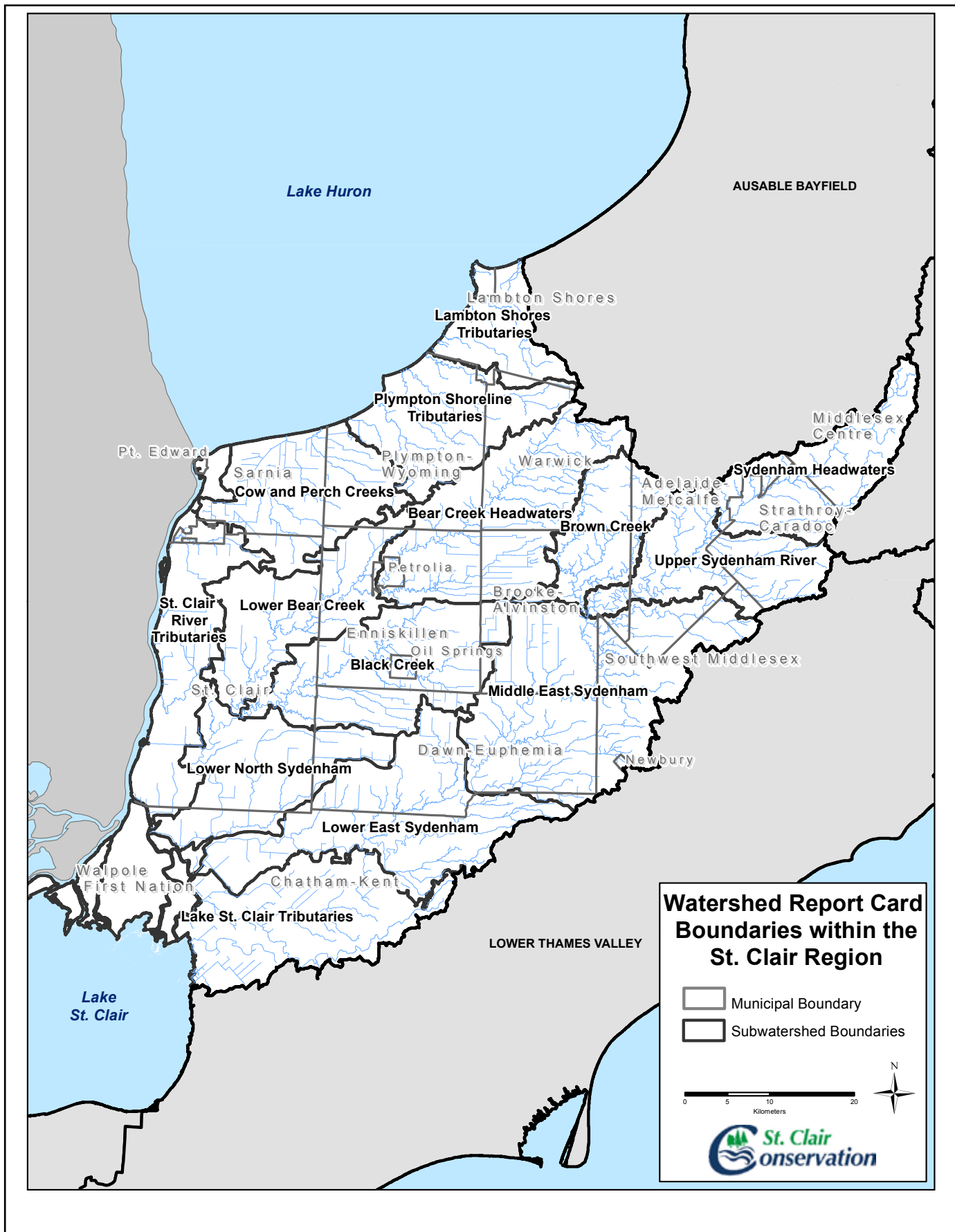
Common Name	Sydenham Headwaters *	Upper Sydenham	Brown Creek *	Middle East Sydenham	Lower East Sydenham	Bear Creek Headwaters	Lower Bear Creek	Black Creek *	Lower North Sydenham *	Lambton Shores Tributaries *	Plympton Shoreline Tributaries *	Cow and Perch Creeks *	St. Clair River Tributaries *	Lake St. Clair Tributaries *	Total
Black Sandshell		x		x	x										3
Creek Heelsplitter						x									1
Creepers				x	x	x									3
Cylindrical Papershell						x									1
Deertoe				x	x										2
Elktoe		x		x	x										3
Fatmucket		x		x		x	x								4
Fawnsfoot					x										1
Flutedshell		x		x	x		x								4
Fragile Papershell		x		x	x		x								4
Giant Floater		x			x	x	x								4
Kidneyshell		x		x	x										3
Mapleleaf				x	x		x								3
Mucket		x		x	x										3
Northern Riffleshell				x	x										2
Paper Pondshell				x											1
Pimpleback				x	x										2
Pink Heelsplitter		x		x	x		x								4
Plain Pocketbook		x		x	x										3
Purple Wartyback		x		x	x										3
Rainbow Mussel				x											1
Rayed Bean		x		x	x										3
Round Hickorynut					x										1
Round Pigtoe		x		x	x	x									4
Salamander/Mudpuppy				x	x										2
Snuffbox		x		x	x										3
Spike		x		x	x	x									4
Threehorn Wartyback					x										1
Threeridge		x		x	x	x	x								5
Wabash Pigtoe		x		x	x	x									4
White Heelsplitter		x		x	x	x	x								5
<b>Total</b>		<b>18</b>	<b>*</b>	<b>25</b>	<b>26</b>	<b>10</b>	<b>8</b>	<b>*</b>	<b>*</b>	<b>*</b>	<b>*</b>	<b>*</b>	<b>*</b>	<b>*</b>	

Notes: Total of 31 native species, recorded live in the watershed.

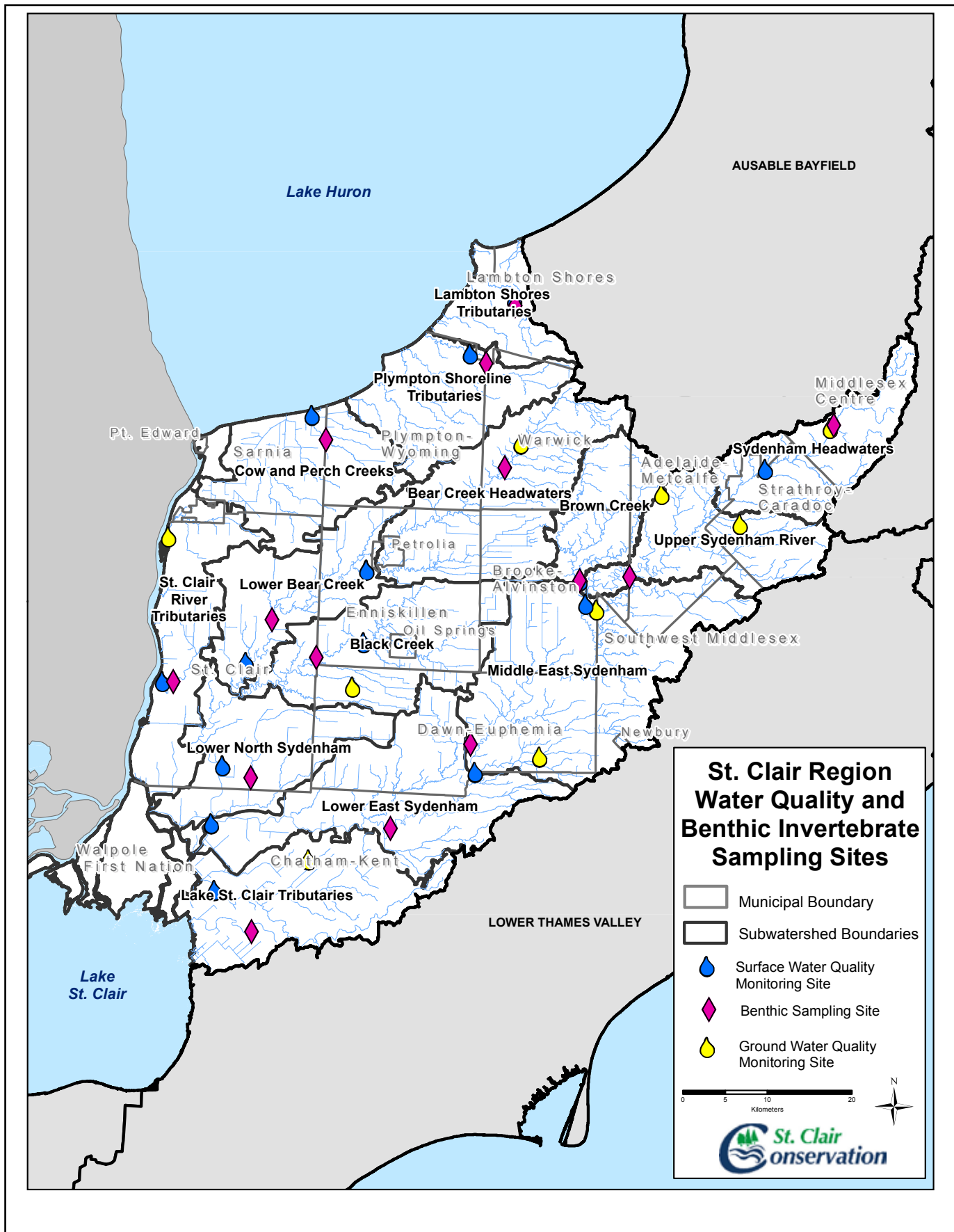
\* lack of mussel records due to lack of sampling effort.

Source: Sydenham Reference Site records from Department of Fisheries and Oceans, and Environment Canada, 1997-2003.

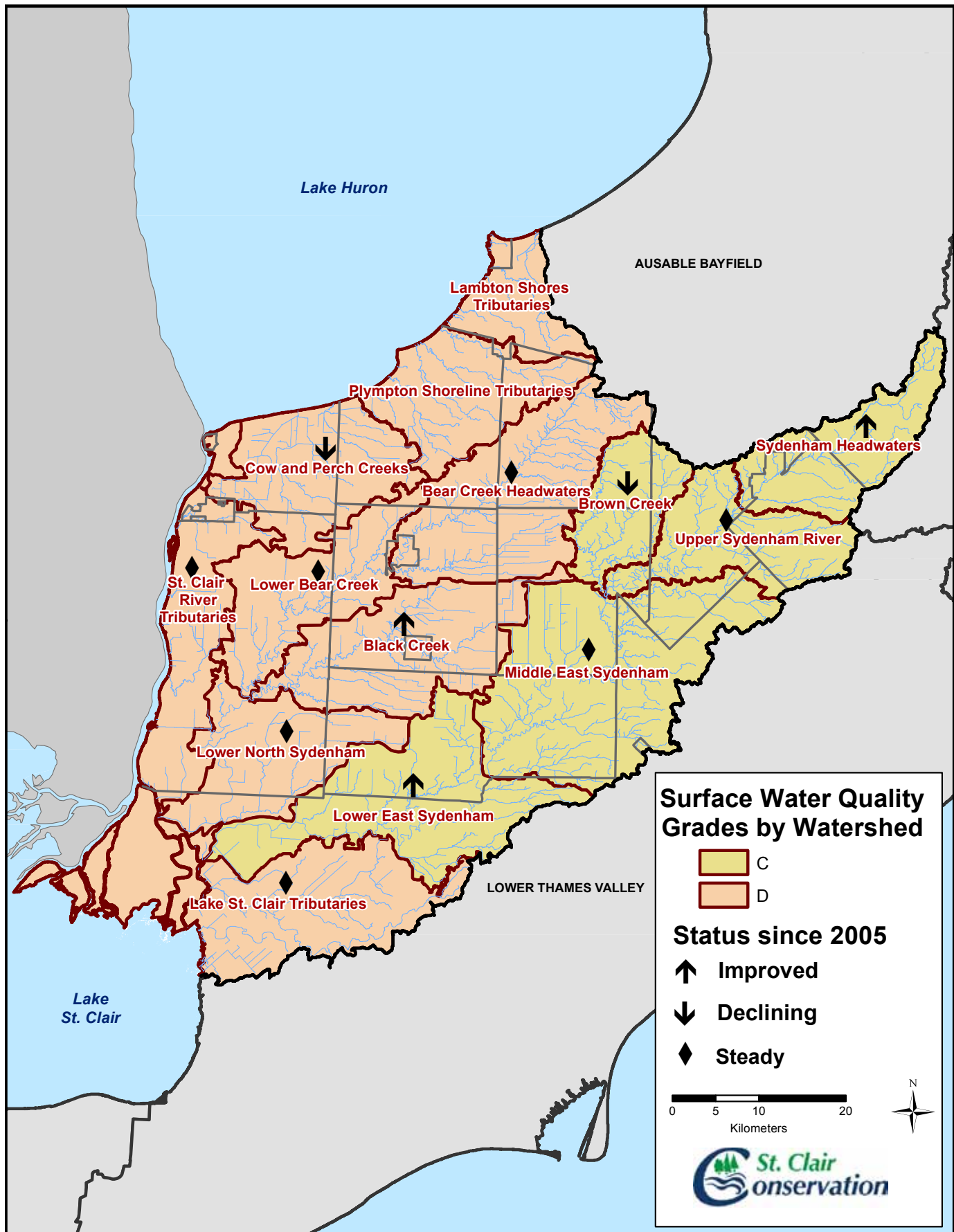
**Map 1: Boundaries for 14 Watershed Report Cards within the St. Clair Region**



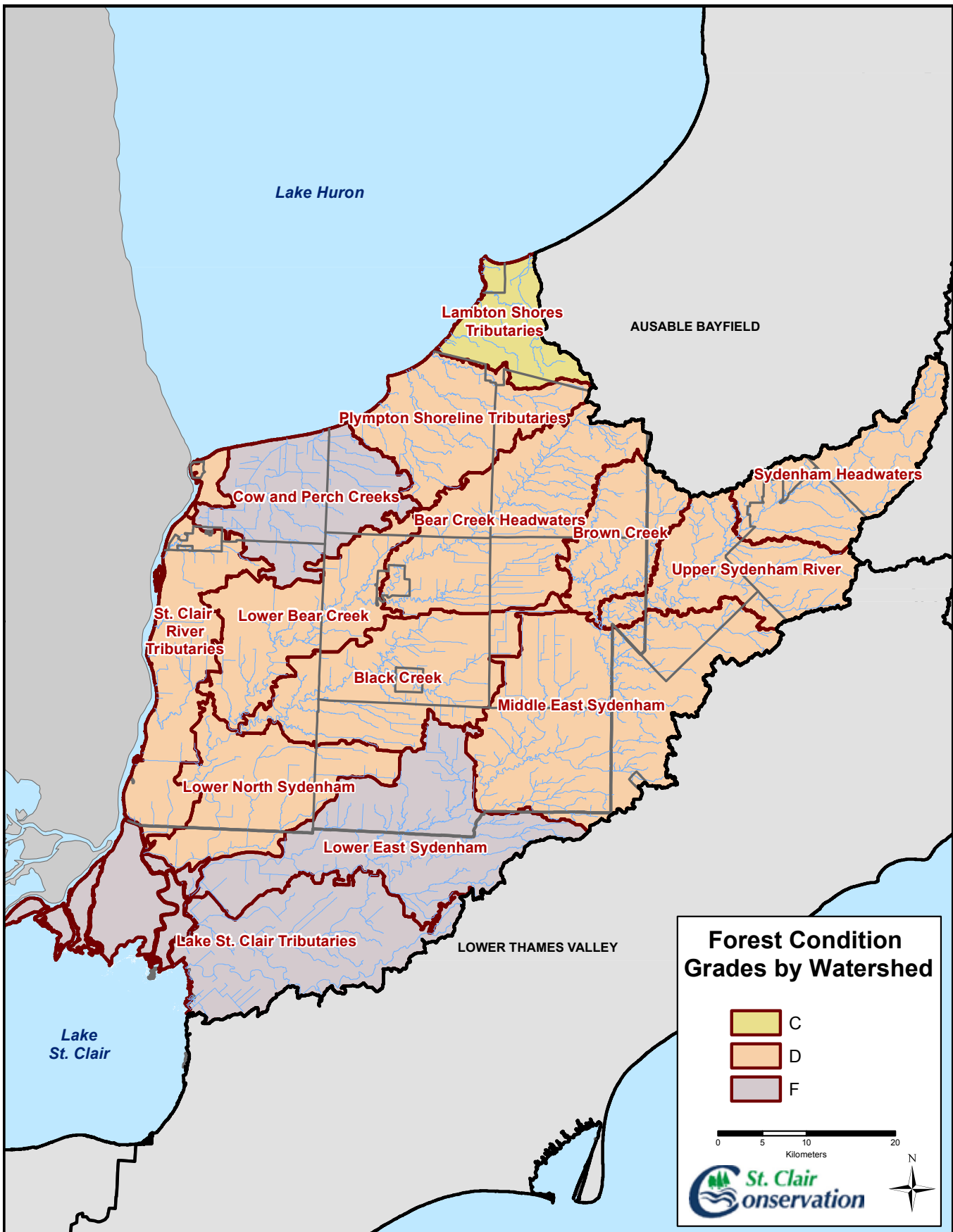
**Map 2: Location of Water Quality and Benthic Macroinvertebrate Sampling Sites within the St. Clair**



**Map 3: Surface Water Quality Grades by Watershed**



**Map 4: Forest Condition Grades by Watershed**



## Section 3: Watershed Report Cards

St. Clair Region Summary Report Card

Sydenham Headwaters

Upper Sydenham River

Brown Creek

Middle East Sydenham

Lower East Sydenham

Bear Creek Headwaters

Lower Bear Creek

Black Creek

Lower North Sydenham

Lambton Shores Tributaries

Plympton Shoreline Tributaries

Cow and Perch Creeks

St. Clair River Tributaries

Lake St. Clair Tributaries