

Lower Bear Creek

SUBWATERSHED

Report Card 2018



The St. Clair Region Conservation Authority has prepared this series of 14 subwatershed report cards as a summary of the state of the forests, wetlands, and water resources in the St. Clair Region.





LOWER BEAR CREEK SURFACE WATER QUALITY

D GRADE

Surface Water Quality

Using a provincial grading system, the three surface water quality indicators all score a D grade, producing an overall grade of D for the Lower Bear Creek subwatershed. Total phosphorus (TP) levels are above the average for the St. Clair Region and are nearly six times the provincial guideline. Maintaining TP levels below the Interim Provincial Water Quality Objective is intended to control excessive plant growth in rivers and streams and to protect aquatic life. *Escherichia coli* (*E. coli*) levels are the second highest in the St. Clair Region at over three times the provincial guideline for safe recreational use of water, indicating ongoing fecal contamination. The stream health grade measured by sampling benthic invertebrate communities is worse than the average for the St. Clair Region and suggests that substantial organic pollution is likely and water quality is fairly poor.

Local Actions to Improve Water Quality

- Develop an Environmental Farm Plan and implement agricultural Best Management Practices;
- Plant and maintain vegetated streamside buffers on one side of municipal drains and along both sides of other watercourses to stabilize the banks, shade the water, and capture nutrients;
- Fix faulty septic systems and establish a septic maintenance plan;
- Create or restore wetlands to trap nutrients, mitigate flooding, and improve habitat;
- Properly store chemicals and dispose of them through household hazardous waste days or drop-off locations (never dump down household or storm drains).

INDICATOR	LOWER BEAR CREEK			ST. CLAIR REGION AVERAGE	PROVINCIAL GUIDELINE	INDICATOR DESCRIPTION
	2001-2005	2006-2010	2011-2015	2011-2015		
Total Phosphorus (mg/L)	0.23 F	0.19 F	0.17 D	0.15 D	0.03 B	Phosphorus is found in products such as detergents, fertilizers, and pesticides. Phosphorus contributes to excess algae growth and low oxygen levels in streams and lakes.
Bacteria (CFU <i>E. coli</i> /100ml)	216 C	220 C	342 D	211 C	100 B (recreational use)	<i>Escherichia coli</i> (<i>E. coli</i>) bacteria is found in human and animal (e.g., livestock, wildlife) waste. Its presence in water indicates fecal contamination and is a strong indicator that other disease-causing pathogens are present in the watercourse.
Benthic Score (FBI)	5.62 C	5.75 C	5.81 D	5.73 C	<5.00 B (unofficial)	Benthic invertebrates are small animals without backbones that live in stream sediments. The pollution tolerances of taxa present in benthic samples are used to calculate the Family Biotic Index (FBI). The FBI ranges from 0 (excellent water quality) to 10 (very poor water quality).
Overall Grade	D	D	D	D		



LOWER BEAR CREEK FOREST CONDITIONS

D GRADE

Forest Conditions

For the Lower Bear Creek subwatershed, the three forest conditions indicators score two D grades and a C grade, producing an overall grade of D. The percent forest cover (14.3%) is above the average for the St. Clair Region but is still only half the recommended cover needed to support natural species diversity and water quality. The percent forest interior (2.6%) is above the average for the St. Clair Region but still considered very poor as it is one-quarter of the recommended value. This indicates that most woodlots are too narrow to support area-sensitive species, such as Scarlet Tanager and Ovenbird. The Environment Canada guideline for southern Ontario is 10% forest interior. The percentage of the riparian zone that is forested (30.8%) is above the average for the St. Clair Region, though lower than the target of 50%.

Any changes in forest cover, either from forest loss or reforestation efforts, is visible using aerial photography. Although there have been a significant number of recent tree planting projects in this subwatershed, forests grow slowly, and young trees are not considered to be forests until they are at least 3 m tall and are developing a canopy.

Local Actions to Improve Forest Conditions

- Establish and enlarge woodlots using a variety of native species to reduce the impact of aggressive insects and extreme weather events on tree health;
- Woodlot owners should prepare and follow Woodlot Management Plans;
- Connect woodlots by planting shelterbelts, windbreaks, and buffers along fields and watercourses to enhance wildlife habitat, protect against soil erosion, and improve water quality.

INDICATOR	LOWER BEAR CREEK			ST. CLAIR REGION AVERAGE	PROVINCIAL GUIDELINE	INDICATOR DESCRIPTION
	2001-2005	2006-2010	2011-2015	2011-2015		
Percent Forest Cover (%)	14.7 D	14.5 D	14.3 D	12.0 D	30.0 B	Percent forest cover is the percentage of the watershed that is forested. Forests are necessary to produce oxygen, store carbon, and offer many ecological services that are essential to the well-being of both humans and wildlife.
Percent Forest Interior (%)	2.4 F	2.7 D	2.6 D	2.1 F	10.0 B	Percentage of the watershed that is forest interior. Forest interior is the core area inside a woodlot that is more than 100 m from the edge. The outer 100 m is 'edge' habitat and is prone to high predation, sun/wind damage, and alien species invasion.
Percent Forested Riparian Buffer (%)	No data	30.4 C	30.8 C	23.1 D	50.0 B	Percent forested riparian buffer is the percentage of forest cover within a 30 m zone along both sides of all open watercourses. Natural cover in this zone prevents sediment and nutrients from entering the water.
Overall Grade	D	D	D	D		



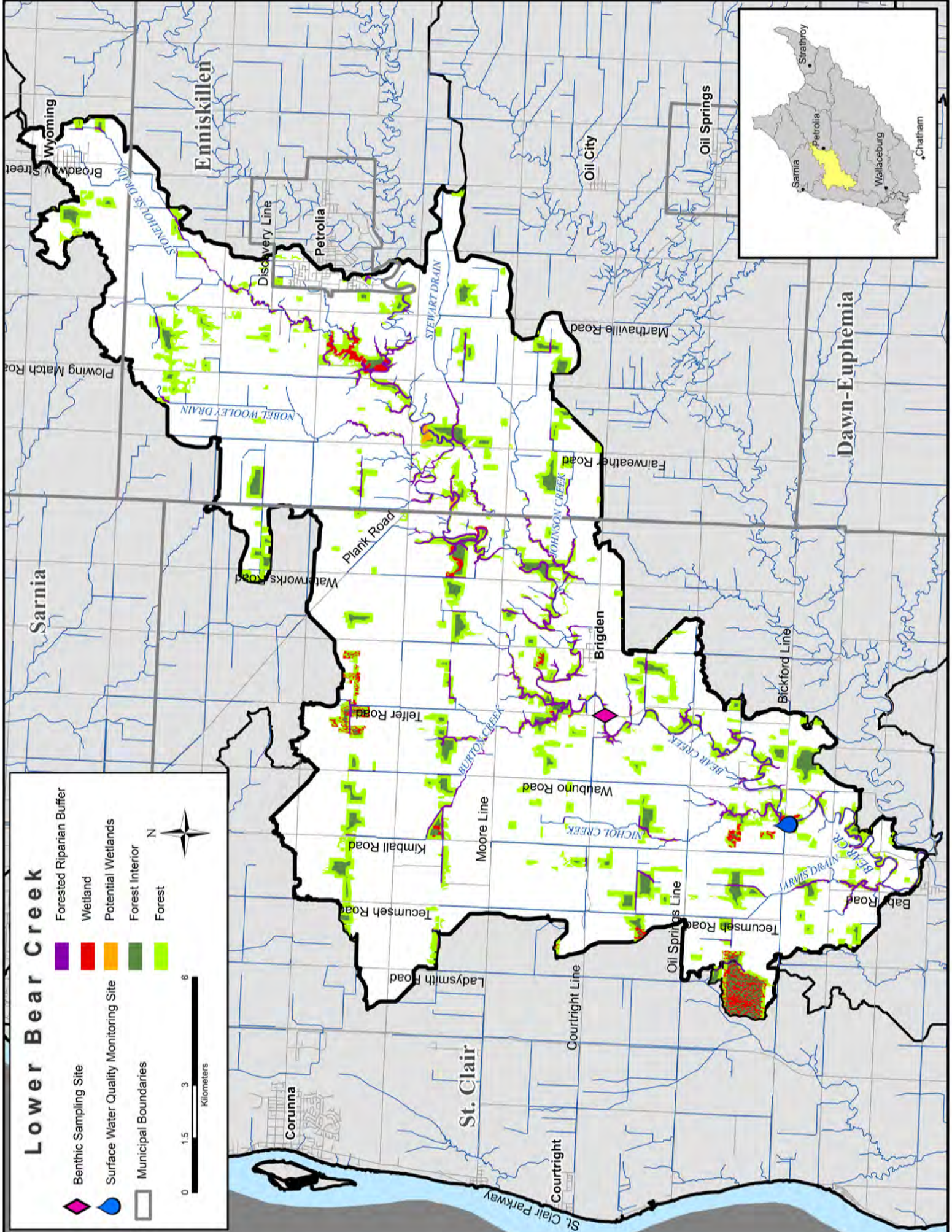
LOWER BEAR CREEK WATERSHED FEATURES

Area	253 km ² , 6.1% of the St. Clair Region watershed
Municipalities	St. Clair (159 km ² , 63%), Enniskillen (81 km ² , 32%), Plympton-Wyoming (10 km ² , 4%), Petrolia (3 km ² , 1%)
Physiography	94% bevelled till plains; 6% till moraines
Soil Type	95% silt and clay; 4% bottom land and beach; 1% sand loams; 1% silt and clay loams; <1% loam
Streamflow	At the top of this subwatershed, the mean annual streamflow was 3.41 m ³ /s from 2003 to 2015, as measured in Bear Creek just upstream of Petrolia. From 2011 to 2015, annual flows were above this mean, ranging from 4.07 to 4.34 m ³ /s. Towards the middle of this subwatershed, the mean annual flow at Brigden was 5.24 m ³ /s as measured from 2003 to 2015. From 2011 to 2015, average annual flows fell below the mean, ranging from 3.84 to 4.76 m ³ /s. During the previous period, from 2006 to 2010, average annual flows ranged around the means throughout the subwatershed – at Petrolia they ranged from 1.89 to 5.30 m ³ /s and at Brigden they ranged from 3.82 to 9.91 m ³ /s.
Precipitation	The average annual precipitation at Petrolia from 2002 to 2015 was 897 mm. From 2011 to 2015, the annual precipitation varied widely around this value ranging from 625 to 1,118 mm. The previous period, 2006 to 2010, was wetter with levels close to or above the mean ranging from 760 to 1,131 mm.
Air Temperature	The average annual temperature at Petrolia from 2002 to 2015 was 8.9°C. From 2011 to 2015, average annual temperatures ranged more widely from 7.4 to 10.4°C than during the previous period, 2006 to 2010, which experienced more stable temperatures ranging of 8.0 to 9.8°C.
Tile Drainage	31% not tiled; 30% randomly tiled; 40% systematically tiled
Watercourse Length and Type	Total length: 327 km Watercourse type: 31% natural, 51% municipal drain, 18% unclassified
Dams and Barriers	Seven dams, including four public dams – three at L.C. Henderson CA and one at Marthaville Habitat Management Area
Sewage Treatment	The Wyoming Sewage Treatment Plant discharges treated effluent to Stonehouse Drain, which enters Bear Creek (via David Creek) downstream of Petrolia in the upper portion of this subwatershed. The Brigden Lagoons discharge treated effluent to Bear Creek downstream of Brigden, south of Courtright Line.











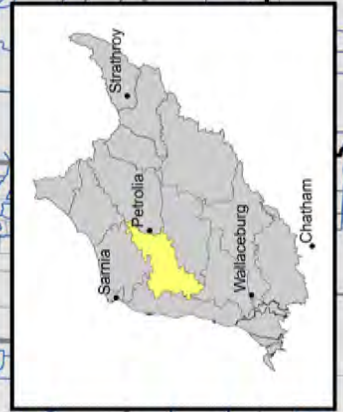
LOWER BEAR CREEK WATERSHED FEATURES

Fisheries Resources	Fifty-one fish species and 13 freshwater mussel species recorded. Game fish include Largemouth Bass and Yellow Perch.					
Species at Risk	<p>Birds: Acadian Flycatcher, Bank Swallow, Barn Swallow, Bobolink, Cerulean Warbler, Chimney Swift, Eastern Meadowlark, Least Bittern, Northern Bobwhite, Prothonotary Warbler, Yellow-breasted Chat</p> <p>Fishes: Channel Darter, Lake Sturgeon, Pugnose Minnow, Pugnose Shiner, Spotted Sucker</p> <p>Mammals: Eastern Small-footed Myotis, Little Brown Myotis, Northern Myotis</p> <p>Mulloscs: Mapleleaf Mussel</p> <p>Plants: American Chestnut, American Ginseng, Blue Ash, Butternut, Common Hop-tree, False Hop Sedge, Goldenseal, Green Dragon, Kentucky Coffee-tree, Spoon-leaved Moss, Willow-leaved Aster</p> <p>Reptiles: Blanding's Turtle, Common Five-lined Skink, Eastern Foxsnake, Spiny Softshell</p>					
Groundwater	The only aquifer is at the interface between the overburden and the bedrock, and is known as the Fresh Water Aquifer. It has high sodium and chloride and is of limited quantity. Therefore, most of the residents are supplied by municipally-piped water from Lake Huron intakes.					
Wetland Cover	187 ha or 0.7% of the subwatershed is identified as wetlands by the Ministry of Natural Resources and Forestry. An additional 12 ha (0.05% of the subwatershed) are identified by the St. Clair Region Conservation Authority (SCRCA) as potential wetlands. Wetlands are vital to the landscape as they reduce flooding and filter water. Environment Canada recommends a minimum of 6% wetland cover at a subwatershed scale.					
Woodlot Size	Size Category	Number of Woodlots	% of Woodlots	Total Woodland Area (ha)	% of Total Woodland Area	Largest Woodlot (ha)
	<5 ha	163	58	320	9	171
	5-10 ha	38	13	271	7	
	10-30 ha	42	15	743	21	
	>30 ha	37	13	2,283	63	
	Total	280		3,617		



Lower Bear Creek

-  Benthic Sampling Site
-  Surface Water Quality Monitoring Site
-  Municipal Boundaries
-  Forested Riparian Buffer
-  Wetland
-  Potential Wetlands
-  Forest Interior
-  Forest



Municipalities: Sarnia, Enniskillen, Oil Springs, Dawn-Euphemia, St. Clair, Courtright, Corunna, Wyoming.

Roads: Broadw V Street, Plowing Match Road, Waterworks Road, Plank Road, Telfer Road, Kimball Road, Tecumseh Road, Ladysmith Road, Courtright Road, Oil Springs Road, Bab Road, Fairweather Road, Marthaville Road, Bickford Line.

Drains and Creeks: STONEHOUSE DRAIN, NOBEL WOOLEY DRAIN, STEWART DRAIN, JOHNSON CREEKS, BURTON CREEK, BEAR CREEK, NICHOL CREEK, JARVIS DRAIN, BEAR CREEK.

Other Features: Discovery Line, Moore Line, Bickford Line, Oil Springs Line, Courtwright Line.

LOWER BEAR CREEK HIGHLIGHTS

Highlights and Progress Since 2011

- There were 21 landowner stewardship projects completed in the Lower Bear Creek subwatershed from 2011 to 2018. These projects included the restoration of wetlands, stabilization of streambanks, removal of an in-stream barrier to fish movement, and the planting of trees, windbreaks, cover crops and riparian buffers. More than 26,800 trees were planted and the total value of all the projects was \$215,900 (76% grants).
- Each year, SCRCA staff organize education stations for Agriculture in the Classroom at the Brigden, Wyoming, and Forest Fall Fairs. Displays focus on the important role farms play to help maintain healthy wetlands, forests, and overall watershed health (left photo).



- For the Lambton Natural Heritage Study led by the County, North-South Environmental surveyed natural areas in nine municipalities from 2010-2012. Regionally rare birds or plants were noted at every site, highlighting the importance of maintaining and enhancing even small natural areas.
- In 2016, the SCRCA removed a corrugated metal barrier in Bear Creek (right photo) and replaced it with a rock riffle that will improve invertebrate habitat, increase oxygen levels in the water downstream, and allow fish passage even during times of low flow.
- From 2011 to 2018, the SCRCA worked with Enbridge to complete their multi-phase Lambton County Naturalization Project on 34 hectares of their land holdings in St. Clair Township. The project brought about the restoration of 1 hectare of wetlands adjacent to Bear Creek, the establishment of 2 hectares of tallgrass prairie habitat over underground pipelines and the planting of more than 62,000 trees across 31 hectares.