Part A: The Report Card Overview

1.0 Introduction

People have become increasingly aware of environmental issues and want to know what they can do to improve their local environment. A report on the condition, or state, of the watershed is important for the general public and environmental managers for a number of reasons. Primarily, the report card provides an opportunity to summarize existing monitoring programs. The report card provides information about the current state of the watershed.

Measuring and reporting on watershed health also provides the public with information about issues affecting their local streams and forests. This report card identifies activities to improve watershed conditions. Finally, the report card also provides baseline information to measure against future conditions. The monitoring and reporting will follow a five-year cycle. In five years the watersheds will be reassessed to determine if conditions are improving or deteriorating. We applaud all our partners who are working to protect watersheds.

Health and the environment are closely linked. The Ausable Bayfield Conservation Authority's Conservation Areas are a source of many opportunities to enjoy nature, breathe fresh air, get active and develop an appreciation for watershed stewardship. In photo above, the beautiful South Huron Trail crosses Morrison Dam Conservation Area.

Photo by Cathie Brown

Objectives

The objectives of this report are to:

1. provide background environmental information about the area draining into the southeast shore of Lake Huron (Figure A.1);
2. use indicators of environmental health to define the current conditions of the 16 watersheds of the ABCA area; and
3. provide information about opportunities to improve local water and forestry conditions.

Components of the Report

The Ausable Bayfield Conservation Authority (ABCA) report card has four main components:

1. a section that describes the indicators and the methodology used to determine forest and water quality grades;
2. a section that describes the main watersheds in the ABCA jurisdiction;
3. the watershed report cards; and
4. a summary of the state of the ABCA watersheds.

1.1 Background

Ausable Bayfield Conservation Authority

In 1946, the municipalities drained by the Ausable River created the Ausable River Conservation Authority (ARCA) in order to deal with problems such as serious local flooding, soil erosion, water quality and supply. The Bayfield watershed and lakeshore gullies were added to the ARCA's area of jurisdiction in 1972.

Currently the ABCA's area of jurisdiction not only includes the areas drained by the Ausable and Bayfield Rivers but also the area drained by Parkhill Creek and a series of gullies and streams that drain directly into Lake Huron. In total the ABCA is responsible for a 2428 km^2 area that lies within Perth, Huron, Middlesex and Lambton Counties (Figure A.1). This area is bounded by the Maitland River watershed to the north, the Upper Thames River watershed on the east, Lake Huron on the west and the streams that drain into the St. Clair River to the south.

Some Ways Conservation Authorities Work with the Community to Improve the Local Environment

Conservation Education

Watershed Stewardship

Land Use Planning, Regulation and Mapping

Research and Monitoring

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Figure A.1: Jurisdiction of the Ausable Bayfield Conservation Authority (2428 km^2)

Watershed Features

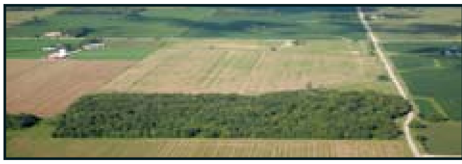
The natural features and the way the land is used determine the quality of the freshwater resources in any given watershed. Key natural features include geology, and the amount and location of woodlots and wetlands. Most of the ABCA watersheds consist of clay to silt/clay till plains with poor to very poor infiltration. Watercourses draining areas with poor infiltration typically have little groundwater input and as a result, have low to intermittent base flows, flashy runoff, turbid waters, and warm temperatures. However, there are areas with coarse moraine deposits, most notably in the northwest area of the ABCA jurisdiction, that provide cool or cold groundwater to the river system.

Wetlands and streamside woodlots are recognized as having an important role in maintaining good surface water quality. Wetlands help to clear sediment-laden waters and reduce nitrogen (N) and phosphorous (P) concentrations. These areas retain and slowly discharge water, which helps maintain base-flow conditions downstream during dry periods. As well, wetlands provide feeding, spawning and nursery areas for fish and other aquatic animals. In the ABCA watersheds wetland area is limited, covering only about 1.25 per cent of the total area available (Figure A.2).

Streamside woodlots shade streams, preventing excessive aquatic plant growth and moderate temperatures. Leaves, twigs and other woody debris provide food for the aquatic food chain and structure to streams. Depending on soil conditions, these woodlots may also reduce the movement of fine soils and the concentrations of N and P. Generally, the main stems of rivers, particularly the lower reaches, have riparian forests but the headwater tributaries lack forest cover (Figure A.2).

Patterns of non-streamside forest cover are quite different. Human settlement has left a striking pattern across the landscape. Woodlots were often left at the backs of farms, many of which remain. As a result, forest cover now occurs mainly as broken strips across the landscape (Figure A.2).

Conservation efforts to protect our environment – expanding forest cover, protecting or improving water quality and air quality, etc. – have only been possible with the partnership of municipalities, landowners, governments, Conservation Authorities, organizations and watershed residents. Where water quality is good, efforts are required to protect that source. Where water quality is poor, efforts are required to improve the water.



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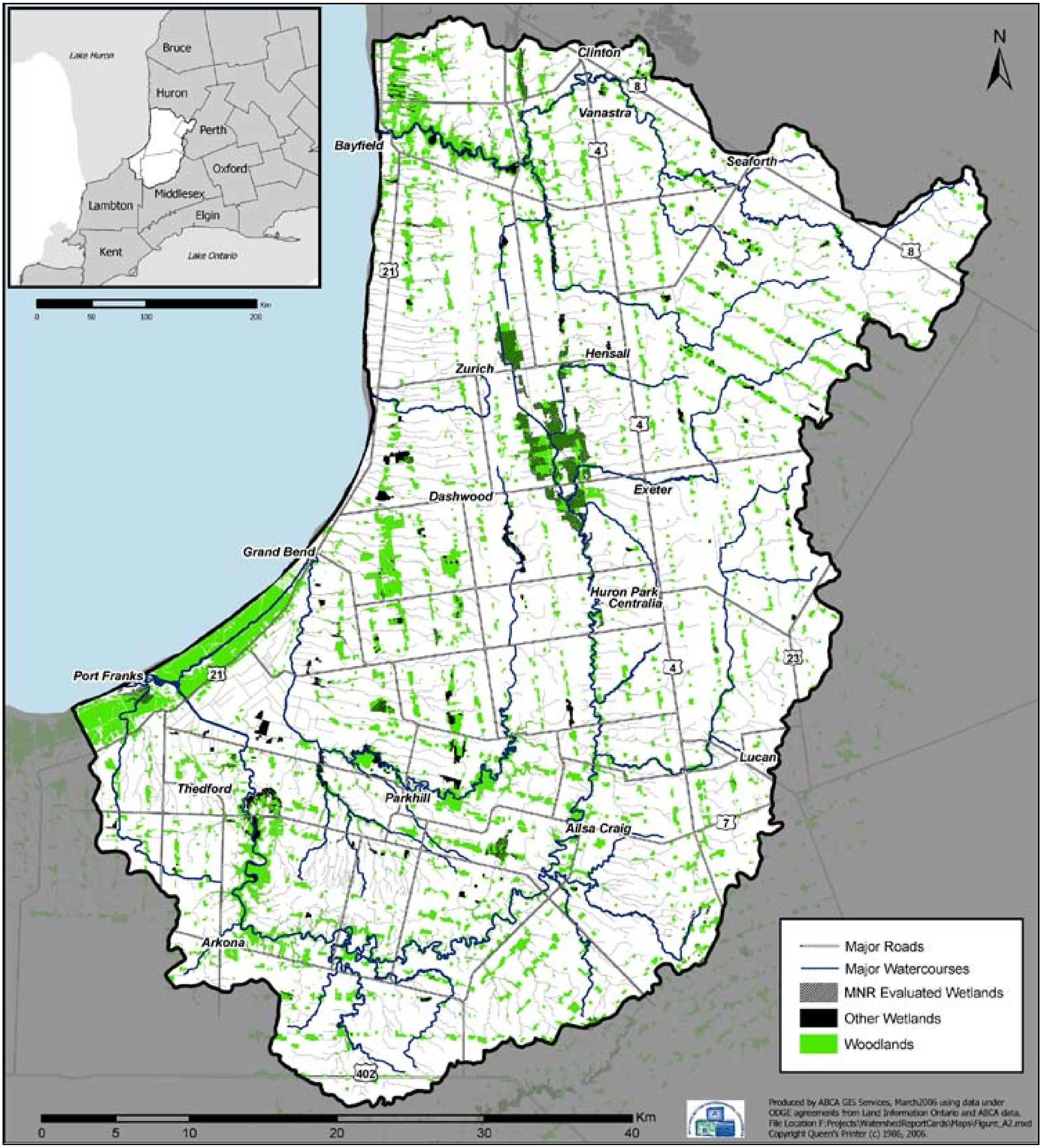

Figure A.2: Wetland and forest cover within the Ausable Bayfield Conservation Authority jurisdiction

2.0 Methodology

The report card format has been demonstrated to be an effective method of presenting environmental information. There are numerous examples of community groups, health units and other environmental agencies that use this format to convey information about the state of the environment.

The number of users and thus the many potential indicators of environmental health and numerous methods of grading these indicators have meant that a comparison across different regions has been difficult. In 2003, Conservation Ontario resolved two important issues facing the watershed report card process. Firstly, Conservation Ontario recommended indicators of forest health and surface water quality as primary requirements of the reporting process. Second, standardized grades were assigned to the indicators. The standardized set of indicators and consistent method of grading should enable environmental managers to compare watershed conditions across regions.

2.1 The Process

To complete the watershed report cards, the Ausable Bayfield Conservation Authority (ABCA) area was divided into 16 watersheds. These watersheds were first used for the ABCA Fish Habitat Management Plan (Veliz 2001) and represent the amalgamated smaller basins used in the ABCA Management Strategy (Snell et al. 1995). These watersheds represent an appropriately sized area with which the general public can relate and the ABCA can monitor.

Watershed boundaries (Figure A.3) were determined as follows:

- sections of the main branch of the Ausable or Bayfield Rivers,
- major tributaries to the Ausable or Bayfield Rivers, or
- systems that drain directly to Lake Huron.

There are three main resource categories that contribute to our understanding of the general watershed condition: forest conditions, surface and groundwater quality. Indicators for each category are as follows:

- forest conditions (per cent forest cover and per cent forest interior),
- surface water quality (Total Phosphorus, E. coli concentrations and benthic invertebrates – small animals that live in the bottom of streams that indicate stream health), and
- groundwater quality (E. coli, Nitrite + Nitrate and Chloride) (Due to infrequent sampling of groundwater, the indicators will not be graded. However, some reference to groundwater vulnerabilities will be noted).

These indicators provide a measure of ecosystem health and are explained further in section 2.2.

Conservation Ontario also provided a grading system to interpret the above indicators. Except for indicators of groundwater quality, the indicators were summarized and assigned a grade for each of the 16 watersheds of the ABCA.

The Watershed Report Cards for the ABCA's 16 watersheds are designed to present environmental information in a way that can be used by the public for practical use and watershed stewardship.

Photo by Daniel Holm

Figure A.3: Watershed boundaries within the Ausable Bayfield Conservation Authority jurisdiction

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Another important part of the process is to involve key stakeholders in the review of both the concept of the report card and a draft of the report card. The following stakeholders were involved:

- Huron County Planner,
- Middlesex County Planner,
- Perth County Planner,
- Lambton County Planner,
- Huron Stewardship Coordinator,
- Upper Thames River Conservation Authority,
- Ontario Ministry of Agriculture and Food,
- Ontario Ministry of the Environment,
- Ontario Ministry of Natural Resources,
- Pinery Provincial Park,
- Ontario Federation of Agriculture (Middlesex/Lambton), and
- Friends of the Bayfield River.

Representatives from these groups and agencies provided input about the data interpretation and format of the report. The stakeholders also recommended local actions and ideas for communications.

Much of the ABCA watershed report process and format was taken from a Conservation Ontario report (Briggs et al. 2003) and Upper Thames River Conservation Authority (UTRCA) Watershed Report Cards (UTRCA 2001).

Water Quality

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Forest Conditions

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Stakeholder Involvement

The Watershed Report Card Steering Committee is one example of the Ausable Bayfield Conservation Authority working collaboratively with environmental partners from different stakeholder groups.

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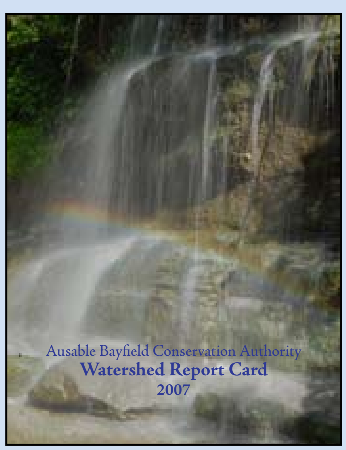
Watershed Report Card



2.2 Measures of Ecosystem Quality

Forest, Streamside Cover and Wetlands

Forest cover and per cent forest interior were the two indicators used to evaluate forest conditions. Forest cover information was taken from the ABCA Natural Areas Mapping (a Ministry of Natural Resources 1983 base layer with updates from the 1999 aerial photography). The per cent forest cover and forest interior was converted to a score and a grade according to Briggs et al. (2003) (Table A.1). This grading system was based on the guidelines recommended from a literature review completed by Environment Canada and the Canadian Wildlife Service (2004).

Table A.1: Scoring Grid for Forest Conditions (from Briggs et al. 2003 - Table 1).

Forest Cover (%)	Forest Interior (%)	Point Score	Grade
> 25.6	> 7.7	5	A
18.8 - 25.6	5.7 – 7.7	4	B
11.9 – 18.7	3.7 – 5.6	3	C
5.0 – 11.8	1.7 – 3.6	2	D
< 4.9	<1.7	1	F

Wooded areas are shaded on all maps in the report cards. Wooded areas include all types of forest such as upland deciduous and coniferous woods, treed swamps, plantations and mature shrub thickets. Other non-woody habitats such as meadows, old fields, cattail marshes, and tallgrass prairies are present in the watershed but are less common. These later habitats were included in calculations for streamside cover but were not included in the woodlots per cent cover measurement.

Streamside cover (in the Watershed Features section of each report card) was determined as a per cent of the 15 m area on either side of the open watercourse.

Given the importance of wetlands to improve water quality, an estimate of potential wetland area was determined for each watershed (in the Watershed Features section of each report card).

The potential wetland area was based on a methodology established in the Severn Sound Historical Wetland Analysis project (McPhail 2004). The ABCA evaluated five criteria, or input layers, suggested by McPhail (2004) including: soils, surficial geology, slope, groundwater discharge, and distance to watercourses. A ranking score was applied to each layer. The combined ranked scores of the individual layers provided a new layer of wetland potential. Threshold values to distinguish potential wetland areas were checked with aerial photography and existing wetland data.

Wetlands fulfil many important environmental functions including protection of water quality.

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Water Quality

Since the early 1960s, the ABCA has partnered with the Ontario Ministry of the Environment to take surface water quality samples at a number of locations within the ABCA watersheds through the Provincial Water Quality Monitoring Network (PWQMN). Currently there are nine PWQMN sites within the ABCA's jurisdiction (Figure A.4). It was felt that the number of sites was inadequate to effectively monitor the water quality in the ABCA watersheds. Thus, in 2003, the ABCA began monitoring eight additional water quality stations (Figure A.4). This enhancement of the water quality monitoring program provides the ABCA with a baseline of information from which the health of the ecosystem may be determined.

Water chemistry is one type of indicator of the aquatic ecosystem. There are natural and human, point and non-point sources of chemicals in the water. The Ministry of the Environment analyzes the PWQMN water samples for 36 indicators. The ABCA has selected a sub-set of seven indicators for the eight additional sites. Conservation Ontario recommended Total Phosphorus as the one water chemistry indicator (Briggs et al. 2003). The 75th percentile was calculated for the data during the period of sampling and for the sites indicated in Table A.2. The 75th percentile concentration of Total Phosphorus was converted to a score and a grade according to Briggs et al. (2003) (Table A.3).

As well, the presence of *Escherichia coli* (E. coli) is monitored and reported in the watershed report card. E. coli are a type of fecal coliform bacteria commonly found in the intestines of animals and humans. Its presence in water is a strong indication of recent sewage or animal waste contamination. Therefore, E. coli bacterial counts are being conducted at all water sampling sites (PWQMN and the additional ABCA sites). Concentrations of E. coli in water can be very low (<10 colonies per 100mL) and very high (>10,000 colonies per 100mL). The average concentration would inflate the typical conditions and therefore, the geometric mean is calculated. It is calculated as the *n*th root of the product of *n* numbers. The geometric mean of E. coli concentrations was converted to a score and grade according to Briggs et al. (2003) (Table A.3). This grading system for Total Phosphorous and E. coli was based on guidelines set forth by the Ministry of the Environment and the Ministry of Health and Long-Term Care.

Ausable Bayfield Conservation Authority staff are involved in several water monitoring projects.

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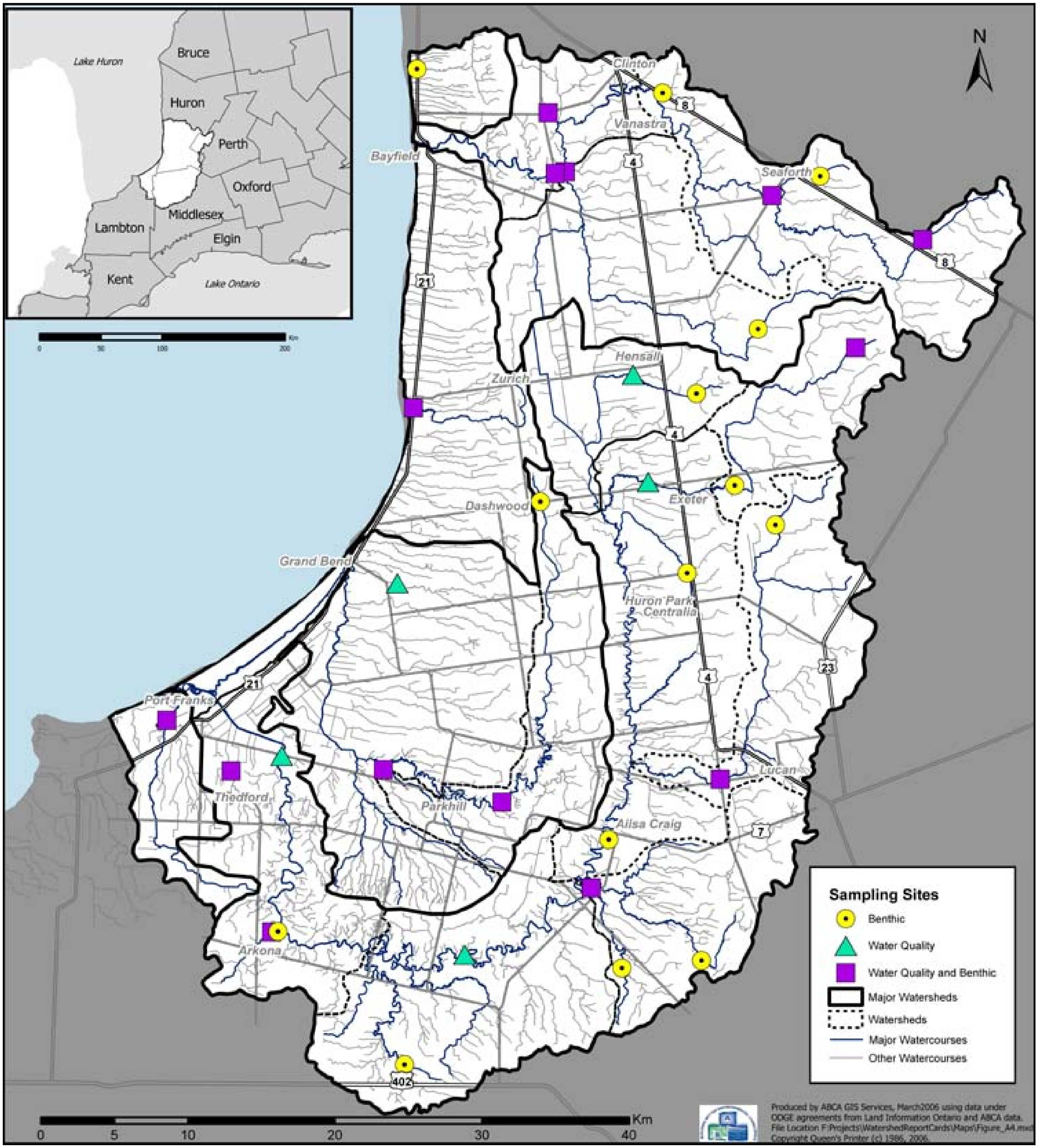

Figure A.4: Location of water quality and benthic invertebrate sampling sites within the Ausable Bayfield Conservation Authority jurisdiction

Table A.2: Data Used to Determine Watershed Grades

Watershed	Site	Total Phosphorus		E. coli		Benthic	
	Main Channel (M) or Tributary (T) *	Years of data	Number of samples	Years of data	Number of samples	Years of data	Number of samples
Bayfield							
Upper Bayfield	Seaforth (M)	2003-2005	26	2003-2005	26	2002, 2003, 2005	3
	Dublin (T)	2003-2005	26	2003-2005	25	2000, 2002, 2004	3
	Silver Creek (T)					2000, 2002, 2004	3
	Helgrammite Creek (T)					2000, 2002, 2003, 2004, 2005	5
Main Bayfield	Varna (M)	2000-2005	48	2003 -2005	26	2002, 2003, 2005	3
	Steenstra Drain (T)	2003-2005	21	2003 -2005	18	2003, 2005	2
Bannockburn	Bannockburn CA (M)	2003-2005	26	2003-2005	26	2001, 2003, 2005	3
	Headwater Tributary (T)					2000, 2002, 2004	3
Ausable							
Headwaters	Staffa (T)	2003-2005	26	2003-2005	26	2000, 2002, 2004	3
	Morrison CA (M)					2001, 2003, 2005	3
Upper	Exeter (M)	2000-2005	48	2003-2005	24		
	Ailsa Craig (M)					2001, 2003, 2005	3
	Centralia Drain (T)					2002, 2004	2
Middle	Springbank (M)	2003-2005	26	2003-2005	26		
	Adelaide Creek (T)					2002, 2004	2
Lower	Bog Line (M)	2000-2005	47	2003-2005	26		
	Decker Creek (T)	2000-2005	48	2003-2005	26	2002, 2004	2
	Rock Glen CA -Tributary	2002-2005	43	2002-2005	42	2002, 2003, 2004, 2005	4
	Rock Glen CA - Main Channel					2003, 2005	2

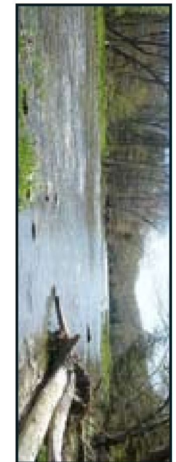

Table A.2 (continued): Data Used to Determine Watershed Grades

Watershed	Site	Total Phosphorus		E. coli		Benthic	
	Main Channel (M) or Tributary (T) *	Years of data	Number of samples	Years of data	Number of samples	Years of data	Number of samples
Black							
	Hensall (M)	2000-2005	48	2003-2005	26	2005	1
	Headwaters – Black (T)					2000, 2002, 2004	3
Little	Lucan (M)	2000-2005	48	2003-2005	26	2003, 2005	2
	Elimville (T)					2000, 2002, 2004, 2005	4
Nairn	Nairn (M)	2003-2005	26	2003-2005	26	2001, 2003, 2005	3
	Denfield Creek (T)					2002, 2004	2
	Bear Creek (T)					2000, 2002, 2004	3
Parkhill							
Upper	Above Parkhill Reservoir (M)	2003-2005	26	2003-2005	26	2001, 2004, 2005	3
Lower	Below Parkhill Reservoir (M)	2003-2005	26	2003-2005	25	2002, 2005	2
	Desjardins Drain (T)	2003-2005	25	2003-2005	25		
North Gullies							
	Gully Creek (T)					2001, 2003, 2005	3
South Gullies							
	Zurich Drain (T)	2003-2005	26	2003-2005	26	2000, 2001, 2003, 2005	4
Dunes							
Mud Creek							
	Mud Creek (T)	2003-2005	26	2003-2005	26	2001, 2003, 2005	3

* For monitoring and reporting purposes, the ABCA has attempted to have a main channel and a tributary water quality site in each watershed (Table A.2).

Table A.3: Surface Water Quality Scoring Grid (from Briggs et al. 2003)

Benthic Score (modified from Hilsenhoff 1988)	**Total Phosphorus** (mg/L) – 75^{th} percentile	Geometric Mean **E. coli** (cfu[1]/100 mL)	Point Score	Grade
< 4.25	< 0.03	0 - 10	5	A
4.26 – 5.00	0.04 - 0.10	11 -100	4	B
5.01 – 5.75	0.11 - 0.17	101 - 1000	3	C
5.76 – 6.50	0.18 - 0.24	1001 - 10 000	2	D
> 6.51	> 0.24	10 001 +	1	F

[1] cfu – colony forming units

Benthic Invertebrates are Important Indicators of Water Quality

The Ausable Bayfield Conservation Authority (ABCA) has been monitoring the aquatic benthic macroinvertebrate communities present within its watersheds since the fall of 2000.

'Benthic' refers to the bottom of lakes and rivers whereas 'macro' refers to the subset of larger or visible invertebrates: generally ¼ to ½ mm in length. Invertebrates are animals without backbones such as insects, crustaceans, molluscs, and worms. Benthic macroinvertebrates are commonly used as indicators of aquatic environmental quality.

Each species that makes up this assortment will have a different tolerance to the variety of stressors and pollutants that may be present in the local environment. The invertebrates present at a given site reflect the environmental quality within the area that these organisms were surveyed.

More simply put, the presence of pollution-intolerant species generally indicates a healthy aquatic environment.

The ABCA has employed a modified version of Hilsenhoff's (1988) Family Biotic Index (Mandaville 2002) to determine an environmental quality score (See Table A.3). In order to monitor environmental quality in both large, main channel and small, tributary streams, the sites have been sampled on an alternating schedule, as noted in Table A.2.

Beginning in the fall of 2000, headwater sites were sampled, followed by main channel sites the next fall (i.e., the fall of 2001). The results from this survey program have recently been reviewed and are presented in a report entitled 'Benthic Monitoring Program: Summary Report (2000-2004)' (Neary and Veliz 2004).

Photo at left shows ABCA staff sampling stream substrate where animals such as a mayfly (see photo at right, by Garry Scrimgeour) may be found. It is a member of the benthic invertebrate community, which provides an indicator of the health of our water.

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Groundwater Quality

Similar to the surface water monitoring program, the Provincial Groundwater Monitoring Network (PGMN) is a partnership between the Ministry of the Environment and local Conservation Authorities. This program was initiated recently (2003) and there are 15 sampling wells within the ABCA jurisdiction. Sampling occurs once a year and therefore water managers decided that grades for each watershed would not provide meaningful information. It will take at least 15 to 20 years to accumulate adequate data to determine trends.

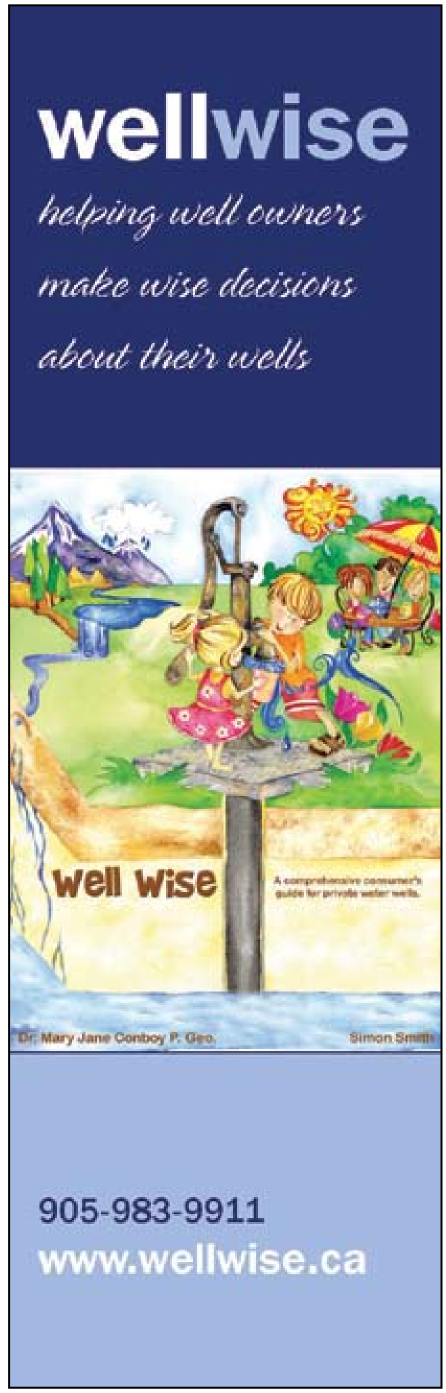
The existing water quality information was summarized for bedrock and overburden (typically more shallow) wells. In each watershed report card, a description of the dominant groundwater features is provided.

Well Care Tips

- Have your well inspected and upgraded where necessary
- Test your well water for coliforms in every season and keep a record of the results
- Do not store fuel, pesticides, or other toxic material near your well
- Ensure that abandoned wells are properly capped
- Use water conservation – install water-efficient toilets and shower heads, restrict use of water for showers, lawn watering and car washing.
- **Consult 'Well Wise' consumer's guide for private water wells to find out more tips.**

A properly-maintained wellhead can limit potential pathway for pollutants to reach groundwater sources.

Photo by Mary Jane Conboy, Ontario Federation of Agriculture



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