



Ausable Bayfield Watershed Report Cards

Part D: Conclusions

1.0 Summary

This section of the report card highlights the results for the indicators of forest conditions and surface water quality.

Forest Conditions

In the Ausable Bayfield area forest cover is limited (Table D.1, Figure D.1, Figure D.2). Most of the watersheds fall into a grade of D; few watersheds have good forest conditions. Agriculture, and in a few areas, urbanization, have resulted in the clearing of much of the Ausable Bayfield watershed forest cover which consequently results in this poor grade.

Table D.1: Per cent Forest Cover and Interior and Final Grades for Watersheds in the Ausable Bayfield Conservation Authority Jurisdiction

Watershed	Forest Conditions				
	Cover (%)	Grade	Interior (%)	Grade	Average Grade
Bayfield Headwaters	7.0	D	0.8	F	D
Main Bayfield	19.9	B	4.4	C	B
Bannockburn	9.6	D	1.0	F	D
Ausable Headwaters	9.0	D	0.9	F	D
Upper Ausable	10.4	D	2.2	D	D
Middle Ausable	12.2	C	1.6	F	D
Lower Ausable	18.0	C	3.3	D	C
Black Creek	18.4	C	7.1	B	B
Little Ausable	5.9	D	0.3	F	D
Nairn Creek	8.7	D	0.8	F	D
Upper Parkhill	13.3	C	2.6	D	C
Lower Parkhill	14.0	C	3.4	D	C
North Gullies	27.7	A	9.0	A	A
South Gullies	9.8	D	1.7	F	D
Dunes	69.0	A	32.3	A	A
Mud Creek	23.7	B	9.4	A	A
ABCA area	12.6	C	2.8	D	C



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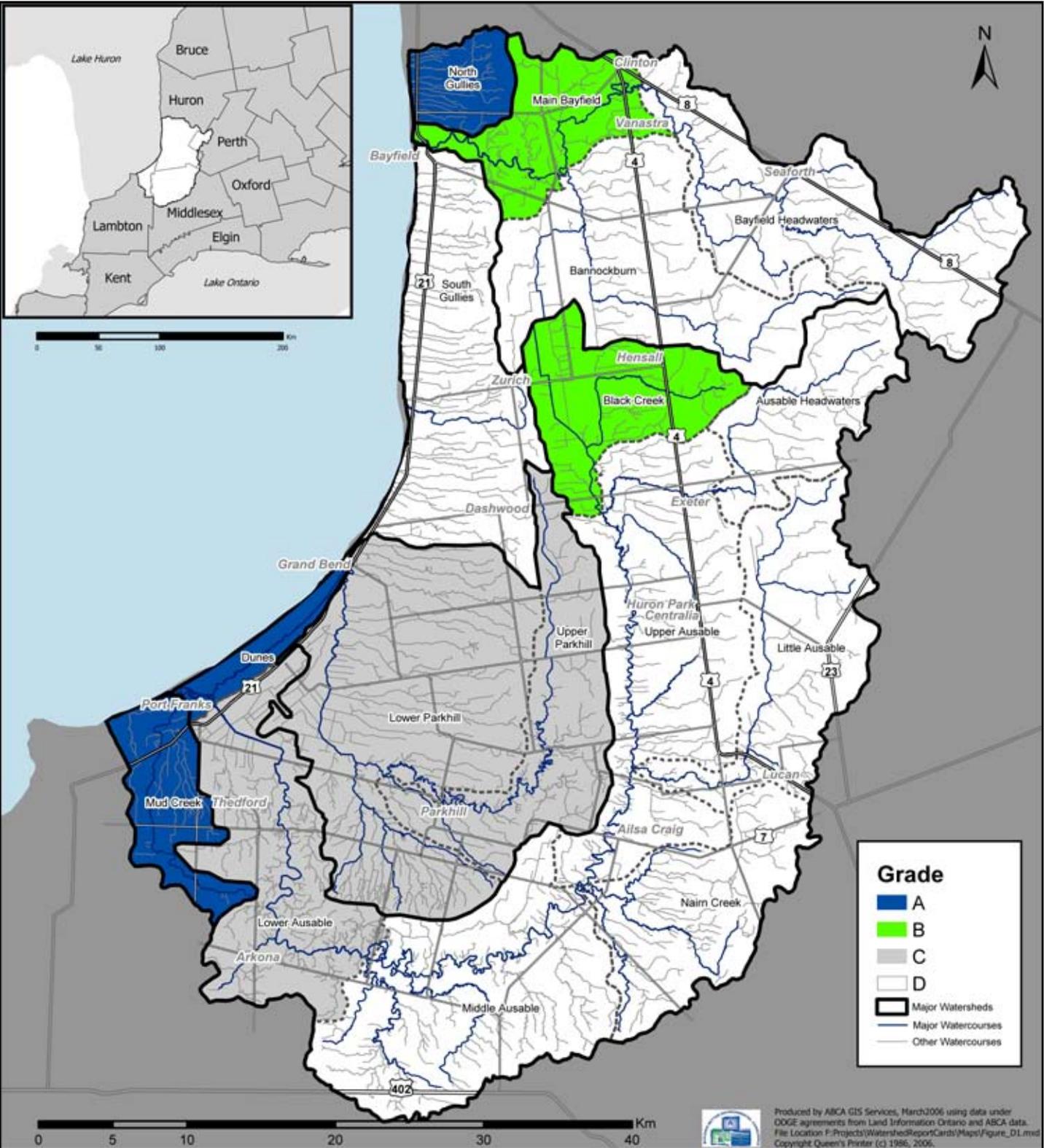


Figure D.1: Overall Grade Distribution of Forest Cover by Watershed



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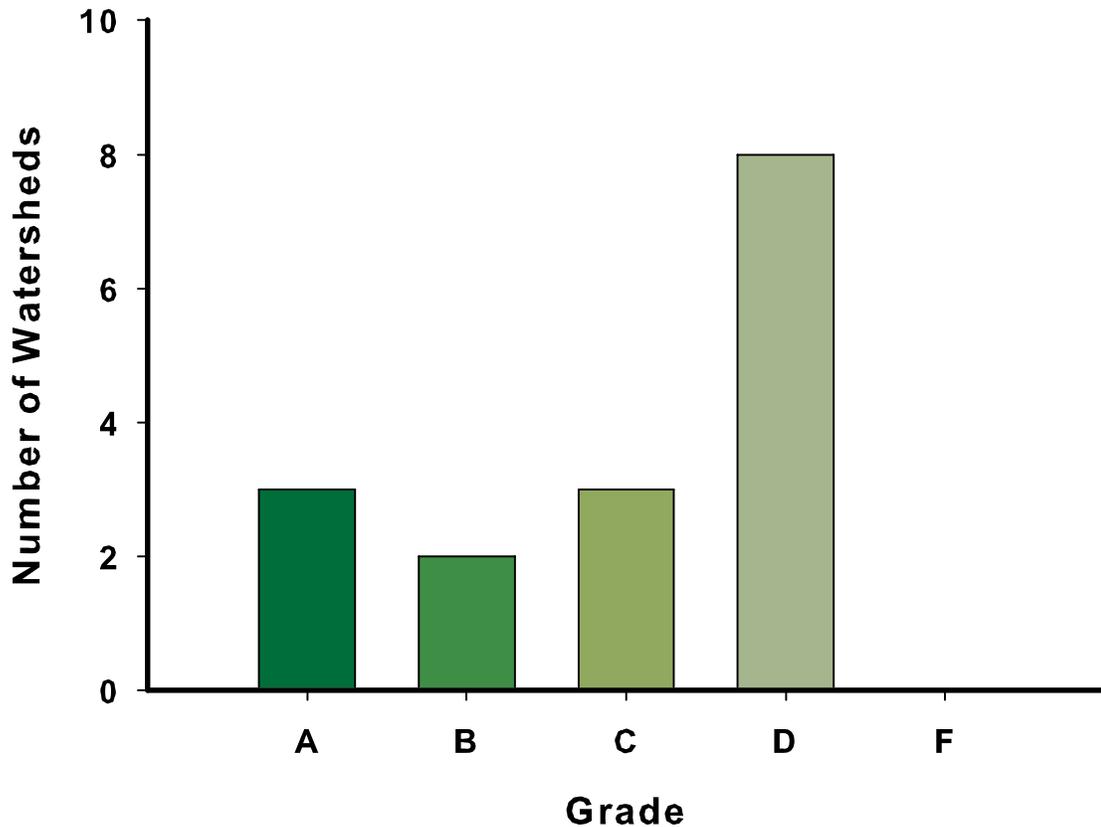


Figure D.2: Distribution of grades for forest conditions across all watersheds for the Ausable Bayfield region

The main settler migration to the area occurred after the purchase of the land by the Canada Company from the Chippewa First Nations in 1825.

In 1850, the proportion of woodland in townships across the Ausable Bayfield Conservation Authority (ABCA) area was 42 per cent. By 1910, the majority of the land had been cleared for agriculture and a few urban areas (Department of Planning and Development 1949) leaving only eight per cent woodland cover.

Remaining strips of woodlots tend to be located at the back of farms therefore providing little interior habitat. The Little Ausable watershed is most deficient in terms of both forest cover (5.9 per cent) and interior forest (0.3 per cent), with five other watersheds with forest cover below 10 per cent.

The Dunes represent the area of highest percent forest cover and interior forest which can be attributed to the fact that most of this watershed is contained within the Pinery Provincial Park. In 1953 this forested area, which was once owned by the Canada Company, almost became privately owned. Fortunately, with the support of the London Chamber of Commerce, the ABCA developed a plan for the park and prevented the residential development that would have degraded this natural area. Elsewhere, the North Gullies and Mud Creek watersheds also contain forest cover amounts and interior forest greater than the overall average grade across all watersheds. Forest cover in these watersheds is found predominantly near the outlet of the water systems and is considerably limited in the headwater areas.



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Surface Water Quality

Overall water quality indicators from the Ausable Bayfield area indicate moderate to poor conditions (i.e., many C grades) with only one watershed receiving an A grade (Table D.2, Figure D.3). Biological indicators (e.g., E. coli concentrations and the benthic invertebrate communities) in particular tended to reflect poor water quality conditions.

Table D.2: Benthic Score, Mean Concentrations of Total Phosphorus and *Escherichia coli* (E. coli) and Grades for all Watersheds

Watershed		Benthic Score (FBI)		Total Phosphorus		E. coli	
		Result	Grade	Result	Grade	Result	Grade
		Family Biotic Index		(mg/l)		(per 100 ml)	
Bayfield	Bayfield Headwaters	5.5	C	0.07	B	376	C
	Main Bayfield	5.5	C	0.05	B	236	C
	Bannockburn	5.1	C	0.06	B	355	C
Ausable	Ausable Headwaters	5.6	C	0.03	A	623	C
	Upper Ausable	4.7	B	0.16	C	159	C
	Middle Ausable	9.4	F	0.09	B	138	C
	Lower Ausable	5.5	C	0.07	B	264	C
	Black Creek	5.9	D	0.09	B	933	C
	Little Ausable	6.6	F	0.05	B	77	B
Parkhill	Nairn Creek	5.5	C	0.03	A	130	C
	Upper Parkhill	5.0	B	0.11	C	171	C
	Lower Parkhill	5.6	C	0.12	C	168	C
Lake Huron	North Gullies	4.2	A	N/A	N/A	N/A	N/A
Tributaries	South Gullies	5.2	C	0.07	B	236	C
	Mud Creek	7.9	F	0.09	B	117	C
ABCA area		5.6	C	0.08	B	233	C



The health of the main channel is linked to the ecological integrity of the smaller tributaries (see photo at left). Beneficial Management Practices in these areas include protecting small wetlands establishing grasses, shrubs and trees on both sides of municipal drains.

Photo by Mari Veliz



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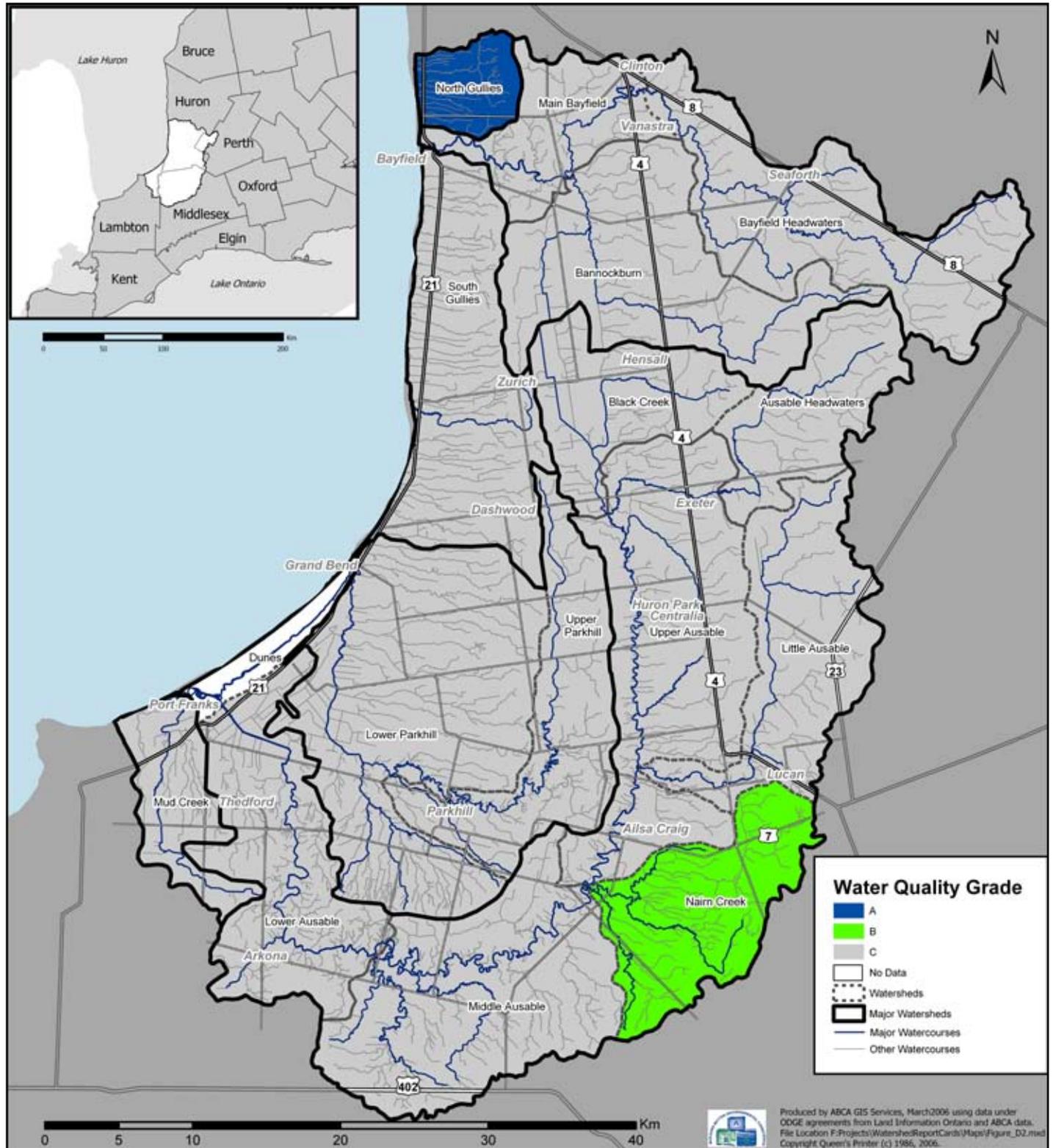


Figure D.3: Overall grade distribution of surface water quality by watershed



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Total Phosphorus

Total phosphorus concentrations were highest in the Upper Ausable watershed (0.16 mg/L). However, there is a tendency for most of the watersheds to have concentrations above the objective set by the Ontario Ministry of the Environment (0.03 mg/L).

Nairn Creek (average Total Phosphorous = 0.03 mg/L) had the lowest phosphorus concentration, which hovered around the Provincial Water Quality Objective and contributed to the B grade in this watershed (Table D.2 and Figure D.4).

Phosphorus concentrations are related to soil erosion because phosphorus binds to soil particles. High phosphorus concentrations may therefore be related to increased erosional processes. This is an issue in the Ausable Bayfield landscape, which is dominated by clay soils and agricultural activities.

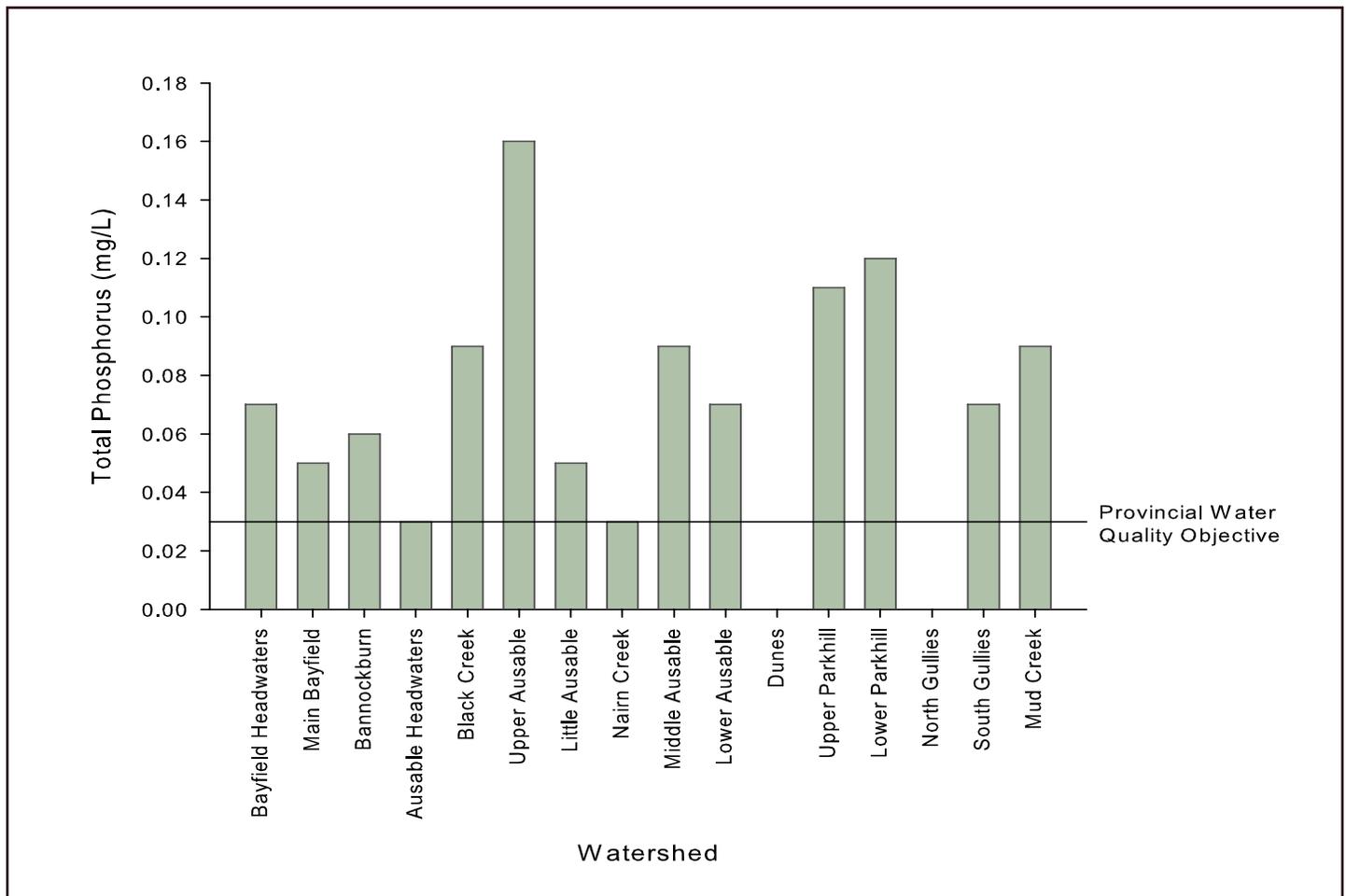


Figure D.4: Total phosphorus concentrations across all watersheds. Black line represents the Ministry of the Environment Objective (0.03 mg/L)



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E. coli

Typically, the geometric mean *E. coli* concentrations in the different watersheds exceeded the Ministry of Health and Long-Term Care Recreational Guideline of 100 cfu/100mL. However, *E. coli* concentrations are extremely variable. At all locations *E. coli* concentrations may be high sometimes and lower at other times. The elevated concentration of *E. coli* in some watersheds such as the Black Creek watershed suggests a more local point source. The only watershed that is below the recreational guideline is the Little Ausable (Table D.2 and Figure D.5).

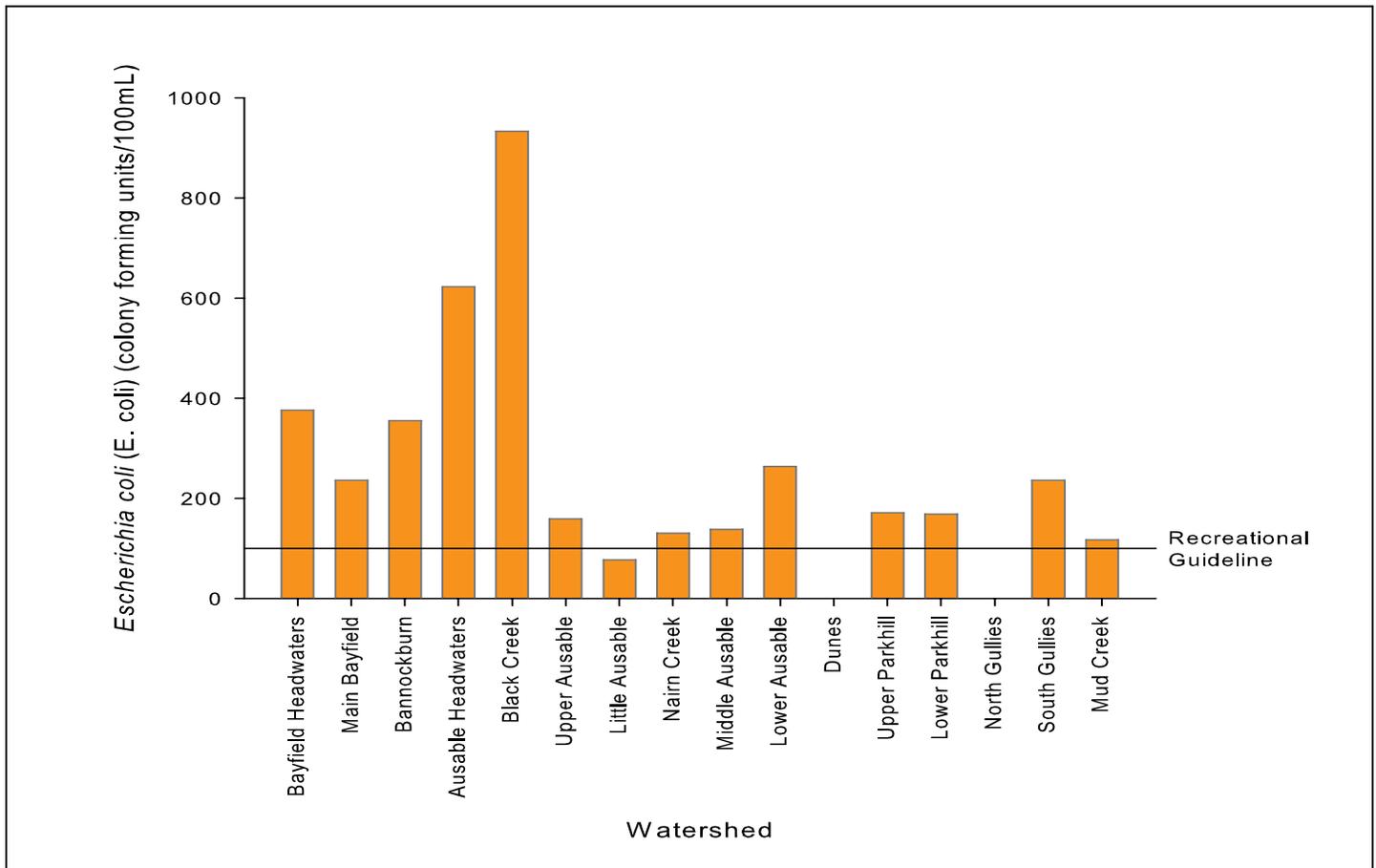


Figure D.5: *Escherichia coli* (*E. coli*) concentrations across all watersheds. Black line represents the recreational guideline set forth by the Ontario Ministry of Health and Long-Term Care (100 cfu/100 mL)



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Benthic Invertebrates

Benthic invertebrate assemblages are reflective of not only water chemistry, but also substrate (i.e., stream bottom) conditions (Lammert and Allan 1999; Richards et al. 1993; de March 1976). Substrate conditions vary across watersheds and therefore efforts were made to be as consistent as possible when sampling benthic sites. Sampling sites for the watershed report card process were of the highest quality substrate that supports the best possible invertebrate communities.

Benthic invertebrate scores indicate that animals that are tolerant to organic pollution dominated the communities. Common species that were found in the ABCA area include worms, riffle beetles and some insects that are tolerant to nutrient enriched conditions. Sites in the Middle Ausable (9.4) and Mud Creek (7.9) watersheds appeared to be more degraded than most other sites in this area (Table D.2, Figure D.6).

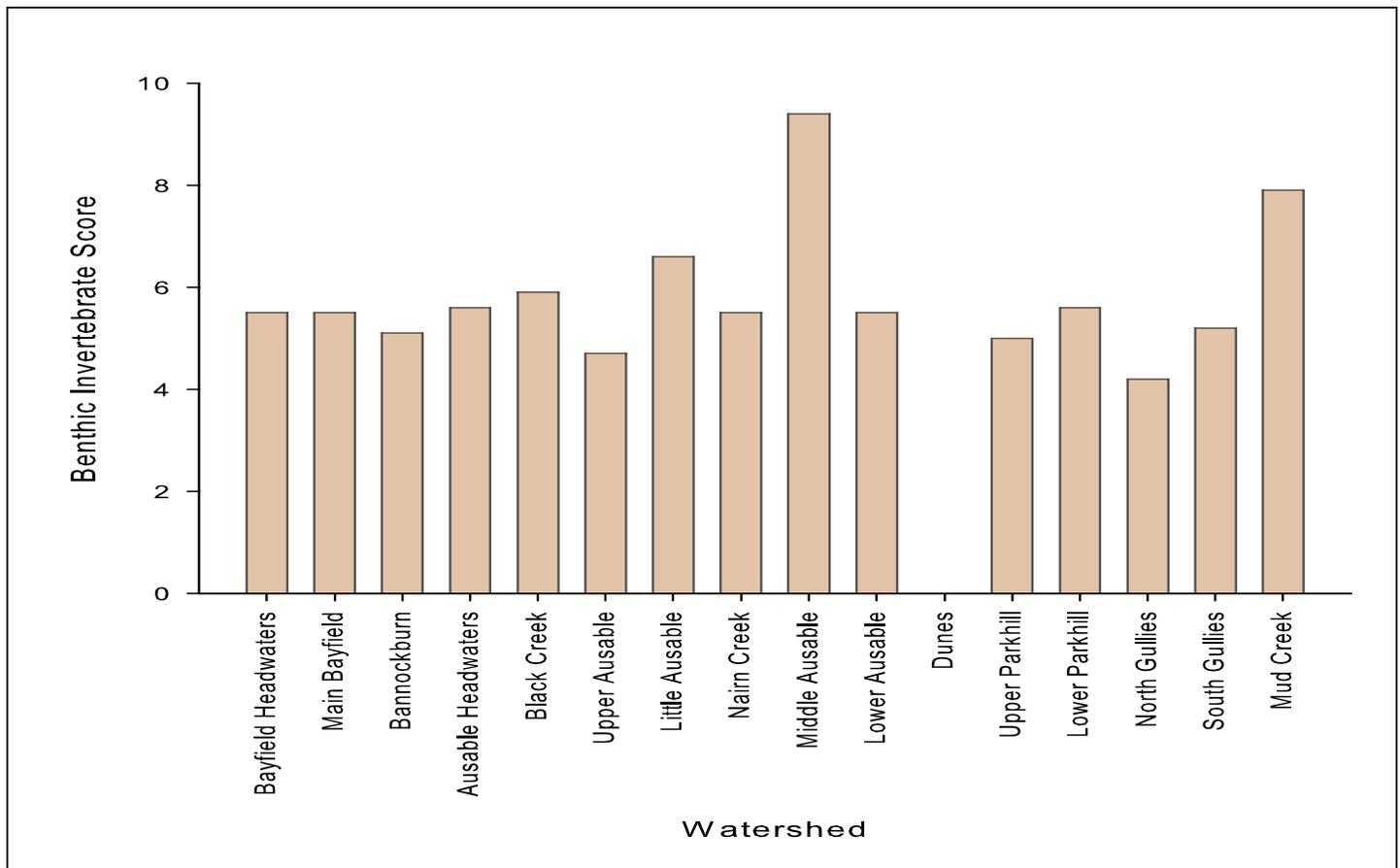


Figure D.6: Family Biotic Index (FBI) scores across all watersheds. A score of 1 represents a healthy watershed and a score of 10 is a degraded watershed



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Watershed Indicators Suggest Moderate to Poor Water Quality

The conclusions from the water quality indicators collected in the watershed between 2000 and 2005 suggest conditions in the Ausable Bayfield area are moderate to poor. Again, it is important to recall that water quality will reflect both the natural features (i.e., soil characteristics, tree cover) and land use. Low forest cover in the area combined with predominantly clay soils, intensive agricultural activities, and in some areas urbanization, result in water quality conditions that need improvement.

As a conservation agency we encourage individuals and agencies to strive to achieve A grades. However, the ABCA is also aware that A grades may not be achievable due to the natural conditions in the watershed. The goal of local agencies or individuals may be, therefore, to improve specific values. For example, forest interior in the Little Ausable watershed was 0.3 per cent; a reasonable goal would be to increase the interior to one per cent. Continual small steps like this will eventually result in better grades.

Why is the Watershed Report Card Important?

Summarizing forest and water quality conditions on a watershed basis provides this information on an ecologically-relevant scale. We may be more accustomed to thinking of our property in terms of municipal boundaries (towns, townships and counties) rather than ecosystem boundaries. For water conditions in particular, ecosystem boundaries help to determine the quality (and quantity) of the resource. Grading the watersheds helps environmental managers and the public rank the environmental health and identify areas with better and degraded conditions. This information highlights areas we need to protect and areas that we need to improve.



Ausable Bayfield Conservation Authority staff work with property owners to improve and protect water quality and increase forest cover. For information on programs contact the ABCA at (519) 235-2610 or 1-888-286-2610 or e-mail info@abca.on.ca

Photo by Daniel Holm

What Can I Do as an Individual?

Watershed health may not be something you think of very often but it has a direct impact on the air you breathe and the water you use.

Can an individual make a difference? Yes. Landowners in many watersheds have done tree planting and site-specific water quality improvement projects to improve local fisheries and water quality.

It is these individual efforts that come together to have a positive cumulative effect.

Just as individual behaviours contributed to degraded watershed health in the first place, it is positive individual efforts which will help protect or improve our environment in the future.

There have already been many recent improvements in the Ausable Bayfield watershed, which have all been driven by local champions.

Local, provincial and federal incentive grants may currently be available to help make improvements to forest conditions and water quality on your property. Local agencies, such as the ABCA, have staff available to assist you with these types of projects.



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2.0 Glossary

For information on the following terms visit www.abca.on.ca

Afforestation

The conversion of land, not previously forested, to forested land through human activities such as planting, seeding.

Area of Natural and Scientific Interest (ANSI)

Area of land and water containing natural landscapes or features that have been identified as having life science or earth science values related to protection, science or earth science values related to protection, scientific study or education.

Aquatic

Of, or concerning water; an organism whose primary habitat for growth, reproduction and survival is on, in or partially submerged in water.

Aquifer

An underground rock formation or structure that carries water.

Baseflow

The amount of water in a watercourse that comes from groundwater.

Benthic macroinvertebrates

Benthic macroinvertebrates are commonly used as indicators

of aquatic environmental quality. '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.

Beneficial Management Practices (BMPs)

A proven, practical and affordable approach to conserving soil, water and other natural resources in rural areas.

Carolinian Zone

The southernmost part of the Province of Ontario, generally considered to lie south of a line drawn between Toronto and Grand Bend. It contains more endangered and rare species of plants and animals than any other part of Canada.

Channelization

The smooth realignment and regarding of a creek or stream bed; implies modification of the watercourse to increase channel capacity; channelized banks are usually reinforced with stone or concrete rip-rap.

Coliforms

Bacteria found only in human and animal wastes; presence in a river

indicates pollution by sewage or farmyard runoff.

Conservation Authority

A natural resource management agency composed of local municipal representatives, having jurisdiction over a watershed, and having access to provincial funds and technical help through the Ministry of Natural Resources.

Conservation Ontario

The umbrella organization that represents Ontario's 36 Conservation Authorities.

***Escherichia coli* (E. coli)**

Bacteria found in human and animal waste. Their presence in water indicates a potential for the water to have other disease-causing organisms.

Ecosystem

An interacting system of living organisms and their environment.

Ecosystem approach

A holistic way of planning and managing natural resources; it means that the consequences of an action (including the cumulative effect on many small actions) on all other parts of the ecosystem will be considered and evaluated before the action is undertaken.



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Environmental Farm Plan (EFP)

Environmental Farm Plans are assessments voluntarily prepared by farmers in order to highlight their farm's environmental strengths, identify areas of environmental concern, and set realistic action plans with time tables to improve environmental conditions. Environmental cost-share programs are available to assist in implementing projects.

Environmentally Significant Area (ESA)

ABCA defines Environmentally Significant Areas as areas of woodlots that contain some wetland features that play an important role in supporting significant plant or animal species and/or serving hydrological functions. A site may also be significant if it supports a remnant or a threatened species of flora or fauna.

Family Biotic Index (FBI)

An index used to provide an evaluation of stream health based on pollution tolerance scores for families of benthic macroinvertebrates.

Forest cover

The percentage of the watershed that is forested. Environment Canada recommends 30 per cent of a watershed should be in forest cover.

Forest interior

The area inside a woodlot that some bird species need for breeding. Environment Canada recommends 10% of a watershed should be in forest cover that is at least 100 m from the forest edge.

Forest management

The intelligent use and control of the forest and its products for a specific purpose; may be for wood production, wildlife habitat, maple syrup, nature trails or any combination of these uses and others.

Geometric mean

The n th root of the product of all the members of the set, where n is the number of members. The geometric mean is useful to determine typical conditions.

Groundwater

The water found underground in the soil, wells, porous rocks, and subsurface reservoirs and channels.

Guideline (Water Quality)

Acceptable concentrations of substances in water that is used for drinking, recreational activities, agricultural uses and the protection of aquatic life.

Habitat

Food, water, shelter, cover and

other elements of the environment that living organisms need to survive.

Headwater Streams

Seemingly insignificant rivulets and seeps that upon convergence form recognizable streams.

Hydrologic cycle

The cycle of water movement from the atmosphere to the earth and return to the atmosphere through various stages, such as precipitation, interception, runoff, infiltration, percolation, storage, evaporation, and transpiration.

Indicator (Ecological)

Measures that provide information about the state or condition of a watershed and provide a means to assess progress towards an objective or target.

Non-Point Source

Non-point source pollution occurs when precipitation runs off fields, streets or backyards. As this runoff moves across the land surface, it picks up soil particles and pollutants.

Nutrients

Elements such as nitrogen and phosphorus, which stimulate growth of aquatic plants. The nutrients act as fertilizers and contribute to heavy weed growth and algal blooms.



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Point Source Pollution

A source of contamination that originates in an identifiable location.

Reforestation

The planting of trees, saplings or seedlings on land that has been cleared of trees in the past.

Sinkhole

Sinkholes are circular or elliptical closed depressions in the surface, usually formed by the dissolution of underlying soluble bedrock, allowing surface water to enter the groundwater. Sinkholes can allow this contact to occur rapidly and do little to filter contaminants in the surface water.

Species at Risk

Species that are at risk of extinction, extirpation or endangerment globally or within a jurisdiction or region.

Standard deviation

A measure of how spread out the values in a data set are. If the data points are all close to the mean, then the standard deviation is close to zero. If many data points are far from the mean, then the standard deviation is far from zero.

Substrate

Stream substrate is the material that is at the bottom of the stream.

Total phosphorus

Total phosphorus refers to the total amount of phosphorus, in a sample. Phosphorous is an element that enhances plant growth and contributes to excess algae, low oxygen in streams and lakes.

Tributary

A tributary is a stream or river that flows into another body of water.

Urbanization

The expansion of the proportion of total population or area in urban areas.

Watercourse

A channel in which a flow of water occurs.

Watershed

A watershed is an area of land that is drained by a river or a stream, and its tributaries, to a body of water such as a lake or ocean. It is often referred to as a drainage area, basin or catchment area for a watercourse.

Watershed stewardship

Caring for our water, land, air

and biodiversity on a watershed basis recognizing that everything is connected in a watershed and is affected by natural and human activities.

Wetland

Land seasonally or permanently flooded by shallow water as well as land where the water table is close to the surface; presence of abundant water causes poorly drained soils, favouring dominance of either water-loving or water-tolerant plants. Wetlands are often areas with high biodiversity and may help to filter pollutants from water and provide species habitat.

Wetland – Locally Significant Wetland (LSW)

A wetland which provides functions or exhibits characteristics that are pertinent to planning decisions, but has not been classified by the Ontario Ministry of Natural Resources.

Wetland – Provincially Significant Wetland (PSW)

A wetland that has been identified and classified as provincially significant by the Ontario Ministry of Natural Resources in accordance with the Wetland Evaluation System. These wetlands may contain critical fish and wildlife habitat; provide a hydrologic role in the watershed; or have unique or provincially-significant features.



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3.0 References

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