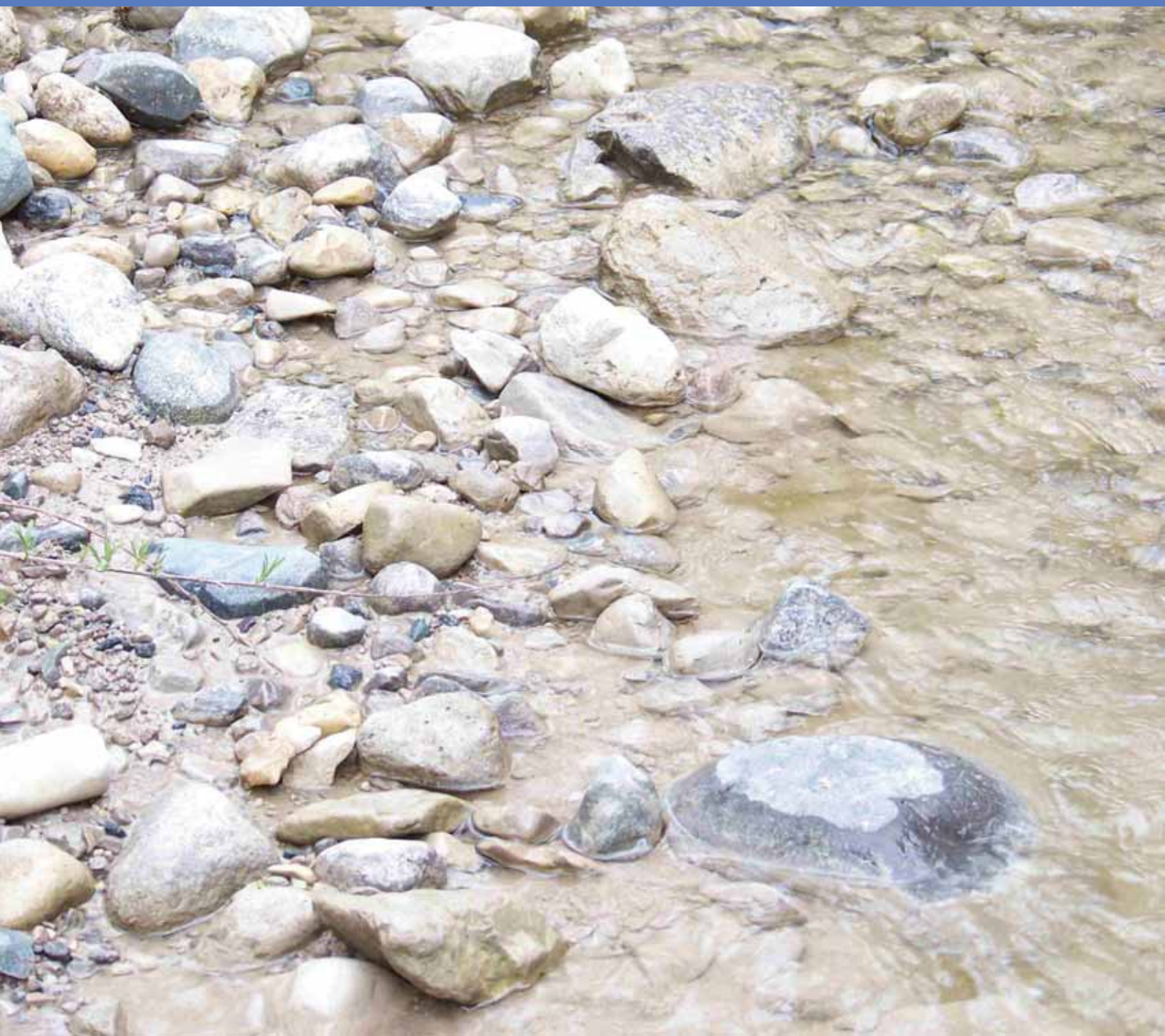
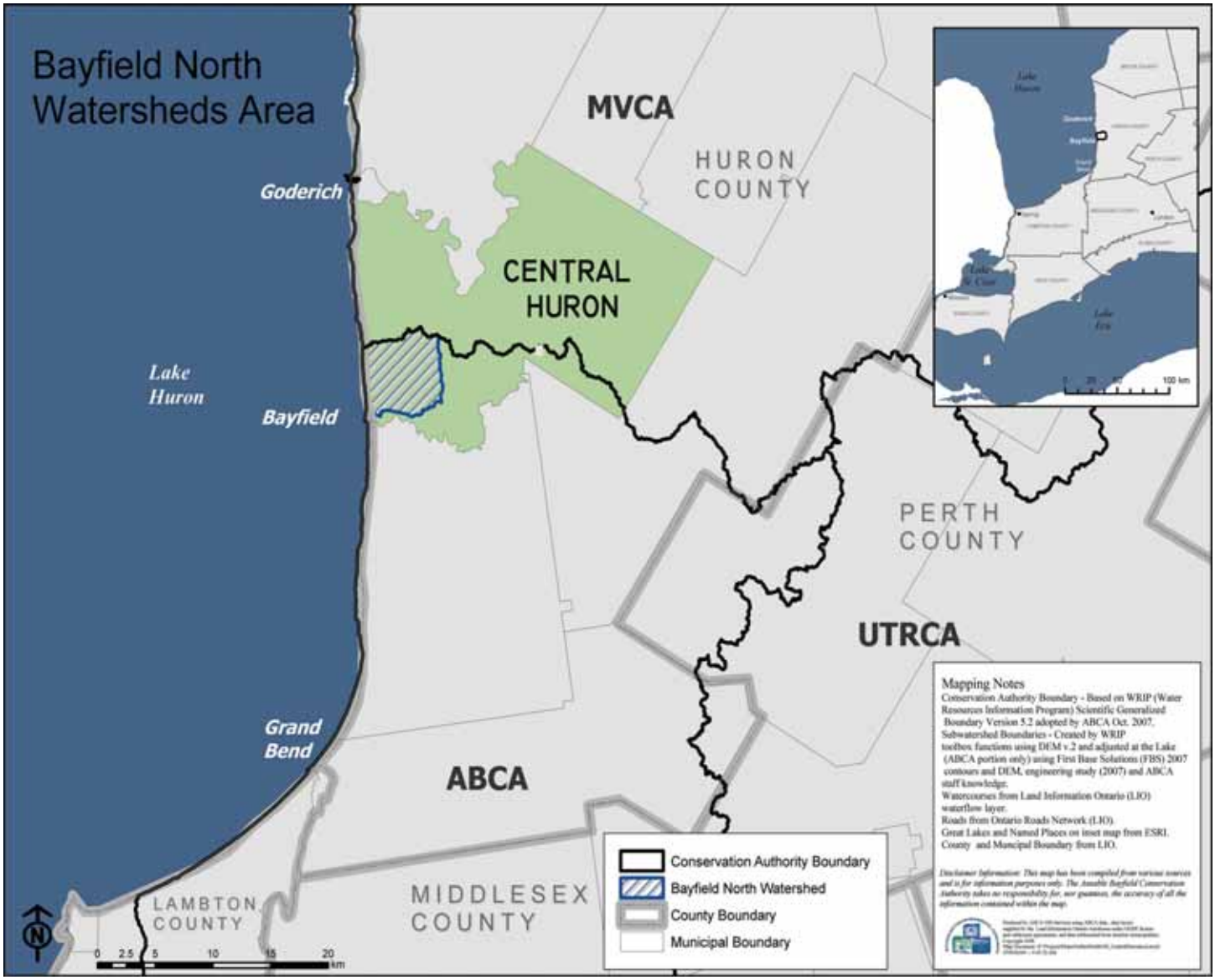
Management Plan for the Bayfield North Watersheds



Management Plan for the Bayfield North Watersheds

Prepared for:

The Bayfield North Watersheds Community
The Ausable Bayfield Conservation Authority
Environment Canada
Lake Huron Framework for Community Action Planning



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Bayfield North Watersheds Management Plan
Executive Summary

Purpose of the Bayfield North Watersheds Plan

The Bayfield North Watersheds Plan was initiated to:

- Document the natural, social and economic features of the watersheds north of Bayfield.
- Identify management strategies to address current community interests and issues.
- Make recommendations to the community to continue to enhance and protect the natural environment in the area north of Bayfield.

This project is part of a larger initiative termed the Lake Huron-Georgian Bay Watershed Canadian Framework for Community Action, which encourages the active participation of individuals, groups and communities, in identifying common issues, and the conservation and stewardship of natural resources.

Community Interests and Issues

Key community interests and issues include:

- **Water Quality** - The Bayfield North area has water quality conditions that are typically better than other areas in the Ausable Bayfield Conservation Authority (ABCA), however, improvements are still possible. Rural non-point source water pollution comes from many diffuse sources which vary over time and space. **Improvements to water quality are therefore best identified and acted upon by individual landowners.** Contact the ABCA for more information on how to develop an Environmental Property Plan at 519-235-2610 or toll free at 1-888-286-2610.

- **Development** - There is a need to balance environmental and development objectives. The area north of Bayfield has some exceptional natural areas (i.e., Lake Huron shoreline, forests and ravines), and as such, they have been designated as provincially significant. Some of these areas have been developed because people choose to live close to these natural features. Development (residential, recreational and agricultural) is important for the economic well-being of the community, however, it is important to protect core natural areas because of the ecological functions and recreational benefits they provide.

- **Erosion** - Three types of erosion are prevalent in the Bayfield North Watersheds: gully erosion, lakeshore erosion and soil erosion across land. While some erosion occurs naturally, erosion can be exacerbated by human activities. Erosion may affect land use, and it can also have adverse effects on water quality. Preventing further erosion and correcting highly eroded areas will improve the natural environment of the Bayfield North Watersheds.

Best Bets for Protection and Enhancement

- **Conduct individual Environmental Property Plans** - Ideally, every property owner will have completed and acted upon their own property plan (i.e., Environmental Farm Plan, Rural Landowner Stewardship Guide, or Stewardship Guide for the Lake Huron Shoreline).
- **Aim for 30 per cent natural cover across the watershed** - Property owners need to protect existing natural areas and increase the natural cover in strategic areas on their own property.
- **Direct future development away from areas of provincial, regional and local significance.**

Foreword

The following document is a community-based watershed plan for the area north of Bayfield. Developed cooperatively by the landowners within this community, the Municipality of Central Huron, the County of Huron and the Ausable Bayfield Conservation Authority, a community-based watershed plan helps ensure that as many local interests are addressed as possible, and that these interests are relevant to the community.

We appreciate all the individuals who took the time to attend the various public meetings, open houses, workshops and tours, and those who donated their time and knowledge to discuss the issues affecting their community, and possible management strategies. Without the continued interest and commitment of this community, this initiative would not have been possible. We hope this plan and its management recommendations are an effective tool for all stakeholders in taking steps towards protecting and enhancing the natural environment of the Bayfield North Watersheds.

Sincerely,

Jim Ginn

Jim Ginn
Advisory Committee Member

Preface

Identified as a high priority for protection in the Ausable Bayfield Conservation Authority Management Strategy (Snell and Cecile and ABCA 1995), the small streams that flow directly into Lake Huron north of Bayfield continue to be recognized as an important area for ecosystem protection (Veliz et al. 2006). In view of the sensitive nature of this area, it is the intent of this project to develop a long-term watershed plan under the guidance of community stakeholders and resource agencies. This community-based approach is supported by the Lake Huron-Georgian Bay Watershed Canadian Framework for Community Action, which works on the belief that all individuals, communities and organizations within the watershed operate independently, but are united by the common goal of improving environmental health. Included in this watershed report is a characterization of the watershed, which will be referred to as the Bayfield North Watersheds, an examination of some of the interests and issues in this area, as well as options for managing and enhancing the quality of the natural environment.

Acknowledgements

The Bayfield North Watersheds Advisory Committee:

Peter Bos, *Bayfield North Landowner*
Denise Carnochan, *Huron County Planning and Development*
Gayle Detenbeck, *Citizen Representative*
Jim Ginn, *Municipal Councilor, Municipality of Central Huron*
Dave Hemingway, *Bayfield North Landowner*
Derek Jefferson, *Bluewater Golf Course and Campground*
Geoff King, *Drainage Superintendant, Central Huron/Maitland Valley Conservation Authority*
Geoff Peach, *Lake Huron Centre for Coastal Conservation*
Susanna Reid, *Huron County Planning and Development*

Thank you to all the landowners of the Bayfield North Watersheds for your interest and your input.

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Bayfield North Watersheds - Management Plan
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Introduction
The Bayfield North Watersheds

The Bayfield North Watersheds area is approximately 40 km^2 in size and consists of 20 small streams flowing directly into Lake Huron within the Ausable Bayfield Conservation Authority (ABCA) jurisdiction (Figure 1). The watershed area extends 8 km inland from the shore of Lake Huron and is largely dominated by agriculture, some natural environment, recreational areas and limited settled areas.

The intent of this report is to document the current landscape, identify management strategies to address current community interests and issues, and make recommendations to the community to continue to enhance and protect the natural environment in the area north of Bayfield.

Why Focus on Bayfield North?

The Bayfield North Watersheds were recognized in the ABCA 2007 Watershed Report Card (referred to as the "North Gullies") as having high grades in both water quality and forest area. From an ecosystem perspective, it may be more effective to protect an area that is currently in good condition than attempt to build a good ecosystem from one that is degraded.

This planning process is an example of the Lake Huron-Georgian Bay Framework for Community Action. This initiative encourages individuals, groups and communities, to identify local environmental issues and take local action to improve the environment (Anderson et al. 2007). The Framework also provides a cyclical planning process

Source: Anderson et al. 2007 (lakehuroncommunityaction.ca)

to aid in the management of the local environment (see above).

Watershed Planning Approach

We all live in a watershed – the area that drains to a common waterbody, such as a stream, lake, estuary, wetland, or ultimately, an ocean (US EPA 2008). The Bayfield North ravines are referred to as 'watersheds' as each of these ravines represents its own watershed. Together these small watersheds comprise the Bayfield North Watersheds.

Recently there has been a recognition of the importance of an ecosystem approach to land use planning. This approach requires that ecological goals be treated equally with economic and social goals. Under the ecosystem approach the boundaries for land use planning should be based on biophysical boundaries; **the primary boundary for an ecosystem approach of land use planning should be the watershed** (Ontario Ministry of the Environment and Energy and Ontario Ministry of Natural Resources 1993).

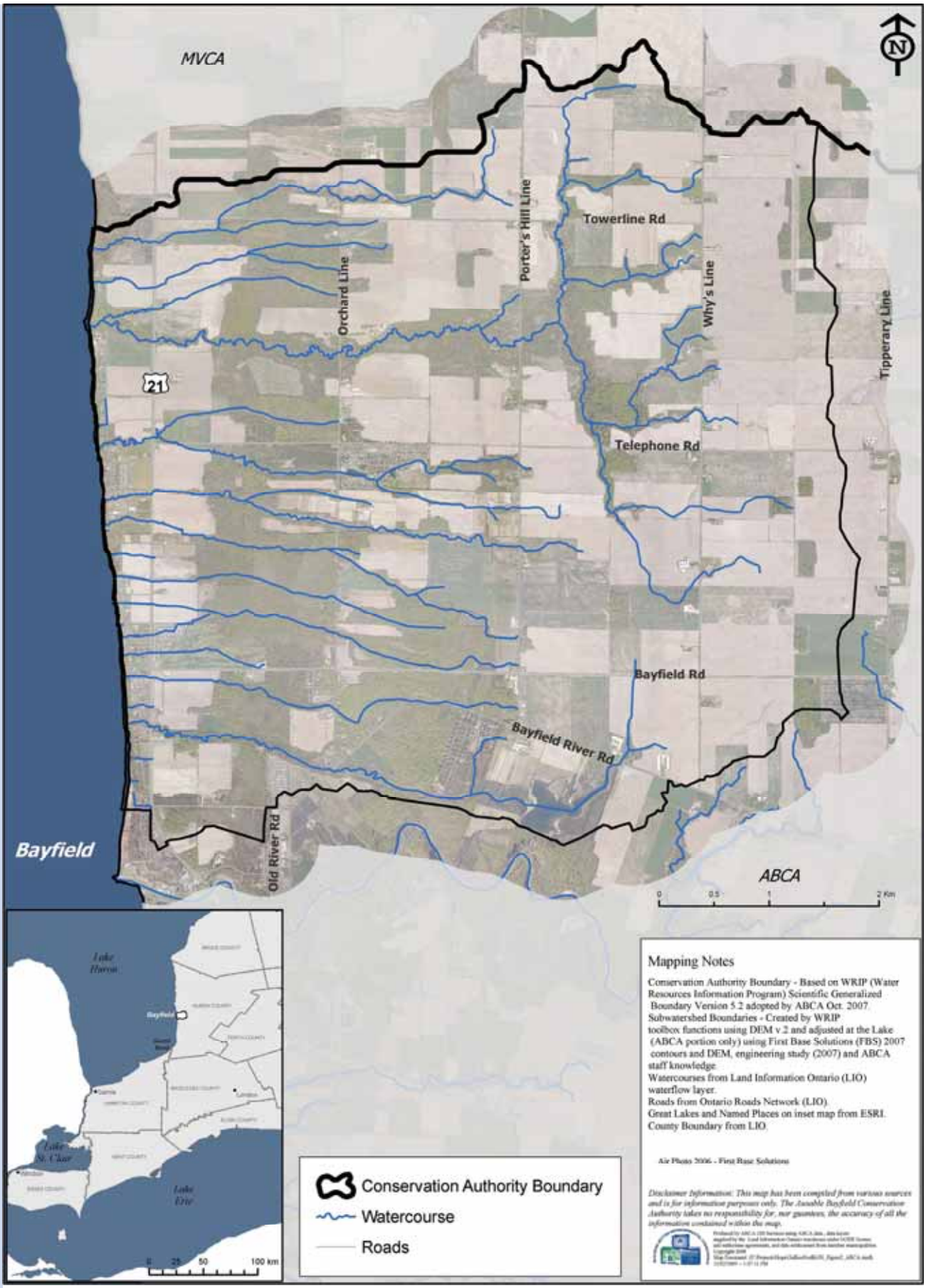


Figure 1: The Bayfield North Watersheds

A watershed management plan is created co-operatively by the community and government agencies to manage the water, land/water interactions and aquatic resources within a particular watershed to protect (and enhance) the health of the ecosystem as land uses change (Ontario Ministry of the Environment and Energy and Ontario Ministry of Natural Resources 1993).

The process of developing a community-based watershed plan has created an opportunity to ensure that as many local interests as possible are addressed. As the plan was driven and developed by the community, the interests expressed are locally relevant.

Relationship with Municipal Plan

Watershed planning, such as this, is consistent with the Central Huron Official Plan. Specific principles of the Official Plan that reflect the goals of the Bayfield North Watersheds Plan include establishing land use policies that support the principles of:

- Promoting the long-term future and flexibility of agriculture;
- Strengthening the economy;
- Protecting the health of the natural environment and the community.

The Central Huron Official Plan considers various environmental issues with respect to land use planning however, these policies need to be updated to include current ecological information and to be consistent with the Provincial Policy Statement (2005). Watershed planning provides current and appropriate information about natural resources and the community's interest in those resources. Thus, watershed planning will provide both a natural and community context to the Official Plan, and helps to ensure that the municipality is creating appropriate policies concerning the natural environment.

Upon completion of the Bayfield North Watersheds Plan, the Municipality of Central Huron should consider the recommendations when updating their Official Plan.

Planning Process

In December 2007, an initial open house was held to inform the public of the project and to gain insight into the interests and issues of the landowners. Work on the characterization of the watersheds also began at that time. An advisory committee that has provided input into the plan and planning process was formed in early 2008. Five community open house presentations were held in July 2008 to aid in developing management options for the watersheds and creating a subsequent action plan. It is the intent of this document to provide a springboard for sustained community action.

Plan Purpose and Format

This document will provide local decision makers, including landowners and agencies, with background technical information about the natural environment and the community interests and issues north of Bayfield. The land management, aquatics, and erosion sections of the plan provide background information, community interests and issues, a management goal and recommended actions. It is important to note that this document attempts to summarize existing available information. It is recognized that the on-going nature of the planning process will necessitate the need to update such information.

Watershed Description
Landscape Features

Location and General Description

The Bayfield North Watersheds are located just north of the Village of Bayfield, Ontario. The watershed area is located entirely within the Municipality of Central Huron in the County of Huron, and is under the jurisdiction of the Ausable Bayfield Conservation Authority (ABCA). An Area of Natural and Scientific Interest (ANSI), as well as several Environmentally Significant Areas (ESAs) are scattered throughout the Bayfield North Watersheds, while the remainder of the area is dominated by agricultural land uses. Settled areas exist however, they are limited to the outskirts of Bayfield, and a narrow strip of recreational land along the lakeshore with seasonal cottages and lakeshore residences.

Of the 20 watercourses that drain directly to Lake Huron, 13 of these watersheds cross Highway 21, and will be considered subwatersheds for the purpose of this study. As a part of this study, all of the 20 watercourses were named, and are currently undergoing the process to become officially recognized (Figure 2). The largest tributary is Gully Creek.

Topography

The Bayfield North Watersheds area is generally level with gently sloping headwaters off the Wyoming Moraine (dark red on Figure 2; labeled Till Morraine on Figure 3), while the lakeshore has very steep bluffs up to 20 metres in height. A considerable elevation difference exists between the headwaters of this area on the Wyoming Morraine and the lake level. Due to the gentle slope of the land, the steep drop at the lake, and highly erodible soils, the water from the ravines cut into the soils at the lakeshore. These cuts in the soil begin to deepen and widen, creating the gully formation that is so prevalent in this area. Further details may be found in the Ausable Bayfield & Maitland Valley Source Protection Region - Watershed Characterization (Luinstra et al. 2007).

Physiography

Headwaters originate on the west slopes of the Wyoming Morraine (between Why's Line and Tipperary Line), which then extend westward towards the lake across the glacial Lake Warren beach and across Lake Warren's beveled till plain, which includes a strip of sand plain (Chapman and Putnam 1984 in Luinstra et al. 2007) (Figure 3).

Soils

Headwater soils of the Bayfield North Watersheds are dominated by well-drained, clay loam soils. A narrow band of well-drained loam extends along the length of the watershed with a larger pocket present in the southernmost portion. Poorly-drained clay loam soil, separated by a band of imperfectly-drained sandy loam, extends along the shoreline for most of the watershed. The southernmost shoreline portion of the watershed is characterized by a small area of silty loam soil (Figure 4).

Aerial view of the Bayfield North Watersheds

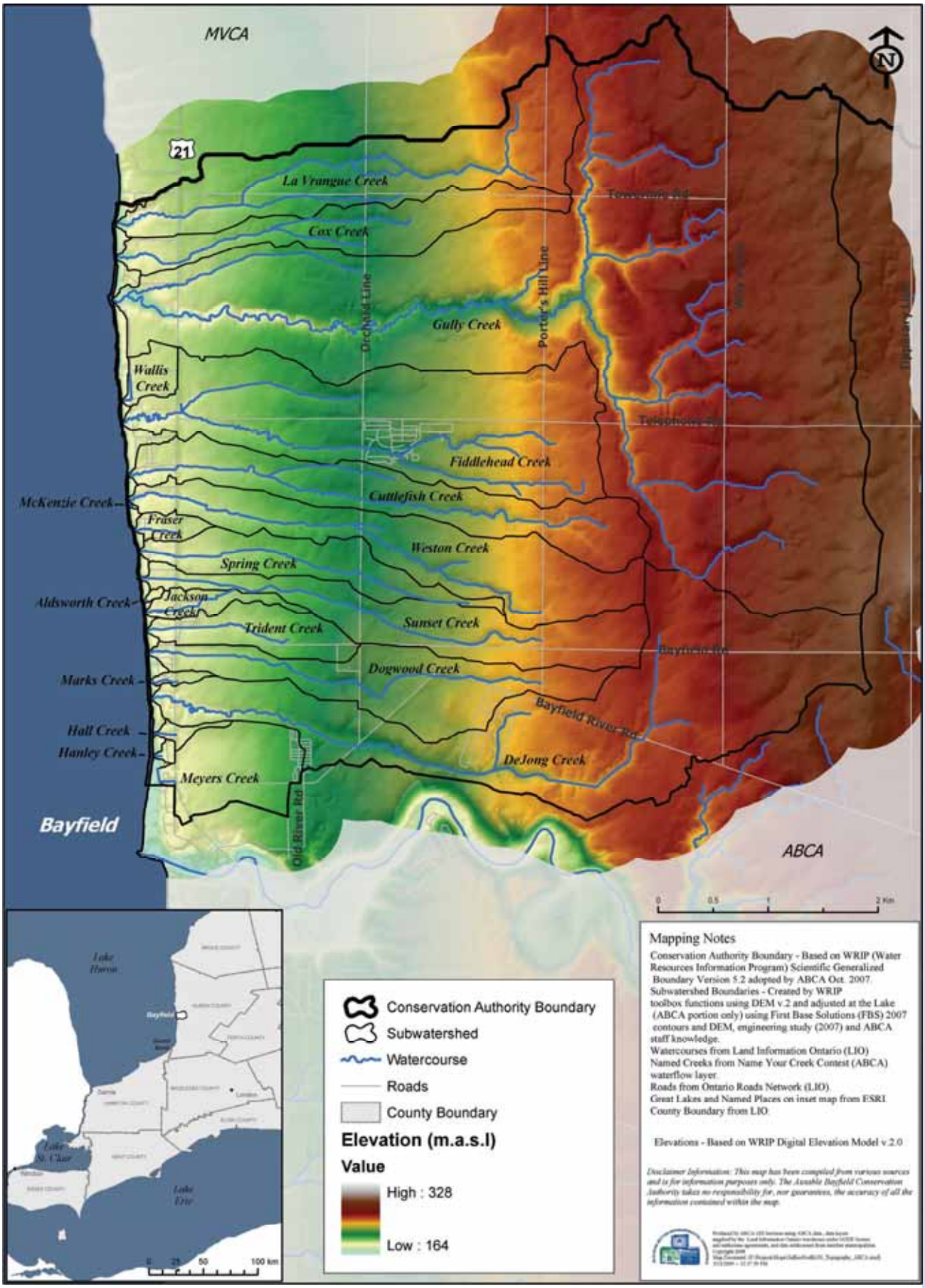


Figure 2: Gully Names and Topography of the Bayfield North Watersheds

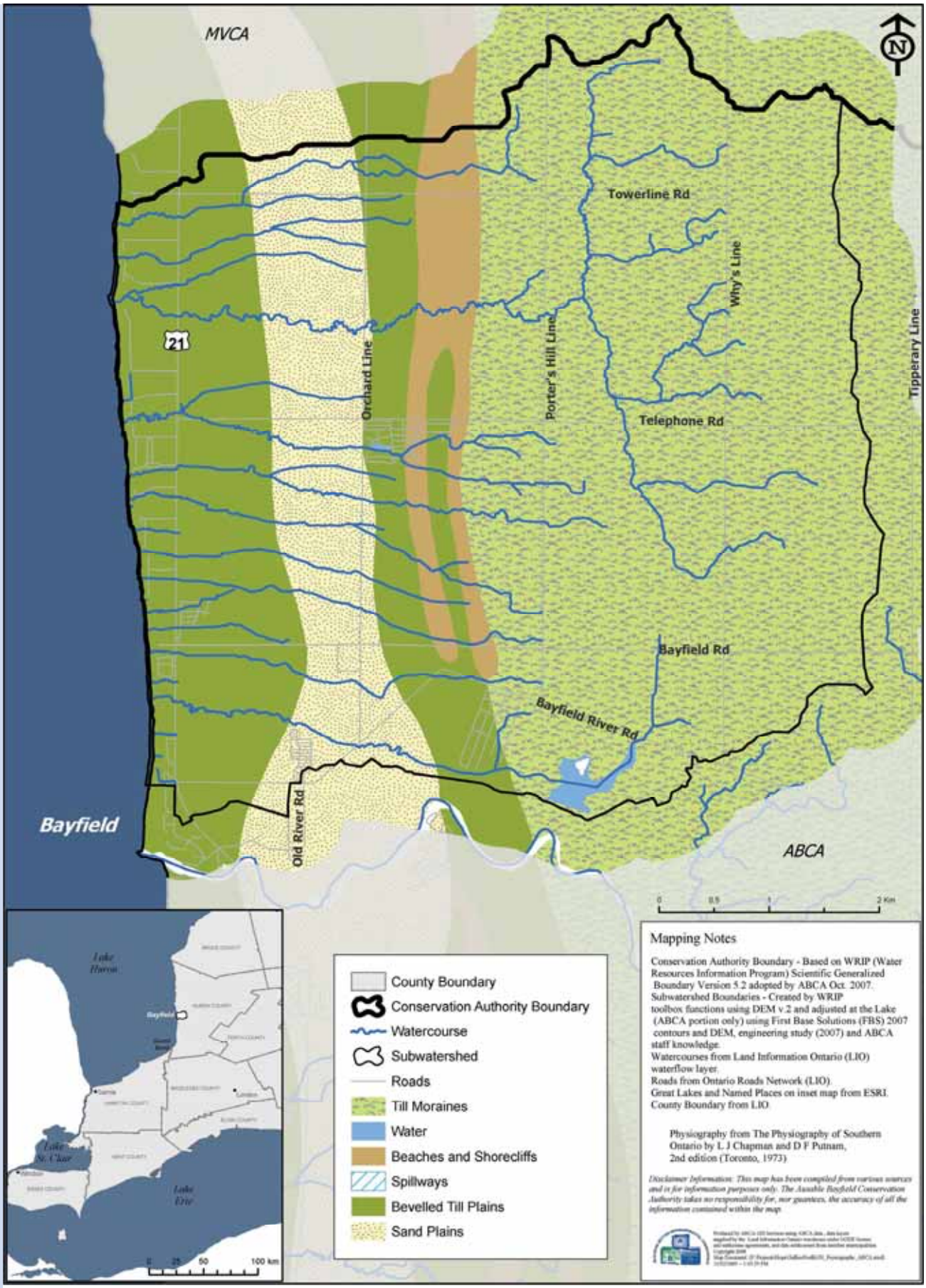


Figure 3: Physiography of the Bayfield North Watersheds

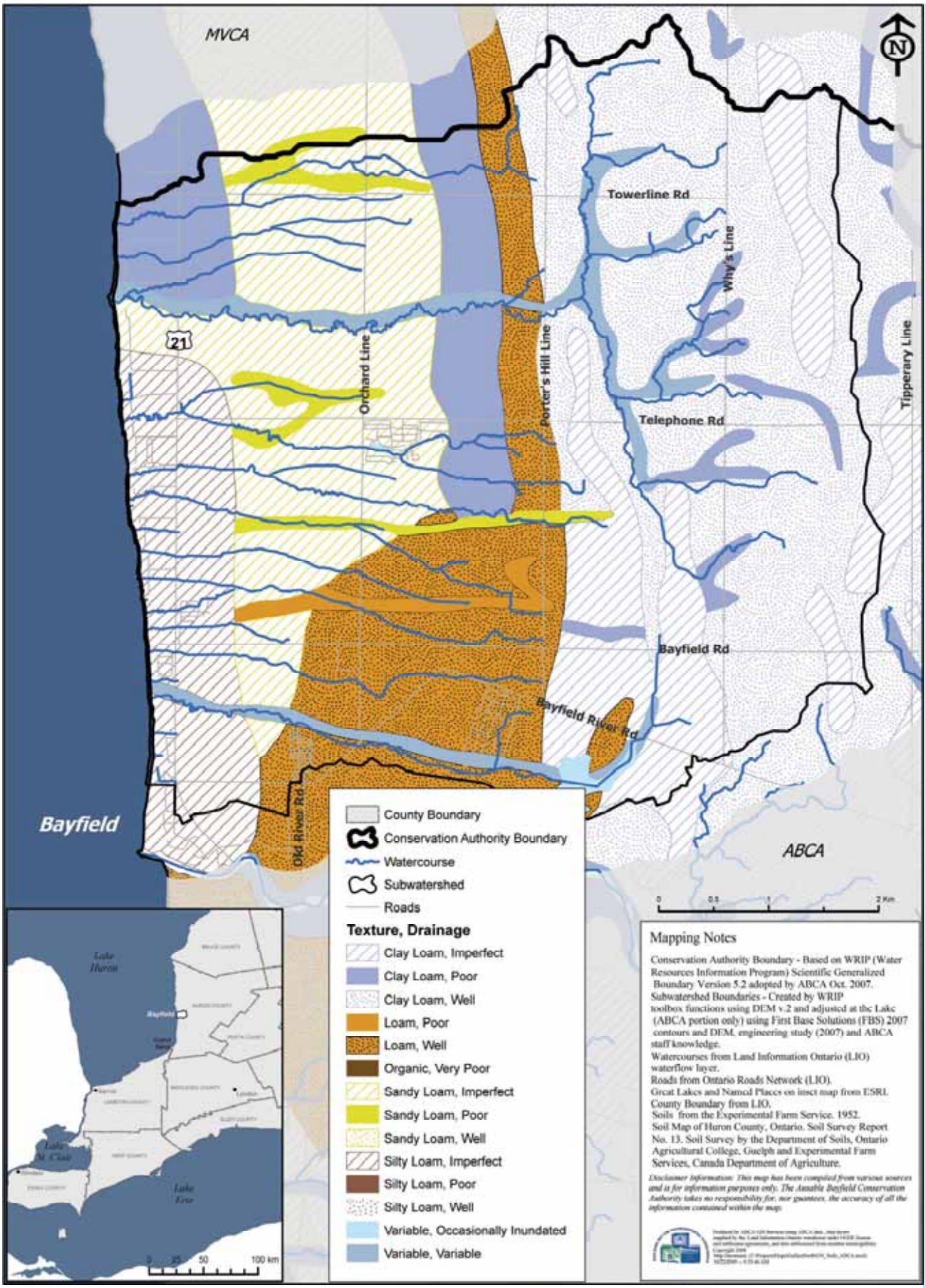


Figure 4: Soils of the Bayfield North Watersheds

Watershed Description
The Socio-Economic Landscape

History

The Village of Bayfield has not always been reliant on tourism, as it is today. The area was first settled in the 1830s. The Baron van Tuyll van Serooskerken, Carel Lodewijk, first purchased a large percentage of the Huron Tract in 1832, including 388 hectares that he set aside for settlement. The village itself was named for nautical surveyor Henry Wolsey Bayfield.

In the 1840s, Bayfield became a major shipping port for grains produced in the area, and turned into a prosperous town. The area surrounding the Village of Bayfield, including the Bayfield North Watersheds, has historically been a landscape dominated by agriculture; the village served as the centre of this agricultural community.

Local clubs welcome visitors to Bayfield

However, with the coming of new technology came change. As the railway came to southern Ontario, it bypassed some of the older shipping ports, such as Bayfield. The port was no longer needed for the export of grain and the shipping industry left the area. As a result, Bayfield turned to a fishing industry, which still exists today. In addition, the agricultural industry continues to employ many of the residents of this area. Eventually the harbours of Bayfield became known for leisure activity and pleasure crafts, and the village soon came to rely on tourism from the lake activities and the abundant natural areas left in the surrounding watersheds (Southern Ontario Tourism Organization 2006).

Demographics

The Bayfield North Watersheds, as well as the Village of Bayfield, are not densely populated like some of the other areas of southwestern Ontario. According to Statistics Canada's census data of 2006, the population in the Village and the surrounding areas has increased by 6 per cent since 2001 (Statistics Canada 2006). This is not surprising, as the area has attractions for those who enjoy the natural environment, as well as those who enjoy water activities.

The population in this area however remains an aging population; approximately 69% of the population in this region is over age 45 with the average being 50 years of age (Statistics Canada 2006). This would suggest that, while much of the population is still part of the working force, there are a large number of retired residents in the region.

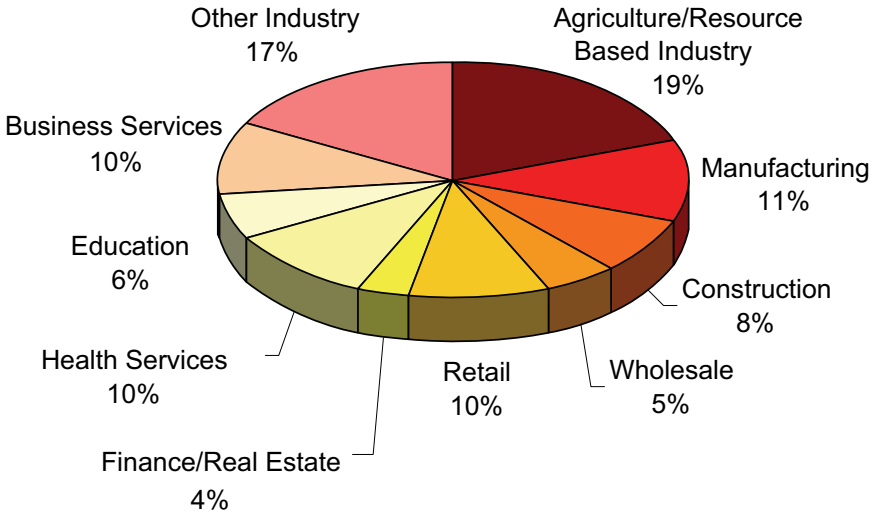
Industry

Residents of the Bayfield North Watersheds, and the Municipality of Central Huron, participate in all sectors of

the economy. While agriculture comprises the largest portion of industry in Central Huron, various other industries make up the majority. Together, manufacturing and construction contribute the same amount to the economy as agriculture. Retail, wholesale and business services also contribute substantially to the economy of Central Huron. It is likely that much of this can be attributed to the high amount of tourism in this region. Education, health services and the finance industry, along with various other smaller industries, also contribute to the economy (Statistics Canada 2006).

If population trends continue in their current form, it is likely that there will be some changes to the nature of industry in the Bayfield North Watersheds. Demographics may be a contributing factor as an aging population attracts different service providers than those catering to a younger demographic. For example, health services may experience a significant increase as opposed to education.

Industry in Central Huron



Source: Statistics Canada 2006

Local industry in Bayfield and the Bayfield North Watersheds

Watershed Description
Land Use

Land Use Planning

Land use planning exists for various purposes. Primarily, it establishes legislative principles and policies that guide a community toward a common vision for the future. The creation of land use planning principles is the responsibility of both the province and the local municipality; Central Huron in the case of the Bayfield North Watersheds. The municipality designates land for specific uses, and policies associated with the different land use designations are created. Zoning by-laws are then created to ensure the appropriate implementation of these policies. Land use planning can become contentious, especially when changes occur to land use designations or policies.

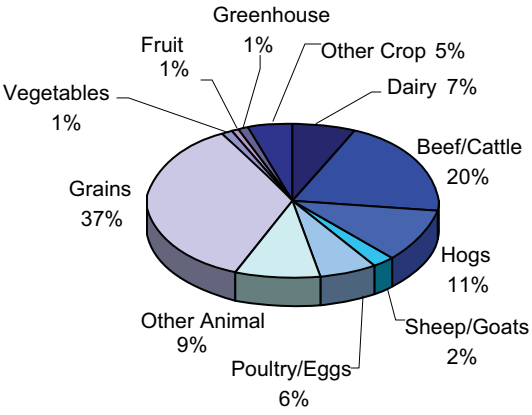
Land Use

The predominant land use in the Bayfield North Watersheds is agriculture at 62 per cent (Figure 5). Agriculture in these watersheds consists mainly of cash cropping and livestock, with smaller produce sectors.

Land designated by the Central Huron Official Plan as natural environment, which consists mainly of forested areas, is scattered throughout and comprises approximately 27 per cent of the Bayfield North Watersheds. All of these natural areas are afforded limited protection (more information on natural areas in the next section).

Wetlands, a part of the natural environment designation, currently make up 3 per cent of the land use in the

Huron County Agriculture



Source: County of Huron 2007

Bayfield North Watersheds (Figure 6). However, there is potential to increase this figure to 7 per cent (Veliz et al. 2006). This wetland potential is calculated using a five-criteria methodology (soils, surficial geology, slope, groundwater discharge, and distance to water feature) (Boitson 2007).

Land designated as urban comprises approximately 6 per cent of the Bayfield North Watersheds. Although Bayfield is not included within the watershed boundary, lands adjacent to this community are designated as urban and currently have several residential areas. The Central Huron Official Plan directs new development to these settled areas north of Bayfield. The remaining 5 per cent of the Bayfield North Watersheds includes recreational (4%) (e.g., campgrounds, trailer parks, golf courses), and mobile home park (1%) land use types.

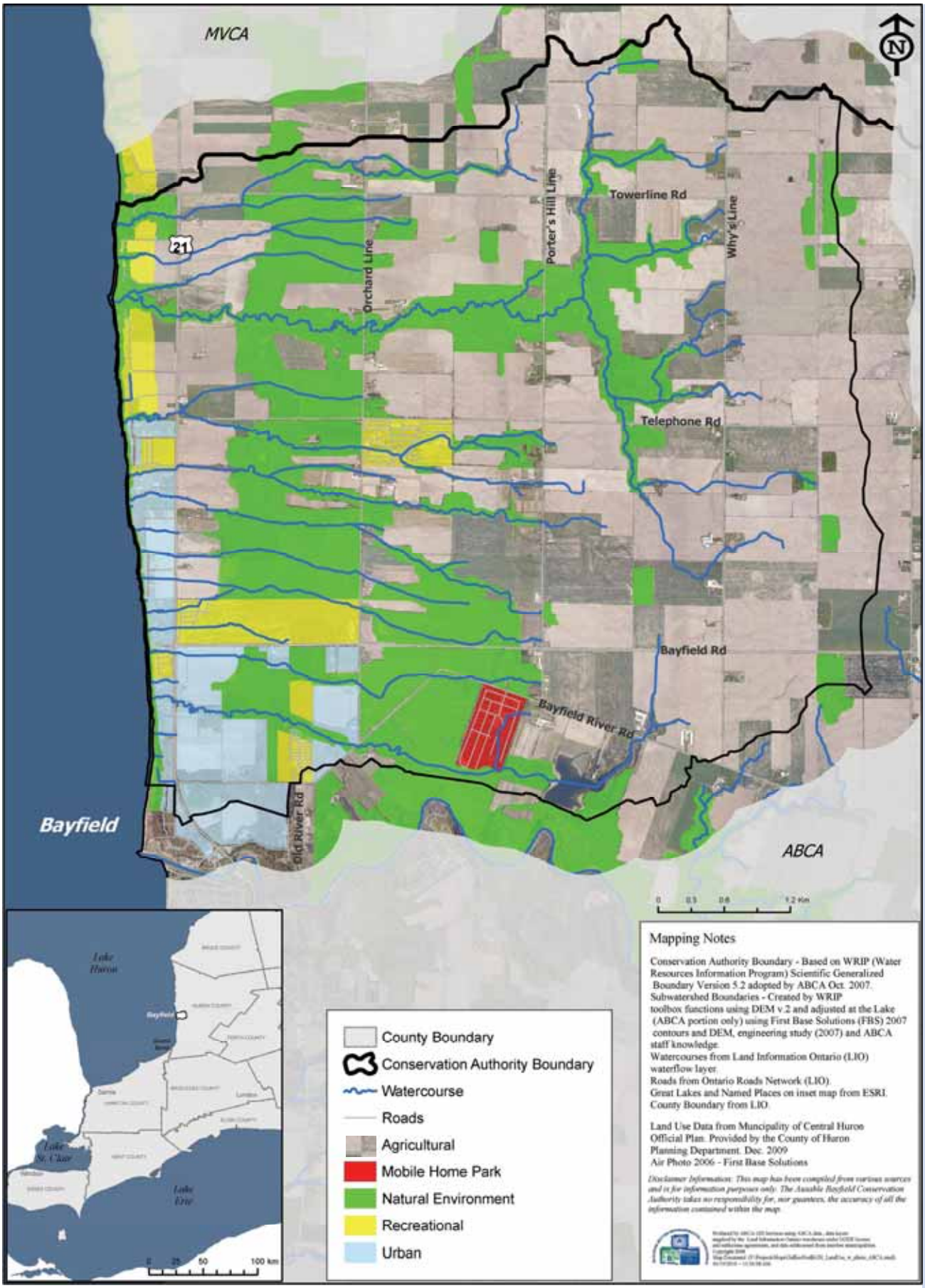


Figure 5: Land Use in the Bayfield North Watersheds

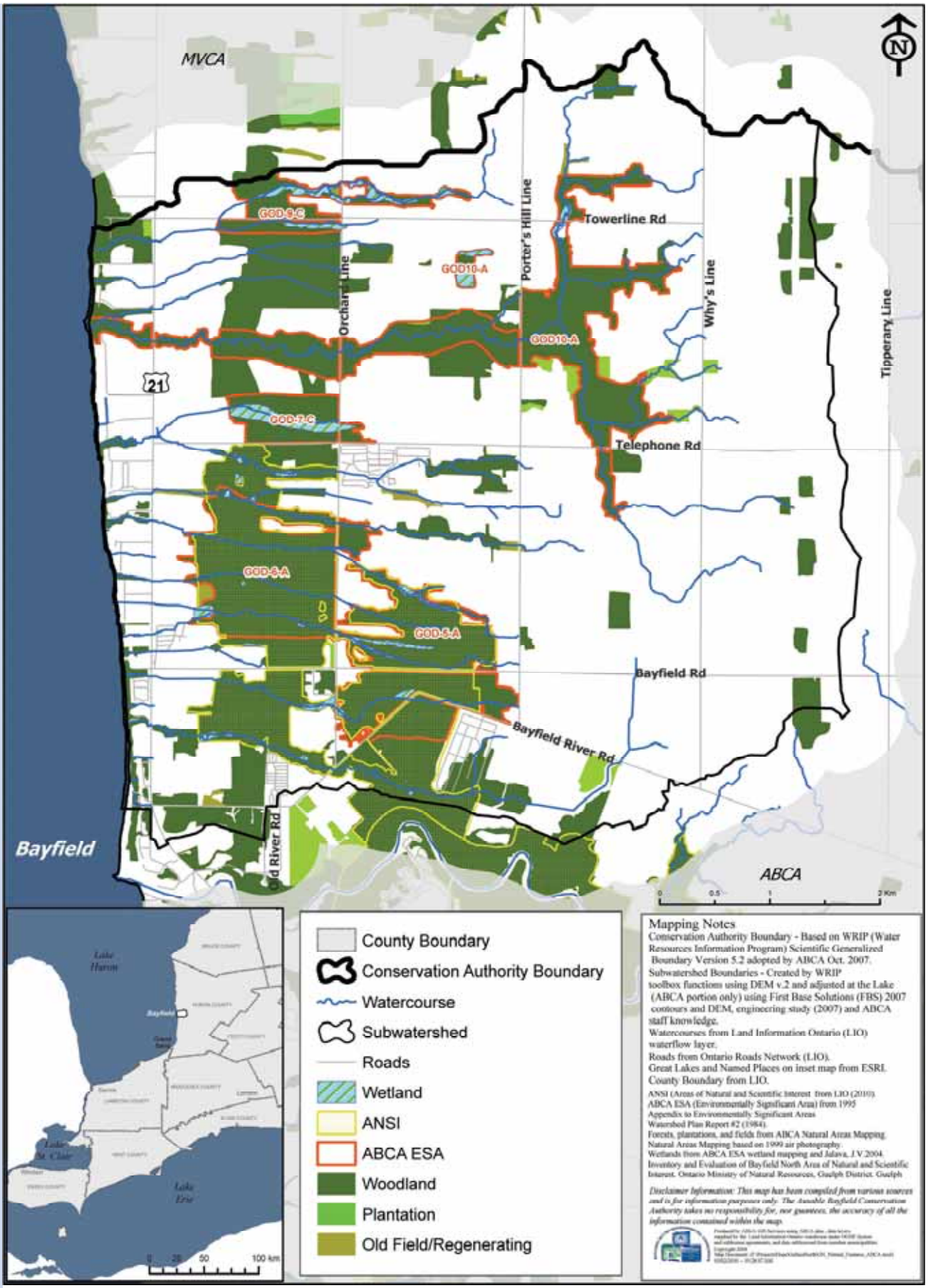


Figure 6: Natural Areas of the Bayfield North Watersheds

Natural Areas

The Bayfield North Watersheds area has considerably more forest, wetland and streamside natural cover than other watersheds in the area (Figure 6) (Table 1). Natural areas provide benefits such as water storage, habitat for wildlife, erosion control and recreational areas. They also provide a multitude of health benefits such as removing airborne pollutants and providing clean water. In 2002, the Municipality of Central Huron documented approximately 17 per cent forest cover/natural environment in its entirety. The target outlined in the municipality's Official Plan is 20 per cent natural cover, which is based on a preference to convert marginal lands to natural environment use.

The Bayfield North Area of Natural and Scientific Interest (ANSI) was designated in 1984 and its boundary recently revised by the Ministry of Natural Resources (MNR). Locally significant areas were also designated by the ABCA in 1984 (Ausable Bayfield Conservation Authority 1995). Although not provincially or locally significant, there are a number of natural areas that are significant to their communities, particularly near the Lake Huron shoreline. Currently it is difficult to capture these culturally significant features into the planning process.

Bayfield North Area of Natural and Scientific Interest

The boundaries of the Bayfield North ANSI were recently expanded by the MNR, and the ANSI now exists as a 457 hectare area. This area, entirely under private ownership, has been designated provincially significant due to the size of its upland forest habitats and the species that comprise such larger forest tracts, as well as for the quality of its streams, stream bottomlands, and seepage zones. Provincially and locally significant species have been documented in this area, which is relatively rich in vegetative species diversity.

Table 1: Current percentage of the forest, wetlands and vegetated riparian habitat for the Bayfield North Watersheds compared to recommended minimum percentages established by Environment Canada for healthy watersheds (Environment Canada 2005) and in the Ausable Bayfield Conservation Authority (ABCA) watershed jurisdiction.

Natural Feature	Current (%)	Environment Canada Recommended (%)	ABCA Watershed[†](%)
Forests	28	30	13
Wetlands	3	10	2
Streamside Cover*	68	75	30

*The calculation used to determine the percentage of streamside cover in the Bayfield North Watersheds (North Gullies) differs slightly from that used by Environment Canada and therefore will not provide a direct comparison to their recommended percentage.

[†]The ABCA watershed jurisdiction is a roughly rectangular area of 2400km^2. This includes the area west of Mitchell and London to Lake Huron, and south of Goderich to south of Port Franks (see p. ii).

In 2003, a study was undertaken of the Bayfield North ANSI, in which vegetation communities were classified. Additionally, breeding bird, amphibian and reptile surveys were completed (Jalava 2004). Provincially and locally rare species are designated by the Natural Heritage Information Centre (NHIC).

Significant Vegetation Communities

Thirty-two different vegetation types have been documented in this ANSI, which provide habitat for 508 vascular plant species. Of these, 392 are native to Ontario which includes four provincially rare sedge species. The extensive forests of the Bayfield North ANSI largely consist of Sugar Maple Forests with black cherry, white ash and beech co-dominant species (Jalava 2004). These large tracts of forest resulted in an 'A' grade for Forest Conditions in the recent ABCA Watershed Report Card 2007 (Veliz et al. 2006).

One provincially rare-to-uncommon vegetation community type (Silky Dogwood Mineral Thicket Swamp Type) was documented within the ANSI, while the condition and relative maturity of the Fresh-Moist Basswood – Ash Lowland Deciduous Forest community was recognized for its unique features (Jalava 2004).

Provincially Rare Plants

Several vascular plant species were also documented within the ANSI. These include the butternut (*Juglans cinerea*), which is listed federally as endangered, and four sedge species: closely-covered sedge (*Carex albicans* var. *albicans*), handsome sedge (*Carex Formosa*), slender wood sedge (*Carex gracilescens*), and slightly hirsute sedge (*Carex hirsutella*) (Jalava 2004).

Steve Baskauf

Butternut tree

Significant Breeding Birds

The red-bellied woodpecker (*Melanerpes carolinus*), which is considered both locally and provincially rare, was documented during the 2003 study. This bird, which prefers mature deciduous forests, is likely near the northern limit of its range in the ANSI (Jalava 2004).

Other provincially uncommon species that have been documented in the ANSI include: green heron (*Butorides virescens*), common nighthawk (*Chordeiles minor*), blue-gray gnatchatcher (*Poloptyla caerulea*), and Brewster's warbler (*Vermivora pinus X V. chrysoptera*) (Jalava 2004).

Amphibians, Reptiles and Mammals

Although mammal surveys were not formally part of the 2003 study terms of reference, and thus not comprehensively surveyed, the ones that were observed were documented and listed in the report in what is likely a non-exhaustive list. Eleven mammal, seven amphibian and one reptile species were documented in the Bayfield North ANSI (Jalava 2004).

Ecological Functions

The presence of these more uncommon vegetation and animals is indicative of a habitat that has maintained important ecosystem functions. These functions are important for the local human community and the broader landscape.

In addition to supporting the above mentioned vegetation and animals, the Bayfield North ANSI also has numerous ecological functions (i.e., an ecological role within the broader landscape) (Table 2) (Jalava 2004).

Environmentally Significant Areas

Environmentally Significant Areas (ESAs) are sites within the watershed that have been designated as significant based on natural features. Sites may consist of woodlots containing wetland features that play an important role in supporting significant plant or animal species, areas that serve hydrological functions, or support remnant or threatened flora or fauna species (Ausable Bayfield Conservation Authority 1995). Six ESAs have been identified in the Bayfield North Watersheds (Figure 6) (Table 3).

Table 2: Ecological functions of the Bayfield North Area of Natural and Scientific Interest (Jalava 2004).

Ecological Function	Significance
Hydrology	• Groundwater-supplied headwaters contribute to flow of streams. • Several significant groundwater seepage zones. • Vegetation along streams buffers floods, reduces pollutant loads, provides cool water habitat for temperature-sensitive species. • Several wetland communities present.
Size, Shape, Connectivity	• Part of one of largest and most intact upland/ riparian habitats in Huron County. • Interior habitat supports certain species of birds.
Corridors	• Part of major corridor of western Huron County. • Facilitates movement, genetic exchange, habitat colonization for flora and fauna. • Refuge for migrating land-birds and raptors.
Natural Disturbances (i.e., tree fall, windthrow, tree mortality)	• Contributes to climax community. • Provides habitat.
Habitat	• Provides winter habitat required by deer. • Provides suitable nesting habitat for raptors (e.g., Cooper's, Red-tailed Hawk). • Provides wetlands and ephemeral ponds for amphibian reproduction.
Older Growth Forests	• Provides nutrient cycling. • Provides specialized species habitat.

Table 3: Environmentally Significant Areas in the Bayfield North Watersheds.

ESA Name	Size (ha)	Wetland Size (ha)	Significance
GOD-5-A	173	23	Large forested area and five streams. Species include yellow birch, cedar, red maple and wetland bushes and grasses. Portions are also part of the Bayfield North ANSI.
GOD-6-A	158	42	Large forested area and four streams. Woodlands are moist and act as a natural reservoir. Species include sugar maple, beech, white birch, hemlock, black cherry, white ash and yellow birch. Wetland species include willow, ash, cedar, trembling aspen and elderberry. Portions are also part of the Bayfield North ANSI.
GOD-7-C	38	7	One main watercourse. Recharges surrounding water table and provides water storage for the lower end of Gully Creek. Species include maple, beech, hemlock, and spruce and pine plantations.
GOD-8-C	6	6	Slowly drains surrounding agricultural land. Species include cedar, basswood, maple, trembling aspen, and a pine plantation. Five small retention ponds contain scrub brush, willow and other wetland species - helps attract wildlife and waterfowl.
GOD-9-C	56	8	Species include hemlock, sugar maple, beech, white ash, black cherry, white and yellow birch, mountain maple, poplar, hop hornbeam, blue and American beech. Wetland dominated by trembling aspen and willow.
GOD-10-A (Gully Creek)	260	5	Sandy beaches at the mouth, vegetated sand banks and deeply incised valleys in lower basin, broad valleys and flat topography in headwaters. Includes an extensive pine plantation. Provides excellent wildlife habitat and helps maintain stability in valley walls. Species include maple, beech, white ash, cherry, yellow birch, trembling aspen and willow. Wetlands resemble a fen community with dense cattail and sedge growth.

Community Interests and Issues

At public meetings held in 2007 and 2008, most residents in the Bayfield North Watersheds noted the benefit of not only protecting natural areas, but enhancing them as well. The community seemed to interpret natural areas to include the forested areas and the more recreational areas such as the Lake Huron shoreline and beaches. Some were concerned that conservation of developed lands needed appropriate compensation. Generally, there was an understanding that development should be balanced with the protection of natural areas.

Management Goal:
Protect areas of provincial and regional significance

During the public meetings of 2007 and 2008, residents of the Bayfield North Watersheds noted that protecting natural areas should be a priority. From an economic standpoint, development will occur north of Bayfield. The development should be directed away from areas of provincial and regional significance. Development that does occur in other natural areas (i.e., along the Lake Huron Shoreline and in culturally significant natural areas) should incorporate measures to buffer the development and minimize further forest fragmentation. The natural heritage features of the area north of Bayfield attract people to live and recreate in the area. However, as development occurs it is that very drawing point that may eventually be degraded.

Currently several funding programs exist which provide landowners with some financial aid to make improvements to natural cover. Contact the ABCA for more information (519-235-2610 or 1-888-286-2610).

Development needs to ensure natural areas remain protected

Recommended Actions:

1. **Direct development away from areas of provincial, regional and local significance.**

At the first opportunity the Municipality of Central Huron should strengthen existing land use policies to direct development and site alteration away from areas of provincial, regional and local significance, particularly the Bayfield North ANSI.

2. **Identify culturally significant natural areas.**

It is hoped that this report will help to highlight areas of provincial and local natural heritage. It is recommended that the Bayfield North community provide information about natural areas that are important to their neighbourhood such that this information can be included in future plan reviews.

3. **Create individual Environmental Property Plans.**

Landowners in the Bayfield North Watersheds may wish to take some environmental actions on their property, but may be uncertain of what can be done to protect and enhance the natural environment around them. Staff from agencies such as the ABCA can visit property owners to help them understand their property and point out opportunities to improve the natural environment. Funding opportunities can also be identified to help cover the cost of certain environmental actions.

ANSI residents are encouraged to manage their woodlands for old-growth or older-growth conditions through existing incentive programs (e.g., Managed Forest Tax Incentive Program and the Conservation Land Tax Incentive Program).

4. Protect and enhance ecosystem function on existing developed lands.

Although the Bayfield North Watersheds have close to the recommended amount of forest for ecosystem health (Table 1), we need to protect these areas and explore opportunities to enhance them. This may include increasing forest interior and landscape connectivity. If we aim to have 30 per cent of the watershed in natural area, landowners need to protect natural areas on their properties. Are there opportunities to protect and enhance the natural area on your property? What would 30 per cent look like on your land? If this amount is not possible, are there opportunities to increase the natural area particularly on properties that have less than 10 per cent natural cover?

The amount of natural environment in the Bayfield North Watersheds is one of the main drawing points for people visiting or settling in the area. Trees and natural areas on an individual property not only increase the beauty of the property, but may also increase property value. It would therefore benefit landowners to look into ways of increasing the amount of natural area on their properties. This would also serve to increase the overall amount of natural cover in the watershed.

5. Ensure recreational and rural residential development occurs such that the Lake Huron shoreline and other natural areas remain protected.

Approximately 5 per cent of the Bayfield North Watersheds is currently zoned to support trailer parks, campgrounds, golf courses and lakeshore dwellings. A large portion of this land use type exists along the gullies and lakeshore, and although these areas provide much in terms of recreational opportunities, these environments are extremely sensitive to development and therefore require protection.

In addition to adhering to density guidelines set forth by the municipality, trailer parks and campgrounds should retain as much of the natural environment as possible, and ensure they operate adequately sized and properly functioning septic systems.

Golf courses should also retain as much of the natural landscape as possible with design aspects focusing on protecting water quality and minimizing the need for irrigation. Golf courses should also explore the Audobon Cooperative Sanctuary Program, which certifies golf courses meeting specific environmental criteria.

Those looking to develop lakeshore dwellings should undertake an Environment Property Plan (i.e., Stewardship Guide), which addresses specific lakeshore concerns before and during construction. In fact, all development that falls in the recreational or rural residential category should create an Environment Property Plan, in addition to contacting the Conservation Authority for any formal permissions that may be required.

The Emerald Ash Borer

Identified under the Plant Protection Act by the Canadian Food Inspection Agency (CFIA) as a plant pest, and native to Asia, the Emerald Ash Borer (EAB) was first discovered in Southwestern Ontario in 2002. This insect is considered to be highly destructive, attacking and often killing ash trees (with the exception of the Mountain Ash which is not a true species of ash).

The EAB bores into an ash tree and the larvae feed just below the bark. This feeding process allows the EAB to create S-shaped galleries beneath the bark of the tree (see below). The galleries disrupt the transportation system within the tree, effectively cutting off water and nutrients. A healthy ash tree can be killed within two years of being infected. An adult beetle will typically emerge in the spring and move to further infest the same tree, or begin to infest a nearby ash tree (Canadian Food Inspection Agency 2009).

Although the EAB naturally spreads at a rate of only a few kilometers every year, human spreading of this pest is far more damaging and far-reaching. People can unknowingly transfer this pest to other areas through firewood or other wood industry products.

The EAB has recently been found in the Bayfield North Watersheds, in addition to other locations, and as a result Huron County has been placed under a Ministerial Order. This Order restricts the movement of ash wood or products without special permission from the CFIA. To slow the spread of the EAB, residents of the Bayfield North Watersheds, as well as visitors coming to this area to camp or cottage, must not move any firewood into or out of the area. Anyone violating these restrictions is subject to a fine and/or prosecution.

This infestation is a threat to the Bayfield North Watersheds in two ways. Quarantine in this area will mean a restriction of the flow of certain wood products. This could potentially be damaging to the economy of this area. Additionally, the EAB is an environmental threat. The Bayfield North Watersheds is rich in forested areas, and regenerating forests have many young ash trees. A large infestation could be devastating to the balance of the natural ecosystem, as well as to the tourism and development industries that rely heavily on the beauty of the natural heritage in this area as a drawing feature.

For more information or to check the other quarantined areas of Ontario, please contact the **Canadian Food Inspection Agency**.

forestimages.org

Emerald Ash Borer (EAB)

CFIA

An EAB larvae creating a s-shaped gallery beneath the bark

Aquatics
Groundwater Resources

Groundwater resources have been identified and mapped for the Bayfield North Watersheds in conjunction with the provincial Drinking Water Source Protection initiative (Luinstra et al. 2007).

In specific reference to the Bayfield North Watersheds, both shallow (Former Lake Warren Shoreline Aquifer) and bedrock aquifers are present. The bedrock aquifer is the most common source of drinking water and is part of a large aquifer system in southwestern Ontario. The shallow Holmesville Aquifer is possibly a source of drinking water for dug or bored wells in the area and is most likely a minor source of flow for the small streams and gullies that drain into Lake Huron. In this area, only the deeper bedrock aquifer has been sampled. Nitrate and chloride concentrations are well below provincial drinking water standards and fluoride concentrations are naturally elevated. A thick sequence of mostly fine-grained glacial sediment separates the small streams and gullies from the bedrock aquifer in this area (Veliz et al. 2006).

Several municipal wells provide water to approximately 180 residences along the lakeshore areas of the Bayfield North Watersheds, which include the Van de Wetering, Dundass and SAM wells (Luinstra et al. 2007) (Figure 7). Remaining residences are supplied by private wells, or may be supplied by Lake Huron surface water intakes closer to Goderich and Bayfield.

As part of the Ausable Bayfield Maitland Valley Drinking Water Source Protection Region, Wellhead Protection Areas (WHPAs) have been modeled from the Wellhead Protection Area Delineation Project (WNMC 2009). These WHPAs reflect the time required for water to move to the well from different areas of the aquifer, and may be divided into 100 metre, 2 year, 10 year and 25 year time-of-travel zones. The entire region was also mapped according to provincial specifications for significant groundwater recharge areas (Figure 7). Recharge areas are areas in which aquifers are being replenished by surface waters at a higher rate than the regional average. Since these areas provide a connection to the otherwise well-protected groundwater, it is important to protect these areas through the protection of the surface waters that replenish them (Luinstra et al. 2007, Assessment Report for AB SP Area 2010).

As a result of these groundwater studies and modeling for the Source Protection Region, the Bayfield North Watersheds area has been identified as an area that requires a more detailed examination of groundwater quantity. Further studies are currently being conducted, but as of yet no conclusions are available. As this data becomes available it will be reported to the community.

Baseflow Study

In the summer of 2007 a reconnaissance study was undertaken by the ABCA to determine which gullies continue to flow into Lake Huron during periods of dry conditions. Each gully was checked at the Highway 21 crossing. Of the major gullies in the Bayfield North Watersheds,

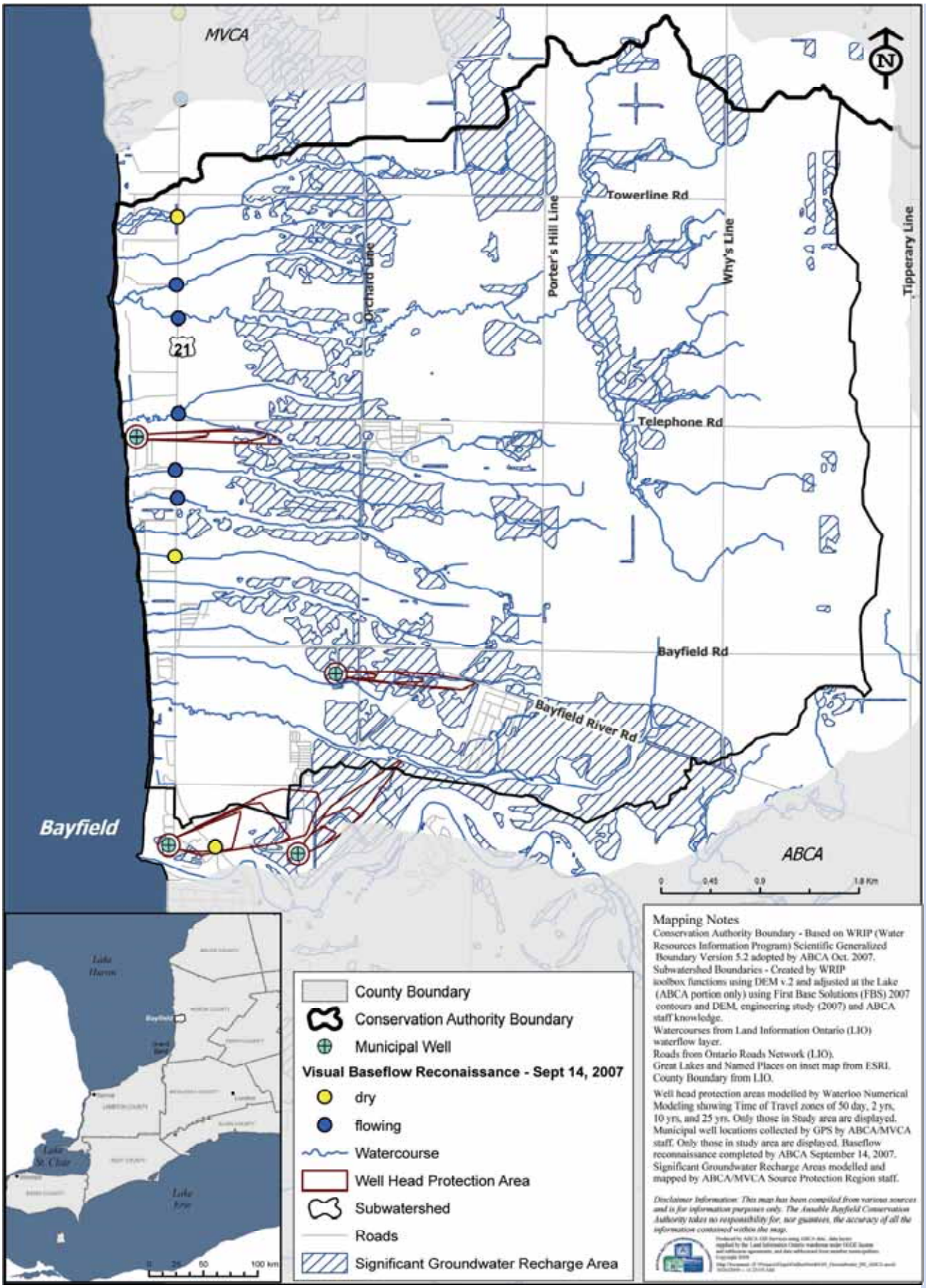


Figure 7: Significant Recharge Areas, Municipal Wells, and Wellhead Protection Areas of the Bayfield North Watersheds

only two were dry (yellow dots on Figure 7). Every other stream was still flowing to some degree, despite the very dry summer of 2007. During the summers of 2008 and 2009, baseflow measurements continued at five sites in this area.

Community Interests and Issues

When posed with the question of what concerned the community living north of Bayfield, issues of both drinking water quality and quantity were brought forward, along with the problem of potential long-term pollution of the groundwater systems. Additionally, some expressed concern over the lack of water conservation initiatives taken in the community.

The quality of drinking water is good at the present time, however, it does take mindful individual responsibility to ensure that the groundwater sources remain as such. In addition, the groundwater could be exposed to small amounts of contaminants that build up over time, causing a slow deterioration of the water quality.

Management Goal:
Protect groundwater resources

As part of the Drinking Water Source Protection initiative, a plan is being developed and over the next few years will be put in place with the intent of protecting drinking water from municipal sources (i.e., municipal wells) and surface water intakes. This program will include the municipal wells that are in use within the Bayfield North Watersheds as well as the Port Blake and Goderich intakes, and will focus on limiting and reducing potential threats to the groundwater supply.

Additionally, the ABCA will continue to offer assistance to landowners who wish to take an active role in protecting the groundwater resources of the Bayfield North Watersheds. Assistance will be both technical expertise and in many cases financial assistance through various incentive programs.

Recommended Actions:

There are actions that all landowners in the Bayfield North Watersheds can take to ensure the groundwater supply remains clean and plentiful.

1. **Maintain your private septic system.**

Without regular pumping and maintenance, septic systems can fail and thus allow contaminants to seep out of the tank and weeping bed, and percolate down toward the shallow aquifers. The tank should be pumped by a licensed contractor as required (usually every 3-5 years). In addition the tank should be opened and inspected every two years to ensure the baffles are in place and the tank is functioning properly. It is also a good idea to examine the tile bed for any saturated or soggy spots. Practice water conservation measures (e.g., low flow toilets, showerheads) to prevent overloading the tank, and limit the use of household drain solvents, cleaners and bleach, which can negatively impact the function of the septic system.

2. **Protect current wells and decommission abandoned wells**.

Water wells also provide a direct pathway to groundwater systems, both shallow and deep, depending on the situation of the well. If a well is not properly maintained, contaminants spilled near a well might enter the well through cracks or imperfections, and eventually pollute the groundwater for surrounding landowners. Contaminants can also enter a well through an improperly sealed well cap. Additionally, the seal around the casing of a well can degrade and allow pollutants to enter into the aquifer. Wells that are no longer in use often fall into disrepair after several years. These wells should be properly decommissioned and sealed to cut off access to the groundwater.

Aquatics
Surface Water Quality

Monitoring

Prior to 2007, surface water quality monitoring in the Bayfield North Watersheds was based on biological sampling with benthic macro-invertebrates. Sampling the benthic (i.e., bottom-dwelling) animals is a commonly used method to determine aquatic environmental quality. Benthic macro-invertebrates are animals without backbones and include organisms such as fly larvae and worms. Each benthic macro-invertebrate species has a different tolerance to environmental stressors and/or pollutants. Thus, the presence and abundance of benthic macro-invertebrates at a given site reflect the environmental quality at that site. The presence of pollution-intolerant species generally indicates a healthy aquatic environment, while pollution-tolerant species are generally found at impaired sites (Veliz et al. 2006).

Benthic sampling has occurred at Gully Creek where it crosses Highway 21 (Figure 8). Gully Creek has been monitored since 2001 on an alternating year schedule (i.e., 2001, 2003, etc.). In order to use the benthic macro-invertebrates collected from this location to derive an environmental quality score and water quality grade, a modified version of Hilsenhoff's (1988) Family Biotic Index, or FBI, (Mandaville 2002) was employed (Table 4). Results from the benthic macro-invertebrate sampling at Gully Creek indicated healthy water quality when compared to the average FBI value in the general ABCA watershed area (Table 5).

Table 4: Surface water quality scoring grid for benthic invertebrates.

Benthic Score (modified from Hilsenhoff 1988)	Grade
<4.25	A
4.26-5.00	B
5.01-5.75	C
5.76-6.50	D
>6.51	F

Briggs et al. 2003

Table 5: Benthic invertebrate scores for Gully Creek (2001, 2003, 2005, 2007) and the average score from the entire ABCA watershed (2000-2005).

Year	Benthic Score	Grade
2001	3.55	A
2003	4.83	B
2005	4.27	B
2007	5.15	B
Gully Creek Average	**4.45**	**B**
ABCA Average	**5.60**	**C**

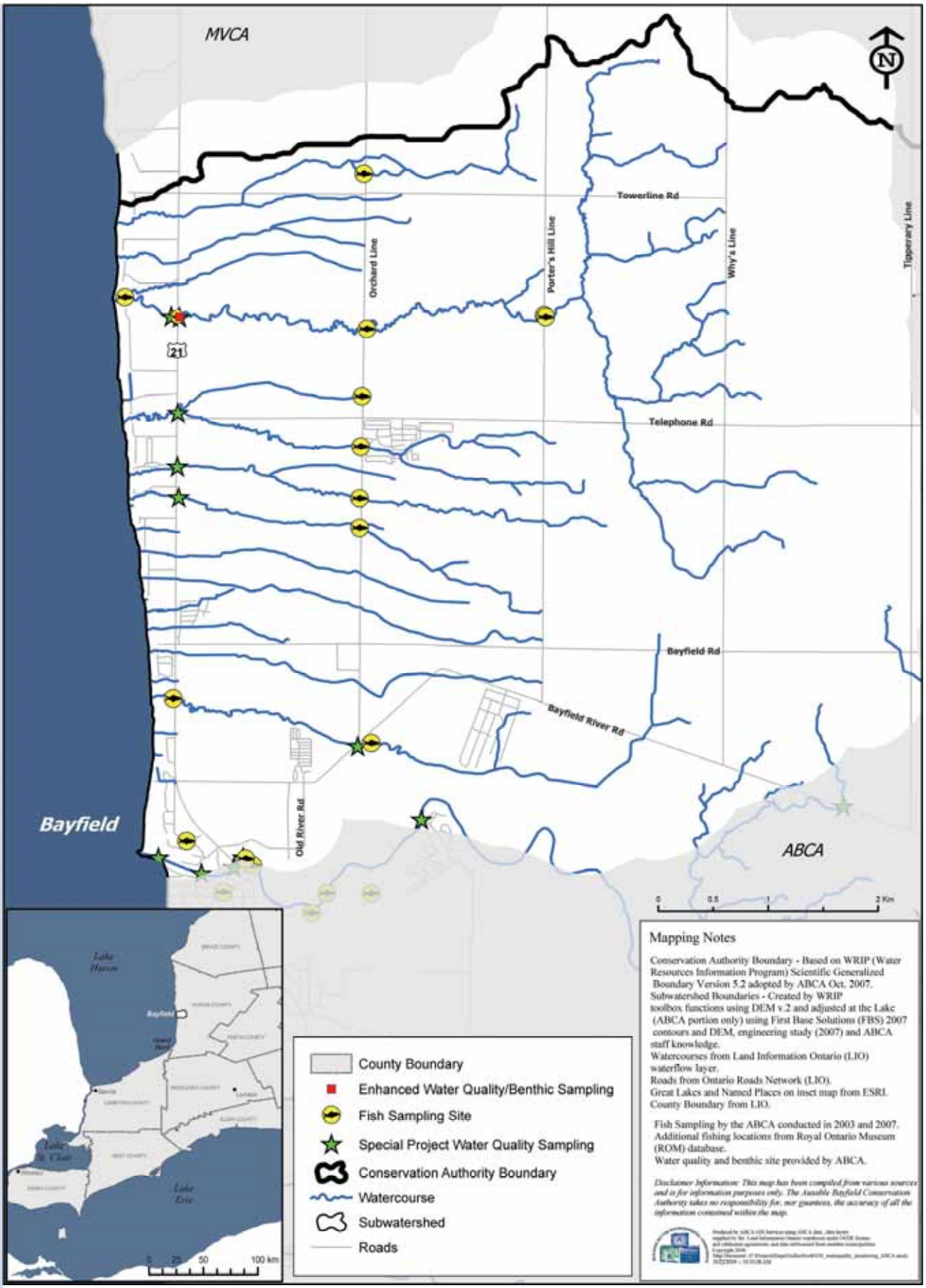


Figure 8: Water Quality Monitoring and Fish Sampling Sites in the Bayfield North Watersheds

Current Monitoring

Beginning in 2007, in addition to the benthic macro-invertebrate sampling at Gully Creek at Highway 21, water quality monitoring began. Monthly grab samples were collected between April and November and were analyzed for the following indicators: total phosphorus, total dissolved phosphorus, total ammonia, nitrate, nitrite, total Kjeldhal nitrogen (TKN), total suspended solids (TSS), and *Escherichia coli* (*E. coli*). In addition to these indicators, temperature, pH, conductivity, dissolved oxygen, and total dissolved solids (TDS) were also measured using a YSI multi-parameter probe. This sampling will continue as a part of the ABCA enhanced water quality program.

In 2008, four additional sites were added (Figure 8). These sites were tested twice per month for *E. coli*, as well as the indicators measured by the YSI multi-parameter probe. The addition of these sites was in response to community interest for more information. These sites were also sampled in 2009.

The 2007-2009 water quality data for Gully Creek demonstrates that bacteria and some nutrient concentrations are greater than the objectives established to protect aquatic health (Table 6). Although some water quality indicators suggest Gully Creek has better conditions than the ABCA area, there is still room for improvement to meet aquatic health objectives. In particular, concentrations of nitrate and *E. coli* could be reduced.

Table 6: Water quality indicators, objectives and results from 2007 - 2009 sampling at Gully Creek (geometric mean for *E. coli*, 75th percentile for total phosphorus, mean for other indicators) and the ABCA watershed average (PWQO - Provincial Water Quality Objective; CWQG - Canadian Water Quality Guideline).

Indicator	Gully Creek 2007-2009	ABCA 2000-2005†	Objective/ Guideline	Reference
E. coli (cfu/100mL)	243	233	100	PWQO
Total Phosphorus (mg/L)	0.03	0.08	0.03	PWQO
Dissolved Phosphorus (mg/L)	0.009	-	-	-
Total Ammonia* (unionized) (mg/L)	0.001	-	0.019	CWQG
Nitrate (mg/L) as Nitrogen	3.89	-	2.93	CWQG
Nitrite (mg/L) as Nitrogen	0.43	-	0.06	CWQG
Total Kjeldhal (mg/L) as Nitrogen	0.57	-	-	-
Total Suspended Solids (mg/L)	17	-	<80	European Inland Fisheries Commission - for maintaining good fisheries

† This data is routinely collected, however it is typically summarized for subwatersheds and not for the entire ABCA watershed. *Effects of unionized ammonia concentrations are dependent on pH and temperature.

Community Interests and Issues

Improved surface water quality is the most important community concern that also has implications for the broader Lake Huron ecosystem. The conclusions from the water quality indicators collected in this subwatershed suggest conditions could be improved. Rural non-point source water pollution comes from many sources which vary both temporally and spatially. Improvements to water quality are therefore best identified and acted upon by individual landowners. Because land treatment must be targeted to areas where improved management will have an effect, consultation with local agencies helps to ensure that well-intentioned efforts will help to meet watershed objectives. It should also be recognized that improvement will take time, as it is often many poor practices that add up and contribute to poor water quality.

There are two main issues that the community identified as issues of concern for water quality: bacterial pollution and erosion.

Bacterial Pollution

There is concern over faulty, unmaintained and under-sized septic systems. Such systems can pool on the surface and run off into the gullies, or leach into the groundwater and contaminate drinking water sources. Septic systems may contribute to bacterial pollution considering the number of septic systems, the age of these septic systems, the increase in water usage, and the increase in lakeshore dwelling usage.

Another concern that was raised is agricultural runoff flowing into water courses. This runoff could result from the improper storage and inappropriate field application of animal waste.

In addition to bacterial pollution, chemicals can also make their way into waterways. Runoff and spills from improperly stored chemicals and fuels also negatively impacts water quality, as does the improper usage of pesticides and artificial fertilizers.

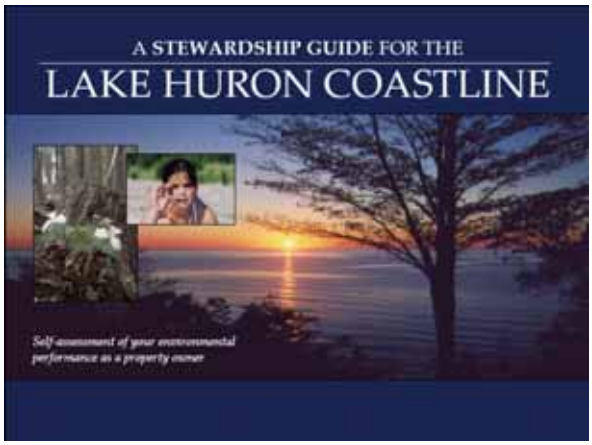
Erosion

Erosion is another cause of concern for water quality because it contributes to siltation in the gullies, and increases nutrient concentrations since phosphorus binds to soil particles. The Bayfield North Watersheds area has many gullies flowing directly into Lake Huron. Due to the highly erodible nature of the soil and the steep bluffs at the lake, the gullies have carved steep banks to reach lake levels.

It should be noted that there is a certain amount of natural erosion in this area, however, there is also erosion that is exacerbated by human activity. One example is erosion caused by land-clearing. When vegetation is removed from the land, the soils are exposed and are more susceptible to erosion by both water and wind. Allowing heavy equipment or livestock near stream banks can also cause erosion, which will cause higher amounts of sediment to be present in the water courses. Additionally, the use of ATVs for both work-related and recreational activities can cause erosion. This can be seen along the gullies, as well as in the dunes and beaches at Lake Huron. For further information on erosion, see pages 33-38.

Management Goal:
Improve water quality

Environmental stewardship is the primary way in which surface water quality can be maintained and improved. The Bayfield North Watersheds community expressed the need for education about stewardship practices that can be put into place. In accordance with this direction, the ABCA will continue to offer workshops and community events to continue to educate the public about good stewardship practices. Workshops in the past have focused on the Rural Landowner Stewardship Guide and the Stewardship Guide for the Lake Huron Coastline.



The stewardship guides (top and middle) and the Environmental Farm Plan help landowners create environmental property plans

Additionally, stewardship programs, such as the Huron Clean Water Project and the Ontario Environmental Farm Plan, exist to help finance landowners who undertake various stewardship activities. Contact the ABCA for more information (519-235-2610 or 1-888-286-2610).

Water quality monitoring will continue at five sites in 2010, as well as benthic invertebrate monitoring in Gully Creek, as a part of the ABCA enhanced water quality program. This allows for tracking changes to the water quality over time, which is important to assess land activities.

Recommended Actions:
As poor water quality is often due to an accumulation of many small sources of pollution, there are many actions that can help to make improvements.

1. Create individual Environmental Property Plans.

Environmental Property Plans can help a landowner identify ways that they can help the natural environment including:

A) Proper manure/chemical/fuel application and storage.

- Apply manure/fertilizers at rates and times to optimize uptake of nutrients and prevent runoff.
- Monitor tile outlets for contaminants during and following application, and implement spill contingency plan if necessary.
- Ensure manure storage facilities are adequate and properly functioning.
- Keep records; develop a nutrient management plan.

Proper chemical and fuel storage tanks are also important. Old tanks can often develop cracks and cause the contents to leak out. Proper maintenance of these tanks will prevent this from happening.

Also, it is important that tanks are placed away from any potential pathways into surface water systems.

B) Maintain your private septic system.

Without regular pumping and maintenance, septic systems can fail and thus allow contaminants to seep out of the tank and weeping bed, and percolate down toward the shallow aquifers. The tank should be pumped by a licensed contractor as required (usually every 3-5 years). In addition the tank should be opened and inspected every two years to ensure the baffles are in place and the tank is functioning properly. It is also a good idea to examine the tile bed for any saturated or soggy spots. Practice water conservation measures (e.g., low flow toilets, showerheads) to prevent overloading the tank, and limit the use of household drain solvents, cleaners and bleach, which can negatively impact the function of the septic system.

C) Protect stream banks from erosion.

There are several ways that stream banks can be protected. Creating buffers and vegetated areas along the watercourses will prevent the soils directly around them from eroding into the water. The vegetation also helps filter sediment and pollutants from land runoff. Additionally, grazing livestock should be fenced out of watercourses. Not only will this help prevent the livestock from directly contaminating the water through fecal matter, but it will also protect the soils directly along the bank that can erode with high livestock activity.

D) Create areas to hold water.

Creating small wet areas in the uplands is another good way of reducing erosion in watercourses. Wetlands will hold back water from running off directly into watercourses, and therefore prevent surface runoff erosion. They also provide a natural filtration system against pollutants and sedimentation. In addition, wetlands will hold back water during large rain events and prevent water from rushing into the streams and gullies; the natural erosion that occurs with high waters will not be as damaging to the banks. There is good opportunity to develop wetlands in this area; currently 3% of the area is wetland and there is potential for 7% of the area to support wetlands.

ABCA staff work with property owners to improve and protect water quality and increase natural cover

Fencing out livestock promotes vegetation growth along streams and prevents erosion

Aquatics
Fisheries and Fish Habitat

With the exception of Gully Creek, the majority of the gullies that flow into Lake Huron in the Bayfield North Watersheds provide warm water fish habitat. Fish surveys conducted by various agencies have reported at least 18 different species within the Bayfield North Watersheds (Table 7), including two species at risk, the endangered redside dace (*Clinostomus elgonatus*) and the threatened black redhorse (*Moxostoma duquesnei*) (above).

Until recently these fish surveys have largely focused on Gully Creek. More recent surveys however have been undertaken by the ABCA (Neary and Veliz 2007) and a graduate student at the University of Toronto (Drake 2007, pers. comm.) with the ABCA survey focusing largely on streams other than Gully Creek (Figure 8). Although the ABCA survey (2007) indicated a relatively low diversity in the streams that were sampled, these surveys, along with the

Table 7: Fish species present in the Bayfield North Watersheds.

Species	Source†
Black Bullhead	ABCA 2003
Black Redhorse	ABCA 2003
Blacknose Dace	ABCA 2003, 2007, Drake 2007
Bluntnose Minnow	ABCA 2003
Brown Trout	ABCA 2003
Common Shiner	ABCA 2003
Creek Chub	ABCA 2003, 2007, Drake 2007
Cyprinid Species	ABCA 2007
Fathead Minnow	ABCA 2003, 2007
Finescale Dace	ABCA 2003
Largemouth Bass	ABCA 2003, 2007
Mottled Sculpin	ABCA 2007, Drake 2007
Northern Redbelly Dace	ABCA 2007
Rainbow Trout	ABCA 2003, Drake 2007
Redside Dace	MNR 1980, Gibson 2001, ABCA 2003, Drake 2007
Rock Bass	ABCA 2003, 2007
Smallmouth Bass	ABCA 2003
White Sucker	ABCA 2003, 2007, Drake 2007

†ABCA 2003 – unpublished fish survey results; ABCA 2007 – Neary and Veliz 2007; Drake 2007 – pers. comm.; MNR 1980 and Gibson 2001 – from COSEWIC 2007.

survey undertaken by Drake (2007), did provide some noteworthy results. Firstly, mottled sculpins (*Cottus bardii*) were found in Gully Creek and the gully just north of the Bayfield River. These observations are of particular interest as mottled sculpins have been found to flourish in clean, cool water and decrease in numbers in the presence of silts, pollution and disturbance (Trautman 1981 in Neary and Veliz 2007). Mottled sculpins have also been considered 'trout indicators' since trout are generally present where there are sculpins (Mayhew 1987). Secondly, the northern redbelly dace (*Phoxinus eos*) and fathead minnow (*Pimpephales promelas*) were observed in the 2007 ABCA surveys. These fish are not commonly observed within the ABCA jurisdiction, and therefore highlight the importance of all the gullies in contributing to the overall species diversity of the ABCA watersheds (Neary and Veliz 2007).

Community Interests and Issues

Most of the concern for fish habitat centres around erosion issues. Increased erosion on land and along stream banks can cause sedimentation in the streams. This increase in sediment can be detrimental to many aquatic species, especially species at risk.

One cause of increased sedimentation is increased traffic along the stream banks. Many community members in the Bayfield North area noted that all-terrain vehicles (ATVs) and snowmobile use has increased in the past few years, most notably along streams and gullies. These recreational vehicles can cause permanent damage to vegetation and increase the amount of erosion, thus increasing the amount of sediment in the water. Other contributions to erosion can be found on page 26.

Another concern regarding the health of fish habitat is the temperature of many streams in the Bayfield North Watersheds. Only portions of some of the gullies are classified as cold water streams. These types of streams are particularly important for several at risk fish species, such as the redside dace. These streams need to be kept cool in order to provide habitat for these species.

Management Goal:
Enhance fish habitat by reducing stream temperature, bank erosion, and stormwater flow

Mottled sculpin (left) and northern redbelly dace (right) found during ABCA fish surveys

Landowners and community members need to work together to limit the amount of activity along the stream banks. They also need to employ technologies that will reduce the amount of stormwater runoff. Agencies like the ABCA will also continue to promote good stewardship practices that will work toward a healthy fish ecosystem.

Recommended Actions:

Some erosion is natural, and cannot be stopped by human means. However, there are actions that landowners can take to prevent more serious erosion and contribute to the health of fish habitats. Additionally, methods and tools can be employed to help improve habitat quality for sensitive fish species. For instance, the municipality needs to ensure drainage projects are designed to create habitat features and mitigate any negative impacts to water quality or habitat.

1. **Limit use of recreational vehicles and equipment on stream banks.**

If recreational vehicles, such as ATVs and snowmobiles are causing erosion along stream banks, then limiting their use will result in less erosion. In turn, less erosion will result in less sediment in the water. The same is true for agricultural equipment. This is not something that can be easily monitored by authorities. Therefore, landowners must monitor vehicle use for their own properties.

Damage to property and the environment has resulted in a process in the County of Huron designed to address the issues involved with the use of ATVs and other off-road vehicles. The Strategic Management of ATVs in the County of Huron (SMACH) committee is comprised of government, agency and organization representatives, and provides a forum for the communication of community concerns. At the present time the Municipality of Central Huron does not have a by-law regarding ATV use and as such these vehicles are not allowed on municipal roads.

2. **Reduce stream water temperatures.**

One strategy to enhance fish habitat is to reduce the temperature of streams. Vegetation along stream banks will help reduce temperatures by providing a shady and protected environment. Additionally, preventing excessive amounts of soil and nutrient runoff from entering the stream can also help to improve habitat.

3. **Begin to employ low impact development techniques.**

Development in the Bayfield North Watersheds is important from a socio-economic standpoint. However, if done without regard for fragile natural systems such as the gullies, there can be negative long-term consequences

Low impact development technologies aim to reduce stormwater volume, and keep that stormwater out of streams and rivers. Some examples of these technologies include green roofs and rain gardens to retain water, ‘rainwater harvesting’ through rain barrels, and green parking lots that use permeable and semi-permeable materials that allow stormwater to percolate through the soil. For the most part, these technologies are not overly expensive, and go a long way to improving the effectiveness of stormwater retention programs.

The Redside Dace - A Species at Risk in Ontario

The Bayfield North Watersheds, and more specifically Gully Creek, provide habitat for the redside dace - a small minnow that typically inhabits cool, clear streams with gravel or stony substrates (Scott and Crossman 1988). Redside dace prefer headwater streams exhibiting overhanging streamside vegetation with both pool (resident) and riffle (spawning) habitat (Parker et al. 1988, Holm and Crossman 1986).

The Redside Dace Recovery Strategy (Redside Dace Recovery Team 2009) lists the following characteristics of preferred redside dace habitat:

- Slow moving sections of streams with both riffles and pools
- Overhanging vegetation
- Boulders, rocks, gravel or sand substrates
- Clear water
- Water temperatures less than 24°C

Designated as 'endangered' by both COSSARO (Committee on the Status of Species at Risk in Ontario) and COSEWIC (Committee on the Status of Endangered Wildlife in Canada), the predominant threats to this species are habitat alterations. Removal of streamside vegetation, erosion, increased siltation and temperature, baseflow alterations, channelization, and agricultural, domestic and industrial inputs all threaten the already limited distribution of the redside dace (Parker et al. 1988, COSEWIC 2007). Additionally, increased urbanization may have a negative impact as urban runoff can create significant changes in the quality and temperature of stream water (Parish Geomorphic Limited 2004).

The redside dace, and other aquatic species, are protected under the Endangered Species Act (ESA 2007). If you are conducting work in or around water on your property, please contact the Ontario Ministry of Natural Resources as you may require an Endangered Species Act permit.

Redside Dace

Land Management
Types of Erosion

Erosion is the deterioration and wearing away of soil by water or wind. Often this is a slow process that occurs over several years or decades. However, there are extreme cases when erosion can occur very quickly and can be very damaging.

The gullies within the Bayfield North Watersheds are a prime example of high rates of erosion. A study done by the Ontario Ministry of Natural Resources (MNR) and the ABCA in the early 1980s shows that gully erosion was a problem at that time as well, and had been occurring for many years prior. While a few gullies proved to be relatively stable, many showed active erosion (Ontario Ministry of Natural Resources 1980). This observation was supported by another study which measured erosion rates of the gully head walls ranging from 0.10-2.28 m/year (Reinders 1989). Some of the erosion in this area is natural due to the clay and sand soils and the steep gradient to Lake Huron, however, some erosion is also exacerbated by human activity.

Types of Erosion

Lake Erosion

Sand dunes are a common natural feature along the shoreline of Lake Huron, however, they occur less frequently in the Bayfield North Watersheds area. Dunes are highly susceptible to erosion as they are comprised of light sand that can easily be carried away with water or wind. Human activity can be harmful to the dunes. Motorized vehicles can quickly damage dune plants, leaving the sand exposed. Similarly, the removal of dune grasses and plants for aesthetic purposes leaves the sand exposed.

Unstable slopes along the lakeshore are also easily eroded. During periods of intense or prolonged rainfall, water can rush down the bluffs and slopes causing high amounts of erosion, or even creating small gullies. When the lake levels are high, wave action can also cause erosion on the unstable slopes.

Lake and gully erosion

Generally, sediment created through the erosion of bluffs north of Grand Bend and south of Goderich, Ontario contributes to the sand beaches and dunes from the Grand Bend area to south of Port Franks. It is recognized that the dynamic nature of the shoreline processes presents erosion problems for existing cottage areas near the bluffs. As with provincial policy, the Ausable Bayfield Conservation Authority Shoreline Management Plan (2000) recommended that new development be restricted to landward of the 100-year erosion setback. Further, the plan recognized that erosion can be accelerated at the lakeshore by

Land Management
Causes of Erosion

increased development or more intensive agriculture, both of which can focus water to unstable bluff areas or gullies.

Gully Erosion
Erosion along the gullies in the Bayfield North Watersheds is very prevalent. Two main types of gully erosion have been observed in the past:

1. Water flowing over the head of a gully can cause back-cutting and erode the bank. This can cause the gully to lengthen and cause small side gullies to form.
2. Runoff and seepage along the sides of a gully can cause sheet and rill erosion along the banks (Ontario Ministry of Natural Resources 1980).

The gully slopes in the Bayfield North Watersheds are much like those near the lakeshore. Many of the gully slopes and stream banks are unstable and highly erodible.

Gully erosion

Upland Erosion
In the headwaters of the Bayfield North Watersheds erosion occurs on land in different ways. This area is mainly comprised of large open fields, which are susceptible to erosion from both wind and water. Wind will blow loose soils across the fields, causing it to settle in other areas or in streams. Similarly, in times of intense or prolonged rainfall, water will often take the same path along the open land causing the soil in these areas to be washed away.

Upland erosion

Causes of Erosion
Just as there are many types of erosion, causes of erosion vary as well. One of the main causes of erosion is the removal of vegetation off the land and near gullies. Vegetation is removed most often for agricultural purposes or for development of the area. A lack of vegetation means that there are very few plant roots to hold the soil in place, absorb moisture, or act as protection against the elements. Exposed soil dries in the sunlight, and can be moved more easily by wind and runoff. Little vegetation also means that the velocity of the water runoff will increase, as there are no barriers to slow it down. This will, in turn, allow more water into the gully at

a faster rate, increasing the water's chance of cutting into the stream bank. Lawns that are cut too close to a gully or livestock paths near streams can have a similar effect.

The greatest erosion occurs with increased or accelerated drainage. During rain events or a spring snow-melt, the amount of water running off the land increases considerably. Due to the increase in volume, the velocity of the water also increases. This will not only cause erosion as the water travels across the land, but will cause accelerated flow in the gullies, increasing the potential for bank erosion. Erosion potential depends on several factors including soil type, slope, and the location of the stream in relation to the toe of the bank.

Garbage, debris and yard wastes can also have an effect on the rate of erosion. If left, some debris can cause vegetation to die off, making the soil more prone to erosion. Additionally, it can cause water to be diverted and cut into stream banks (Ontario Ministry of Natural Resources 1980).

The improper maintenance of erosion control structures can exacerbate erosion as well. Many control structures can be expensive to both build and maintain. If not properly designed and cared for, such structures can fail with water cutting new paths and gullies by eroding the soil.

Development can also put pressure on sensitive gully banks. Homes built too close to the edge of a gully on unstable slopes may be susceptible to soil movement. Additionally, the surfaces near the gully become hardened, increasing the amount and velocity of water runoff.

Policies of the province, the municipalities, and of the local conservation authorities are intended to direct development or site alteration away from those areas which have been identified as naturally hazardous.

In the Bayfield North Watersheds region, areas which have been identified as hazardous/sensitive are regulated under the Conservation Authorities Act by the ABCA (Figure 9). Formal permission of the ABCA may be required to undertake activities within these areas or in close proximity to them.

Please contact the Authority to discuss your proposed activities within these areas. The ABCA has extensive experience in managing erosion, flooding and other natural hazards and can provide advice for your proposed project.

Community Interests and Issues

Many residents of the Bayfield North community expressed concern at the amount of erosion that they see along the gullies on a regular basis. As seen in the previous sections of this plan, erosion is a concern as it affects many different aspects of an ecosystem.

Certain agricultural practices can leave soil more prone to erosion, while many residents who live along ravines can face the threat of erosion as it continues to eat into their property. Lakeshore residents perceive this threat along both the gullies and Lake Huron. Many residents also see the threat to fish species that live in the gullies north of Bayfield. Increased erosion means increased sediment in the water, limiting the number of species that can live in that habitat. Furthermore, nutrients can also bind to sediment, which can cause downstream algal problems.

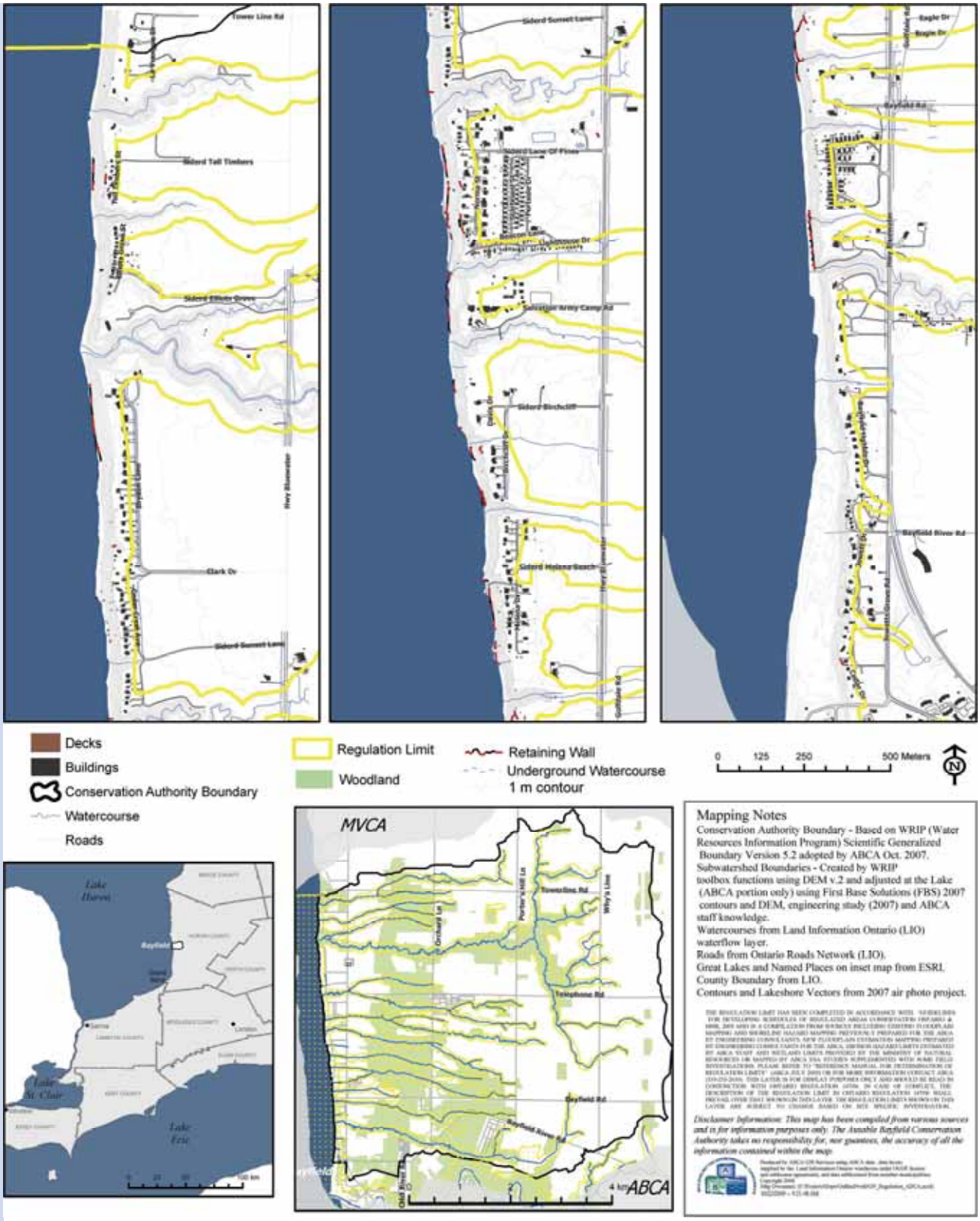


Figure 9: ABCA Regulation Limit along the Shoreline and Gullies of the Bayfield North Watersheds

Management Goal:
Prevent excessive erosion along the lakeshore, ravines and on land

As mentioned previously, it is not possible to stop all erosion. Wherever water flows there will always be some natural erosion. However, it is possible to prevent excessive amounts of erosion and to slow the processes down.

There are actions that landowners can take on their properties to help prevent erosion. The best way to identify these opportunities is through creating Environmental Property Plans. In this way, erosion issues can be identified and landowners can take appropriate measures to correct the problem. In some instances landowners may need to work with agencies, such as the ABCA, to identify the problem areas and find effective solutions.

Recommended Actions:

1. **Create individual Environmental Property Plans.**

Landowners can only tackle erosion problems if they are aware that they exist. Creating a property plan (e.g., Environmental Farm Plan or Stewardship Guide) will help landowners identify areas where they can take action against erosion. Once issues are identified, there are several approaches that landowners could take:

A) **Vegetative Control** – Landowners can establish permanent erosion-resistant land-cover. Vegetation will hold the soil together, provide absorption, provide protection from the elements, slow the velocity of water, and is relatively inexpensive. It is also aesthetically pleasing. However, a good ground-cover can take time to establish properly. Vegetative control can also be used in open fields. In cropped agricultural headwaters consider no till, cross slope tillage and grassed waterways.

An ABCA staff member showing the benefits of a grassed waterway

B) **Structural Control** – There are several different types of man-made structures that can help with erosion issues. When working in or around water, these structures will possibly need to be engineered and will require a permit from one or more agencies in some instances. In areas of residential development more consideration needs to be given to holding water on individual properties. Techniques such as using rainwater barrels, rain gardens, and vegetated swales may be important. Some landowners have also used tiles and culverts to divert water either directly into the gully without eroding the banks or directly to the lake, avoiding the gully altogether. Berms and grassed waterways can be useful in the upland reaches. Regardless of which method used, structural controls are only effective if they are planned correctly, properly constructed and well maintained (Ontario Ministry of Natural Resources 1980). The ABCA, in partnership with landowners, would like to undertake a study to examine the effectiveness of WASCoBs (Water and Sediment Control Basins) on reducing sediment delivery to waterways.

2. Monitor your property for disturbances causing erosion.

Even after landowners have created an Environmental Property Plan, it will be necessary to continue to monitor their properties for new erosion concerns that might arise. It is best to tackle these problems while they are relatively small than to wait until the problems have escalated. Landowners should also monitor any outside disturbances, such as recreational vehicles on their land, that could exacerbate erosion.

3. Make use of planning tools to establish protocols for development.

In accordance with the Shoreline Management Plan (Ausable Bayfield Conservation Authority 2000) the following recommendations are important for the shoreline area:

- Protect and enhance the existing limited vegetation near gullies and lake banks;
- Develop a surface drainage plan and/ or stormwater management plan to ensure safe outlet (i.e., the toe of the lake bank or bottom of the gully) for any redevelopment or development plans;
- Employ setbacks from the bluff or dynamic beach feature in new development (and redevelopment).

Bayfield North Watersheds residents with the garbage collected from a gully clean up event (left) and learning about the importance of woodlots (right).

Concluding Remarks

During the development of this plan there have been workshops and watershed tours to explain the importance of rural beneficial management practices that hold water, and reduce sediment and nutrients at the seemingly insignificant sources. Over 30 projects have been completed or initiated in this 40 km^2 area since the planning process began in 2007. Funds from the Ministry of Natural Resources Canada-Ontario Agreement have supported on-the-ground tree planting and stream bank restoration projects. Local agencies will continue to support environmental projects from the community and we look forward to submitting our recommendations to the Municipality of Central Huron for incorporation into their Official Plan Review process.

The recommended actions listed throughout this report are summarized at the end of this document (Table 8), however, they are by no means an exhaustive list. There are many steps that landowners and agencies can take to protect and enhance the natural landscape, while ensuring the economic viability of this area.

Four key actions to take into consideration by all stakeholders in the Bayfield North Watersheds include:

1. Strengthen the Central Huron Official Plan policies to direct development away from areas of provincial, regional and local significance, and ensure that future development have regard for natural systems.
2. Create individual Environmental Property Plans.
3. Focus efforts on preventing downstream erosion.
4. Increase natural cover in areas that typically have lower vegetative cover.

By focusing on these basic actions, the residents of the Bayfield North Watersheds will continue to protect and be on their way to enhancing this unique corner of the province

Ausable Bayfield Conservation Authority staff teaching local Scouts about erosion control techniques (left); Bayfield North Watersheds residents increasing the natural cover and reducing erosion on their property (right).

Table 8: Management options for agencies and individuals in the Bayfield North Watersheds to take action on the landscape.

	Recommended Management Approach	Recommended Actions: Agencies	Recommended Actions: Individuals (Environmental Property Plans will help you identify actions to protect terrestrial and aquatic resources)
Natural Areas	Protect areas of provincial and regional significance	• Strengthen Central Huron Official Plan policies to direct development away from natural areas (i.e., Bayfield North ANSI). • Coordinate existing land use policies with recommendations. • Promote funding programs and opportunities. • Assist landowners with Environmental Property Plans.	• Identify culturally significant natural areas. • Create individualized Environmental Property Plans. • Protect and enhance ecosystem function on existing developed lands: • Compare current property natural cover per cent to broader ecosystem goals (30% natural cover of a watershed) and determine where it might be possible to enhance natural cover on your property (Contact the ABCA at 519-235-2610 or 1-888-286-2610).

Groundwater Resources	Protect groundwater resources	• Support actions developed by Drinking Water Source Protection which may include:
		  • Limiting chemical use around drinking water areas.
		  • New development or changes in practice should assess water usage.
			• Maintain your private septic system (orwc.uoguelph.ca).
			• Maintain current wells and decommission abandoned water wells (wellaware.ca or wellwise.ca).
			• Those that have property within the two year time of travel of a municipal water well may wish to be more involved in the Drinking Water Source Protection planning process (sourcewaterinfo.on.ca).
			• Assess current water consumption and adopt water conservation practices (theguide.huronstewardship.on.ca).

Surface Water Quality	Improve water quality	• Promote best management practices for all property types.
		• Develop Environmental Property Plan program.
		• Promote funding programs and opportunities.
		• Continue water quality monitoring.
			• Create individualized Environmental Property Plans:
			  • Proper manure/chemical/fuel application and storage.
			  • Maintain your private septic system.
			  • Protect stream banks from erosion.
			  • Identify and create areas to hold water.

Fisheries and Fish Habitat	Enhance fish habitat by reducing stream temperature, bank erosion, and stormwater flow	• Assist landowners in developing riparian areas along streams. • Identify areas of high erosion and help to establish erosion control measures. • Recognition of ABCA endorsed stormwater management policies/practices. • Continued collaboration with municipal governments through planning and development review activities. • Ensure municipal drainage projects are designed to create habitat and mitigate any negative impacts to water quality.	• Limit use of recreational vehicles on stream banks. • Establish stream side natural cover to help reduce stream temperature. • Employ low impact development techniques in order to manage stormwater runoff.

Land Management	Prevent excessive erosion along the lakeshore, ravines and on land	• Identify areas of high erosion and help to establish erosion control measures.
		• Explore community approaches to better manage recreational vehicle usage in areas of high erosion.
		• Assist landowners with Environmental Property Plans.
		• Conduct a study to examine the effectiveness of Water and Sediment Control Basins (WASCoBs).
			• Create individualized Environmental Property Plans:
			  • Establish erosion control structures in fields and gullies.
			  • Plant buffers along gullies.
			  • Plant windbreaks to prevent wind erosion.
			  • Create grassed waterways in fields with high erosion.
			  • Create areas to hold water at the head of the watershed to lessen the flow.
			  • Create grade control structures.
			  • Plant appropriate vegetation to hold soil on steep slopes at the lake shore.
			  • Drainage outlets into gully features should be constructed to limit erosion potential (i.e., bottom of gully).
			  • Avoid the disposal of yard wastes over the top of the bank or on slopes.
			• Limit use of recreational vehicles on stream banks and along the lake shore.

Area of Natural and Scientific Interest (ANSI)
Significant representative segment of Ontario biodiversity and natural landscapes including specific types of forests, valleys, prairies and wetlands, native plants and animals, and supporting environments. ANSIs play an important role in the protection of Ontario's natural heritage since they best represent the spectrum of biological communities, natural landforms and environments across Ontario.

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 geologic formation or structure that carries water.

Baseflow
The discharge of groundwater to surface water streams, rivers and other waterbodies.

Benthic Macro-invertebrates
Benthic macro-invertebrates 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, mollusks and worms.

Beneficial Management Practices (BMPs)
A proven, practical and affordable approach to conserving soil, water and other natural resources in rural areas.

Conservation Authority
A local, community-based environmental agency which represents a grouping of municipalities on a watershed basis, and works in partnership with others to manage watershed resources.

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

Development
The creation of a new lot, a change in land use, or the construction of buildings and structures requiring approval under the *Planning Act* (RSO 1990). It does not include activities that create or maintain infrastructure authorized under an environmental assessment process or works subject to the *Drainage Act*.

***Escherichia coli* (*E. coil*)**
Bacteria found in human and animal waste. Their presence in water indicates a potential for the water to have other disease-causing organisms.

Ecological Function
The natural processes, products or services that living and non-living environments provide or perform within or between species, ecosystems and landscapes. These may include biological, physical and socio-economic interactions.

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 of many small actions) on all other parts of the ecosystem will be considered and evaluated before the action is undertaken.

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.

Environmental Property Plan
Environmental Property Plans are property assessments that that help landowners identify and mitigate environmental issues on their property. Examples of such plans are the Environmental Farm Plan for farmers, the Rural Landowner Stewardship Guide for rural non-farm landowners, and the Stewardship Guide for the Lake Huron Coastline for lakeshore landowners.

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 macro-invertebrates.

Forest Cover
The percentage of the watershed that is forested. Environment Canada recommends 30 percent of a watershed should be in forest cover.

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.

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 Pollution
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.

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.

Species at Risk
Species that are at risk of extinction, extirpation or endangerment globally or within a jurisdiction or region. COSEWIC (Committee on the Status of Wildlife in Canada) and COSSARO (Committee on the Status of Species at Risk in Ontario) make the federal and provincial designations.

Substrate
Stream substrate is the material that is at the bottom of the stream (e.g., gravel).

Total Phosphorus
Total phosphorus refers to the total amount of phosphorus in a sample. Phosphorus 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
An area of land that is seasonally or permanently covered by water, or where the water table is close to the surface. Four types of wetlands are swamps, marshes, bogs and fens. Wetlands often have special plants and ecological, social and economic benefits which may make them important from an provincial perspective. They are dynamic ecosystems that can change over time, due to factors such as natural succession and changing water levels. They may be considered locally or provincially significant.

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 habitat; provide a hydrologic role in the watershed; or have unique or provincially-significant features.

Wildlife Habitat
Areas where plants, animals and other organisms live and find adequate amounts of food, water, shelter and space needed to sustain their populations. Specific wildlife habitats of concern may include areas where species concentrate at a vulnerable point in their annual or life cycle, and areas that are important to migratory or non-migratory species.

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