Kennisis Watershed & Lakes Management Plan

September 2007

Prepared by: The Kennisis Lake Planning Steering Committee in conjunction with French Planning Services Inc.

Sponsored by: The Kennisis Lake Cottage Owners' Association

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About This Version

This is the approved version of the Kennisis Watershed & Lakes Management Plan. It replaces the May and August 2007 draft versions that were distributed in conjunction with an extensive consultation process.

Supplementary maps and reports relating to the Plan will be released on an occasional basis. Please see www.kennisis.ca for details. Comments on this document may be sent to KennisisLakePlan@sympatico.ca

Front Cover: *The photograph on the front cover was taken by Lake Steward, Cam Douglas in the fall of 2006. It is a view of the Kennisis Watershed looking almost due north from the southernmost point of the watershed with Lipsy Lake in the immediate foreground. The image is intended to reflect that the document is about the entire Kennisis Watershed, although the focus is on the Kennisis Lakes.*

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ACRONYMS AND ABBREVIATIONS

CEWF	Coalition for Equitable Water Flow
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
COSSARO	Committee on the Status of Species at Risk in Ontario
DFO	Department of Fisheries and Oceans (federal) (aka Fisheries and Oceans Canada)
DOC	Dissolved Organic Carbon
FOCA	Federation of Ontario Cottagers' Associations
ha	hectare (100 hectares = 1 square kilometre)
HHOA	Haliburton Highlands Outdoor Association
KLCOA	Kennisis +Lake Cottage Owners Association
MOE	Ministry of the Environment (Ontario)
MNR	Ministry of Natural Resources (Ontario)
NHIC	Natural Heritage Information Centre
NIMC	Norah's Island Management Committee
OMB	Ontario Municipal Board
PWQO	Provincial Water Quality Objectives
SARA	Species at Risk Act
TKN	Total Kjeldahl Nitrogen
TOC	Total Organic Carbon
TSW	Trent Severn Waterway
U-Links	U-Links is a project of the Haliburton County Community Co-operative and is supported by Trent University and the Township of Minden Hills. U-Links fosters interaction between university and community resources.

1 INTRODUCTION

1.1 THE PURPOSE OF A WATERSHED & LAKE MANAGEMENT PLAN

The purpose of a Watershed & Lake Management Plan is to recognize and protect the unique character of a watershed and the lakes contained therein. Ways to ensure the long-term protection, maintenance and restoration of natural, social and physical features are recommended. Because most people tend to live around one or more lakes within a watershed, these plans are frequently referred to as "Lake Plans".

Lake Planning is a community-based process that considers the interests of all stakeholders within the watershed surrounding a particular lake. These stakeholders include shoreline owners and residents, commercial operators, private and crown land managers and lake users.

1.2 THE KENNISIS WATERSHED & LAKES

The Kennisis watershed occupies a unique location in Central Ontario. From the watershed's northern boundary, water flows one of three ways: west to Georgian Bay; east to the Ottawa River; or south through the Kennisis Lakes and the Gull and Trent River systems to Lake Ontario. As headwater lakes, the Kennisis Lakes have no upstream sources of pollution to contend with and their pristine nature is a valuable legacy to protect for future generations both within the immediate watershed and downstream to Lake Ontario.

1.3 THE KENNISIS WATERSHED & LAKES MANAGEMENT PLAN

Section 2 of the Kennisis Watershed and Lakes Plan describes a series of principles and targets that are important in order to ensure the health and sustainability of our lakes, streams and rivers for future generations. These in turn lead, in later sections of the Plan, to the identification of a series of issues, options and recommended actions.

Sections 3 through 6 of the Plan provide a general description of the Kennisis Lakes and identify the significant natural, physical and social characteristics that make our lakes and the surrounding watershed desirable places to live, work and visit. A key influence is the well-established 'cottage owners community' which brings with it a whole sub-culture and an array of aspirations and expectations.

Section 7 deals with land-use planning, designated 'public-use' lands and the regulatory aspects of zoning and waste disposal. In Section 8, the Plan attempts to synthesize the wealth of information in the preceding sections into a coherent set of issues and recommended actions.

Some of the recommended actions will be presented to the Municipality of Dysart et al with regard to enhancing land-use policies and tools to protect the special features of the Kennisis environment. However, the majority of recommended actions are for everyone to consider because they are focused on Stewardship and Education actions designed to protect the area's superb quality of life.

1.4 WHAT THE KENNISIS WATERSHED & LAKES PLAN IS NOT

Every effort has been made by the Kennisis Lake Plan Steering Committee to ensure that the production of this document is NOT a self-serving exercise to advance the special interests of those lucky enough to already own a cottage on one of the Kennisis Lakes. Instead, the community of cottage owners has tried to rise above their own special interests and consider the broader issues that impact the natural environment and the overall health of the local ecosystem. In this effort they have been aided by a wide array of stakeholders that includes local businesses, all levels of government, and others who visit the region for a variety of recreational opportunities.

1.5 HOW THE KENNISIS WATERSHED & LAKES PLAN WAS DEVELOPED

In the summer of 2004, the members of the Kennisis Lake Cottage Owners Association (KLCOA) endorsed a proposal from the Lake Steward to form a Steering Committee to develop a Lake Plan. The volunteer Steering Committee engaged the services of French Planning Services Inc. to provide professional consulting assistance. Based on the valuable experience gained by those who have developed lake plans for other regions of Ontario, background data were collected, a number of stakeholder workshops were held and a wide-ranging mail-in survey of issues was conducted.

These inputs formed the basis for the identification of key issues, options and possible solutions. A further round of consultation then allowed the Steering Committee to confirm priorities and to build consensus around a series of recommend actions aimed at ensuring the long-term sustainability of the Kennisis Watershed and Lakes for future generations. These actions encompass concern for such things as improved water quality, wildlife habitat, recreational opportunities, and appropriate residential and commercial development.

Details of the 'Residents' and 'Commercial' surveys conducted during the summer of 2005 are included in the Appendices as well as summaries of the 2005 stakeholder and residents workshops, and summaries of additional workshops held during the summer of 2006.

In May of 2007 the Draft Lake Plan document was released. 1,200 copies of the Lake Plan Summary were printed and efforts were made to distribute a copy to every cottage property on the Kennisis Lakes as well as all stakeholders. The summary and complete versions of the Plan were also posted on the KLCOA website. Feedback was encouraged by mail, e-mail, on a Facebook website, and at two 'open houses' held at the Haliburton Forest. A presentation was made to Municipal Council and discussions held with the municipal planning department. On July 3, Council briefly reviewed the Draft Lake Plan recommendations and advised of their continuing interest in the lake planning process for the Kennisis Lakes.

In August of 2007, as a result of comments received during the consultations, a revised Draft was released on the KLCOA website and a synopsis of changes made to the May 2007 Draft was prepared and provided to those attending an open

meeting held in conjunction with the KLCOA Annual General Meeting on September 1, 2007.

At the meeting which was open to members as well as non-members of the KLCOA, the Plan was approved by a majority (73%) of the 130 votes cast.

1.6 Sponsors and Supporters of the Planning Process

The Kennisis Watershed and Lakes Management Plan was sponsored by the KLCOA, whose members provided the majority of funding and volunteer support. Significant in-kind support was provided by The Haliburton Forest and Wildlife Reserve Ltd. Extensive work in 2004-2005 by the KLCOA Lands Tasks Committee was invaluable in developing the section on 'Designated Public-Use Lands'.

Mapping data was obtained free of charge from the Ontario Ministry of Natural Resources (MNR) under the terms of an Interim Data Sharing Agreement and customized for the Lake Plan. We acknowledge the support of MNR's Geographic Information Branch with thanks.

Additional cash contributions were provided by the Municipality of Dysart et al.

1.7 Sources of Published Information

A list of reference materials is provided at the end of this document. Many individuals, businesses, not-for-profit and government organizations provided both encouragement and valuable information regarding one or more aspects of the Lake Planning exercise. They included:

- The Municipality of Dysart et al
- The Township of Algonquin Highlands
- The County of Haliburton
- The Ontario Ministry of Natural Resources
- The Ontario Ministry of the Environment
- The Ontario Ministry of Northern Development and Mines
- The Ontario Provincial Police (Marine Unit)
- Fisheries and Oceans Canada
- Parks Canada Agency: Trent Severn Waterway
- The Coalition for Equitable Water Flow
- Haliburton Highlands Land Trust

Because the Lake Plan is an on-going process, several contributors will inevitably have been omitted: the Steering Committee nonetheless appreciates and values ALL who have provided input.

1.8 The Lake Plan is Just the Beginning

Lake Planning is a *process* and so the production of a Kennisis Watershed and Lakes Management Plan is only the first step in an on-going community effort to maintain and enhance the natural, social and physical environment that is the Kennisis experience.

1.9 DISCLAIMER

The maps and figures presented in this document are for reference purposes only. No representation is made or warranty given as to the accuracy or completeness of any content. The user assumes all risks of use. Neither the Lake Planning Steering Committee nor the KLCOA assumes responsibility for any loss resulting from such use. Maps are produced by KLCOA based on data provided under Licence with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2007.

Kennisis Lake Planning Steering Committee

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Cameron Douglas	Lake Steward, Executive Liaison, Land Use, Waste Disposal (Septics & Landfill)
Jeff Gardner	Survey, Public Lands Use and Maps
Cathie Heppell	Administration and Historical Elements
Paul Potter	Social Elements
Jim Prince	Natural Heritage & Physical Environment
Chris Riddle	Editor
Peter Schleifenbaum	Natural Heritage & Physical Environment
Grif Speers	Natural and Environmental Heritage
Jan Townley	General support
Ann Vanstone	Communications

2 VALUES, VISION & PRINCIPLES

2.1 COMMUNITY VALUES

The purpose of this Lake Plan is to identify, protect and improve the important natural, physical, and social values and characteristics of the Kennisis Lakes.

The planning process and the execution of the Plan are designed to find common ground for the diversity of needs and interests that exist among those who have a stake in, and an impact on, the continuing health of the Kennisis Lakes. The Plan will also assist the various stakeholders, including the appropriate levels of government, in determining land use polices that will protect the special properties of the lakes that attracted many of us to the Kennisis Lakes in the first place.

The Lake Plan is a cornerstone to protecting what we, in common *value*. More than anything else, the vast majority of our community values the preservation and improvement of the natural environment.

The 2005 Survey, and the 2006 Property Owner workshops, determined there was a strong consensus with regard to the things that people value. Figure 2.1 ranks the qualities and activities that survey respondents said were either very or somewhat important.

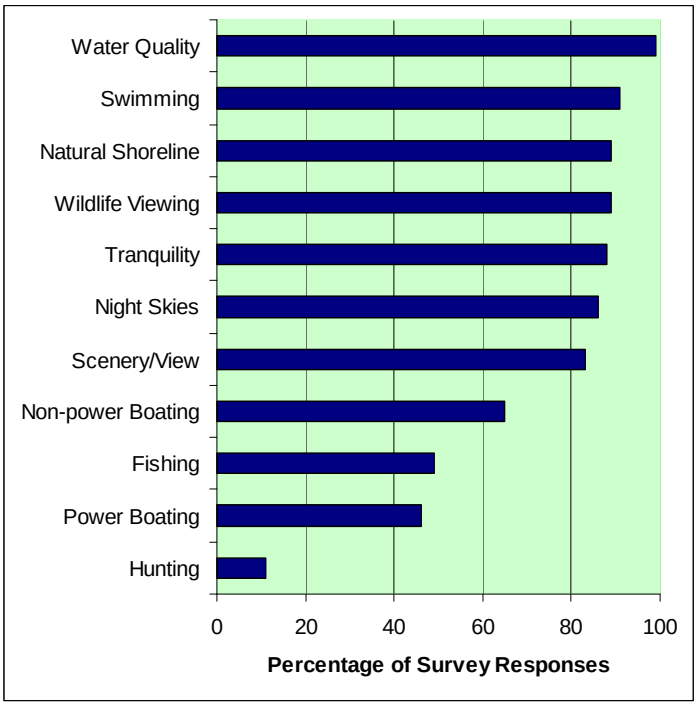
Important Qualities:

- Water Quality 99%
- Natural Shoreline 89%
- Wildlife 88%
- Tranquility 88%
- Night Skies 86%
- Scenery 83%

Important Activities:

- Swimming 90%
- Canoeing/Sailing 65%
- Fishing 49%
- Power Boating 46%
- Hunting 11%

Figure 2.1 Ranking of Lake Quality Values



2.2 VISION FOR THE FUTURE

Three questions influenced the development of the Lake Plan:

1. What will Kennisis Lake look like 50 years from now?
2. What do we value sufficiently that we feel is worth protecting?
3. How can we ensure that future generations will be able to enjoy what we have today?

The answers to these questions led to the following vision statement:

Figure 2.2 Vision Statement

Our Community Envisions the Kennisis Lakes to be a place where:

The beauty of the landscape, the tranquility of the surroundings and the quality of the water are protected and preserved;

Precedence is given to activities that maintain the natural and social qualities of the lake over activities that have the potential to degrade environmental sustainability;

Wildlife, fish and plant habitat are safeguarded;

The lake is a shared experience, where respect and dignity are shown to others and expected in return;

Our community balances the needs of those that desire tranquility with the needs of recreational users;

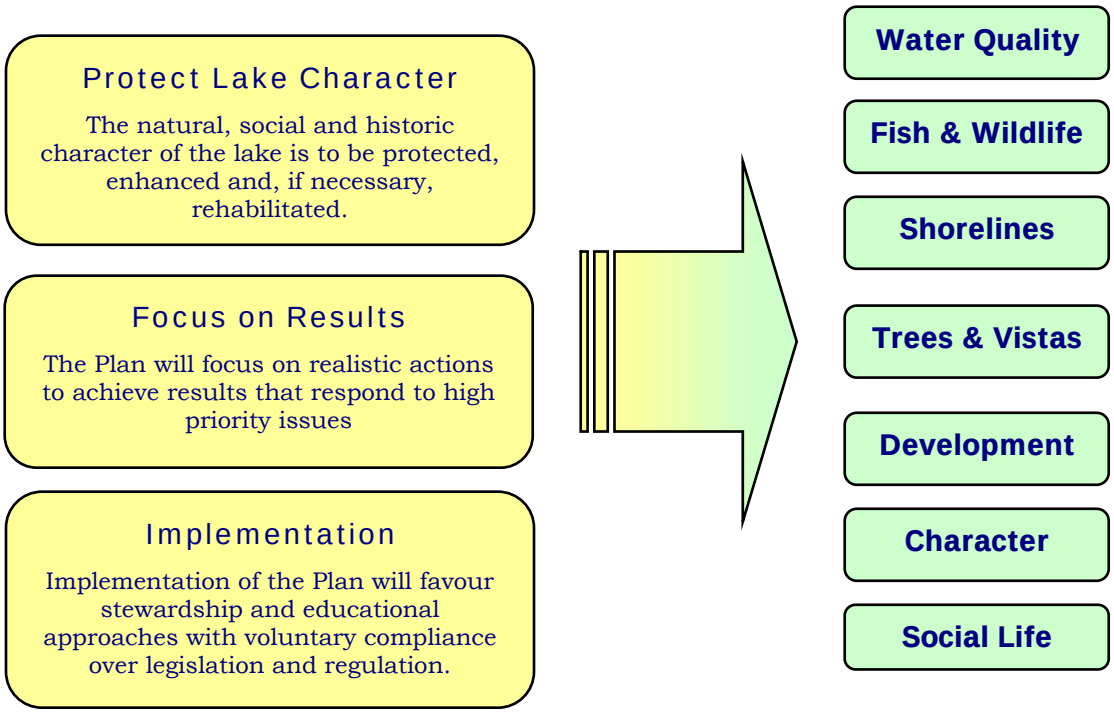
Public spaces are maintained for everyone to enjoy; and

The community is actively involved in stewardship; and promotes education as a way to ensure respect for their neighbours and the law.

2.3 GUIDING PRINCIPLES

A set of guiding principles was established to focus the Lake Plan on several key values and start the process of making the Vision a reality.

Figure 2.3 Guiding Principles and Key Elements



Typical implications of the guiding principles for each key element are as follows:

Water quality – That the water of the Kennisis Lakes not contain contaminants in excess of the natural historic levels (i.e. the level of contaminants that would occur in nature prior to human habitation) nor in excess of current officially regulated standards;

Fish and wildlife – That the Kennisis Lakes support a sustainable fish population including optimum habitat for their naturally reproducing lake trout and maintain stability in the bio-diversity of wildlife species and their habitat. That the further introduction of "invading species" such as zebra mussels be prevented;

Natural shorelines – That the protection and rehabilitation of the lake shoreline and river banks, described as the "ribbon of life" that supports a diverse range of fish and wildlife species, be promoted to increase the amount of natural shoreline;

Trees and vistas – That the natural vista from the Kennisis Lakes be maintained and that buildings and structures have a minimal impact on the natural appearance of the shoreline and on the viewscape from the lakes;

Economic and property development – That a cooperative working relationship exists between residential, recreational and commercial members of the community to ensure that proposed development and activities respect the environment and character of the watershed, as well as maintain property values;

Historical, cultural and natural character – That the historical, cultural and natural character of the watershed is recognized, protected and restored, where appropriate; and

Social life – That a range of social and recreational activities are promoted consistent with the natural character of the Kennisis watershed, thereby preserving the health and ambience of the Kennisis Lakes, and fostering a sense of community.

2.4 Personal and Collective Accountabilities

To protect the things we value and to achieve our vision, we all have important roles to play, both as individuals and as a community:

Cottagers have an obligation to protect the natural environment and demonstrate those community values which will help the community to realise its Vision;

The KLCOA needs to monitor changes and respond promptly to environmental and social needs;

Commercial Operators and Land Owners need to respect the environment and the desires of the community to ensure that any further commercial development, construction, and change to the environment is respectful of the communities' stated values and vision;

Government organizations need to listen to the community, respond to its needs and protect the environment as a public trust;

Recreational Users, Visitors, Landlords & Renters need to be aware of, and encouraged to act in accord with the values of the community; and finally

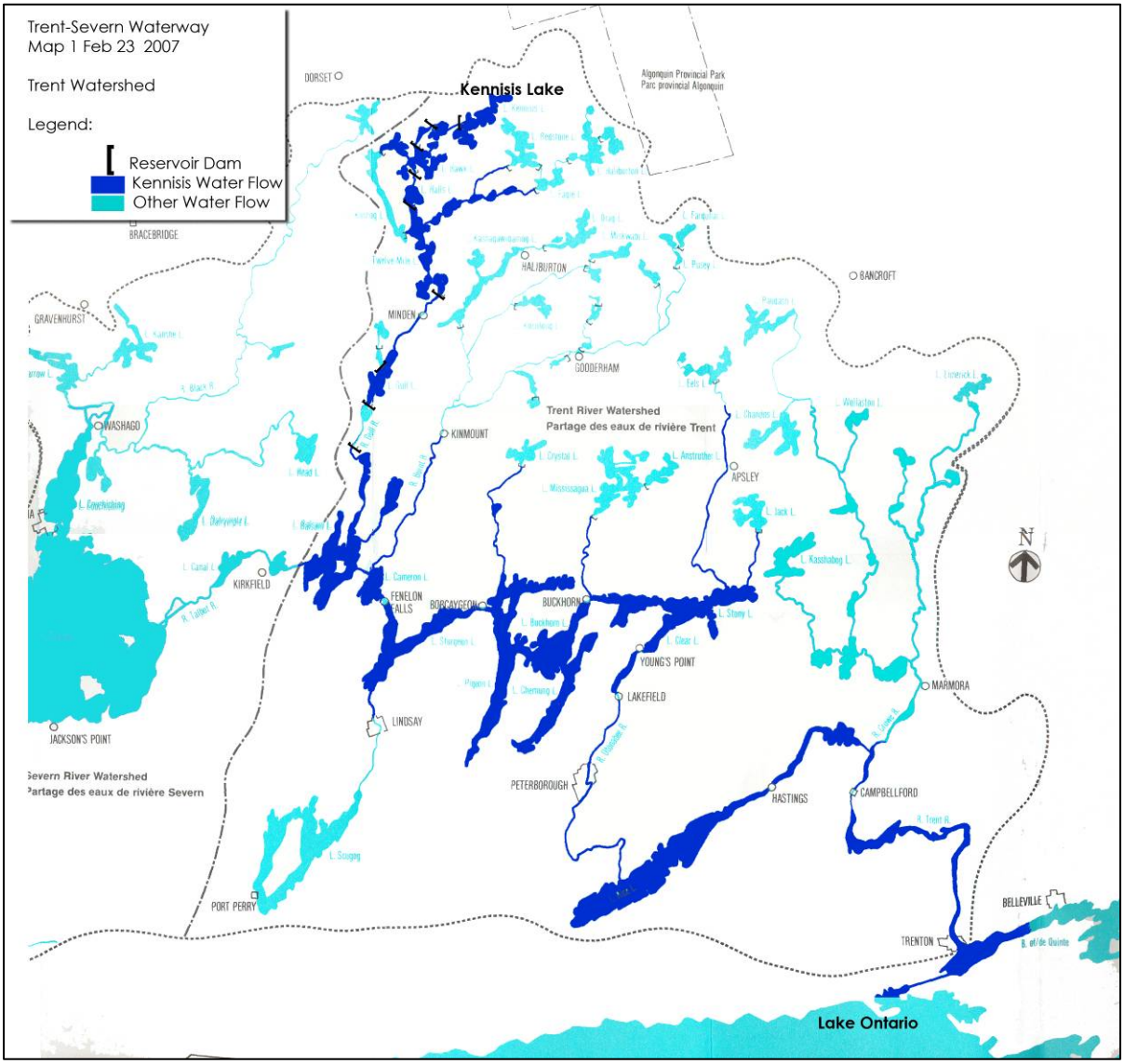
All of us need to be open to learning how best to be good stewards of the Kennisis Lakes watershed and to be willing to coach, mentor and train **young people** to be the future custodians of this wonderful resource.

3 LAKE DESCRIPTION

3.1 GENERAL LOCATION

At a regional level, the Kennisis Lakes are headwater lakes for the Gull River Watershed, which is one of eleven river watersheds that comprise the large drainage basin of Lake Ontario (Map 1).

Map 1 The Trent Watershed



Adapted from information provided by the Trent Severn Waterway

The dark areas indicate the flow of water from Kennisis Lakes through the Trent Watershed to Lake Ontario.

At its northern boundary the Kennisis watershed abuts three other watersheds: one is the Redstone watershed which, like Kennisis, drains into the Gull River and feeds the Trent side of the Trent-Severn Waterway; another drains to the west via the Hollow River through Lake Kawagama and on into Georgian Bay; and another drains water to the east via the Galipo and Madawaska Rivers, on into the Ottawa River.

Little Kennisis Lake drains into Kennisis Lake, which empties into Red Pine Lake via the only outflow, the Kennisis River. Downstream from Red Pine Lake the river connects Nunakani, Big and Little Hawk, Halls, Boshkung and all other Lakes within the Gull River system. It is estimated that over 60 million cubic metres of water flow through Kennisis Lake annually (Michalski, 1996).

The Gull River passes through Gull Lake which empties into Balsam Lake at the bottom of the Gull River watershed. From Balsam Lake water flows east to Lake Ontario via the Kawartha Lakes and the Trent and Otonabee Rivers. The Trent River begins at the outflow of Rice Lake and flows southeast towards the Bay of Quinte, Lake Ontario. Balsam Lake is the highest point of the Trent- Severn Waterway; from here boat traffic is able to descend west towards Georgian Bay via the canal system that includes the Black and Severn Rivers.

3.2 KENNISIS LAKES CHARACTERISTICS

Kennisis and Little Kennisis Lakes are both deep, cold-water lakes situated on the Canadian Shield, which is dominated by insoluble, Precambrian granite. Both lakes are generally characterized by very soft water and high transparency due to low concentrations of nutrients; a consequence of the area's geology. The size and shape of both the watershed and the lake and the flushing rate are also important parameters when characterizing a lake's water quality (Figure 3.1). Lakes with long residence times such as Kennisis (flushing rate 0.19/year or turnover rate of 5.3 years) have a higher potential to recycle nutrient inputs year after year while lakes with short residence times will flush nutrients faster than can be utilized.

Figure 3.1 Kennisis Lakes Parameters

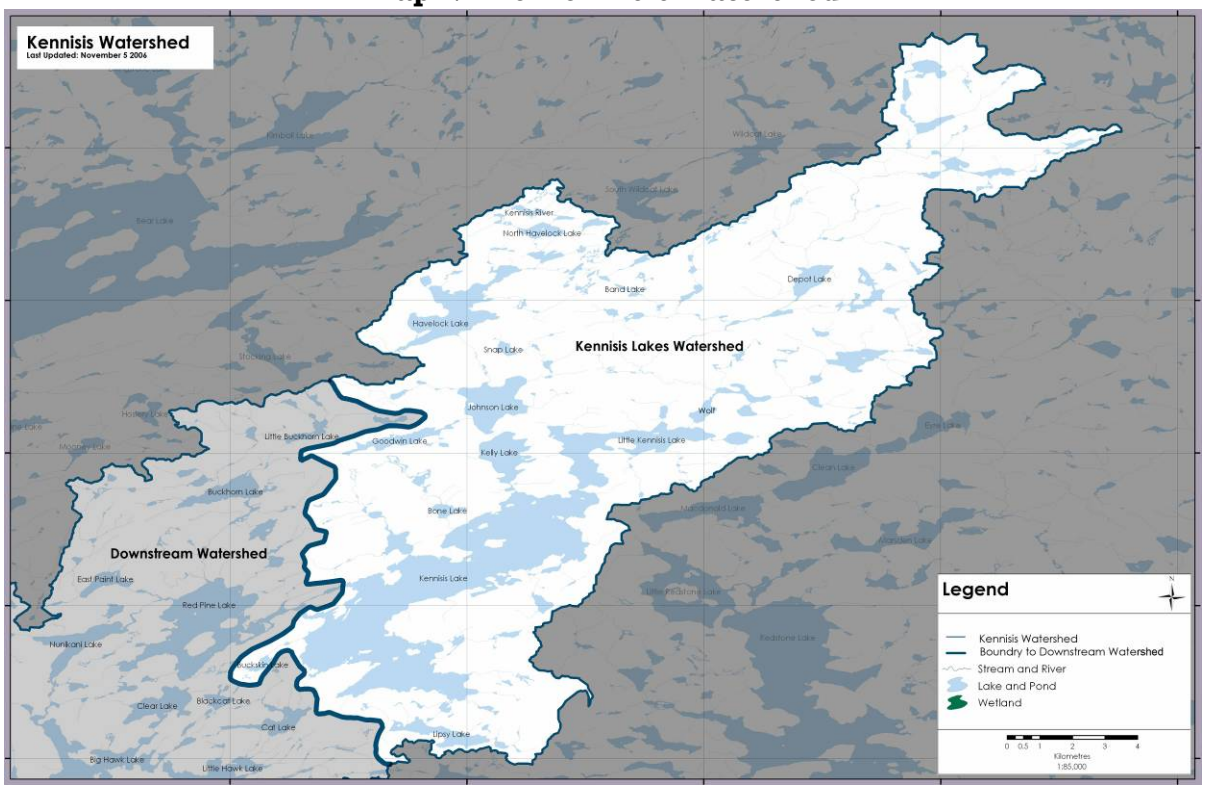
Parameter	Kennisis Lake	Little Kennisis Lake
Surface Area (ha)	1,417	231
Lakeshed area (ha) excluding lake	7,500	8,150
Lake Volume ($m^3 \times 10^6$)	332.05	34.81
Maximum depth (m)	68	44
Mean depth (m)	23.4	15.1
Flushing rate (times per year)	0.19	0.85
Turnover time (years)	5.26	1.15
Total Annual Outflow ($m^3 \times 10^6$)	63.87	28.69
Height above Mean Sea Level	370 m (1212 feet)	
Latitude and Longitude	North 45˚ 13' West 78˚ 38'	

Sources: Michael Michalski Associates, 1996. Peter Schleifenbaum, Parks Canada & EcoPlans Study

3.3 KENNISIS WATERSHED

The Kennisis watershed (Map 2) encompasses some 174 square kilometres (17,400 hectares) and extends into the Haliburton Forest and Wild Life Reserve Ltd.

Map 2 The Kennisis Watershed



Its northernmost drainage areas form part of the Algonquin Dome with elevations of up to 540 meters. A total of some 15,100 hectares (approximately 35,000 acres) of predominantly forested land drains into the Kennisis Lakes. Of paramount importance is the Wolf Lake drainage into Little Kennisis Lake. Almost one half of the entire Kennisis Lake watershed, namely 7,200 ha, drains through Wolf Lake into the north-east end of Little Kennisis Lake. Almost the entire area of this drainage is situated on the private lands of Haliburton Forest and Wild Life Reserve Ltd.

In total, water from 8,150 ha drains into Little Kennisis Lake. The secondary drainages are Dog Lake (ca. 150 ha), Ted's Pond (ca. 100 ha), various creeks on the north-west and west side of Little Kennisis Lake (ca. 300 ha) as well as 3 creeks on the south side of the lake with app. 400 ha of drainage.

All of the waters of Little Kennisis Lake flow through the narrows at its southernmost end and into Kennisis Lake.

The Little Kennisis Lake watershed, despite the significant size difference to Kennisis Lake, is slightly larger than that of the bigger lake. Kennisis Lake proper only has a watershed itself of some 7,500 ha. Its most prominent tributary is the Kelly Lake watershed with close to 3,000 ha. Again, the forested lands of this

watershed are almost exclusively in the ownership of Haliburton Forest and Wild Life Reserve Ltd. Other, secondary drainages into Kennisis Lake are Lipsy Lake at its south-west end (ca. 1500 ha), creeks in the south-central portion of the lake (ca. 1.000 ha), Paddy's Bay (ca. 600 ha) and Bone Lake (ca. 400 ha), both situated along Kennisis' north shore, and finally the Birchy Lake drainage on the south shore.

3.4 OWNERSHIP OVERVIEW

A detailed description of land ownership, zoning and use within the Kennisis Lakes watershed is provided in §7.1.2. Specific zoning information is available from the Municipality of Dysart et al (http://www.dysartetal.ca/frame12viia.asp) and township zoning maps are available on CD-ROM from the municipality.

In general terms, regarding the ownership of lands immediately adjacent to Kennisis Lake and Little Kennisis Lake, it is noted that:

- almost the entire shoreline of the Kennisis Lakes is privately owned and zoned for waterfront residential use;
- there are a few areas designated as 'open space' or under 'environmental protection';
- much of the back-lot space around the Kennisis Lakes is zoned 'rural' and a good part of it is owned by the Haliburton Forest and Wild Life Reserve Ltd.;
- some areas near the Marina and Haliburton Forest are zoned for 'tourist commercial' or 'highway commercial' use;
- the municipal landfill is zoned for 'industrial disposal'; and
- there is an area adjacent to County Road 7 and Birchy Lake that is zoned for 'extractive industrial'.

Much of the rest of the Kennisis sub-watershed lies within the privately owned Haliburton Forest and Wild Life Reserve Ltd.

A number of canoe routes, snowmobile, ski and hiking trails pass through the area and provide a modest network of historic rights-of-way.

On March 23, 2007 the ownership of the largest island on Kennisis Lake was transferred to the Haliburton Highlands Land Trust with the name Norah's Island.

Although there is very little Crown Land within the Kennisis sub-watershed, immediately downstream from the Kennisis Dam is an extensive area of Crown Land associated with the Leslie M. Frost Natural Resources Centre. [Following an extended closure of the Centre, in March 2007, it was announced that the Province had signed a long-term lease with FCI Group to operate the Leslie M. Frost Centre. The lease provides for environmental and outdoor education programs. It is understood that public access to walking, hiking, and ski trails near the Frost Centre property, which had been maintained through a long-term licence with the Township of Algonquin Highlands, will continue.]

To the northeast the lands of the Kennisis watershed abut Algonquin Provincial Park. There are no known First Nation reserves in the watershed.

3.5 ACCESS

There is limited access to the Kennisis Lakes and watershed. Most access is by road, apart from a very small number of people who chose to access the area by float plane, canoe or snowmobile.

However, with a single road, County Road 7, serving the Kennisis Lakes, the area is a 'drive-to' and not a 'drive-by' destination. This serves to limit the number of short-term visitors and 'casual' traffic.

Road access to the watershed upstream from the Kennisis Lakes is mainly provided by the private road system of the Haliburton Forest and Wild Life Reserve Ltd. Road access to the cottages around the lake is made possible by a network of municipal and private roads as shown in Map 3 (available in separate file on website).

Water access to the Kennisis Lakes is also limited. In addition to the Kennisis Marina, there are some four public access locations with limited boat launching capability (depending on water level). The principal public access point, which also has room for parking, is at the Kennisis Dam. In addition to providing access to Kennisis Lake, this is a traditional point of access to the water-access properties on Red Pine Lake. Other access points include the 'first' and 'third' bridges and a public boat launch on Wilkinson Road near the Marina.

Figure 3.2 Open Spaces on Kennisis Lake

The shoreline access points for some of the traditional portage routes and snowmobile trails were recently relocated in conjunction with the development of the West Shore of Kennisis Lake. Regrettably there is little if any signage to indicate these changes.

A small number of 'open spaces' on Kennisis Lake are publicly accessible. These are shown in the figure 3.2 and include:
1. Bullfrog Bay (aka the South Shore Wilderness Area)
2 & 3: The East and West Blueberry Islands
4: Norah's Island
5: Lipsy Bay (also known as the Soap Pond)

There are no 'public beaches' on the Kennisis Lakes, although there is limited beach area at some of the access points and some small beach areas at the two commercial resorts.

The recently completed '911 project' means that all properties around the Kennisis Lakes now have a unique road name and number. A detailed road atlas is available from The County of Haliburton in both print and on-line versions (see http://www.haliburtoncounty.caMaps and GIS page) and a printed map is available from tourist information locations for $4.

3.5.1 Access Issues and Options

The recent opening-up of the West Shore of Kennisis Lake, of Lipsy Lake and of the Kennisis River below the Kennisis Dam has done two things. It has increased the number of seasonal residents and it has reduced the amount of undeveloped shoreline. This in turn has created a number of pressures.

New roads and increased traffic mean that the Municipality is facing increased pressure for road repair and maintenance

The public launch facilities on Kennisis Lake are poorly maintained and, due to the fluctuating water level, are sometimes un-useable

With more people on the lake and less undeveloped shoreline, people are concerned that there is 'nowhere to go' or that the places they used to go to are now off-limits (see options in Section §7.2 "Designated Public-Use Lands').

***Issue Statement**: Property development is causing traditional rights-of-way such as portage and hiking trails to be re-routed or abandoned: this reduces recreational opportunities for enjoyment of the wilderness and reduces the number of 'places to go'.*

Option 1: Maintain Canoe & Snowmobile Routes, and Hiking Trails in the Area.

Option 2: Develop and implement a Canoeing Plan and monitor any changes in government policy and legislation that could impact canoeing and related recreational activities.

Option 3: Create a Canoeing/Trails Map as has been done by the Township of Algonquin Highlands but expanded to include a broader range of 'Places to Go' such as camping sites, the Clear Lake Conservation Reserve, the Haliburton Forest and its many attractions, and the Leslie Frost Centre and lands.

Option 4: Request regulations be enforced to maintain rights-of-way.

Option 5: Re-establish a trail to circumnavigate Kennisis Lake by foot or bicycle.

Option 6: Have the KLCOA work with local business and the Municipality to communicate the location of water access points, boat launching facilities, trails, and open spaces: for example, arrange for signs to be posted at the shoreline marking access to portage trails and other rights-of-way.

Option 7: Request that the Municipality make the upgrading of public launch facilities on the Kennisis Lakes a priority.

Option 8: Request that the KLCOA road committee increase monitoring of road conditions and assist the Municipality in setting priorities for road repair and maintenance.

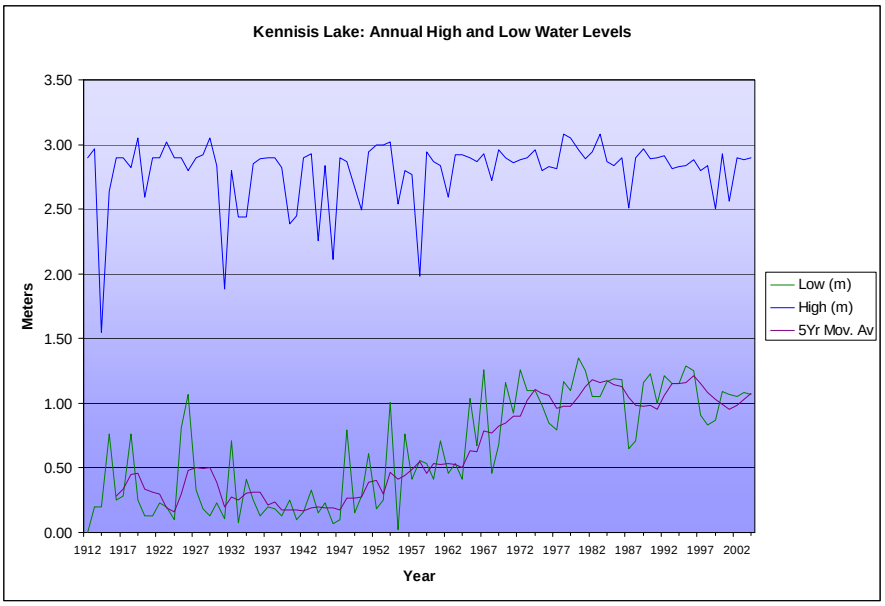
3.6 WATER LEVELS

Kennisis Lake is dam-controlled: the original shoreline having been flooded early in the 1900s to build-up the reservoir capacity of the Lake. Initially this was done to support logging operations; however the beneficiaries today are mainly those using the Trent-Severn Waterway for recreational purposes, as well as those living down-stream in areas where flood control is important.

Water drained to feed the Trent-Severn system is hard to replace due to the low level of inflow to the Kennisis Lakes during the summer and as a result the water level drops significantly, especially during August and September.

The maximum height of the Kennisis Dam is 2.90 meters (9 feet 6 inches) above the sill plate. Heavy run-off has been known to raise the lake level above the top of the dam by as much as 18 centimetres (7 inches) as happened on May 8, 1983.

Figure 3.3 Historical Variation of Water Levels.



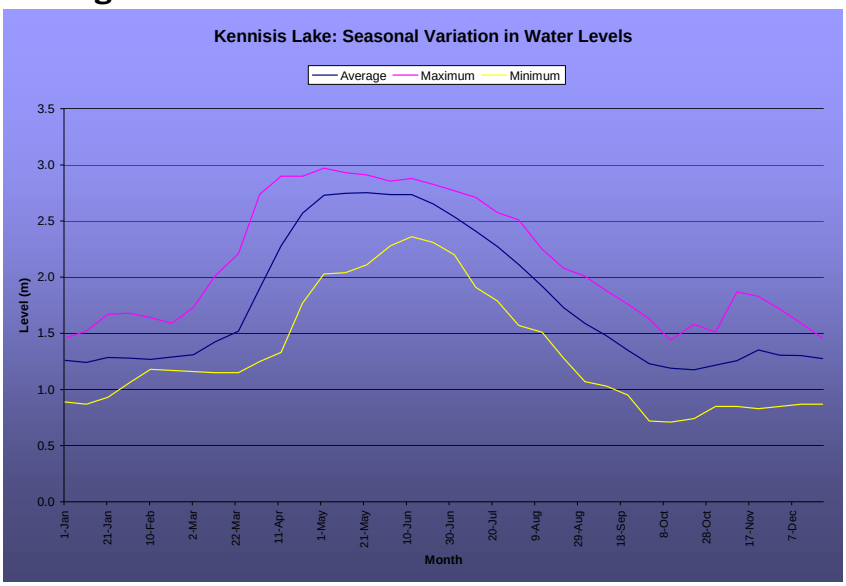
It is rare for the lake to be drained all the way to the sill plate: in fact the last time it came close was on September 26, 1955. In the first half of the 20th century the low water level was typically some 2.5 metres (about 8 feet) below the top of the dam: however, since the 1970s it has been rare for the water level to drop more than 1.9 metres (6 feet) below the top of the dam. About once every ten years the low water level may reach 2.1 – 2.2 metres (about 7 feet) below

the top of the dam: this was the case in 1977, 1987, and 1998. These variations are illustrated in Figure 3.3.

Although the annual variation in recent years has been about 6 feet, there is considerable variation from year to year and so it is helpful to understand the typical high and low water levels for any given date, as well as the mean. A representation of this data is shown in Figure 3.4 for the years since 1988.

Figure 3.4 Seasonal Water-Level Fluctuation

As illustrated on the graph, the variation from the average water level can be some 25 to 50 centimetres (10 to 20 inches) higher or lower. The season with the greatest variation and hence unpredictability of water levels tends to be August – September.

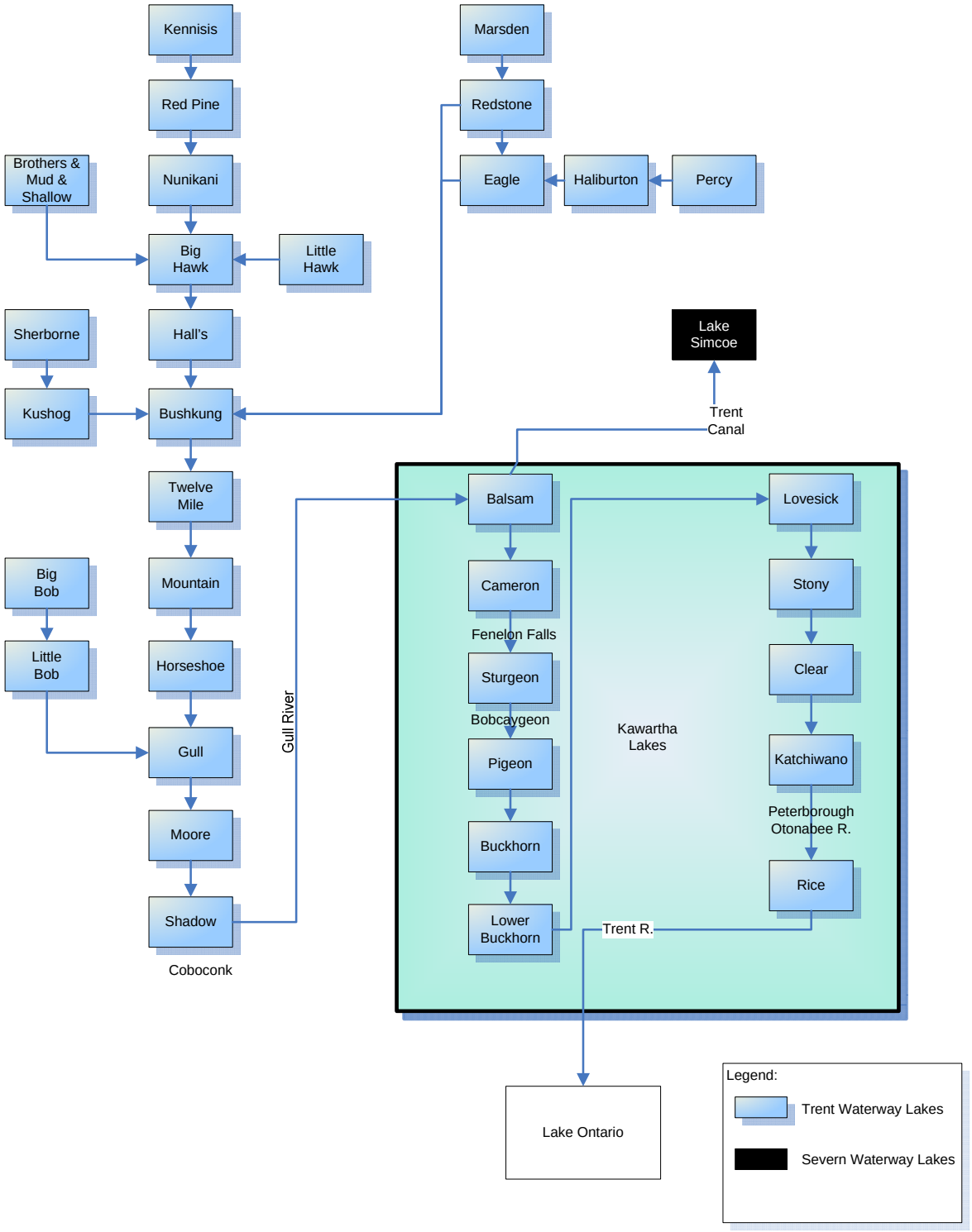


The cycle of events during an average (calendar) year that is reflected in the graph is as follows:

January to the end of March	the lake is frozen and the level of the ice surface remains constant, some 1.6 metres (about 5 feet) below the top of the dam;
Early April to mid-May	the surface level rises steadily some 1.4 metres (over 5 feet) with the ice 'going out' sometime in mid-to-late April. At the end of this period the lake level is typically within 15 centimetres (some 6 inches) of the top of the dam.
Mid-May to mid-June	The lake level is maintained relatively constant, within 15 centimetres (some 6 inches) of the top of the dam.
Mid-June to end of September	The lake drops steadily by about 1.6 metres (about 5 feet): that is equivalent to some 10 centimetres (4 inches) a week. Some years the rate is about twice as fast – but over a shorter period.
October	The lake level usually holds steady at its low point for the year, about 1.7 metres (5 feet 6 inches) below the top of the dam.
November	The level rises slightly, peaking about the third week of November at 1.5 metres (just under 5 feet) below the top of the dam.
December	The level falls slightly and the lake freezes during the latter part of December with its surface some 1.6 metres (about 5 feet) below the top of the dam.

Figure 3.5 is a schematic of the system of Dams used to control water-flow in the Trent system (Map 1) indicating Kennisis as a principal headwater lake.

Figure 3.5 Schematic of Dams of the Trent-Severn Waterway



3.6.1 Fluctuating Water Level Issues and Options

Water level issues were discussed at a workshop held in 2006 (Appendix 9). The key issues relating to water levels in the Kennisis Lakes are inextricably linked with the broader issue of managing the Trent Severn Waterway (TSW). As such two developments in 2006 are of particular significance.

First, was the formation of the Coalition for Equitable Water Flow (CEWF), a collective of cottage owners associations within the Trent Severn watershed. The KLCOA is an active participant in the CEWF. The Coalition believes that the current approach to water management in the TSW is seriously outdated and it has the following objectives:

- to provide a unified, collaborative voice in a comprehensive structured review of the water management framework of the Trent-Severn Waterway insofar as it relates to the Gull and Burnt River Watersheds in the Haliburton Sector of the system;
- to collectively lobby all three levels of government to see a modern evaluation of the system to fruition in an expeditious manner;
- to be a unified source of accurate information for our members and the public in general; and
- to work in concert with the other stakeholders.

Second, was a December 20, 2006 announcement from Park Canada (see Figure 3.6) that responds to the Coalition's primary objective. Subsequently the CEWF released a set of recommendations (see Figure 3.7).

Figure 3.6 Announcement of Trent Severn Waterway Study

WATER MANAGEMENT ON THE TRENT-SEVERN WATERWAY

PETERBOROUGH, ONTARIO, December 20, 2006 –Barry Devolin, Member of Parliament for Haliburton-Kawartha Lakes-Brock, today announced that a contract has been awarded by Parks Canada to study the past, present and future of water management on the Trent-Severn Waterway and make recommendations on alternative approaches to water management that may better address the interests of a full range of stakeholders while protecting the environment.

The Trent-Severn Waterway National Historic Site of Canada enables marine navigation between Lake Ontario and Georgian Bay by linking numerous rivers, lakes and man-made canals in central Ontario. Over 160 dams along the system, operated by Parks Canada, are used to maintain navigable water levels by drawing water from the Trent and Severn Watersheds. … In the past, the primacy of marine navigation was the overarching principle by which waters were regulated along the Trent-Severn Waterway and the reservoir lakes. Over the years, use of the watersheds by other interests has increased significantly and now includes hydroelectric generation, potable water for municipalities and shoreline residents, recreational and other tourism uses. Protection of the watersheds has emerged as a top priority and includes concerns about natural habitats, clean water, renewable energy and ecological sustainability.

"By studying the issues and concerns of the past and the present, Parks Canada is ensuring a healthy future for the Trent-Severn Waterway," said Mr. Devolin. "Residents and businesses along the waterway, including those on reservoir lakes in Haliburton County, will welcome this opportunity to have their voices heard."

Abstract of Parks Canada Press release

Figure 3.7 Select Recommendations from CEWF February 2007

Regarding the Management Structure for the TSW System:

- A recognition of the negative impacts water-level fluctuations have on the environment, water safety, access and economy including their effect on property rights and values.
- That the operation and management of the TSW should provide for the input of stakeholders within the watershed areas, including shoreline property owners and business owners.

Regarding Equitable Water Levels:

- That any proposal for future water management ensure that (lake levels are) high enough to:
  - Access waterfront property by boat where land access is not available.
  - Navigate safely within lakes, and between lakes through channels and waterways that are navigable at the start of the season.
  - Provide spawning grounds for fish and consistent habitats for wildlife.
- Ending the issuance of permits to draw large quantities of water from the watershed.

Regarding Adjusting Priorities to Current Conditions:

- That access to safe navigation on and between the watershed lakes be assigned equal priority to navigation within the TSW itself.
- That where necessary, federal or provincial legislation be enacted to protect and preserve environmental, economic and property interests.

Regarding Maintenance and Modernization of Infrastructure:

- The implementation of an immediate interim solution for improving water management. Suggestions include:
  - Decreasing the target levels in canals and locks, at once or as the season progresses.
  - Use of holding ponds and/or recycled water where possible.
- A timely review and assessment of infrastructure conditions and speedy repair where safety is a concern.

As of August 2007, the Panel on the Future of the Trent Severn Waterway is conducting public hearings. Its website (http://www.tswpanel.ca/) contains a number of Discussion Papers as well as an extensive Study by Ecoplans Ltd entitled *A Study of the Past, Present and Future of Water Management on the Trent-Severn Waterway National Historic Site of Canada*. This Study is of particular interest because of the attention it gives to the reservoir and 'flow-through' lakes. The TSW Panel site also contains the submissions to the Panel from the KLCOA and the CEWF.

3.6.1.1 Ecosystem Impacts

As reported in the Federation of Ontario Cottagers' Associations: (FOCA) Lake Stewardship Newsletter (Summer 2006), the management of lake levels alters the natural environment and can affect natural lake ecosystem functioning and system productivity. The manipulation of water levels can cause a variety of changes, such as water temperature, dissolved oxygen, and clarity; increased salinity, nutrient

enrichment, and runoff; erosion and property damage; obstruct migration routes for some species; expand the range of invasive species; disturb spawning behaviour and habitat; destroy diversity of habitats and species; and affect navigational waterways. Wetlands and natural shorelines are especially vulnerable.

The duration, frequency, and magnitude of water level changes are perhaps the most important factors that affect the health of a lake. High water levels create flooded conditions and increase wave action along the shoreline which can cause erosion, loss of vegetation, and increased nutrient enrichment and mercury deposition, as well as other water quality changes.

Extended periods of low water levels can expose sediments in the littoral (shallow) zone and change temperatures patterns throughout the lake, which will result in the loss of some optimal habitats. In shallower lakes, periods of low water can cause increases in salt levels, turbidity, and area of stagnant water, and cause increased wave action near the bottom of the lake. Increased dredging to facilitate navigation during these low-flow periods only exacerbates environmental impacts.

In terms of the natural habitat, fluctuating water levels create false shorelines for near-shore spawners such as lake trout. In the fall; if water levels drop after spawning, eggs can be left exposed to the elements or predators. Lake trout in Kennisis Lake are known to spawn between mid and late September. It is understood that MNR attempts to notify the Trent-Severn Waterway as soon as lake trout commence spawning so that water levels are not altered further.

A 'barren zone' along the shoreline is created between the high and low water marks: in addition ice sheets are known to lift whole sections of plant-life from just below the low water mark as the lake level rises prior to the spring thaw.

3.6.1.2 Water quality Impacts

Flooding of an area may increase the availability of habitat for spring spawners that use vegetated and near shore habitat to deposit their eggs. However, flooding also increases the influx of toxins, such as mercury, and nutrients into a lake, which may negatively impact the reproductive success of aquatic species.

It is true that, as head lakes, the water quality of the Kennisis Lakes is considerably better that that of many lakes further downstream. However, Little Kennisis Lake, and some of the bays suffer from algae and high tannin levels due to limited inflow, shallow water and bog features. Kennisis Lake is generally free from any major visible water quality impairment due to the fluctuating water level. (see also §4.1).

3.6.1.3 Navigational Hazards

Both Kennisis Lakes have a number of rock shoals and other navigational hazards. None are officially marked with buoys, although a few have been marked by lake residents with a variety of objects such as plastic bottles and highway construction cones.

In 2006 a survey of the lake at low water level identified 31 navigational hazards that do not exist at high water. Of these 23 were rocks, some in the middle of the lake or in the main navigational channel to the marina; 8 were extensive shoals that run out from the shore. (Map 4 - Kennisis Lakes Water Depth & Navigational Hazards available in separate file on website).

Despite the efforts of some individuals to mark hazards near their property, there is concern with the liability this may entail, and a feeling that navigational markers are the responsibility of federal authorities since the lake is understood to be a federally regulated waterway.

Given the 6 foot seasonal change in water level, hazards at high water are different from those at low water. In addition the marking of these hazards is difficult due to the need to design a marker that is effective at all water levels and is not 'taken out' by the winter ice.

Some residents believe that the lack of navigational markers is 'an accident waiting to happen' – and they do not want to have to wait until there is a serious personal injury before action is taken.

3.6.1.4 Shoreline Structures.

The 6 foot seasonal change in water level presents a variety of challenges to residents, especially with regard to docks. These challenges vary depending on the rate of drop-off at each property. Some residents lose reasonable boat access due to mud flats appearing in front of their property. For many residents, in order to operate a boat for the full summer season, an elaborate dock system is often needed, some with very long ramps. These large dock systems are hard to maintain and are also particularly prone to ice damage during the spring break-up which coincides with a rapidly rising lake level.

Overall Issue Statement: *Fluctuating water levels create navigational hazards, have a negative impact on the natural environment, cause problems for water-access properties and require the construction of extensive docks.*

Option 1: Increase the extent of water quality monitoring to include those features that are sensitive to fluctuating water levels.

Option 2: Document and monitor areas of erosion and approach landowners with possible solutions to protect their property and the environment.

Option 3: Document and monitor the overall impacts on plants, fish and animal life due to changing water level.

Option 4: Participate in the activities of the Coalition for Equitable Water Flow in order to promote communications with Parks Canada and other stakeholders and to work collaboratively on the development of educational materials regarding the importance of sound water management practices (see insert box re select CEWF recommendations).

Option 5: Lobby the federal government and TSW to reduce the overall variation of the water level (lower highs and higher lows) and help assure greater consistency of water levels during the summer season.

Option 6: Develop an informational pamphlet containing advice on dock designs for challenging locations, appropriate materials to use etc.

Option 7: Create a navigational hazards map for boaters.

Option 8: Seek to have one or more federal agencies take responsibility for marking navigational hazards on the lake, especially those caused by the lowering of the water level, but also those in narrow channels and at bridges.

Option 9: Encourage the protection of fish habitat by government agencies through more careful control of lake level in fall (inter-departmental issue).

4 NATURAL HERITAGE FEATURES

This section examines the natural heritage features of the Kennisis Lake watershed in order to identify potential issues and actions for the lake plan including constraints affecting present and new land development and resource management. Water quality, vegetation, streams, fish and wildlife and species at risk are discussed in this section.

4.1 WATER QUALITY

Lakes are dynamic systems, responding to both natural events (fluctuations) and artificial stimulus. All surface waters are subject to nutrient, sediment and toxic contamination, some of these come from the lake's own substrate or runoff from the landscape. In general, there is no single measure that constitutes "good" or "poor" water quality because qualifying water quality depends on its use (i.e., drinking water vs. navigational water vs. recreational use), and some water quality problems are treatable. Therefore, water quality is defined through the analysis of its chemical (nutrients, alkalinity, conductivity, total dissolved solids (TDS) and pH), physical (turbidity, colour and odour) and biological (chlorophyll a and fecal Coliform concentrations) content. Figure 4.1 lists all the important water quality parameters and their analytical relationship pertaining to the health of Kennisis and Little Kennisis lakes and their sub-watersheds; these parameters are further explained in the following text.

Both lakes have participated in the MOE's Lake Partner Program—an enhanced lake monitoring series—to improve information about the lake's water quality. During this period, lake volunteers have measured total phosphorus and chlorophyll a concentrations and water clarity depth profiles with a Secchi disc. This information will allow the early detection of changes in the nutrient status and/or the water clarity of the lake from impacts, and enable natural resource managers to determine the type and level of recreational activity that could be sustained by the carrying capacity of the lake.

Dredging and pollution, water level manipulation, increased boating and angling pressures, fisheries stocking, climate change, and on-going shoreline and infrastructure development have caused changes to the physical landscape as well as impacted the environmental health of the watershed, which may compromise the health of the aquatic systems downstream.

Kennisis and Little Kennisis lakes are both oligotrophic lakes because they are ecologically young lakes with low nutrient concentrations and deep, transparent waters. Oligotrophic lakes undergo a natural succession process of aging to become eutrophic lakes. Eutrophication is the process of basin filling and nutrient enrichment usually by nitrates or phosphates found in organic matter, silt and sediments from the surrounding environment and biological activity, i.e., algal blooms, which leads to increased productivity and aging of the lake (Addy and Green 1996). Throughout the eutrophication process the physical, chemical and biological composition of the lake change. This process may be accelerated by human induced land use activities—a cultural eutrophication.

Figure 4.1 Provincial Water Quality Objectives for the Kennisis Lakes

Factor/Objective	Kennisis Lake	Little Kennisis Lake
Secchi Depth (m) > 5 oligotrophic 3 – 5 mesotrophic < 3 eutrophic	**Mean = 8.4, Range from 6.6 to 10** ▪ **Un-enriched or nutrient poor** ▪ **Cool water** ▪ **Water is very transparent or clear**	**Mean = 5.1**, Range from 4.0 to 6.4 ▪ Border—moderately un-enriched ▪ Water is transparent ▪ Moving towards mesotrophic ▪ Possibly aging affects more pronounced because of shallower depth
Chlorophyll a (µg/L) < 3.5	**Mean = 0.93, Range from 0.5 to 1.4** ▪ **Un-enriched**	**Mean = 2.53**, Range from 0.7 to 5.1 ▪ Moderately un-enriched ▪ Moving towards mesotrophic
Total Phosphorus (µg/L) < 10 aesthetic < 20 nuisance algae	**Mean = 4.27, Range from 2.5 to 7.7** ▪ **Low nutrients** ▪ **Low concentration of algae & aquatic plants** ▪ **High transparency**	**Mean = 4.94**, Range from 3.3 to 7.5 ▪ Border –moderately low nutrients ▪ Low concentration of algae and aquatic plants ▪ Moderate transparency
Dissolved Oxygen (mg/L) Summer > 6 excellent > 4 good/fair < 3 poor	**Mean = 4.0** ▪ **End of summer lake trout habitat is impacted by lower D.O. concentrations due to nutrient enrichment, pollution or invasive species** ▪ **May impact fish reproduction and change ecological communities**	**Mean = 4.5** ▪ Impacts on end of summer fish habitat less of an issue
pH 6.5 – 7.5 excellent 5.5 – 6.5 good/fair 5.0 – 5.5 poor	**Mean = 6.4, Range from 6.1 to 6.7** ▪ **Slightly acidic** ▪ **Natural acidic conditions and pollution may lead to algae blooms and other ecological changes**	**Mean = 6.2**, Range from 5.9 to 6.8 ▪ Slightly acidic ▪ Natural acidic conditions and pollution may lead to algae blooms and other ecological changes
Alkalinity (mg/L) < 10 sensitive	**Mean = 1.76, Range from 1.43 to 2.5** ▪ **Highly susceptible to acidification**	**Mean = 2.0**, Range from 1.6 to 2.8 ▪ Highly susceptible to acidification
Organic Carbon (mg/L) < 5.0 DOC	**Mean = 2.62**	**Mean = 3.88**
Ammonia/Nitrogen (mg/L) < 1.0 nitrogen (TKN), <0.02 ammonium, <3.0 (proposed) nitrate	**Mean = 0.16 TKN; 0.01 ammonium; and 0.15 nitrate** ▪ **No negative impact**	**Mean = 0.21 TKN; 0.02 ammonium; and 0.19 nitrate** ▪ No negative impact
Conductivity (µS/cm) < 100 excellent	**Mean = 30.5** ▪ Soft water ▪ Low concentration of dissolved substances indicating a nutrient poor lake consistent with lakes on the Shield ▪ Individual nutrient levels should be monitored (e.g., sodium chloride – salt) to prevent pollution or accelerated eutrophication	**Mean = 33.1** ▪ Soft water ▪ Low concentration of dissolved substances indicating a nutrient poor lake consistent with lakes on the Shield ▪ Individual nutrient levels should be monitored (e.g., sodium chloride – salt) to prevent pollution or accelerated eutrophication

Early 20th century limnologists – scientists that study lakes and freshwater ecosystems, devised a classification system – the trophic status, to describe lake conditions as they proceed through the eutrophication process, and, therefore, encourage appropriate lake management efforts (Addy and Green 1996). At one end of the spectrum are lakes such as Kennisis and Little Kennisis lakes. These lakes are generally clear and deep with low nutrient concentrations and, consequently, low biotic productivity. They maintain high dissolved oxygen concentrations throughout the water column and throughout the summer. They are dominated by cold-water species such as lake trout and are lined with granite substrate and surrounded by peat soils. This lake type is called **oligotrophic**. Other terms synonymous with oligotrophic include non-productive, non-enriched, nutrient poor and young.

At the opposite end of the spectrum are productive, nutrient enriched, old **eutrophic** lakes. These lakes tend to be warm and shallow, and are dominated by bass, perch, pike and carp, devoid of cold-water species. Bottom sediments are commonly organic muck, and the deep waters become depleted of dissolved oxygen during the summer. These lake types are typical of some of the Kawartha Lakes and others bordering on or south of the shield.

Indications of eutrophication or a change in water quality include loss of native species, accelerated proliferation of organisms (algal blooms caused by excess of phosphorus or nitrogen compounds in the water), a change in chemical properties (such as acidification due to acid rain), or the presence of organisms that indicate unsanitary conditions (Coliform bacteria).

Measurements of various physical, chemical and biological parameters can be used to indicate changes in the lake's water quality. For example, Figure 4.2 illustrates a physical parameter (Secchi disc/water clarity) and a biological parameter (chlorophyll a concentration) and their relationship to oligotrophic and eutrophic lakes. The following sections identify the common tools used by water quality specialists, such as the MOE, to describe drinking water and aquatic habitat conditions in a lake.

Figure 4.2 Water Clarity and Chlorophyll a vs. Lake Type

Lake Status	Secchi Disc readings in metres (m)	Chlorophyll a Concentration in mg/L
Eutrophic Lake	0 – 3	> 4
Mesotrophic Lake	3 – 5	2 – 4
Oligotrophic Lake	> 5	0 – 2

Source: Ministry of the Environment, Self-Help Program (1986)

4.1.1 Indicators of Water Quality

4.1.1.1 Water Clarity

Water clarity is a widely accepted indicator of lake trophic status, which measures the level of turbidity or water clarity using a Secchi disc (a 20 cm in diameter, black and white disc, which is lowered into the water by a rope marked in 1 m increments to determine the depth to which light penetrates the water column). The common assumption is that the deeper the Secchi disc is visible from the surface of the water, the clearer and more oligotrophic the lake.

Clarity is affected by suspended physical particles (sediment) and biological particles (algae and bacteria). Physical particles can enter the water through natural or human caused soil erosion, waster discharge, or disturbance to an inflowing riverbed. Biological particles may enter the water through waste discharge (bacteria) or by proliferation of algae during warm summer months (algal blooms). High turbidity can increase water temperatures, reduce light levels for photosynthesis for plant growth, clog the breathing gills of fish and macro-invertebrates (benthic insects) and decrease habitat diversity.

Secchi disc readings have been collected by Kennisis Lake volunteers in association with the MOE's Self Help and Lake Partner Program between 1972 to 1998, including one reading from 2005 (Figure 4.2), and readings collected by MNR and MOE during lake inventories between 1972 and 1995. Secchi disc readings continue to be taken (2006) but a formal tracking and reporting program is not in place.

According to the data, water clarity has been very high for Kennisis Lake with Secchi disc readings ranging from 6.6 to 10.0 m, with annual reading averages in excess of 5 m. These oligotrophic conditions indicate that there is little or no natural colouring of the water from decomposing or decomposed organic material, which means that Kennisis is a nutrient poor lake (Michalski, 1996; MNR, 1987).

Little Kennisis Lake has slightly lower Secchi disc readings, which averaged between 4.0 to 6.4 m, and therefore a moderately high degree of water transparency. The degree of water clarity has ranged from moderately high to high during the period of record. The highest average Secchi disc readings occurred from 1974 to 1978 and the clarity in recent years has been lower with average Secchi disc readings ranging from 4 to 5.0 m. The reason for the decline in water clarity in recent years is not apparent since the densities of suspended algae have remained low for most of the period of record. Based on these results, Little Kennisis Lake would now be considered borderline between moderately enriched and un-enriched (MOE 1987).

4.1.1.2 Total Phosphorus and Chlorophyll a

Phosphorus and chlorophyll a concentrations are considered good indicators of a lake's physical and biological health because they measure the level of ecosystem productivity or the total weight of living biological material (biomass) in a water body at a specific location and time. Total phosphorus, chlorophyll a and water clarity are all inter-related components based on the fact that changes in nutrient levels causes changes in algal biomass which in turn causes changes in lake clarity.

4.1.1.3 Chlorophyll a

Chlorophyll a is the most common type of green pigment found in phytoplankton (photosynthetic microscopic algae which are the basis of the food chain on which all other life in the lakes depend). The amount of chlorophyll a in a lake sample is an estimate of the abundance of phytoplankton and/or biological activity in the water.

Average summertime chlorophyll a concentrations < 3.5 µg/L indicates low algal (phytoplankton) densities or oligotrophic conditions. Based upon the results of MNR lake surveys, MOE data, and the Self Help Program chlorophyll a concentrations for Kennisis Lake have been consistently low, with ranges from 0.5 to 1.4 µg/L between 1972 and 1994. These values are consistent with un-enriched lakes, with excellent water quality.
Values for Little Kennisis Lake were slightly higher with concentrations ranging from 0.7 to 2 µg/L (1972 to 1986), with occasional periods of short-term pulses

which increased concentrations to 5.1 µg/L during warm, calm periods in mid-summer (Michalski, 1996; MOE, 1985).

Disregarding the occasional pulse or data anomalies during the sampling time frame, both lakes would be considered un-enriched because of low densities of suspended algae. However, recent data is unavailable and with the increasing frequency of warm, drying summer conditions and intense rain events due to climatic changes and land use changes lakes within this watershed may be experiencing nutrient enrichment as a consequence. As well, Kennisis Lake has a low flushing rate of 0.19 times per year, which means that nutrients and pollutants are retained for longer periods of time increasing their hazardous impact potential for the ecosystem (MNR 1984). More frequent monitoring through the Lake Partner Program is recommended to trend chlorophyll a.

4.1.1.4 TP (Total Phosphorus, Phosphate)

Phosphorus is a natural element found in rocks, soils and organic material (e.g., human and animal waste). It is also found in storm sewage and runoff as a by-product of human created products and activities such as farm and industrial waste water, soaps and fertilizers.

Under natural conditions in aquatic systems, phosphorus is a nutrient in limited supply, which enables natural control of the size of algae and plant populations in lakes. Elevated levels of phosphorus leads to increased aquatic plant growth, which may result in excessive algae production, and foaming, which decreases water clarity and reduces the amount of available dissolved oxygen to bottom waters and the amount of available habitat for aquatic life. Algal blooms can also harm aesthetic and recreational values of lakes.

Total phosphorus (TP) is a measure of the combined amounts of all sources of organic and inorganic forms of phosphorus. The sister lakes of Kennisis and Little Kennisis all remained below the Provincial Water Quality Objectives (PWQO) total phosphorus threshold of 10 µg/L for the ice-free period for protection of aesthetic deterioration and below 20 µg/L to avoid nuisance concentrations of algae in lakes. Concentrations ranged from 2.5 to 7.7 µg/L for Kennisis Lake and 3.3 to 7.5 µg/L for Little Kennisis Lake during the 1972 to 1994 and the 2002-2005 survey periods. This is an indicator of oligotrophic conditions. Note that current scientific evidence is insufficient to develop a consensus for acceptable levels of total phosphorus, and that the thresholds are a guideline.

Any form of land use that deviates from undeveloped 'forested land' will contribute more phosphorus to a water-body because clearing forests or shoreline vegetation reduces the lands ability to retain phosphorus. Phosphate-based detergents and fertilizers; improperly sited and maintained septic systems; agricultural drainage; storm-water runoff; waste water treatment effluent; animal waste; road de-icers; and atmospheric deposition increase phosphorus levels in aquatic systems.

Although the available data indicates that Kennisis and Little Kennisis Lakes have not been impacted by excessive phosphorus loading, programs should be put in place to ensure that incremental phosphorus loading does not negatively impact water quality.

4.1.1.5 Nitrogen (Ammonia and Nitrates)

Nitrate (NO_3) is the principal form of nitrogen in natural waters and results from the complete oxidation of other nitrogen compounds including Nitrites (NO_2) and ammonia (NH_3). Nitrate is absorbed directly into surface waters through atmospheric deposition, from surface water runoff, wastewater effluents and industrial discharge, or through the seepage of groundwater to streams and lakes. In well-oxygenated waters, nitrate is readily taken up by aquatic plants and algae and used for growth. Nitrite, nitrate and ammonia levels are analyzed to determine water quality conditions to protect aquatic life. Another test for nitrogen in water (Total Kjeldahl Nitrogen or TKN) measures the sum of ammonia plus organic nitrogen.

Tests for ammonium (NH_4), nitrates (NO_3) and TKN have been performed on Kennisis and Little Kennisis Lakes during the early 1980s and 1990s by the MOE. Concentration values for ammonium exceeded the PWQO of 0.02 mg/L during the early 1990s for both lakes. If concentrations of nitrogen exceed 0.3 mgN/L in the spring, there is sufficient nitrogen to support summer algal blooms.

TKN were low and remained uniform throughout both lakes during the sampling period. Nitrogen levels ranged from 0.18 to 0.22 mgN/L in Kennisis Lake and 0.23 to 0.26 mgN/L in Little Kennisis Lake.

Early life stages of aquatic animals are more sensitive to nitrate than are juvenile and adult animals. Larval stages of amphibians appear to be particularly sensitive to subtle effects from nitrate exposure. For example, nitrate can reduce the overall size and weight of frog tadpoles by the time they change into adults. This may reduce their ability to compete for food or mates or to escape from predators.

In most Canadian lakes and rivers, concentrations of nitrate are less than 4 mg/L litre of water. Higher levels, which may exceed the freshwater guideline of 13 mg/L, typically occur in waters near heavy urban or agricultural development, or immediately downstream from municipal wastewater discharges. As nitrate concentrations in groundwater are most often higher than in surface waters, particular attention should be paid in areas where groundwater comes into contact with surface waters (i.e., up-wellings in stream beds).

4.1.1.6 Dissolved Oxygen and Temperature Profiles

Most aquatic animals breathe oxygen that is dissolved into the water from the atmosphere or produced by photosynthetic activities of aquatic plants. A consistently high level of dissolved oxygen in the water is, therefore, critical to support aquatic life functions and is considered a prime indicator of overall water quality.

Dissolved oxygen levels vary with water temperature and depth, flow velocity, shape of the lake, and the presence of aquatic plants and animals. Studies have shown that fish require at least 5-6 mg/L of dissolved oxygen. Humans can affect the amount of dissolved oxygen in water through the addition of oxygen-consuming organic wastes to the water, such as sewage and food wastes, nutrients and chemicals, and by altering flow regimes.

If lakes lose oxygen faster than it can be replaced by photosynthesis and atmospheric exchange, the lake may become anoxic, without oxygen. When anoxia occurs, a chemical reaction takes place in bottom sediments, which releases sediment-bound phosphorus into the water column and perpetuates the cycle further. Oxygen levels are most critical for the protection of cold-water fish species like lake trout and a decrease in deepwater oxygen levels below 4 mg/L, therefore, reduces the availability of lake trout habitat. Temperature and dissolved oxygen are important limiting factors for determining lake trout habitat (MNR 1985). Water temperature is also a fundamental biological determinant that regulates habitat selection by aquatic animals.

Oxygen profiles are completed to determine if oxygen depletion is a factor, with respect to ecosystem health, and to assist in the management of cold-water species. Fisheries managers in Ontario recognize that the most critical water quality condition for lake trout materialize in late summer. At this time, water temperature and dissolved oxygen combine to restrict that portion of the lake having suitable habitat for lake trout.

Thermal stratification occurs in both lakes with a thermocline (sharp temperature gradient below the water surface) forming in June and persisting to the end of September at an approximate depth of 7 metres (MNR 1978-1993). In general, the location of the thermocline fluctuates with temporary or seasonal temperatures; during the summer months the thermocline tends to be deeper and during the spring freshet it may be closer to the surface or undetectable during turnover. Locating the thermocline will give an indication of the location of optimal (water temperatures < 10° C and > 6 mg/L of dissolved oxygen) habitat for cold-water species such as lake trout.

In general, oligotrophic lakes are transparent, deep with large amounts of dissolved oxygen. Based upon MNR and MOE data collected from the early 1970s to the mid-1990s, the analysis of the average dissolved oxygen concentrations and temperature readings for Kennisis and Little Kennisis Lake suggests that these lakes' have cold-water thermal regimes, with high concentrations of dissolved oxygen throughout the majority of the water column, providing both useable and optimal lake trout summer habitat. Dissolved oxygen concentrations in the bottom waters at approximately 45 m for both Kennisis and Little Kennisis Lake during late summer averaged 4.0 mg/L or greater. Concentrations from 8.5 to 12.0 mg/L were recorded throughout the remaining water column in both lakes.

This translates to healthy dissolved oxygen levels and an adequate cold water environment to sustain lake trout.

4.1.1.7 pH

Erosion of the lake basin's bedrock, leaching from surrounding soils, biological activity and atmospheric deposition are often the main source of chemical species which determine the pH of the water. For example, peat soils and granite rock promote acidic (low pH) conditions and limestone bedrock promotes alkaline (high pH) conditions. All plants and animals are adapted to a certain pH range, usually between 6.5 and 8.0. A change in pH outside the normal range of a water body will cause a loss of species depending on their sensitivity. Human caused changes in

pH may result from disturbance to acidic soils, industrial wastes, burning of fossil fuels (acid rain) and climate change (Horne and Goldman, 1994).

The PWQO states that pH should be maintained within the 6.5 to 8.5 range in order to protect aquatic life and recreational users from acidic or alkaline conditions (MOE 1994). The PWQO indicates that water with a pH of 6.5-7.5 is excellent, 5.5-6.5<8 (alkalinity) is good/fair, and 5.0-5.5, 8.8-9 (alkalinity) is poor. Based upon MOE and MNR sampling done in the mid-1980s and early 1990s and independent research during 2001 and 2002 Kennisis and Little Kennisis Lakes have a pH average of 6.3 and 6.1, respectively. These pH values are slightly on the acidic side. According to the 30 year pH reading range of 6.1 to 6.5, both lakes seem to be naturally acidic because of the basin's geology, which makes it highly susceptible to atmospheric deposition or run-off of acidic compounds. The pH readings for the Muskoka-Haliburton Region averaged at 6.6 for 53 sampled lakes, ranging from 5.6 to 7.3 (Paterson et al., 2001).

4.1.1.8 Alkalinity

Alkalinity (carbonate-bicarbonate concentration) is a measure of the acid-neutralizing (buffering) capacity of an aquatic system. Alkalinity can also be generated in soils, groundwater discharge and inputs from runoff. This is especially important during the spring in order to protect aquatic organisms in their primary stages of life against an influx of large amounts of acidic snowmelt and runoff from the adjacent watershed. Aquatic species that are very sensitive to acidification include bass (smallmouth and rock) and lake trout (DFO, Experimental Lakes Area, 2006).

Lakes on the Canadian Shield typically have low acid neutralizing capacities because of the insoluble granite-based bedrock. The soils on the Canadian Shield are typically shallow and acidic due to the organic composition of the area.

The PWQO standard for alkalinity indicates that lakes with less than 10 mg/L may be susceptible to acidification, especially lakes with alkalinity levels below 2 mg/L. Therefore, if a lake has a high alkalinity level, it can resist pH changes caused by acid precipitation.

Alkalinity concentrations during the early 1980s and 1990s ranged from 1.2 to 2.5 mg/L for Kennisis Lake, and 1.6 to 2.8 mg/L for Little Kennisis Lake. The mean alkalinity concentration for the Muskoka-Haliburton Region is 6.2 mg/L, ranging from 0.4 to 23.0 mg/L (Ref. 3 2001). The mean for both lakes fell below the 2 mg/L threshold, indicating that these lakes are susceptible to acidification and extremely sensitive to acid rain and deposition of strong acids (MOE, 2004 and Paterson et al., 2001).

Human-caused acidification of lakes can cause long-term alterations to algal and fish communities by changing their abundance, species composition and spatial distribution. Sensitive species such as bass and lake trout will probably not reproduce (Michalski 1996). As a lake acidifies (pH and alkalinity concentrations go down and sulphate and nitrates go up) cyanobacteria are replaced by filamentous green algae species in the littoral, benthic areas (near shoreline and lake bottom). It is believed that mats of floating clouds of algae, known as

metaphyton, shift primary production in the littoral zone of lakes during summer months.

In 2005, notable blooms of metaphyton algae, commonly known as 'cotton candy algae' were documented for many shallow areas along the shoreline of Kennisis Lake. Other sources have contributed these types of blooms as a side-effect of a changing landscape and climate, and invasive species. For example, a dry, warming climate increases the events of heavy rains, which create flash flood conditions washing nutrients into the lake and drought conditions reduce the volume of water in the lake, increasing the concentration of certain nutrients.

Metaphyton algae are not toxic, but are also not a favoured food resource because most grazers (zooplankton) have a hard time digesting filamentous algae; therefore, these algae species accumulate. Large mats, however, can over shadow substrate-based vegetation, out-competing local species and changing the local community. These mats also become stagnant and make recreational swimming unpleasant.

When pH falls below 6.0 and alkalinity concentrations are reduced metals and compounds such as aluminium, nitrates and sulphates are released into the water column and can become toxic to aquatic life if sufficient quantities are present. Nitrates in acid precipitation and runoff can accelerate the eutrophication process in unproductive lakes. Under low oxygen conditions, the chemical changes are intensified.

4.1.1.9 Carbon (Dissolved and Total Organic)

The natural world is carbon-based, and carbon affects all biogeochemical processes and nutrient cycling. Carbon is, therefore, an important water quality indicator since organic matter (both dissolved and particulate organic carbon) plays a major role in the ecology of aquatic systems. Carbon is measured as dissolved and/or total organic carbon (DOC and TOC), the measurement of the carbon dioxide released by chemical oxidation of the organic carbon in a water sample. It's what gives lakes a deep amber colour, which helps to limit the penetration of light down the water column by absorbing ultra-violet radiation. In natural waters, DOC/TOC ranges from 1 to 30 mg/L with values less than 3 mg/L representing oligotrophic conditions.

Kennisis and Little Kennisis lakes were measured for DOC (dissolved organic carbon), only. Based on the samples taken in the early 1980s and 1990s, measurements in both lakes fell well below the PWQO standard of 5 mg/L. The data indicates that DOC levels are much higher for Little Kennisis, peaking at 4.9 mg/L in 1986 and 4.0 mg/L in 1991. In general, both Haliburton and Muskoka lakes have sustained similar trends over the past decade of increased concentrations of DOC from 4.3 to 4.8 mg/L, respectively (MNR 2001 and Patterson et al).

4.1.1.10 Conductivity

Conductivity is a measure of the quantity of dissolved substances in water. The major contributing ions are calcium (Ca), magnesium (Mg), sodium (Na), potassium (K), carbonate (CO_3), sulphate (SO_4) and chloride (Cl). These ions are leached from

rocks and soils in a stream's watershed and are also deposited from atmospheric precipitation or dust, surface runoff, and industrial waste. Some minerals, such as sodium and potassium are not toxic, high concentrations do strongly indicate possible contamination from more damaging compounds. Other metals and chemicals sampled, which also measure hardness and pollution, include silicon (Si), zinc (Zn), aluminium (Al), copper (Cu), nickel (Ni) and lead (Pb) were measured for both lakes in the early 1980s and 1990s (MOE 2004).

Lakes with conductivity levels at <100 µS/cm (umhos/cm) are excellent. Conductivity levels for Kennisis and Little Kennisis lakes were measured during the 1980s and 1990s and ranged between 29.0 and 31.0 µS/cm (umhos/cm). Averages for the Muskoka-Haliburton Region were calculated during a 2001 study of 53 lakes; the mean was measured at 43.3 µS/cm (umhos/cm), with ranges between 22.2 and 87.0 (Ref. 3 2002).

Current measurements for both lakes have not been provided. Current measurements of conductivity would be beneficial because increases in conductivity concentration would be a good indicator of landscape changes such as erosion of bedrock, sedimentation or pollution, and climate change. Increased measuring and trending of conductivity is strongly recommended.

4.1.2 Water Quality Conclusions

None of the mean concentrations measured by the MOE exceeded any of the Provincial Water Quality Objectives and, therefore, verify oligotrophic conditions. However, annual measurements for aluminium and iron at certain sampling stations in Kennisis Lake exceeded the PWQO in the early 1980s. No current data are available.

Based upon the Secchi disc depth readings, the low chlorophyll a and total phosphorus concentrations, these lakes are typical of the unproductive, clear waters of Canadian Shield lakes. In terms of these parameters, and the lakes' flushing rate and geology these lakes have maintained excellent water quality for recreational use, consumption, as well as excellent conditions to support cold-water fisheries over the 30 year sampling period. However, these conclusions do not take into consideration the influence of land use.

In general, water quality trends are influenced by watershed characteristics, (presence of wetlands), biological activity and by changes in climate. Recent changes in global climate patterns have been documented and noticeable land use changes within the watershed have occurred, as well as the presence of new aquatic species; these water quality influences have not been taken into account because of the lack of long-term annual data collection.

Without long-term base data and continuous monitoring using standardized techniques, a long-term range health assessment is impossible and the mechanisms contributing to lake changes cannot be identified to implement appropriate management options. Protecting and conserving the natural systems that work together to maintain water quality should be made a priority by governing bodies and local communities because local and downstream ecosystems

and communities depend upon appropriate and responsible management decisions.

While there is general agreement that the use of pesticides, herbicides and fertilizers needs to be reduced, there is a lack of consensus as to how to do this. However a 'best practices' review of leading communities in Canada, the United States and Europe clearly indicated that only those communities that passed a by-law and supported it with education had a high degree of success (http://www.toolsofchange.com/English/CaseStudies/default.asp?ID=117).

4.2 VEGETATION

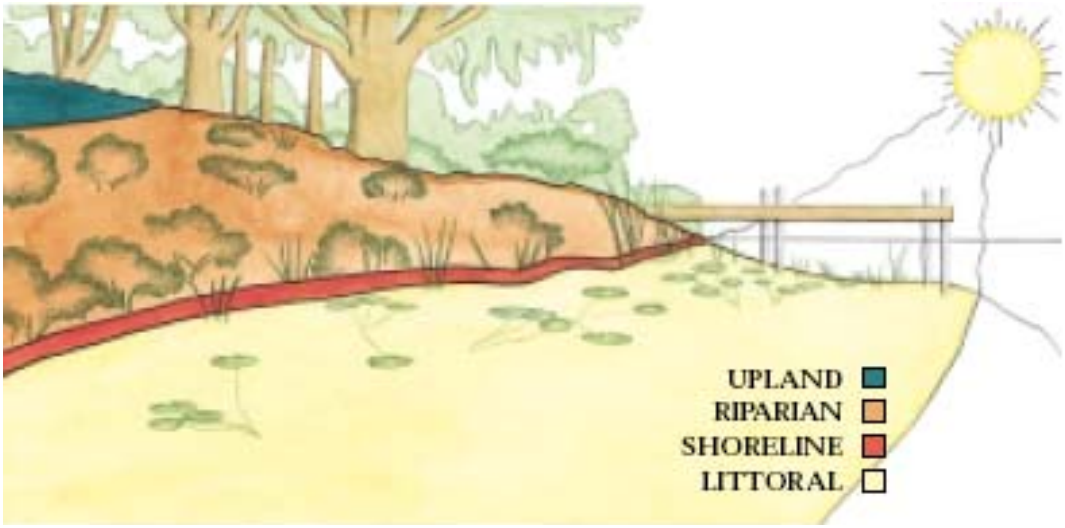
Kennisis and Little Kennisis lakes are located within the Haliburton Highlands portion of the Great Lakes-St. Lawrence Forest Region of Ontario. The vast majority of this area is forested and non-agriculture mainly because of the rock outcrop and associated shallow soils, rough topography, stones and wetlands. The forests are in a transitional zone between the southern deciduous forest and the northern coniferous boreal forest of Ontario. The species are tolerant hardwood, containing a number of boreal influences. Historically, mining and logging were a dominant industry in the past, with the last major clear cut occurring 60 to 100 years ago. The area was logged extensively for Eastern White Pine in the late 1800's and extensive lakeshore development commenced in the Haliburton region in the late 1940s.

The landscape is speckled with tree and shrub species tolerant to extreme conditions, such as fluctuating rain events and nutrient-poor or acidic soils. The riparian, shoreline and other wetland areas support hardwood and mixed (conifer-hardwood) forests whose canopies typically include red maple, balsam poplar, black ash, eastern white cedar, black spruce, tamarack and speckled alder. In the dryer, well-drained upland sites species, the forest canopies typically include sugar maple, white and red pine, jack pine, white birch, American basswood, white spruce, trembling and large-toothed aspen, red oak and American beech. The exposed bedrock outcrops along the shoreline support characteristic associations, typical of the Georgian Bay shoreline, consisting of grasses, ferns and shrubs (poverty grass, common juniper, bearberry, bush-honeysuckle, blueberry, bracken fern, and sweet fern) (Michalski 1996).

Terrestrial and aquatic vegetation found in the water, along the shoreline, and on the uplands adjacent to a lake is important for maintaining the health of a lake system. Plants provide shade in the littoral zone, which decrease water temperatures; filter runoff from the landscape; prevent shoreline erosion; provide food and shelter for fish and wildlife; and increase the beauty of the surrounding landscape.

The lakes' shorelines contain three distinct vegetated zones – littoral, riparian and upland – each with its own characteristic communities of organisms. Although each of these zones contributes separate functions to the health of the lake, it should be noted that the shoreline is a natural progression of each zone, seamlessly transitioning into the next. Therefore, alteration of any zone affects the entire shoreline by diminishing the shore's ability to support life on the lake.

Figure 4.3 Shoreline Zones



4.2.1 Littoral Zone

The littoral zone extends out from the shoreline into the lake towards a point where sunlight is no longer capable of penetrating the water column down to the lakebed (bottom). It is a highly productive transitional zone between terrestrial and aquatic ecosystems. Various submergent and floating aquatic wetland plants, such as duckweed, arrowhead, pickerel-weed, bulrush, cattail, water milfoil, water lily, pondweed, horsetail, sedges and grasses, grow within the Kennisis Lake littoral zone pertaining to small bay and shoreline wetland areas (Michalski, 1996; MNR, 1968-1991; Lake Plan Boat Tour, 2005). Unfortunately, both lakes have very minimal aquatic vegetation along the majority of the main lakes shorelines. This is in part due to the significant variation in lake levels during the year as the lake is drawn down to feed the Trent Severn Water System (see §3.6).

Aquatic plants are the lungs of the lake and capture nutrients, sediments and toxins from the terrestrial and atmospheric component of the watershed. Plants, rocks, branches and logs scattered along the shoreline provide in-lake shade and cover for fish, food for wildlife, and habitat for algae and animals to adhere to. Many plants and animals such as frogs, turtles, fish, and numerous insects fulfill important portions of or their entire life-cycles within this zone.

4.2.2 Benthic (Lake Bottom) Community

Aquatic macro-invertebrates or large insects, such as mayfly, stonefly, caddisfly, damselfly and dragonfly nymphs, are not only a great food source for fish and wildlife but are also good indicators of water quality health. These insects, much like lake trout, require cold, well-oxygenated water to survive. If water quality deteriorates, these species respond quickly after minimal exposure and will disappear from the population to be replaced by more tolerant species, such as worms, leeches and snails. These insects make-up a small part of the benthic community found in the substrate and water column of the littoral zone. It is this

rich diversity of habitat and food sources that provides for the abundance of fish and wildlife in our lakes.

4.2.3 Riparian Zone

The combination of trees, shrubs and herbaceous plants in lowland speckled alder-willow-dogwood thickets, wet grass-bulrush meadows, cattail marshes and leather-leaf-sweet gale shore fens along the natural shoreline makes up the riparian zone of the lake, which is designated by a minimal to 30 metre set-back (Michalski, 1996). The riparian zone is an exceptionally important portion of transitional land between the lake, river, stream, floodplain or wetland and the upland ecosystems.

The typical vegetation of the riparian zone of Kennisis and Little Kennisis lakes' shoreline includes a mixed forest of deciduous and coniferous tree and shrub species such as eastern hemlock, eastern cedar, white birch, poplar/aspen, speckled alder and other upland species tolerant to shade and/or wet soil conditions. The complex web of tree roots and foliage help to control erosion from fluctuating water levels, large wakes and heavy rains and winds, as well as filter toxins, capture sediment and buffer surface runoff. The riparian vegetation provides shelter and food for wildlife, and important corridors to move between core habitats such as deer yards. Leaf litter also helps to maintain the nutrient cycles and provide micro-habitats in the littoral zone.

There is a significant relationship between good water quality and habitat availability and the density of shoreline vegetation in the riparian zone. Water quality is maintained, which enable the aquatic systems to support life and life cycles, when riparian vegetation remains intact.

Maintenance of well vegetated buffers between septic fields and the lake will mitigate nutrient inputs, although most will eventually reach the lake via ground water or leaching (MNR, 1991).

MAPLE Inc. (Mutual Association for the Protection of Lake Environment in Ontario Inc.) is an initiative with close links to the Rideau Valley Conservation Authority. In addition to a shoreland restoration program, they have developed a Shoreline Classification Survey Manual which is available from http://www.rideauvalley.on.ca/maple/products/index.html.

The township of Lake of Bays has introduced a 'Development Permit System', one aim of which is to protect natural vegetation in the shoreline buffer zone. It is understood that the Municipality of Dysart et al is monitoring this approach. The implementation of a tree-cutting bylaw may however be a more effective approach because it is not limited to development situations.

4.2.4 Upland Zone

The upland zone is the periphery of a lake's riparian zone. It is an area typically forested with trees and slopes having well-drained soils in comparison to those found in the riparian or lowland areas. The tolerance level of each species to varied environmental factors (soil type, bedrock and topography, depth of water table, precipitation and shade) determines the species composition of the upland zone.

Upland and riparian trees filter an estimated 90 % of run-off from winter snow and rains before it enters the lake. Protecting this buffer ensures that silt and sediments from shoreline development do not reach the lake.

The areas of deeper, well-drained soil support highly productive stands of Sugar Maple commonly mixed with a variety of other hardwoods and conifers. While common hardwoods cover the hilltop and side hill areas in the upland zone of the lakes, conifers are predominantly found in low lying areas and along shorelines. While 70% of the forests in the Kennisis Lake watershed are hardwood dominated, only 30 % feature conifers prominently. This ratio is reversed along the shorelines of Kennisis Lake due to the dominance of conifers in shoreline areas (Schleifenbaum, 2006).
In total, 23 commercial tree species are growing in the forests surrounding Kennisis Lake. This natural variety is supported by the range of landforms described above, as well as the wide amplitude of growing conditions sustained by the local tree flora.

The forests of the Haliburton Forest and Wild Life Reserve Ltd. surround all of Little Kennisis and the northern and eastern shorelines Kennisis Lake.

The effects of higher density development, which has increased lot coverage and intensity of use, results in upland forested areas receiving more severe impact than would be felt with lower density development. Removal of vegetation creates conditions favourable for the introduction of hardy ('weeds') invasive species. Other activities that negatively impact plant communities are the addition of sand, rocks and retaining walls; planting non-native plant species; crib and cement docks that destroy habitat; and the artificial regulation of water levels, which creates an abnormal "false shoreline" along the lakeshore.

The Kennisis Lake shoreline has been subjected to many disturbances, including shoreline development, dam construction, artificial water levels, increased recreational activities, vegetation removal, acid precipitation, and increased sediment runoff, over the past century, and the alteration of the lake area continues to have a negative impact on its long-term health.

The shorelines of Kennisis and Little Kennisis Lakes are typical of many lakes on the shield and within MNR site-district 5E-9, with shallow till and rock ridges of varying heights dominating the landscape (MOE, 1988). Both lakes have irregular shorelines, and there is little shallow water for aquatic plant production, except in the few bays and stream inlets. Steep, vertical rock cliffs reaching heights of 440 metres above sea level, or 33 metres above the lake level, are found along the shorelines of Little Kennisis, especially along the southern half of the lake near the outflow to Kennisis Lake. Moderately, sloping treed shoreline ridges dominate Kennisis Lake. Both lakes have exposed rocky shoreline outcrops, largely of granite-origin, and pockets of small wetlands in sheltered bay areas and natural, sandy beaches, remnants of glacial outwash, scattered throughout the periphery of the lakes.

Figure 4.4 Trees, Shrubs and Herbs Common to the Watershed

Common Name	Latin Name	% Area Coverage
Red or Soft Maple	*Acer rubrum*	*7*
Sugar or Hard Maple	*Acer saccharum*	*39*
Mountain Maple	*Acer spicatum*	--
Yellow or Golden Birch	*Betula alleghanensis*	*5*
Paper Birch	*Betula papyrifera*	--
American Beech	*Fagus grandifolia*	*12*
Black or Swamp Ash	*Fraxinus nigra*	*1*
White Ash	*Fraxinus americana*	*1*
Northern Red Oak	*Quercus rubra*	*3*
Eastern Hemlock	*Tsuga canadensis*	*13*
Balsam Fir	*Abies balsamea*	*2*
Tamarack or Larch	*Larix laricina*	*>1*
White Spruce	*Picea glauca*	*2*
Black or Swamp Spruce	*Picea mariana*	*2*
Red Spruce	*Picea rubra*	*1*
Eastern White Pine	*Pinus strobus*	*3*
Red Pine	*Pinus resinosa*	*>1*
Balsam Poplar	*Populus balsamifera*	*1*
Ironwood	*Ostrya virginiana*	*1*
Large-tooth Aspen	*Populus grandifolia*	*2*
Trembling Aspen	*Populus tremuloides*	*2*
Black Cherry	*Prunus serotina*	*1*
Eastern White Cedar	*Thuja occidentalis*	*>1*
Basswood or American Linden	*Tilia americana*	*1*
White Elm	*Ulmus americana*	*>1*
Striped Maple	*Acer pennsylvanicum*	--
American Fly-honeysuckle	*Lonicera canadensis*	--
Partridge-berry	*Mitchella repens*	--
Bunchberry	*Cornus Canadensis*	--
Leatherleaf	*Chamaedaphne calyculata*	--
Beaked Hazelnut	*Corylus cornuta*	--
Hobblebush	*Viburnum alnifolium*	--
Wood Sorrel	*Oxalis Montana*	--
Sensitive Fern	*Onoclea sensibilis*	--
Wild-lily-of-the-valley	*Maianthemum canadense*	--
Wild Sarsaparilla	*Aralia nudicaulis*	--
Northern Starflower	*Trientalis borealis*	--
Spotted Jewelweed	*Impatiens capensis*	--
Goldthread	*Coptis trifolia*	--
Rose Twisted-stalk	*Streptopus roseus*	--
Marsh St. John's Wort	*Triadenum fraseri*	--
Grandular Wood Fern	*Dryopteris intermedia*	--
Shining Clubmoss	*Lycopodium lucidulum*	--

Source: Peter Schleifenbaum, 2006 and Michael Michalski Associates, 1996

4.2.4.1 Natural Areas

A 'natural area' is identified as having significant or unique natural heritage features. The Kennisis River, is a 100 ha Candidate Life Science ANSI (Area of Natural and Scientific Interest) of Regional Significance located at the outflow of the Kennisis and Little Kennisis Lakes' watershed

The Kennisis River flows down from Kennisis Lake through a narrow hemlock and cedar lined course for about 1 km before widening out into the flooded-affected, marsh, sand-bottomed eastern end of Red Pine Lake. Standing chicos (stumps) from the flooding created by the Red Pine Lake dam are common along the shore, which leads up into a disturbed tolerant deciduous and mixed upland forest (Sugar Maple, Eastern Hemlock, and Yellow Birch). Aquatic vegetation varies from marsh and swamp elements in flooded bays to sparsely-distributed deep-water vegetation in the main river channel (Brunton, 1991 and NHIC, 2006).

Just beyond the south-west boundary of the Kennisis watershed, and accessible by canoe or by trails from Kennisis Lake's West Shore Drive, lies the Clear Lake Conservation Reserve. The reserve consists of 1,307 hectares of land located within the Leslie M. Frost Natural Resources Centre and contains a provincially significant concentration of old growth eastern hemlock and white pine. Reportedly, this is the best representation of these forest communities in the area, better than similar but smaller stands within Algonquin Park.

The relatively inaccessible forest surrounding Clear Lake provides habitat for species such as red-shouldered hawk, pine marten and pileated woodpecker. The reserve has only seen minor disturbance in the late 1800's when some white pine were removed along the northern waterways. The extensive aging of the hemlock stands shows an all-aged structure from sustained recruitment in the absence of disturbance. It also contains the headwaters of five small watersheds and a rare form of lake called a 'meromictic' lake (Blackcat Lake), in which there is no spring or fall turn-over of water. The sediments at the bottom of meromictic lakes remain well-preserved and are significant in the study of past ecosystems. Clear Lake and Blackcat Lake contain "pure" populations of Northern Redbelly Dace.

4.3 WETLANDS

Wetlands are land types such as areas of shallow open water, swamps, marshes, fens and bogs, including peat lands. They occur intermittently across the landscape along lakes, rivers and streams, or in any area where the ground water table is close to the surface. The Kennisis Lakes have all four wetland types present. Wetlands provide important habitats to a variety of species, act as sponges holding large quantities of water (releasing water slowly to prevent erosion and flooding and to allow time for water purification), and act like giant filters. Threats to wetlands include development; draining, dredging and filling to create fertile land; peat harvesting; non-native, invasive species; climate change; and air and water pollution.

All these special features and functions result in substantial ecological, social and economic benefits, and opportunities for the local residents including fishing, boating, other recreational activities, wildlife viewing, and an overall appreciation for nature. The protection of wetlands is therefore a crucial component of watershed health.

According to the 2005 Provincial Policy Statement (PPS), all municipal official plans must protect natural features and areas for the long term; therefore, development and site alterations shall not be permitted in significant wetlands on or off the Canadian Shield (p. 15). The PPS provides policy direction on matters of provincial interest related to land use planning and development. Development and site alteration may be permitted on adjacent lands (120 m from the wetland boundary) provided that an Environmental Impact Assessment demonstrates no negative impact on the natural features or their ecological functions. However, the PPS does not provide similar protection for regionally or local significant wetlands, and this must be considered in the municipal official plan and zoning by-law.

4.3.1 MNR's Wetland Evaluation System – Provincially Significant Wetlands

The wetland evaluation system is based upon scientific criteria and was primarily designed to serve the needs of Ontario's planning process. The evaluation system recognizes the critical role of wetlands in maintaining healthy ecosystems. The system identifies and inventories the biophysical features or values of a wetland, and provides a way of rating wetlands relative to one another using a point system that quantifies these wetland values. The Ontario Wetland Evaluation System identifies four wetland types: marsh, swamp, fen and bog.

Kennisis and Little Kennisis Lakes are on the Precambrian/Canadian Shield and MNR Site Region 5E-9 and, therefore, fall within the guideline stipulated within the Northern Manual—Ontario Wetland Evaluation System. In total an estimated 200 wetlands can be found in the Kennisis lake watershed. This number does not include small ponds, which some include in the wetland category if they are greater than 0.5 ha in size.

In 1990 Haliburton Forest and Wild Life Reserve Ltd. entered into a partnership with Ducks Unlimited in which over 300 wetlands throughout the forest were mapped and assessed. Since 1994 the federal Canadian Wildlife Service has outlined a 10,000 acres area within Haliburton Forest, which is being monitored annually and on a long-term basis for environmental change as expressed by changes in its wildlife/ waterfowl occupancy, aquatic life and water quality.

To date no wetlands have been designated provincially significant in the Kennisis Lake watershed. Wetland designation of the watershed area by the MNR should be pursued.

Going forward, it is extremely important to map and initiate the protection of all local wetlands, which are so vital to the health of the lake. Specific initiatives must be in place to ensure that provincial and local zoning bylaws are enforced to ensure wetland protection.

4.3.1.1 Marshes

Marshes are wet areas of standing or flowing water found along shorelines and inlets of lakes, rivers and ponds, and are frequently interspersed with channels or pools of deep or shallow open water (Environment Haliburton, 2004; MNR WET, 1994). Marshes may be bordered by a peripheral band of trees and shrubs, but the predominant vegetation consists of a variety of emergent, non-woody plants, including cattails, reeds, grasses, sedges and rushes. Water remains within the rooting zone of these plants for most of the growing season; marshes are the most productive wetland habitat.

A band of low shrubs, such as sweetgale, red osier, leatherleaf and winterberry, may also occur in marshes along the shoreline. These plants are excellent shoreline buffers to trap surface nutrient and pollutant runoff, provide stability against erosion, and a hedge row against geese habituation (source). Maintaining these shoreline buffers is the best quick-fix for protecting water quality and habitat conditions.

Within the open water areas, floating or submerged plants dominate, such as water milfoil (Myriophyllum species), waterweed (Elodea species), pondweeds (Potamogeton species), water lilies (Nymphaea and Nuphar species), water plantain (*Alisma plantago-aquatica*) and broad-leaved arrowhead (*Sagittaria latifolia*). These plants provide excellent fish nursery and rearing habitats, turtle nesting sites, and moose feeding grounds.

An extensive Marsh area called “Archer’s Marsh” can be visited north of Wolf Lake within Haliburton Forest (Schleifenbaum, 2006).

4.3.1.2 Swamps

Swamps are wooded wetlands and may be isolated or found along rivers, streams and lakes. The soil is usually saturated due to fluctuating water levels in spring; especially after the snow melt and rain events have flooded the area. The substrate will usually remain waterlogged, but in some areas soils may dry due to the dryer conditions of late summer or a receding water table. Swamps are often nutrient rich and productive.

By definition, swamps have a 25% or more cover of trees and tall shrubs, which distinguish it from a marsh. The vegetation is composed of predominantly coniferous trees – black spruce and tamarack, as well as deciduous trees – black ash and silver maple, and tall shrub thickets, commonly speckled alder, herbs and mosses.

A typical swamp is the extension of Paddy’s Bay to the north into its drainage basin (Schleifenbaum, 2006).

4.3.1.3 Bogs

Bogs are hummocky wetlands commonly found in northern parts of Ontario, north of the Canadian Shield, and are peat covered areas with a high water table and a general lack of nutrients. Bogs rely solely on atmospheric deposition for its nutrient and moisture supply; therefore, as a result, bogs usually have low

biological diversity (often having less than 12 different plant species), and the surface water and underlying peat are strongly acidic and "nutrient-poor" (deficient in mineral soils). Due to poor drainage and the decay of plant material the surface water of bogs is strongly acidic.

Bogs are characterized by Sphagnum mosses, ericaceous (heath) shrub species, such as bog laurel (*Kalimia polifolia*), sheep laurel (*Kalmia angustifolia*), bilberry (*Vaccinum myrtilloides*) and swamp blueberry (*Vaccinium corymbosum*), and cotton grasses and sedges, which are tolerant of acidic soils and low nutrients; "acid-loving plants". Bogs may also support trees, but never exceeding 25% of the total area; black spruce often dominates the upper or crown vegetation of some older peat bogs as well as Tamarack , but only in small numbers and, usually, only along the periphery of the bog.

Bogs are generally extremely rare in southern Ontario. Bogs are therefore rare in the Kennisis Lake watershed and only occur in small areas. Some of the largest bogs in the area surround Powderhorn Lake, north of Kennisis Lake, but outside its watershed (Schleifenbaum, 2006).

4.3.1.4 Fens

Fens are characterized by a high water table with slow or restricted internal drainage by seepage down low gradients. Fens are characterized by surface layers of peat with varying degrees of decomposition. The water and peat found in fens are less acidic than in bogs, and often are relatively nutrient rich since they receive water through cold, groundwater discharge from adjacent uplands. Their surface waters can be acidic or alkaline. Water slowly flows in and out of these wetlands to a point where they may dry-up completely under drought conditions.
Fens are more nutrient rich than bogs and therefore more commonly support trees. Fens are dominated by sedges and some shrubs. Like bogs, they are more commonly found in the north. Several plant species with narrow pH tolerances, such as buckbean (*Menyanthes trifoliata*), bog rosemary (*Andromeda glaucophylla*) and bog willow (*Salix pedicellaris*), are common in fens and are often used as indicators of fen habitats.

Some fens can be found north of Wolf Lake along the extensive marshes in Archer's Marsh (Schleifenbaum, 2006) and a small fen can be found on Norah's Island.

4.4 STREAMS

Streams or creeks are an important feature of any landscape. In a watershed, streams and rivers transport water from the atmosphere and the ground, downhill to the lowland areas, filling in lakes and wetlands, and connect chains of lakes through outflows. Streams interact with the valley in which they flow, with the associated riparian areas and flood plains providing many important functions such as water storage, water release, and nutrients and sediment interactions (Horne and Goldman, 1994).

Water quality in head-water streams and lakes is incredibly important for the maintenance of downstream lakes that rely on inflow from these sources. Kennisis Lake is a headwater lake, relying on ground-water fed streams as a water source,

so upstream contamination is a minimal concern unless resource extraction, development or climatic changes contaminate or eliminate its freshwater source. Downstream is, however, a concern. Whatever water quality and quantity conditions transpire in the lake will affect the entire Gull River Watershed.

Removing vegetation and filling wetlands along streams alters the hydrology of the stream, usually resulting in higher peak flows and lower summertime flows (source). Development threatens stream fish habitats and communities through the loss of riparian vegetation, removal of structural habitat (woody debris and rocks), sedimentation, nutrient impacts, channelization, herbicides, pesticides, infilling, dredging, damming and changes in flow regime. Disturbances that increase the number of impervious surfaces in the watershed contribute to the soils poor attenuation qualities by increasing the flow of runoff, erosion, sedimentation and channelization (source).

Stream assessments and monitoring of substrate type, temperature, flow, habitat conditions and species composition is incredibly important to identify and protect cold-water streams because they are a source of ground water seepage.

The majority of Kennisis and Little Kennisis Lakes' streams occur on Private Land. There are five inflowing tributary streams on Little Kennisis Lake, most likely originating from ground water seepage from lakes and streams (Kennisis River) in the Algonquin Dome (see Map 2), and one outflow which drains south into Kennisis Lake. Kennisis Lake receives inflow water from ten streams connected to upstream lakes, including Little Kennisis River (Little Kennisis Lake) and Kennisis River (Kelly Lake), which receive their water from Havelock, Johnson, Bone and Loon lakes. Kennisis Lake has only one outflow, the Kennisis River at the south end of the lake, which drains into Red Pine Lake and then into the Gull River system downstream. Therefore, any future improvements of Kennisis Lake's ecological health would benefit all downstream waters.

These streams are either permanent or intermittent in nature, but all are an important part of the fish and wildlife habitat of these lakes. These streams have not been researched, neither identified by name nor inventoried extensively, and there may be more streams unidentifiable from maps or aerial photography that connect to both lakes. However, MNR is supportive about potential research or volunteer efforts for the collection of water quality information and species inventories in these streams and others in the Gull River Watershed (MNR Minden, 2005).

A formal inventory of all streams should be completed, and working with the MNR a monitoring program should be established for water quality trending.

4.5 FISH COMMUNITY

The Ministry of Natural Resources' Minden Area Office manages the Kennisis and Little Kennisis lakes' fisheries, including the monitoring and protection of fish habitat. Various combinations of fisheries management practices, including fish stocking, population surveys, spawning habitat remediation, protecting critical fish habitat (littoral zone), and the accumulation of baseline date to develop appropriate

management strategies, began concurrently with the development boom in the early 1920s.

By the 1950s and 60s, MNR (Department of Lands and Forests during this time) began to use standardized scientific methods for long-term data collection, which forms the basis of current fisheries management. Both lakes were originally surveyed in 1968, with subsequent water chemistry (eutrophication) updates and netting programs provided sporadically over the past 38 years, as well as field studies including creel surveys, water levels, introductions, shoreline alterations, radio-tracking, spawning shoal surveys, and habitat rehabilitation projects. This data enables MNR biologists to better understand how fish communities and therefore lake productivity respond to different pressures, and adjust fisheries management strategies accordingly (MNR, 2005).

All Fisheries Management Plans identify the following issues concerning today's fisheries:

- Over-harvesting and angling pressures;
- Population decline;
- Stocking;
- Climate change and pollution and critical habitat loss;
- Dam and artificial changes in water levels;
- Lack of long-term data, an adequate database, and scientific knowledge;
- Lack of public awareness and involvement; and
- Species introductions and exotic species.

Kennisis and Little Kennisis lakes are regarded as excellent lake trout lakes because of their deep, cold, un-enriched waters, which are ideal for lake trout spawning and survival. Based on a maximum temperature of 10°C and a minimum dissolved oxygen concentration of 6 mg/L, optimal lake trout habitat was abundant throughout the 1990s sampling period, limited primarily by warming of the surface of the lake (MNR, 1993). In the early 1990s, all inland lake trout lakes were assessed; at that time, 65 % of Little Kennisis Lake was optimal lake trout habitat and 61 % of Kennisis Lake was optimal habitat, indicating excellent conditions for lake trout survival.

Michalski (1996) reported that as indicated in the temperature and dissolved oxygen (1987 MNR data) profiles, useable and optimal habitat constitute a considerable portion of Kennisis Lake's depth. The MOE has calculated the volume of optimal habitat in Kennisis Lake to be 166.03 x 106m^3 or 50% of its volume (Michalski, 1996). According to MNR, as suggested by the Lake Trout Synthesis program, the amount of lake trout habitat that should be maintained in a lake should exceed 20% of the lake's total volume, which is the case for Kennisis Lake (Michalski 1996). At this time, Little Kennisis lake trout habitat data are lacking.

Lake trout are common to many lakes in the Minden/Haliburton area. The true history of lake trout populations in this area is somewhat speculative – it is probable that lake trout colonized these lakes from glacial refugia, following the retreat of the last glacial ice cover, 10,000 years ago. Some lakes, with physical and chemical characteristics suitable for lake trout, possibly never were colonized by lake trout or other fish populations because of their physical isolation or other geographic barriers (roughly, 40% of northern Ontario Lakes have no fish community). Information on the fish communities dates back to the settlement of

the area, but only to a few of the larger lakes, and many lakes may have lost their lake trout populations due to over-harvesting/over-fishing or loss of habitat from dams or poor logging practices as a result of settling the area. Kennisis and Little Kennisis Lakes are therefore very special to have these natural resources.

4.5.1 Fish Stocking and Introductions

It is believed the original lake trout population in Kennisis Lake became extinct as a result of dam construction on the lake around 1850. The present population was introduced through stocking efforts which began in 1925 and 1939 with larval-sized fish (not yet a year old). Stocking has continued into the early 1990s every 2 to 3 years with 5000 young of the year lake trout. Stocking older, larger fish enables the stocked fish to defend themselves against predators.

These populations have since become naturalized to the lake, which means that they are naturally reproducing regardless of supplemental stocking efforts. Netting programs and creel surveys in the 1990s indicated that 82 to 93 % of the lake trout caught in Kennisis Lake were naturally reproduced, as opposed to stocked, fish. From the water quality perspective this is not surprising given that the water chemistry is indicative of excellent quality habitat (MNR, 1993). MNR stopped stocking lake trout in Kennisis Lake because of the naturally reproducing stock, and reports of the poor survival of stocked fish although this has not been verified. Smallmouth bass and rock bass were illegally (bait) introduced to the lake in the 1970s and 1980s, respectively.

It was common practice from the 1920s to the 1960s to stock fish in waters that appeared to be suitable to a species needs in order to provide angling opportunities. In fact, an average 40 % of Ontario lakes have no fish community and, therefore, some lakes may have been first introduced to lake trout at this time.

During the late 1980s and early 1990s assessment netting of Little Kennisis Lake reported that natural reproduction was evident at low levels representing less than 50 % of the total catch, and that reasonable survival and poor to moderate growth of stocked lake trout fish was occurring. In the past, Little Kennisis Lake had never been heavily stocked which may account for the moderate representation (53.8 %) of stocked fish in the catch. Continuation of supplemental stocking was recommended for Little Kennisis Lake (MNR 1993 and 1987).

In conversations with MNR representatives, it was learned that stocking of lake trout has ceased because a naturally reproducing population has been established and it is MNR's policy not to stock reared populations on top of naturally producing populations. Artificially increasing the lake trout population causes added stress to the native population, either through competition, genetic hybridization, and/or increased angling pressure.

When "natural lakes" are stocked, the fish that are stocked are substituting fish for other fish rather than actually adding fish to the lake. Stocking of lake trout is a suitable management technique where lake trout rarely or never reproduce. Since these lakes' lake trout population is supported via natural reproduction, MNR will not supplement, through stocking, these natural reproducing lake.

4.5.2 Lake Trout Spawning Shoals

Lake trout spawn in the fall over variously sized rock rubble shoals, typically in shallow water 2 to 12 m deep, or less (30 cm) for inland lakes so that eggs are aerated with clean, well-oxygenated water (DFO, 2006). After the dam was constructed, Kennisis Lake level rose approximately 3 metres, which would have left traditional spawning shoals deeper and not subjected to wave action required for maintenance of the shoal (eggs need oxygen free of silt) (MNR 1993 and1987). Other studies in the area have discovered that lake trout abandoned traditional spawning shoals that were made deeper, approximately 10 to 12 m, as a result of dam construction, for shallower sites less than 3 m deep (MNR 1992). Previous intensive spawning surveys in the 1980s failed to locate any visible, shallow water spawning sites in Kennisis Lake, suggesting that the lake trout are deep spawners. Therefore, the current lake trout population in Kennisis Lake, although naturalized, may have been using the traditional, yet deeper, spawning shoals because they were the most suitable spawning shoals available.

During the 1990s sampling period (1993) and the sonic telemetry (radio-tagged lake trout) project (1990-91) two main areas of spawning activity were identified near the centre of the lake (4 to 10 m depth) and towards the west end (1 to 4 m depth). As well, an additional eleven (11) potential shoals (defined by biologists as shoals with suitable rubble and frequented by adults) were identified (MNR 1992). Unfortunately, all potential sites were heavily silted and provided poor quality habitat for egg deposition (MNR 1992). Tracking tagged adults indicated that the deeper shoal was the most active and should be rehabilitated with 100 tonnes of broken rock rubble addition. In summer 2000, Kennisis Lake Cottagers Association in affiliation with the MNR and the Haliburton Highlands Outdoors Association (HHOA) conducted various spawning shoal rehabilitation projects on verified spawning shoals (HHOA, 2000 and MNR, 2005).

In a province with over two-hundred thousand lakes less than 1% of Ontario's lakes are lake trout lakes. It is, therefore, critical that efforts are made to protect the water quality, shoreline vegetation and in-water habitats of Kennisis and Little Kennisis lakes to ensure the long-term survival of a unique, rare and highly valued natural resource, the lake trout.

Mapping and assessment of lake trout spawning shoals is an important component of lake trout management. Identifying the location of shoals permits effective review of development proposals, such as lot creation and shoreline alterations. Assessment of shoal condition determines the need for rehabilitative efforts such as washing or addition of spawning rubble. Once located, stewardship efforts can include monitoring survival assessments of eggs and juvenile fish and the maintenance of clean shoals for long-term productivity. It can be argued that effective protection and care of spawning shoals is perhaps one of the most crucial components of lake trout management, because without suitable spawning sites the species will fail to survive (MNR 1993).

4.5.3 Bass Habitat

In deep, cool/cold-water lakes, littoral vegetation is sparse. Aquatic vegetation proliferates with increasing nutrient levels, and in oligotrophic lakes, patches of

weed growth are usually found along the shoreline near streams, wetlands and bays protected from winds where nutrient accumulation occurs in the shallow sediments. Smallmouth bass and sunfishes are attracted to these areas for food. Whereas, lake trout, traditionally stay in the deeper parts of the lake, usually greater than 20 metres, where temperatures remain cool, or along drop-offs near shoals where they cruise for food (MNR, 2003).

Smallmouth bass nest in the warm shallow areas of the lake, where the males excavate round, nests in the gravel, sandy sediment, and guard the young once they have hatched (MNR, 2003). Spawning occurs in spring from May to June. To date, bass nest mapping has never been initiated by MNR to identify critical (high density) shorelines for spawning bass (MNR, 2005).

Rock bass generally inhabit the same shoreline areas with other bass and sunfishes, and are also nest builders (MNR, 2003). Many nests can often be found clustered together in suitable habitat within the littoral zone, where the young are able to survive by feeding on benthic invertebrates and other small fish. During spawning, rock bass are quite aggressive and may compete with smallmouth bass for habitat or prey on their un-guarded nests.

4.5.4 Fish Community

Fish population fluctuations are a natural occurrence in nature. Environmental conditions (loss of habitat, eutrophication, climate, pollution, land use) change on a yearly basis and these fluctuations will manifest themselves in the degree of spawning success (i.e., recruitment) of each fish species. Therefore, some years will support a strong "year class" of fish while others may be less. In addition, the predator-prey dynamics within the aquatic food web will also cause other populations of fish to fluctuate accordingly (e.g., a year of poor recruitment in a particular species of baitfish may have implications on predator fish species) (MNR, 2000).

In recent years, however, lake trout lakes that have introduced bass populations have noted a change in community structure and predator-prey relationships. Competition between bass and lake trout has not been generally recognized because of opposing habitat requirements; bass inhabit the littoral zone and lake trout inhabit the deep, pelagic zone. But they do share a common prey resource, fish (Vander Zanden et al., 2004).

Rock bass are highly competitive and hardy fish, which can tolerate many types of disturbances. Lake trout has always been the top-predator in most inland lake trout lakes, but with the introduction of rock bass, their position in the food chain is challenged. A reduction in prey abundance forces adult lake trout to consume benthic insects, zooplankton and juvenile lake trout. A shift in diet reduces the amount of energy consumed, as well as the number of juveniles that make it to adulthood to reproduce.

Current research through the MNR (with Dr. J. Casselman) and the Ontario Federation of Anglers and Hunters hypothesize that if the prey-base can be restored with the removal of rock bass, then the lake trout population should

experience increased productivity. The only advantage in stocking would be to provide potential prey for lake trout (Vander Zanden at al., 2004).

4.5.5 Fisheries Management

Kennisis Lake was always one of the best lake trout producing waters in Haliburton County (MNR). It was unique because up until the early 1970s when smallmouth bass was illegally introduced, lake trout was the only game fish species found in the lake. According to MNR's historical lake surveys, fisheries assessments, and creel surveys (from the 1970s and early 1980s and recent voluntary creel surveys) there are 21 known species inhabiting Kennisis Lake (Figure 4.5); any additional species have not been verified. Other species, which inhabit the streams, have not been verified.

Figure 4.5 Fish Species Common to the Kennisis Lakes

Fish Species	
Lake Trout	Lake Chub
Longnose Sucker	Common Shiner
White Sucker	Spottail Shiner
Brown Bullhead	Bluntnose Minnow
Golden Shiner	Fathead Minnow
Yellow Perch	Longnose Dace
Northern Redbelly Dace	Creek Chub
Rock Bass	Fallfish
Smallmouth Bass	Pearl Dace
Pumpkinseed	Brook Stickleback
Finescale Dace	

Source: MNR Lake Files, 2005

Fishing pressure has increased substantially over the past decades because of increased access to inland lakes, which means that the average angler is catching fewer and smaller fish. Kennisis Lake is especially subjected to heavy lake trout winter angling (MNR). Despite concentrated habitat protection efforts, habitat rehabilitation, and extensive fish stocking efforts there are still concerns regarding the health of lake trout fisheries in the Minden-Haliburton area. Anglers continue to report poor catches and a prevalence of small fish. Requests for increases in stocking rates persist despite evidence that stocking of hatchery fish over native populations can have serious negative consequences on the community. Furthermore, a reluctance to accept harvest controls leaves few options (MNR 1995 and 1972).

Stocking cannot increase the natural carrying capacity of a water-body. Overexploitation can only be controlled by limiting fishing opportunities, limiting harvest, or by restricting access to the resource.

4.6 Wild Life and Wildlife Habitat

The wetland and upland ecosystems that make up the Kennisis lakes' environment are intertwined and linked to a variety of smaller ecosystems that provide many habitat-types to support an abundant wildlife population, including mammals, birds, reptiles and amphibians, which are listed in Figures 4.6, 4.7 and 4.8. The various habitat-types available within the watershed have been identified as

preferred habitat for the American marten and southern flying squirrel (a species at risk), the preferred breeding habitat of the red-shouldered hawk, and the preferred and optimal wintering habitat for the white-tailed deer and moose, respectively. Protection of these habitats are incredibly important for the conservation of local biological diversity and the preservation of self-sustaining species' populations around Kennisis and Little Kennisis Lakes. However, if habitat fragmentation (removal of core and corridor habitats) continues because of development pressures, loss of this valuable resource will be the end result.

Figure 4.6 Mammals in the Kennisis-Hawk-Boshkung Watershed

Common Mammals		
White-tailed Deer Moose Raccoon Black Bear Lynx* Mink Bobcat Northern River Otter American Marten Striped Skunk Fisher Beaver	Muskrat Porcupine Bats *(Northern long-eared bat, eastern pipistrelle, and the little brown bat)* Weasel species *(possibly least, and short-tailed and long-tailed weasel)* Red Fox Eastern Chipmunk Squirrels *(red and grey squirrels, possibly southern flying squirrels)*	Coyote Wolf *(Gray and, possibly, Algonquin Red-Wolf)* Woodchuck *(Groundhog)* Mice *(white footed mouse and deer mouse)* Mole *(species not identified)* Shrew *(species not identified)* Vole *(species meadow vole)* Snowshoe Hare

Source: NHIC, 2006 and Mammals of Ontario, 2002

4.6.1 Significant Species and Habitats

4.6.1.1 White-tailed Deer and Moose

White-tailed deer are at their northern range limit in Ontario because of the harsh winter conditions. Fortunately, deer have adapted themselves to survive these harsh conditions by migrating from summer ranges and herding into dense, coniferous forested "deer yards", which provide suitable winter cover and food for winter survival, as well as protection against predators. Moose also require wintering areas for protection and food, but are solitary animals and will not herd.

There are only two moose wintering areas north of Kennisis Lake, but no deer yards. The huge Hinden deer yard, traditionally used by both deer and moose as wintering grounds, is located to the north and west side of Big Hawk Lake, but this area is now abandoned by deer during the winter do to people along the Highway 35 corridor feeding deer during the winter months. South of Little Hawk is a smaller deer yard, which is surrounded by moose wintering area, and similar habitat exists within Halls Lake's sub-watershed to the west and south-east.

Moose feed on woody and leafy plant material found in wetlands. During June and July, moose are able to get sodium and minerals from the new growth of aquatic plants, but must rely on natural or artificial mineral licks, including roadside ditches and salt blocks, during the winter. Moose feeding areas are incredibly important to protect because they provide the necessary mineral and dietary intake to sustain the species throughout the summer months, especially during calving

season in late May-early June. There are several small wetlands scattered around quiet areas of the lakes that would provide optimal summer moose feeding areas. There are no identified mineral licks for the area.

Additional information on deer and moose habitat and ecology is available from the Minden MNR Area office.

4.6.1.2 Black Bear

The bear is primarily solitary except during breeding or feeding at dumps. Nuisance bears have become a major problem in Ontario because of open dumps or human encroachment on their natural habitats. The MNR Bancroft District office has a bear population index program, which is conducted each year, and when public safety becomes an issue the MNR takes action (MNR, 2005). The District office works with the public to deal with nuisance calls in the summer (relocate and educate), and advising folks about removing attractants and what to do when a bear is encountered.

Nuisance bears are dangerous because they begin to lose their fear of humans and become bolder. There has been a lot of pressure by the public to reinstate the spring bear hunt to control local populations, but the black bear population, around the world, has been hard hit by poaching that the ban will not be lifted for some time in Ontario.

4.6.1.3 Birds

Kennisis and Little Kennisis lakes are home to a great variety of bird species. Many of these species are migrant songbirds, which migrate from the South American regions to breed in Ontario during the spring and summer months. Other species such as ducks, geese, owls and some coniferous songbirds are year-round residents of these lakes and can be seen at various times of the year on or near the Kennisis lakes.

Figure 4.7 Birds in the Kennisis-Hawk-Boshkung Watershed

Confirmed Breeding in Watershed		Unconfirmed Breeding Evidence	
Common Loon	Brown Creeper	*American Bittern*	*Yellow-throated Vireo*
Great Blue Heron	Winter Wren	*Green Heron*	*Warbling Vireo*
Canada Goose	Golden-crowned Kinglet	*Turkey Vulture*	*Gray Jay*
American Black Duck	Veery	*Mallard*	*Northern Rough-winged Swallow*
Wood Duck	Swainson's Thrush	*Green-winged Teal*	*House Wren*
Mallard	American Robin	*Northern Harrier*	*Ruby-crowned Kinglet*
Ring-necked Duck	European Starling	*Sharp-shinned Hawk*	*Eastern Bluebird*
Hooded Merganser	Cedar Waxwing	*Cooper's Hawk*	*Hermit Thrush*
Common Merganser	Nashville Warbler	*Northern Goshawk*	*Wood Thrush*
Osprey	Chestnut-sided Warbler	*Red-shouldered Hawk*	*Gray Catbird*
Broad-winged Hawk	Magnolia Warbler	*Red-tailed Hawk*	*Brown Thrasher*
Merlin	Black-throated Blue Warbler	*Wild Turkey*	*Yellow Warbler*
Ruffed Grouse	Yellow-rumped Warbler	*Spotted Sandpiper*	*Northern Waterthrush*
Killdeer	Black-throated Green Warbler	*American Woodcock*	*Canada Warbler*
Herring Gull	Blackburnian Warbler	*Black-billed Cuckoo*	*Vesper*
Mourning Dove	Pine Warbler	*Black/yell-billed Cuckoo*	*Indigo Bunting*

Confirmed Breeding in Watershed		Unconfirmed Breeding Evidence	
Belted Kingfisher	Black-and-white Warbler	*Eastern Screech-Owl*	*Bobolink*
Ruby-throated Hummingbird	American Redstart	*Great horned owl*	*Brown-headed Cowbird*
Yellow-bellied Sapsucker	Ovenbird	*Barred Owl*	*Red Crossbill*
Downy Woodpecker	Mourning Warbler	*Northern Saw-whet Owl*	*White-winged Crossbill*
Hairy Woodpecker	Common Yellowthroat	*Whip-poor-will*	*Pine Siskin*
Northern Flicker	Scarlet Tanager	*Chimney Swift*	
Pileated Woodpecker	Savannah Sparrow	*Black-back Woodpecker*	
Eastern Wood-Pewee	Song Sparrow	*Olive-sided Flycatcher*	
Eastern Phoebe	Chipping Sparrow	*Alder Flycatcher*	
Great Crested Flycatcher	Field Sparrow	*Willow Flycatcher*	
Eastern Kingbird	Black-throated Blue Warbler	*Least Flycatcher*	
Blue-headed Vireo	Swamp Sparrow		
Red-eyed Vireo	White-throated Sparrow		
Blue Jay	Dark-eyed Junco		
American Crow	Rose-breasted Grosbeak		
Common Raven	Evening Grosbeak		
Tree Swallow	Red-winged Blackbird		
Barn Swallow	Common Grackle		
Bank Swallow	Baltimore Oriole		
Cliff Swallow	Purple Finch		
Black-capped Chickadee	American Goldfinch		
Red-breasted Nuthatch			
White-breasted Nuthatch			

Source: Ontario Breeding Bird Atlas, 2006

The Ontario Breeding Bird Atlas splits Ontario into 10 km^2 squares, based on topographical coordinates (UTMs), and relies on voluntary birders to confirm the occurrence of bird species during the breeding season. Breeding evidence, such as observation of young or nest with eggs, is a confirmed occurrence of a bird species within a specific square; only breeding events are tracked, not fly-bys during non-breeding season (e.g., bald eagle during winter months). All square summary sheets are confirmed by experts and the lists are published. Kennisis and Little Kennisis lakes are split between the two breeding squares 17PL80 and 17PL81; these numbers correspond with map coordinates. It is assumed by biologists that if suitable habitat and conditions (food, shelter, etc.) are available and species occurrence prevails in a breeding square then it is probable that the species may be present locally. Figure 4.7 lists all the confirmed and probable bird species for the area.

Habitat preferences vary with each bird species—some prefer the dense upland forest cover while others prefer the shoreline or wetland areas. The variety of birds that exist in the Kennisis lakes' area is a product of the variety of natural habitat available in the region. Wetlands provide exceptional waterfowl staging, moulting and breeding areas as well as significant stopover areas critical during migration. Therefore, in order to protect this diversity, it is important for the residents to ensure that the current variety of existing habitat is maintained and protected within the lakeshed.

4.6.1.4 Ducks

The American black duck and the mallard have adapted to increased human activity whereas other water birds, such as the wood duck, prefer the more secluded and protected wetland areas away from human activities. Most duck species make their nests in spring along shorelines of wetlands and lakes for easy access to water resources and a quick escape from dry-land predators. The close proximity of nests to water, however, exposes their nests to flooding, swamping and wave action.

Shoreline development, lead sinkers and jigs, water level fluctuations, water pollution, water craft and nest predators put all water birds at risk of population declines.

The American black duck is the subject of unique concern in northern wetlands because it has been suffering continuous decline on its wintering areas in the United States (source). In southern Ontario, American black duck populations have been reduced to very low populations, whereas the mallard has been steadily increasing its population numbers substantially. It is important, especially to the ecological and recreational stability of these lakes, to retain its marshes and swamps, those that have suitable brood-rearing habitat—emergent vegetation for cover and shallow water for feeding, for the American black duck.

According to the Ontario Breeding Bird Atlas's 2006 data, the American black duck has been confirmed breeding in the Haliburton County region and breeding square 17PL81 which encompasses the north-eastern portion of Kennisis and Little Kennisis Lakes.

4.6.1.5 Loons

Loons rely on an abundant supply of baitfish in a lake for their diets. Maintaining clear, uncontaminated water in a lake allows the loons to use their astonishing speed, lightning fast underwater pivots, and quick thrusts to hunt and seize baitfish in these lakes. They can dive to great depths to pursue their prey and roam over the entire lake to satisfy their hunger. The loon's streamlined body and webbed feet are built for maximum efficiency underwater; unfortunately, this design makes them very awkward on land.

Today, increased human activity is one of the main causes for losses of loon populations on northern lakes. Loons are particularly sensitive to development and shoreline disturbances. Power boaters and other activities that cause excessive waves and noise disturb the nesting loons, loon chicks, or feeding loons. Sensitivity to such disturbances will often cause loons to abandon nesting sites and/or the lake completely. The presence of loons on a lake is often used as a biological indicator of the ecosystem's health. Unfortunately, MNR Minden Area office does not participate nor keep records of "mapped" loon's nests in the vicinity of their jurisdiction. Local residents however have been recording the location and number of nests and breeding pairs on the lake.

In the climate zone of the Kennisis lakes, loons typically begin courtship and nesting in June, 4 to 5 weeks after spring arrival; usually in May further south. Nests are built by both adults and are usually along the water's edge and typically are large, bulky vegetated structures. If water rises during incubation period, the adults continue adding to the nest's height to prevent flooding (NatureServe, 2006).

There are a number of steps that can be taken to keeping our lake loon friendly:

- Keeping the lake as wild as possible
- Naturalize shorelines
- Minimize boat wake (sensitive boating practices
- Use non-lead sinkers and jigs
- monitor water quality
- Reduce large water level changes during the nesting season (May to July)
- Don't feed nest predators (racoons or gulls)
- lobby for loons (air pollution and water quality programs)

For more information on specific bird species or to report a sighting, please contact Bird Studies Canada at http://www.birdstudiescanada@bsc-esc.org, the Ontario Breeding Bird Atlas at http://www.birdsontario.org/atlas/, the Long Point Bird Observatory at http://www.bsc-esc.org, the Natural Heritage Information Centre at http://www.mnr.gov.on.ca/MNR/nhic/nhic.cfm, or NatureServe Explorer – an on-line encyclopaedia of life at http://www.natureserve.org/explorer/.

4.6.1.6 Heronries

The conservation of established heronries and foraging areas is important to ensure the stability of breeding populations of herons and egrets across Ontario. Heronries may be occupied for decades due to the favourable habitat conditions. However, if birds are forced to relocate, the alternative habitat may be less qualified or even inhospitable for breeding.

The American Bittern, Green Heron and the Great Blue Heron have all been observed during their breeding season in suitable breeding habitat in the Kennisis Lakes' watershed area. The Great Blue Heron is the largest and most wide spread heron in Ontario, and those colonies located on the Canadian Shield are usually smaller but more numerous than colonies south of the shield.

Great Blue Heron heronries have not been mapped by the MNR. According to the Ontario Breeding Bird Atlas, Great Blue Heron breeding has been confirmed in breeding squares 17PL80 and 17PL81, which includes the northern and southern reaches of Kennisis lakes.

Colonial water birds are especially vulnerable to disturbance, habitat destruction and human activity during the breeding season because herons will desert nests and entire colonies if disturbed during pair bonding, nest construction, or early egg-laying stages. Desertions of entire colonies can affect the stability of the entire regional population of herons even when the heronry is relocated.
However, the maintenance of dense vegetation in and surrounding the colony may lessen the impact of disturbances. The removal of trees and shrubs along the shoreline facilitates the intrusion of predators as well as increases the exposure of nests to fluctuating water levels and run-off. Therefore, by retaining the natural vegetation and conserving wetland habitats along the shorelines and within the riparian and upland zones, natural buffers against disturbance can be maintained and alternate nest sites provided in order to help protect Ontario's and Kennisis heronry populations.

4.6.1.7 Reptiles and Amphibians

Lake shorelines, riparian zones and wetlands are home to a variety of reptiles and amphibians including several rare and/or "at risk" turtle and snake species. There are 12 amphibian and 3 reptile species within Kennisis and Little Kennisis sub-watersheds (lakesheds). There are an additional 9 species, including 1 lizard whose geographical ranges are within the larger watershed referred to as 2 HF-08 by MNR, which includes the lakesheds of Kennisis, Halls and Hawk, Kushog, Boshkung and Horseshoe Lakes.

Within the past two decades, there has been a noted decline in global frog populations. The decline of amphibian populations and the loss of biological diversity has been linked to climatic and landscape changes, such as acid rain, greenhouse gases, habitat loss, stream channelization, and effluents leaching into wetlands, due to several or a combination of environmental factors influenced by human activities such as the food trade, industrialization and habitat destruction for development purposes (source). This significant decline has prompted the use of various biological indicators, such as frogs, and cold-water species, to highlight and identify notable environmental changes in ecosystem health.

Figure 4.8 Reptiles and Amphibians in the Kennisis et al (2 HF-08)

Amphibians	
Lakeshed	
Eastern American toad	*Bufo americanus*
Spring Peeper	*Psuedacris crucifer*
Gray Treefrog	*Hyla versicolor*
Wood frog	*Rana sylvatica*
Northern Leopard frog	*Rana pipiens*
Green frog	*Rana clamitans*
Bull frog	*Rana catesbeiana*
Spotted salamander	*Ambystoma maculatum*
Northern Redback salamander	*Plethodon cinereus*
Northern Two-lined salamander	*Erycea bislineata*
Red-spotted newt	*Notophthalmus viridescens viridescens*
Mink frog	*Rana septentrionalis*
Watershed	
Western chorus frog	*Pseudacris triseriata*
Reptiles	
Lakeshed	
Common Snapping turtle	*Chelydra serpentina serpentina*
Midland Painted turtle	*Chrysemys picta marginata*
Eastern Garter snake	*Thamnophis sirtalis sirtalis*
Watershed	
Common Five-lined Skink*	*Eumeces fasciatus*
Northern Redbelly snake	*Storeria occipitomaculata*
Eastern Hog-nosed snake*	*Heterodon platirhinos*
Northern Water snake	*Nerodia sipedon sipedon*
Northern Ribbon snake	*Thamnophis sauritus septentrionalis*
Eastern Milk snake	*Lampropeltis triangulum*
Northern ringneck snake	*Diadophis punctatus edwardsi*
(Eastern) Smooth Green snake	*Liochlorophis vernalis*

Source: NHIC – Herpetofaunal Atlas, 2000 and ROM, 2006

Amphibians are particularly at risk because they require both healthy aquatic and terrestrial habitats to fulfill life-cycle requirements. Increases in water temperatures and ultra-violet light exposure due to loss of shoreline vegetation are both detrimental to egg and embryo development. Many toxins that are leached into the soils or deposited by rain inhibit normal growth in tadpoles and cause mutations during metamorphosis into the adult form (source).

Turtle and snake species populations have declined because of habitat loss due to development encroachment, road traffic, and direct persecution. Many turtles lay their eggs in in-ground nests, which are heavily predated by both terrestrial and aquatic mammals, along sandy shorelines or gravely roadsides and trails, and the adults are often killed by on-coming traffic prior to or after the laying of these eggs. Annual lake water drawdown each fall may also negatively impact turtle populations. Turtles burrow in the shoreline sediments bottoms of ponds, and other warm places where temperatures remain above freezing (typically at 4°C) during winter hibernation. If drawdown exposes these warm places to freezing and drying air temperatures, burrowed animals could become frozen in the lake's sediment. Snakes on the other hand are often injured or killed purposefully because of fear and misidentification.

Canadian turtles hibernate for over five months every winter. Some, like the Painted and Snapping Turtles, hibernate on the bottom of quiet backwaters, nestled up to sunken logs or under stream or lakeside banks. Others, such as the Spotted Turtle, hibernate in the fens or flooded fields in which they live during the summertime. They must choose sites where the water does not freeze right to the bottom or become too low in dissolved oxygen.
The common five-lined skink and the eastern hog-nosed snake are found within the larger watershed which includes Kennisis and the lakes connected downstream to the Gull River (Halls and Hawk, Kushog, Boshkung, Horseshoe lakes). Both of these species are "at risk" and have special status designations both provincially and nationally in Ontario and Canada, which affords them some protection (Ontario Endangered Species Act and the Species at Risk Act) against "wilful" persecution and habitat destruction. To date these species occurrences in Kennisis sub-watershed has not been verified.

If you find a turtle's nest or an injured turtle on your property or along the roadside, please contact the Kawartha Turtle Trauma Centre at http://www.kawarthaturtle.org/ or the Toronto Zoo at http://www.torontozoo.com/ to find out how you can help.
Reptiles and amphibians are important members of the Kennisis lakes ecosystem. Since there has been no formal reptile and amphibian inventory initiative to date, it is important to inventory our lake's watershed for signs of these species.

4.7 INVASIVE SPECIES

Exotic (non-native, alien) and/or invasive (native to Ontario but non-native to local area) species describes organisms that have been introduced into non-native, new habitats. The introduction of these invading species cause widespread and unpredictable changes to habitats, native populations, local infrastructure and human health, and it is a worldwide problem (source).

Introductions of non-native and invasive aquatic species to inland lakes have occurred through a variety of pathways including species transported in or on boats and vessels, natural barrier removal (e.g., Trent-Severn Waterway and dams), stocking and lack of education, which causes accidental releases from boat hulls, aquariums, bait harvesters, anglers and the live fish food trade. Unless precautions are taken to remove these organisms before traveling to a new water body, these exotics can be spread from one body of water to another. Once introduced, minnows, crayfish, molluscs, larval and adult invertebrates, and other live bait may be unknowingly transported to other inland waters by recreational watercraft, bait buckets, fishing gear and fish stocking.

There are several known invasive and non-native aquatic species that have been identified in the Kennisis and Little Kennisis sub-watershed, including Rock Bass, Smallmouth Bass, Spiney-water Flea and Purple Loosestrife. In the Great Lakes region of Ontario there are over 160 known exotic species and many other invasive aquatic and terrestrial species establishing thriving populations in inland Ontario lakes, which may include the Kennisis lakes' sub-watershed or the Gull River watershed. Some of the species which could pose a risk to the Kennisis watershed include:

Rusty Cray Fish (*Orconectes rusticus*)
Round Goby (*Neogobius melanostomus*)
Eurasian Water-milfoil (*Myriophyllum spicatum*)
Curly Pondweed (*Potamogeton crispus*)—associated w. Eurasian Water-milfoil
Flowering Rush (*Butomus umbellatus*)
Canary Reed Grass (*Phalaris arundinacea*)
European Frogbit (*Hydrocharis morsus-ranae*)
Fanwort (*Cabomba caroliniana*)

Round Goby, Rusty Crayfish, European Frogbit and Eurasian Water-milfoil have been identified in the Haliburton, Hastings and Muskoka County lakes, as well as the Trent-Severn Waterway. These species may already be present in the Kennisis lakes' sub-watershed.

4.7.1.1 Rock bass and Smallmouth Bass

Rock bass (*Ambloplites rupestris*) and Smallmouth bass (*Micropterus dolomieu*) were 'accidentally' introduced into Kennisis and Little Kennisis Lakes systems in the 1970s and 1980s because of bait buckets or illegal stocking (not by the MNR), and quickly became established residents. These fish species are both native to Ontario, but were not a component of the original fish-community prior to their introduction.

4.7.1.2 Purple loosestrife

Purple loosestrife (*Lythrum salicaria*) is a plant native to Europe and Asia that has seriously impacted wetland habitats since its introduction to North America as an ornamental plant in the 1800s. Purple loosestrife reproduces at an alarming rate, spreading along roads, canals and drainage ditches, and has invaded marshes and lakeshores choking out native wetland vegetation. Unfortunately, complete

eradication of this plant is impossible, even though mechanical removal has been effective in slowing down the spread. The plant is currently undergoing trial bio-controls with a native weevil (http://www.invasivespecies.com/ and www.obs-sbo.ca/).

According to the Invasive Species Watch Program, most watersheds across Ontario have been invaded by purple loosestrife. It is highly likely, therefore, that wetlands within the Kennisis lakes' sub-watershed have populations of purple loosestrife. There are, however, several plant species that mimic or look similar to the loosestrife such as fireweed (*Epilobium angustifolium*), blue vervain (*Verbena hastate*) and water-willow or swamp loosestrife (*Decoden verticillatus*) but, unlike the purple loosestrife, these plants are native.

4.7.1.3 Spiny Water-flea

The spiny water flea is a predacious zooplankton species, which competes directly with native zooplankton for food and indirectly with fish larvae (young) by reducing or eliminating their food resources (loss of zooplankton populations). This exotic zooplankton has been invading Ontario lakes since its introduction into the Great Lakes system from ballast water discharge of Eurasian ships. It has spread throughout all the Great Lakes and more than 60 inland lakes in Ontario, including Kennisis lakes.

4.7.1.4 Zebra mussels

Zebra mussels (Dreissena polymorpha) have been invading Ontario lakes since their introduction into the Great Lakes system from ballast water discharge of Eurasian ships. Zebra Mussels attach to boat hulls. If these boats enter inland lakes without the hulls being cleaned, zebra mussels can be introduced into that lake. It is probable that if pH is greater than 7.4 and calcium levels exceed 20 mg/L that zebra mussels can establish colonies. Mussels require calcium to develop shells.

According to distribution maps of zebra mussels in inland lakes of Ontario and the Invasive Species Watch Program Annual Report 2005 (OFAH), zebra mussel veligers and/or adult sightings were not documented for either of the Kennisis lakes (OFAH, 2006).

4.8 RARE SPECIES AND SPECIES AT RISK

Figure 4.9 identifies Provincially Significant and Locally Rare Fauna for Kennisis Lake and its quaternary watershed 2HF-08, which includes downstream lakes (Hawk, Halls, Boshkung, and Horseshoe lakes).

The causes of rarity or scarcity of a species are many and varied, and may be natural or related to human activity. Rarity may be caused by the lack of suitable breeding habitat, lack of migratory stopover areas, poor winter habitat, predation, unregulated hunting, disease, pollution, habitat destruction, or over-collecting (NHIC, 2003). Rarity may also be due to the fact that the particular population of a species is at its natural limits of its distribution range (e.g., Carolinian Forest, Badger). Rare species are considered very important and worthy of protection efforts because of their biological, social and, most often, economical value. Many

of these species are ranked in accordance to their rarity status, which are established by the Natural Heritage Information Centre (NHIC), and are significant species and of conservation priority (NHIC, 2006).

Figure 4.9 Provincially Significant and Locally Rare Fauna

Blanding's turtle	*Emydoidea blandingii*
Common Five-lined skink	*Eumeces fasciatus*
Eastern Hog-nosed snake	*Heterodon platirhinos*
Eastern Pipistrelle (bat)	*Pipistrellus subflavus*
1 butterfly/moth species:	
Pepper and Salt Skipper	*Amblyscirtes hegon*
2 rare Odonata (dragonfly/damselfly) species:	
Lake Emerald	*Somatochlora cingulata,*
Williamson's Emerald	*Somatochlora williamsoni,*
Tapered Vertigo (mollusc)	*Vertigo elatior,*
13 rare plant species:	
Water Awlwort	*Subularia aquatica*
Woodland Cudweed	*Gnaphalium sylvaticum*
Prickly Hornwort	*Ceratophyllum echinatum*
Bee-balm	*Monarda didyma*
Hidden-fruited Bladderwort	*Utricularia geminiscapa*
Carey's Smartweed	*Polygonum careyi*
Cloud Sedge	*Carex haydenii*
New England Sedge	*Carex novae-angliae*
Sedge	*Carex trisperma var. billingsii*
Goldie's round-leaved Orchid	*Platanthera macrophylla*
Snail-seed Pondweed	*Potamogeton bicupulatus*
Algae-like Pondweed	*Potamogeton confervoides*
Carolina Yellow-eyed-grass	*Xyris difformis*

A "Species at Risk" status designation of special concern, threatened or endangered is provided by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and/or the Committee on the Status of Species at Risk in Ontario (COSSARO). These official statuses direct planning, recovery and conservation efforts, and provide legal protection for 'schedule 1' threatened and endangered designated species in Ontario (i.e., Ontario Endangered Species Act and the Species at Risk Act (SARA)). Other species are or may be of conservation concern, but their formal conservation status has yet to be evaluated.

For more information regarding the laws and regulations in place in Ontario for the protection of fish and wildlife, please contact the MNR Minden Area Office or visit the MNR web site at http://www.mnr.gov.on.ca/MNR/.

4.9 CLIMATE CHANGE

Climate warming will adversely affect Canadian water quality and water quantity. The magnitude and timing of river flows and lake levels and water renewal times will change. In many regions, wetlands will disappear and water tables will decline. Habitats for cold-water fishes will be reduced in small lakes. Warmer temperatures will affect fish migrations in some regions. Climate will interact with over-exploitation, dams and diversions, habitat destruction, non-native species, and pollution to destroy native freshwater fisheries.

4.10 NATURAL ENVIRONMENT ISSUES AND OPTIONS

4.10.1 Water Quality

Issue Statement: *The impact of property development, waste disposal and boating is a threat to the water quality of the Kennisis Lakes.*

Option 1: Develop an education program to encourage cottage owners, renters and others to become good stewards of the land and lakes by promoting awareness about the impact of their activities on water quality. Compliment print materials with hands-on workshops. Include information on laundry and dishwasher detergents containing phosphorus as well as lawn fertilizers and other garden chemicals (pesticides and herbicides) etc. Also include the need to regularly pump-out septic systems. Include materials about new septic technologies etc. and the proper draining of hot tubs.

Option 2: Establish an overall 'Environmental Code of Ethics' for the Kennisis Lakes with a focus on environmental stewardship but covering a broad range of issues.

Option 3: To reduce pollution from power boats promote the switch from 2-stroke to 4-stroke motors through an educational approach.

Option 4: Continue a comprehensive water quality monitoring program through MOE's Lake Partner program. Seek to include benthic and plankton communities. Produce an annual report of water quality testing results and make available to all property owners on the lake, municipal officials of Dysart et al, and other stakeholders in the watershed.

Option 5: Have the KLCOA participate with other lake associations (or lake stewards) to form a regional council, such as a Gull River Council.

Option 6: Initiate a wetland evaluation to inventory the wetlands in the immediate surrounding area. Local official plans and zoning bylaws must identify the location of wetlands and provide appropriate policy to ensure their protection, including the enforcement of environmental/lake impact assessments for new development proposals in provincially significant wetlands as well as the associated adjacent lands.

Option 7: Seek to eliminate the use of pesticides, herbicides and fertilizers in the Kennisis Lakes watershed and support the introduction of a by-law eliminating or restricting the use of pesticides, herbicides and fertilizers in the watershed.

4.10.2 Shoreline Vegetation

Issue Statement: *The environmental and aesthetic value of natural shorelines is threatened by removal of vegetation and the introduction of man-made structures.*

Option 1: Develop an education program, including hands-on workshops, to inform property owners about landscape alternatives to manicured lawns, paved driveways and other impervious features, non-native species, and sandy beaches to help reduce undesirable and inhospitable artificial landscapes along the shoreline.

Option 2: Take general and/or specific action to promote natural landscaping e.g. establish model sites in Lipsy Bay or on Norah's Island. For example: in the littoral zone consider in-water rehabilitation with the assistance of Conservation Authorities or MNR by adding downed native logs and other woody debris, as well as carefully placed rocks near the shoreline, to create micro-habitats for aquatic species and to protect the natural substrate; and in the riparian zone create a buffer of native plants, shrubs and trees between the water line and lawn, to discourage erosion and prevent sediment runoff.

Option 3: Work with the Municipality of Dysart et al to verify and maintain a map of significant wetlands around the Kennisis Lakes and seek to change by-laws re shoreline integrity/buffer areas and discouraging high-profile development and resource management activities (forestry and mining) in the viewscape of the lake.

Option 4: Propose that Dysart et al enact a municipal "Tree Cutting" bylaw to ensure that private lots retain a percentage of their natural vegetation (see for example Algonquin highlands bylaw per Halls & Hawk Lakes Plan)

4.10.3 Fish and Wildlife

Issue Statement: *The preservation of fish and wildlife habitat is threatened by development and increased human activity.*

Option 1: Support ongoing and new educational opportunities with Haliburton Forest on fish and wildlife.

Option 2: Distribute educational literature that promotes the protection of wildlife habitat and shorelines to property owners. Lakefront owners should be encouraged to maintain or return a significant portion of their shoreline to natural vegetation to encourage nesting and suitable habitats for other species.

Option 3: Develop an education program in conjunction with MNR regarding the protection of rare species' habitat (including threatened and

endangered species) and provide examples of how to naturalize private property to encourage rare species establishment. Report identification of endangered or threatened species to Natural Heritage Information Centre/Haliburton Forest.

Option 4: Develop a thorough species inventory in partnership with the Haliburton Forest and the MNR, to identify native, rare and exotic species and estimate relative abundance indices for the lake as well as identify important habitat sites for protection along the shoreline.

Option 5: Develop a specific initiative on Lake Trout and game fish preservation. For example consider a KLCOA partnership with the HHOA's Haliburton Fish Hatchery. Promote and participate in creel census projects and present results at KLCOA meetings, newsletters.

Option 6: Work with the Municipality of Dysart et al to ensure by-laws recognise significant habitat. Local official plans and zoning bylaws must identify the location of newly identified significant wildlife habitat and provide appropriate policy to ensure its protection, including the enforcement of environmental impact assessments for new development proposals.

5 PHYSICAL ELEMENTS

This section examines the physical aspects of the Kennisis watershed in order to identify potential constraints affecting present and new land development and resource management. Soils, floodplains, narrow water-bodies, steep slopes, minerals and aggregates are discussed.

5.1 PHYSIOGRAPHY AND SOILS

Physiography refers to the characteristic of different landforms and how they together create a variable landscape, such as gradients in relief (elevation) and resource availability (Ecological Land Classification Manual, 2003). Kennisis lakes' watershed lies on the Canadian Shield in eco-region 5E and eco-district 5-9, an area which is typically complex with moderately undulating bedrock ridges interspersed with troughs and hollows, wetlands, streams and uplands; landmarks left behind by the glaciers (NHIC, 2001). Soil substrates are usually shallow and patchy, as well as acidic and low in nutrients. The lakes' sub-watersheds are predominantly rolling terrain (50%) with mixed forests, and smaller pockets of hilly (25%) rock ridges near the south-western shorelines of Kennisis and Little Kennisis where conifer trees dominate, as well as patches of flat (15%) terrain and deciduous-dominated forests.

The Canadian Shield rock of the Kennisis watershed is predominantly made up of acidic metamorphic and igneous rocks (e.g., granite, quartz, gneissic), which are hard and generally resistant to weathering. Erosion and soil accumulation are, therefore, a slow process in this area. Glacial sediments in the area are generally located in bedrock controlled valleys or depressions. The lack of limestone in this area provides minimal natural buffering for the affects of acid rain.

The lake sub-watershed is found within the Haliburton Highland (Algonquin) region, which is defined by a broadly domed-shaped relief, with heights of land (elevation) peaking at 550 m above-sea-level. The topography of the area is characterized by the granite and other Precambrian rock bedrock and glacial deposits from 10,000 years ago.

Roughly 10,000 years ago glaciers covered ¾ of Ontario and their movements scoured the Canadian Shield eroding the pre-glacial topography, scraping away soils and carving out the current landscape. Upon their retreat, the glaciers' weight, movements and torrential melt water cut and scoured the Canadian Shield eroding pre-glacial topography, scraping away soils, and filling in depressions, carving out the current landscape. Northern lakes are, therefore, typically younger, in geological years, than the lakes south of the Precambrian Shield.

Today, the Gull River watershed is characterized by a rough relief, with round, hummocky hills (drumlins), till plains, many deep lakes and patches of wetlands, and frequent outcrops of bare or exposed rocks and ridges. The lakes' shoreline and uplands have frequent outcrops of bare or exposed bedrock and forests where soil has accumulated. The sandy glacial, Sherborne till soils are generally shallow, but thickness over the bedrock varies greatly over short distances (Schleifenbaum, 2006; Chapman and Putnam, 1984). The soils are sandy, stony and acid due to

the historically dense coniferous vegetation; therefore, sub-marginal for agricultural purposes. Many of the valleys are floored with outwash clay, sand and gravel and scattered wetland habitat types provide thicker, mineral-based soils which are useful forest soils. In localized areas of shallow soil, the ground water table is often close to the surface, which interferes with its absorption and leaching capabilities.

Local climate characterizes the type of weathering and soil profile development for an area or eco-site. This is a region of cool, moderately moist climate. Rainfall and snow are heaviest on the westerly slopes of the dome facing Georgian Bay, and seasonal droughts dominate the eastern inland slope. Under a mixed hardwood and some conifer canopy, soils consist of dark mineral surface layers under leaf litter, with a thick, brownish horizon over the parent, unweathered rock material at the base. The soil is acidic and low in nutrient elements. These soils are called Brunisols. In the Minden-Haliburton area and in Muskoka and Parry Sound a few small areas of soil on lacustrine clay, silt and fine sand are included with this region – Grey Brown Luvisols are found on well-drained sites.

5.2 CLIMATE

The Kennisis Lakes watershed enjoys a moderate continental climate with cold winters and warm summers; both moderated by extensive precipitation spread rather evenly throughout the year. While Kennisis Lake does not have detailed weather observation data, the Ontario Ministry of Environment maintains an extensive research site north of the village of Dorset. Its climate data fits the Kennisis Lake weather better than the Haliburton climate data due to its closer proximity to Georgian Bay as well as its elevation (Schleifenbaum, 2006).

Figure 5.1 Dorset Climate data as published by Environment Canada:

Latitude: 45° 13' N **Longitude:** 78° 55' W **Elevation:** 323.10 m

Temperature:	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Daily Average (°C)	-11.1	-9.3	-3.7	4.3	11.7	15.9	18.7	17.6	13.1	7	0.4	-7	4.8
Standard Deviation	3.3	3.2	2.3	1.9	2	1.4	1.1	1.3	1	1.4	1.6	3.5	2.5
Daily Maximum (°C)	-5.3	-3	2.6	10.2	18.4	22.3	25	23.5	18.7	11.8	4.1	-2.3	10.5
Daily Minimum (°C)	-16.7	-15.6	-10	-1.7	4.9	9.5	12.3	11.6	7.5	2.1	-3.4	-11.6	-0.9
Extreme Maximum (°C)	12	12.5	21.1	30	32.2	33	**34.5**	34	32	26.5	19	16.5	
Date (yyyy/dd)	1995/14	1984/23	1977/30	1990/28	1977/21	1994/16	**1988/08**	1988/03	1999/04	1979/22	1978/05	1982/03	
Extreme Minimum (°C)	**-42.5**	-41	-37	-18	-7.2	-1.5	3	-0.5	-5.5	-11.1	-24.5	-40.5	
Date (yyyy/dd)	**1981/04+**	1979/11+	1980/02	1982/08	1977/07	1980/09+	1981/22+	1986/28	1981/30	1977/23	1995/29	1980/25	
Rainfall (mm)	26.5	18	41.7	61.2	86.4	75.2	90.4	86.4	112.2	99.4	80.4	25.8	803.6
Snowfall (cm)	74.2	45.4	36.3	11.8	1.1	0	0	0	0	4.5	35.7	68	277
Precipitation (mm)	95.4	60.7	76.8	73.1	87.5	75.2	90.4	86.4	112.2	103.9	115.6	90.6	1067.8
Average Snow Depth (cm)	35	44	35			0		0				16	
Median Snow Depth (cm)	35	45	36			0		0				15	
Snow Depth at Month-end (cm)	41	41	16	0	0	0	0	0	0		6	25	
Extreme Daily Rainfall (mm)	42.6	40.2	39	34.3	50.6	54.3	**130.6**	51.8	47.2	40.6	56.6	46.7	
Date (yyyy/dd)	1980/10	1997/21	1980/21	1995/21	1984/22	2001/21	**2000/31**	1978/15	1996/13	1991/26	1989/15	1984/28	
Extreme Daily Snowfall (cm)	**41**	19.5	35	19	11	0	0	0	0	25	21.8	29.2	
Date (yyyy/dd)	**1979/13**	1982/03	1985/04	1985/10	1994/26	1977/01+	1977/01+	1977/01+	1977/01+	1997/26	1995/27	1977/03	
Extreme Daily Precipitation (mm)	42.6	48.2	49	34.3	50.6	54.3	**130.6**	51.8	47.2	40.6	56.6	46.7	
Date (yyyy/dd)	1980/10	1981/10	1980/21	1995/21	1984/22	2001/21	**2000/31**	1978/15	1996/13	1991/26	1989/15	1984/28	
Extreme Snow Depth (cm)	77	**84**	83	58	0	0	0	0	0	18	36	60	
Date (yyyy/dd)	1984/18	**1982/04+**	1982/05+	1985/11	1981/01+	1981/01+	1981/01+	1981/01+	1981/01+	1997/27	1995/28	1983/29	

Source: MOE and Schleifenbaum (2006)

Overall, even the information in the Dorset data should be amended slightly: due to the higher elevation (Haliburton Forest Base Camp at 420 m elevation and the top of the Wolf Lake watershed (see below) at 594 metres above sea level) Kennisis Lake is slightly cooler than Dorset. The same applies to precipitation: the majority of the Kennisis watershed is part of the south western rise onto the Algonquin Dome, which received higher amounts of precipitation than surrounding areas - especially to the east.

5.3 FLOODPLAINS

Floodplains are low-lying areas of land surrounding a water-body, which captures and holds the overflow of water during spring freshet (rise in water levels during snowmelt) or other flooding events. Property development in floodplain areas puts property and the health and safety of residents at risk, and such development should not be permitted. In addition, the placement of fill in floodplain areas disrupts fish and wildlife habitat and displaces water which can result in other off site impacts, such as increased flows and water levels. The Municipality of Dysart et al's Official Plan includes policy to restrict new buildings and structures or the removal or placing of fill in floodplain

5.4 MINERALS AND AGGREGATES

The impacts from mining and aggregate operations can be substantial when they occur near a lake or water-body or along sensitive streams or tributaries. Aggregate and mineral excavation can have impacts on ground water levels, sedimentation of lakes and streams, and result in noise pollution from increased truck traffic, blasting and machinery operation.

5.4.1 Minerals & Mineral Aggregates

According to information from the Ontario Ministry of Northern Development and Mines (MNDM) in 2006 there were no active mining claims in the Kennisis watershed. Current mining land claims information is available from the MNDM website http://www.mndm.gov.on.ca/mndm/mines/lands. According to MNDM there is a large area north of Kawagama Lake, outside the Kennisis watershed, which has a number of active claims. Some quarries in the Municipality of Dysart et al are being mined for white crushed quartz, granite and limestone to be used as building and landscaping stone and many small quarries are in operation mining for aggregates to be used for general construction.

The term "mineral aggregates" refers to gravel, sand and various types of bedrock that are suitable for construction and industrial, manufacturing or maintenance purposes.

According to the Ontario Geological there is only one area of primary significance in the region and it is located at the outlet of the Kennisis River into Halls Lake, beyond the boundaries of the Kennisis watershed that is the subject for this Lake Plan. Some quarries in the municipality are in operation and are mining aggregates to be used for general construction. A number of small local quarries in the lake shed are active.

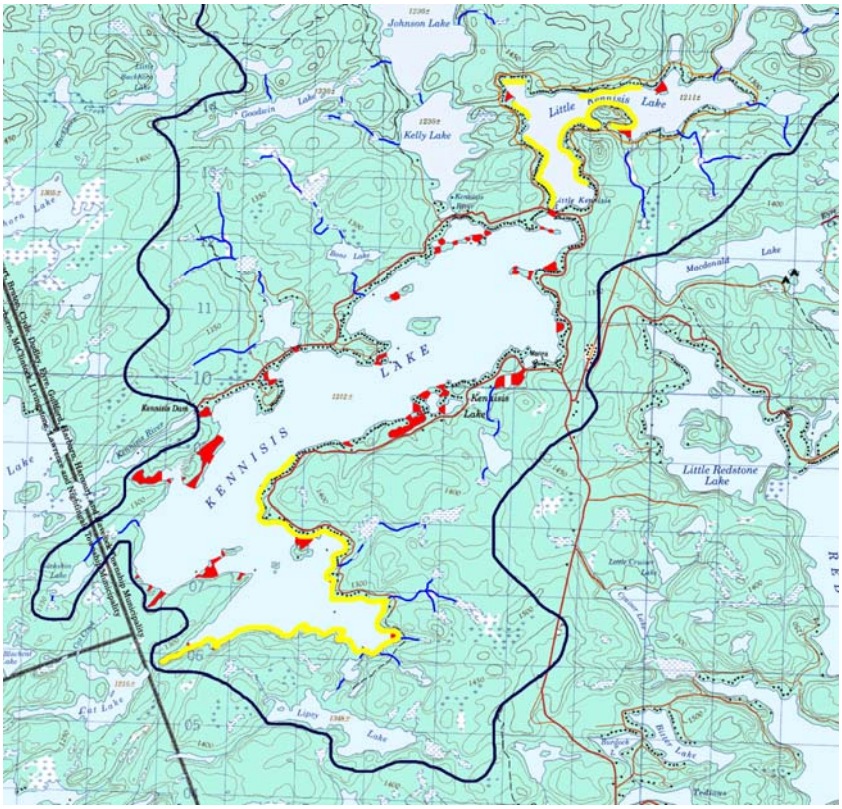
5.5 NARROW WATER-BODIES

Narrow water-bodies (bays and navigable rivers), by their nature, have shorelines that are in close proximity to each other, and high or even moderate density development in these areas can detract from natural aesthetics, privacy and the remote character of the lake. Increased development in these areas may also result in congestion and create navigational hazards with respect to water users.

There are no criteria in the Municipality of Dysart et al Official Plan with respect to identifying narrow water-bodies as a constraint to development. Other municipalities, such as the County of Hastings and the District of Muskoka, have official plan policy that identifies narrow water-bodies to be the portion of lake where the distance from shore to shore is less than 150 metres (500 ft) and a distance of 50 metres for rivers. In these areas, shoreline lot frontage requirements for new lots have been increased to 120 metres (400ft).

Figure 5.2 identifies (red shading) those areas on Kennisis Lakes that are narrow water-bodies (about 150 metres from shoreline to shoreline). Most of these areas on Kennisis Lakes abut private land but several are adjacent to designated public-use lands such as the Blueberry Islands, Lipsy Bay and Bullfrog Bay (see §7.2). There are some water-bodies close to the Kennisis River that should be designated as narrow and decreased densities for new shoreline development proposed.

Figure 5.2 Sensitive Areas – Narrow Channels and Steep Slopes



5.6 STEEP SLOPES AND CLIFFS

Development on steep slopes rock faces can result in substantial alteration of the natural landscape and visual impact due to the prominence and location of development, and the intrusion of the skyline. Indirect impacts can also include increased erosion, slope instability, a significant increase in storm water run-off and the potential damage to fish and wildlife habitat.

Policy 9.2 of the Official Plan for the Municipality of Dysart et al identifies areas exhibiting steep slopes (greater than 25%) as an "Area of Use Limitation". The Official Plan defines these areas as "slopes of 25% or more, measured over a horizontal distance inland of 45 metres (148 ft) from the high watermark, along a continuous shoreline frontage of 25 metres (82 ft).

Figure 5.2 identifies (yellow shading) those areas with prominent cliffs or ridges. Any development, land clearing or resource management activity (forestry, mining) must be considerate of these areas and maintain the natural aesthetics and remote character. This can be accomplished through increased shoreline frontages for new lots, increased setbacks from cliff edges, and maintenance of vegetative buffers.

5.7 FORESTRY

Where deep and well drained, the Sherborne Till (see: Soils) is an excellent forest soil. But shallow depth and the subsequent effect on the rooting zone causing moisture stress, often limits tree growth.

The areas of deeper soil support highly productive stands of Sugar Maple, commonly mixed with a variety of other hardwoods and conifers. While commonly hardwoods cover the hilltop and side-hill areas, conifers are predominantly found in low lying areas and along shorelines. While 70% of the forests in the Kennisis Lake watershed are hardwood dominated, only 30 % feature conifers prominently. This ratio is reversed along the shorelines of Kennisis Lake due to the dominance of conifers in shoreline areas.

In total, 23 commercial tree species are growing in the forests surrounding Kennisis Lake. This natural variety is supported by the range of landforms described above, as well as the wide amplitude of growing conditions sustained by the local tree flora.

The forests of Haliburton Forest and Wild Life Reserve Ltd surround all of Little Kennisis and most of Kennisis Lake. Figure 5.2 lists all native tree species found at Haliburton Forest with their common, Latin and local name as well as their percentage of occurrence in the forest.

Figure 5.3 Native Tree Species of the Haliburton Forest

Scientific Name:	Common Name:	Local Name:	Percentage:
Abies balsamea	Balsam Fir		2%
Acer rubrum	Red Maple	Soft Maple	7%
Acer saccharum	Sugar Maple	Hard Maple	39%
Betula alleghanensis	Yellow Birch	Golden Birch	5%
Fagus Grandifolia	American Beech		12%
Fraxinus nigra	Black Ash	Swamp Ash	1%
Fraxinus Americana	White Ash		1%
Larix laricina	Tamarack	Larch	> 1%
Ostrya virginiana	Ironwood		1%
Picea glauca	White Spruce		2%
Picea mariana	Black Spruce	Swamp Spruce	2%
Picea rubra	Red Spruce		1%
Pinus resinosa	Red Pine		> 1%
Pinus strobus	White Pine		3%
Populus balsamifera	Balsam Poplar		1%
Populus grandifolia	Largetooth Aspen		2%
Populus tremuloides	Trembling Aspen		2%
Prunus serotina	Black Cherry		1%
Quercus rubra	Red Oak		3%
Thuja occidentalis	Eastern White Cedar		>1%
Tilia Americana	Basswood	American Linden	1%
Ulmus Americana	White Elm		>1%
Tsuga Canadensis	Eastern Hemlock		13%

5.8 PHYSICAL ENVIRONMENT ISSUES AND OPTIONS

Several physical environment issues have either social or land-use implications and are dealt with in Sections 6 and 7 of the Lake Plan.

5.8.1 Sustainable Forest Management

Issue Statement: *The community is not aware of the importance of sustainable forest management in the Kennisis watershed.*

Option 1: Using examples and guidance from Haliburton Forest and other organizations that support forest management promote the notion that sustainable forest management is mandatory in the Kennisis Lakes watershed.

For example: (1) provide training and workshops on the benefit of sustainable forest management with a direct link to the benefits that it provides to the lake environment; (2) oppose any further commercial development of Haliburton Forest and the Leslie Frost lands (or other large natural land areas surrounding the lake); (3) support Haliburton Forest in any initiatives that promote sustainable forest management; and (4) partner with organizations or educational to develop and deliver indigenous tree education programs – hiking excursions, forest tours etc.

6 SOCIAL ELEMENTS

Social elements enhance the quality of life on the Kennisis Lakes. To many cottagers, "a lake environment is a place where you can relax, recreate and get away from it all" and thus the tranquility of the natural environment is a major attraction. Although people on the lakes may have diverse interests, there are some commonly held values that unite most cottagers. Through the lake plan workshops and survey, the lake plan committee has attempted to identify the most significant issues that concern Kennisis Lake residents. Some of the most important elements that contribute to an individual's experience of the lake are recreational activities such as boating, swimming and other water-related activities, landscape and aesthetics, especially the preservation of natural vistas, and containment of noise and night lighting.

Cottagers need to remember that there are business interests on the lake, such as the marinas, resorts and real estate offices. Various government agencies including the Municipality of Dysart et al, the OPP and the MNR have jurisdiction in and around the land and water with respect to land use, wildlife, ecosystem protection and human behaviour. Additionally, the Haliburton Forest provides an extensive natural wildlife habitat experience as well as eco-tourism opportunities for many visitors as well as lake residents.

For those who are fortunate enough to enjoy the social life that goes with owning a cottage in the pristine Kennisis wilderness, there needs to be an awareness of the stewardship responsibilities that will help to sustain and preserve the natural environment.

6.1 RECREATIONAL BOATING

Boating is one of the most important activities on the Kennisis Lakes after swimming. Survey respondents indicated participation rates of 92% for swimming, 74% for canoeing and 70% for power-boating.

There are many reasons for people to use a boat. Some do it simply for fun or the adrenaline-rush of speed. There is the enjoyment of water skiing and wake boarding. Some people use a boat to get somewhere; maybe a water-access cottage, the Blueberry Islands, the Marina, or to visit friends on the lake. People boat to explore the lake and enjoy the shoreline, bays and swamps: to see wildlife and to go fishing.

6.1.1 Boating Use

According to the residential survey (Appendix 1) boating is a very popular activity. Survey results indicate an average of four boats per cottage. Two-thirds of these are non-motorized, mainly canoes and kayaks. It is estimated that in 2005 there were some 1400 motorized boats on the two lakes and that nearly half of these were boats equipped with motors under 25 hp. Some 84% of these 'small' motors were 2-strokes. Table 6.1 provides the breakdown of motor boats as reported in the survey.

Such a high level of boat usage raises several safety and environmental issues. For example, there are concerns regarding unsafe speed, reckless operation, the closeness of boats and water-skiers to swimmers, and small vessels like canoes and kayaks.

Environmental concerns include water pollution, especially from 2-stroke motors, damage to shorelines and wildlife habitat, particularly bird nesting areas and fish spawning grounds.

In addition there is the potential of wake damage to property, docks and docked boats, and increased noise from the vessel's engines and occupants of the boats.

Figure 6.1 Number of power boats on the Kennisis Lakes by engine size

Boat Type (Engine Size)	Inboard	2 Stroke	4 Stroke	Total	%	Ext*
Motorboats under 25 hp	11	180	27	218	46%	**654**
Motorboats 25-100 hp	11	80	22	113	24%	**339**
Motorboats 101-200 hp	54	25	20	99	21%	**297**
Motorboats over 200 hp	16	4	2	22	5%	**66**
Personal Watercraft	3	16	2	21	4%	**63**
Total	**95**	**305**	**73**	**473**	**100%**	**1419**
Per cent	**20%**	**65%**	**15%**	**100%**		
**** Extrapolated to entire lake population***	***285***	***915***	***219***	***1419***		

6.1.2 General Concerns with Recreational Boating

Throughout 'cottage country' there are several common concerns with the increase in recreational boating and a general desire to seek a balanced approach to dealing with these concerns.

6.1.2.1 Personal Water Craft (PWC)

The operation of Personal Watercraft (PWC) is one of the greatest boating concerns of shoreline residents. PWCs are cited most often as an unpopular recreational activity on many lakes. In some US States PWCs have been banned entirely from certain water bodies. The main concern with PWCs appears to be the uncaring attitude of a limited number of PWC operators, which causes all operators to be viewed as irresponsible.

6.1.2.2 Speed and Wakes

The environmental impacts of inappropriate boat speeds and wakes can have long term or permanent negative effects on wildlife and vegetation. The same is true for the operation of propeller-driven and jet boats in shallow waters even at low speed.

In addition to the negative visual impact, erosion of the shoreline, and operation of boats in shallow waters, increases turbidity and damages weed beds, resulting in the loss of fish habitat. Disturbance of nesting waterfowl results in unsuccessful brooding efforts and abandonment of nests and/or nesting site. The long-term effects are a reduction in fish because of loss of habitat, which means reduced food supply for waterfowl. Eventually this may result in a reduction of the local wildlife population.

6.1.2.3 Pollution

According to the survey, two thirds of power boats on the Kennisis Lakes are powered by 2-stroke engines. Environment Canada's Environmental Technology Centre tests show that conventional two stroke outboards produce 12 times as much benzene, toluene, ethyl benzene and xylenes, and five times as much oil and grease as four-stroke outboards. According to the Environment Canada 'Green Lane' web site:

> *"Although outboard motors exhaust their emissions into the water, recent studies of their impacts on lakes revealed that most hydrocarbon compounds in the water migrated into the air within 6 hours, and that samples taken about a metre below the surface showed no contamination. However, heavier hydrocarbons, such as oil and grease, remain on the surface for a longer period of time and may affect the health of microscopic organisms."*
>
> *"Further comparisons of the exhaust emissions from a light-duty van, a 9.9 two stroke outboard and a 9.9 four–stroke outboard showed that the two-stroke produced 50 % more carbon monoxide than the four-stroke and nearly 60 times more than the van. The two-stroke also emitted 15 times more unburned hydro-carbons than the four-stroke, and nearly 125 times more than the van."*
>
> *Source - http://www.ec.gc.ca/science/sandemay00/article1_e.html*
> *http://coastaloutdoors.com/articles/0101/2strokev4stroke.htm.*

As reported by the Massachusetts Office of Coastal Zone Management (CZM), newer two-stroke technology has led to higher fuel efficiency and lower hydrocarbon emission levels.

There are several sources of information on these direct fuel injection engines. A good starting point is the CZM website http://www.mass.gov/czm which contains a useful index and includes pages on 'Better Boating through Environmental Engines" as well as "The Scoop on Boat Engines"

Another form of 'pollution' is the introduction of invasive species caused by boats being transported from one lake to another. Thorough cleaning of boat, trailer and bulge prior to launching visiting boats is necessary to prevent infestation of foreign

water species. Ideally this cleaning should take place at a 'choke-point' through which the majority of boats entering the watershed have to pass.

6.1.2.4 Boat Noise and 'Nuisance Traffic'

Noise is a significant issue on many lakes, including the Kennisis Lakes, since the sound of boat motors, as well as music and loud conversations taking place on boats, resonate across open water. Such noise is disturbing to some residents of the lake who seek a tranquil setting to relax in.

Nuisance boat traffic especially boats and PWC's that go back and forth in one area of the lake or bay.

6.1.3 Boating Code of Conduct

The resolution of boating concerns has proven to be contentious for lake associations and lake planners alike. The approach that appears to have had the greatest success is an educational approach based around a well-publicised 'code of conduct'.

For the Kennisis Lakes it is therefore proposed that the boaters' code of conduct in Figure 6.2 be adopted. It is assumed that the vast majority of boaters are responsible and safe boat operators and that a code of conduct serves to remind boaters of existing 'rules of the road', to educate new boaters, and to emphasize any concerns that are relevant to the Kennisis Lakes.

6.1.3.1 The Lake Watch Program & Enforcement of Boating Rules

While education is preferred to enforcement, cases do arise where stronger action is required. A possible intermediate, stewardship approach, similar to 'block parent' and 'neighbourhood watch" programs has been termed 'lake watch'. Such a program would establish lake watch signs for docks to give the community 'an eye on the lake'. In addition, as has been done in the Muskoka lakes, it might establish a boat patrol on the lake staffed by volunteers.

In extreme cases, speeders are long gone by the time the police are on the scene, so it is necessary to educate boaters on how to assist with community based policing.

For example, it is important that boat registration numbers and descriptions of the drivers of the offending vessels be recorded. To prosecute a case video recordings are extremely useful as evidence, and eyewitnesses have to be prepared to testify in court.

A lake watch program would encourage witnesses to a serious boating incident to call the OPP at 1-888-310-1122. This will open an incident file which helps determine how often the OPP should patrol our lake

Figure 6.2 Proposed Kennisis Boaters Code of Conduct

Kennisis Boaters Code of Conduct
'Friendly Boating Practices on the Kennisis Lakes'

Follow the Safe Boating Guide and obtain your Pleasure Craft Operator's Card – learn how to safely operate your boat.

Minimize your wake especially in narrow channels and near shore so that natural shorelines are not eroded, loon and duck nesting sites are not disturbed and your neighbours' floating docks and parked boats are not bounced around and damaged.

Reduce your speed especially in narrow channels and near shore where other boats and swimmers could be in danger and remember that within 30 metres of the shore your speed should be less than 10 km/hr (it's the law).

Head for the centre of the lake when travelling at speed or when water skiing or tubing - don't ride parallel to the shoreline.

Give everyone a wide berth and travel slowly when pulling away from docks, launching ramps or swimming areas.

Respect your neighbours' TRANQUILITY by moving around the lake rather than operating on one small area.

Protect the environment by treating bays as no wake zones, operating in water over 1.2 metres (4 feet) deep to avoid disturbing the lake bottom, stowing garbage until you return to shore, and avoiding spillage of gas and oil into the water during refuelling.

When anchored take care not to obstruct navigation for other boats.

Clean your boat and trailer when transporting them to other lakes and when bringing them into the Kennisis lakes to avoid transporting invasive species. Remember to drain your bilge on shore away from the lake and empty holding tanks for onboard toilets in a proper facility.

Remember that drinking and boating is dangerous and illegal.

6.2 LANDSCAPE AND AESTHETICS

The residential survey and workshops confirmed that the Kennisis Lakes community values the aesthetic quality of the natural landscape. This is an important value because it is aligned with protecting the natural health and beauty of the lake. Maintaining a natural landscape is dependent upon the protection of such features as the shoreline and the horizon as well as the maintenance of a range of landscape types such as forest, wetland and open views.

The most significant landscape feature on Kennisis Lake and Little Kennisis Lake is the winding shoreline; no two lots are the same. Some have steep rock faces to the water and others have a natural sand beach, while others have a mix of sand and rock together in the same lot.

There are two important landscape lines where development can impact the natural setting of the lake: the shoreline and the tree line or horizon. When viewing the opposite side of the lake, our eyes are immediately drawn to these two lines and anything that stands out on these lines can greatly impact the natural character. As a result any development that occurs on these landscape lines will directly impact the natural setting. The main source of visual impact in these areas is the construction of buildings, transmission lines & communications towers and the removal of vegetation.

The viewscape defines the area within the sight-horizon (viewscape) of Kennisis Lake. To retain the natural aesthetics of the landscape, it is important that no pits or quarries be allowed within the viewscape and that no significant removal of natural vegetation or clear-cutting take place. The horizon should suffer minimal disturbance and shoreline structures, such as boathouses, docks, awnings and recreation areas should be low profile and kept to a minimum.

6.3 TRANQUILITY AND NIGHT-SKIES

Peace and tranquility are highly rated as essential elements of life on the lakes. Unwarranted noise and indiscriminate lighting both affect the enjoyment of the natural setting because they interfere with these values.

Light pollution affects many shoreline residents; however, it is recognized that strategically located shoreline lighting has traditionally aided navigation and that a few navigation buoys or landmarks with lighting can enable night time cruising.

The brightening of the night sky is a growing problem as evidenced by the increased popularity of street, garden and landscape lighting which adds to the unnatural level of light around the lake. Research has proven that nocturnal insects that congregate around light sources are at greater risk of predation. Bats, which consume 30-50% of their body weight in insects each night, feed on these insect masses found at light sources. Insects, which are important pollinators and food sources for many species, and those that are unable to detect bats, are removed from the local food chain, reducing the local biodiversity. Unless initiatives are taken to inform cottagers and local business about the effects and costs associated with lighting, viewing the stars at night and conserving the local biodiversity will become more difficult.

The results of residential survey, with regard to the negative impact of excessive noise and light pollution on our lake's shoreline indicate that:

- about one third of respondents are moderately or significantly impacted by daytime (35%) and night time (31%) noise; and
- a similar number (29%) are significantly or moderately impacted by light pollution.

These percentages are not high, reflecting the survey's overall result that for cottagers on the Kennisis Lakes the 'positives' are much greater than the 'negatives' at this point in time.

However, with an increasing number of cottages on the lake, it will be important to take steps to reduce these negative impacts for if nothing is done the situation could quickly deteriorate.

6.3.1 Protecting Dark Skies

A U-Links project conducted by Chris Murray and Jenn Robus of Trent University in conjunction with the Kennisis lake plan has set the stage for implementation of an initiative to protect dark skies. The following are some of their observations.

6.3.1.1 Light Pollution

Light pollution is a broad umbrella term that covers all types of unwanted and inefficient lighting. The International Dark-Sky Association defines light pollution as "any adverse effect of artificial light including sky glow, glare, light trespass, light clutter, decreased visibility at night, and energy waste". There are three main classes that light pollution falls under: light trespass, glare, and sky glow. Light trespass is the spilling of light beyond the area or property intended to be lit. This includes bothersome lighting from neighbours' outdoor lights shining into windows that reduces privacy. This is most commonly a problem in urban areas where residences are tightly spaced and outdoor lighting from streetlights pours in through bedroom windows at night, although it can also be a problem in cottage country. Waterfront lighting is particularly susceptible to trespass, as water reflects glare across the lake, so a neighbour's dock lamp may inadvertently illuminate property across open water. Even outdoor lighting that spills into natural habitat for local flora and fauna can be considered light trespass.

6.3.1.2 Voluntary Dark Sky Initiatives

There are several stewardship and voluntary initiatives taking place in central Ontario which address dark skies. Some of the leading examples come from the Muskoka region, where the Muskoka Natural Heritage Foundation has been quite active in researching and promoting the protection of the night sky. More specific to waterfront properties and lighting, the Muskoka Natural Heritage Program also has a "Sensible Waterfront Lighting Guide" which lists simple adjustments that residents can make to existing lighting fixtures to make them more dark sky friendly. It was a combined initiative put together by the local townships as well as Lake Associations and the overarching District of Muskoka. Other Ontario initiatives directed at raising public awareness and promoting night sky stewardship include: Mississippi Mills, Manitoulin Island, and the Bruce Peninsula all have initiatives.

6.3.1.3 Night-Friendly Products

Night friendly products are light fixtures that help to eliminate light pollution in one way or another. A wide variety of products are available on the market today, it just takes consumer initiative to seek them out, and common sense when selecting fixtures. The International Dark Sky Association has a complete list of specific fixtures that they have approved as night sky friendly (see bibliography). A design feature that makes these fixtures night friendly is their 'cut-off'. Full cut-off fixtures direct all light downwards, with no light escaping from the sides or top of the fixture.

6.4 SOCIAL ENVIRONMENT ISSUES AND OPTIONS

6.4.1 Power Boating

Issue Statement: *Some power boating use pollutes the lake, damages the shoreline, puts swimmers at risk, and shatters the tranquility of the lake*

Option 1: Promote 'Friendly Boating'. Have the KLCOA membership specifically endorse a 'Boating' Code-of-Conduct. Focus on Safety. Publish and post the code so it is available to residents and visitors (laminate with boating map, issue with rental agreements, provide to real estate agents, ask OPP to hand out, display at marinas.

Option 2: Establish acceptable boating speeds for different areas of the Kennisis Lakes. Post signs restricting speed limit and wake in narrow channels as well as within 30 metres of shore. Identify restrictions on boating map.

Option 3: Issue 'cottage watch' signs for mounting at end of dock or at shore – have participants approach recalcitrant boaters to provide 'friendly boating' sheet.

Option 4: Support OPP etc. re safety enforcement. Work with OPP and Coast Guard to enforce water traffic laws and courtesy vessel inspections etc.

Option 5: Promote the phasing-out of old, polluting 2-stroke motors in favour of new, environment-friendly 2-stroke and 4-stroke motors on the lake; in the interim promote the use of environment-friendly 2-stroke lubricants.

Option6: Establish cleaning stations at all boat launches and at an access 'choke-point' to reduce risk from invasive species.

6.4.2 Tranquility

Issue Statement: *Excessive noise from boats, snowmobiles, traffic, and cottage sites reduces the tranquility and 'quiet enjoyment' of the natural environment at the lake.*

Option 1: Establish a recognized 'quiet time' such as before 10 a.m. every Sunday.

Option 2: Educate residents re Dysart et al's municipal noise bylaw, things to do to reduce noise (mufflers) and the process to follow to report occasional or persistent infractions.

Option 3: Support residents in noise-related issues, and when necessary organize residents to terminate persistently noisy situations.

Option 4: Have the KLCOA maintain an ongoing action to communicate tranquility as a fundamental community priority. Post and distribute 'tranquility posters'. Run a photography competition for the best picture that captures the tranquility of the lake (then use on posters).

Option 5: Review the municipal noise by-law (88-18) and discuss improved enforcement with Dysart et al. Encourage the Municipality of Dysart et al to amend the noise by-law to specifically include limits (time and duration) for boats with motors that exceed a defined decibel limit.

6.4.3 Night Skies

Issue Statement: *Excessive lighting negatively impacts enjoyment of the night skies and the natural environment.*

Option 1: KLCOA to provide educational materials re reducing night-time exterior lighting e.g. provide sketches of how to design installations, list products to use and where to get.

Option 2: Conduct a night-time light inventory to establish a baseline from which yearly progress can be tracked: develop a strategy to eliminate light pollution "hot spots."

Option 3: Work with the Municipality of Dysart et al to update lighting by-laws in order to require or encourage light abatement and reduce 'light trespass. Specifically require that a property owner may only light his/her property and that illumination of adjoining properties be prohibited. Require that all lighting located within 50 ft (12m) of open water should be a low cut off type.

Option 4: Provide incentives for the use of night-friendly lighting, for example, a property tax credit, a hydro rebate, a dark skies plaque for compliant cottages.

6.4.4 History

Issue Statement*: We are not aware of the history of the Kennisis Lakes and are missing an opportunity to learn from the past.*

Option 1: Consider approaches that will help us learn from past successes or failures – such as a History Project as has been done on some other lakes such as Boshkung.

7 LAND USE

7.1 SUMMARY OF LAND USE

7.1.1 Our two Lakes

The shoreline areas of Big and Little Kennisis Lakes are now highly developed with more than 1000 cottages and year round homes. With very few exceptions, the shoreline area is in private ownership, and the vast majority of lots have now been developed. Only seven lots (including a lot on island C – see figure 7.3) on the big lake and two lots on the little lake of sufficient size to be developed have current zoning that precludes construction of a dwelling. If building permits for new cottages are used as evidence, it appears that a full 50 cottages/residences were under construction in winter, 2007. Six islands (all in the big lake) are developed – these are the only developed water access lots on the lake. The Municipality of Dysart et. al. owns a number of lots/access points around the lake, including:

- just west of the current marina site
- on both sides of the county road at the Little Kennisis bridge
- at the south east corner of the 1st bay into Little Kennisis, and
- at the Dam.

Larger back lot areas on the two lakes are also in private ownership. Backlots are those located on the side of the main cottage roads opposite the lake. Only one main building and two accessory structures are allowed per lot (same as waterfront lots). Severance of backlots is currently limited to those that result in new lots of not less than 20 ha (44 acres).

Commercial development on the big lake currently consists of one marina/store and a housekeeping cabin resort ("Windermere Cottage Resort"). Kennisis Lake Lodge is the sole commercial development on the little lake.

Cottage development began in the 1950s. By the end of the 1960s, all but the West Shore had been opened up and built upon. In the late 1990s and ensuing years, development approvals were obtained to open up 107 new lots on the West Shore, and as of 2006, construction had begun on approximately 60% of the lots.

Very few cottages were occupied year round in the 1950s and 60s. A steady trend since then has seen smaller, seasonal cottages knocked down and replaced with year round homes as working and retired owners moved from the "the city" to live year round at the lake. Six per cent of dwellings on the two lakes are now occupied year round. Survey results indicate that a further 10% who now occupy seasonally said they were considering moving to the lake for year round "permanent" use.

The number of years of ownership of cottages ranges widely but is rather equally spread out between 1 and 50 years. Some families have seen four generations enjoying the lake; many others have seen 2 or 3 generations' use.

The vast majority of lot frontages are small; with many as small as 50 ft. West Shore lots are significantly larger. There are only two large frontages on the two

lakes, and both are on the south shore of Cat Bay. These two lots have controls placed on them that preclude further lot creation ("severance") without a full re-zoning application.

7.1.2 Ownership

An overview of land ownership was provided in §3.4. As noted, most of the watershed area (see Map 2) is privately owned by Haliburton Forest and Wildlife Reserve. The shorelines of the lakes in the Haliburton Forest are mostly undeveloped. Shoreline development where it does occur for the most part takes the form of leased campsites which allow for camper trailers, small decks and removable docks. The rest of the property is intensively managed for mixed use purposes of

- sustainable forestry (including a saw mill)
- ecotourism (dogsled and snowmobile trails, mountain biking, canoeing, nature appreciation etc)
- environmental education
- hunting and fishing (in season)

Remaining lands within the watershed, including back lot developments on Kennisis Lakes, are owned by several large private landholders, many of whom operate these properties under the Managed Forest Tax Incentive Program. Under this program, owners create and implement plans to improve their forest lands (trails, silviculture, wildlife habitat etc) in exchange for tax breaks.

In addition to Haliburton Forest, commercial activity based in the watershed includes several service operations (real estate & outdoor equipment) and a heavy equipment operator whose property is also zoned for extraction of gravel and topsoil.

The municipality operates a landfill and recycling transfer station 300m from the lake on County Road 7 that services Kennisis and Redstone Lake areas. A discussion of issues surrounding the landfill can be found in §7.3.

Figure 7.1 provides a "snapshot" of the types of waterfront land use on the Kennisis Lakes.

Figure 7.1 Shoreline Development on the Kennisis Lakes (2002)

	Kennisis Lake	Little Kennisis Lake	Total
Seasonal Dwellings	641	235	876
Permanent Dwellings	44	14	58
Vacant	74	36	110
Resorts and Marinas	2	1	3
Total	**761**	**286**	**1047**

Although current planning regulations do not allow for construction of boat houses on our two lakes, a number of boat houses were constructed before this regulation came into effect. Although no survey has been done to ascertain the number of boat houses, a reasonable estimate suggests there are between 30 and 50 on the

two lakes. Although covered boat slips are illegal, they are appearing around the lake in increasing numbers.

The number of people living on and using the lake can have a direct effect on water quality and can impact on social elements such as decreased natural landscapes, as well as increased noise, recreation and boating activity. Longer stays at the cottage increase the amount of phosphorus generated through sewage. The survey results were used to estimate the "population" on the lakes during the different seasons and are shown in Figure 7.2

Figure 7.2 Estimated population on the Kennisis Lakes by Season (2005)

Season	Population
Peak summer	2500
Early Fall	450
Winter	650
Spring	400

7.2 DESIGNATED PUBLIC-USE LANDS

Issue Statement: *We no longer have enough public spaces on the Kennisis Lakes and there is a lack of consensus within the community as to how the 'public-use' lands that we do have should be shared.*

Five parcels of land on the Kennisis Lakes have been designated for non-commercial, public-use. They are listed below with a number that corresponds to the identified location in figure 7.3.

Bullfrog Bay (1)
(aka Wilderness Area), owned by KLCOA

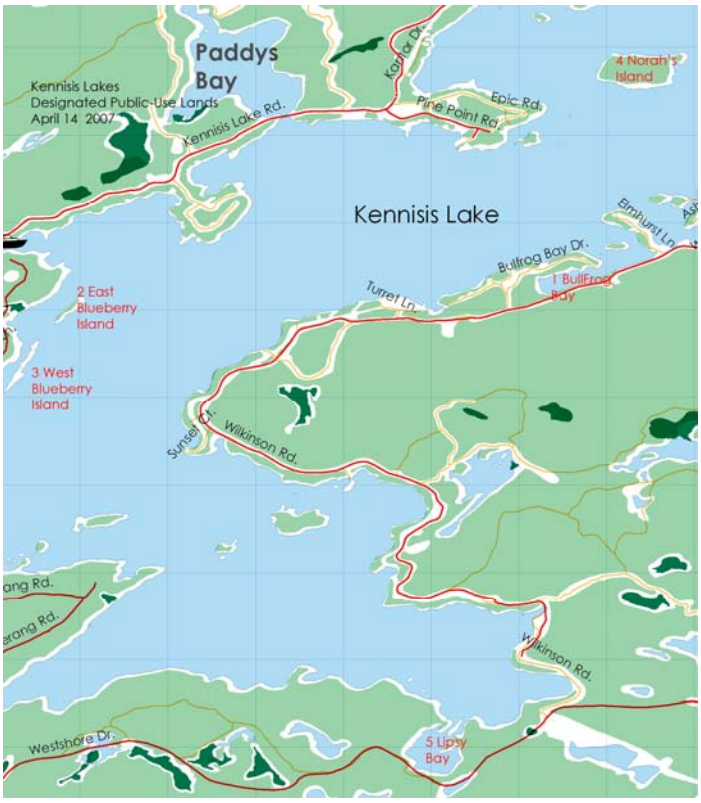
East Blueberry Island (2)
owned by Dysart et al

West Blueberry Island (3)
owned by Dysart et al

Norah's Island (4)
Owned by the Haliburton Highlands Land Trust (HHLT) - to be managed in partnership with KLCOA

Lipsy Bay (5)
owned by Dysart et al

Figure 7.3 Public-Use Lands



The development of much of the shoreline of the Kennisis Lakes has meant that there are fewer and fewer public 'places to go' on the lake. Traditionally people have enjoyed visiting locations away from the cottage in order to: picnic, swim, enjoy nature, take a break during a canoe-trip, camp, meet friends, find solitude etc.

Thus careful stewardship of the public-use lands is a high priority.

7.2.1 Policy Framework

Based on feedback from the Lake Plan Survey, workshops, meetings and comments received, a 'policy framework' has been developed (figure 7.4). Using this framework, specific policies have been developed for the five designated public-use lands identified above. These will be reviewed with the community and with the Municipality of Dysart et al prior to implementation.

7.2.1.1 Campfires

Use of campfires have been a contentious issue, since some cottagers worry that their investment and the beauty of our community could go up in smoke, while others appreciate the social values of a campfire. For municipally owned lands such as Blueberry Islands and Lipsy Bay the issue of campfires is governed by the municipal 'burn bylaw' allowing campfires for warmth and cooking under controlled conditions. The Fire Chief has recommended that we designate fire pits on public lands since the threat of forest fire is much higher in non designated fire pits (typically from tree root underground fires).

So far we have been fortunate at avoiding forest fires; however the neighbouring Black Cat Lake 2km to our west was not so fortunate in 2002: Perhaps you saw the water bombers using Kennisis water to put out this fire. Shortly after that a fire on Lipsy Lake was also believed to have been the result of careless campers.

The picture to the right, taken in July 2006, shows the impact, four years later, of the ½ acre forest fire on Black Cat Lake caused by use of an unapproved fire pit at an undesignated camp site.

Figure 7.4 Policy Framework for Designated Public-Use Lands

Designated Public-Use Lands Policy Framework

Regardless of ownership, 'designated public-use lands' are to remain as natural open space; for use by the general public.

Designated public-use lands are to be managed so as to ensure that their natural environment is protected, preserved and sustained according to sound environmental stewardship principles.

Where conflicts arise between public-use and environmental stewardship a balanced approach will be sought with the emphasis on environmental stewardship (the precautionary principle) with a goal of maintaining or developing a natural diverse habitat for future generations to enjoy.

Public-use lands policies must consider the practical limitations and capabilities of the land owners to maintain the designated lands on a day-to-day basis.

7.2.2 Achieving Consensus

Achieving consensus on how designated public-use Lands should be utilized requires the balancing of many different points of view. The following table documents the approach to achieving consensus.

Forum	Bullfrog Bay	Blueberry Islands	Norah's Island	Lipsy Bay
Community Input 2005- 2006		✓		
Workshops Summer 2006	✓	✓	✓	✓
Dysart et al Municipal Council		✓		✓
Draft Lake Plan presented to KLCOA May meeting 2007	✓	✓	✓	✓
Community Feedback	✓	✓	✓	✓
Final Lake Plan presented to KLCOA Sept Meeting 2007	✓	✓	✓	✓

7.2.3 Policies and Rationale

The following general policies and corresponding rationales are proposed for all the designated public-use lands:

Policy	Rationale
1. Regardless of ownership, "designated lands" are to remain "natural open space" for use by the general public.	Although KLCOA currently owns the wilderness area near Bullfrog bay, there is no desire or capability for the KLCOA to restrict use of the lands to KLCOA members.
2. No Rope swings, structures or docks.	Due to liability and safety issues, as well as limited ability for seasonal and ongoing maintenance.
3. No Outhouses.	We can envisage a day when KLCOA can properly manage 'outhouse type facilities', however these facilities are not proposed at this time since maintenance issues need to be addressed. To be reassessed at a future date as the KLCOA matures and based on the presence or absence of exposed excrement and toilet paper.
4. Use at own risk.	KLCOA assumes no risk for the designated lands.
5. Daytime use only – no overnight camping.	Overnight camping is not possible because there are no toilet facilities and no garbage collection. Island users have been using adjacent 'non public' mainland properties as 'bathrooms' causing issues for cottage owners. Overnight camping would require garbage collection and properly maintained outhouses/thunder boxes which are beyond the capabilities of the KLCOA. Further, the presence of campers can deter others from day use of the area.
6. Campfires at designated fire pits only. Users are encouraged to	As per the Haliburton County Burning Bylaw' – campfires for warmth and cooking are allowed.

Policy	Rationale
bring their own firewood.	Restrictions therefore are neither possible for publicly owned lands and for many cottagers are not desirable. KLCOA will maintain a list of designated fire pits which will be inspected and approved by the Fire Chief. The Fire Chief has also noted that designated fire pits are more safe than using 'un-managed areas' Proposed locations are: Norah's Island (subject to decision by Norah's Island Management Committee (NIMC), Blueberry (East and West), Lipsy Bay. Bringing firewood will be evaluated over time for environmental impact and is currently encouraged.
7. No excessive noise.	Noise carries to cottages within the vicinity of the designated spaces. It has had a serious impact on cottages close to the Blueberry Islands in particular.
8. Users are to remove all garbage.	KLCOA does not currently have a sustainable capacity to collect garbage.
9. Discrete approved signage will be posted explaining the purpose for each area to advise Users of stewardship guidelines.	Signage is required to communicate and raise awareness.
10. Vandalism will not be a deterrent to implementing the above policies.	Based on previous experience, we may anticipate that some signs may be vandalised from time to time. We will simply replace them.

Each of the five designated public-use lands poses a unique management challenge and the following location-specific policy recommendations are proposed:

7.2.3.1 Blueberry Islands:

The proposed approach takes into consideration the limited community capability to sustainably:

- maintain the islands;
- protect the environment;
- manage the safety of the island users; and
- manage the safety and tranquility of cottagers in the immediate island areas.

Recommendation	Rationale
1. Post one discrete sign near the fire pit on each island, stating the following wording: • Daytime use only / No Overnight Camping • Campfire in designated fire pit only (Users are encouraged to bring their own firewood) • Please remove all garbage Priority HIGH	Overnight camping is not possible because there are no toilet facilities and no garbage collection. Island users have been using adjacent 'non public' mainland properties as 'bathrooms' causing issues for cottage owners. Overnight camping would require garbage collection and properly maintained outhouses/thunder boxes which are beyond the capabilities of the KLCOA. Further, the presence of campers can deter others from day use of the area. The Fire Chief has noted that designated fire pits are safer than using 'un-managed areas'. Unauthorized fire pits will be removed.

Recommendation	Rationale
2. Small discrete signs will be posted at both ends of the West Blueberry Islands stating "Please respect the safety of swimmers - slow down".	Safety of swimmers in the narrows between the mainland and islands needs to be considered – both for island users and local cottagers. We recognize that some boaters will not respect this request but also believe that some will.
3. Ownership transfer from the Municipality to KLCOA or a Land Trust should be deferred until community reaches a broader consensus on island usage. Other issues to consider are: • Liability Insurance • Fire protection • Land use consensus may develop over time	KLCOA need to demonstrate their ability to be good stewards of the islands and have the necessary infrastructure in place to manage the islands before any transfer may take place. Transfer to a land trust may be another viable option. Given that this is a future activity, its priority is LOW.

7.2.3.2 Wilderness Area – Bullfrog Bay

Recommendation	Rationale
1. The signs identifying the wilderness area should be replaced.	KLCOA should establish a sustainability plan for all of the signs it maintains.

7.2.3.3 Norah's Island

Recommendation	Rationale
1. The HHLT should designate an area where people may picnic. 2. Posted one discrete sign near a designated fire pit stating the following wording: • Daytime use only / No Overnight Camping • Campfire in designated fire pit only (Users are encouraged to bring their own firewood) • Please remove all garbage Priority HIGH	Norah's island is already utilized for picnics and day use. There is human waste, broken bottles and garbage on the island (Sept 2006). It is best to try to manage this problem. Overnight camping is not possible because there are no toilet facilities and no garbage collection. Island users have been using 'non public' mainland properties as 'bathrooms' causing issues for cottage owners. Overnight camping would require garbage collection and properly maintained outhouses/thunder boxes which are beyond the capabilities of the KLCOA. Further, the presence of campers can deter others from day use of the area. The Fire Chief has noted that designated fire pits are safer than using 'un-managed areas'. Unauthorized fire pits will be removed.

7.2.4 Other Public-Use Lands

Although they are public-use spaces, to which the general policy framework would apply, specific policies have not been developed for the following public-use lands:

- the dam and surrounding public lands
- public boat launches
- Lipsy Bay

Except for Buckskin Lake, the lands of the Leslie Frost Centre, lie just outside the Kennisis watershed boundary. However, these lands provide a wonderful range of hiking, camping and canoeing 'places to go' to enjoy the natural environment.

Of particular significance is the Clear Lake Conservation Reserve which is accessible by trail from West Shore Drive. It is proposed that the community should:

- promote the trail and conservation reserve as part of the solution for the lack of 'places to go';
- obtain agreement from any private land owners for access to the trail;
- produce a map of the trail; and
- develop a group of volunteers to help maintain the trail.

7.3 WASTE DISPOSAL

7.3.1 Septic Treatment Systems

The survey results indicate that cottagers are concerned about the impacts of septic systems on the lake and public health. E-coli bacteria from untreated human waste can present serious human health threats, and phosphorus reaching the lake from sewage disposal systems speeds lake eutrophication and threatens cold water fish (lake trout) populations according to the following chain reaction: elevated phosphorus levels result in increased algae production; algae die and sink to bottom of lake where they decompose; decomposing algae use up precious oxygen at bottom of lake, effectively suffocating the deep water (cold-loving) fish such as lake trout.

Although the Province sets the building code for septic disposal systems and takes care of licensing new technologies, permitting and inspections are handled by local health units. In our case, this is the Haliburton office of the Haliburton, Kawartha, Pine Ridge District Health Unit.

7.3.1.1 Types of sewage treatment systems on the Kennisis Lakes

The Kennisis lakes have essentially four categories of systems for treating waste water from cottage toilets and sinks. The statistics for the distribution of systems come from the survey results.

Category 1: A full eighty eight percent (88%) of survey respondents use a combination of septic tank and leaching bed. In this system, waste water flows into a tank where solids settle out and scum/grease is trapped in surface baffles. The effluent from the tank then flows into a system of "leaching" tiles that allow the effluent to percolate into the porous sandy soil bed. In a properly installed and maintained system, soil bacteria and chemistry kill harmful bacteria and remove a portion of the phosphorus from this now groundwater. Other factors aside, the further a leaching bed is from the lake, the greater the neutralization of harmful bacteria and chemicals.

Solids accumulating in the bottom of the tank necessitate it being pumped out at regular intervals, depending upon frequency of use.

For a detailed current discussion of how different tank/bed treatment systems work and their correct operation and maintenance see the CMHC website http://www.cmhc-schl.gc.ca/en/co/maho/gemare/gemare_009.cfm

Category 2: One percent (1%) currently are using a composting toilet system in conjunction with some sort of grey water disposal system for sink/shower wastewater. When properly maintained, composting toilets are clean, odour-free and release no harmful bacteria to the groundwater and significantly less phosphorus. Compost-like residues are disposed of seasonally, well away from water courses. Composting toilets are a sound environmental choice. If the grey water leaching system is built to code, it should result in phosphorus removal effectiveness similar to the regular leaching bed described above. Improper or no

grey water treatment system can result in direct (overland) discharge of grey water (phosphorus, detergents) into the lake.

Category 3: Six percent (6%) of cottages use an outhouse for human waste in conjunction with some sort of grey water disposal approach for sink/shower wastewater. Older outhouses are "legally non-conforming" (grandfathered), but this approach is no longer permitted within the building code. All new lots must have two sites suitable for a leaching bed (primary and back-up) and cottages are required to install some treatment system for toilet and sink wastes.

Category 4: Five percent (5%) use a holding tank for toilet wastes. In these situations, grey-water drains into either the holding tank as well or is discharged separately (see discussion above). The cost of regular pump-outs suggests that most users of holding tanks drain their grey-water elsewhere. Similar to outhouses, holding tanks are legally non-conforming for older cottages but not permitted with new cottages.

7.3.1.2 Other Sewage Disposal Options

There are other licensed options for sewage treatment that are more compact and offer better removal of phosphorus. Some involve different types of leaching beds; other involve processes within the tanks. An alternative to the composting toilet is the incinerating toilet. In some cases costs are higher and maintenance more onerous, but benefits certainly warrant a closer look. Two Trent University students through the U-Links program have compiled a comparison of these technologies and their analysis will inform the lake plan implementation phase.

7.3.1.3 What else do we know about our septic systems?

Similar to cottage setbacks, leaching bed setbacks have increased over time. The current required setback is 30 metres (100 ft.) Figure 7.5 summarizes the survey results.

Age of septic systems varies considerably as can be seen in figure 7.6. The lifespan of a properly maintained system usually falls between 20 and 30 years, but brand new systems can be rendered problematic through negligence (trucks backs up onto leaching bed) or improper use.

The vast majority of cottagers appear to understand the importance pumping their tanks; 90% report having pumped within the past 5 years.

Virtually all cottages have some sort of bath or shower. Half have a clothes washer, and approximately a third have a dishwasher. Without careful avoidance of phosphate soaps/detergents, these appliances result in additional phosphorus loads to the treatment system and ultimately the lake as well.

Figure 7.5 Distance (in feet) of leaching bed from the shoreline

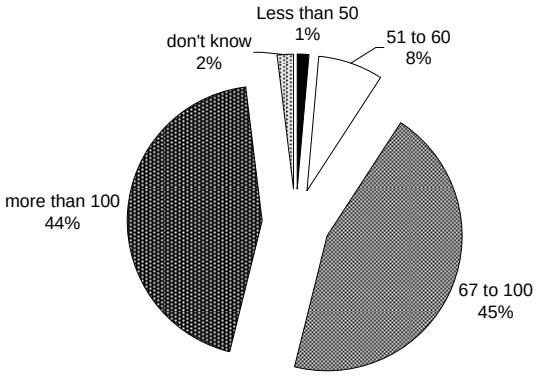
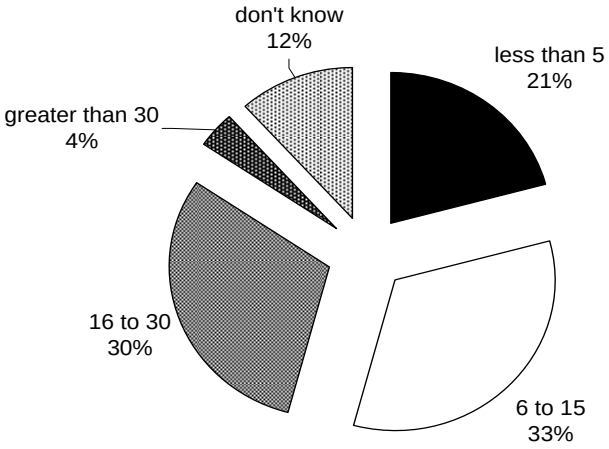


Figure 7.6 Age (in years) of Septic System



7.3.2 Septic Treatment System Issues and Options

Issue Statement: *The impact of waste disposal is a threat to the water quality of the Kennisis Lakes.*

Issue 1: Grossly malfunctioning septic systems may be releasing dangerous bacteria and large quantities of phosphorus into the lake.

A grossly malfunctioning septic system is one that allows untreated sewage effluent to enter the lake. This could be a result of

- an old metal tank that has rusted out and is leaking
- cracks in a concrete tank
- a tank that has not been pumped for so many years it is allowing solids to enter and clog the tile field

- all soil pore space in an old tile field has over life span of system become "clogged" with effluent minerals, and the effluent is now pooling on the surface of the bed and running overland into the lake
- the tile bed and perhaps underlying pipes/tiles have been damaged by being driven on or otherwise significantly weighted

Septic re-inspection programs are conducted to identify grossly malfunctioning systems and to require that these systems be fixed or replaced. Such a program visited every cottage on little and big Kennisis Lake in 1997 and used trained summer students to do the actual field work. The manager of septic permits/inspections at the local health unit who was in charge of this re-inspection program has indicated that several seriously substandard systems were identified by the survey and that work orders were issued. However, neither the Health Unit that conducted the survey nor the Municipality of Dysart et al who paid for the survey (with provincial funding) are able to locate the final report. This is troubling. Without the actual report, we have no way of knowing how many systems were identified as problematic, and can not confirm that all work orders were followed through.

The anecdotal survey responses suggest strongly that cottagers would like to see another mandatory septic re-inspection program on our two lakes. It's not clear how many of those respondents were aware of the 1997 program, and it's not clear how many of said respondents would be willing to pay for such a program.

Algonquin Highlands municipality (immediately to the northwest of Dysart et al) has just completed a 3 year long re-inspection of all septic systems within their boundaries. Fourteen percent (14%) of approximately 5000 systems were identified as needing some form of remedial action. More than 400 systems had been improved to some extent within one year of program completion. The program was paid for by cottagers through a $10/yr property tax levy for 5 years. The municipality indicates that final costs were closer to $65 per cottage. Unfortunately, the local Health Unit chose not to participate in the program, and as such there was no agency with a mandate to force owners of identified systems to follow through with work orders. Compliance was largely voluntary.

The local health unit does <u>not</u> recommend committing further resources to re-inspecting Kennisis systems and does not appear to willing to participate in such a re-inspection. Their position is that the 1997 program took care of the worst cases, and that to best limit phosphorus inputs to the lake, resources should instead be directed towards shoreline stewardship initiatives that create healthy, natural front yard buffers.

<u>Impacts if not addressed</u>
There may be sewage disposal system around the lake that are leaking effluent into the lake and causing significant environmental and public health impacts. Whether this is the case or not, it appears that cottagers would like some sort of reassurance that all reasonable efforts have been made to identify and fix such systems.

Option 1 That the KLCOA should investigate all options for conducting another re-inspection program with mandatory follow up. Some possibilities include:

- a County-wide re-inspection. This is being considered by the County, but has not been identified as their top priority, so funds have not been allocated. Public pressure could move this forward.
- a municipality-wide program. The municipality is not currently considering such a program.
- a lake-wide program that is paid for by cottagers (roughly $65 per cottage) through a tax levy similar to Algonquin Highlands

Regardless of the geographic scope of a re-inspection program, it appears that support and participation from the local Health Unit will be necessary to ensure work orders are followed through with.

Option 2 That only the oldest and least frequently pumped systems be re-inspected. While this may result in some efficiencies, it may not be effective. Professionals in this field indicate that age is not always a good indicator of likely failure. A brand new system could be ruined by a large truck backing onto it. Further, it would require someone to pull all the permits at the health unit to assess age. Although the survey collected the age of systems, the survey guaranteed privacy, and survey results represent only about one third of the lake community.

Option 3 That cottager owners be educated as to how to identify if their system is malfunctioning, and then asked to fix/replace problematic systems. Neighbours could be encouraged to work together in their inspections, and a list of certified professional inspectors would be provided on the Association's website. One might optimistically assume that the problematic systems were already dealt with in 1997, so there should be few present problems. Clearly, this will not catch all problems; some owners will not examine their systems, and others who are aware of problems may choose to do nothing. However, without the active participation of the health unit to force the follow through of work orders, this option might result in roughly the same overall impact as the Algonquin Highlands program (coerced but ultimately voluntary compliance) with much less money involved.. Although cottagers would not actively be encouraged to "rat out" their neighbours, it is anticipated that a well educated community of cottagers would be more apt and able to identify and report suspect systems on the lake to the Health Unit.

Option 4 That we work towards making a septic re-inspection a mandatory condition of sale of a cottage. This is presently difficult. The municipality does usually learn of a sale until the deed is transferred on day of purchase, and hence the timing is problematic. We would however pursue participation with other associations to form a regional council (such as Gull River Council) to lobby the provincial

government for changes to provincial laws that would prohibit the sale of residential properties unless the septic system passes inspection. In the mean time, we would try to seek the support of all real estate agents in recommending to all prospective purchasers to insist on a re-inspection. Notices to this effect could also be put on large road signs approaching the lake and on the KLCOA website.

Issue 2: All properly working conventional (tank & leaching bed) septic systems result in an addition of phosphorus to the lake. When considered cumulatively, the phosphorus releases become significant.

The Ontario Ministry of the Environment calculates the carrying capacity (maximum number of building lots) of cottage lakes primarily on their ability to flush out phosphorus from septic systems. For their modeling purposes, they assume that every gram of phosphorus put down a sink or toilet ultimately reaches the lake. Although this is a slight oversimplification, it makes clear the point that

- all conventional systems have an impact on the lake
- human waste excluded, we can control what goes into our septic tanks and hence into the lake

Impact if not addressed

Lake water quality was identified in the survey as of very high importance. The link between phosphorus inputs and lake quality is direct and very well established in literature.

The number of cottages (septic systems) on the lake continues to increase. So too does the number of water using appliances as existing cottages are modernized and older cottages replaced. Without a change in behaviour with regards to the types of products being used in kitchens and bathrooms, it should therefore be expected that phosphorus inputs to the lake will increase over time.

It should then be expected that overall water clarity and intensity and frequency of algae blooms on the lake will also increase. One needs look only as far as the Kawartha Lakes to appreciate the impacts of phosphorus. Many shorelines are so choked with aquatic vegetation that cottagers must mechanically remove the vegetation just to be able to swim. These lakes are geologically and biologically different from Haliburton lakes in the first place, but have also been subject to more intense pressure from phosphorus inputs from cottages and agriculture.

Option 1 An intensive and extensive education program as to what should and should not go down drains & toilets should be conducted. This program should also ensure that phosphate-free products are being sold at the marina and cookhouse. Pamphlets explaining the merits of these products would be given to each and every customer purchasing anything at these two stores. An informational decal could be produced to go above sinks and toilets. This education program would also include best practices for pumping septic tanks. A frequently pumped tank results in a better working system and less release of phosphorus. Hot tub owners are educated regarding the

draining of their tubs (e.g. let sit uncovered, then drain into ground away from lake – not into septic system).

Option 2 Cottagers who are exclusively using phosphate-free products are recognized through a stewardship reward program (non-monetary).

Option 3 Cottagers are provided with information detailing the effectiveness, cost, site appropriateness and licensing timing of new sewage treatment options. Various new technologies are being developed and tested that apparently have the ability to significantly reduce the ultimate release of phosphorus into the lake. [A U-Links project is underway to produce such a guide]

Issue 3 – It appears that a significant portion of cottages may be discharging grey water improperly.

When asked on the survey, a full 9% of respondents did not answer the question about how their grey water is treated. This may well be because they were confused about the distinction between grey water and septic waste treatment. But it may also indicate that these respondents did not want to go on record as having grey water being discharged directly into the ground or a grey water well, both of which are illegal.

Impact if not addressed
There are many reasons that direct discharges of grey water would lead to more phosphorus reaching the lake:

- most cottages (and hence grey water drains) are closer to the lake than their associated septic systems – therefore less soil minerals to remove phosphorus
- the discharge may be into soils that are not effective in removing phosphorus (wrong composition or not be deep enough)
- in the worst cases, grey water may be draining overland into the lake

Option 1 Strategies to curb illegal grey water disposal should be similar to those identified to curb grossly malfunctioning septic systems. An enforceable septic re-inspection system should first be sought. Failing this, an education program should be used to help cottagers realize the impacts of their illegal systems with a goal towards voluntary remediation.

7.3.3 Kennisis Lake Landfill

The Kennisis Lake Landfill site has accepted garbage from cottagers on Kennisis Lake and Little Redstone Lake since cottaging began in the 1950s. The dump is situated at the junction between the main Haliburton Forest access road and Country Road #7 and is zoned “Disposal Industrial”. It has been and continues to be managed by the municipality, but day to day operations are currently contracted out and the contractor, his employees and subcontractors are responsible for checking access passes, ensuring that disposal bylaws are followed,

collecting fees when applicable, tidying the site, and maintaining the site with regard to top-coating with fill material.

Despite the many day to day grumblings about "the dump", Kennisis cottagers have expressed clearly, but not unanimously, they support having access to a local waste disposal facility and the ability to recycle and to dispose of hazardous waste.

Although there has been speculation for many years that the landfill site may be forced to shut down, a recent study suggests that the Kennisis Lake site has approximately 20 years remaining capacity, and perhaps more if recycling efforts are conscientious. When the site does eventually close, it is unlikely that another site will open in the area. The provincial trend in waste management sees responsibilities transferring from municipal to county levels, and smaller decentralized landfill sites being replaced by a system of larger centralized waste management facilities with local transfer stations.

Frustration has been raised over the years regarding limited and inconvenient hours of operation of the Kennisis Lake landfill site. Without the budget for 7 days per week operation, it has been difficult to find a schedule that suits year round residents, week long summer users and weekend users. An up-to-date schedule of landfill hours and alternate sites can be found on the municipality website http://www.dysartetal.ca . As of spring 2007, the Kennisis landfill schedule is as follows:

Summer (May 1st to September 30th):
Monday, Tuesday, Thursday and Saturday10:00 a.m. to 5:00 p.m.
Sunday & Holiday Mondays 12:00 noon to 8:00 p.m.
Non-holiday Mondays, Wednesday and Friday – Closed

Winter (October 1st to April 30th)
Saturday and Thursday10:00 a.m. to 5:00 p.m.
Sunday & Holiday Mondays10:00 a.m. to 5:00 p.m.
Non-holiday Mondays, Tuesdays, Wednesdays, Fridays – Closed.

Three main issues that were reviewed regarding the Kennisis Lake landfill site led to the identification of proposed options.

Issue 1: The potential for contamination of the water table and lake.

A modest surface water monitoring program has been in place since 1995, while ground water monitoring started in 2005. In the summer of 2006 the municipality released a draft report detailing the results of water quality monitoring around the dump ("leachate"). Surface water was monitored in three places:

- immediately down-gradient of the waste pile;
- at the property boundary down-gradient of the landfill site; and
- at the point at which surface water enters Kennisis Lake, down-gradient of the landfill site and at the outlet of several wetlands.

Two groundwater monitoring stations have been set up:

- beside the landfill site, to establish background (non contaminated) conditions; and
- down-gradient of the waste pile.

Although the groundwater and surface water immediately down-gradient of the waste pile show clear signs of waste-related increased chemical concentrations, it appears from the consultant report that there presently is no appreciable impact from the dump on the lake water quality. With regard to surface water testing station at the outlet to Kennisis Lake, the report concludes "The chemical values from this location are significantly reduced from the upstream locations and do not reveal any impact on the lake at this location. There are no significant increasing trends in chemical values".

That said, the report also acknowledge that a more thorough testing regime and more time-series data are needed to fully assess impact of the site on leachate water quality. This includes more sites, more frequent tests (once per season) and more parameters. The final report (May 2007) sets out a series of remedial actions that would need to be taken should contaminant levels in surface or groundwater be found to be above provincial standards.

Option 1 Express clear support to the Municipality for the leachate monitoring program, and ask Dysart et al to expand the testing program as recommended in the recent consultant's report.

Option 2 Request that the municipality promptly provide the results of the annual leachate monitoring program to the KLCOA; and seek information from the municipality /consultant on early warning indicators.

Issue 2 Cleanliness of the landfill site and illegal dumping

It has been a challenge to keep the landfill site clean. Garbage has been scattered by wind and animals throughout the surround forested area. Illegal "after hours" dumping at the gate to the site continues to be a problem and the accessible portion of the landfill site has at times been messy.

The problems of illegal dumping and site cleanliness have been raised over the years with the municipality and the contractor, and significant progress has been made. Nonetheless, illegal dumping continues, and despite many proposals there is no clear community consensus on a solution.

It is understood that the municipality stationed "undercover" inspectors near the entrance at key off-hours times in an unsuccessful attempt to apprehend offenders and there has been talk of video camera surveillance for the same purpose. What the community does agree upon however is that this problem needs a solution.

Option 1 Write a letter to municipality and contractor supporting efforts to prevent illegal and after hour dumping at gate. State clearly that the lake community would like to part of ongoing discussions and would be willing to assist where appropriate in finding a solution.

Option 2 Ensure that the issue is addressed in the "Stewardship Guide" (see Recommendation #1 in section 8.3) and highlighted in the orientation section for new owners and renters.

Issue 3 The need for improvements to the schedule of accepted materials.

In earlier days, virtually no restrictions were placed on what could be disposed of in the landfill, no user charges were levied and there was no on-site monitoring of dumping.

Over the years, restrictions and fees have been put in place by the municipality and a contractor is now onsite at all scheduled operating hours.

Recycling facilities became available about 15 years ago and have been managed by Muskoka Container Services. Some materials can be set aside for "re-use" while others are taken off site for further processing. Objectives of these measures include:

- keeping the site clean;
- promoting/enforcing recycling for environmental reasons and to extend the lifespan of the site;
- ensuring that only those paying local taxes are able to use the landfill;
- maintaining the "no-fee" nature of the dump for small scale domestic garbage, and charging for larger scale dumping (appliances, building materials and brush) with a portion of the fees collected going towards the cost of transporting materials from the Kennisis site to other municipal processing sites; and
- avoiding hazardous materials in the dump.

As of 2007, recycling has become mandatory, and users will be required to use clear garbage bags so that the attendant can verify compliance. Contractor attendants are now expected to stop every vehicle entering the site to check for a permit card and to ensure garbage/recycling has been separated. It should be noted that recycling will extend the life of the Kennisis landfill site.

Although it has changed over the years without formalized consultation with the Kennisis Lake and Redstone Lake communities, the table below summarizes the schedule for materials accepted at the landfill site as of spring 2007. Users should check with the municipality for updates:

bagged domestic garbage	*no fee*
recycling	*no fee*
large appliances	*$10 ($30 without sticker demonstrating removal of CFCs)*
tires on rims	*cannot be left on site*
tires off rims	*$3*
oil tanks (must be cut in half)	*$40*
propane tanks	*no fee*
brush	*$5/cubic yard*

building materials	*$5/cubic yard if "chippable" (wood), $10/cubic yard if can not be chipped (insulation, shingles etc)*
hazardous materials	*cannot be dumped or left on site*

There is minimal support for the stewardship efforts of the lake community with regard to the safe disposal of hazardous waste.

In recent years the Haliburton Village landfill site has been allotted one day a year, in August, and the Haliburton and Harcourt sites have split a day in the fall. Cost is an issue with the municipality, but without a local means for dealing with hazardous waste, unscrupulous individuals will dispose of hazardous waste with domestic garbage, and the environment will be threatened.

Option 1 The immediate community using the Kennisis Lake landfill site ask to be formally consulted before decisions are made pertaining to the landfill material schedule because these decisions have a significant influence on the lifespan of the landfill site.

Option 2 The mandatory recycling program be publicized in KLCOA communication materials and renters and new owners be targeted through the 'Stewardship Guide".

Option 3 The Kennisis community advocate to the municipality for the means to deal with hazardous waste at the Kennisis Lake landfill site on a regular on-going basis.

7.4 DEVELOPMENT PLANNING

Development around our lakes is controlled mostly through municipal planning. Kennisis Lake and Little Kennisis Lake are situated in Havelock and Guilford Townships, which are two of the 9 townships forming the Municipality called "The United Townships of Dysart et al. "The Municipality of Dysart et al, as it is commonly referred to, in turn is one of four municipalities forming the County of Haliburton, the upper tier municipality.

Land-use Planning in Ontario is regulated by the Planning Act of 1990 as amended, administered by the Ministry of Municipal Affairs. Regional and local land use issues are dealt with at the County and Municipal level. In Haliburton, the County Official Plan sets the framework for the Municipal Official Plan, out of which flow the regulatory zoning bylaws.

Virtually all objectives and controls relevant to lake development are found within the lower tier Official Plan and Bylaws. At a lot level, these include for example minimum lots sizes, minimum set backs from lot line and shoreline, and maximum number and size of structures. At a lake level, Official Plans and bylaws set out to protect sensitive habitats (e.g. wetlands), steep/sensitive slopes, and to control the broad uses of land (e.g. residential vs. commercial vs. tourism vs. industrial extractive). Lot severance is administered at the County level.

A number of opportunities exist for the participation of individuals or organizations such as the Kennisis Lake Cottage Owners Association (KLCOA) in land-use planning at the watershed level. Official Plans and Zoning Bylaws are reviewed on a regular basis, usually every 5 years. At this time public consultation occurs and input from groups and individuals alike is being sought. In July 2004 the Municipality of Dysart et al, after several years of consideration, updated its Official Plan, and on December 12, 2005, updated is zoning bylaw.

On specific issues, presentations to Municipal Council can be made at any time with the objective to change or amend zoning bylaws. On several instances representatives of the KLCOA have addressed Council on land-use issues at Kennisis Lake over the past years. Their presentations and input were well received and created a constructive relationship with local politicians, who are aware of the overall concerns and issues at Kennisis Lake.

If groups or individuals are not satisfied with the land-use and zoning decisions arrived at the municipal level, any party can appeal these decisions to the Ontario Municipal Board (OMB) as a last resort.

More importantly, lake associations and neighbours of persons applying for zoning changes or variances, are notified by the Municipality of Dysart et al in advance of meetings concerning these applications. This provides an opportunity for proactive responses on part of the lake community.

Similarly, neighbours and the KLCOA are notified by the County of Haliburton when an application for a lot severance (a "consent") is received. Comments regarding severances are welcomed.

Development controls also flow from directives in the various provincial ministries and others. For example, the Ministry of Environment establishes the maximum number of cottage lots permitted on each cold water lake (suitable for trout populations) in cottage country based on the lake's phosphorus regime. The Ministry of Natural Resources in conjunction with the federal Department of Fisheries and Oceans regulates and permits the development of docks and other shoreline structures. Local Health Units in Ontario issue permits for residential sewage treatment systems.

Abstracts from the municipal planning bylaw are provided in §7.6. Some specific provisions are referenced below as they arise in the "Issues and Recommendations" section.

7.4.1 Survey Data

Two of the questions asked in the 2005 Survey (question 15) were:

a) Should the shoreline setback for new buildings and structures (not docks or boathouses) be:
- ☐ Strictly enforced at 66 ft. from the high water mark
- ☐ Increased from 66 ft to 100 ft. from the high water mark
- ☐ Flexible according to the situation

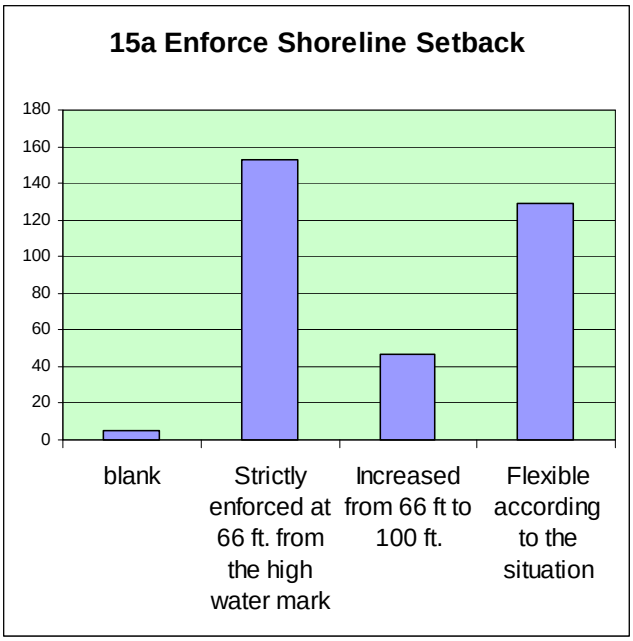
b) Should the Township regulate shoreline alteration (i.e. restrict the removal of native trees or vegetation)?
Yes ☐ No ☐ Don't know ☐

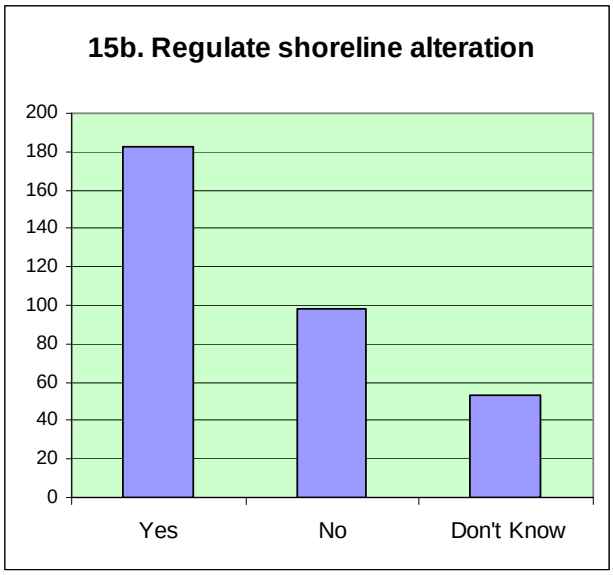
There were 334 responses to both questions.

Regarding setbacks 47% of the respondents indicated that setbacks should be strictly enforced at the 66 foot mark while 14% wanted the setback increased to 100 ft. Thus just over 60% wanted strict enforcement. 39% responded that they preferred flexibility according to individual situations.

Based on the narrative responses provided with the survey, this result has been interpreted as indicating that a majority favour enforcement of the 66 foot setback but that flexibility is important where circumstances make this impractical. A typical response was that there should be flexibility and grand-fathering for current structures with small lots because (1) increased setbacks would put the cottage close to the road, or require blasting; and (2) no-one should be penalized because they have yet to replace their old cottage.

Regarding shoreline alteration, 55% thought there should be regulation, 29% thought not and 16% did not know. This response has been interpreted as indicating that while a majority are concerned about shoreline alteration and favour regulation, there are many who are opposed or who are not sure as to the best approach.





7.5 LAND USE ISSUES & RECOMMENDATIONS

Issue Statement: *Over-development has a negative impact on the natural environment, degrades water quality and harms the social environment by reducing the number of 'places to go' to enjoy a wilderness experience.*

Development within the waterfront and along the shoreline especially has a negative impact on the natural environment, degrades water quality and harms the social environment by reducing the number of 'places to go' to enjoy a wilderness experience. A balance is therefore sought that will allow for development that will sustain natural and social environments *in the long term*. Given that the vast majority of the lakes' shoreline has already been developed, the most significant present threats are not large, single point source, but instead small, incremental changes to many smaller parts of the lakeshore and watershed at the individual lot level. In other words, there should be more concern about the small things being done on existing cottage properties as compared to the risk of a major new condominium/resort development or gravel pit.

Whereas the preceding sections of this lake plan have identified 'options' for consideration before recommended action are developed (see §8), land-use issues have received more extensive consultation and are presented as top priority recommendations.

The guiding principle for identifying recommendations in this section is that uses, policies and controls that slowly and cumulatively allow for degradation of the natural and social environment over time need to be addressed. The Kennisis lake

community has the capacity to influence municipal planning policies and bylaws and it should exercise that role in a goal oriented and proactive manner. One way is through the upcoming review of the Official Plan.

The following issues and recommendations flow from the principles identified above and the perspectives of cottagers as expressed in the survey, workshops and in feedback to the May 2007 Draft of the Lake Plan.

7.5.1 Minor Variance Requests:

When the municipality receives an application for a minor variance request, it circulates the application to neighbours of the applicant and to the KLCOA President and Lake Steward for comment. There is usually a two week window to submit comments before the committee of adjustment meets to make a decision. In some cases the committee decides to conduct a site visit and as such postpones decision making.

It is now widely recognized by scientists and planners that the most ecologically sensitive and critical area of a cottage lot is that which is adjacent to the water. Although minor variations are by themselves perhaps insignificant, their approval should be viewed in the context of the hundreds of similar applications that will be made on the lake over the next 50 years and their ensuing cumulative impacts. The protection of sensitive and critical ecological function of the near shore areas and the minimization of built "visual pollution" as seen from the water should be sought.

Recommendation
Requests for minor variances to the existing bylaws for waterfront properties should be considered by the Municipality in the context of a set of General Development Principles to be developed as part of the implementation phase of the Lake Plan.

7.5.2 Applications to Sub-divide (Consents)

A lot owner may apply to the County of Haliburton if they wish to divide their lot into 2, or more, smaller lots. Presently, new lots created this way need to have at least 45m frontage. Our lakes are virtually "ringed" with cottage development, and consequently the few undeveloped stretches of shoreline remaining are of high ecological and social value by virtue of their scarcity. Severance of larger shorelines/lots into smaller ones will reduce the little "breathing space" that is left on the lake.

Recommendation
That the Municipality be encouraged to enact a zoning bylaw amendment increasing the minimum shoreline frontage for new lots on Little Kennisis, Big Kennisis and Paddy's Bay from 45 m to 100m. NOTE: This new frontage requirement would not apply to the two large lots on Cat Bay that are already subject to more restrictive severance requirements.

7.5.3 Vegetation Removal and Visual Pollution in the Near-shore Area.

Natural, native vegetation plays a crucial role reducing the movement of phosphorus and sediments from land to water. This is especially true following larger storm events. Research clearly establishes that grass is nowhere near as effective as natural vegetation in this regard. Sedimentation of the near shore areas is often disastrous for spawning fish. Native vegetation supports native species. Shoreline vegetation provides shade and refuge for fish and invertebrates.

Most cottagers value a natural look to the lake, and they come to the lake to avoid the relatively barren landscapes of the city. Most survey respondents indicated they noticed a reduction in shoreline vegetation compared to 5 years earlier. The clear-cutting of shoreline areas and other significant removal of vegetation, over and above the needs for access trails and views from cottage to lake, impacts significantly on the aesthetic enjoyment of lake users.

Extensive clearing or removal of vegetation on lots in general but along the shoreline especially is leading to significant impairment of ecological function and aesthetics. A majority (55%) of survey respondents indicated that they wanted the municipality to regulate shoreline alteration. Currently, the municipality tries to limit shoreline disturbance to 25% of the waterfront, but this is a guideline in the Official Plan, and not a bylaw. Hence there is no enforcement capability.

The Official Plan requires that at least 50% of waterfront lots to remain as "naturalized open spaces". Included in their definition of naturalized open space is grass and open bedrock. It is therefore still possible to clear all native vegetation and plant grass on any non bedrock surfaces and remain compliant. Further, the bylaw does not distinguish between sensitive front yards and less sensitive back yards; the back yard could be planted with grass the front clear cut and still be in compliance.

New examples of extensive vegetation removal are seen each year on the lake, and this trend can be expected to continue as more West Shore lots are developed, and as cottages on the rest of the lake change hands. In the worst cases, lots are clear cut from cottage to water's edge. It appears that the existing Official Plan guideline by itself is not effective.

In order to protect water quality and the overall health of the Kennisis Lakes, the single most important change land owners need to make is to protect the shoreline vegetation zone within 15m of the high water mark (vegetation includes trees and small plants).

The depth of the buffer zone has three major effects: mitigation of storm-water run-off (surface flow); uptake of nutrients (subsurface flow from septic beds and soak-away pits); and visual preservation of the natural shoreline.

For cottages with a 20m (66 ft) building setback this recognizes that there needs to be about 5m (15 ft) of vegetation disturbance around the cottage for air circulation, fire safety and maintenance. The depth of the shoreline vegetation buffer zone

should be as large as possible but the minimum size should be 15m (50 ft). For cottages with less than a 20m (66 ft) building setback exceptions will be required.

Recommendation
That the Municipality of Dysart et al be encouraged to enact a tree-cutting bylaw relating to the removal of trees and vegetation on waterfront properties.

In addition, that the Municipality be made aware of the community's concerns for the preservation of natural shoreline vegetation and the environmental impacts of development in general, and shoreline hardening in particular, through the General Development Principles to be developed as part of the implementation phase of the Lake Plan. These principles to include limiting the removal of vegetation in a 15m shoreline buffer zone save for an allowance up to 5m wide for access to the shore and dock area.

That a major education initiative be launched to help cottagers appreciate the important ecological and aesthetic role of trees and vegetation. Cottagers to be encouraged to minimize further disturbance, and to engage in rehabilitation of already disturbed areas. Education of new owners will be especially important. Workshops to demonstrate rehabilitation strategies may be offered, and the KLCOA could help to coordinate the procurement and distribution of seedlings and other materials for rehabilitation.

7.5.4 Expansion or Replacement of Legal Cottages within the 20 m Setback

Over the past 20 years, many older cottages closer than 20 metres (66ft) to the water (legal, non-conforming) have been knocked down and replaced with much larger cottages that are the same non-conforming distance from the lake. These large, modern looking cottages often have a large visual impact on the lake aesthetics due to their closeness to the water, and may well have led to impaired ecological function by way of larger building footprint.

Most survey respondents indicated that they are more aware of shoreline structures than they were 5 years ago. While this may include small sheds and pump houses, the trend of increased visual impact remains.

In the last Official Plan review (2005), the municipality removed the option to expand building footprints within 10m (33ft) of the high water mark. This partially addresses the problem, but still allows for large "replacement" cottages to be constructed between 10 and 20m (33-66ft) of the high water, as long as the new width is not more than 50% of lot width or 18.5m (whichever is smaller).

There are many legal non-conforming older cottages within the 10-20m setback zone that will sooner or later require replacement. Within the existing regulatory framework, it is very likely that many larger cottages will emerge within this zone. 18.5m is significantly wider than many of the existing structures, and with no height restrictions, the part of the new cottage visible from the water may increase substantially with an associated increase in visual impact.

Recommendation
That the Municipality of Dysart et al be encouraged to enforce the existing bylaw for structures on waterfront residential lots within the 0-10m and 10-20m (0-33ft and 33-66ft) setback.

That, the General Development Principles to be developed as part of the implementation phase of the Lake Plan include as a principle that requests for minor variances to the existing bylaws for waterfront properties in the 0-20 meter zone only be granted if there are compelling circumstances.

7.5.5 Legal, Non-conforming Boat Houses.

Survey results indicate that (highly visible) boathouses are not wanted by the vast majority of cottagers. Bylaw prevents their replacement, and hence many are in poor states of repair. As boat size and investment has increased, so too has the number of non-conforming covered boat slips that are for the most part also highly visible. The extrapolation of survey results suggests that cottagers do not want to see a lake ringed by covered boat slips.

Recommendations
That educational materials be provided to the community regarding the zoning bylaw provisions for accessory buildings and marine facilities, specifically including information on minimum water setbacks and the existing prohibition on covered boat slips.

That, the General Development Principles to be developed as part of the implementation phase of the Lake Plan include as a principle that due consideration be given to all aspects of the 'viewscape' so that visual disturbance of the natural shoreline is minimized and that existing, legal shoreline structures, such as boathouses should be low-profile and neutral in colour.

7.5.6 Backlot development and co-ownership (fractional ownership)

It can be expected that as vacant but 'buildable' waterfront lots within the municipality become hard to find, pressure for backlot development will increase. Without a strong position from our lake community, municipal councillors may be convinced by a strong development lobby to relax the minimum lot size for backlots.

If minimum lot size were to be reduced, the lake would be subject to increased ecological and social impacts. It is likely that municipal rights of way would be developed as lake access points and more boat-related impacts would result.

Recommendation
That the Municipality of Dysart et al be encouraged to enforce the existing bylaw regarding back-lot development and not allow any reduction in minimum lot size for back-lots.

7.6 EXTRACTS FROM THE MUNICIPALITY OF DYSART ET AL. ZONING BYLAW

The preceding sections of this land-use section of the lake plan were influenced by the new municipal zoning by-law. Relevant extracts are abstracted below. The full zoning bylaw document is available from the municipality or on-line at http://www.dysartetal.ca/frame12viia.asp. Township zoning maps are available on CD-ROM from the municipality.

7.6.1 New By-Law Highlights:

The new bylaw uses the 1977 by-law as a foundation but incorporates many changes intended to:

- ensure the by-law conforms with the new Official Plan approved in 2004;
- adopt innovative best planning practices
- resolve issues and problems that Council, staff and the public encountered in working with the 1977 by-laws;
- respond to input received through public consultation while the by-law was being prepared;
- make the by-law simpler and clearer and the maps more readable and accurate;
- update concepts and wording to reflect changes in residential and business development practices and provincial legislation and policy since 1977;

Most changes from the 1977 by-law will not reduce existing development rights on individual properties. There are a few exceptions, mainly targeted at shoreline protection, a key objective of the new Official Plan.

Property owners are reminded that regardless of anything in the new Zoning Bylaw, all buildings, structures and uses *legally* in place on December 12, 2005 are entitled to continue indefinitely. Also, anyone may appeal the Bylaw to the Ontario Municipal Board, up to January 9th, 2006. If any appeal us filed, the 1977 Zoning Bylaw as amended remains temporarily in effect, until the new Bylaw is dealt with by the OMB.

The following are highlights of the new by-law as they may apply to land-use and zoning in the Kennisis Lake watershed. This list may not be complete, dealing only with general rules and concepts:

7.6.1.1 General By-Law Provisions:

- Consistent with the Official Plan, water setbacks are increased to 30 meters (98 feet), This only applies to newly developed lots. Existing developed lots with 20 meter setbacks under the 1977 Bylaw are exempted.
- No part of an existing building that is within 10 meters (33 feet) of shore may be enlarged.
- All shoreline structures that are covered, whether permanently or temporarily, are prohibited.
- Docks and other marine facilities must be set back 7.5 meters (25 feet) from side lot lines, versus 4.5 meters in the 1977 Bylaw.

- Docks and other marine facilities may not occupy more than 30% or 12 meters (39 feet). Whichever is less, of a lot's shoreline frontage.
- A private cabin, where permitted, may be either a detached one storey building or part of a one or two storey building. If part of a building, a private cabin has to be completely separate from other uses on the same floor and have a separate entrance, and, like the private cabin, all the other uses in the building must be accessory to the dwelling (for example a garage or home workshop is acceptable).
- No new dwellings with a floor area of 100 square meters (1.076 square feet) or more may be built to the lesser standards for cottages that the Ontario Building Code allows for. Zones not accessible by fully maintained road are exempted.
- Lot coverages, separated into those for main buildings and accessory buildings in the 1977 By-law are now combined. For example, in a zone where the 1977 bylaw restricted lot coverage to 10% for the main building and 5% for the accessory buildings, the new bylaw allows lot coverage of 15% for all buildings.
- Lot coverage now includes decks and verandas.
- A minimum percentage of a lot has to be left in naturalized open space, including natural vegetation, natural bedrock, and lawns and gardens. This replaces the landscaped open space requirement in the 1977 bylaw, and the minimum percentages have increased in most cases.
- Exterior lights may not be more than 9 meters (30 feet) above ground and must direct light downwards.
- Outdoor storage in motor vehicles, trailers, and freight containers is prohibited except in industrial zones under strict conditions.

7.6.1.2 Waterfront Residential Zones:

- These zones generally include all lands designated Waterfront in the Official Plan, including the Seasonal Residential zones and some of the Rural Residential and Open Space zones in the 1977 bylaw.
- There are 10 types of Waterfront Residential zones, depending on the lot frontage, lot area, and water setback permitted in the 1977 bylaw, whether there is a fully maintained public road, and whether year-round occupancy is currently permitted.
- There is a new restriction on shoreland coverage. The maximum lot coverage percentage for the 60 meters closest to the water is on most lots the same as the lot coverage percentage for the whole property. On large lots, the maximum lot coverage for the front 60 meters is less.
- There is a restriction on dwelling unit area, limiting the total floor area of the dwelling relative to the lot area. The effect is that on a lot with the minimum permitted area for its zone type, dwelling floor area is capped at around 475 to 500 square meters (just over 5.000 square feet). Because the restriction is less effective on larger lots, there is a further new restriction on dwelling size. The floor area of each storey of the dwelling is capped at 280 square meters (3.014 square feet).
- The only type of home business permitted is a home office (a professional practice involving one or two residents, which will not attract regular visitors). However, where year-round occupancy is permitted, the full

range of permitted home businesses, as well as Bed and Breakfast use, is also permitted.

7.6.1.3 Other Residential as well as Rural and Environmental Protection Zones:

- There are five types of Rural, Suburban and Urban Residential zones, depending on whether the property is in Haliburton Village, west of Haliburton village along County Rd. 21, or in a hamlet, whether there is municipal sewage service and what type of dwellings are currently permitted.
- All residential zones are subject to minimum lot areas and frontages, especially in areas without municipal sewage, in order to ensure adequately sized lots.
- A wide variety of uses is permitted in several Commercial Zones (General Commercial, Highway Commercial) in order to reflect the marketplace and the specific requirements of business activity.
- There are four types of Rural zones, depending on the lot frontage and lot area, whether there is a fully maintained public road, which prescribe the types of uses permitted. In all rural zones, dwellings are limited to one per lot and no mobile homes are permitted. See table below for specifics.
- There are three types of Environmental Protection zones: Open Space (the dry land Open Space zone in the 1977 Bylaw), Lake or River (the 1977 water body Open Space zone), and Environmental Protection (the 1977 Hazard zone plus non-development natural heritage features designated in the Official Plan). Private structures are prohibited in Environmental Protection zones except for minimal stairways, walkways and docks.

Residential *Zones* include the following:

		Explanatory note re purpose:
Waterfront Residential Type 1 *Zone*	WR1	60 m *lot frontage*, 30 m *water setback*, year-round occupancy
Waterfront Residential Type 2 *Zone*	WR2	60 m *lot frontage*, 20 m *water setback* on *lots* developed as of 2004, year-round occupancy
Waterfront Residential Type 3 *Zone*	WR3	45 m *lot frontage*, 30 m *water setback*
Waterfront Residential Type 3L *Zone*	WR3L	45 m *lot frontage*, 30 m *water setback*, limited services (no public road)
Waterfront Residential Type 4 *Zone*	WR4	45 m *lot frontage*, 20 m *water setback* on *lots* developed as of 2004
Waterfront Residential Type 4L *Zone*	WR4L	45 m *lot frontage*, 20 m *water setback* on on *lots* developed as of 2004, limited services (no public road)
Waterfront Residential Type 5 *Zone*	WR5	90 m *lot frontage*, 30 m *water setback*
Waterfront Residential Type 5L *Zone*	WR5L	90 m *lot frontage*, 30 m *water setback*, limited services (no public road)
Waterfront Residential Type 6 *Zone*	WR6	150 m *lot frontage*, 30 m *water setback*
Waterfront Residential Type 6L *Zone*	WR6L	150 m *lot frontage*, 30 m *water setback*, limited services (no public road)

RESIDENTIAL *PERMITTED USES*	**WR1, WR2**	**WR3, WR4, WR5, WR6**	**WR3L, WR4L, WR5L, WR6L**
Residential uses (See notes at end of residential uses s			
Single-family dwelling	X		
Converted dwelling			
Duplex dwelling			
Semi-detached dwelling			
Seasonal dwelling		X	X
Private cabin	X	X	X
Notes: *(a)* Only if served by a *sanitary sewer system.*			
Non-residential uses			
Bed and breakfast establishment	X		
Home office	X	X	X
Any other *home business*	X		
Place of worship			
Public park	X	X	

7.6.2 Rules and regulations as they apply to structures and buildings:

All buildings erected in the Municipality exceeding 10 square metres (108 square feet) of floor area must comply with applicable Ontario Building regulations and zoning by-law provisions (see above).unless authorizing permission to vary from the requirements set out in the bylaws has been granted.

Buildings and structures constructed after July 11, 1977 must be set back a minimum of 20 meters from the high water mark of any water body. Unenclosed decks may extend 3 meters into the water setback if they are attached to a permitted building. All cottages and seasonal dwelling units must have a minimum floor space of 55 square meters (600 square feet).
All dwellings must be 4.5 meters (15 feet) from the side lot line.

An addition to a building which does not comply with the setbacks required by the zoning bylaw can occur if the project meets the following criteria:

- The building existed prior to July 12, 1977
- The original building plus addition is no greater than either 60 feet in total length or 50% of the lot frontage, whichever is more restrictive, and
- The addition comes no closer to the lot line or high water mark than the original building

If the project does not meet these criteria, a minor variance can be applied for.

The majority of lakefront lots in Dysart et al. are zoned Seasonal Residential (SR). In this zone each lot is permitted one seasonal dwelling and a maximum of 2 accessory buildings. One of these accessory buildings can be a “private cabin”. A private cabin is building which is a maximum of 45 square meters (480 square feet) in which sanitary conveniences may be provided, but which contains NO KITCHEN facilities and is accessory to a permitted dwelling house.
No accessory building may be constructed prior to the erection of a seasonal dwelling unit on the same lot.
Special exemptions for setbacks exist for accessory buildings.
Buildings designed to house people or additions which will increase the occupancy of the building require Health Unit approval prior to the issuance of a building permit.

Trailers are not permitted anywhere other than in licensed trailer parks. A trailer may be placed on a lot for use while the cottage is being constructed. The trailer may not be used once the cottage is occupied.

8 RECOMMENDATIONS & ACTION PLAN

8.1 A COMMUNITY APPROACH

In the introduction to this lake plan document (§1 & §2) the values and vision for a community-based approach were articulated.

Through the surveys and workshops, as well as informal discussions, it is clear that the community has become engaged. The challenge for the future is to build and expand upon the strong base of community support and to engage additional participants in the implementation of the recommendations. At the same time a number of opportunities have been identified to reach out to a broader community and develop new partnerships such as may be represented by a proposed Gull River Regional Stewardship Council or the Coalition for Equitable Water Flow.

The lake planning process has identified many issues and even more options for dealing with the issues.

The recommended options that are listed in the following section all reflect high priority issues. Overwhelmingly the preferred approach is one of EDUCATION and COMMUNICATION coupled with STEWARDSHIP. In only a few cases are REGULATORY actions proposed.

Some of the options developed in the preceding sections of the lake plan are not being recommended for immediate action – there are just too many. A number of these are nonetheless believed to have merit and should be revisited over time.

8.2 PRIORITY ISSUES

Twelve high priority issues have been identified that reflect the values and concerns expressed by the Kennisis Lakes community. Each issue affects the natural, physical, or social environment of the Kennisis Lakes. The statements in Figure 8.1 are intended to capture the essence of each issue.

Figure 8.1 Twelve Priority Issues

1. Water Quality

The impact of property development, waste disposal and boating is a threat to the **water quality** of the Kennisis Lakes.

2. Development

Over-**development** has a negative impact on the natural environment, degrades water quality and harms the social environment by reducing the number of 'places to go' to enjoy a wilderness experience.

3. Public-Use Lands

We no longer have enough public spaces on the Kennisis Lakes and there is a lack of consensus within the community as to how the **'public-use' lands** that we do have should be shared.

4. Natural Shorelines

The environmental and aesthetic value of **natural shorelines** is threatened by removal of vegetation and the introduction of man-made structures.

5. Water Levels

Fluctuating **water levels** create navigational hazards, have a negative impact on the natural environment, cause problems for water-access properties and require the construction of extensive docks.

6. Power Boating

Inconsiderate **power boating** pollutes the lake, damages the shoreline, puts swimmers at risk, and shatters the tranquility of the lake.

7. Wildlife

The preservation of **wildlife** habitat is threatened by development and increased human activity.

8. Tranquility

Excessive noise from boats, snowmobiles, traffic, and cottage sites reduces the **tranquility** and 'quiet enjoyment' of the natural environment at the lake.

9. Night Skies

Excessive lighting negatively impacts enjoyment of the **night skies** and the natural environment.

10. Traditional Rights-of-Way

Property development is causing **traditional rights-of-way** such as portage and hiking trails to be re-routed or abandoned: this reduces recreational opportunities for enjoyment of the wilderness and reduces the number of 'places to go'.

11. Sustainable Forest Management

The community is not aware of the importance of **sustainable forest management** in the Kennisis watershed.

12. History

We are not aware of the **history** of the Kennisis Lakes and are missing an opportunity to learn from the past.

8.3 RECOMMENDATIONS

Several options for dealing with the priority issues have been presented in the preceding sections of this document. The **recommended** options for dealing with each issue are now presented along with an Action Plan.

The majority of recommendations relate to education, communication and stewardship: only a few anticipate the need for regulatory action.

One recommendation cuts across several issues and is presented first.

Principal Recommendation

#1 Produce a Practical Stewardship Guide for the Kennisis Lakes

Create a practical Stewardship Guide to encourage cottage owners, renters and others to become good stewards of the land by promoting awareness about the impact of their activities on water quality and the natural environment.

The Guide will focus on environmental stewardship and especially the importance of natural shorelines. It will include information on 'how to':

- reduce or eliminate laundry and dishwasher detergents containing phosphorus;
- eliminate the use of lawn fertilizers and other garden chemicals such as pesticides and herbicides;
- select the best of the new septic technologies;
- properly drain a hot tub;
- maintain and restore natural shorelines.

A special section will provide orientation to cottage country for new owners and renters.

Priority 1 - Water Quality

#2 Water Testing

Continue a water quality monitoring program through MOE's Lake Partner program and produce an annual report of water quality testing results and make this available to all property owners on the lake, Dysart et al municipal officials and other stakeholders. Be willing to invest KLCOA funds to do this.

#3 Septic systems and Grey water

Educate cottager owners to identify if their septic or grey-water disposal system is malfunctioning, and encourage them to fix/replace problematic systems.

Over time, working with other lake associations in the form of a proposed Gull River Regional Council, require that septic re-inspection be a mandatory condition of sale of a cottage. In the mean time, seek the support of real estate agents in recommending to all prospective purchasers that they insist on a septic system inspection.

#4 Pesticides, Herbicides and Fertilizers

In addition to providing education and stewardship, be willing to support the introduction of a by-law eliminating or restricting the use of pesticides, herbicides and fertilizers in the Kennisis watershed.

#5 Municipal Landfill

Work with the Municipality of Dysart et al to support the leachate monitoring program at the Kennisis municipal landfill and to find ways to encourage the proper disposal of hazardous waste for example by accepting such material at the Kennisis Lake municipal landfill site on a regular basis (more than once a year).

Priority 2 - Development

#6a Support the enforcement of existing zoning bylaws:

6a.1 Regarding Back-lots: Encourage the Municipality of Dysart et al to enforce the existing bylaw regarding back-lot development and not to allow any reduction in minimum lot size for back-lots.

6a.2 Regarding redevelopment of legal cottages within the 0-20m (0-66 ft) setback: The Municipality of Dysart et al is encouraged to enforce the existing bylaw for structures on waterfront residential lots within the 0-10m and 10-20m (0-33ft and 33-66ft) setback.

6a.3 Regarding boathouses and covered boat slips: Provide educational materials to the community regarding the zoning bylaw provisions for accessory buildings and marine facilities, specifically including information on minimum water setbacks and the existing prohibition on covered boat slips.

#6b Encourage the Municipality to consider bylaw amendments:

In conjunction with the next review of the Municipality of Dysart et al's Official Plan in 2009, and the subsequent updating of the zoning bylaws:

6b.1 Regarding protection of the shoreline vegetation zone: Encourage the Municipality of Dysart et al to enact a tree-cutting bylaw relating to the removal of trees and vegetation on waterfront properties.

6b.2 Regarding applications to sub-divide: Encourage the Municipality to enact a zoning bylaw amendment increasing the minimum shoreline frontage for new lots on Little Kennisis, Big Kennisis and Paddy's Bay from 45 m to 100m. (This new frontage requirement should not apply to the two large lots on Cat Bay that are already subject to more restrictive severance requirements.)

#6c Establish General Development Principles

Increase awareness of the community's development values by establishing and publishing a set of "Development Principles" for the Kennisis Lakes that would be shared with the community and filed with the Municipality of Dysart et al as a 'benchmark' for planning decisions. Over time, develop a

capacity to respond to individual property owners seeking advice on environmentally-sound approaches to development.

The "Development Principles" should reflect the values endorsed in the Lake Plan. Where conflicts arise between development and environmental stewardship a balanced approach will be sought with the emphasis on environmental stewardship (the precautionary principle) with a goal of maintaining or developing a natural diverse habitat for future generations to enjoy.

The Development Principles include:

- Natural Vegetation: Avoid significant removal of natural vegetation in a 15m shoreline buffer zone, save for an allowance up to 5m wide for access to the shore and dock area.

- Environmental Impact: Minimize the environmental impact of development on: streams, wetlands, wildlife and fish habitat and require formal evaluation of any such features in the development approval process.

- Variances: Only allow variances to the existing bylaws for structures on waterfront residential lots within the 0-20m (0-66 ft) setback if there are compelling circumstances.

- Viewscape; Minimize visual disturbance of the natural shoreline and the horizon. Existing legal shoreline structures, such as boathouses should be low profile and neutral in colour.

- Avoiding Shoreline Hardening: Maintain natural shoreline habitats by avoiding 'shoreline hardening' through the creation of manmade structures such as retaining walls.

- Intensification of Development: Maintain, but do not intensify, the existing level of commercial development of waterfront property on the Kennisis Lakes.

Priority 3 - Public-Use Lands

#7 Designated Public Use Lands

Adopt the following policy framework for public use lands:

Designated Public-Use Lands Policy Framework

Regardless of ownership, 'designated public-use lands' are to remain as natural open space for use by the general public.

Designated public-use lands are to be managed so as to ensure that their natural environment is protected, preserved and sustained according to sound environmental stewardship principles.

Where conflicts arise between public-use and environmental stewardship a balanced approach will be sought with the emphasis on environmental stewardship (the precautionary principle) with a goal of maintaining or developing a natural diverse habitat for future generations to enjoy.

Public-use lands policies must consider the practical limitations and capabilities of the land owners to maintain the designated lands on a day-to-day basis.

Regarding the Blueberry Islands:

Post one discrete sign near the fire pit on each island, stating:

- Daytime use only / No Overnight Camping
- Campfire in designated fire pit only
- Users are encouraged to bring their own firewood
- Please remove all garbage

Post small discrete signs at both ends of West Blueberry Island stating:

- Please respect the safety of swimmers - slow down.

Ownership transfer from the Municipality to KLCOA or a Land Trust should be deferred until community reaches a broader consensus on island usage and other issues are considered, including:

- Liability Insurance
- Fire protection
- Land use consensus

Regarding the KLCOA Wilderness Area – Bullfrog Bay

The signs identifying the wilderness area should be replaced.

Regarding Norah's Island

In accordance with the terms of the draft agreement between KLCOA and the Haliburton Highlands Land Trust, an area should be designated where people may picnic.

A discrete sign should be posted near a designated fire pit stating:

- Daytime use only / No Overnight Camping
- Campfire in designated fire pit only
- Users are encouraged to bring their own firewood
- Please remove all garbage

#8 Land Trusts

Promote the creation of additional Land Trusts and Conservation Easements within the Kennisis watershed.

Priority 4 - Natural Shorelines

#9 Landscape Alternatives

Develop an education program to inform property owners about landscape alternatives to manicured lawns, paved driveways and other impervious features, non-native species, waterfront retaining walls and sandy beaches to help reduce undesirable and inhospitable artificial landscapes along the shoreline.

#10 Natural Landscape Remediation and Model Sites

Take specific action to promote natural landscaping, for example: (1) through advice on remediation of problem sites in cooperation with amenable landowners; or (2) by establishing model sites in appropriate areas of the public-use lands such as in Lipsy Bay or on Norah's Island.

Improve areas of both the littoral and riparian zones with input from Conservation Authorities or MNR. For example: (1) provide in-water rehabilitation by adding downed native logs and other woody debris, as well as carefully placed rocks near the shoreline, to create micro-habitats for aquatic species and to protect the natural substrate; and (2) create a buffer of native plants, shrubs and trees at shoreline sites to discourage erosion and prevent sediment runoff.

Priority 5 - Water Levels

#11 Promote Sound Water Management of the Trent–Severn System

Continue to participate in the activities of the Coalition for Equitable Water Flow in order to promote communications with Parks Canada and other stakeholders and to work collaboratively on the development of educational materials regarding the importance of sound water management.

#12 Navigational Hazards

Publish and maintain an up-to-date navigational hazards map for boaters.

Work to ensure the proper marking of navigational hazards on the Kennisis Lakes (rocks, shoals, narrow channels and the approaches to bridges).

Encourage the appropriate federal agency to take responsibility for marking hazards on the lake caused by lowering the water level.

#13 Suitable Dock Design

Over time, distribute a pamphlet containing appropriate existing information and advice on environmentally appropriate dock designs for challenging locations due to water level fluctuation, including appropriate materials to use.

#14 Monitoring Impacts of Water Level Changes

Over time, document and monitor impacts on plants, fish and animal life due to changing water level. Similarly, document and monitor areas of erosion and approach landowners with possible solutions to protect their property and the environment.

Priority 6 - Power Boating

#15 Boating Code of Conduct

Adopt the 'Boating Code-of-Conduct' (section 6.1.3 and Figure 6.2) and promote 'friendly boating' with a focus on safety by publishing the code so it is available to residents and visitors along with a boating map through rental agreements, real estate agents, the OPP marine unit and the marinas.

#16 Promote Use of Environment-friendly Motors

Promote the phasing-out of old, polluting 2-stroke motors in favour of new, environment-friendly 2-stroke and 4-stroke motors on the lake; in the interim promote the use of environment-friendly 2-stroke lubricants.

#17 Invasive Species and Boat Cleaning

Increase awareness of the threat from invasive species such as zebra mussels through educational materials, including the posting of a sign on County Road 7 to alert those entering the watershed.

Seek the creation of a boat cleaning station at a 'choke point' such as West Guilford to reduce the risk of contamination of the Kennisis watershed by invasive species.

#18 Dock Watch

Over time, consider issuing 'cottage watch' signs for mounting at the end of docks or on shore

Priority 7 - Wildlife

#19 Haliburton Forest

Support educational opportunities with the Haliburton Forest that promote the preservation of wildlife habitat and link to initiatives that encourage cottage owners to maintain natural vegetation at their shoreline. Over time, expand this into a comprehensive rare and exotic species inventory for the watershed.

#20 Protection of Rare Species

Develop an education program in conjunction with MNR regarding the protection of rare species' habitat (including threatened and endangered species) and provide examples of how to naturalize private property to encourage rare species establishment. Over time, work with the municipality

to ensure that the official plan and zoning bylaws recognize and protect significant habitat.

#21 Lake Trout

Develop an ongoing partnership between the KLCOA and the Haliburton Highlands Outdoor Association's Haliburton Fish Hatchery in support of Lake Trout and game fish preservation. For example, promote and participate in creel census projects and publicize the results.

Priority 8 - Tranquility

#22 Quiet Time

Promote Sunday morning before 10 a.m. as 'quiet time' on the Kennisis Lakes.

#23 Noise By-law

Inform residents about the municipal noise bylaw (88-18), identify ways to reduce noise (e.g. boat mufflers), and document the process to follow to report noise bylaw infractions.

Over time, work with the Municipality to improve compliance with, and enforcement of, the noise bylaw and encourage Dysart et al to amend the municipal noise by-law to specifically include limits (time and duration) for boats with motors that exceed a defined decibel limit.

#24 Photography Competition

Over time, run a photography competition for the best pictures capturing the tranquility of the lake and youth engaged in stewardship.

Priority 9 - Night Skies

#25 Exterior Lighting

Through the KLCOA, provide educational materials about reducing night-time exterior lighting; for example, provide sketches of how to design installations, list products to use and places to buy them.

Over time, conduct a night-time light inventory to establish a baseline from which yearly progress can be tracked: develop a strategy to eliminate light pollution "hot spots."

Over time, work with the Municipality of Dysart et al to update lighting by-laws in order to require or encourage light abatement and reduce 'light trespass'. Specifically require that a property owner may only light their own property and that illumination of adjoining properties be prohibited. Require that all lighting located within 50 ft (12m) of open water should be a low cut-off type.

Priority 10 - Traditional Rights-of-Way

#26 Maintain trails and portage access points

Through volunteer efforts, maintain local canoe and snowmobile routes and hiking trails and work with the municipality to re-establish a trail to circumnavigate the lake by foot or bicycle.

Maintain shoreline access points for portage and hiking trails and other rights-of-way around the Kennisis Lakes and post signs at the shoreline marking access points.

#27 Public Launch Facility

Request that the Municipality of Dysart et al upgrade and maintain the public launch facility adjacent to the Kennisis Marina

#28 Keep Rights-of-Way Accessible

Request that the Municipality of Dysart et al, or appropriate agencies, enforce regulations to maintain rights of way, including recognized portages, in the Kennisis watershed.

#29 Places to Go

To reduce pressure on over-used areas such as the Blueberry Islands, alternative locations should be publicised as 'places to go' to enjoy the natural environment. These should include Norah's island and the hiking trail to the Clear Lake Conservation Reserve.

Over time, through the KLCOA, create a local canoeing and hiking trails map that includes a broad range of 'places to go' including camping sites, Buckskin Lake and the Clear Lake Conservation Reserve, the Haliburton Forest, and nearby parts of the Leslie Frost Centre lands.

Priority 11 - Sustainable Forest Management

#30 Haliburton Forestry Partnership

Support the Haliburton Forest in initiatives that promote sustainable forest management; for example partner with educational organizations to develop and deliver indigenous tree education programs – forest tours etc.

Priority 12 - History

#31 Kennisis History Project

Establish a 'history project' working group with the aim of producing a "History of the Kennisis Lakes" and to include approaches that will help future generations learn from the past.

8.4 ACTION PLAN (NEXT STEPS)

Once the Lake Plan is formally endorsed by the KLCOA membership, a significant communications effort will be required to start the implementation process, to marshal significant volunteer resources and to keep all stakeholders, including the municipality informed.

Several of the key issue areas have been the subject of individual U-Links projects and the subsequent reports are expected to help pave the way to successful implementation.

Those recommendations that fall under the jurisdiction of the Municipality of Dysart et al will need to be explained to municipal officials and presented to Council.

Stewardship, communication and education actions will require a coordinated volunteer effort.

In every case, it is proposed that a broad cross-section of the community, and especially youth, be involved. In implementing the recommendations it will also be important to find ways to measure and celebrate success.

This is just the beginning!

GLOSSARY

This glossary is intended for the general reader. It attempts to clarify specific or unusual terms used in the lake-planning process. These are not to be construed as formal scientific definitions.

Acid Lake – A lake that has water with a pH less than 6 standard units

Algae – Small aquatic plants lacking stems, roots or leaves which occur as single cells, colonies, or filaments.

Algal Bloom – Rapid, even explosive, growth of algae on the surface of lakes, streams or ponds; stimulated by nutrient enrichment.

Aquatic Macrophytes – Large water plants - either free-floating or rooted.

Bacteria - Microscopic unicellular organisms, typically spherical, rod-like, or spiral and threadlike in shape, often clumped into colonies. Some bacteria cause disease, while others perform an essential role in nature in the recycling of materials, for example, decomposing organic matter into a form available for reuse by plants. Some forms of bacteria are used to stabilize organic wastes in wastewater treatment plants, oil spills, or other pollutants. Disease-causing forms of bacteria are termed "pathogenic." Some forms of bacteria harmful to humans include:
[1] Total Coliform Bacteria—A particular group of bacteria that are used as indicators of possible sewage pollution.
[2] Fecal Coliform Bacteria—Bacteria that are present in the intestine or feces of warm-blooded animals. They are often used as indicators of the sanitary quality of the water.
[3] Fecal Streptococcal Bacteria—Bacteria found also in the intestine of warm-blooded animals. Their presence in water is considered to verify fecal pollution.

Beneficial Use – Any of the various uses which may be made of the water, including domestic water supplies, industrial and agricultural water supplies, recreation in and on the water, wildlife habitat, and aesthetics.

Benthic Zone - The lowest level of a body of water, such as an ocean or a lake. It is inhabited by organisms that live in close relationship with (if not physically attached to) the ground, called benthos or benthic organisms. Generally, these include life forms that tolerate cool temperatures and low oxygen levels, but this depends on the depth of the water.

Biodiversity - Refers to the variety and variability of life, including the complex relationships among microorganisms, insects, animals, and plants that decompose waste, cycle nutrients, and create the air that we breathe.

Black-water - Water that contains animal or human wastes. Compare to Grey-water.

Carrying Capacity - (General) The amount of human development that can occur in the lake's watershed without causing a significant change in its water quality. This is understood to include a measure of the capacity of a lake for boating, skiing, bathing - recreational use in general - and residential occupation of the shore and shore border land without patent overcrowding, pollution and consequent danger to health and safety. Carrying capacity may be greatly limited if a single use is given priority; also it may be expanded if the surface area of the lake is zoned for particular uses and the time for use in each zone is specified. Some of the factors involved in determining carrying capacity: size, shape, depth, character and location of swimming areas and beaches, regulatory and zoning restrictions, season of year, accessibility (public or private), available services (marinas), level of pollution, parking facilities, usable frontage and fish (abundance, species).

Carrying Capacity - (Biologic) The biologic carrying capacity of a lake refers to its natural productivity. In relation to fish production, or other aquatic life, the numbers which the natural food-supply, or pasturage, will support adequately.

Cultural eutrophication – An accelerated rate of lake aging induced by human sources of nutrients, sediment and organic matter.

Cut-off – Refers to the cut off angle, of a light fixture – defined as the angle between the vertical axis and the first line of sight at which the bare source (the bulb or lamp) is not visible (see http://calgary.rasc.ca/lp/definitions.html).

Dissolved Oxygen – Molecular oxygen freely available in water and necessary for the respiration of aquatic life and the oxidation of organic materials.

Erosion – The wearing away of the landscape by water, wind, ice, or gravity to smaller particles, usually sediment.

Eutrophic – Literally, “nutrient rich”. Generally refers to a fertile, productive body of water. Contrasts with oligotrophic.

Grey-water (gray-water) - Waste water from a household or small commercial establishment which specifically excludes water from a toilet or water used for washing diapers.

Hydraulic Retention Time – The time required for all the water in the lake to pass through the outflow.

Intermittent Streams – A stream that only flows for part of the year, as after a rainstorm

Lakeshed – immediate drainage basin of a lake. For example, the lakeshed of Kennisis Lake is 3,211 ha

Leachate - is the liquid produced when water percolates through any permeable material. It can contain either dissolved or suspended material, or usually both. This liquid is most commonly found in association with landfills where the result of rain percolating through the waste and reacting with the products of

decomposition, chemicals and other materials in the waste produces the leachate. If the landfill has no leachate collection system, the leachate can enter groundwater, and this can pose environmental or health problems as a result. Typically, landfill leachate is anoxic, acidic, and rich in organic acid groups, sulfate ions and with high concentrations of common metal ions especially iron. Leachate has a very distinctive smell which is not easily forgotten.

Littoral Zone – The region along the shore of a non-flowing body of water: more specifically, the zone extending from the shoreline to a depth where the light is barely sufficient for rooted aquatic plants to grow - corresponds to the 'riparian zone' for a flowing body of water. In tidal areas it is the zone of the sea flood lying between the high and low tide levels.

Load – The amount of substance, usually nutrients or sediment, discharged past a particular point; expressed in weight per unit time.

Mesotrophic – A term applied to freshwater lakes where nutrients are available but not abundant (moderately nourished).

Non-point Source – Pollution discharged over a wide land area, not from one specific location.

Nutrient Loading – The addition of nutrients, usually nitrogen or phosphorus, to a water body.

Nutrients – Elements or compounds essential to life, including by not limited to oxygen, carbon, nitrogen and phosphorus.

Oligotrophic – A term applied to freshwater lakes where nutrients are in short supply (little nourished).

Pelagic Zone – The area of a lake beyond the influence of the bottom (i.e., open lake waters).

Phosphorus – An essential nutrient for aquatic organisms, derived from weathered rock and human sources.

Plankton - Any drifting organism that inhabits the water column of oceans, seas, and bodies of fresh water. They are widely considered to be one of the most important organisms on Earth, due to the food supply they provide to most aquatic life.

Point-Source Pollution – Pollutants discharged from any identifiable point, including pipes, ditches, channels, sewers, tunnels, and containers of various types.

Riparian Zone - Land areas directly influenced by a body of water. Usually such areas have visible vegetation or physical characteristics showing this water influence. Stream sides and marshes are typical riparian areas.

Setback – the distance from a built feature to either the regulated high water mark of the lake or a lot line.

Steady–State – Assumes no change with time.

Stewardship - Administrative and/or custodial actions taken to preserve and protect the Natural Resources, particularly the plant (Flora) and animal (Fauna) life, of an area or Ecosystem

Storm-water runoff – Surface water runoff, usually associated with urban development, which carries both natural and human-caused pollutants.

Total Maximum Daily Load – A pollutant budget most simply expressed in terms of loads through quantities or mass of pollutants added to a water-body. Typically this budget takes into account loads from point and non-point sources, and human-caused as well as natural background loads.

Thermal Stratification – The distribution of heat within a lake forming separate strata based on water temperature.

Viewscape - A viewscape is all of the land and water seen from a point or along a series of points (a lake, road or trail). Viewscape management includes describing, planning, and designing the visual aspects of all components of the area. Managing the seen aspects may greatly affect the perceived spirit of a place.

Water Quality Standard – Legally mandated and enforceable maximum contaminant levels of chemical, physical, and biological parameters for water. These parameters are established for water used by municipalities, industries, agricultures and recreation.

Water Quality – A term used to describe the chemical, physical, and biological characteristics of water with respect to its suitability for a beneficial use.

Watershed – An area of land that drains surface water runoff into a stream, lake or other body of water and is generally defined in terms of hectares or square kilometers.

Wetlands - Wetlands are transitional lands between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is often covered by shallow water during some parts of the year.

NOTE: For a more exhaustive glossary of terms please refer to the North American Lake Management Society http://www.nalms.org/glossary/glossary.htm

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- COSEWIC http://www.cosewic.gc.ca/
- Environment Canada, Canadian Wildlife Service (CWS) – Species at Risk http://www.speciesatrisk.gc.ca/
- Provincial Policy Statement 2005 http://www.mah.gov.on.ca/userfiles/page_attachments/Library/1/789108_ppsenglish.pdf
- Species at Risk Act, Public Registry http://www.sararegistry.gc.ca/

9 APPENDICES

9.1 SUMMER 2005 RESIDENT'S SURVEY

937 Surveys were mailed, hand delivered or picked up by residents
334 Surveys were returned, - 37% which is very high for this type of survey.

Issues identified depend on specific circumstances of individuals and are sometimes dependent on the location of the cottage (for example: septic inspections for areas developed in the 1950/60s, ATV, Skidoo issues near trails, and new development are often dependent on where the cottage is located.)

There is a high level of **concern (and many responses)** with the following themes

1. Tranquility and noise levels from power boats, personal water craft, and to a lesser extent ATV, Skidoos are the most commonly mentioned concern
2. Fluctuating water levels were a major concern, however there was little consensus on what should be done other than keep the water higher in the summer/fall.
3. Respect for the environment. Pollution – including air, gas in lake, noise, water quality
4. Septic Systems – older parts of lake are very concerned about lack of monitoring by Municipality, new developments along the lake do not have this concern.
5. Wake limitations, shore line erosion
6. Value of tax dollars re dump, road quality, general distrust of municipal government in addressing the cottagers' issues.
7. Dump – quality, hours, unsightly, concern renters don't recycle
8. Restrict development – avoid Grandview, Deerhurst type developments of Muskoka
9. Restrict boat houses (86% of respondents)
10. Improve stewardship of the lake.
11. Education is lacking, train the young and novices to the lake
12. Restrict back lot development
13. Respect for your neighbours
14. Night Sky – darkness
15. Maintain natural shoreline – no lawns
16. Loss of back bays and tranquil areas to go to
17. Respondents were in favour of more cell phone and internet access (prior to the construction of the new cell tower).
18. Most people would like the potholes fixed on the road but not a significantly improved road.

Noteworthy – significant number of responses mentioned:

1. Blueberry island use, access and keeping it clean and usable, a right to be there or a need to go somewhere like a park
2. Renters need to be made aware of rules and respect the environment
3. There needs to be a community area for people / children to go to

Key areas identified on the Map:

1. Blueberry island
2. Soap Ponds (Lipsy Bay)
3. Other vacant Islands
4. Loon nest sites

9.1.1 Common Suggestions Identified in General Comments

1. Have a training program and outreach for the next generation (special training for children)
2. Encourage conversion of 2 stroke to 4
3. Convert dump to a transfer station
4. Better fuelling station at marina
5. Night sky stewardship
6. Prohibit severance of existing lots (or some limit on minimal frontage)

A 2005 presentation on the survey data to the KLCOA is available on the KLCOA website at http://www.klcoa.org/lakeplan/ressurveyanalysis.pdf

9.2 SUMMARY OF COMMERCIAL STAKEHOLDERS' SURVEY & WORKSHOP

A Commercial Survey very similar to the Residential Survey was sent to stakeholders that have a presence at the lake (resorts, marina, real estate agents). The written response was limited and would not represent statistically significant data. The responses that were received, were from individuals who are also residents on the lake and the feedback reflected that same values and priorities as the residential survey responses. Since the Commercial Stakeholder workshop was very well attended, the feedback from the workshop was considered to be primary commercial input for the lake plan.

This workshop, held on May 27, 2005, was developed as a follow up to the survey sent to commercial stakeholders on the lake. Commercial stakeholders are an integral part of our community and offer a different perspective from residential property owners.

The participants included Haliburton Outdoor Equipment, Haliburton Forest, Windermere Cottage Resort, Kennisis Lake Lodge, ReMax Realty, Countrywide Realty, Environment Haliburton, Dysart et al (Municipality), Department of Fisheries & Oceans, Parks Canada, Ministry of Natural Resources

Their initial comments on why they felt it was important for this group to be included in the Lake Plan process included:

- quality of lake affects business, (4 season operator, not on lake)
- need to know more about lake planning (Environment Haliburton)
- makes our jobs easier (MOE)
- live in area and care about future (MNR)
- information to share with perspective buyers (real estate)
- helps to develop community within townships (Municipality)
- gives info to facility users (lodging operator)

9.2.1 Values

Each of the participants wrote down as many 'values' they could think of that they had of the lake and the area. The following points were brought out.

- Water quality - not dirty, muddy, turnover because of dam, clarity, no smell - people talk about it when visiting the lake, great swimming, fishing, attractor
- Wildlife and habitat - e.g. ducks
- Landscape surrounding water - shoreline vegetation, lack of lot clearing, newer properties seem to be not clearing as much as older properties
- Shoreline habitat - also includes watershed area coming to lake
- Involvement of people on the lake - value to municipality
- Sense of community—possibly due to remoteness, one road in and out, love being at the 'end of the road'
- Natural shoreline - don't see boathouse and cottages from water, setbacks good
- Lake is an indicator as to what will happen to other lakes, inspires actions
- Properties well maintained, no junk (private stewardship)

9.2.2 Concerns and Issues

Commercial operators/businesses have a different perspective on the lake and the people who use it. They are in the area most of the time, if not living right on the lake. They were asked for their impressions of concerns and issues they see now or forthcoming.

- Shorelines eroding
- Redeveloping/rebuilding - people putting 'monster' homes on older lots, too close to shoreline

- Boating ethics - size, speed, safety, wake, pollution, traffic, noise, shoreline damage
- PWC use - reckless use, noise
- Climate change - potential impact
- Change in the way lake is used—permanent, shared ownership, rentals - need to make sure they love it as much as we do
- More services needed, more economic activity
- Land fill (dump) - garbage needs to be contained, more controlled, possible contamination to lake, users can't always get in
- Water level fluctuations - can impact fish and hibernating reptiles, will affect lakes down the watershed
- Back-lots - can be done within municipal standards
- Road traffic - can't walk or ride bikes safely, roads too busy, improvements only cause cars to speed up
- Communication - consultation with lake community difficult due to seasonal tendencies, makes planning difficult
- Marine – ramps - disaster at this point, everyone buys 'toys' and has to put them in, public ramps safety issue re traffic, upkeep and storage needed throughout year
- Invading species – e.g. spiny water flea, contaminants in fish flesh (don't trust the guide!)
- Loss of portages and water trail systems

9.2.3 Participation

The participants were reminded that they are very much a big part of the community and perhaps they had resources that could assist the KLCOA in achieving the values they shared earlier. This could be in the form of time to help, collected data, contacts, to name a few. The facilitator asked each participant to possibly think of something that they or their organization could offer to this plan.

- Resort educating customers, use of land, garbage, posted in rooms, have copies of plan
- Work out water levels, watershed shape, drainage area and surface area of lake, bottom surface, old MNR info could probably be digitized
- Lodging - fisher based info - same groups in every year - records kept re fish caught, methods used
- Copies of Official Plan, digital info of GIS system
- Historic info on watershed, aerial pictures, old survey notes (vegetation) tapes of 1900's re Joe Kennisis, lakes & rivers management plan
- Education as people come to the lake, why we want the shoreline as is, type of development, compromising changes, promotion of KLCOA, newsletters
- Fact sheets, educational days, presentation at KLCOA meetings, links to federal agencies, equipment available for use
- Lake surveys, fish stocking lists, resource management, fact sheets
- Environment book - distribute, advocacy work/research, networking
- Information and education to the public

9.2.4 Advice & Actions

The participants were also asked what advice they would suggest to the committee.

- Teach, guide, help!; Continuously educate
- Look at more than just the lake.
- Be inclusive—all stakeholder, keep in touch with council
- Snowball information exchange
- Communication—more is better

- Community approach to value system as clearly as possible—set consensus and work toward meeting those values—confirm those values
- Listen to all stakeholders
- Find underlying issues—establish real issue
- Take time, Have fun
- Communicate to the rest of the county
- Face to face contact with other recreational users—camps, canoeists
- Create a visitors' log
- Develop a 'Trails and Tours' contact

9.3 SUMMARY OF RESIDENTS' WORKSHOP - JULY 16, 2005

The content of this workshop, held on July 16, 2005, was developed as a follow up to the survey of Kennisis Lake property owners from the Spring of 2004.

The participants were asked to identify the most important values of the lake, special places, memories, etc. Most of those brought forward at this workshop were also reflected in the survey results. They included:

9.3.1 Values

- privacy (skinny dipping)
- quiet nights
- wildlife-bears, moose, loons, deer, fox, raccoons, chipmunks, fishers, herons
- water quality-swimming, supports wildlife (fish, birds)
- riparian zone (zone between high and low water levels)-shoreline protection, wildlife, natural vegetation, erosion, view
- flora, berries
- visual aesthetics-want to see trees, wilderness, not buildings
- relationship with neighbours-meeting new friends, respect, Elderberries, there is not the same community sense apparent to all – we need to develop it
- dark skies at night
- access to canoe routes/waterways
- clean common areas
- safety-swimming, boating, walking
- winding roads

Special spaces also brought out many conflicting names, as different areas of the lake had their own name for some of the same spots! There was consensus that many areas have been 'lost' due to development of over-use. Some of the memories over the years which were shared were, campfires, The Big Storm – 10 years ago the date of this workshop, forest fires and water bombers, longest resident here, family reunions, Joe Kennisis-historical development. It was also noted that there are some families celebrating 5th generation use and many more 1st generations.

9.3.2 Issues/Solutions

Participants used the values and memories to help generate issues, as well as possible solutions. The top 5 are summarized in the table below.

9.3.3 Best Advice/Actions

The group was asked what guiding principles the membership needs the committee to work on over the winter. Do we work on compliance, education, enforcement, etc.?

- Awareness is key, communicate the values/rationale, provide more opportunities for discussion
- Approach – welcoming committee, code of conduct re best practices, bylaws, etc.
- Set appropriate limits (boundaries) –
- Develop alliances with people/businesses with common objectives – honour local stewards (e.g. Forest), find most critical point to influence
- Positive PR – not a vigilante group

The Lake Plan Steering Committee would like to extend a HUGE thank you to the participants.

Issue	Problems/Conflicts	Possible Solutions
Boats (11) Wakes (6) Snowmobiles/ATV's (1)	- wakeboard boats, large boats, seems increased this year, damage to docks, shoreline - ATV/snow –noise, safety, trespassing - boats – gas, closeness to shore - noise, speed, wakes, pollution, safety - awareness of existing regulations/rules/law - too large a motor, no respect - lack of awareness - water attracts boats - misuse - effect on residents, shoreline, wildlife - enforcement (marine patrol, OPP)	- publication of existing regulations (newsletter, marina) - education & awareness that there is a problem - enforcement & presence on lake (OPP, Coast Guard)
Gathering place (6) Public spaces (6) Youth needs (5)	- Need for a focus place for the 'community' to meet and go to, youth - Public spaces - Youth – gathering places	- build gathering place - marina, forest, other location (uninhabited island?) - provide more social events geared to age groups
Development (10) Backlots (2) Kennisis River (1)	- West Shore large lots (condos, etc), controlled/appropriate - enforcement, municipality hiring/training (tax increase?) - work with contractors (quality), land owner awareness of construction quality - new to lake do not know the rules (publication) or stewardship values, good manners/etiquette/ethics, education on techniques - real estate agents	- develop relations with Dysart to allow our voices to be heard re Zoning & By-laws - work on Official Plan development - publication of information, stewardship values in newsletter - have real estate agents/firms on board with lake expectations/values
Shoreline preservation (11)	- natural shoreline preservation when developing lots - clear cutting	-education, publication -workshops (DFO, MNR) -enforcement
Education (7)	- natural, environmental responsibilities - awareness	-publications -workshops -speakers at AGM

9.4 SUMMARY OF LANDS MANAGEMENT WORKSHOP

This workshop was held on July 15, 2006. The lands we are talking about include public-use lands on the lake for which we will probably be taking more responsibility over the future years. These include, at present, Blueberry Islands, Lipsy Bay (Soap Pond), Bullfrog Bay and Norah's Island. Also of interest are privately-owned lands designated as 'open-space' such as Island 'C'.

9.4.1 Changes seen on the lake over the years include:

- West Shore development obvious
- Size of newer cottages, louder boats on water,
- Economics has lessened (population used to support 2 marinas),
- Wakeboarding developed,
- New 'surprise' development on existing properties,
- Less tolerance apparent (people need to be more so), diversification good,
- Concerns re radically changing what has been happening over the past 40 years,
- Islands have not really changed over 40 years, concern of how they might change for the worse if left in the wrong hands,
- More people relaxing in their own way,
- A lot more plastic garbage on islands, looking a lot more trampled,
- Concern re allowing brush removal and setbacks to go unchecked,
- Islands are still a community resource but sympathy toward new lot owners,
- Not as many campers coming through as before (nowhere to camp),
- Not as many frogs as there used to be, bigger algae blooms every year,
- Noise-increased # of people, less tolerance and consideration of neighbours, People seem to think they can do whatever they like, need to educate people on expected/requested lake values,
- Municipality doesn't seem to be able to enforce the regulations in place anymore,
- Clash of 'needs' between younger and newer people coming to the lake and those who have been here longer or permanent,
- Spaces have been filled in (public/open), islands have become much cleaner over the past 5 years-if people see it clean, they will keep it clean (same could apply to channel between islands),
- Fear re safety from the speed of boats going through the channel,
- safe places for people to swim or boat/ski,
- People don't want to comply (why not?), need to represent those,
- Less space to do what you want to do without trespassing on someone else's space,
- 1963-bridges were a big concern for KLCOA, 'parkland' around the lake was sold off by municipality and no one saw it as a problem at that time (Back Bay, Bullfrog Bay),
- Density issues,
- A lot of things that were enjoyed in past are now 'taboo' or politically incorrect or just not there anymore (e.g. Skinny Dip Bay!),

9.4.1.1 Recommended Strategies (General):

Perhaps all of our attitudes have changed or can change toward everyone's perspectives and how that can be managed carefully and properly – attitude toward the community

- Need for balanced stakeholder representation
- Changes proposed must be balanced and fair
- Council referred previous proposal re Blueberry islands to Lake Plan to better ensure all sides of issues were addressed

Manageable changes,

- Concern re future development (resorts, condos),
- Need for education, need to educate people, can't teach/force respect,
- We need to work on changing peoples' attitudes

9.4.2 Blueberry Islands

These islands became part of a deal through the past Lake Steward and the developer so that the islands would be held as 'open space' as it was promised to the Association. Residents on the channel behind Blueberry Islands (and others) had major concerns re safety of use.

In the Fall of 2004, the Lands Committee took on working out solutions to the above problems. Developed 9 steps – 8 & 9 were education and enforcement. Approved by membership and Executive – implementation begun. Presented to Dysart councillor (Leon Jones) re transferring the lands to KLCOA. Municipality wanted clarification and take it to public consultation before finalizing, hence was incorporated into the Lake Plan process.

9.4.2.1 Issues:

The safety issue of boats, etc at the channel needs to be dealt with immediately, regardless of all the other issues with the channel and lands.
No legally enforceable speed limit available for that channel.

9.4.2.2 Recommended Strategies:

May not be unanimous but most agreed that:

- signs-small, inconspicuous from lake
- no campfires
- no overnight camping
- remove all garbage

9.4.3 Other Lands/Islands Issues:

- Lack of tolerance, respect, responsibility toward others and the environment
- Open/common spaces – need to be preserved, define public spaces and their use, develop principles for use
- Be pro-active re responsibility to lands and use
- Possibly limiting not WHAT we do, but WHERE we do it and HOW we do it
- Opportunity for 'legacy/heritage experiences'
- Point of use management vs. blanket policy

9.4.3.1 Recommended Strategies:

- Need to balance and maintain the quality of freedom and responsibility
- Compromise is necessary
- Need enlightenment/training/communication
- Build on success stories re changes of behaviour
- Applications for variances need to be evaluated as individual situations
- Need to be vigilant and aware of Dysart council's proceedings and use existing laws and regulations to influence decisions on behalf of Kennisis Lake (OPP, existing regs.)
- KLCOA needs better representation at municipal level
- Knowledge of existing laws and legislation

9.5 SUMMARY OF MUNICIPAL SERVICES WORKSHOP

This workshop was held on July 22, 2006.

9.5.1 The Dump

Environmental impact, capacity and illegal dumping after hours were the main topic areas of discussion.

9.5.1.1 Issue: Environmental Impact

The municipality hired consultant re land fill concerns and having just received a draft report from municipality, it seems that what they are doing is good. They have been testing surface water since 1994 sporadically, but picked up the effort over the last two years. Water from the streams coming out of the pile and out of the wetland into the lake have been tested. It does seem to improve as it gets closer to the lake. Water is clean and clear, and meets most of the environmental department requirements for drinking water by the time it gets to the lake. Last year the municipality drilled two wells and tested them – both ok, meet standards. Recommend that there should be at least one more well done. Will test twice a year (spring and fall)
No indication of contaminant change at lake sites re more use and the profile shows that what the trends show is appropriate for the dump.

Recommendation: Re: Contamination of lake by landfill leachate
To clearly voice our support to the municipality of the leachate monitoring program, and ask the municipality to follow through with the recommendations' expanded testing program (frequency, # of sites and # of parameters), and annually report to KLCOA, also giving early warning indicators.

9.5.1.2 Issue: Capacity

Answers from the municipality are uncertain-approximately 20 years.
Other dumps in more severe situations are taking priority over us.
Smaller satellite dumps will be phased out and a larger one will be properly developed as this issue will be moved to county level.

Recycling material is currently taken off site, with the municipality paying to move it to Bracebridge. There is a new company working with the cardboard program where the municipality gets paid for the cardboard.
Since mandatory recycling will begin this Fall, the dump manager will be monitoring those not using recycling bins.

There was also discussion of what should be permitted into the dump – permanent, transference, recycling, composting materials.

Recommendations:
That we follow up with the capacity report when received and prepare recommendations as necessary.
That we support the mandatory recycling program by publicizing it in our newsletter and other educational materials and that we further publicize what is and what is not permitted in the dump (from municipality).
That we advocate for at least 2 hazardous waste days during the summer at our landfill.
That we create/support some municipal based incentives (not barriers) to recycle, and handle hazardous goods responsibly.

9.5.1.3 Issue: Illegal Dumping After Hours

Concern was expressed over the garbage left outside the dump gates during closed hours. Apparently, this is happening at all dumps. Many are walking the garbage in when closed, but this is dangerous since there are bears present. The gates were initially put on by provincial law to prevent people from dumping hazardous waste after hours; therefore the municipality cannot put a box outside of the gates for this purpose. One municipality did install a surveillance camera and have found a significant decrease in illegal dumping after fining those responsible.

There was a lack of consensus on the solution, but the issue is noted and will be followed up with the municipality and our association.

Recommendations:

That the association write a letter to municipality and contractor supporting efforts to prevent illegal and after hours dumping at the gate.

9.6 SUMMARY OF SEWAGE DISPOSAL WORKSHOP

This workshop was held on July 22, 2006.

9.6.1 Sewage Disposal System Issues

Results were presented from survey, classes of sewage disposal (1—4), phosphorous input, public health.
Issues identified included grossly malfunctioning units, usual problems: rusted metal tank/cracked plastic or concrete, no leaching bed treatment, leaching bed is clogged (most common), unapproved grey-water disposal.

9.6.1.1 Solutions and Strategies

The solution is to replace or fix system.
Possible strategies:
Lake wide re-inspection-$65 from certified inspector. Who pays? (we pay or municipal levy for 6 yrs or lobby for county-wide re-inspection) Presumably, worst cases have already been identified and addressed in '97. Apparently, they were found and fixed. Note: Municipal survey and subsequent report cannot be located!

Targeted re-inspection (oldest and least frequently pumped, or don't know where their system is located). Since it is currently all 'voluntary compliance' to date, we could call for compliance (notification to all about what substandard system would look like, and ask for remedial action). In some cases neighbours 'call in' obvious problems. Health department is not really available to pursue, although they do support the concept.

Force or engage re-inspection upon purchase of property by having real estate agents to agree to strongly recommend such and provide a list of certified inspectors) as well as signage suggesting/encouraging pre-purchase septic inspections. 'New owners' package from real estates to include septic information. Provide education regarding care of system to prevent malfunction by posting on website.

Health unit representative is suggesting that we shouldn't be spending so much time, concern, etc on septic, but rather on natural shorelines instead, as that is where they feel the biggest influence on water quality is coming from.

9.6.2 Incremental Phosphorous

This is from all systems, including unapproved 'grey-water' systems as well as improper development of the lake shoreline. We have background data re phosphorous and the trends so far show that we are ok, however it is not to say that it could get worse. Note that any septic system does not remove any phosphorous content. Whatever phosphorous goes into the tank, goes into the lake (this is a simplification used in modeling; in fact, vegetation and minerals do remove some phosphorus).

9.6.2.1 Solutions

- Education is needed.
- Phosphate free products -what should and should not go down drains. Provide sale of phosphate free products at marina and cookhouse, and investigate bulk buying of products. Pamphlets are already available.
- Pumping – more pumping = less phosphorous.
- Provide info to septic owners with regards to alternate and better treatment strategies as they become available (newsletter, website).
- Hot tubs – alternative chemical use and appropriate emptying practices.

9.7 SUMMARY OF MUNICIPAL PLANNING WORKSHOP

This workshop was held on July 22, 2006 and focussed on matters typically covered under the municipal zoning bylaw.

9.7.1 Variance Requests:

It has been the mandate of KLCOA (through the Lake Steward) to comment on variance requests. In the past, it has commented on shoreline setback encroachments, additional structures and increases in maximum heights and widths. Municipal council always makes ultimate decision and neighbours can provide input.

9.7.1.1 Recommended Strategies:

KLCOA retains the 'right' to object to requests depending on circumstances, subject to approval by executive. Applicants will not be contacted, nor will site visits normally occur. However, applicants are welcome to contact the association if they want to know what the KLCOA response is.

Perhaps training of more individuals, developing capacity in association to respond in a more site specific manner (include in draft plan).

9.7.2 Severance or Re-zoning Applications

9.7.2.1 Recommended Strategies:

KLCOA will object to any further severance of lots that result in frontages (pt to pt) less than 300 ft and any rezoning that results in additional lots, based on the fact that lake is already 'ringed' with very little breathing space.

9.7.3 Rezoning of Island C

(large fish shaped island immediately east of Cat Bay)

9.7.3.1 Recommended Strategies:

The association submit a formal objection to the pending rezoning application based on:

- -Spirit of earlier agreement with association negotiated by Blair Johnston (past Lake Steward)
- -Lack of green space – much of which was sold by municipality
- -High visibility of island
-
- Objection would be copied to Dysart, current owner (Shall May) and prospective buyer

9.7.4 Protection of Natural Shoreline

Max disturbance of shoreline is set out in Official Plan as 25%, but is not a bylaw – no enforcement capability. 25% can be considerable, too (large or small lot)

9.7.4.1 *Recommended strategies:*

Major education initiative to minimize further disturbance, and maximize rehabilitation. Workshops for rehabilitation strategies, and association assists in coordinating seedlings and other materials.

Adopt bylaw limiting the amount to clearing that can happen on a lot (modeled on other municipalities)

**Note - There was some objection to pursuing and adopting this as a bylaw and to possibly make people remove or change their existing retaining walls.

9.7.5 Redevelopments within 20 m Setback

Visual pollution being created on the lake from new large cottages being re-built within the 20 m (66 ft) setback over original footprint.

9.7.5.1 Recommended strategies:

Create bylaw for our lake that limits redevelopment within the 10 - 20 metre (33 to 66ft) setback to 50% increase in building footprint and overall sq. footage. Larger redevelopments must be back at least 20 or 30 metres (66ft or 100ft). Expansion of cottages closer than 10 metres (33 ft) to the lake is already (as of this year) not permitted. Leave a bit more open ended.

9.7.6 Boat Houses/Floating Awnings

Current bylaws are that new boat houses and covered boat slips are not permitted. Boathouses are not wanted by vast majority of cottagers. There are many (40?) old boat houses, covered boat slips in various physical conditions dotting shoreline.

9.7.6.1 Recommended strategies:

Owners should be contacted via letter and encouraged to voluntarily:

- -remove boathouse/covered slip, and if unwilling to,
- -paint the boathouse/cover the slip in natural colours (leaf green and bark brown)

Give the association a mandate to develop design guidelines/best practices for any future development to set out current bylaws and what the KLCOA endorses.

9.8 SUMMARY OF NATURAL ENVIRONMENT WORKSHOP

This workshop was held on July 22, 2006 and focussed on the natural environment, water quality and water levels.

9.8.1 Water Quality Issues:

- Boats:2 stroke vs. 4 stroke
- Zebra mussels, spiny water fleas-bilge water used in wake boats, OPP boats cleaned between lakes to avoid contamination
- Encourage sailboats, canoes, kayaks, electric boats
- Larger boats with 'heads' on board-dumping into lake

9.8.1.1 Recommended Strategies:

- Trade in/up with manufacturers, use local stores, use alternative/biodegradable fuel (Shell Nautilus), stock this fuel at marina and other local stores, coupons/give aways of samples.
- Set a target date for upgrading boat engines, etc.
- Re-introduce ' wind' regatta
- Regatta is largest gathering – utilize

9.8.2 Cleaning Products:

Inappropriate disposal/use affecting water quality.

9.8.2.1 Recommended Strategies:

Need to influence more use of phosphate free products
Use fridge magnets, brochures, point system, giveaways/coupons

9.8.3 Natural Shoreline:

Buffer zone to filter what is going into the lake, possibly the most important aspect we can influence
Trent Severn system causes severe fluctuation and therefore causes significant environmental, habitation damage between high and low water levels

9.8.3.1 Recommended Strategies:

Communicate current by laws that 75% of your shoreline must be natural, bylaws in place, municipal bylaws re riparian zone

9.8.4 Natural Environment/Fishing:

Lake trout – need clean, well oxygenated water, cold – phosphorous uses up oxygen – these fish are a good barometer of how good the water is, negative impact pressures increasing, need to control those
MNR, 3-4 years ago, did a public consultation and stocked approx 60,000 brook trout into Kennisis, looking for feedback (Minden-David Flowers)

MNR wants to know when and where the species are seen, however, education is the best prevention

Trout are fall spawning and this may be a problem since our lake levels are down at that time
Survey in 70's indicated there were no bass in the lake! Also, bass eat trout

Invasive species- populations tend to get out of control, crash, then balance out
Shoreline and shallows – everyone has altered their shoreline to some extent, everything affects the habitats of small shoreline animals (minnows, tadpoles, insects)

9.8.5 Water Level Issues

- Survey indicated that level fluctuations was a high concern however no one problem was divulged
- Other lakes have higher changes than ours (max 9 ft)
- Survey respondents recommend tighter controls on changes, pre-determined times, knowledge of reasons for change
- Trent Severn system requires 6 ft of draft, some end of summers it has gone to 4 ft
- Rate of flow on the system can have less affect on our lake if slowed down
- Possible that if Parks Canada is affecting our lake re navigational hazards, they should be assisting to mark them on the lake
- TS system is a significant and historical part of Ontario and we should probably work with them instead of trying to stop them
- They have traditionally not had to worry about affecting properties/people in the past, however now there are a lot more on the lake
- TS working with designated trout lakes by dropping the water levels to its minimum 6 weeks prior to spawning times in order to be sure that the eggs laid are not destroyed when water goes down
- Our lake is unique with the amount of water drawn out
- Kennisis supplies 10% of the water for the TS
- Winter level is set based on what is required for spring and to alleviate flooding
- Education on the TS and our water levels is paramount
- We also need to maintain a good relationship with TS and work together to meet our needs and theirs

9.8.5.1 Recommended Strategies:

Discussion-Prioritization-Provide Direction

- -Stewardship
- -Enforcement
- -Incentives
- Tie enforcement into municipal bylaws
- Develop 'Lake Watch' program
- Warning signs on fertilizer bags, or is all fertilizer bad
- Code of ethics re how to maintain your property with best interests in water quality
- Education information needed for cottagers on how to manage their shorelines
- Keep any publication and directives positive
- Green Cottage awards-similar to heritage plaques
- Respect for neighbours

Working groups will get together and pull out similarities. Agreement to put natural shoreline as #1 priority.

9.9 SUMMARY OF EDUCATION & PERSONAL WATER CRAFT WORKSHOP

This workshop was held on July 30, 2006 and focussed on youth issues, especially with regard to education and the use of personal water craft PWCs)

9.9.1 Engaging Young People

It is felt that it is important to engage the younger people on the lake in order to teach and encourage those older ones about keeping the lake a clean and safe lake
-***who?*** Ages 14-16 and 17-19
Need to get actual feedback from that age group before we make any decisions, direction
-***how****?* Listen and respect their perceptions/concerns
-***where and when?*** An adjunct to swimming lessons, information fair at regatta, for the wee ones- a colouring contest

9.9.1.1 Recommended Strategies:

- Cottage renting information package
- New cottage owners-realtors
- Get the older group involved in peer pressure 'Lake Watch' program
- Use the regatta as a pool of resources of young people, do on the spot interviews - questions regarding their views on the lake's environment
- Website – access and input their findings of flora and fauna on their own waterfronts, road side
- Poster/photo competition – put into calendar, post at marina, West Guilford
- Exchange found items
- Scavenger hunt – GPS, compass
- Make regatta an entire day event, with BBQ and movie in evening

9.9.2 PWC Use

Survey indicated that 86% of respondents said PWCs reduce their pleasure, tranquility and safety
Respect, tolerance, balance. Kennisis is a shared experience, everyone deserves respect, everyone needs to be tolerant. Workshop is to achieve a BALANCE between those that seek tranquility at the lake and PWC users

9.9.2.1 Perceptions and Comments

- Intrigued by them, a bit envious of what they can do on them, people obviously having fun
- Those that buzz around non-stop are annoying
- Have developed (mechanically), just one of several types of water toys-new things coming
- Just a few inconsiderate yahoos causing the negativity, it's the riders not the machines (seems like mostly adult offenders)
- Noise is most offensive-especially close to shore
- Purchased on a small quiet bay wanting privacy, small and quiet, not busy with boats and nosy PWCs
- If they go too shallow (less than 4 ft) stirs up bottom
- Slower speed creates more wake
- Georgian Bay Cottagers Association has experienced that the PWC issues have lessened due to costs of gas, insurance, novelty, etc.
- PWC's are sometimes driven in a manner that is negatively perceived such as:

- Too fast, too close to swimmers, too close to property/shoreline, too close to other boats (wake jumping)

9.9.2.2 Recommended Strategies:

We are agreed that……

- Education is a major component of response to PWC issues – development required
- -regatta – possible PWC competition
- -use marina product suppliers to sponsor education workshop
- -train PWC operators, ensure they understand the impact they have on others and the environment
- -develop a PWC code of conduct (part of an overall "Boating Code of Conduct")
- -develop a Lake Watch program
- -develop a 'renters' package for landlords (those that rent cottages out) discourage renters from bringing PWCs to Kennisis or follow the Code of Conduct
- -encourage people to use canoe routes, encourage renters to bring canoes
- -entice Dysart to develop information package re canoe routes similar to Algonquin Highlands'
- -most renting cottages do not leave motorized boats, but do leave canoes, peddle-boats
- -Options to consider: train PWC operators, promote better use of PWC
- -publish negative incidents/accidents which occur on the lake in the newsletter
- -encourage the use of less harmful oil such as Shell Nautilus
- -encourage the commercial establishments to carry such products
- -encourage potential buyers to consider 4 stroke PWC
- -stay out of shallow (less than 4 ft) areas to not disturb bottom

9.9.2.3 Draft PWC Code of Conduct (handout)

- Respect your neighbours' TRANQUILITY by moving around the lake rather than operating in just one small area
- Protect the environment: stay out of bays and away from the shoreline, don't operate in shallow water, use the centre of the lake
- Head for the centre of the lake and don't ride parallel to the shoreline
- Slow down when close to shore to reduce noise and environmental impact
- Follow 'Best Practices' guidelines

9.9.2.4 Lake Watch program (handout)

A mandate to promote water safety through common sense and courtesy required for the safe operation of vessels

- In Muskoka they have a marine patrol that works closely with the OPP, however their job is not one of enforcement but education
- The Marine Patrol are on the lakes from 10 am – 6 pm daily through July & August. They can call if they have any safety concerns on the water. Cottagers can also call the Marine Patrol
- Youth Lake Watch participate and encourage youth training and set a good example

It was agreed that this set up is not exactly what we would like to do, but to use the principles and purpose of the Patrol for our lake

- -Community Policing representative (OPP liaison with KLCOA) suggests that residents always call the toll free OPP number to report incidents so that a file would be made for the lake
- -many of the points discussed were also related to boats – these will be carried onto the boating workshop on August 12th

9.10 SUMMARY OF QUALITY OF LIFE WORKSHOP

This workshop was held on August 12, 2006. The most important quality of life issues according to last season's survey of cottagers were night skies (lighting), tranquility and boating issues.

9.10.1 Dark Skies

Dark skies lighting strategies provides for energy efficient, neighbour friendly night lighting that avoids glare, light trespass and sky vault illumination. The importance of having night lighting, as well as the importance of having dark skies was shared and discussed, resulting in the following strategies being recommended:

9.10.1.1 Dark skies lighting strategies:

- Use a 'full cut off' light fixture
- Mount low on a pole or wall
- Locate near where the light is required
- Use low wattage energy efficient bulbs
- Activation: by on/off switch, by light sensing switch, by infra red motion detection (for security locations), rheostat, timer, etc.
- Be aware of how your lighting affects your neighbours and respect that
- Put wattage limitation into current by-law
- Have municipality measure light spillage
- Site plan approvals – initially for new sites only
- Promote a 'dark skies' weekend next year, maybe coincide with Muskoka

9.10.2 Tranquility at the Lake

Why do we come here? Priorities can change each time we come. Problems present themselves when one neighbour decides to have a 'quiet' weekend and the other has a 'party' weekend. Tranquility is a relaxing experience perceived through different ways for different people – we believe that tranquility is an experience created by solitude, beautiful scenery, clean air and water, and the joyful sounds of people having fun without undue and intrusive disruption of others.

Possible strategies to achieving tranquility could be:

- Keep our shorelines as natural as possible, have respect for all of our neighbours' views to and from the water, when we can see another point of view (water quality issue, trees block sounds).
- Provide education -pull out key bylaws that are not well understood/aware of and communicate to the lake community.
- Have respect for all others using the waterways, including the loons-boating code.
- Replace outdoor lighting –by-law issues.
- Recognize that sound travels on water especially at night and we take our party inside after 11:00 PM (education, awareness). Respect quiet time e.g. mornings - cannot specify noise 'maker' or day/time to set.
- Drive the speed limit on cottage roads and be cognizant of sharing the road and with respect to walkers and bikers.
- Make a conscious effort to preserve the existing beauty of the lake for future generations by sharing these values with others.

9.10.3 Boating at the Lake

Boating statistics from the survey showed that the vast majority of boats on the lake on non-powered. Approximately 1400 are motorized with the majority under 25 hp (46%). 24% are 25-100 hp, 21% are 100-200 hp.

Issues identified included noise from motors, excessive speed especially near shore and in channels that can endanger swimmers and other boats, safety associated with good boating practice, pollution especially of the water with garbage, oil and fuel, boat wakes especially near shore and narrow navigation areas that promote shoreline erosion, damage to parked boats and floating docks, disruption to loon and duck nesting sites, nuisance boat traffic that goes back and forth, thorough cleaning of boats to prevent infestation of foreign water species.

Possible solutions for developing Friendly Boating Practices:

- laminated poster with good map with 'no or minimal wake' zones on back and safe boating code on other side
- bring in Coast Guard/Transport Canada and OPP to regatta
- bring in other pertinent organizations to run certification courses
- hand outs to anyone on lake, from OPP, through real estate, renters

Lake Watch Program

- encourage cottagers to call the OPP at 1-888-310-1122 when a serious boating issue occurs – they will open an incident file which helps determine how often they should patrol our lake
- establish Lake Watch signs for docks (similar to the Block Parent and Neighbourhood Watch signs) – this gives us eyes on the lake
- following the establishment of Lake Watch signage, develop a boat patrol on the lake staffed by volunteers – Muskoka is doing this; we will monitor their success.