SHOAL LAKE WATERSHED MANAGEMENT PLAN

Recommended Strategies and Actions for

- **Maintaining Ecological Integrity and Environmental Quality**
- **Sustaining Watershed Communities and Resources**
- **Guiding Future Development**

A Report to Governments prepared by the Shoal Lake Watershed Working Group

April, 2002

The “Water is Life – Respect Our Water Resources” logo shown on the front cover and elsewhere in this document was the product of a contest among junior grade students attending the Shoal Lake #40 elementary school. The contest winners were Corin Redsky, Freedom White and Freeman White.

Photographs illustrating community life, resource use and watershed vistas were provided by Dave Green, Don Greer, Jim Holmstrom, Phyllis Jack, Terry Kjartanson and Betty Wires.

Landsat image photo of Shoal Lake watershed area on front cover provided by MNR Geomatics Service Centre, Peterborough, Ontario, 2002. (Photo is not to scale.)

Shoal Lake Watershed Working Group

TO: *Government of Canada:*

Honourable David Anderson, Minister of Environment
Honourable Robert D. Nault, Minister of Indian Affairs and Northern Development

Government of Manitoba:

Honourable Oscar Lathlin, Minister of Conservation
Honourable Jean Myfanwy Friesen, Minister of Intergovernmental Affairs
Honourable Eric Robinson, Minister of Aboriginal and Northern Affairs
Honourable MaryAnn Mihychuk, Minister of Industry, Trade and Mines
His Worship Mayor Glen Murray, City of Winnipeg

Government of Ontario:

Honourable Jerry Ouellette, Minister of Natural Resources
Honourable Chris Stockwell, Minister of Environment and Energy
Honourable David Young, Attorney General and Minister Responsible for Native Affairs
Honourable Jim Wilson, Minister of Northern Development and Mines

Shoal Lake First Nations:

Chief Leon Mandamin, Iskatewizaagegan #39 First Nation
Chief Erwin Redsky, Shoal Lake First Nation #40

Dear Ministers, Chiefs and Mayor

In November 1998, representatives of your government ministries/departments and Band Councils met at the Quetico Centre in Northwestern Ontario to cooperatively consider, and begin, development of a Shoal Lake watershed management plan. The desirability of such a plan had previously been identified by your governments as a means for proactively, comprehensively and advisedly dealing with the accumulating list of issues and concerns surrounding community growth, resource development and environmental protection within the watershed.

The Quetico meeting resulted in the preparation of a draft vision and a set of management principles to guide development of the plan. It also led to the creation of the Shoal Lake Watershed Working Group (SLWWG) and eventually to the allocation of the staff and fiscal resources that would be required for this significant undertaking.

The Working Group has completed its work and is now pleased to present its final report and recommendations for your consideration. As a first step toward implementing the plan, we are recommending development of a Memorandum of Understanding among the partner governments and the formation of an Implementation Coordination Team to oversee shared work planning. Early action on these initiatives is considered important in order to build upon the momentum and goodwill that has been established through the Working Group.

Sincerely

Jim Berry
(for the Canada members)

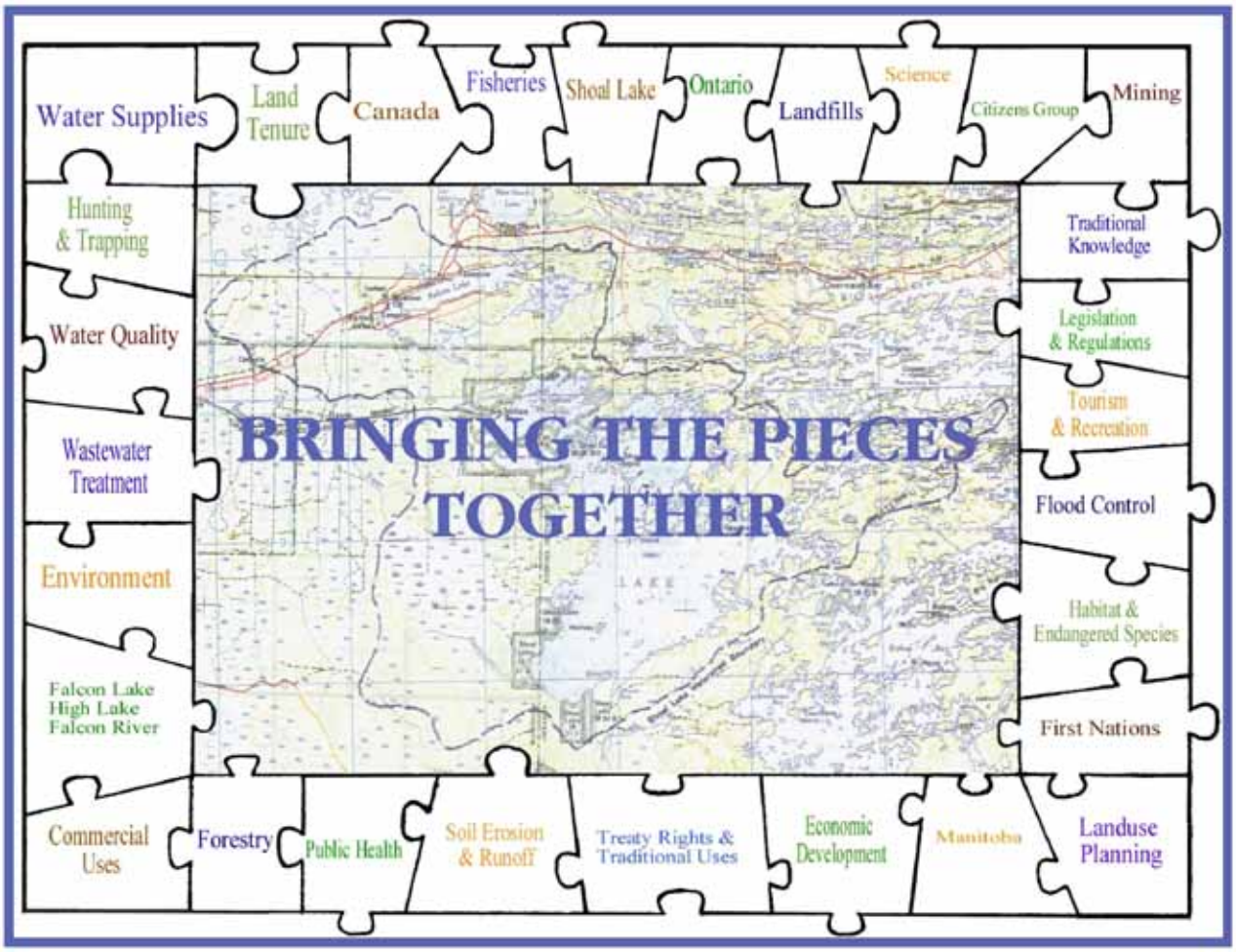
Dave Green
(for the Manitoba and City of Winnipeg members)

Basil Greene
(for the Iskatewizaagegan #39 First Nation members)

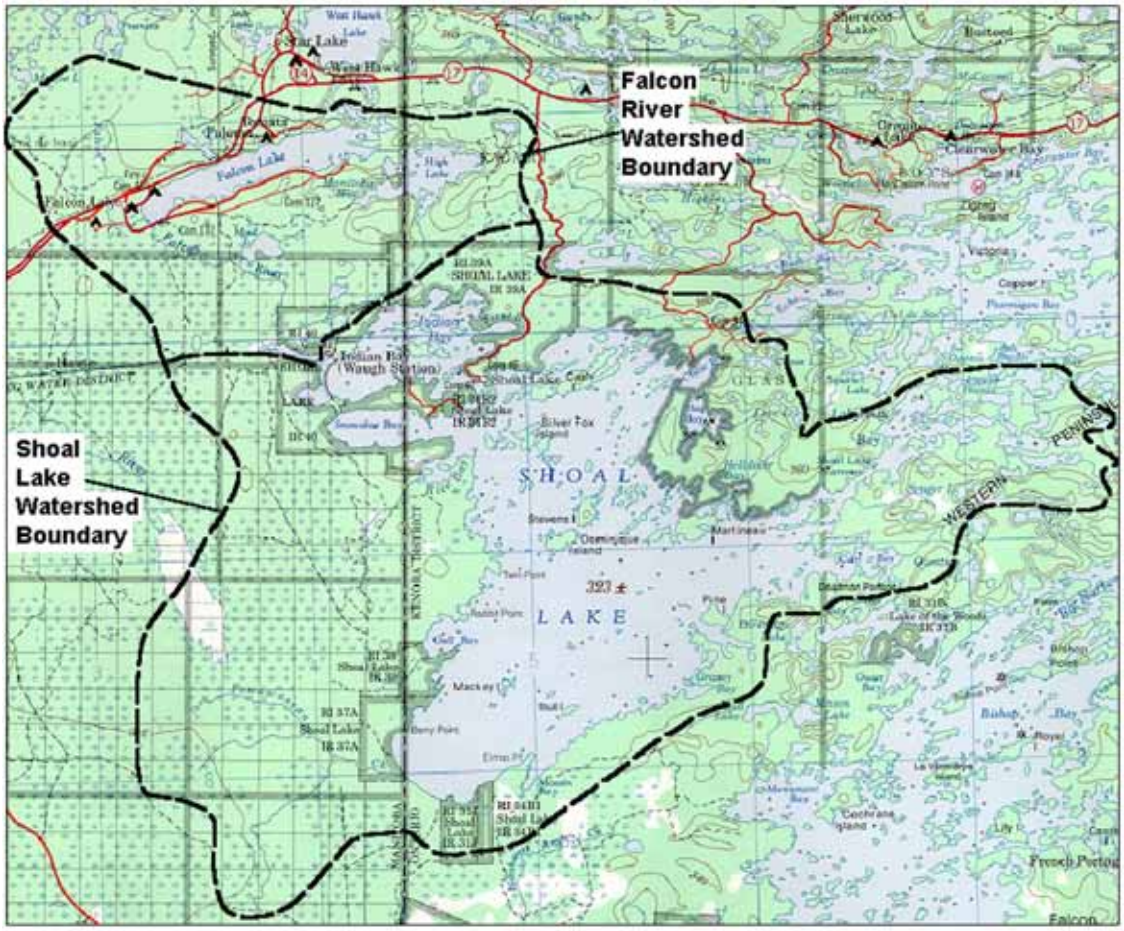
Don Greer
(for the Ontario members)

Lamont Kabestra
(for the Shoal Lake #40 First Nation members)

April 2002



Shoal Lake Watershed Management Plan, Bringing the Pieces Together. (Figure adapted from "Clean Water Act Problems and Watershed Solutions", United States Environmental Protection Agency (USEPA), 1997.)



Shoal Lake Watershed

Contents

FIGURES

TABLES

MAPS

Preface

The Shoal Lake watershed[1] possesses a long and important development history that has featured both shared and conflicting interests among its resident communities, landowners, and resource users, and among the governments and agencies responsible for its development and protection. Many of these interests revolve around water and water-related resources and uses.

These interests include:

- Resident and non-resident First Nations communities of Treaty 3 who have treaty and Aboriginal rights in the area and who depend on watershed resources for physical, cultural and spiritual necessities of life;
- 635,000 Winnipeg area residents and numerous commercial, industrial and institutional facilities served by the City of Winnipeg water supply;
- Some 1000 cottage owners on Shoal and Falcon lakes;
- Several hundreds of campers and recreational day users;
- Tourist resort operators located on Shoal and Falcon lakes;
- Mining companies, mining-lands holders and investors with expectations of financial returns from the development of mineral and aggregate resources;
- Forestry and other resource-based industries with property and resource harvesting rights in the watershed;
- Non-watershed resident anglers and hunters;
- The communities, residents, hydropower producers, tourist resort operators and other stakeholders on the broader Lake of the Woods system who may be impacted by actions taken within the Shoal Lake watershed; and
- The governments of Ontario, Manitoba and Canada, and associated ministries and departments, with mandates and responsibilities over land use and natural resources.

The Shoal Lake Watershed Management Plan has been developed in response to concerns relating to the long-term protection and use of water and aquatic resources and to the achievement of ecological and community sustainability.

Participating governments agreed that development of a consensus-based plan, that addresses stakeholder concerns and provides an appropriate balance among interests, was a necessary step in formulating those policies and processes that will help guide the future development and utilization of watershed resources.

The ecosystem-based watershed approach has been successfully used in water resources management in many Canadian and international jurisdictions for several decades. Its refinement and broader application to land-use and resource-use decision-making has been particularly strong over the past 10 to 15 years.

Management of water use, land use, and resource development activities in a watershed context does not preclude the continued use of other planning and regulatory measures. It brings an important focus to the application of existing federal and provincial legislation, policies and standards; to the utilization of indigenous knowledge; to the use of site management controls; and to the adoption of resource stewardship activities. The watershed approach proactively integrates among, and extends the value of, these and other management tools and practices.

[1] The word ‘watershed’, along with other scientific/technical words and expressions used in this document, is defined in the “Glossary of Terms”, Appendix A.

Watershed Vision and Management Principles

VISION FOR THE SHOAL LAKE WATERSHED

The Vision for the Shoal Lake watershed is one of a healthy ecosystem with excellent water quality, and healthy communities with strong and sustainable economies that respect the cultural and traditional values of the communities served.

GENERAL PRINCIPLES FOR MANAGEMENT OF THE SHOAL LAKE WATERSHED

- Development decisions are consistent with maintaining the integrity of the watershed ecosystem.
- Development decisions seek to balance the distribution of socioeconomic benefits.
- First Nations and the people of Ontario and Manitoba continue to benefit from the quality and adequacy of water resources.
- In accordance with section 35 of the *Constitution Act*, 1982, existing treaty and Aboriginal rights of the First Nations peoples within the Shoal Lake watershed are respected.
- Development and use of renewable resources is sustainable.
- Renewable and non-renewable resource development use best management practices (BMPs) and are ecologically and environmentally responsible.
- All jurisdictions involved in developing and implementing the Shoal Lake Watershed Management Plan share in the responsibility for protecting the ecosystem and for contributing to careful planning.
- All stakeholders proactively share information and knowledge. They act cooperatively and seek to communicate openly and clearly.
- Traditional First Nations knowledge and other local knowledge are used in the development and implementation of the Plan.
- The Shoal Lake Watershed Management Plan is viewed not only as a product, but also as part of an ongoing process. As new information is obtained, the Plan is revisited and, where necessary, is refined.

Using the Shoal Lake Watershed Management Plan

The Shoal Lake Watershed Management Plan is intended to guide the design and delivery of government programs and services for the promotion of the sustainable development of watershed lands and resources and for the protection of the watershed environment. It is also intended as a guide to watershed communities, resource users and developers, and other stakeholders in planning and managing their activities and in taking appropriate actions for the attainment of the watershed Vision.

The preparation and suggested government endorsement of the Shoal Lake Watershed Management Plan was, and is, not a legal requirement. It is anticipated that pursuit of the Plan's directions and recommendations will be undertaken in "good faith" unless and until an alternative formal or binding agreement is agreed to among the partnering governments.

Nothing in this Plan is intended to add to, nor derogate from, existing treaty and Aboriginal rights of the First Nations peoples as recognized and affirmed in section 35 of the *Constitution Act*, 1982.

Note Regarding Place Names

The Working Group was made aware of a number of cases where the name commonly assigned to a particular watershed place or physical feature, by members of the First Nations communities or other stakeholders, differed from the names appearing in the *Concise Gazetteer of Canada*. While the *Gazetteer* name was generally used in the preparation of this document, the Working Group is pleased to provide the following table of alternative names to assist the reader.

Gazetteer Name	Alternative(s)
Powawassan Creek	Powassan Creek Powassin Creek Hay River
Northwest Angle	North West Angle North-West Angle

Abbreviations Used in this Report

Acronyms and Other Abbreviations

AOFRC	Anishinabek/Ontario Fisheries Resource Centre	ME	Manitoba Environment
CCME	Canadian Council of Ministers of the Environment	MIA	Manitoba Intergovernmental Affairs
CSWQG	Canadian Surface Water Quality Guidelines	MITM	Manitoba Industry, Trade and Mines
EC	Environment Canada	MNDM	(Ontario) Ministry of Northern Development and Mines
FMP	Forest Management Plan	MNR or OMNR	(Ontario) Ministry of Natural Resources
FMU	Forest Management Unit	MOE	(Ontario) Ministry of Environment
GWWD	Greater Winnipeg Water District	OECD	Organization for Economic Cooperation and Development
INAC	Indian and Northern Affairs Canada	OIC	Order in Council
IJC	International Joint Commission	ONAS	Ontario Native Affairs Secretariat
LCM	(Ontario) Lakeshore Capacity Model	PWQO	(Ontario) Provincial Water Quality Objectives
LOW or LoW	Lake of the Woods	SLWWG	Shoal Lake Watershed Working Group
LWCB	Lake of the Woods Control Board	SWQO	(Manitoba) Surface Water Quality Objectives
MANA	Manitoba Aboriginal and Northern Affairs	THM	trihalomethane
MC	Manitoba Conservation		

Abbreviations for Units of Measurement

cm	centimetre	mg/L	milligrams per litre (= parts per million)
gm	gram	MG/d	million gallons per day
ha	hectare	ML/d	million litres per day
kg	kilogram	μg/L	micrograms per litre (= parts per billion)
km	kilometre	ppb	parts per billion (= micrograms per litre)
L	litre	ppm	parts per million (= milligrams per litre)
m	metre	s	seconds
m^3	cubic metre	yr	year
mm	millimetre		

Shoal Lake Watershed Working Group Members, Alternates[2] and Support Persons

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Iskatewizaagegan #39 First Nation

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Shoal Lake #40 First Nation

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[2] Participated in three or more Working Group meetings or was a primary contact person.

WORKING GROUP SUPPORT

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Margaret Wanlin Wanlin & Company	Facilitator	1998–2001

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Shoal Lake #40 First Nation	Bobby Blackhawk, Alfred Redsky, Jim Redsky
Other First Nation	George Boyd (Bimose Tribal Council); Adolphus Cameron, Fred Green, Joe Kuhn (Grand Council Treaty 3); Kim Sandy (Northwest Angle #33)

[3] Participated in one or two Working Group meetings.

Acknowledgements

Preparation of this management plan was made possible through the significant commitment of funding and staff resources by the participating governments. They recognized that a cooperative, comprehensive and adequately supported watershed approach was key to addressing important social, environmental and economic issues that surround the ongoing development of Shoal Lake watershed resources and communities.

Government contributions toward plan development over the three-year period included direct budget allotments of more than half a million dollars and the equivalent of more than 36 months of staff time. Working Group members were drawn from two federal departments, four departments/ministries within each of province, the City of Winnipeg, and the two resident Shoal Lake First Nation communities.

The Working Group wishes to recognize the extensive contributions of John Kinkead, the group's lead consultant. John provided ongoing direction and assistance to the Working Group from its initial formation in late 1998. He brought understanding and discipline in the application of the watershed approach and helped the partners find essential common ground when dealing with areas of conflict and competing interest. John compiled and integrated extensive background information on the natural resources and development activities of the watershed; prepared story board information for the Working Group's open houses; and served as the primary writer of the management plan.

The Working Group is indebted to Margaret Wanlin for facilitating discussion and guiding progress at Working Group meetings and for maintaining the group's discussion notes. Margaret was also instrumental in managing the group's public outreach and involvement initiatives.

The work of TetrES Consultants Inc. (in partnership with Gartner Lee Ltd.) and of the Anishinabek/Ontario Fisheries Resource Centre (AOFRC) helped fill important information gaps in our understanding of watershed resources and processes. TetrES undertook a review of recent water quality data, constructed a water-balance model for Shoal Lake, and adapted the Lakeshore Capacity Model for use in predicting the watershed's trophic status response to future development. Using funding provided by the Ontario Ministry of Natural Resources (OMNR), AOFRC conducted an assessment of existing OMNR and First Nations information on the health of the Shoal Lake fishery, coordinated new fall walleye index-netting surveys, and helped facilitate development of suggested allowable harvest estimates for the fishery.

Mediation Services Inc. of Winnipeg organized and facilitated the March 2000 Focus Group sessions held in Winnipeg and Kenora and also assisted the Working Group in responding to the important public/stakeholder feedback received from these sessions.

Many thanks are due Hayat Azmat and staff of the Computer Graphics and Support Services Section, Manitoba Conservation, for their dedication and craftsmanship in preparing the story boards used during the public and community open houses. Peter Schaffer, OMNR Kenora District, and the Regional Information Resources Section, OMNR Thunder Bay, are also acknowledged for their efforts in preparing the watershed base map that is to serve as the platform for future mapping initiatives. The Working Group also extends its thanks to Heather Brown, Dorothy Lock and Tom Watkins of the Ontario Ministry of Northern Development and Mines. Heather proofread and edited the final text and figures to ensure consistency; Dorothy meticulously typeset the document; and Tom exercised his considerable cartographic skills to improve the quality of the final figures, as well as coordinating printing of the final document.

The Working Group thanks the many band members of Iskatewizaagegan #39 and Shoal Lake #40 First Nations' communities as well as staff of the Winnipeg Water and Waste Department who provided accommodations and heartily fed the Working Group during meetings held within the communities and at the Winnipeg water intake site.

Finally, the Working Group acknowledges the interest and participation of those individuals and organizations who attended open houses and focus group sessions and who provided both written and verbal input at a number of stages throughout the plan development process. Their views helped in the review, revision and affirmation of the plan's vision, principles, objectives and strategies, and in the finalization of the recommendations which are now being sent on to governments.

PART I

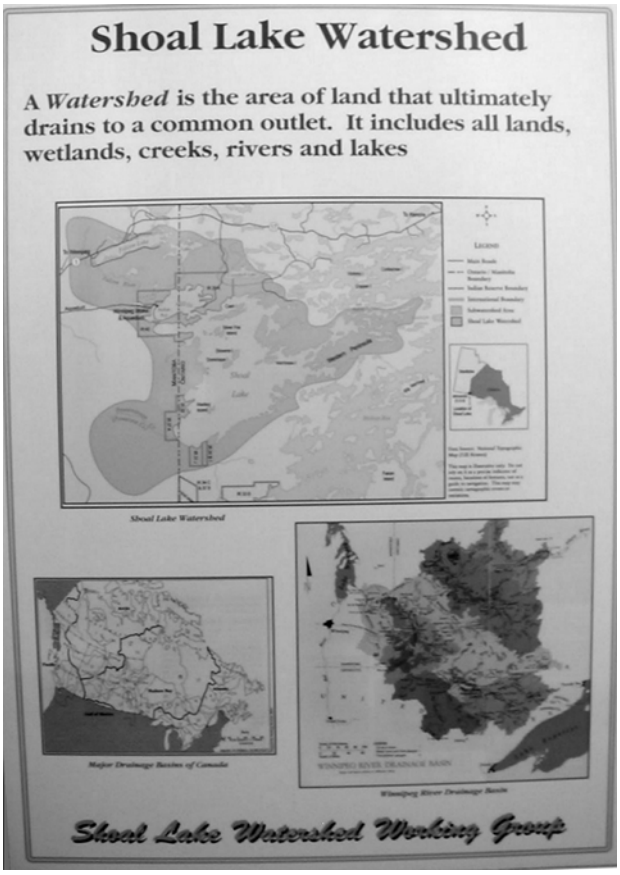
INTRODUCTION TO THE SHOAL LAKE WATERSHED

1.0 Watershed Characteristics, Communities and Uses

1.1 LOCATION AND PHYSICAL CHARACTERISTICS

The Shoal Lake watershed (Figure 1.1) straddles the Manitoba–Ontario border at an approximate latitude of 49.5_N. It is part of the larger Rainy River–Lake of the Woods–Winnipeg River drainage basin. The total area of the watershed (including its lakes and streams) is approximately 960 km@. Fifty-four percent (54%) of the watershed area is located in Ontario and 46% in Manitoba[1*].

The three lakes of greatest significance in the watershed are Shoal Lake, Falcon Lake and High Lake. Shoal Lake is the largest of the watershed's three lakes with a surface area of about 260 km@. Over 95% of the lake's surface area is situated in Ontario, while less than 5% is contained within the province of Manitoba[2]. The lake has an estimated average depth of 9 m, but incorporates many shallower embayments such as Indian Bay, Snowshoe Bay and Clytie Bay in its northern portions.



The Shoal Lake watershed is part of the larger Winnipeg River drainage basin.

Shoal Lake is connected to Lake of the Woods at a location known as Ash Rapids. Construction of a control dam at the Winnipeg River outlet of Lake of the Woods in the 1880s raised the level of the lake by about a metre above its natural condition. In turn, this brought water levels in Shoal Lake into an approximate balance with levels in the much larger Lake of the Woods, at least over an extended portion of the year.

The channel at Ash Rapids was deepened and widened from its natural state, through blasting, around the turn of the century. This was reportedly done to provide a water-based transportation route to serve both timber and mining operations in the Shoal Lake area. While opening up the lake to unrestricted small boat access to and from Lake of the Woods, the channel modifications also allowed for two-way water exchange between the lakes. At its narrowest point, the navigable channel at Ash Rapids is about 10 m wide and the mid-channel water depth is about 1.5 m at low water datum.

Falcon Lake lies northwest of Shoal Lake and is located entirely within Manitoba. It is approximately 12 km long by 1.3 km wide with a surface area of about 15 km@. It has an average depth of 14 m, a maximum depth of 26 m, and a watershed area of about 197 km@ (including the lake)[3]. Water levels in Falcon Lake are regulated by a culvert and stop-log dam located in the southwest corner of the lake where it outlets to the Falcon River.

The smaller and more isolated High Lake straddles the inter-provincial border. It is about 5.5 km long by 3 km wide with an area of approximately 10 km@. It is the coldest of the three lakes, with an average depth of 12 m and a maximum depth of 21 metres.

Outflows from both Falcon Lake and High Lake drain, via the Falcon River, into Shoal Lake at Snowshoe Bay. The Falcon River originally discharged directly into Indian Bay, which is located immediately to the north of Snowshoe Bay. The lower end of the Falcon River was altered to its present course around 1916 during construction of the Winnipeg water intake and aqueduct. This was done in order to divert the highly coloured river discharge away from the shore-based intake.

*Superscripted, italicized numbers refer to references and explanatory notes that are found in "Sources and Notes" at the end of this report.

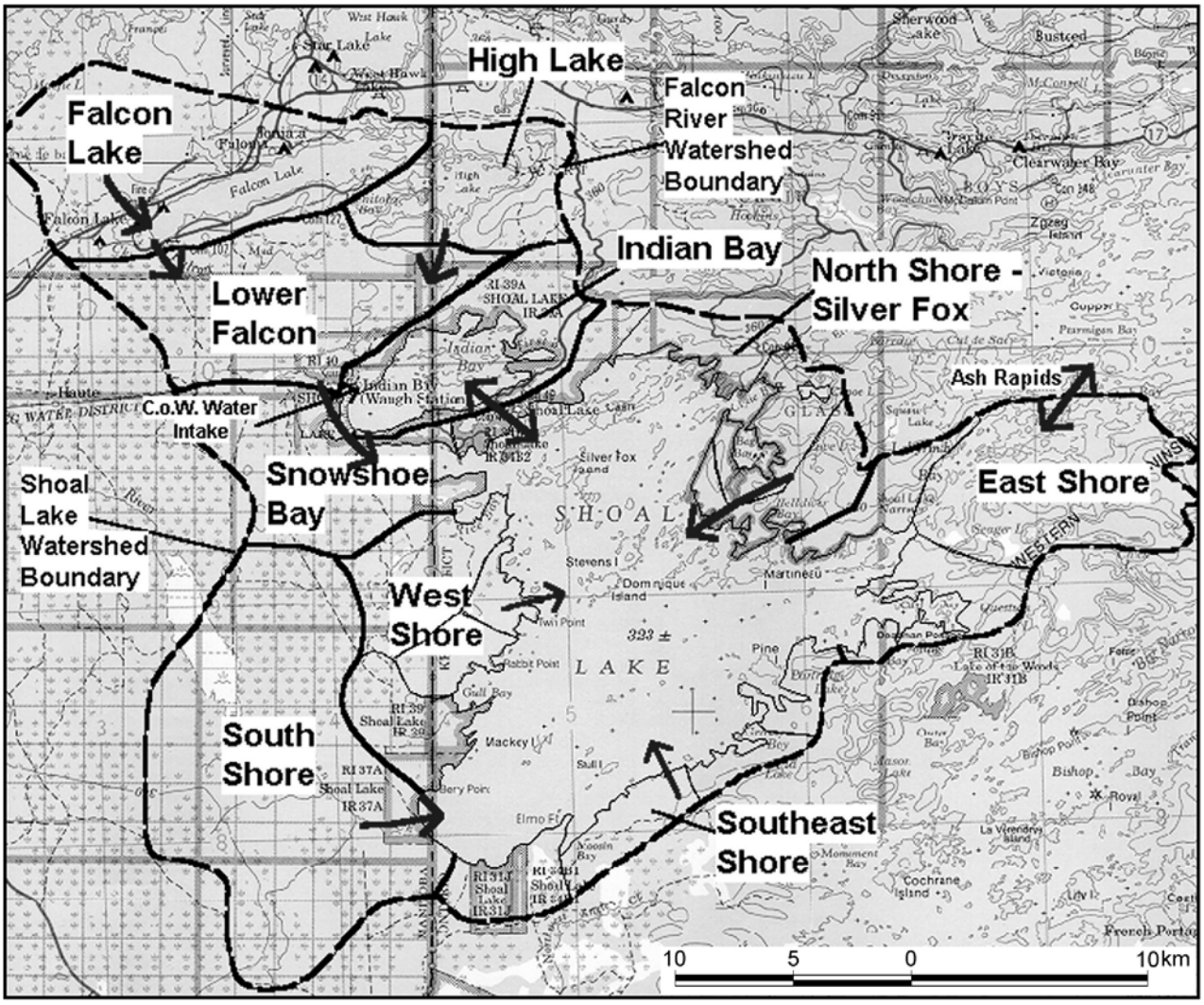


Figure 1.1. Shoal Lake watershed boundaries (*adapted from* TetrES report, June 2000).

1.2 ECOLOGICAL SETTING

The Shoal Lake watershed is part of the Boreal Forest Region as well as part of the Lake of the Woods ecoregion as defined by the *National Ecological Framework for Canada*[4]. It is more closely identified with the warmer and more humid southeastern mixed forest region than with the colder and drier boreal regions to the north. It typically experiences warm summers and cold winters. The mean annual temperature is approximately 1.5_C, with a mean summer temperature of 15_C and mean winter temperature of –13_C. Mean annual precipitation is in the range of 600 millimetres.

Characteristic vegetation includes a succession from trembling aspen, paper birch and jack pine to white spruce, black spruce and balsam fir. Warmer areas support red and eastern white pine, while cooler and wetter sites support black spruce and tamarack.

The watershed is underlain by rocks typical of the Precambrian Shield, with massive outcropping present particularly to the north and east. Extensive wetlands, including treed bowl bogs and peat margin swamps, are found in the western and southern areas of the watershed. (See Map 1, back pocket.)

Characteristic wildlife includes white-tailed deer, moose, black bear, wolf, lynx, snowshoe hare and woodchuck. Bird species of the area include ruffed grouse, hooded merganser, pileated woodpecker, bald eagle, turkey vulture, great blue heron, herring gull, cormorant, white pelican and a variety of waterfowl.

1.3 WATERSHED SETTLEMENT

1.3.1 First Nations Peoples of Treaty 3

Canada's indigenous peoples are believed to have continuously inhabited the Shoal Lake area for more than

Mixed stands of conifers and deciduous species are found in the watershed.

Falcon River and adjacent wetlands downstream of Falcon Lake.

6000 years. The Anishinaabe or Ojibwe peoples living in the area today are descendents of these original inhabitants.

The earliest recorded interactions among the indigenous peoples of the Shoal Lake area and Europeans began in the late 1600s around fur trade operations of the Hudson's Bay Company. Treaty 3 – *A Treaty between Her Majesty the Queen and the Saulteaux Tribe of the Ojibbeway Indians* – signed at North West Angle in 1873, significantly changed the nature of the relationship between the First

White-tailed deer and moose – common sights in the Shoal Lake watershed.

Nations, other governments and non-native peoples[5]. Negotiations leading up to the treaty signing were initiated because of "the desire of Her Majesty to open up (the area) for settlement, immigration and such other purpose as to Her Majesty may seem meet".

In the context of land and resources, the First Nations agreed under the treaty:

- "to cede, release, surrender and yield up to the Government of the Dominion of Canada for Her Majesty the Queen and Her successors forever, all their rights, titles and privileges whatsoever, to the (subject) lands".

At the same time, the Government of Canada agreed:

- "to lay aside reserves for farming lands…";
- "to [also] lay aside and reserve for the benefit of the said Indians, to be administered and dealt with for them by Her Majesty's Government of the Dominion of Canada, in such a manner as shall seem best, other reserves of land in the territory hereby ceded, which reserves shall be selected and set aside where it shall be deemed most convenient and advantageous for each band or bands…"; and
- to permit the said Indians "to pursue their avocations of hunting and fishing throughout the tract surrendered…, subject to such regulations as may from time to time be made by Her Government of Her Dominion of Canada, and saving and excepting such tracts as may, from time to time, be required or taken up for settlement, mining, lumbering or other purposes by Her said Government…"

Notwithstanding that the document described above appears to have been duly agreed to and signed by government-appointed representatives and the Chiefs of the assembled First Nations, Grand Council Treaty 3 does not recognize it as a true representation of the content and outcome of the treaty negotiations[6]. Grand Council instead adheres to the recorded and signed notes of Joseph Nolin and August Nolin, who were retained by the Chiefs and were present at the treaty negotiations. The Nolin account is commonly referred to by Treaty 3 First Nations as the Paypom Treaty or the Paypom Document.

The Paypom Document does not provide a full description of treaty negotiations and makes no specific reference to the surrender of lands. It records eighteen "terms of the treaty", most of which are held in common (although more simply worded) with the signed treaty document. It contains some other provisions, such as those around mineral rights and rice harvest, which don't appear in the signed document.

The Anishinaabe First Nations hold the view that Treaty 3 did not convey exclusive ownership of the lands to the Crown but rather provided for shared jurisdiction over these lands by both the Crown and the signatory First Nations. Historically, the Anishinaabe peoples moved about freely and frequently within their traditional-use areas as dictated by the seasons and by the location and abundance of the plants, animals and materials used for subsistence and other purposes. While they were territorial, they did not hold the same sense of ownership over land and natural resources as that held by their Treaty 3 counterparts. Based on their cultural beliefs and traditional knowledge, all lands and resources are considered gifts from the Creator provided for the use, benefit and respect of the Anishinaabe peoples. They are instructed by the Creator to live in harmony with nature.

At the time of the signing of the Treaty, there were an estimated 2,500 Anishinaabe living in the treaty area, which covers some 55,000 square miles (142,500 km@) as shown in Figure 1.2[7]. The boundaries of the area were established on the basis of watersheds, in recognition of the strong societal and other linkages of the Anishinaabe people to water and watercourses.

Today, the watershed is home to the two Shoal Lake First Nations communities of Iskatewizaagegan #39 and Shoal Lake #40. Community-occupied reserve lands are located in the Indian Bay and Snowshoe Bay areas (see Map 1, back pocket). There are presently about 530 band members living on reserve within the two communities and more than 300 members living outside the reserves[8]. Both communities possess basic infrastructure, limited retail outlets, indoor and outdoor recreational facilities and provide local elementary schooling to Grade 8.

Year-round road access to the Iskatewizaagegan #39 community from the Trans-Canada Highway has existed only since construction of the Shoal Lake Road in 1965. Road access does not yet extend out to the Shoal Lake #40 community, which is reached by car ferry or personal watercraft in the ice-free period, and by ice road in winter. In earlier years, the communities obtained many necessary supplies and goods via the Greater Winnipeg Water District (GWWD) railway, i.e. they were shipped to the GWWD water intake site. This terminus site for the railway was also known as Waugh Station.

Northwest Angle #37 and Big Island First Nations also have reserve lands in the southern part of the watershed but presently have no permanent habitation of these lands. Together with the nearby Northwest Angle #33 community and other Treaty 3 First Nations, they share Aboriginal and treaty rights in the Shoal Lake watershed with the Iskatewizaagegan #39 and Shoal Lake #40 communities.

1.3.2 Later Settlement

The first non-native settlement of the watershed was associated with the commencement of logging and mining operations in the late 1800s and was likely to have been highly variable and transient at the time.

Limited cottage development began in the Falcon Lake area in the 1920s and was made possible by the close proximity of the lake to the Canadian Pacific (CPR) railway line. Road access was established some 10 years later and was further improved with the completion of the Kenora to Winnipeg portion of the Trans-Canada Highway. The townsite was officially opened in 1958. Since that time, Falcon Lake has become the most extensively developed and settled portion of the watershed in both seasonal and year-round use.

Current development at Falcon Lake includes a number of retail and service outlets, approximately 85 resort

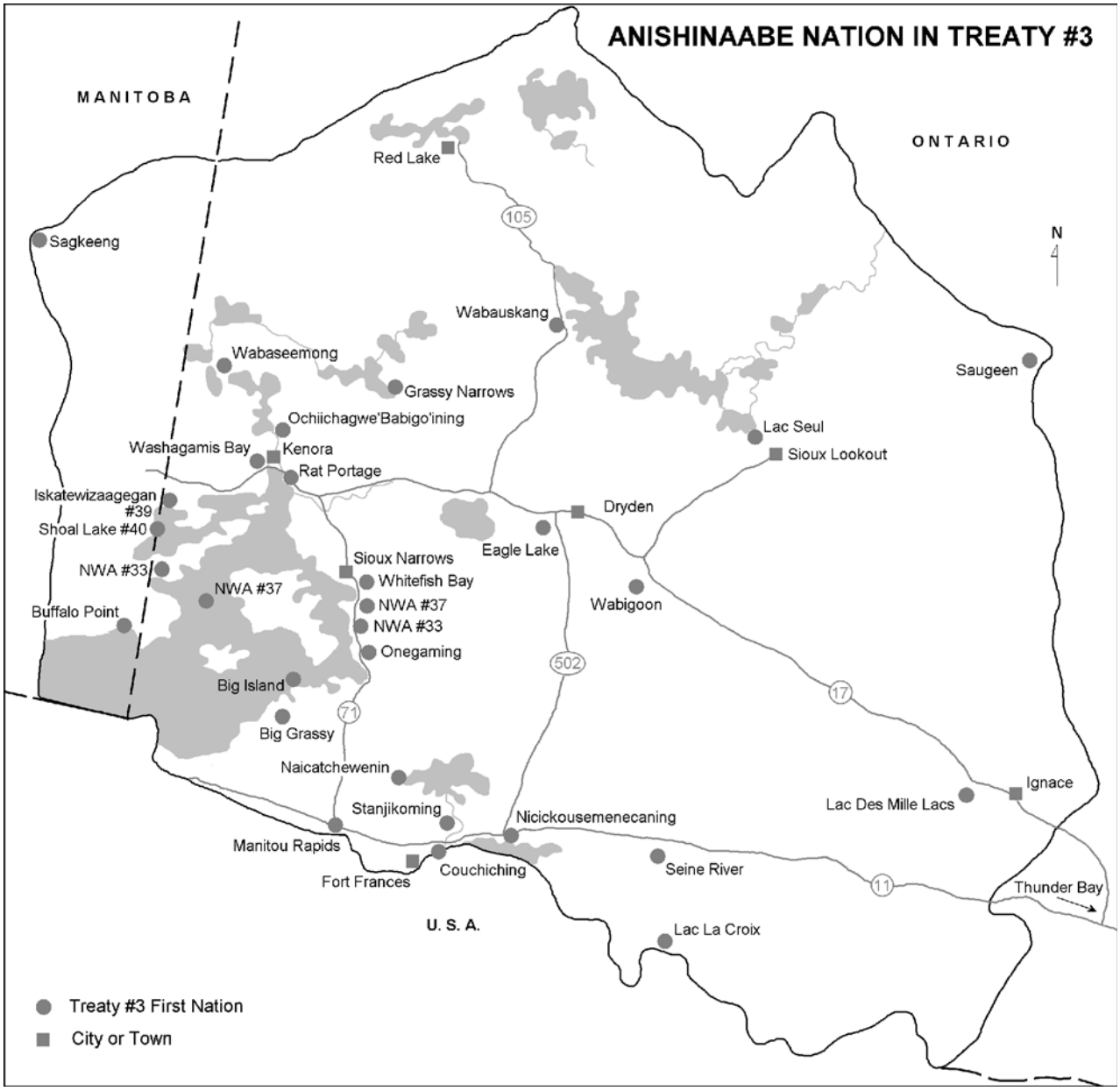


Figure 1.2. Treaty 3 area boundaries. *Adapted from* Treaty 3 area map shown on The Grand Council of Treaty 3 website (www.treaty3.ca), accessed January 16, 2002.

hotel/lodge units, some 785 cottages, 550 campsites within two campgrounds, a trailer park, and associated day-use areas[9]. It is the site of an 18-hole championship golf course, downhill and cross-country skiing, snowmobile trails and other popular recreational venues. There are about 230 permanent residents, made up primarily of people connected with retail and commercial outlets, park operations, hydro operations and policing. Although the seasonal-resident and day-use populations vary among seasons, peak use periods occur on long weekends during the summer. Local business interests are trying to attract increased winter recreational use.

There are some 180 cottages on Shoal Lake[10], many of them owned by residents from the nearby Winnipeg area. Most cottage development is focused along the shoreline in the northeast quadrant of the lake and on the many islands located in the northern half of the lake. Road access to mainland cottages is via the Clytie Bay Road. The lake's island residents use either the Clytie Bay Road or the Shoal Lake Road to access parking, docking and boat launching facilities. Winter access is available to many island cottages by ice road.

There is no current settlement of the High Lake area. Limited trails into the lake are found on both sides of the provincial border and a gated private road allows access from the Shoal Lake Road to patented mining lands located at the eastern end of the lake. In 1996, Manitoba Conservation granted a Crown-land lease for the construction of six

Shoal Lake First Nations' peoples – a long history of watershed habitation and resource use.

remote outpost cabins to be located at the western end of the lake. Construction of two cabins commenced in late 2000.

1.4 LAND TENURE

With the signing of Treaty 3 in 1873, all lands of the watershed were placed under the jurisdiction of the Crown. Today, the majority of watershed lands still remain under Crown jurisdiction (see also the Anishinaabe First Nations perspective on jurisdiction as described in section 1.3.1).

Present-day land ownership within the Manitoba portion of the watershed includes federal Indian Reserve lands; lands purchased by the City of Winnipeg for construction of the water intake facilities, aqueduct and railroad; Trans-Canada Highway corridor lands; and Crown lands (see Map 2, back pocket). The City of Winnipeg land holdings include the lands under water within the Manitoba portion of Indian Bay. Crown lands include the Whiteshell Provincial Park to the north and Northwest Angle Provincial Forest to the south.

Manitoba Crown land tenure also includes the leasing, permitting and licensing of areas for a variety of purposes that include recreation, forestry, trapping, and mineral and quarry development. While there are a number of existing mining claims, some Crown lands have been removed

Falcon Lake town site and resort community.

from mine claim staking and others have been identified as special interest areas. Areas identified as special interest are currently being investigated for potential designation as protected areas within the *Manitoba Protected Areas Initiative*.

Within the Ontario portion of the watershed a variety of land ownership and land-use scenarios exist (see Map 2, back pocket). These include provincial Crown lands; federal Indian Reserve lands; private lands (patented mining claims and individual patented parcels); licenses of occupation (land under water); mining claims; Crown leases; and land use permits. Lands made available for mineral prospecting, exploration and active mining are also found in the Ontario portion of the Shoal Lake watershed and are subject to various approval or tenure mechanisms under the *Mining Act*. There are no Ontario lands in the watershed under provincial-park designation. Recently, as part of the Ontario Living Legacy program[11], a substantial section of the Western Peninsula separating Shoal Lake and Lake of the Woods was designated as a Conservation Reserve under the (Ontario) *Public Lands Act*. Under the act, certain resource uses within the reserve may be prohibited or restricted through regulation.

1.5 RESOURCE DEVELOPMENT AND USE

This section describes the history of resource development in the watershed, documents current levels of resource use, and provides some insight into future resource development interest and potential. Acknowledgement of the current and potential contributions of watershed resources to local, regional and broader economies is provided where available. Within individual resource use sectors, economic valuing estimates have been derived on the basis of current market values of, or the demonstrated willingness to pay for, initial-level products or services, e.g. dressed lumber, pulp/newsprint, whole or dressed fish, gold bullion, or the provision of potable water. As such, these estimates include value-added capital and operating costs associated with developing the product or providing the service, including the costs of resource development planning, extraction/harvesting, transportation/delivery, plant/infrastructure and materials processing. The estimates do not, however, include the economic contributions associated with subsequent levels of manufacturing and use.

Monetary and other forms of valuing are increasingly being sought and used in assessing options and in making management decisions relating to the allocation and development of resources and to environmental protection. Resource valuing data and economic impact analysis can also be helpful to governments in directing future efforts and in assessing future progress in applying the watershed management principle which states that, "Development decisions [should] seek to balance the distribution of socioeconomic benefits".

Not surprisingly, the quality and availability of water resources are shown to be central to the pursuit and enjoyment of many human activities happening in, and many benefits arising from, the Shoal Lake watershed. These uses and benefits cover a broad spectrum that includes drinking water supplies, fisheries, hunting, recreation, tourism, navigation, hydropower production, and cultural and spiritual sustenance. The availability of adequate supplies of clean water has been and will continue to be fundamental in supporting a healthy watershed environment and in contributing to healthy communities and healthy economies (see also section 1.5.7).

1.5.1 First Nations Traditional Uses

Members of the Iskatewizaagegan #39 and Shoal Lake #40 communities, and to a much more limited extent, other Treaty 3 First Nations, have and maintain social, cultural, spiritual, subsistence and economic ties to the lands and resources of the watershed. Traditional uses and activities extensively practiced by members of both communities include fishing; trapping and hunting; gathering or harvesting of berries, wild rice and medicinal plants; and the preservation and use of sites of special significance, such as spiritual sites, ceremonial sites, community-gathering areas and traditional burial grounds.

As a way of increasing awareness, understanding and care on the part of all stakeholders, Iskatewizaagegan #39 is in the process of mapping traditional-use locations and related activities. This information, which will be available in report and map formats, will form a valuable input to future watershed management planning and actions designed to respect and protect their Aboriginal and treaty rights.

1.5.2 Fishing

Over the years, Shoal Lake has been intensively fished both commercially and for sport. As many as five native and non-native commercial operations were operating on the lake in the 1970s, serving both native and non-native interests.

The Shoal Lake walleye fishery has remained closed to both commercial fishing and recreational fishing since 1983 in an effort to allow recovery of fish stocks from the effects of several successive years of over-exploitation. First Nations' subsistence fishing for walleye and other species does still occur. Ontario, with the agreement of Manitoba, holds lead management responsibilities over the Shoal Lake fishery.

Both Iskatewizaagegan #39 and Shoal Lake #40 currently hold commercial licenses for species other than walleye. These licenses are held by the community or band and not by individual fishers. Existing commercial quotas provide for a total annual catch of 83,515 pounds (37,882 kg) of all species combined from Shoal Lake waters. The First Nations communities have been allocated 100% of the whitefish and 50% of the northern pike catch. The current market value of the Shoal Lake commercial fishery quota (excluding walleye) is estimated at $43,000 annually[12].

If restored to its former health, a Shoal Lake fishery that included sustainable walleye catches would be valued at many times the referenced quota value, particularly if it featured a strong recreational-fishery orientation. This assumes that the necessary resort infrastructure would be in place locally, i.e. on Shoal Lake, to take advantage of the opportunities.

Of the watershed's other two lakes, Falcon Lake supports a healthy recreational fishery, while High Lake sees traditional-use fishing by members of the First Nations communities and by the occasional walk-in angler.

1.5.3 Forestry

Logging activities in the Shoal Lake watershed over the past century have generally focused on pine and spruce.

The Ontario portion of the Shoal Lake watershed is located within the Kenora Management Unit (KMU). Spruce, pine and fir from the KMU provide part of the wood supply to the Abitibi Consolidated Inc. paper mills in Kenora and Fort Frances. They also provide part of the sawlog supply to five sawmills operating in the Kenora area. A small amount of poplar is being marketed to the Voyageur Panel oriented-strand board mill in Barwick as an interim measure until the new Trus Joist, Kenora Operations, hardwood mill comes on line in Kenora.

The KMU has historically been managed by Kenora District of the Ontario Ministry of Natural Resources. It is, however, anticipated that Weyerhaeuser Company Limited will obtain the required Sustainable Forest License (SFL) and become the unit's forest manager upon the successful completion of ongoing government-company negotiations. This is expected to occur sometime in 2002.

All forest management activities on Crown lands in Ontario are planned in accordance with requirements contained in the *Forest Management Planning Manual* for Ontario's Crown Forests. This manual incorporates the environmental assessment (EA) requirements for forest management.

Some expansion of timber harvesting activities is planned for the watershed.

On April 1, 2001, a twenty-year management plan (2001-2021) was approved for the KMU. This plan describes the selection of areas of forest operations (harvesting, renewal and maintenance), the development of operational prescriptions and the locations of primary and secondary access roads for the five-year term of the forest management plan (FMP).

The 2001-2006 five-year FMP operating plan for the KMU allocates a total of 213.7 ha of mature production forest for harvesting within the watershed. A further 112.9 ha are allocated for harvest in the Working Group's extended study area, i.e. the area that includes Crowduck Lake (which drains to Rush Bay on Lake of the Woods)[13] (see Maps 1 and 2, back pocket, for outline of extended study area). An additional 106.5 ha of planned contingency harvest area have been designated within the watershed, in the event that natural damage such as wildfire or blowdown occurs to the regularly planned harvest areas. Another 221.5 ha of planned harvest area within the watershed have been declared as surplus. The harvest blocks range in size from 7.9 to 134.8 hectares. Twelve blocks (one within the watershed and eleven within the extended study area boundary) are planned for renewal and maintenance work. Silvicultural activities will include tree planting, site preparation, and stand tending and stand cleaning. There are no new primary or secondary access roads identified within the watershed in the 2001-2006 FMP.

A recent OMNR economic impact analysis of the Shoal Lake watershed timber supply (Ontario portion only), as identified in the 2001-2006 FMP, places the estimated economic benefit of "final goods" production (softwood pulp and paper, softwood lumber, hardwood lumber and oriented strand board) at $1.53 million annually.[14]

The Manitoba portion of the watershed falls within the Pineland Forest Management area and includes parts of designated Forest Management Units (FMUs) 20 and 30. The last major forest inventory for the area was completed in 1983. A revised forest inventory for this area is now being undertaken. Each FMU has an established Annual Allowable Cut (AAC) set by the Province, and harvesting is allocated as percentages of the AAC through a quota system. Harvest block allocations occur on a five-year review basis. Harvesting by quota holders is via Timber Sale Agreements with the Province.

The Mud Lake area, which is situated between Falcon Lake and Indian Bay, is currently the site of the heaviest harvesting activity on the Manitoba side[15]. Harvesting is essentially restricted to the winter season and focuses mostly on black spruce and aspen.

1.5.4 Mining

The Shoal Lake area first became an active gold mining region in the late 1800s. The largest producing gold mine on the lake was the Mikado Mine located at Bag Bay. As many as four gold mines operated in the area between the years 1896 and 1936, producing 38,300 ounces of gold and 5,100 ounces of silver[16]. Figure 1.3 shows the location of mining patents and the sites of historic mineral production.

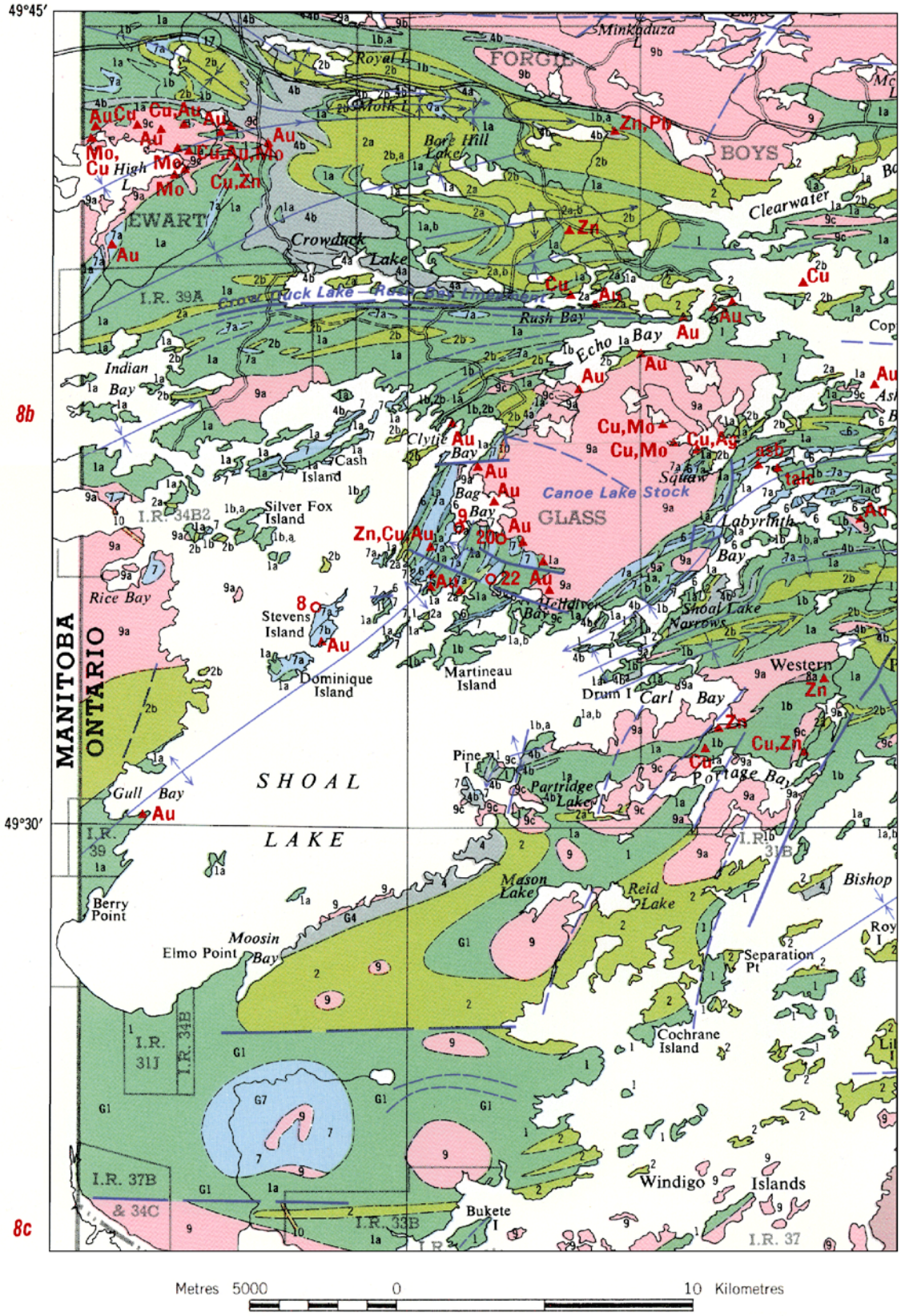


Figure 1.3a. Geology and mineral deposits of the Shoal Lake watershed, Ontario (*from* Map 2443, Ontario Geological Survey).

LEGEND

PHANEROZOIC

CENOZOIC

QUATERNARY

PLEISTOCENE AND RECENT

Sand, gravel, clay.

UNCONFORMITY

PRECAMBRIAN

MIDDLE TO LATE PRECAMBRIAN

MAFIC INTRUSIVE ROCKS

10 — *10 Diabase dikes.*

INTRUSIVE CONTACTS

EARLY PRECAMBRIAN[a]

FELSIC AND INTERMEDIATE INTRUSIVE ROCKS

9 — *9 Unsubdivided.*
9a Massive to foliated, equigranular and porphyritic, quartz monzonite, granodiorite, trondhjemite, quartz diorite, and granite.
9b Gneissic to foliated trondhjemite, quartz monzonite, granodiorite, quartz diorite.
9c Quartz and feldspar porphyries.

8 — *8 Unsubdivided equigranular and porphyritic monzonite, syenodiorite, syenite, diorite and quartz diorite.*
8a Monzonite, syenodiorite, syenite.
8b Diorite, quartz diorite.

METAMORPHOSED MAFIC AND ULTRAMAFIC INTRUSIVE ROCKS

7 — *7 Unsubdivided mafic intrusive rocks.*
7a Gabbro, norite, diorite.
7b Anorthosite, anorthositic gabbro.

6 — *6 Peridotite, pyroxenite.*

INTRUSIVE CONTACTS[b]

METASEDIMENTS

CHEMICAL METASEDIMENTS

5 — *5 Unsubdivided ironstone.*
5a Magnetite ironstone.
5b Pyrite ironstone.
5c Chert.

CLASTIC METASEDIMENTS

4 — *4 Unsubdivided.*
4a Pebble and boulder conglomerate.
4b Sandstone, siltstone, argillite, and derived schists.
4c Migmatite, metatexite.

METAVOLCANICS

ALKALIC MAFIC METAVOLCANICS

3 — *3 Unsubdivided.*
3a Flows[c]

FELSIC TO INTERMEDIATE METAVOLCANICS

2 — *2 Unsubdivided.*
2a Flows[d]
2b Tuff, agglomerate, and breccia[e]
2c Migmatite.

MAFIC METAVOLCANICS

1 — *1 Unsubdivided.*
1a Massive and pillowed flows.
1b Tuff, agglomerate, and breccia.
1c Amphibolite, amphibolite gneiss, and migmatite.

---

[a] *Rocks are subdivided lithologically; order does not necessarily imply age relationships within or among groups.*

[b] *Indicates general intrusive nature of groups 6 to 9.*

[c] *Predominantly trachybasaltic.*

[d] *Predominantly rhyolitic to dacitic.*

[e] *Predominantly dacitic to andesitic.*

The letter "G" preceding a rock unit number, for example "G9" indicates interpretation from geophysical data in drift covered or unmapped areas.

PAST PRODUCERS

5 Baden Powell mine *(Cb8b)* ..... **Au**
6 Big Master mine (Kenwest) *(Da8c)* ..... **Au, Ag**
7 Bonanza mine *(Da8b)* ..... **Au**
8 Cameron Is. mine (Damascus, Duport) *(Ab8b)* ..... **Au, Ag**
9 Cedar Is. mine (Cornucopia) *(Ba8b)* ..... **Au, Ag**
10 Champion mine (Bad, Franklin) *(Bb8a)* ..... **Au**
11 Cone, Russell C. mine *(Da9b)* ..... **Au**
12 Elora mine (Jubilee) *(Da8c)* ..... **Au, Ag**
13 Foley mine *(Da9b)* ..... **Au, Ag**
14 Gold Hill mine *(Bb8b)* ..... **Au**
15 Golden Star mine *(Da9b)* ..... **Au**
16 Grace Mining Co. *(Cb8b)* ..... **Talc**
17 Kenricia mine (Three Ladies) *(Ba8b)* ..... **Au, Ag**
18 Laurentian mine *(Da8c)* ..... **Au**
19 Maybrun mine *(Ca8c)* ..... **Cu, Au**
20 Mikado mine *(Ba8b)* ..... **Au**
21 Olive mine *(Da9a)* ..... **Au, Ag**
22 Olympia mine *(Ba8b)* ..... **Au**
23 Ophir mine *(Bb8b)* ..... **Au**
24 Pinewood Peat Industries *(Bb9a)* ..... **Peat**
25 Polar Bear Peat Moss Products Registered *(Ca9b)* ..... **Peat**
26 Port Arthur Copper mine *(Da9a)* ..... **Cu**
27 Redeemer mine *(Da8b)* ..... **Au**
28 Regina mine (Black Eagle, Horseshoe) *(Bb8c)* ..... **Au, Ag**
29 Sakoose mine (Golden Whale, Van Houten) *(Db8b)* ..... **Au, Ag**
30 Straw Lake Beach mine *(Cb8d)* ..... **Au, Ag**
31 Sultana mine *(Bb8b)* ..... **Au**
32 Twentieth Century mine *(Da8c)* ..... **Au**
33 Wendigo mine *(Bb8b)* ..... **Au, Ag, Cu**

Past producers of metals valued at less than $4,500.00 are shown as mineral occurrences.

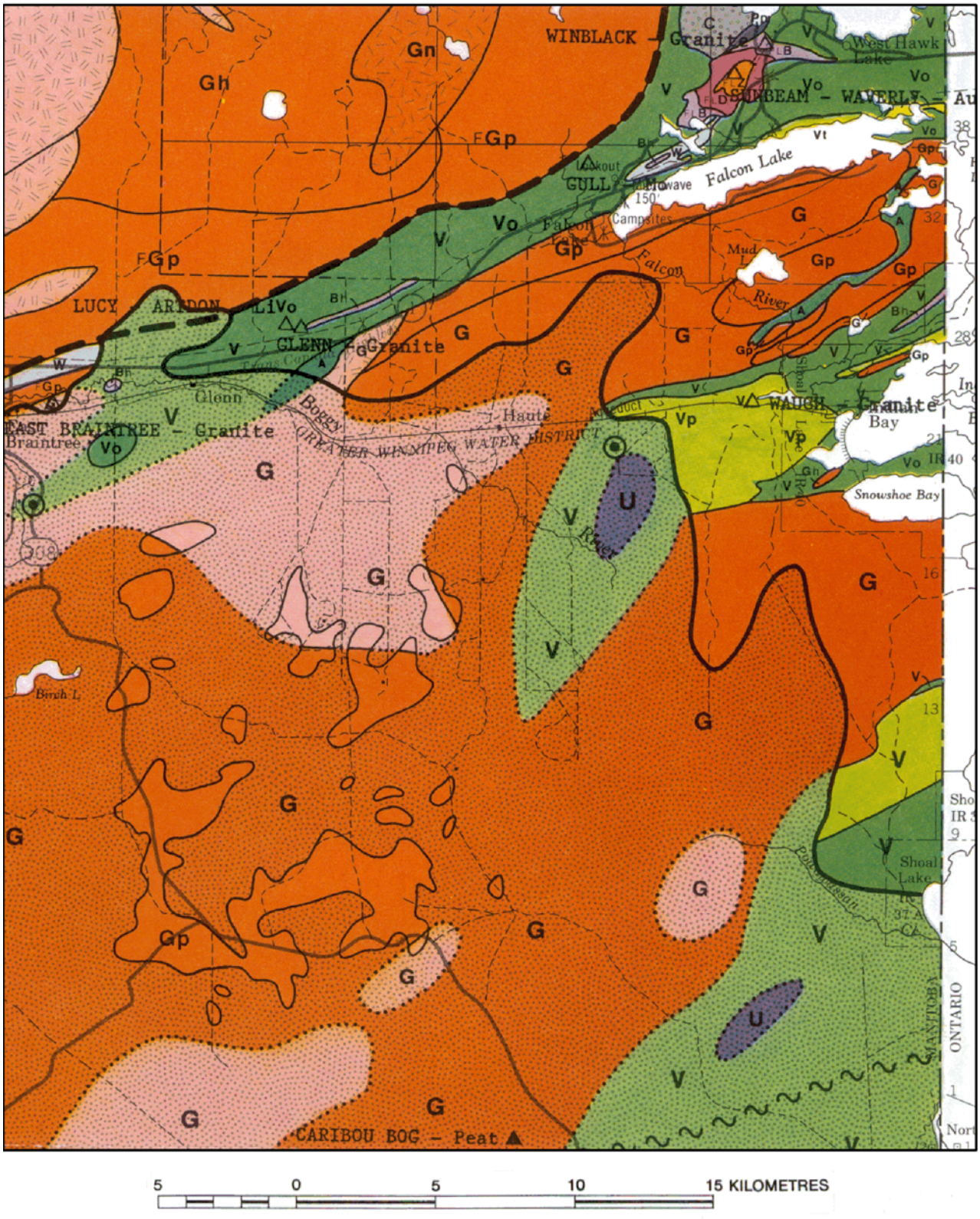
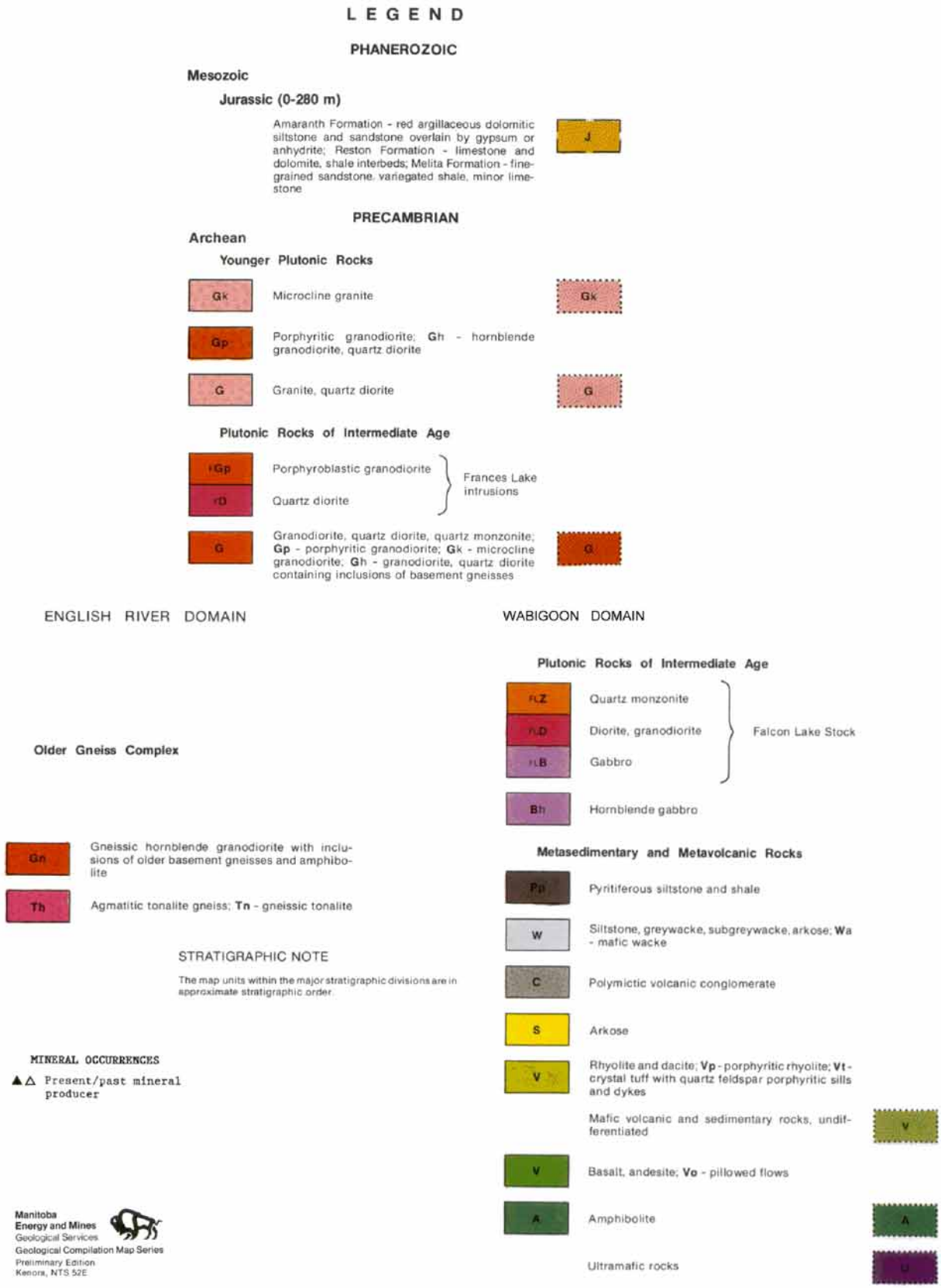


Figure 1.3b. Geology and mineral deposits of the Shoal Lake watershed, Manitoba (*from* Map NTS 52E, Manitoba Energy and Mines).


LEGEND
PHANEROZOIC
Mesozoic
Jurassic (0-280 m)
Amaranth Formation - red argillaceous dolomitic siltstone and sandstone overlain by gypsum or anhydrite; Reston Formation - limestone and dolomite, shale interbeds; Melita Formation - fine-grained sandstone, variegated shale, minor limestone
J
PRECAMBRIAN
Archean
Younger Plutonic Rocks
Gk
Microcline granite
Gk
Gp
Porphyritic granodiorite; Gh - hornblende granodiorite, quartz diorite
G
Granite, quartz diorite
G
Plutonic Rocks of Intermediate Age
rGp
Porphyroblastic granodiorite
rD
Quartz diorite
Frances Lake intrusions
G
Granodiorite, quartz diorite, quartz monzonite; Gp - porphyritic granodiorite; Gk - microcline granodiorite; Gh - granodiorite, quartz diorite containing inclusions of basement gneisses
G
ENGLISH RIVER DOMAIN
Older Gneiss Complex
Gn
Gneissic hornblende granodiorite with inclusions of older basement gneisses and amphibolite
Th
Agmatitic tonalite gneiss; Tn - gneissic tonalite
STRATIGRAPHIC NOTE
The map units within the major stratigraphic divisions are in approximate stratigraphic order.
MINERAL OCCURRENCES
▲△ Present/past mineral producer
WABIGOON DOMAIN
Plutonic Rocks of Intermediate Age
rLZ
Quartz monzonite
rLD
Diorite, granodiorite
rLB
Gabbro
Falcon Lake Stock
Bh
Hornblende gabbro
Metasedimentary and Metavolcanic Rocks
Pp
Pyritiferous siltstone and shale
W
Siltstone, greywacke, subgreywacke, arkose; Wa - mafic wacke
C
Polymictic volcanic conglomerate
S
Arkose
V
Rhyolite and dacite; Vp - porphyritic rhyolite; Vt - crystal tuff with quartz feldspar porphyritic sills and dykes
Mafic volcanic and sedimentary rocks, undifferentiated
V
V
Basalt, andesite; Vo - pillowed flows
A
Amphibolite
A
Ultramafic rocks
U
Manitoba
Energy and Mines
Geological Services
Geological Compilation Map Series
Preliminary Edition
Kenora, NTS 52E

Activity was highest in the earlier years but subsided quickly following the Klondike gold discovery. Mining in the Shoal Lake area then resumed in the early to mid 1930s in response to moves by the United States and Great Britain to go off the gold standard. Production peaked in 1936 during the three-year tax exemption period established for gold production[17].

Periodic interest in these mining properties continued through the next three decades but without any serious activity until the Duport property, at Stevens Island, was acquired by Consolidated Professor Mines Ltd. in 1973. An estimated $10 to 15 million was spent by Consolidated Professor in exploration of the Duport property. This included major surface diamond drilling and advanced underground exploration. Ore reserves were estimated at 2 million tons grading 0.35 ounces of gold per ton for the equivalent of 700,000 ounces of gold[18].

In the late 1980s, Consolidated Professor initiated discussions with regulatory authorities and other watershed stakeholders toward proceeding with development of a mine and concentrating facility. Concerns over water quality protection ultimately led to the proposal being designated under the Ontario *Environmental Assessment Act*. In responding to these environmental concerns, the company then proposed to locate its processing operations outside the watershed. Pursuant to a decline in gold prices, Consolidated Professor abandoned the proposed project. Majority interest in the Duport mine was acquired by Royal Oak Mines Ltd. in 1996 and was subsequently acquired by Sheridan Platinum Group Ltd. in 2000.

View of the (inactive) Consolidated Professor mine site at Stevens Island, circa 1992.

Kenora Prospectors and Miners Ltd. operations at the former Mikado mine site, Bag Bay, circa 1991.

In the period 1987 to 1989, several other exploration companies were also involved in active exploration within a 16 km radius of the Duport site. Exploration of the Kenora Prospectors and Miners Ltd. (KPML) property located between the former Cornucopia and Mikado mines has revealed estimated reserves of 1 million tons of ore grading 0.24 ounces per ton or the equivalent of 240,000 ounces of gold. In the early 1990s, KPML attempted to recover gold from existing tailings at the old Mikado Mine site using a cyanide leaching process. This operation did not succeed in achieving viable recovery rates because of technical problems in the extraction process and was subsequently abandoned.

At the current gold price of about CD $400 per ounce, proven reserves among the six studied deposits—Cedar Island, Duport, Electrum (C- and W-Zones), Evenlode and Purdex—are conservatively valued at CD $470 million[19]. None of these deposits is considered to be of sufficient tonnage or value to be mined in the current economy.

Exploration of molybdenum potential proceeded to the underground development stage in the High Lake area over a period extending from the 1940s to the late 1970s. Evenlode Mines Ltd. and subsequently Eco Explorations sank a shaft in the late 1970s but abandoned mining plans following a slump in molybdenum prices. At a current price of about CD $3.26 per pound, established Evenlode molybdenum reserves have an estimated value of CD $3.35 million[20].

Some of Manitoba's earliest mining claims were staked in the area around Falcon Lake as well as in the West Hawk Lake and Star Lake areas just outside the Shoal Lake watershed boundary to the north. Within this northern limit there are also several existing mining claims and mineral leases. As in Ontario, mineral potential in these areas focuses on gold. There are approximately 27 mining claims located to the south of Indian Bay. The southern portion of the watershed on the Manitoba side also contains extensive bog areas with mining claims and quarry leases for peat and quarrying materials.

In the early 1990s, the Province of Manitoba withdrew Crown lands surrounding Indian Bay on Shoal Lake from prospecting and claim staking to help protect water quality near the Winnipeg water intake. More recently, other Manitoba Crown lands within the watershed have been temporarily withdrawn from staking to allow their consideration as part of the province's protected areas initiative.

1.5.5 Tourism and Recreation

The Falcon Lake townsite and surrounding area (Figures 1.4a and 1.4b) is the most extensively developed tourism destination in the Shoal Lake watershed. This planned-resort community officially opened in 1958 but was the scene of earlier cottage development. Seasonal tourism and recreation activity, along with expanding year-round use, is accommodated by the area's extensive cottage development, two motel/lodge operations, several hundred campsites, and numerous day-use facilities. In addition to the attraction of the lake, sandy beaches, camp-

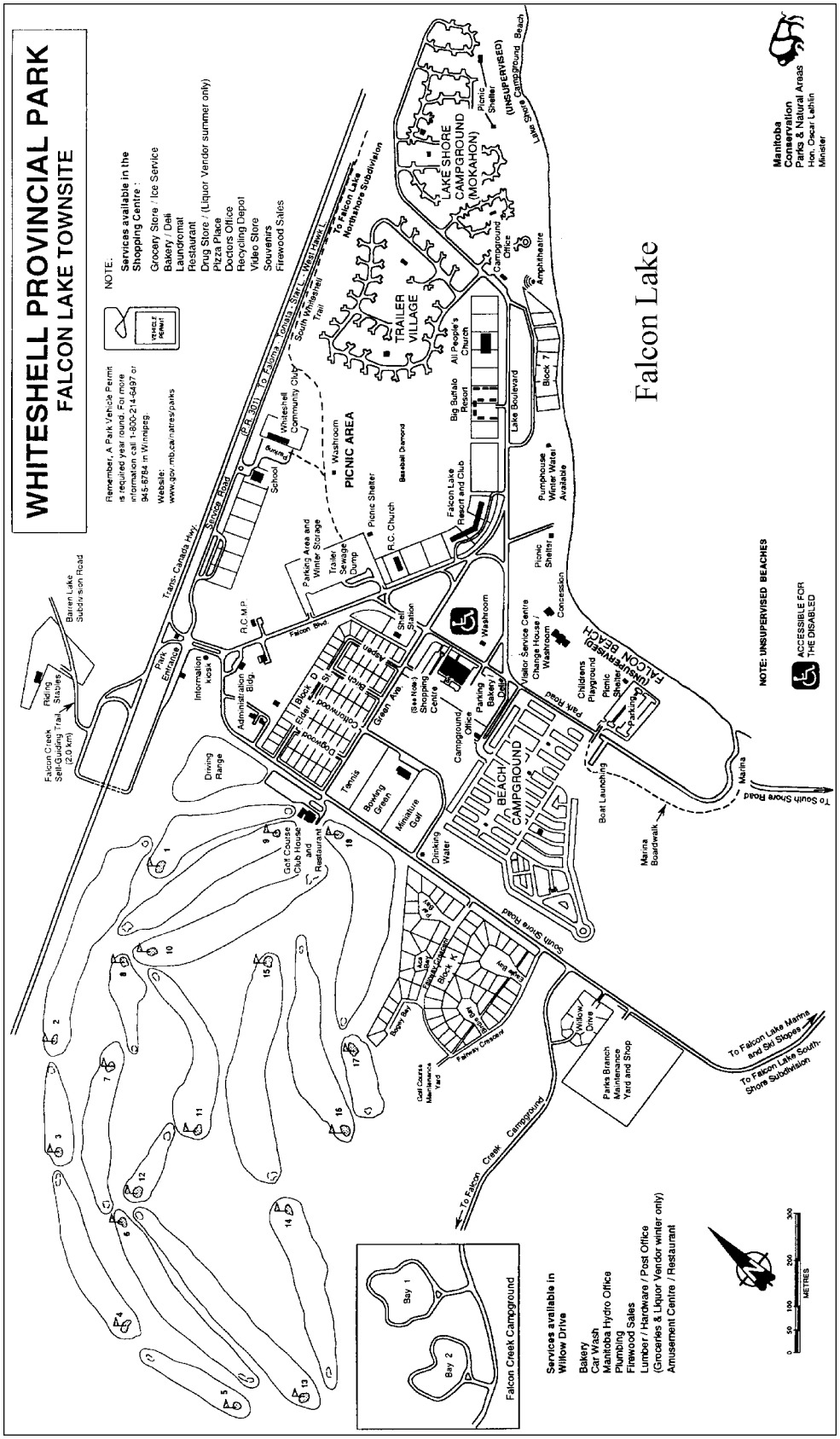


Figure 1.4a. Falcon Lake townsite.

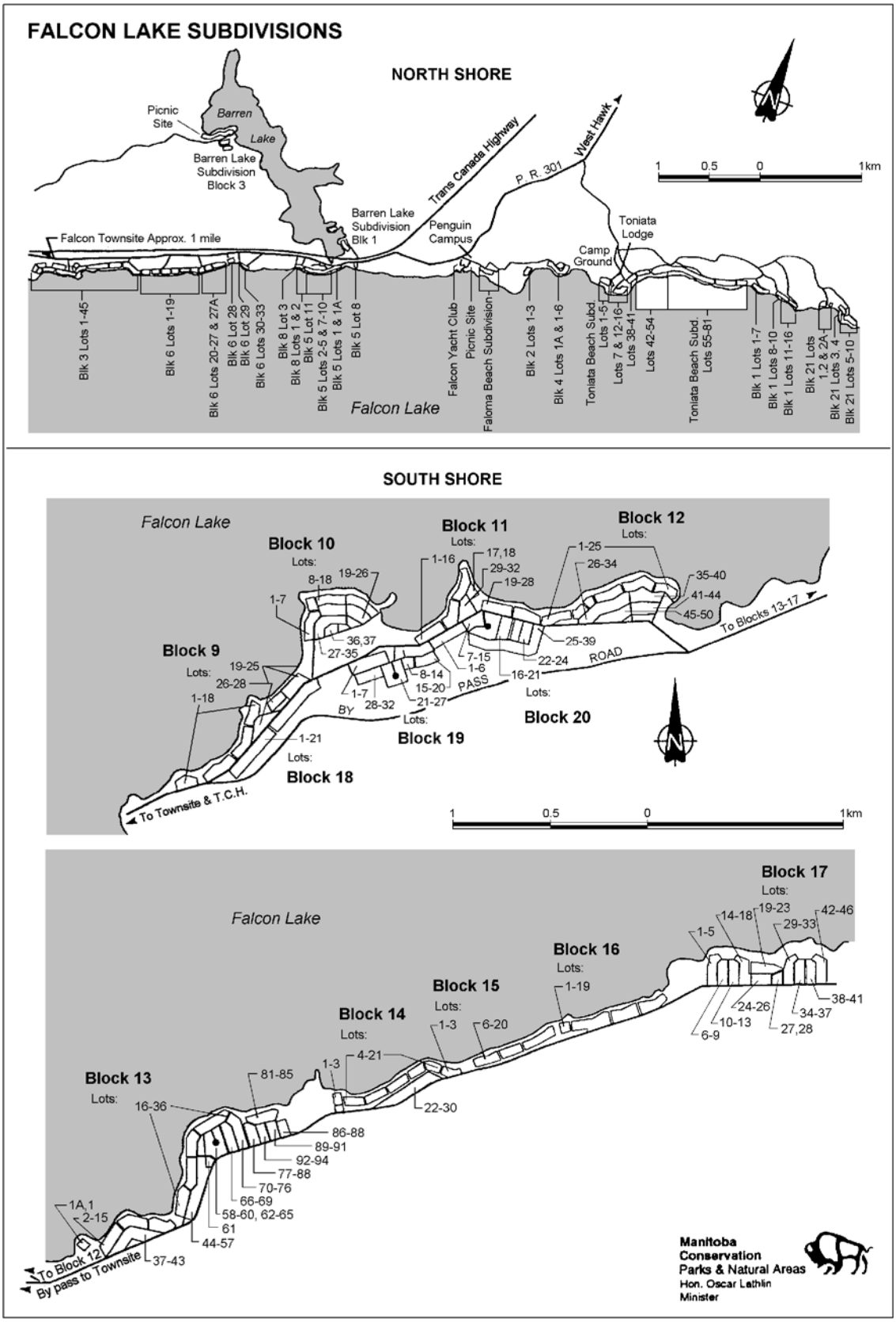


Figure 1.4b. Falcon Lake cottage subdivisions.

grounds and picnic grounds, the area is home to an 18-hole championship golf course, downhill and cross-country skiing, snowmobile trails, tennis courts, riding stables and other outdoor recreational venues.

While information is not readily available on the size of the local economy, spending on tourism and recreation in the Falcon Lake area is much greater than that occurring in the remainder of the watershed.

High Lake is accessible on the west from Falcon Lake by an abandoned access road and other trails. On the east, a gated private road provides restricted access from the Shoal Lake Road to patented lands. A portion of these patented lands was the site of molybdenum mining exploration activities that occurred in the 1970s. Small numbers of tourists are known to visit the lake on occasion for fishing, hunting and other outdoor-recreational activities. Moderate expansion in existing recreational use of the lake, and of the surrounding lands at its western end, will occur as a result of the ongoing and pending construction of the six remote outpost cabins referred to in section 1.3.2.

Shoal Lake is much less developed for tourism than either Falcon Lake or nearby Lake of the Woods. Road access to the lake is essentially restricted to the north shore. There are currently two commercial tourist facilities on or adjacent to Shoal Lake: a hunting and fishing camp located in Shoal Lake Narrows that can accommodate up to twelve persons; and a larger all-seasons camp located just outside Ash Rapids on Lake of the Woods. This camp can accommodate up to 30 people and provides both fishing and hunting opportunities. Several other Lake of the Woods resorts are also known to use Shoal Lake as a sport-fishing destination.

A summer youth camp operates on Cash Island and MacKinnon Island, which are located offshore of the eastern end of the Iskatewizaagegan #39 Reserve lands.

Fishing and hunting tourist camp, Shoal Lake Narrows.

1.5.6 Trapping

Trapping of beaver, marten and other fur bearers has been practiced by the indigenous peoples of the Shoal Lake region for many centuries. In addition to providing for their basic physical needs for food, clothing and shelter, trapping became a focal point for Aboriginal interaction with European settlers and traders.

There are currently ten registered traplines that encompass parts of the Shoal Lake watershed within the province of Ontario. All of these traplines are native-held. The major species taken in the area include beaver, marten, otter and fox. Smaller numbers of lynx, bobcat and mink are also taken. Current quotas for the traplines includes 312 beaver and 20 fishers. The market value of this quota is an estimated $11,800 based on spring 1998 average fur prices[21].

The Manitoba portion of the watershed includes both registered trapline areas (RTL) and an open trapping area. The RTL is the Whiteshell Registered Trapping Area, covering the northern portion of the watershed, with the open trapping area lying to the south. Trapping is very active in the area, targeting beaver, fisher, fox, marten, mink, muskrat, otter and squirrel. For the 1998/99 year, beaver appeared to be the most common species trapped within the RTLs associated with the watershed. There were 65 animals taken with an estimated total market value of about $1,800[22].

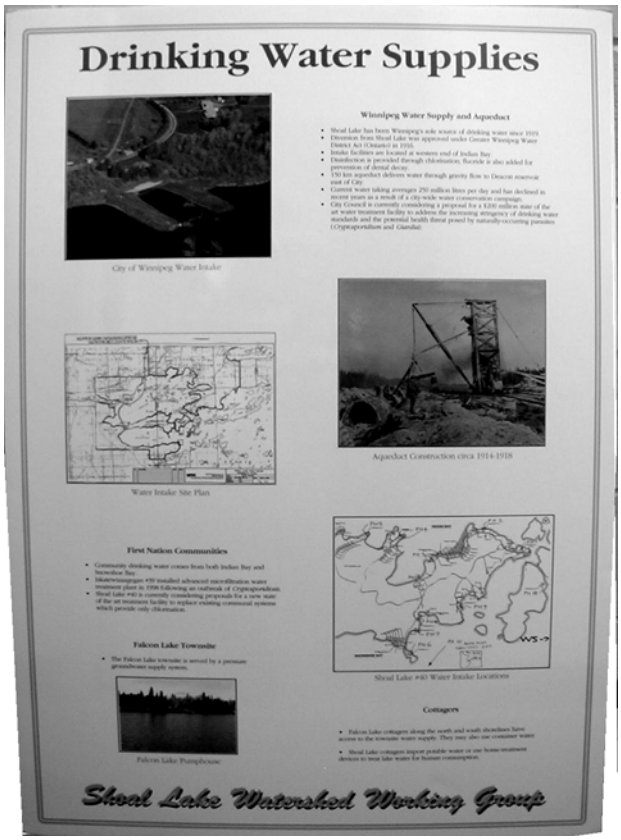
1.5.7 Water Supply

Water resources of the Shoal Lake watershed serve the potable water supply needs of the City of Winnipeg, the First Nations communities of Iskatewizaagegan #39 and Shoal Lake #40, and the Falcon Lake townsite. Other extractive water supply uses within the watershed are limited to individual domestic takings (typically for non-drinking water purposes) by resorts, camps and cottagers at both Falcon and Shoal lakes.

The Shoal Lake to Winnipeg aqueduct and water supply began operation in 1919 and has been the sole source of potable water for the City of Winnipeg since that time. The selection of Shoal Lake as the city's preferred source of supply recognized the lake's high quality relative to other sources under consideration, the ability to convey water by gravity alone, and the ability to draw, via Ash Rapids, on waters of Lake of the Woods as demand required[23].

A 1913 (Ontario) Order in Council (OIC) conferred the right of the Greater Winnipeg Water District (GWWD) to take Shoal Lake water, at a rate of up to 100 million gallons per day (MG/d) or 455 million litres per day (ML/d). Authorization was granted to the GWWD, "comprising the [former] municipalities, in the Province of Manitoba, that is to say, Winnipeg, St. Boniface, Transcona, Assiniboia, Fort Garry, St. Vital, and Kildonan, for permission to take water from Shoal Lake for domestic and municipal purposes…"[24]. Approval was made subject to several terms and conditions including:

- compensation, by GWWD, to Ontario and all private parties "whose lands or properties may be taken, injuriously affected or in any way interfered with…;
- confirmation by Ontario that the water taken "is not property to be paid for";
- monitoring and verification of water quantities and inspection of works;
- usage "only for the purposes that municipalities and residents therein ordinarily use water…"; and
- construction of remedial works or payment of compensation, by GWWD, to the Town of Kenora in the event that the water taking "appreciably reduces the amount of power now developed and owned by the Town of Kenora, or in any way injuriously affects the property of the said town…"



First Nation communities and the City of Winnipeg draw water supplies from Shoal Lake.

Water-taking authorizations were also provided by the Government of Canada and by the International Joint Commission (IJC) in 1913 and 1914, respectively. The IJC noted that its authorization included the diversion of the waters of both Shoal Lake and Lake of the Woods. Evidence was provided at the 1914 IJC hearings, by Winnipeg and others, that the city's water supply "would have to draw [at times], through Shoal Lake, on the waters of the Lake of the Woods"[25]. The IJC also noted that its approval was "in no way to interfere with or prejudice the rights, if any, of any person, corporation or municipality to damages or compensation for any injury he or it may sustain by reason of the diversion approved of".

Water is taken from Shoal Lake at the westerly end of Indian Bay and is delivered to Winnipeg through a 150 km aqueduct (Figure 1.5). Flow is generally by gravity only, however, low-lift pumps have been installed at the intake to provide additional delivery capacity in the event of very low lake levels. The aqueduct and intake facilities were built over the period 1913 to 1919 at a then cost of $13.5 million. Water treatment processes currently provided at the intake site include screening and chlorination.

At the city end of the aqueduct, the water is held in open storage at the Deacon Reservoir complex located just east of the Red River Floodway. The Deacon Reservoir was initially built in the 1970s with additional retention cells constructed in the 1990s. Water leaving the reservoir is again chlorinated prior to distribution. The fluoridation system, formerly located at the intake site, has recently been moved to the Deacon Reservoir location.

The City of Winnipeg water supply serves a current population of about 635,000 people, as well as numerous commercial, industrial and institutional customers. The

City of Winnipeg water intake facilities at Indian Bay, Shoal Lake.

City of Winnipeg water-supply aqueduct construction, circa 1916.

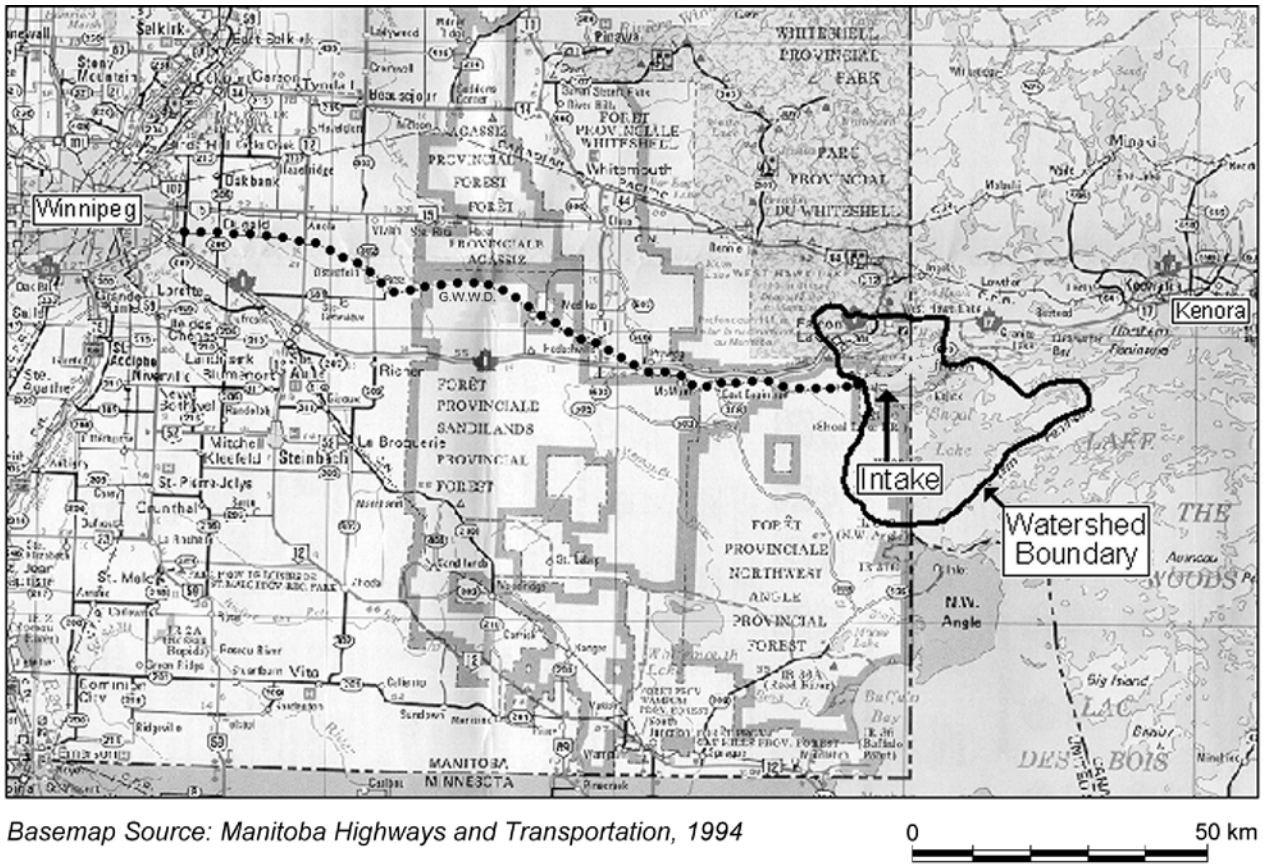


Figure 1.5. Shoal Lake to Winnipeg water supply aqueduct (*adapted from* TetrES report, June 2000).

2000 annual average flow was 227 ML/d, or about 50% of the maximum allowable water taking authorized by provincial Order in Council. Figure 1.6 illustrates the average daily water usage, on a year-to-year basis, since 1921. Current total and per capita water usage is more than 20% below the peak levels observed in 1988. This reduction in demand is in response to Winnipeg's water conservation program initiatives.

In November 2000, Winnipeg city council approved construction of a new water treatment facility. Approval followed extensive studies undertaken by the city and its consultants over the previous decade. These studies concluded that full treatment was necessary to meet increasingly stringent Canadian Drinking Water Quality Guidelines; to help protect against potential health risks such as disinfection by-products and *Cryptosporidium*; and to improve the taste, odour and appearance of the drinking water supply[26]. Construction of the treatment plant, which is being built at a projected cost of $204 million, is expected to begin in 2004.[27] According to the current schedule, the facility would become operational in the fall of 2006.

First Nation Iskatewizaagegan #39 gets its water supply from Indian Bay and, since 1999, has provided treatment in an advanced membrane technology and ultraviolet light (UV) disinfection facility. The decision to construct the water treatment plant followed a 1997 outbreak of Cryptosporidiosis within the community. During the interim period, the community was operating with a boil-water order and was also using bottled water supplies.

The Falcon Lake townsite is served by a municipal well-water supply located in close proximity to the northern shore of the lake. Cottagers, especially those not connected to the municipal supply, often import drinking water but use lake water for other domestic purposes.

As acknowledged in the preamble to section 1.5, the water resources of the Shoal Lake watershed serve many interests, both extractive and in-stream/in-lake. Assessing the economic value of water to those interests is compli-

The City of Winnipeg's Year 2000 water withdrawal is equivalent to about 0.5% of the long-term annual average outflow from Lake of the Woods through the Norman Dam to the Winnipeg River.

cated by the special nature that water holds among natural resources.

Water has not been, and generally is not, considered a tradable commodity by Canadian federal and provincial governments. At various times, governments have introduced policies and legislation to reinforce the view that water in its natural state is not an economic good and is, therefore, not subject to free trade provisions contained in binational and international trade treaties and agreements[28,29,30]. This was confirmed by the governments of Canada, the United States and Mexico in a statement on water and trade as appended to the 1993 *North American Free Trade Agreement* (NAFTA). The statement confirms that "unless water in any form has entered into commerce and become a good or product, it is not covered by the provisions of any trade agreement, including the NAFTA."

In the Shoal Lake watershed context, the 1913 Ontario Order in Council authorizing the Winnipeg water taking also states that "… water taken [by the Greater Winnipeg Water District] within the terms [of the Order] hereof, and considered merely as water, is not property to be paid for."

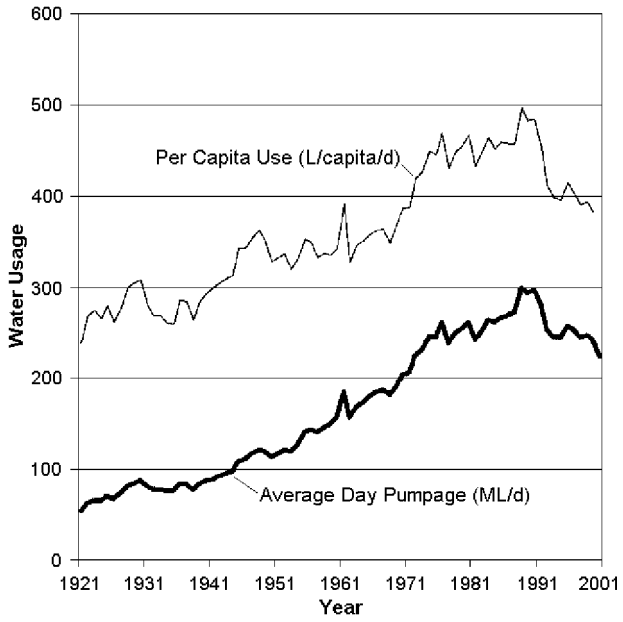


Figure 1.6. City of Winnipeg water usage.

Notwithstanding these trade-related tenets surrounding the economic valuing of water, leading governments domestically and worldwide acknowledge the view that water is too often undervalued in its many uses. They recognize and accept that availability of adequate supplies of clean water is fundamental in supporting healthy environments, healthy communities and healthy economies. They subscribe to the view that undervaluing has led to, and continues to support, practices that work against wise use, conservation and water quality protection[31,32,33].

The value of the Shoal Lake water serving the three watershed communities and the City of Winnipeg is reflected in the costs that their consumers/customers pay for the provision of those supplies in a potable state. This includes the value-added costs associated with accessing, transporting, treating and delivering water services to the consumer, in addition to other costs associated with watershed protection. These costs include monies needed for the ongoing operation of water supply and distribution systems as well as the annualized costs of maintaining, upgrading, renewing and expanding the system to meet government regulations and the demands of growth. The "full-cost pricing" approach to municipal water services is supported by the Canadian Council of Ministers of the Environment (CCME)[34].

The City of Winnipeg fully costs all aspects of supplying water to its customers in accordance with the full-cost pricing concept. Annual water-billing revenues collected by the City in 2000 to cover the costs of these services were $74.4 million[35]. This included monies being collected into capital reserve funds for water treatment plant construction and for completion of the aqueduct rehabilitation program.

Current operating and maintenance costs in supplying drinking water services within the two Shoal Lake First Nations communities are estimated to be about $180,000 annually[36]. The new drinking water treatment plant commissioned by Iskatewizaagegan #39 in 1998 was built at a cost of $3.6 million[37]. The Shoal Lake #40 community may face capital costs of the same magnitude should it proceed with the proposed construction of a similar treatment facility.

Water supply services for the Falcon Lake townsite are provided at an estimated annual cost of $41,000[38].

2.0 State of the Environment and Resources

2.1 INTRODUCTION

The current state of watershed resources and environmental conditions provides a baseline against which future management efforts in resource management and environmental protection can be measured. Where environmental quality may have changed over time, knowledge of historical or predevelopment conditions and trends can also provide insight into the sensitivity of water, fisheries and other watershed resources to the impacts of development and pollutants, and be helpful in identifying potential opportunities for environmental enhancements.

While looking at the broader watershed ecosystem, the Working Group's assessment of resource values and conditions has placed greater emphasis on the status of water quality, hydrologic and hydraulic functions, and fisheries.

2.2 WATER QUALITY

The following description and evaluation of water quality conditions in Shoal Lake and Falcon Lake and in other watershed lakes and streams is presented chronologically beginning with water quality assessments and observations made as far back as the early 1900s.

Existence of such a lengthy historical perspective is a rarity in water quality assessment initiatives and was helpful to the Working Group in looking for possible trends and cause-effect relationships. Material excerpted from both early and more recent reports helped capture water quality considerations that have driven significant decisions made with respect to the regulation of watershed development and the treatment of drinking water supplies.

2.2.1 Water Quality Objectives

As an introduction to the discussion of water quality it is important to understand the existing and evolving jurisdictional contexts used in defining levels of acceptability and in determining how water quality is managed and protected.

The Ontario and Manitoba goals and objectives for water quality protection are generally similar. They also are quite consistent with objectives and guidelines established at the national level. Slight differences do, however, exist in the numeric limits for some contaminants, and some variations exist in the policies and methodologies used in applying the objectives. These differences can potentially influence the relative stringency of controls imposed on wastewater emissions and on resource development and land use activities.

The underlying rationale for the Ontario Provincial Water Quality Objectives (PWQOs) is the protection of all forms of aquatic life, throughout all life stages, and the protection of recreational water uses[39]. This basic intent is often referred to as the goal of ensuring that all waters of the province are "fishable and swimmable". In most cases, this also implies the protection of water quality for all other uses. With respect to drinking water, Ontario requires that surface water sources receive treatment consisting of a minimum of "chemically assisted filtration and disinfection or other treatment capable of providing water of equal or better quality" prior to public use[40].

PWQOs for individual contaminants are periodically reviewed and updated to reflect current research in such matters as acute and chronic toxicity, bio-accumulation, and mutagenicity.

Ontario employs a two-track approach to establishing wastewater discharge or effluent requirements. Water-quality-based effluent limits are determined for the actual watercourse and discharge location using the PWQOs and knowledge of receiving-water characteristics. These suggested limits are then compared to current federal and provincial treatment-technology-based effluent requirements and the most stringent of the requirements is then applied. Ontario has established treatment-technology-based effluent requirements for municipal wastewater discharges and for individual industrial sectors. They reflect "best available treatment economically available" or BATEA.

Ontario also uses lakeshore-capacity modeling to manage development and protect the water quality of "recreational" lakes. The modeling approach, which focuses on nutrient-related water quality concerns, is discussed in section 7.3.2.

In contrast to the Ontario objective-setting approach, current Manitoba Surface Water Quality Objectives (SWQOs) set differing levels of quality based on protecting six categories of water use[41]. These categories include domestic consumption; protection of aquatic life and wildlife; industrial consumption; agricultural consumption (irrigation and livestock watering); recreation; and other miscellaneous uses. Waterbodies, or portions thereof, are therefore classified by the use(s) to be protected and the relevant SWQOs are applied in making decisions regarding wastewater discharge approvals. The province has recently proposed revisions to the SWQOs, which would establish a three-tiered set of standards, objectives and guidelines[42]. For Tier I substances, the proposal would employ a two-track approach similar to Ontario's. Tier II substance guidelines would also be used in developing discharge limitations. The Tier III list of substances would mainly be used in identifying new or emerging problems.

The 1988 Manitoba SWQOs also make general provision for classification of some waterbodies as either "High Quality Waters" or "Exceptional Value Waters". The proposed revisions retain this concept. Currently, three Manitoba watersheds have been designated as High Quality Waters. No lakes in the Shoal Lake watershed have been designated High Value, and to date, no waterbody in Manitoba has been designated as Exceptional Value.

Ontario has on previous occasions considered and subsequently rejected use of a waterbody classification system. Provincial policy states that the PWQOs are to be applied province-wide, and that no lowering of receiving-water quality below the objectives should be permitted wherever it is currently better than the PWQOs.

Where a PWQO is exceeded due to natural background conditions, Ontario may consider a request for a deviation from the normal policy requirement of ensuring that all practical measures are taken to upgrade water quality to the PWQOs. Manitoba policy currently requires, in cases where an exceedance of the Manitoba SWQOs is caused by natural background quality, that no further reduction in water quality due to the introduction of man-made pollutants will be allowed unless this reduction does not jeopardize any beneficial use.

Ontario and Manitoba mixing-zone requirements are generally similar, although Ontario requires that there be no toxic conditions within a mixing zone, while Manitoba requires only that the mixing zone not be acutely lethal to aquatic life passing through it.

Both provinces participate in the ongoing federal-provincial initiatives of the Canadian Council of Ministers of the Environment (CCME) relating to the development and refinement of water quality guidelines and standards. Ontario considers the CCME Canadian Surface Water Quality Guidelines (CSWQGs)[43] when developing its PWQOs, while Manitoba proposes to use the CCME Canada-Wide Standards[44] in its Tier I list of substances.

While water quality objectives themselves are not legally enforceable in either province, enforcement of any wastewater effluent limit based on the objectives is possible once those limits have been included in a certificate of approval or other regulatory instrument.

2.2.2 Slichter Report of 1912[45]

Dr. C.S. Slichter's September 6, 1912, report to the Public Utility Commissioner of the City of Winnipeg may be the first recorded reference to Shoal Lake water quality[46]. Dr. Slichter made his assessment in the context of comparing several potential sources of water supply being considered to replace the then-existing groundwater supplies serving the city.

Dr. Slichter visited Shoal Lake on August 24, 1912, where he examined conditions of temperature, colour and suspended matter at a number of locations being considered for an intake site. Those locations included the nearshore of Indian Bay, as well as a site in 20 feet (6.1 m) of water in the main body of Shoal Lake on a line extending out six miles (9.7 km) through Indian Bay.

In comparing Indian Bay to the main lake, Slichter said, "Indian Bay possesses a slight color, and there is also more matter in suspension. The water, both in the lake itself and in Indian Bay, was free from disagreeable odors and taste". He estimated summer peak temperatures of surface waters to be in the vicinity of 65_F (18.3_C), with bottom waters being in the range of 45 to 55_F (7.2 to 12.8_C).

Slichter also noted that:

> "The water of Shoal Lake would require no treatment. No fear need ever be in mind that the sanitary quality of the water would be poor at any time in the future. The shores of the lake are hard rocks of the Laurentian series, entirely unfitted for agriculture, and the country thereabout must remain in its present wild state indefinitely. There need be no fear of the growth of cities or towns upon the shores of Shoal Lake. The Lake of the Woods constitutes an enormous reservoir of clear, pure and soft water, situated 300 feet [91 m] above the City of Winnipeg, and within 100 miles [160 km] of the city.
>
> I believe that an intake could be so located that there would be no trouble from algae. The algae are harmless from the health standpoint, but they impart a seaweed odor and taste to water, and accordingly should be removed when present. They may grow in any artificial or natural reservoir open to sunlight".

2.2.3 Board of Consulting Engineers Report of 1913

In May of 1913 the Greater Winnipeg Water District (GWWD) retained the services of a team of consulting engineers to study and submit a report on "the best means of supplying the GWWD with water from Shoal Lake." Their report was submitted on August 20, 1913[47].

Field observations from a visit to Shoal Lake in the period May 12 to 14, 1913, as well as from subsequent microscopic examinations of Shoal Lake water provided to the board by the GWWD, led the board to conclude that:

> "Physical and chemical examinations of water taken from Shoal Lake show that it is practically free from contamination, that it is clear and practically without color and that it is free from odor and has an agreeable taste. It is very soft in comparison with the water at present supplied to Winnipeg, and was, at the time we examined the water, of excellent quality for a domestic water supply. The chemical analyses show that it is well suited for boiler and general manufacturing purposes.
>
> Microscopic examinations of the water have been made every day or two since June 2, and the results up to August 2 were available to us at the time of writing this report. They show, as is the case with the water of all lakes and reservoirs, that the water contains a variety of minute animal and vegetable organisms, which can be discerned with the microscope and some of them with the naked eye. The total number of organisms per cubic centimeter has ranged from 249 to 1776, and averaged 833, which is no more than the amount usually found in small lakes and the better class of reservoirs used for water supplies.

So far as the examinations have been carried, the water has had no disagreeable taste and odor at any time, but it is sometimes the case that these minute organisms increase greatly in numbers and give the water a pondy or even a disagreeable taste. This is not as likely to be the case in large lakes as in small ponds and artificial reservoirs. Many cities take water from the Great Lakes, from Lake Superior to Lake Ontario, and there has been no complaint from bad taste and odors from such waters, although they are not free from such microscopic organisms.

There are many other reservoir supplies which contain a much larger number of organisms than has been shown by the recent examinations of Shoal Lake water, and which are nevertheless used without serious complaint on the part of the water takers.

We can not, in the absence of definite knowledge as to the history of Shoal Lake water, affirm that growths will not occur at times to cause unpleasant tastes and odors, but the results of recent observations and all of the conditions indicate that troubles from bad tastes and odors should be infrequent and not very serious, if they occur at all.

Having made such an extended reference to these organisms, we wish to state positively that they have no relation whatever to disease germs and there is no evidence that they render the water unwholesome.

Should it ever become desirable to filter the water, either completely or to the more limited extent required to remove the microscopic and larger organisms, this can be provided for at the site of the proposed reservoir east of Transcona, where an opportunity is also presented for the aeration of the water should this be found advantageous.

The situation of Shoal Lake is such that there are two bays forming a part of the lake which are from 4 to 5 miles [6.4 to 8 km] nearer Winnipeg than the main lake, and water could be taken from these bays with a saving in the cost of works much greater than the proportionate saving in the length of the aqueduct.

Snowshoe Bay, the southerly of the two is so shallow that waves, due to winds, stir up the mud on the bottom and the water would be turbid and unsatisfactory for use. Indian Bay has sufficient depth – generally a little more than 20 feet [6 m] – so that the effect of the waves, if any, upon the bottom would be slight; but Falcon River brings into the west end a considerable quantity of dark-colored muskeg water, which gives the water at the end of the bay a marked brownish tint.

Our investigations, however, show that toward the west end of these bays the distance between them is only two-thirds of a mile, and that the ground is but little above the level of the water in the bays, so that it is feasible, at small cost, to cut a channel from one bay to the other, and this channel, in connection with an embankment across the westerly end of Indian Bay, would divert the Falcon River from Indian Bay into Snowshoe Bay, thus making Indian Bay an acceptable location for the intake of the aqueduct.

It may be questioned by some whether the water of Falcon River will not ultimately find its way from Snowshoe Bay into Indian Bay and thus affect the quality of the water supply. It is true that the water of the river will in time find its way from Snowshoe Bay into Indian Bay, but these bodies of water are so large that it will require several years for the water to complete the course and in the meantime the color of the Falcon River water will have disappeared through the bleaching agencies that nature provides. It is probable that a large proportion of the water which enters Shoal Lake from its drainage area is a brownish muskeg water, but as the supply in each year is only a small part of the capacity of the lake, it undergoes the transformation that makes it a nearly colorless and attractive looking water."

2.2.4 Shoal Lake First Nations Perspectives on Water Quality Conditions

The Working Group heard from First Nations community representatives about water quality changes in Shoal Lake as observed and reported through oral tradition over a number of generations. These observations relate primarily to the aspects of water clarity and to the presence of algae and aquatic weed growth.

Community elders spoke of declining water clarity over several decades, referring to areas of Shoal Lake where it was once possible to see the lake bottom quite clearly but where increased colouration, suspended sediment, and algae have since reduced the depth of light penetration. Snowshoe Bay in particular was identified as an area where increases in sediment suspension and sediment deposition and in the extent of aquatic weed growth have adversely and progressively impacted on water quality over the past decade or more. These problems were reported, by Shoal Lake #40 representatives, to have affected communal water intakes on Snowshoe Bay and rendered several community water supplies unsuitable for human consumption and other domestic uses.

In response to concerns that bank erosion in the cut channel (across the peninsula that separates Indian Bay and Snowshoe Bay) might be a source of increased sediment transport to Snowshoe Bay, the City of Winnipeg undertook a field assessment of the channel in 2000[48]. The channel cross-section was, however, found to be little changed from its original design. As noted in section 2.2.3, sediments in the bay have historically been considered to be subject to wind-induced resuspension.

2.2.5 General Monitoring and Other Studies (1991 to 1998)

The Manitoba government has actively monitored the water quality of Shoal Lake, Falcon Lake and the Falcon River over the past decade and possesses the most extensive database on current conditions in the watershed. Monitoring of Shoal Lake, or portions of the lake, has also been conducted by the City of Winnipeg and by the Ontario Ministry of Environment (MOE). Ontario MOE has not, however, conducted regular monitoring of the lake since 1993. Manitoba monitoring stations are shown in Figure 2.1.

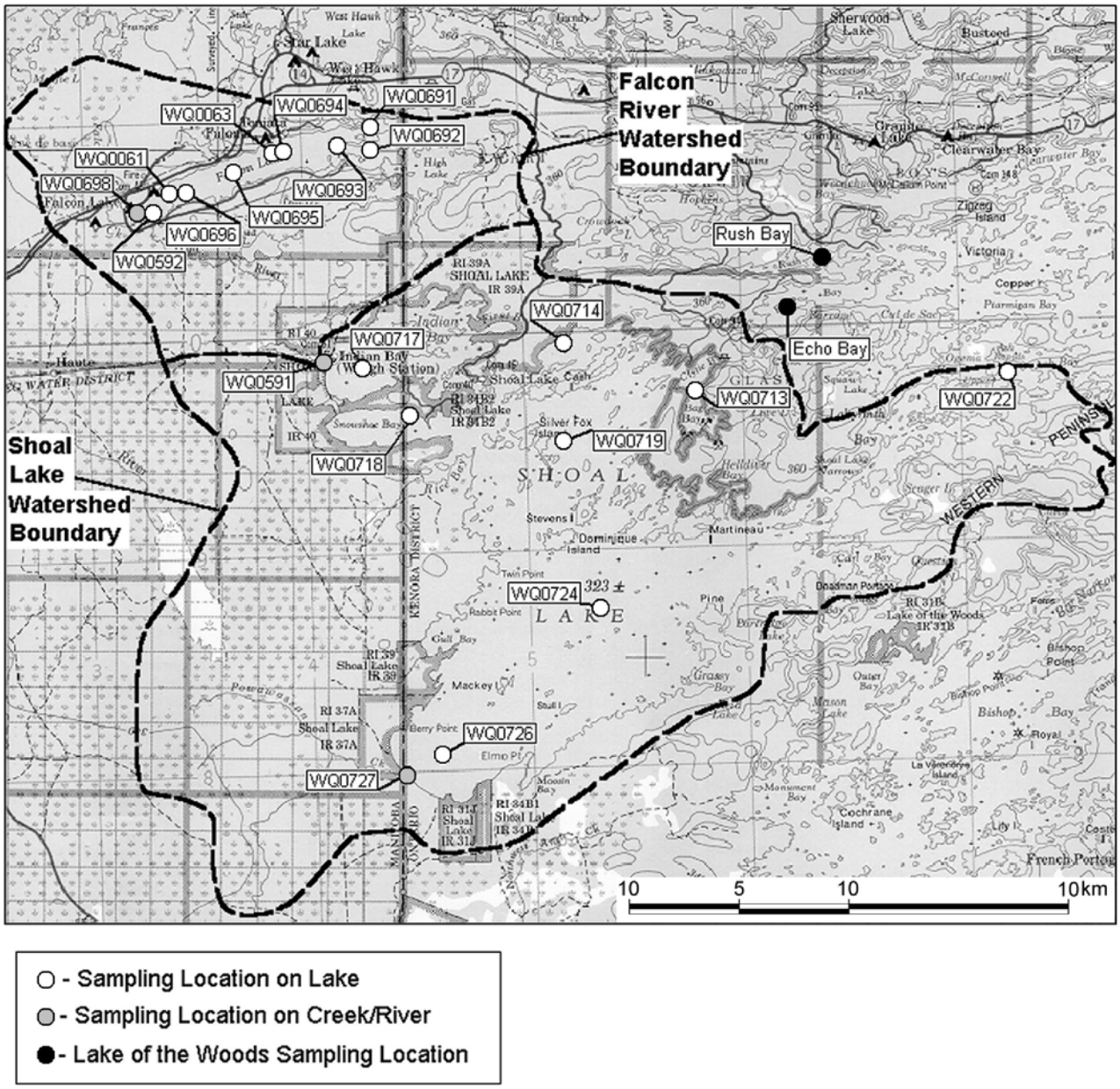


Figure 2.1. Water quality monitoring stations (*adapted from* TetrES report, June 2000).

The following sections provide an overview of water quality using available reports covering the 1991 to 1998 period[49].

2.2.5.1 FALCON LAKE

Manitoba Conservation (MC) undertook the first major study of Falcon Lake water quality and biology in 1974–75. The department has continued monitoring of several lake and tributary locations since 1990. It has also conducted periodic cooperative sampling programs with the assistance of cottage owners.

The lake has a theoretical hydraulic residence time of greater than 15 years. This is the time required for the volume of incoming flows to displace the volume of water contained in the lake. With this relatively long residence time and the lake's considerable depth, incoming sediments from Falcon Creek and other runoff have time to settle to the lake bottom and organic material is broken down. The lake's dissolved oxygen levels are, however, reported to be consistently above the 5 mg/L level required for the protection of cold water fish species including lake trout.

Falcon Creek is the only well–defined tributary inflow to the lake. The headwaters of the creek originate in a bog not far upstream of the Trans–Canada Highway. The creek then runs through the Falcon Lake Golf Course (which may be a potential source of additional nutrients, as well as herbicides and other turf–care chemicals) and receives the

seasonal discharge from the sewage lagoon. The lagoon receives wastewater from the townsite sanitary sewage collection system as well as hauled sewage from cottages in the outlying areas. Lagoon effluent is discharged to drainage ditches, which flow through a large natural wetland area and into the southwest end of Falcon Lake not far from the point at which the lake outlets to the Falcon River.

A 1995 Manitoba Environment (ME) information bulletin provides the following description of the lake's water quality[50]:

> "In general, the water quality of Falcon Lake is excellent and meets all Manitoba Environment objectives for both recreational use and aquatic life. Nutrient concentrations are relatively low and have not increased since 1974. As a result, algal blooms are usually not a problem. The lake is slightly alkaline with a pH of approximately 7.8 units. Concentrations of metals such as copper, lead, cadmium, nickel and zinc are, in most cases, non-detectable or very low. Fecal coliform bacteria are detected only rarely in water samples from Falcon Lake."

Falcon Lake outflow to the Falcon River.

2.2.5.2 SHOAL LAKE

An extensive water-quality-monitoring database for Shoal Lake has been acquired through the combined efforts of Manitoba, Winnipeg and Ontario since the late 1980s (see Appendix B for a summary of sampling periods and parameter coverage). Prior to the analysis carried out for the Working Group by TetrES Consultants Inc. (see section 2.2.8), these data were not subjected to any in-depth analyses. A review of some earlier Manitoba reports does, however, allow a quick comparison (for a limited set of indicators) of water quality in both Shoal and Falcon lakes to the relevant Manitoba and Ontario objectives.

The comparison is based on lake-wide averages and therefore evens out differences (higher or lower) in concentrations found in more localized portions of each lake. These in-lake differences can be significant from a water-use perspective and are discussed in subsequent sections.

As shown in Table 2.1, average or open-water conditions compare favourably to government objectives for those parameters that are routinely monitored. Less frequent testing of additional parameters such as heavy metals shows that Shoal Lake waters are also within accepted limits for those parameters and are typically below normal laboratory detection limits.

Table 2.1. Lake-wide average water quality of Shoal and Falcon lakes (circa 1991-95).

Parameter	Shoal Lake	Falcon Lake	Manitoba SWQO for aquatic life and/or recreation	Manitoba SWQO for domestic consumption (concentration in raw water)	Ontario PWQO for aquatic life and/or recreation
PH	7.89	8.05	6.5-9.0	6.5-8.5	6.5-8.5
Hardness (mg/L)	85.77	57.40	-	200	-
Iron (mg/L)	0.04	0.07	0.3	0.3	0.3
Manganese (mg/L)	0.05	0.03	-	0.05	-
True colour	5.28	14.7	should not impair beneficial uses	15	should not impair beneficial uses
Turbidity (NTU)	0.76	0.89	<5 mg/L increase in total suspended solids	5	<10% decrease in Secchi depth*
Total phosphorus (μg/L)	15-21 (avg 18)	15-22 (avg 19)	25	-	20
Dissolved nitrate (mg/L)	0.02	0.01	-	10	-
Chloride (mg/L)	1.55	3.87	-	250	-
Sulphate (mg/L)	3.23	3.92	-	500	-
Fecal coliform (#/100 ml)	<1	<6	200	10 (must be 0 in treated water)	100 E. coli.

*Secchi depth refers to the measured depth of light penetration.

A number of shorter-duration or issue-specific studies and surveys have also been carried out and have included:

- Acid sensitivity surveys conducted by Ontario that characterized the Lake of the Woods system (including Shoal Lake) as "not sensitive to acid loadings and capable of withstanding heavy acid loadings during spring run-off without biological damage." The lake contains "sufficient buffering capacity to neutralize acid rain for an indefinite period of time"[51].

- An August 1993 report of blue-green algal toxins in Shoal Lake and in Winnipeg tap water[52]. The algae species present were capable of producing hepatotoxins that could affect the human liver. By September of the same year measured hepatotoxin concentrations were close to the interim Health Canada guideline of 0.5 μg/L of Microcystin LR but dropped to barely detectable levels shortly after.

- Iskatewizaagegan #39 (in cooperation with Health Canada) conducted bacteriological sampling of 23 nearshore sites inside and outside of Indian Bay[53]. The summer 1997 survey was initiated following an outbreak of Cryptosporidiosis in the community over the previous winter. The testing did not specifically look for *Cryptosporidium*, but did indicate the occurrence of total coliform and E. coli bacteria at levels indicative of a water supply considered unsafe for human consumption without adequate treatment and disinfection. Manitoba Conservation's testing of the more offshore waters of Indian Bay indicate that bacteria levels are typically below the lower limit of detection, i.e. <1 organism per 100 millilitres.

2.2.6 Winnipeg Water Consortium Report, September 1999

The consultants' report contained a number of references to the current water quality condition of the Shoal Lake supply and to parameters of concern from a drinking water standpoint[54]. Observations regarding "high" levels of some substances or indicators were made in the context of the waters drawn from Indian Bay and were therefore not considered necessarily reflective of other portions of the lake. Following are some excerpts from the report:

- "The quality of Shoal Lake water has met most of the Canadian Drinking Water Quality Guidelines and has been accepted by the public".

- "Since 1919 Shoal Lake water has been of sufficiently high quality that the addition of chlorine for disinfection and fluoride for prevention of tooth decay was the only treatment required. However recent planning studies have recommended that the City plan to implement additional water treatment for these major reasons:

  - evolution of much more stringent Canadian Drinking Water Quality Guidelines to protect public health,

  - concerns relating to the public health of the utility customers in two areas; the risk of an outbreak of waterborne disease caused by chlorine resistant pathogens, and the existence of disinfection by-products in excess of the guidelines, and

  - concerns regarding the aesthetic parameters of drinking water (e.g. taste and odour).

- "Since total organic carbon levels in Shoal Lake [i.e. Indian Bay] water are moderate to high, the potential for TDP (disinfection by-product) formation is significant". Note: Chlorine, which is commonly used for disinfection, can react with the organic matter present in the raw water to produce a variety of by-products such as trihalomethanes (THMs) and haloacetic acids (HAAs). These compounds have been linked to chronic health effects.

- "[Phyto]plankton [algae] levels are particularly high in Shoal Lake [i.e. Indian Bay] and Deacon reservoir water for a large part of the year. Taste and odour events in Winnipeg's distribution system normally coincide with or follow elevated algae levels in Deacon Reservoir and/or Shoal Lake".

2.2.7 Shoal Lake Phytoplankton Assessment Report, Manitoba Conservation, November 1999

Manitoba Conservation has been monitoring algal species composition and abundance at several locations in Shoal lake since 1992[55]. An assessment of data collected from 1992 to 1996 was made to determine what spatial and temporal trends and variability might exist. The report published in late 1999 concluded that:

> "In Shoal Lake, the species composition, annual biomass estimates, and chlorophyll "a" values suggest an oligotrophic/mesotrophic nutrient status. Average summer biomass estimates were only 500 μg/L and annual chlorophyll "a" values averaged 2 μg/L.
>
> Algae from seven different algal groups were identified. Chrysophyceae, mainly represented by the "small chrysophytes", were dominant in terms of both species abundance and biomass. In terms of quantity of other phytoplankton taxa, some general patterns of species seasonal succession were observed. The winter phytoplankton was largely composed of Chrysophyceae, chiefly *Rhodomonas minuta*. During spring, Chrysophyceae was dominant mainly represented by *Dinobryon bavaricum* and *Dinobryon sociale*. The numbers of Chrysophyceae decreased over summer and Bacillariophyceae increased. A mixed diatom flora consisting of *Cyclotella* sp., *Fragilaria* spp., *Melosira* sp., *Stephanodiscus* sp., *Synedra acus*, and Tabellaria sp. were abundant during summer and often dominated the autumn phytoplankton. Cyanophyceae increased during the

late summer. *Anabaena* spp., *Aphanizomenon flos-aquae*, *Aphanocapsa* sp., and *Gomphosphaeria* sp. reached maximum concentrations during August or September.

While Chrysophyceae are typical of oligotrophic lakes on the Canadian Shield and are dominant in Shoal Lake, significant contributions by the centric Bacillariophyceae, Cyanophyceae, and Chlorophyceae suggest more mesotrophic conditions.

The phytoplankton was found not to have changed significantly over the years of study suggesting that water quality had also remained similar. However, the phytoplankton did contain certain algae, cyanobacteria, diatoms, and flagellates that are responsible for causing problems in water supplies. If these algae become more common in Shoal Lake the potential for them to impact on water quality will undoubtably increase".

2.2.8 TetrES Report, June 2000

The Working Group's water study consultants examined existing water quality and variability throughout the watershed with a focus on nutrient enrichment issues[56]. Data used in this analysis were essentially those used in the earlier state-of-environment reporting by Manitoba, and generally covered the period 1991 to 1998. Additional emphasis was, however, placed on evaluating temporal and spatial differences and variability in total phosphorus and other nutrient-status indicators, and in developing estimates of nutrient loading from both natural sources and human inputs. The following sections are excerpts taken from the Working Group's July 2000 report[57] summarizing the TetrES findings.

2.2.8.1 TOTAL PHOSPHORUS (SEE FIGURES 2.2 AND 2.3)

"For Shoal Lake, mean total phosphorus concentrations vary between 0.015 and 0.023 mg/L with an overall average of 0.018 mg/L for the entire lake. Generally higher total phosphorus concentrations occur in the northwestern, northern and southern sections of the lake, with concentrations decreasing towards Ash Rapids. Phosphorus concentrations on the Lake of the Woods side of Ash Rapids do not appear to be any higher than those found on the Shoal Lake side. It appears that the spatial distribution of phosphorus levels can be explained by the existing phosphorus loading distributions and by the volume of the various sections of the lake. Higher concentrations are associated with high loading areas having shallow water depths.

Mean total phosphorus concentration for Falcon Lake is similar to that for Shoal Lake ranging between 0.015 and 0.024 mg/L with an overall average of 0.019 mg/L for the entire lake. Apart from a section of the lake about 1 km from the southwestern corner, phosphorus concentration generally decreases slightly from the southwestern to the northeastern portion of the lake.

Total phosphorus concentrations are lower in High Lake compared with those of Shoal and Falcon lakes. The concentrations range from 0.009 to 0.018 mg/L with an average of about 0.015 mg/L. However, High Lake appears to be deeper and may have increasing phosphorus concentration with depth and may exhibit anoxic conditions in deep sections of the

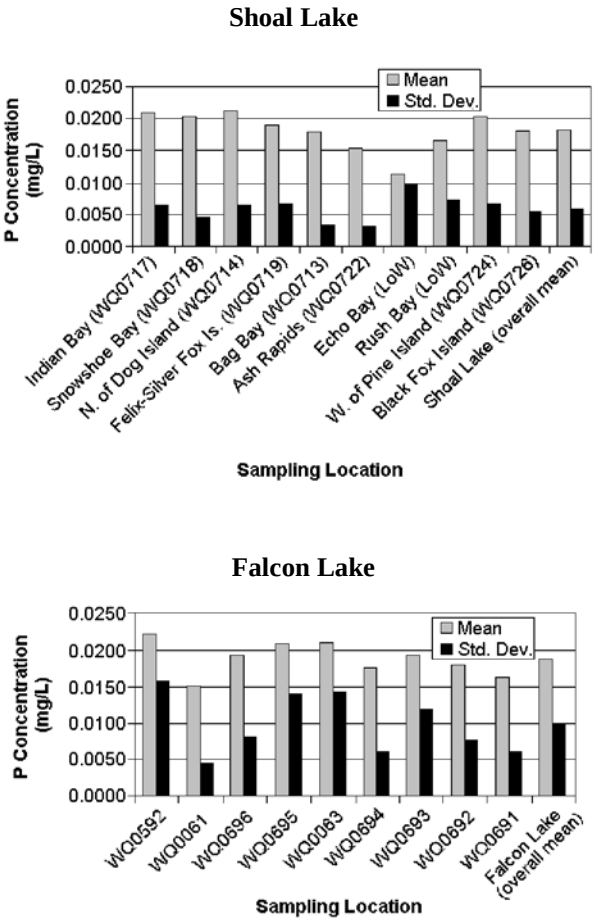


Figure 2.2. Spatial variation of total phosphorus (P) concentrations in Shoal and Falcon lakes (*adapted from* TetrES report, June 2000).

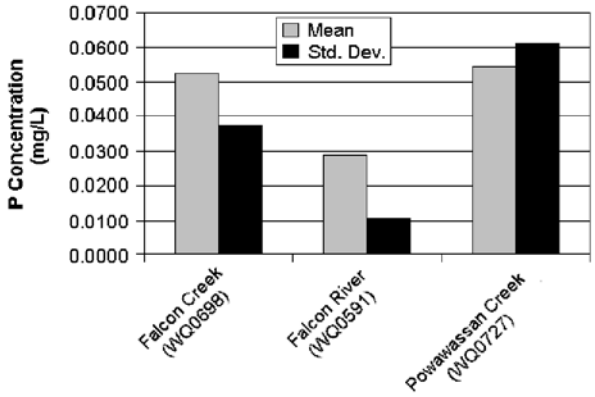


Figure 2.3. Total phosphorus (P) concentrations in tributary streams (*adapted from* TetrES report, June 2000).

lake, while Shoal and Falcon lakes do not do not generally show such conditions".

2.2.8.2 CHLOROPHYLL "a" (SEE FIGURE 2.4)

"Mean summer chlorophyll "a" concentrations across Shoal Lake typically range between 3 and 5 μg/L (micrograms per litre or parts per billion), with an overall average of approximately 4 μg/L for the entire lake. The corresponding range for Falcon Lake is 2-4 μg/L with an average level of about 3 μg/L. For both Shoal and Falcon lakes, mean chlorophyll "a" concentrations follow the same spatial trend as mean total phosphorus concentrations, except at Snowshoe Bay in Shoal Lake and the northwestern corner of Falcon Lake that both show higher chlorophyll "a" concentrations when the average phosphorus concentrations are not correspondingly high".

2.2.8.3 WATER CLARITY AND COLOUR

"Water clarity is generally high for the entire Shoal Lake (mean Secchi depth of 4.0 m), but low for Snowshoe Bay (mean Secchi depth of 2.1 m). Snowshoe Bay is shallow (<2.5 m in depth in most locations), therefore the lower depth was mainly due to physical depth limitations. Average true colour for Snowshoe Bay is 15 TCUs (total colour units), which is about three times the entire Shoal Lake average of 5 TCUs, indicating that dissolved organic carbon inflow from the Falcon River is a major contributor to water colour in the Bay.

Data for Falcon Lake indicate an average clarity of about 3.9 m Secchi depth. The slightly lower clarity of Falcon Lake may also be due to dissolved organic substances since the true colour data for the lake (mean of 12 TCUs) was slightly more than double the true colour (5 TCUs) for Shoal Lake".

2.2.8.4 PHOSPHORUS LOADING

"Nutrient inputs from natural sources, i.e. from surface runoff and atmospheric deposition are major sources of phosphorus loading. Both contribute approximately equal amounts of phosphorus into lakes in the Shoal Lake watershed. Phosphorus was generally determined to be the limiting nutrient for lakes within the watershed.

For Falcon Lake, development around the lake contributes 26% of the phosphorus loading (20% from septic fields and 6% from lagoon discharges). This is slightly less than that contributed by each of the natural sources (43% for runoff and 31% for atmospheric deposition)".

For the main body of Shoal Lake and for High Lake, development was found to contribute relatively little or no phosphorus (3% and 0% respectively). In Snowshoe Bay and Indian Bay, current phosphorus contributions from development were found to be slightly higher at about 5% of total input. The smaller volume and more restricted water exchange of these and other embayments naturally make them more sensitive to the influences of local development. Figure 2.5 illustrates the contributions of development, runoff and atmospheric inputs of phosphorus and nitrogen to the total loading in each of the three lakes".

2.2.8.5 NITROGEN LOADING

While phosphorus is considered to be the limiting nutrient for algal growth in watershed lakes, nitrogen inputs may also play a role in determining algal species diversity and abundance. Figure 2.6 indicates the contributions of natural and development-related sources to total nitrogen loading in the three lakes.

2.2.9 Trophic Status and Water Use

The Shoal Lake watershed encompasses the transition from the rock outcrops and rugged topography of the Canadian Shield to the mixed soils and flatter topography more typical of the Eastern Prairies. It can be expected, therefore, that watershed lakes will be naturally more nutrient-rich than similarly developed lakes located entirely on the Shield to the east and north, and more nutrient-poor than prairie lakes lying to the west. This trophic character serves to define such things as the species and abundance of fish and other aquatic life that will be present, and to set some conditions around the suitability for other water uses. Useful systems for categorizing individual lakes by their nutrient-enrichment characteristics have been developed by lake researchers and by a number of organizations interested in environmental management. One such system in widespread use is that developed by the Organization for Economic Cooperation and Development (OECD)[58].

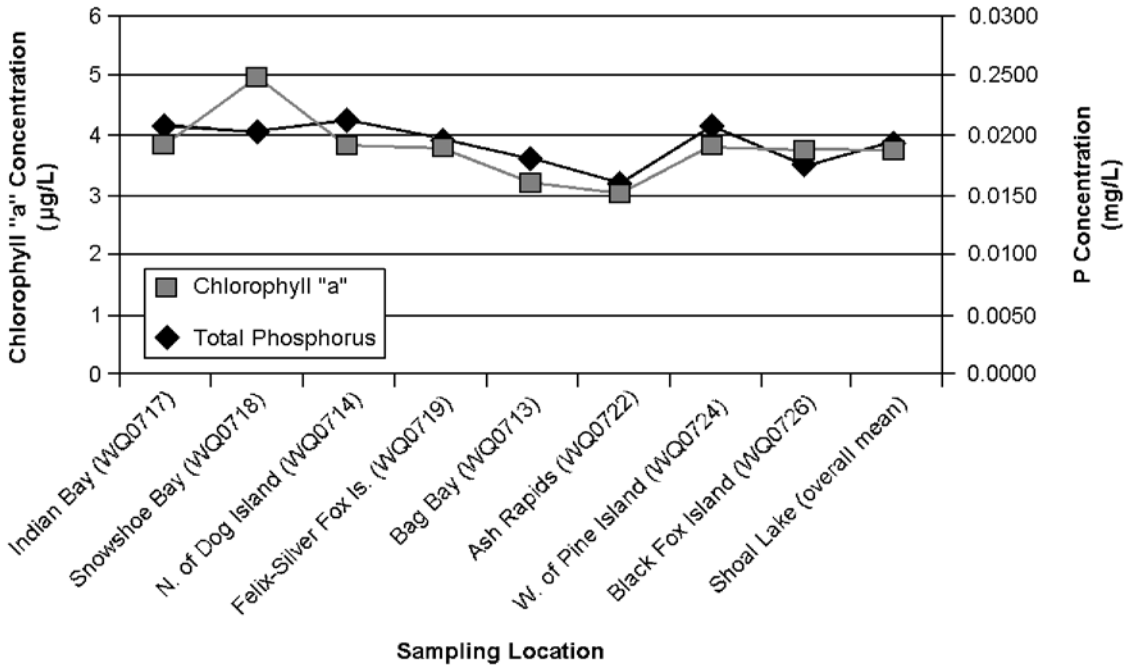
As shown in Table 2.2, all watershed lakes and their embayments, with the possible exceptions of High Lake and Snowshoe Bay, fall near the lower limits of the mesotrophic or moderately enriched classification as used by OECD. While only limited water quality data exist for High Lake, available data supported by verbal descriptions of the lake's current condition suggest that it is more oligotrophic in character. Snowshoe Bay, on the other hand, exhibits abundant macrophyte (rooted aquatic weed) growth more characteristic of eutrophic conditions. Not unexpectedly, the waters of the Falcon River and Powawassan Creek have also been found to be rich in nutrients and to exhibit high colour attributable to naturally occurring wetland drainage.

2.2.10 Concluding Observations on Current Water Quality

The waters of Shoal Lake, Falcon Lake and High Lake are of a quality that meets provincial and national ambient water quality objectives in most locations and at most times. As such these lakes are well suited to supporting a wide variety of uses.

Nearshore and embayment areas may occasionally be impacted by localized pollution sources resulting in limited exceedence of some objectives, e.g. bacteria, but ongoing monitoring suggests that this is not generally a concern at this time.

Shoal Lake



Falcon Lake

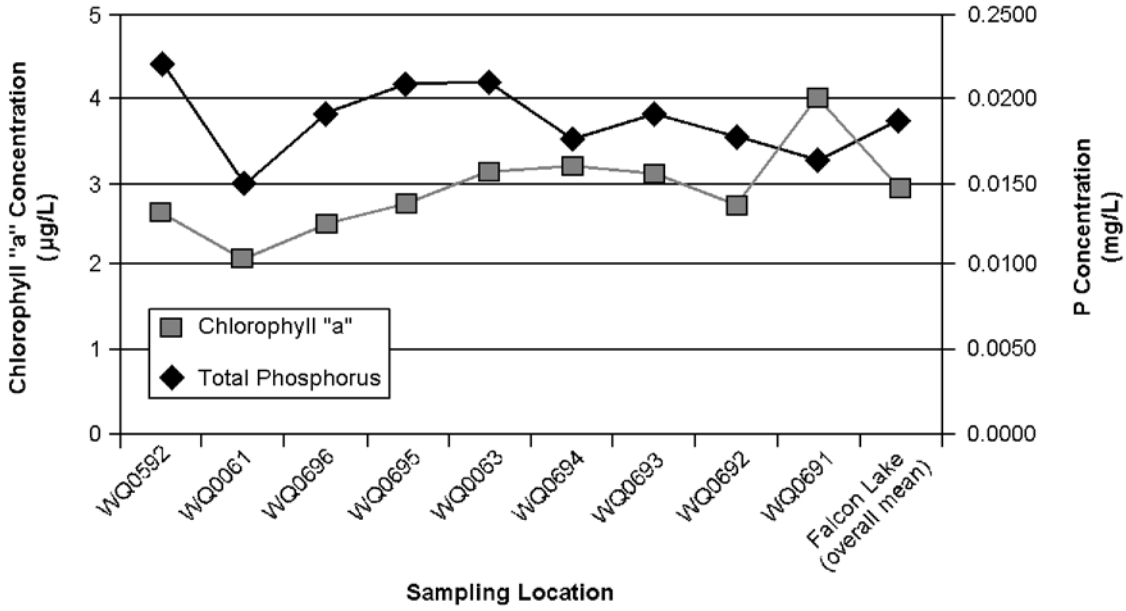


Figure 2.4. Relationship of mean chlorophyll “a” to total phosphorus (P) in Shoal and Falcon lakes (*adapted from* TetrES report, June 2000).

Table 2.2. Trophic status characterization of watershed lakes using OECD trophic classification system.

Trophic Status	Mean Total Phosphorus (μg/L)	Mean Chlorophyll "a" (mg/m^3)	Maximum Chlorophyll "a" (mg/m^3)	Mean Secchi Depth (m)	Minimum Secchi depth (m)	Limnological and Water Use Characterization
Ultra-oligotrophic	≤ 4.0	≤ 1.0	≤ 2.5	≥ 12.0	≥ 6.0	
Oligotrophic	≤ 10.0	≤ 2.5	≤ 8.0	≥ 6.0	≥ 3.0	• Low productivity • Low biomass • Low greens and/or blue-greens • High bottom oxygen • Little impairment of multi-purpose use
Mesotrophic	10-35	2.5-8	8-25	3-6	1.5-3	• Medium productivity • Medium biomass • Variable greens / blue-greens • Variable bottom oxygen • Variable impairment of multi-purpose use
Eutrophic	35-100	8-25	25-75	1.5-3	0.7-1.5	• High productivity • High biomass • High greens / blue-greens • Low bottom oxygen • Great impairment of multi-purpose use
Hypertrophic	≥ 100	≥ 25	≥ 75	≤ 1.5	≤ 0.7	

Comparative Values for Watershed Area Lakes and Embayments

Shoal Lake	18	3.7		4.0		
-Indian Bay	21	3.8		3.5		
-Snowshoe Bay	20.5	5.0		2.1		
-Ash Rapids	15	3.0				
Falcon Lake	19	3		3.9		
High Lake	13	-		-		
Crowduck Lake*	23	-		-		
*Not part of the Shoal Lake watershed, i.e. discharges to Rush Bay on Lake of the Woods.						

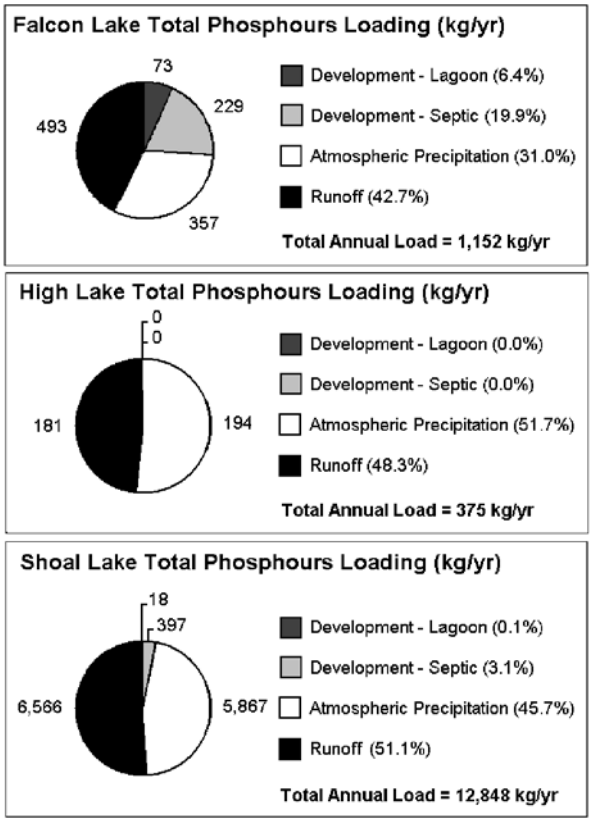


Figure 2.5. Comparison of total phosphorus sources and loadings in Falcon, High and Shoal lakes (*adapted from* TetrES report, June 2000).

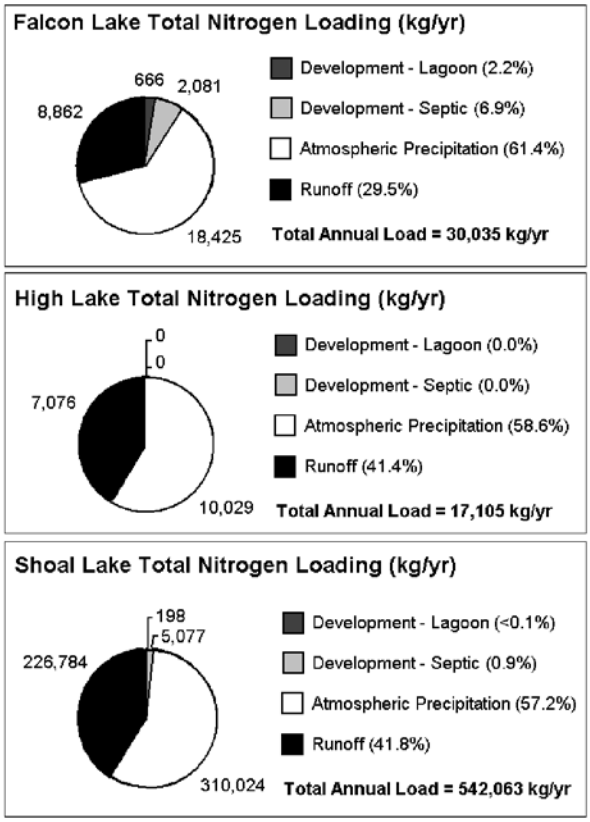


Figure 2.6. Comparison of total nitrogen sources and loadings in Falcon, High and Shoal lakes (*adapted from* TetrES report, June 2000).

Based on the available evidence, it also appears that water quality of Shoal Lake, most notably its trophic status, may not have changed significantly over the past century. Field observations made during the search for a new source of municipal water supply for the City of Winnipeg, documented similar algal growth considerations to those present today. This is not to suggest that some increase in algal abundance and/or changes in species composition have not progressively occurred in certain areas, including Snowshoe Bay and, to a lesser extent, Indian Bay. The large nutrient contribution (>95%) from wetland and atmospheric sources compared to inputs from development-related sources suggests, however, these changes may be quite close to what could have been expected from natural inputs alone.

2.3 WATER LEVELS AND WATER BALANCE

2.3.1 Review of Background Data

Shoal Lake water levels have been continuously recorded since 1919 via a gauge located at the Winnipeg water intake. Figure 2.7a shows a plot of monthly average water levels recorded over the period 1962 to 1999[59]. A study completed on behalf of the City indicates that water levels at the intake location are not significantly impacted by wind setup and should be reasonably reflective of the lake-wide average.

The occurrence of low-water levels on Shoal Lake can negatively impact on the gravity flow potential at the water intake[60]. A water level in excess of 322.40 m above datum is necessary to maintain a gravity flow of 386 million litres per day (ML/d), the full-flow capacity of the existing aqueduct.

The historic lowest level of 321.9 m was recorded in February 1925 and again in February 1931[61]. Low levels, at or below 322.0 m, occurred in 1925, 1931, 1940, 1973, 1977, 1981 and 1988. Low levels often persisted for several months with the longest periods of sustained low levels being recorded over a 30 month period October 1929 to March 1932, and a 26 month period March 1939 to May 1941. Notwithstanding these occasional periods of low levels, the City of Winnipeg has been able to meet water demands exclusively through gravity flow in all years except 1988.

Prior to construction of the Norman Dam at Kenora, Shoal Lake consistently discharged into Lake of the Woods. Seasonal and shorter-term flow reversals at Ash Rapids are a relatively common occurrence today as a result of the combined factors of Rainy River inflows to Lake of the Woods, flow releases at the Norman Dam, local precipitation/runoff in the Shoal Lake watershed, and the Winnipeg water withdrawal.

Figure 2.7b illustrates the typical seasonal variation of water levels in both Shoal Lake (Indian Bay) and Lake of the Woods. From May to November, water levels in Shoal Lake closely track those of Lake of the Woods[62]. Lower levels in both lakes generally commence in the early-winter period (January-February) and end in early spring (late April or early May). During this period, water levels in Shoal Lake are on average about 15 to 25 cm higher than those found in Lake of the Woods. The Lake of the Woods Control Board operating rules are structured to build and maintain higher levels through late spring and summer to benefit recreation interests and to build storage that is subsequently used for increased power generation through the fall and winter months.

Water movement and circulation patterns within Shoal Lake may be important in determining spatial and temporal water quality variation in response to pollutant inputs. They may also influence fish movement and spawning behaviour. Water circulation patterns are a function of the location, magnitude and seasonality of inflows and outflows; the effects of winds; the bathymetry and shape of the lake; and the presence of islands and other obstructions.

Given the lake's relatively large size in proportion to the overall area of the watershed and the surrounding topography, most runoff/drainage inflows to Shoal Lake are

Approach to Lower Ash Rapids looking northeast toward Lake of the Woods. Taken June 18, 1991, this photo shows flow entering Shoal Lake from Lake of the Woods.

Approach to Upper Ash Rapids looking east toward Lake of the Woods. Photo taken June 18, 1991.

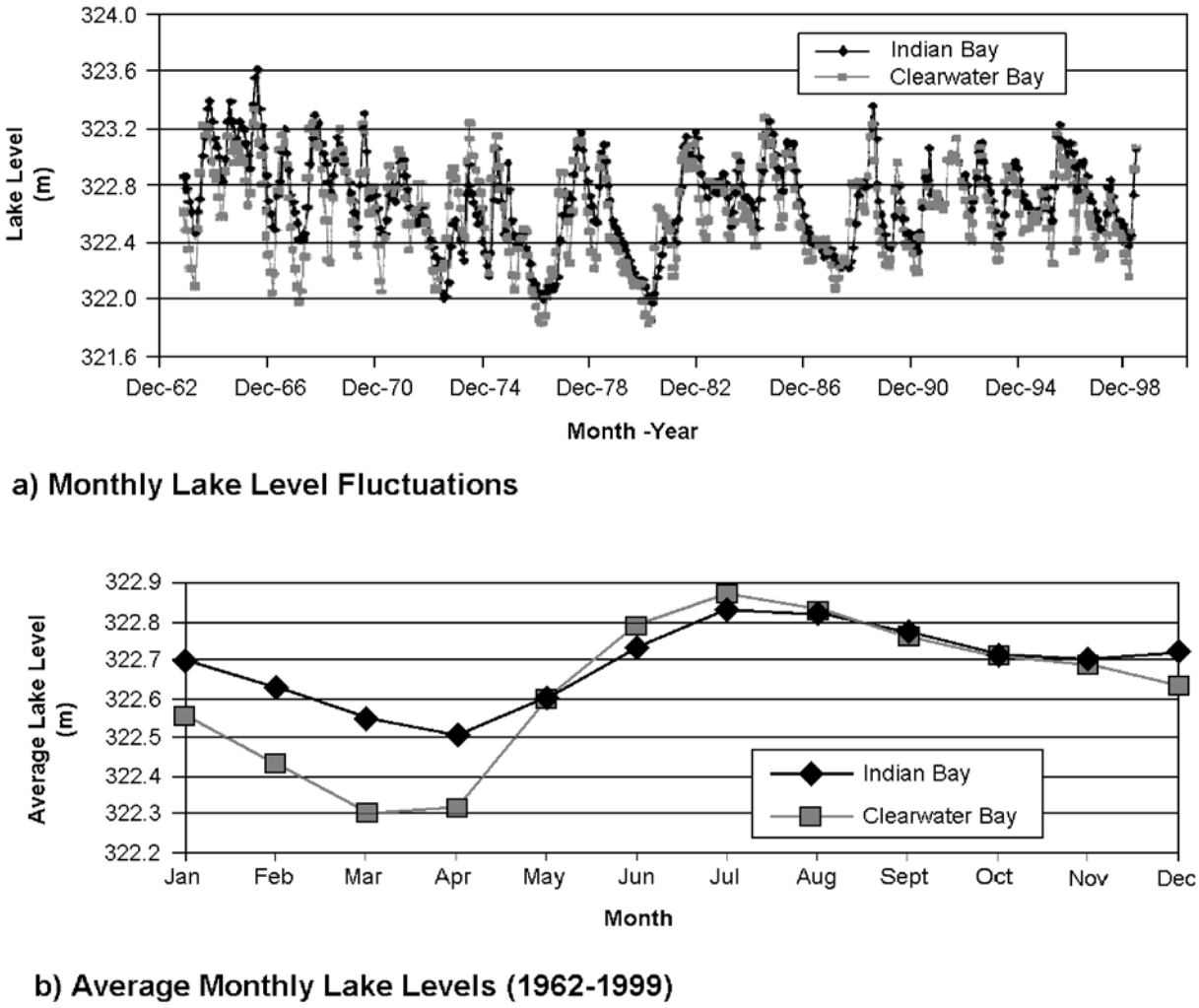


Figure 2.7. Shoal Lake (represented by Indian Bay) and Lake of the Woods (Clearwater Bay) water levels, 1962 to 1999 (*adapted from* TetrES report, June 2000).

not well defined. Tributary watercourses are essentially limited to the Falcon River and Powawassan Creek. The former receives inflows from Falcon and High lakes and discharges into Snowshoe Bay, while the latter drains the extensive lowlands on the western side of the watershed and then outlets to the southwest corner of the lake.

2.3.2 TetrES Study

The Working Group had its Water Study consultants further examine water budgets and water balance and variability within the watershed with an emphasis on Shoal Lake[63]. Seasonal and longer-term changes in the lake's water balance were considered to be of likely significance to water supply, fisheries and other water-level and flow-dependent uses. The study was intended to:

- identify and explore the inflow and outflow components of the Shoal Lake water balance;
- determine how the influence of individual components, on lake levels and exchanges, changes in relation to natural factors, i.e. weather and climate variability and human factors, i.e. management of Lake of the Woods inflows and outflows and variation in the magnitude of the Winnipeg water withdrawal; and
- develop knowledge that would assist in calibrating and applying predictive water quality models.

A review of the study findings is provided in Chapter 7, section 7.2.2.

2.4 FISHERIES

Shoal Lake and Falcon Lake support relatively diverse fish populations, which include walleye, northern pike, whitefish, smallmouth and largemouth bass, and yellow perch. Muskellunge and black crappie have localized

distribution in Shoal Lake. Members of the local First Nations' communities report the recent presence of smelt in Shoal Lake as well as the presence of sturgeon in the Snowshoe Bay area.

Ontario Ministry of Natural Resources (OMNR) reports that the Shoal Lake walleye population is "slowly rebuilding", from its lowest levels of the early 1980s, in response to closure of the fishery for this species and banning of gill nets in 1983. Following several years of missing year-classes, recent monitoring indicates that successful reproduction has occurred annually since 1992. Prior to that time, OMNR monitoring suggests that only the 1983 and 1987 year-classes had been produced after 1979[64].

Studies by OMNR have attempted to determine the primary spawning sites for walleye in Shoal Lake. Numerous locations have been looked at, including the Falcon River, Falcon Bay, the diked area separating Falcon Bay from Indian Bay, and several open-water locations. Based on this work, Ministry staff believe that Falcon River and Falcon Bay are significant spawning locations. Wide year-to-year variability has been reported in walleye spawning activity at the mouth of the Falcon River. Walleye spawning is believed to occur at water temperatures between 6_C and 11_C. Depending on the onset of spring snowmelt, these temperatures are usually reached somewhere between mid April and mid May on Shoal Lake[65].

Some enhancement of spawning grounds at the mouth of the Falcon River and adjacent to the dike was undertaken several years ago. The effectiveness of these improvements has not been established and additional analysis is needed to determine whether further enhancement efforts are warranted[66].

OMNR surveys indicate that northern pike and whitefish populations in Shoal Lake are similarly recovering from lower levels observed prior to 1983. The number of fish taken in index netting has "doubled during the period from 1980-96" and "greater stability" appears to have returned[67].

Smallmouth bass population numbers in Shoal Lake have also increased in recent years and there is evidence of increased angling interest focused on larger trophy-sized fish. In 1996, a catch and release regulation for bass came into effect on Lake of the Woods. At the request of the First Nations communities it was extended to include Shoal Lake. In this regard, the Iskatewizaagegan #39 community has held a number of successful catch and release bass tournaments in recent years. Largemouth bass have only recently been found in Shoal Lake and numbers are less significant than those of smallmouth bass.

Commercial catch records indicate a significant decline in whitefish stocks in the period 1958 to 1983 followed by increases in recent years.

Yellow perch are abundant in the lake but are considered a 'secondary species' within both the commercial and angling catch, due to a high incidence of yellow grub in their flesh.

OMNR reports a decline in muskellunge populations in recent years that parallels the increase in northern pike numbers.

The Ontario Ministry of the Environment has assessed contaminant levels in walleye, northern pike and whitefish from Shoal Lake, and in lake trout and northern pike from High Lake. Fish from both lakes were tested for mercury and other metals. In addition, the Shoal Lake fish were tested for levels of PCBs, mirex and several pesticides[68]. Significant results are summarized below.

Current human consumption restrictions on Shoal Lake fish apply to northern pike larger than 75 cm (30 inches). Testing of walleye from the lake indicate that fish larger than 65 cm (26 inches) would also be subject to restricted consumption. In High Lake, restrictions apply to both lake trout and northern pike longer than 55 cm (22 inches). Based on Health Canada consumption guidelines, persons are advised not to consume more than 4 meals per month of these fish. For an average size adult, a meal is considered to be 227 gm (8 ounces).

Consumption restrictions in these larger-size fish are common to many northern Ontario lakes. A comparison of survey results indicates that Shoal and High Lake fish have lower contaminant levels than fish from other lakes and rivers within the Rainy River–Lake of the Woods–Winnipeg River basin.

2.5 FOREST RESOURCES

The Shoal Lake watershed falls within the Boreal Forest Region of northwestern Ontario and southeastern Manitoba. The area is characterized by generally warmer conditions than those found in areas to the east and north[69]. This contributes to a somewhat greater occurrence of jack pine and a lesser abundance of white birch and balsam fir than found in other parts of the boreal forest. Forest productivity in the watershed is highly variable in direct relation to soil particle size, drainage and overburden thickness, i.e. smaller particle-size soils (silts and clays) having good drainage and depths of more than one metre are the most productive.

The small size of the watershed land base, together with extensive wetlands topography in the western and southwestern portions of the watershed, somewhat limits the extent of forest cover. Mixtures of jack pine, red pine, aspen, black and white spruce, and balsam fir are, however, common in significant portions of the watershed.

The eastern (Ontario) side of the watershed was originally logged for spruce pulpwood to supply the paper mill built in Kenora in 1926. Pine sawlogs were also harvested over the past century to sustain sawmills in the area. The southern half of the Western Peninsula, south of Portage Bay, is very flat and supports a large concentration of mature poplar stands interspersed with black spruce swamps and treed muskeg. The larger-diameter black spruce, which are found along the swamp fringes, were harvested for pulpwood. These fringe-area cutovers now support advanced regeneration to black spruce and tamarack[70].

The northern portion of the Western Peninsula, north of Portage Bay, and the area southwest of Echo Bay is ex-

tremely rugged and presently supports a large concentration of balsam fir stands along with a minor component of poplar, pine and cedar stands. Forest stands in the High Lake area consist of mature poplar and a range of mature jack pine and spruce growing stock[71].

Within the Manitoba portion of the watershed, forest cover is mixed in nature. Stands of jack pine, aspen, white birch and white spruce are found on elevated sites, while poorly drained sites, which include areas of shallow and deep peat deposits, are dominated by stands of black spruce and tamarack[72]. As in Ontario, forest harvesting has focused on pulp and to a smaller extent on sawlogs, with the majority of harvestable timber coming from black spruce and aspen. Most harvest activities occur during the winter months.

2.6 WILDLIFE

The Shoal Lake watershed is home to a diverse wildlife population consisting of white-tailed deer, moose, black bear, fox, beaver, marten and other fur bearers. Birds common to the area include bald eagle, white pelican, cormorant, red-tailed hawk, ruffed grouse, Canada goose, ducks, loons and grebes[73,74].

The extensive wetlands associated with the Falcon River are important habitat and nesting areas for waterfowl. The area is also an important feeding area for the bald eagle, which takes advantage of the spring spawning runs of white sucker and other species. Some wetland/peat bog areas located in the western portion of the watershed in Manitoba also may include nesting sites for sandhill crane and other bird species associated with wetland habitats[75]. From an outdoor-recreation tourism perspective, these wetlands hold significant potential for wildlife viewing[76,77].

2.7 MINERAL RESOURCES

Because of the discovery of gold-bearing ore deposits in the late 1800s and subsequent production activities that lasted until 1936, the Shoal Lake area is one of the more studied mineral regions of northwestern Ontario. The occurrence of "greenstone belts" in the area mark it as having the "highest potential" to host mineral deposits and, by extension, mineable deposits of gold and base metals[78].

Within the overall watershed, the northern part of the Shoal Lake area and the High Lake area have been the subject of detailed geologic mapping with a focus on gold deposits. Based on this mapping, the area mineralization has been described as follows[79]:

> "Mineralization is largely confined to fractures in the porphyritic granodiorite and to shears in both the adjacent basalt and the overlying conglomerate. Molybendite and chalcopyrite, in trace amounts, are widely distributed in the porphyritic granodiorite; they are more highly concentrated, with quartz, in shear zones adjacent to east-trending faults, and are accompanied by minor gold. Gold is also associated with pyrite, chalcopyrite and pyrrhotite in shears at or near the contact with basalt, and in quartz lenses and in irregular masses in porphyry, basalt or conglomerate where there are complex areas of competency contrast. Pedora (1976) has suggested that mineralization is arranged about the southern, non-porphyritic granodiorite phase in a zonal pattern, and that the mineralizing fluid may have originated from the southern phase.
>
> Most gold occurrences are in the tholeiitic sequence. Those associated with the east-southeast faults typically consist of a chloritic shear zone within which a felsite dike occurs. Silicification, commonly in the form of quartz veins or lenses, is accompanied by pyrite, traces of base-metal sulphides, and rare visible gold. Some gold was produced from fracture zones of this type at the Olympia and Cedar Island Mines.
>
> South-southeast fractures developed near the margin of the Canoe Lake stock following its intrusion. At the Mikado Mine, gold is associated with quartz veins and stringers in such a fracture which crosses basalt and a thick dike of quartz diorite. Pyrite, chalcopyrite, tetradynite and bismuthinite also occur in the quartz.
>
> Fault and shear zones parallel to volcanic stratigraphy are mostly narrow and quartz veining within them is similarly narrow and discontinuous. The fault at the Duport Mine is much wider, and gold occurs with quartz in zones where competency contrast accompanied by brittle fracturing resulted in greater permeability (Smith 1984). There is a strong association of gold with arsenopyrite, but it also occurs as free grains associated with pyrrhotite, pyrite and chalcopyrite."

Silver is also present in ore deposits at Shoal Lake and minor quantities of it were produced as an adjunct to gold mining activity over the 40 year period from 1896 to 1936[80].

Other mineral commodities known to be present in the Shoal Lake–High Lake area include nickel, cobalt, zinc, antimony, asbestos and lead. Industrial mineral commodities including building and ornamental stone, soapstone, flagstone and aggregate may be present but have not yet been identified[81].

3.0 Competing Interests – The Case for a Watershed Management Plan

3.1 INTRODUCTION

There are both shared and conflicting interests among the resident communities, landowners, resource users and governments who have a stake in the future of the Shoal Lake watershed. Many of these interests revolve around water and water-related resources and uses. These include:

- Resident and non-resident First Nations communities of Treaty 3 who have treaty and Aboriginal rights in the area and who depend on watershed resources for physical, cultural and spiritual necessities of life;
- 635,000 Winnipeg area residents and numerous commercial, industrial and institutional facilities served by the City of Winnipeg water supply;
- Some 1000 cottage owners on Shoal and Falcon lakes;
- Several hundreds of campers and recreational day users;
- Tourist resort operators located on Shoal and Falcon lakes;
- Mining companies, mining-lands holders and investors with expectations of financial returns from the development of mineral and aggregate resources;
- Forestry and other resource-based industries with property and resource harvesting rights in the watershed;
- Non-watershed resident anglers and hunters;
- The communities, residents, hydropower producers, tourist resort operators and other stakeholders on the broader Lake of the Woods system who may be impacted by actions taken within the Shoal Lake watershed; and
- The governments of Ontario, Manitoba and Canada, and associated ministries and departments, with mandates and responsibilities over land use and natural resources.

The following sections provide an overview of these interests as well as of issues that have been raised regarding the opportunities and constraints associated with both existing and future resources development and utilization in the watershed.

3.2 PROTECTING ECOLOGICAL INTEGRITY

The Shoal Lake ecosystem has changed over the years from its predevelopment state in response to actions and activities such as:

- introduction of lake-level regulation on Lake of the Woods;
- opening up of Ash Rapids;
- timber harvesting;
- mineral exploration and mining;
- commercial and sport fishing; and
- naturally occurring processes including weathering and climate change.

Ecological change has occurred, and is likely still occurring, at varying rates and with varying impacts on the ecosystem, on watershed communities and on other resource uses. Some changes, such as a naturally induced shift toward increased trophic conditions within watershed lakes, or altered forest and vegetation types and productivity brought on by climate change, proceed over long periods of time. Where such change occurs gradually over many decades or centuries, an ecosystem typically adjusts to a new equilibrium and the change in average conditions is often difficult to measure against the inherent short-term, or year-to-year, variations. Watershed communities, resource uses and ecological functions also tend to adapt to gradual ecosystem change without any dramatic or sudden adverse impacts being imposed on them.

The protection of ecological integrity is a goal of most resources planning and management agencies and activities. In the context of the Shoal Lake watershed, this would imply that the extent and type of resource development and human activity is controlled in a manner that precludes adverse consequences for aquatic and terrestrial bio-diversity. This would be accomplished through the protection of existing ecological functions such as system hydrology and hydraulics, nutrient cycles, contaminant transfer and transformation, and food chain relationships and processes. It also involves the safeguarding of essential human, plant and animal habitats both in terms of amount and quality.

3.3 BUILDING HEALTHY AND VIABLE FIRST NATIONS COMMUNITIES

The First Nations communities of Shoal Lake have a large stake and significant interests in the future of the Shoal Lake watershed. It is their ancestral home; a focal point of cultural, spiritual and family life; and a necessary source of livelihood. Through many generations, the lands and waters of the watershed have been a primary source of food and other necessities of life and have provided an important economic base. Similar to the experiences of many other Aboriginal peoples[82], the Shoal Lake First Nations consider that the largely non-native development and use of watershed lands and natural resources has resulted in a disproportionate distribution of benefits, and in a deterioration of environmental quality, community health and their way of life.

The realities of community growth, changing values and lifestyles, and decreased availability of and access to resources, have caused the communities and band members to look beyond the watershed for additional opportunities and support. Nevertheless, they desire to solidify their connections to the watershed and to more fully benefit from the natural resources base. They look forward to being initiators of and active participants in new development and to use this development as a source of sustained economic independence. At the same time, they wish to ensure that development will not adversely impact on community health and wellbeing.

The Shoal Lake First Nations, like other communities of Treaty 3, also aspire to a greater role for their governments and band members in the ongoing planning and management of resource development and use in the watershed. Such aspirations are consistent with recent federal government commitments in "Gathering Strength – Canada's Aboriginal Action Plan"[83]. The Action Plan commits the federal government to "work with First Nations, provinces and territories to strengthen the co-management process, and to provide increased (First Nation) access to land and resources".

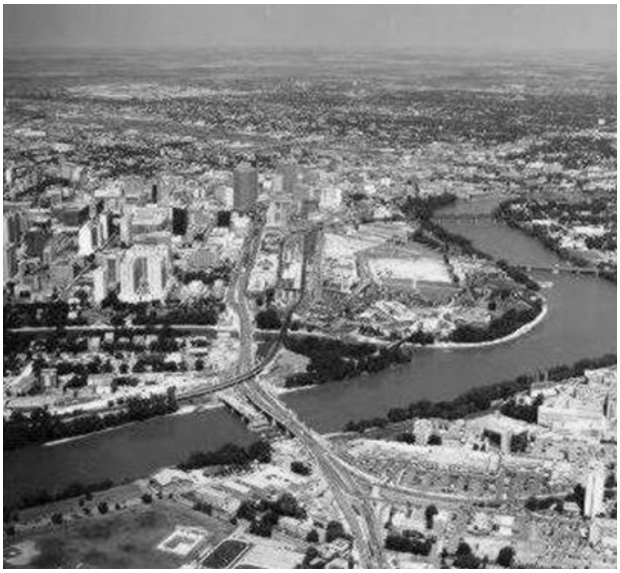
3.4 SAFEGUARDING WINNIPEG'S WATER SUPPLY

Measures necessary to ensure the protection of the quality of the Shoal Lake water supply have long been a priority of the Province of Manitoba and of the City of Winnipeg.

As an integral part of the water intake and aqueduct construction project, the Falcon River outlet was permanently rerouted from Indian Bay to Snowshoe Bay. This was done to reduce the risk of the highly coloured river waters from reaching the shore-based intake. Since that time, the province and the city have continued to express concern over planned developments in the watershed that they felt would adversely impact on drinking water quality.

The city views pollution prevention at source as an important component in a multi-barrier approach to drinking water protection[84]. The multi-barrier approach is widely supported by other municipalities and by the American Water Works Association, which generally represents the North American water supply industry. In this context, the city and the province negotiated a development agreement with Shoal Lake #40 First Nation to ensure protection of water quality in the Indian Bay area. Within the 1989 *Tripartite Agreement*, the First Nation receives financial and other considerations in exchange for limiting certain types of development on Band #40 Reserve lands[85].

A 1992 water supply planning study undertaken for the City of Winnipeg recommended a long-term supply and treatment plan that included immediate implementation of a water conservation program[86]. Other recommendations included the phased development of a groundwater source option and construction of a supplemental Shoal Lake supply to meet projected demands in excess of the 85



City of Winnipeg skyline - Norwood and Main Street bridges, looking north.

City of Winnipeg - a downtown view of Portage Avenue.

million gallons per day (MG/d) or 386 million litres per day (ML/d) capacity of the aqueduct. The water conservation program, which has been underway for a number of years, includes leakage detection and correction, municipally subsidized residential water efficiency retrofit kits, commercial-industrial water efficiency audits, lawn-watering restrictions, and public education and outreach initiatives. Conservation initiatives have reduced total municipal water use and per capita use by 21% and 23% respectively since 1990 (see Figure 1.6).

The City of Winnipeg is currently committed to two major capital improvement projects including aqueduct rehabilitation and construction of a new water treatment plant. The $54 million aqueduct rehabilitation project began in 1993 and is projected to be complete in 2003. Capital monies required for the aqueduct rehabilitation and treatment plant projects are being raised through water-rate increases and are being retained in reserve funds[87].

Manitoba Health, Manitoba Conservation and the City of Winnipeg have established a public awareness campaign regarding *Cryptosporidium* issues. The campaign is focused at physicians, the general public health system, and more vulnerable individuals (i.e. immuno-compromised persons), as well as at owners and operators of water utilities.

The planned provision of full water-treatment services will give the City of Winnipeg a higher level of drinking water protection and greater confidence in managing present and future variability in Shoal Lake water quality.

3.5 DEVELOPING MINERAL RESOURCES

Significant portions of the Shoal Lake watershed have been identified as having high to extremely high mineral development potential. The following factors are key considerations of the mining industry in determining whether and when to proceed with plans to develop the already identified gold and other mineral reserves and in continuing with, or initiating, active exploration for new deposits:

- current and projected mineral commodity price;
- size and grade of the ore deposit;
- location of the deposit relative to essential infrastructure such as electrical power, water and road access;
- cost of labour, materials and capital;
- cost of ensuring the deposit can be mined and closed in an environmentally acceptable manner; and
- other economic factors such as taxes and similar incentives and disincentives.

The Ontario Ministry of Northern Development and Mines reports that there are nine mineral deposits with significant mineral potential identified in the Shoal Lake–High Lake area. These include the previously referenced Duport and KPML properties (see section 1.5.4).

3.6 DEVELOPING A SUSTAINABLE SHOAL LAKE FISHERY

It is widely acknowledged that Shoal Lake has the productive potential to offer excellent fisheries opportunities for a range of species that includes walleye, smallmouth bass, northern pike, whitefish and muskellunge. The critical considerations for the future relate to issues of both fishing pressure and habitat protection.

Over the years, Shoal Lake has been intensively fished both commercially and for sport. As many as five commercial fishers were operating on the lake in the 1970s, serving both native and non-native interests. The sport fishery was composed of local cottagers, guests at Shoal Lake and Lake of the Woods resorts, and local residents of the Kenora–Keewatin area.

Several successive years of over-exploitation of the walleye fishery during the 1970s reduced the annual reproduction rates and resulted in a dramatic decline in stocks. The fishery was closed to both commercial fishing and sport fishing in 1983, and has remained closed ever since in an effort to allow the stocks to recover. First Nations' subsistence fishing for walleye still occurs.

Over-exploitation of the walleye fishery has shown how fish populations can be impacted and can result in the loss of the very resource that fishers depend on for their livelihood. Agreements need to be reached between resource regulators and users over the sustainable annual catch of walleye and other species with a view to:

- ensuring continued traditional access of First Nations to the Shoal Lake fishery;
- maximizing the economic opportunities and value obtained by the First Nations communities from the fishery;
- providing continued sport-angling opportunities to non-native fishers; and
- setting, allocating and enforcing sustainable catch limits.

First Nations subsistence fishing for walleye and lake whitefish from Shoal Lake.

Experience elsewhere has shown that a recreational fishery can produce a higher return to native and local non-native interests than a commercially focused fishery.

In 1995, consultants for the City of Winnipeg conducted an assessment to determine the extent of entrainment and impingement (i.e. numbers passing through or being caught on the intake screens) of walleye spawn, larval fish and juveniles occurring at the city's water intake site[88]. Observations were also made of impacts on whitefish, yellow perch and white sucker. Study results did indicate that small numbers of walleye were spawning in the intake channel and that spawn, larval fish and juveniles were being entrained or impinged.

Relative to the size of the lake's spawning walleye population, the losses were not felt to be "biologically significant", i.e. entrainment losses in spring 1995 were estimated to be equal to the reproductive potential of 53 spawning female walleye. Smaller losses of whitefish larvae, through entrainment, and some impingement of yellow perch on the water intake debris screens were also documented. The study authors suggested additional assessment be undertaken to account for expected year-to-year and within-year variability in spawning activity and to assess the possibility that lower than average intake volumes/velocities during the 1995 study period may have limited the number of spawning walleye present. The Shoal Lake First Nations, Ontario, Manitoba, Winnipeg and the federal Department of Fisheries and Oceans continue to discuss mitigative measures that would reduce impacts to the fishery at the intake.

Investigations of the quality and use of the Falcon Lake sport fishery were not included as part of the Shoal Lake watershed planning process. A 1999 survey by Manitoba Conservation indicates, however, that this fishery fits the definition of a high-quality sport fishery.

3.7 DEVELOPING SUSTAINABLE FORESTS

Within the Ontario portion of the watershed, the full range of forest management activities is being guided by the forest management plan (FMP) for the broader Kenora Forest Management Unit. This 20-year plan (2001-2021) provides for the creation of 5-year operating plans that will specify areas of operation, harvest, renewal, maintenance and access. A five-stage public consultation process is included.

Criteria for evaluating forest sustainability within the Kenora FMP involve measures of bio-diversity, including spatial/landscape patterns, disturbance and species diversity. They also involve determination of multiple benefits to society, from wood supply, to the recognition and protection of traditional uses, to the protection of wildlife habitat, to the maintenance of hydrologic systems and water quality.

Knowledge gained in the development of the Shoal Lake Watershed Management Plan has been factored into development of the 2001-2021 Kenora FMP.

Within the Manitoba portion of the watershed, Manitoba Conservation is responsible for timber management and sets allowable harvest levels based on annual allowable cut. The province has further initiated the application of an ecosystem-based approach to management through its long-term provincial forest plan. This coincides with the province's commitment to the principles of sustainable development and provides for greater understanding of changes to ecosystem structures and functions in the management of all provincial forests.

3.8 SUPPORTING SUSTAINABLE COTTAGING, RECREATION AND TOURISM

3.8.1 General

The Shoal Lake area is part of the broader Whiteshell and Lake of the Woods region, which is a popular recreational destination for cottagers and day users who are attracted to the scenic Canadian Shield landscape and the region's many lakes and rivers. The proximity to Winnipeg and the mid-west United States makes the region a favoured destination for seasonal users and shorter-term visitors from those areas.

Future resource-based recreation and tourism opportunities throughout the watershed will be interrelated by virtue of shared markets, and differentiated by the type of recreational experiences being offered. Expanded resource-based recreation and tourism within the watershed needs to be considered in the context of their potential to impact on broader resource values, environmental quality and other uses.

3.8.2 Shoal Lake

Existing land-use directions contained in the 1983 Ontario Ministry of Natural Resources (OMNR) Kenora District Land Use Guidelines, together with limited road access and the development controls imposed by the OMNR *Shoal Lake Restricted Area Order (Public Lands Act)*, have all contributed to relatively low levels of recreational activity on Shoal Lake[89]. Beyond new cottage development that has been proceeding at a rate of about 2 to 3% per year over the last decade, short-term recreational use is generally comprised of visitors to fishing and hunting resorts located in Shoal Lake Narrows and nearby Lake of the Woods, and of summer youth camp users.

Experience from similarly sized lakes elsewhere in Ontario suggests that the natural resources of the lake and surrounding area could offer expanded opportunities for tourism and recreation while also respecting the needs and interests of other uses. A number of resource-based and culturally based tourism initiatives are currently under consideration by the Shoal Lake First Nations communities.

3.8.3 Falcon Lake

A few years ago, Manitoba Conservation developed a draft development strategy for Falcon Lake which focused on the townsite area and identified both short- and long-term development potential and investment opportunities[90]. Subsequently, the department completed a waterfront/beach area development strategy which focused on enhancing user experience along with sustaining the environmental, historical and recreational resources of the area[91].

Public/stakeholder consultation was a key component of these initiatives. It included Open Houses in Winnipeg and Falcon Lake as well as consultation with the Falcon Lake Chamber of Commerce, the Whiteshell District Association, cottage owners, government officials and prospective investors.

The initial strategy was developed from a shared understanding that the townsite required both renewal and revitalization, that further development should not encroach on the natural environment, and that better use should be made of underutilized and unattractive open space. Among the initiatives mentioned in the study report, there was strong support for revitalization of the shopping mall, highway commercial site development, waterfront enhancement, and street-scaping within the townsite.

Other issues raised during the Falcon Lake consultations included concerns that "the lake was overcrowded" and that "the water quality has deteriorated over the years". Monitoring by Manitoba Conservation has not indicated any ongoing deterioration in water quality. Concerns were also expressed regarding sewage handling and the threshold capacity of the existing lagoon system. This issue is currently being addressed through other government studies.

A number of projects were proposed for Falcon Lake with priority given to moving forward with the following initiatives at this time:

- privatization and revitalization of the Falcon Lake shopping centre to better serve cottagers and day visitors throughout the summer months and an expanded shoulder season;
- redevelopment of the highway site including provision of a service station, a tourist information centre and associated retail facilities; and
- waterfront improvements including a boardwalk, pier, boat docking, restaurant and amenities.

3.9 PROTECTING DOWNSTREAM INTERESTS ON LAKE OF THE WOODS AND THE WINNIPEG RIVER

Two-way exchange of water between Shoal Lake and Lake of the Woods dates back to the construction of outlet controls on Lake of the Woods and the deepening of the channel at Ash Rapids. It was further influenced, some 30 years later, by the initiation of the Winnipeg water taking. The frequency and extent of flow in either direction changes seasonally and year to year, primarily as a function of Lake of the Woods level regulation, but also in response to changing precipitation-runoff-evaporation patterns in the Shoal Lake watershed.

Provisions for the protection of waterpower interests in the Kenora area and for restitution or compensation, by Winnipeg, of any identified impacts on those and other interests are contained in the Ontario Order in Council (1913) authorizing the Winnipeg water taking. The current (2000) drinking water withdrawal by the city is equivalent to about 0.5% of the annual average outflow, and about 2.6% of the extreme-low outflow, from Lake of the Woods to the Winnipeg River as reported by the Lake of the Woods Control Board (LWCB).

Potential benefits and disbenefits of structural modification (e.g. a fixed or variable-height weir) to control the passage of water, fish and watercraft through Ash Rapids continue to be a subject of periodic discussion and debate among watershed stakeholders.

Arguments for restricting boat passage through Ash Rapids have been put forward by some First Nations community members because of concerns that access by fishing parties originating from Lake of the Woods resorts is adversely impacting upon the sustainability of the Shoal Lake fishery. On the opposite side, the Winnipeg water supply cannot be sustainably supported without the continued authorized access to Lake of the Woods, which supplements the naturally occurring Shoal Lake supply in periods of average and drier than average climatic conditions (see Chapter 7). Any measures that would limit and control the existing flow of water through Ash Rapids would clearly require the careful assessment of interests, risks, costs and benefits.

PART II

COMING TOGETHER AND WORKING TOGETHER

4.0 Evolving Interest in Watershed Planning

4.1 EARLY INTERACTIONS

Government to government interaction around the allocation, development and management of the resources of the Shoal Lake watershed has been ongoing for more than a century. Most discussion, debate and decision-making has, however, been event-related and without benefit of a sufficient and shared understanding of watershed resources and of the full spectrum of current and future needs, interests, opportunities and limitations relating to the use and management of those resources.

The signing of the North-West Angle Treaty 3 in 1873 led to the establishment of Crown land ownership in the area together with the confirmation of the rights of the Shoal Lake and other Treaty 3 First Nations to continue their traditional uses of watershed lands and resources. Several years subsequent to the treaty signing, several parcels of federal reserve lands were set aside for the exclusive habitation and use of the Shoal Lake First Nations.

Canadian, United States and provincial governments entered into agreements authorizing the damming of the Lake of the Woods outlet in the late 1800s and, subsequently, setting the rules for the ongoing sharing and management of levels and flows through the broader Rainy River–Lake of the Woods–Winnipeg River drainage basin.

Canadian, United States, and provincial governments, along with the International Joint Commission (IJC) were again brought together in 1914 to consider and approve the proposed diversion of waters from Shoal Lake and Lake of the Woods for the City of Winnipeg water supply.

4.2 INCREASING ISSUES AND CONCERNS

Issues related to whether and how land and resource development within the watershed might impact on Shoal Lake water quality have received periodic attention of governments and stakeholders over the years as specific development proposals, e.g. the Duport mine, have come forward. These concerns have become the subject of ever-increasing stakeholder and inter-jurisdictional debate and discussion in the past 15 to 20 years. Central to many of these discussions has been the question of how to protect water quality and drinking water supplies serving the resident First Nations communities and the City of Winnipeg while recognizing ongoing pressures for community and resource development.

A variety of initiatives and actions have been taken to address water and other resource-use related issues and interests as they have arisen. Principal among these have been:

- The 1978 *Shoal Lake Restricted Area Order* implemented by the Ontario Ministry of Natural Resources (OMNR) under the *Public Lands Act* as a way of regulating expanding development on patented lands in the northern and eastern portions of the watershed.
- The 1989 *Tripartite Agreement* involving Shoal Lake #40 First Nation, Manitoba and Winnipeg, which provided financial and other incentives to the community in exchange for development controls on Shoal Lake #40 lands adjacent to Indian Bay and Snowshoe Bay.
- A proposal by Consolidated Professor Mines, in the late 1980s, to develop a gold mine at Stevens Island on Shoal Lake. Concerns over potential water quality impacts led the Manitoba government to request that Ontario designate the project under the *Environmental Assessment Act*. Ultimately, the company did not proceed with the project and the mining interests were sold to Royal Oak Mines Ltd.
- A 1981 memorandum of understanding (MOU) between Manitoba Environment (ME) and Ontario Ministry of the Environment (MOE), which arose out of development issues in the High Lake area[92]. The MOU committed the governments to continuing consultation on the future of the watershed, particularly as it related to significant resource development proposals that may arise.
- A circa 1985 MOU between Ontario (OMNR) and Manitoba Environment (ME) regarding the cooperative assessment and management of fisheries resources on High Lake and on other border lakes.
- The 1988 removal, by Manitoba Mines Branch, of Crown lands in the Indian Bay area from staking and mining claims.
- The 1994 *Shoal Lake Watershed Agreement* between Ontario and the five Shoal Lake area First Nations, which was put in place to provide for greater involvement of the First Nations in decision-making concerning development, use and management of watershed resources[93]. The Agreement called for development of a watershed management plan and made provision for involving the Province of Manitoba.

A full listing of these and other relevant treaties, agreements, MOUs, and policy/regulatory instruments is contained in Appendix C.

As discussed in Chapter 5, continuing issues and concerns ultimately led all governments to recognize that successfully balancing pressures for community and resource development with the need to protect resource values and environmental quality required a more comprehensive approach to dealing with development proposals. Review of individual development proposals needed to occur within a broader framework that would provide greater certainty around processes and outcomes for interests on both sides, i.e. protection and sustainable development. This framework needed to be built on the basis of sound scientific knowledge and the committed participation of the affected parties.

5.0 Shoal Lake Watershed Working Group

5.1 THE BEGINNINGS

The 1994 agreement the between Province of Ontario and the Shoal Lake First Nations acknowledged the need for a watershed plan to help guide future decision-making regarding resource use and development within the watershed. This agreement also recognized the necessity of bringing the government of Manitoba and the federal government to the table if the plan were to be truly representative of the collective interests in the watershed. Successful development and implementation of the plan was seen as requiring the participation and committed support of all governments.

Representatives of Ontario, the First Nations and the Province of Manitoba met in the late summer of 1998 to discuss Manitoba's participation. Agreement was reached to convene a session of First Nations community and government representatives, with a fundamental knowledge of the watershed, to establish a framework for the joint development of a watershed plan. This meeting was held in November 1998 at the Quetico Centre near Atikokan, Ontario. Representatives of two federal departments also attended.

Among the accomplishments at this meeting were the drafting of a watershed vision statement and a set of management principles to guide plan development. The meeting also resulted in the establishment of the Shoal Lake Watershed Working Group.

5.2 WORKING GROUP MEMBERSHIP

The Shoal Lake Watershed Working Group (SLWWG) includes representation from the Government of Canada, the Provinces of Manitoba and Ontario, and the two First Nations communities resident in the watershed. Members were drawn from the respective natural resources, environment and Aboriginal affairs departments as follows:

Canada

- Indian and Northern Affairs Canada (INAC)
- Environment Canada (EC)

First Nations

- Iskatewizaagegan #39 Independent First Nation
- Shoal Lake #40 First Nation

Manitoba

- Conservation (formerly the separate departments of Environment and Natural Resources) (MC)
- Intergovernmental Affairs (formerly Urban Affairs) (MIA)
- Aboriginal and Northern Affairs (MANA)
- Industry, Trade and Mines (MITM)
- City of Winnipeg (WPG)

Ontario

- Natural Resources (MNR)
- Environment (MOE)
- Northern Development and Mines (MNDM)
- Native Affairs Secretariat-Ministry of the Attorney General (ONAS)

5.3 PREPARATION OF A BACKGROUND REPORT

The partners agreed at the November 1998 meeting to contribute a variety of reports, data and other information that would assist in the completion of a background report on the Shoal Lake watershed. The report (unpublished) assisted in bringing Working Group members and others to a shared understanding of the watershed's resources, communities and issues, and helped to identify information gaps requiring further study. Preliminary drafting of the background report had been initiated, in the summer of 1998, by Ontario and the Shoal Lake First Nations.

5.4 WORK PLAN AND BUDGET

The Working Group developed a two-year work plan extending over the 1999-2000 and 2000-2001 fiscal years. The work plan identified a number of studies that were required to pull together and assess existing information, to acquire new information, and to develop new tools to support decision-making. Both provinces and the federal government provided funding contributions of $100,000 each in the first year and $75,000 in the second, with the City of Winnipeg providing a share of the Manitoba contribution. Portions of the Ontario and federal funding contributions were targeted at supporting First Nations participation in Working Group activities.

Throughout the two-year plan-development period, valuable in-kind contributions of many government ministry/department staff were made in support of the process. These staff contributions have totalled an estimated 36 person months.

6.0 Watershed Vision and Management Principles

Creation of a Vision Statement for the future of the Shoal Lake watershed began with the initial meeting of the Working Group members in November 1998. The group also proposed a set of Management Principles as a basis for defining the context in which the interests of the many stakeholders would be recognized and protected.

The vision and accompanying principles were openly reviewed and refined through stakeholder input and through ongoing discussion among the Working Group partners.

The statements that follow are intended as guideposts for the sustainable development and use of watershed resources. They reflect a commitment to seek an appropriate balance among environmental, social and economic needs.

Watershed Vision

The Vision for the Shoal Lake watershed is one of a healthy ecosystem with excellent water quality, and healthy communities with strong and sustainable economies that respect the cultural and traditional values of the communities served.

General Principles for Watershed Management

- Development decisions are consistent with maintaining the integrity of the watershed ecosystem.
- Development decisions seek to balance the distribution of socioeconomic benefits.
- First Nations and the people of Ontario and Manitoba continue to benefit from the quality and adequacy of water resources.
- In accordance with section 35 of the *Constitution Act* 1982, existing treaty and Aboriginal rights of the First Nations peoples within the Shoal Lake watershed are respected.
- Development and use of renewable resources is sustainable.
- Renewable and non-renewable resource development use best management practices and are ecologically and environmentally responsible.
- All jurisdictions involved in developing and implementing the Shoal Lake Watershed Management Plan share in the responsibility for protecting the ecosystem and for contributing to careful planning.
- All stakeholders proactively share information and knowledge. They act cooperatively and seek to communicate openly and clearly.
- Traditional First Nations' knowledge and other local knowledge are used in the development and implementation of the Plan.
- The Shoal Lake Watershed Management Plan is viewed not only as a product, but also as part of an ongoing process. As new information is obtained, the Plan is revisited and, where necessary, is refined.

7.0 Filling Knowledge Gaps and Developing Management Tools

7.1 INTRODUCTION

The Working Group determined early in its deliberations that important gaps existed in available information and knowledge about watershed resources and ecological functions. Filling these gaps was considered critical to setting objectives for watershed protection and for effectively managing watershed development and resource use into the future. Work plans were therefore developed and monies allocated for follow-up initiatives in the areas of information consolidation and exchange, water quality/quantity model development, and stakeholder consultation.

This chapter describes the actions taken by the Working Group to improve the knowledge base. Much of the information gained through data consolidation and through studies of the current state of water balance, water quality and the Shoal Lake fisheries has been previously reported in Chapter 2. Chapter 8 describes Working Group activities and outcomes relating to stakeholder outreach and consultation.

7.2 IMPROVING THE UNDERSTANDING OF WATERSHED HYDROLOGY AND THE SHOAL LAKE WATER BALANCE

7.2.1 Background

Hydrologic and hydraulic functions within a watershed are primary determinants of other ecological features and functions such as water quality, nutrient and pollutant transport, sediment deposition, water circulation, primary productivity, and aquatic plant and animal species diversity and abundance. Average hydrologic/hydraulic conditions, in addition with short- and long-term variability in precipitation, runoff and water levels, often dictate the water-related uses that can be sustainably supported within a watershed. They can also serve to delineate occasions when overall conditions may be either beneficial or limiting to certain uses. The integrated action of these features is often referred to as the 'water balance' or 'water budget' and may be determined for the entire watershed and for individual lakes.

As reported in Chapter 3, the hydraulic regime within the Shoal Lake watershed was significantly and permanently altered by past actions, some of which date back more than a century. These include the damming of the Lake of the Woods outflow, blasting of the Ash Rapids channel, and the Winnipeg water supply diversion. Watershed ecology and, out of necessity, many watershed uses, have adapted to these changes but are nevertheless impacted by the ongoing daily, weekly, seasonal and longer-term variability in weather and climate.

Given the uncertainties over watershed hydrologic and hydraulic functions and interactions, how those interactions change over time, and what their significance might be for watershed ecology and water use, the Working Group referred these questions to a consultant for investigation.

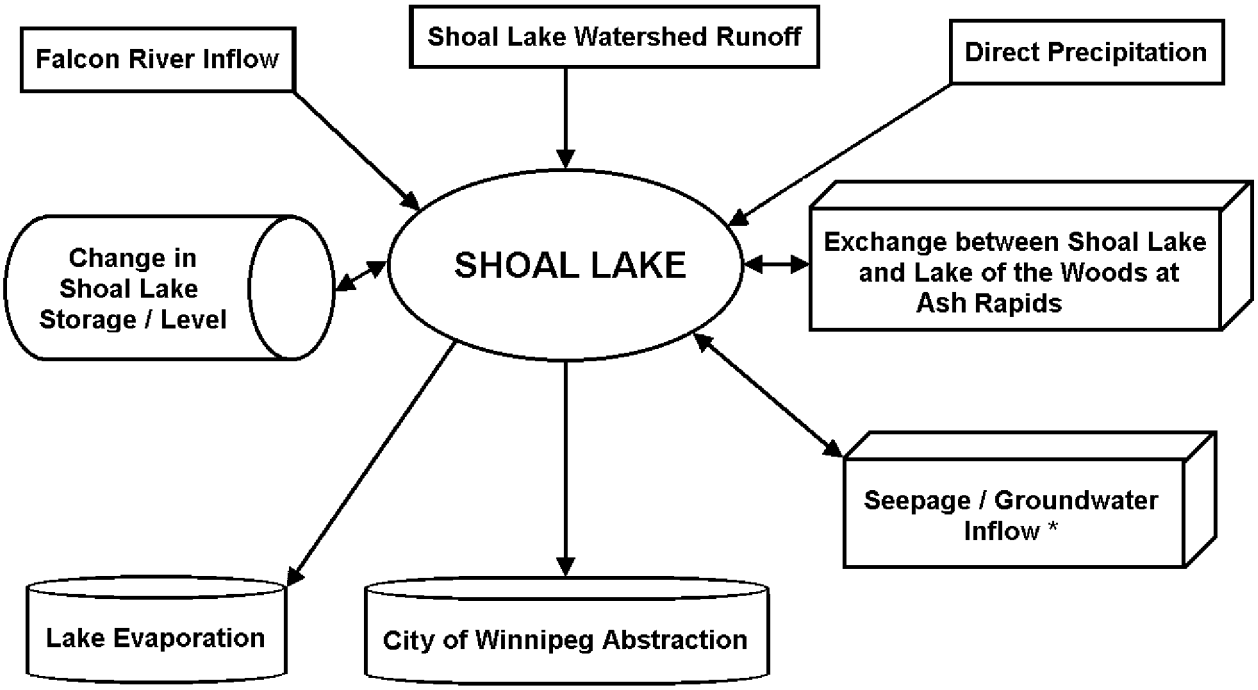
7.2.2 TetrES Study

7.2.2.1 STUDY OBJECTIVES, SCOPE AND APPROACH

The Working Group requested TetrES Consultants Inc. to undertake an assessment of the Shoal Lake water balance and to examine its variability under long-term average climate conditions, as well as under conditions more characteristic of wet and dry years. The study was to determine how climate conditions impacted on water exchange at Ash Rapids and to identify which components of the water balance (see Figure 7.1) were most important in determining seasonal and annual lake levels and in determining the magnitude, direction and duration of water exchanges at Ash Rapids[94].

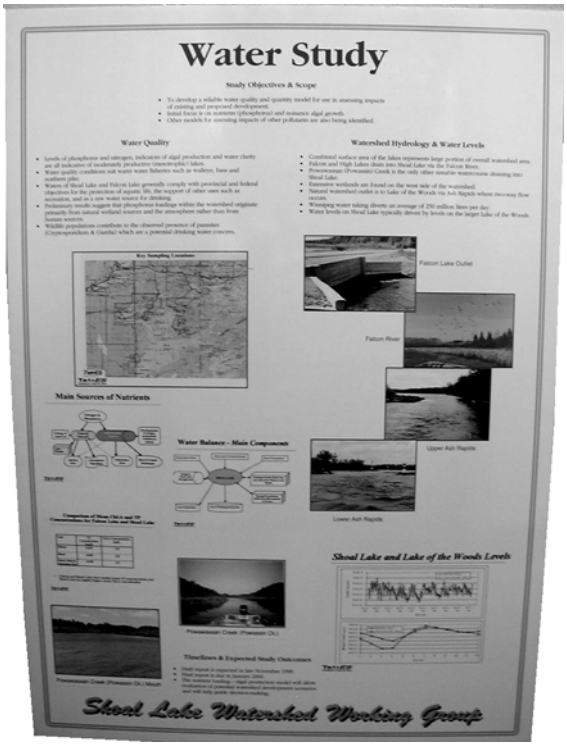
The parameters used in the consultant's evaluation included precipitation, runoff, evaporation/evapotranspiration, lake levels and gradients between Lake of the Woods and Shoal Lake, and Winnipeg water-withdrawal rates. Direct measurements of precipitation, runoff, evaporation, and water exchange at Ash Rapids were not available from within the watershed, and were determined through ex-

Approach to Lower Ash Rapids looking northeast toward Lake of the Woods. Taken June 18, 1991, this photo shows flow entering Shoal Lake from Lake of the Woods.



** Net effect unknown and not included in water balance analysis*

Figure 7.1. Main components of the Shoal Lake water balance (*adapted from* TetrES report, June 2000).



The Working Group initiated a water study to fill important information gaps.

Working Group members and study consultants on boat tour of Shoal Lake.

trapolation from adjacent monitored watersheds (see Figure 7.2) or were selected from the scientific literature.

7.2.2.2 STUDY CONCLUSIONS

The major conclusions arising out of the TetrES analysis of water balances, as reported in the July 2000 summary report, were as follows (see Figures 7.3 and 7.4)[95]:

> "In an average year, there is outflow from Shoal Lake to Lake of the Woods during winter months and vice-versa during summer months, resulting in a small net annual outflow from Shoal Lake. In a dry year, there is inflow from Lake of the Woods to Shoal Lake during most of the year with relatively small outflow from Shoal Lake occurring from mid-winter to early spring. In a wet year, flow is primarily from Shoal Lake to Lake of the Woods during the entire year.

Surface runoff and inflow from Falcon River into Shoal Lake are comparatively smaller than direct precipitation into the lake, especially during an average or dry year. This appears to be mainly due to the relatively large proportion of the lake area compared to the watershed area.

In a dry or average year, evaporation losses are the largest outflow from Shoal Lake followed by water withdrawals by the City of Winnipeg, while in a wet year outflow through Ash Rapids is higher than the combined effects of evaporation and Winnipeg withdrawals.

For Falcon Lake and other smaller lakes that have a smaller proportion of lake to runoff area,

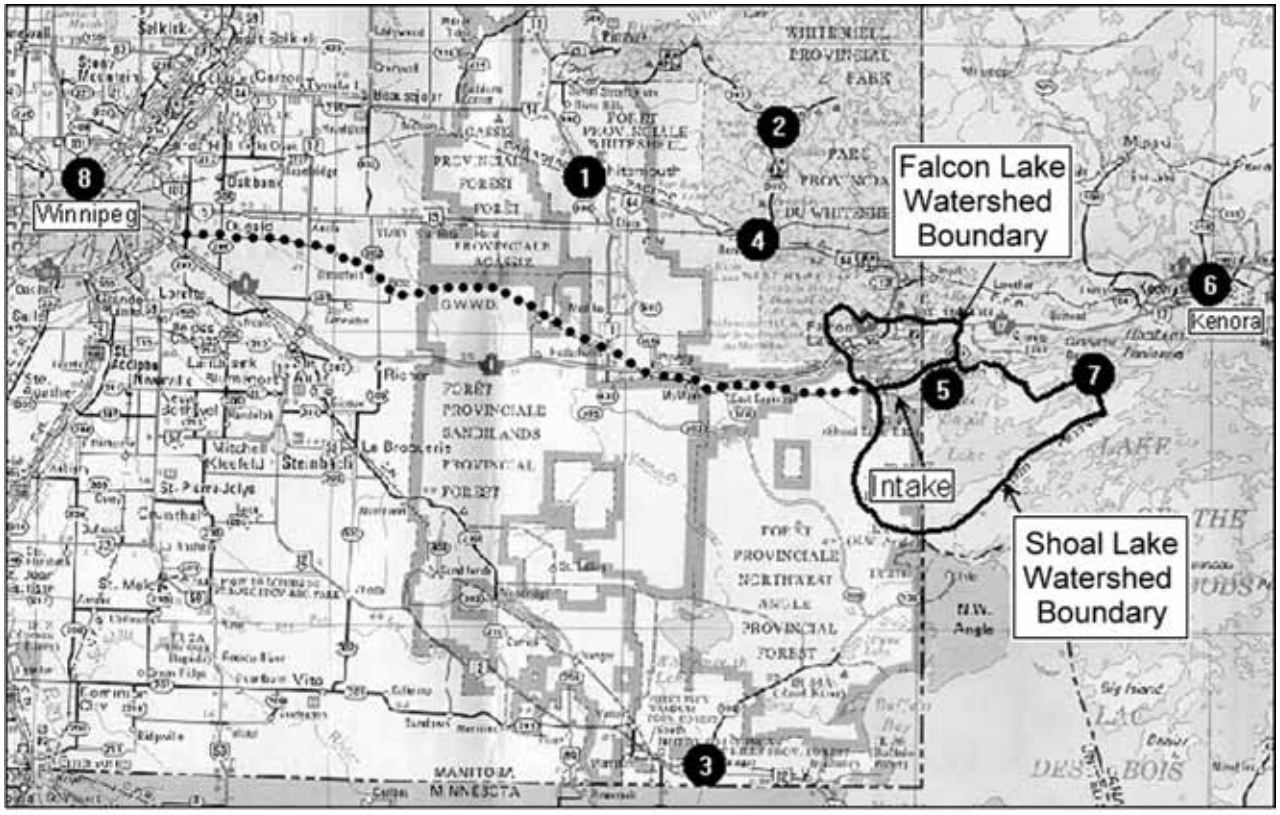


Figure 7.2. Location of weather and hydrometric monitoring stations used in water balance analysis (*adapted from* TetrES report, June 2000).

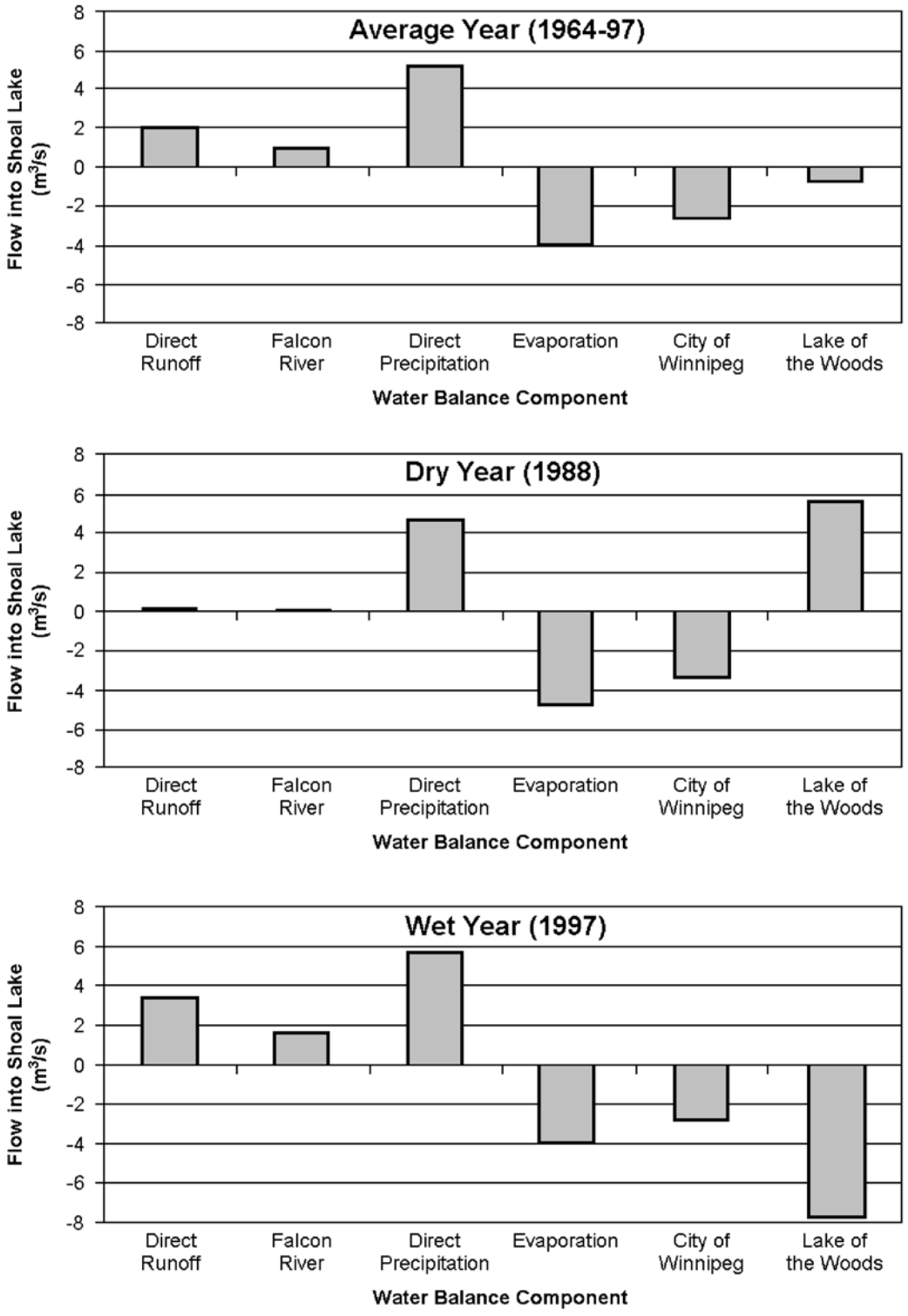


Figure 7.3. Typical annual water balance of Shoal Lake for average, dry and wet years (*adapted from* TetrES report, June 2000).

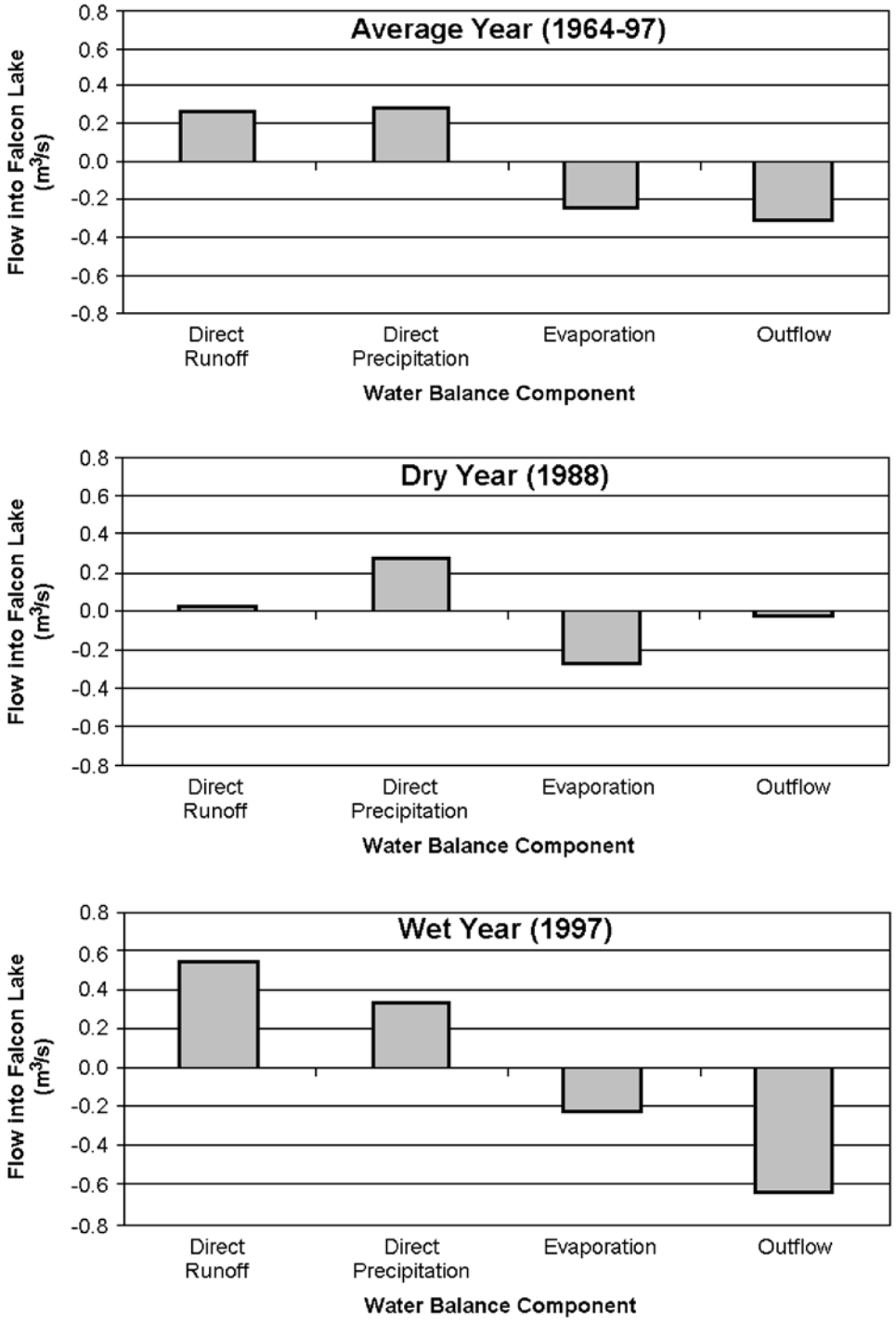


Figure 7.4. Typical annual water balance of Falcon Lake for average, dry and wet years (*adapted from* TetrES report, June 2000).

runoff is equally as important as direct precipitation in an average year, higher in a wet year, but much less in a dry year.

Lake evaporation is about 18 and 30% less than total yearly precipitation for average and wet years, respectively, but is about 5% higher in a dry year.

Due to the relatively large size of Shoal and Falcon lakes compared to their watershed areas, low hydraulic loading rates, and typically long hydraulic residence times (> 20 years), the water balance generally has little effect on lateral water movement or drift within the lakes when compared to the effects of wind-driven exchanges. However, for Indian Bay, there is a larger (although smaller in magnitude than wind set-up exchanges) local drift to the bay from the main lake. On average the hydraulic residence time for Indian Bay is less than one year. For Snowshoe Bay, which has an average hydraulic residence time shorter than six months, long-term local drift is relatively high (but lower than short-term water exchanges from wind set-up) and is toward the main lake, especially in an average or wet year. For the Ash Rapids area and the eastern side of Shoal Lake, drift is expected to be high in the direction dictated by the direction of water flow through the rapids".

At the request of the Working Group, TetrES also examined the implications, for Shoal Lake, of the proposed operating rule-curve changes for the Rainy and Namakan lakes, which lie upstream of Lake of the Woods. Flow through these lakes constitutes, on average, about 65% of the inflow to Lake of the Woods. Based on the analysis undertaken by the Lake of the Woods Control Board (LWCB), the changes, which have recently been approved by the Canadian and U.S. governments, are expected to:

- lower the January to May water level of Lake of the Woods by an average of 1 cm, thereby resulting in an increase in outflows from Shoal Lake at Ash Rapids, i.e. the Shoal Lake water level is typically a few centimeters higher than the Lake of the Woods level during this time period;
- raise the water level of Lake of the Woods by an average of 4 cm over the period from June to September, thereby resulting in a similar increase in the level of Shoal Lake since the Shoal Lake level generally tracks the Lake of the Woods level through the summer months; and
- have little impact on levels and flows during the October to December period when compared to operations under the existing rules.

The consultants made a number of recommendations intended to improve future assessments of water balances and budgets in the watershed. The recommended actions, which would also enhance the accuracy of future water-quality-modeling initiatives are outlined in Chapter 11, section 11.7.

7.2.3 Climate Change

To the Working Group's knowledge there have been no direct assessments, by Canadian researchers, of how climate change might impact on water and other natural resources in the immediate Lake of the Woods–Shoal Lake area. The recently completed U.S. *National Assessment of the Potential Impacts of Climate Variability and Change* does, however, provide information that is potentially relevant to Shoal Lake interests[96]. This major study looked at the possible consequences of changing climate on water, on other resources, and on communities and businesses throughout the United States. The study incorporated best available knowledge and generated predictions of likely future conditions, using available climate-change-circulation and climate-change-impact models. The study used the existing Canadian and Hadley (UK) models.

For the water resources component of the study, the continental U.S. was divided into major drainage basins. One of these was the combination of the Souris, Red and Rainy River watersheds, which includes Lake of the Woods. The study notes that this three-basin area is generally less vulnerable to climate change impacts than most other areas of the continental U.S.

Overall, the modeling study indicates that climate is expected to become more variable, with more extreme (intensity and duration) wet and dry events. Average annual precipitation is projected to increase, however, increased evaporation/evapotranspiration rates could more than offset this effect and result in net decreases in the average basin runoff conditions. The study indicated that average annual runoff in the region could fall as much as 25 to 30% within the next 30 years, as a result of the combined effects of climate change on precipitation, evaporation/evapotranspiration and anticipated water demand.

Researchers generally agree that further data collection, along with enhancement of available climate change models, is needed to improve confidence in the current projections. If, however, decreases of the magnitude described above did occur in the Lake of the Woods system, it would require reconsideration of the existing water-level operating rules. This would potentially involve alteration in the range (maximum and minimum) of seasonal water levels that would be permitted. This in turn would impact on water exchange at Ash Rapids and on water levels in Shoal Lake. It would therefore be essential that Shoal Lake interests (e.g. water supply, fisheries, recreation, navigation and shoreline protection) be properly assessed in the decision-making process.

7.3 DEVELOPMENT AND TESTING OF A PREDICTIVE WATER QUALITY MODEL

7.3.1 Introduction

Good environmental planning is concerned not only with the impacts of individual developments but also with the cumulative and long-term impacts of all existing and

proposed development on water quality and other environmental conditions. The most common way to assess such impacts on water quality is through the application of predictive mathematical models. Cause-and-effect models incorporate theoretical or empirical algorithms or equations that relate water quality changes to pollutant inputs and watershed characteristics. Some models are designed to operate in a steady-state manner and provide results indicative of average conditions in time and space, e.g. the annual or seasonal average concentration of a substance or contaminant over an entire lake. Others are dynamic and can be used to predict concentrations at various times and at various points within a waterbody.

Use of dynamic models requires a much more detailed understanding of physical and other processes operating in a lake such as water movements, volume exchanges, temperature gradients and biochemical transformations. All models require knowledge of the pollution-generation potential (contaminant loadings) of the development projects being evaluated.

There are several models in use today that can predict the impacts of a broad spectrum of pollutants, however, the more commonly used models for evaluating the effects of growth and development on lake environments are generally focused on nutrients and trophic status.

7.3.2 Calibration of the Ontario Lakeshore Capacity Model and Evaluation of Other Models

7.3.2.1 ONTARIO LAKESHORE CAPACITY MODEL

The Ontario Lakeshore Capacity Model (LCM) is a steady-state model that has been developed for use in predicting the long-term cumulative effects of development on the trophic status (nutrient enrichment and nuisance algal growth) of recreational lakes. It is the accepted tool for making lake-development-capacity decisions in the province of Ontario and has been adopted for application in other jurisdictions as well. It can also be used to assess the effectiveness of pollution-prevention and -mitigation strategies. Figures 7.5a and 7.5b schematically depict the lake-to-lake relationships and components upon which the model is based.

The model uses historic and current data on water quality, along with information about the size, depth and hydrology of watershed lakes, and about the current and future inputs of phosphorus from both natural and human sources. From this information it predicts the average or steady-state total phosphorus concentration for a lake or embayment. A total phosphorus concentration of 20 μg/L is typically considered to be the threshold for the onset of nuisance algal growth in Precambrian Shield lakes.

At the request of the Working Group, the LCM was calibrated, tested and verified for use in the Shoal Lake watershed. Its primary application should focus on its use in long-term planning, i.e. for the assessment of the cumulative impacts of potential development on lake-wide, or embayment-wide, average trophic status conditions.

7.3.2.2 OTHER MODELS

The consultants were also asked to look at other (dynamic) models that could be better suited to the assessment of more localized and time-dependent impacts, and in the evaluation of water quality issues and parameters that extend beyond trophic status considerations.

Calibration and effective application of these models in the Shoal Lake watershed would require implementation of monitoring and surveillance program upgrades as outlined in the following section. Other suitable wastewater-discharge modeling and assessment techniques are available to predict the impacts of individual developments and associated pollution control measures. A development proponent would normally be required to utilize

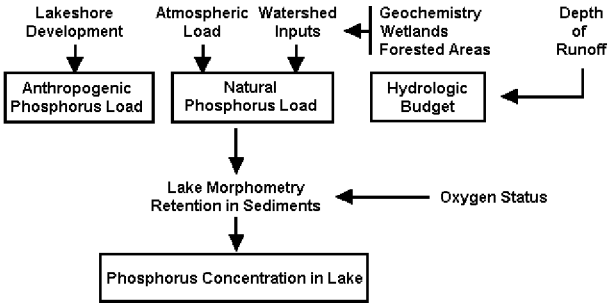


Figure 7.5a. Schematic of the Ontario Lakeshore Capacity Model (*adapted from* TetrES report, June 2000).

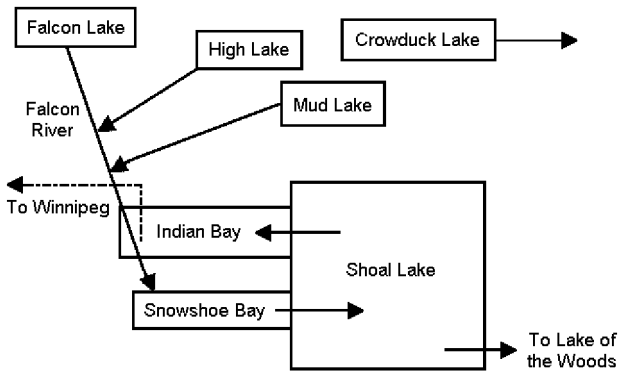


Figure 7.5b. Relationship between lakes in the Shoal Lake Watershed Model (*adapted from* TetrES report, June 2000).

one or more of these techniques as part of a submission for development approval.

7.3.2.3 CONCLUSIONS ON THE FURTHER USE AND DEVELOPMENT OF MODELING CAPABILITIES

With respect to the application of the Ontario Lakeshore Capacity model and the development of additional modeling capabilities, TetrES Consultants Inc. concluded that[97]:

> "The Lakeshore Capacity Model has been successfully calibrated to current Shoal Lake watershed conditions and should be used as a planning tool for the assessment of potential long-term and cumulative changes (i.e. steady-state) in mean phosphorus concentrations and trophic status [nutrient enrichment] of all lakes in the watershed. Future development scenarios and proposals should be evaluated using the model and should include documentation of any carryover impacts on downstream lakes and/or on adjacent lake sub-basins.
>
> A dynamic water quality model(s) incorporating an acceptable advection-dispersion sub-component should be used for simulating the spatial and temporal movement and fate of persistent or toxic constituents particularly where short-term or more localized impacts are important. Such models are also important in the assessment of the potential impacts of spills or for modeling time-dependent effects of a new point source discharge on other water uses in the area. The collection and use of additional or more precise (time series) information on physical factors such as wind direction, wind velocities, shoreline configuration and water temperature will be needed in these models.
>
> Of the three dynamic models (WINWASP+, CE-QUAL-ICM and MIKE 3) evaluated in this study, WINWASP+ is recommended based upon an overall consideration of attributes including cost of model and data acquisition, level of technical knowledge required, user-friendliness, and interface and data processing capabilities. However, other dynamic models could also be considered provided they can be successfully calibrated for the watershed.
>
> Sufficient nutrient and physical data currently exist within parts of the Shoal Lake watershed to allow use of a dynamic model as a supplement to the Lakeshore Capacity Model.
>
> Dynamic modeling of other contaminants including metals and persistent organic substances [such as might be associated with mining and mineral extraction or with other industrial operations] may require the more accurate determination of current background concentrations of these compounds in the watershed. Sampling carried out to date typically shows that ambient concentrations of these substances are below normal laboratory detection limits.
>
> Use of a dynamic model should also consider validating mass exchange rates between different sections of the lake through detailed hydraulic and water quality modeling and/or through specific field measurements".

The consultants identified a number of actions that would improve the knowledge base and therefore increase the confidence level associated with future modeling initiatives. Their recommendations for additional studies and monitoring-program enhancements are outlined in Chapter 10, section 10.13 and cover the following topics:

- more precisely defining pollutant loadings;
- improving characterization of event-related water quality impairment;
- improving current understanding of water budgets and water movements; and
- supporting application of the Lakeshore Capacity Model and other models.

7.3.3 Formulation and Testing of Development Scenarios

The boundaries on a lake's development capacity, or the probable impacts of an assumed amount of development, are often looked at through testing-of-growth scenarios reflective of a variety of possible development types, locations, intensities and timeframes. The pollution-generation potential of each scenario is used as input to a suitable watershed carrying-capacity model, and the resulting impacts on water quality and other environmental parameters are determined. The offsetting effects of environmental-control strategies can also be assessed through such models.

Development pressure and development potential are dependent on a variety of natural, social and economic factors. Some of the more obvious factors are population growth, the type and availability of natural resources, the costs of developing or using those resources, and the existence of markets for them. As discussed in Chapters 2 and 3, the Shoal Lake watershed is home to important natural resources of ongoing development interest, including water, forest products, minerals and fisheries. Events over the past century serve to illustrate the off-and-on nature of the interest in, and demand for, some of these resources.

As part of the Water Study, the consultants examined the relative sensitivity of watershed lakes and embayments to further increases in phosphorus loadings. In one example they modeled the anticipated impact of a simultaneous 500 kg per year increase in phosphorus inputs to each lake/bay[98]. The model predicted the resulting increase in long-term average phosphorus concentration in the receiving waterbody and included the effects of phosphorus carryover from upstream to downstream, e.g. from Falcon Lake and High Lake to Snowshoe Bay. Table 7.1 provides a simple picture of the phosphorus-loading potential associated with various land uses and management practices.

The predicted changes in ambient lake concentrations associated with the hypothetical 500 kg increase are shown in Figure 7.6. Average concentrations were determined to remain the same in the main body of Shoal Lake. Sizeable increases were, however, found in all other lakes and bays, including a 20% increase in Indian Bay, 43% in Falcon Lake, 74% in Snowshoe Bay, 107% in High Lake and

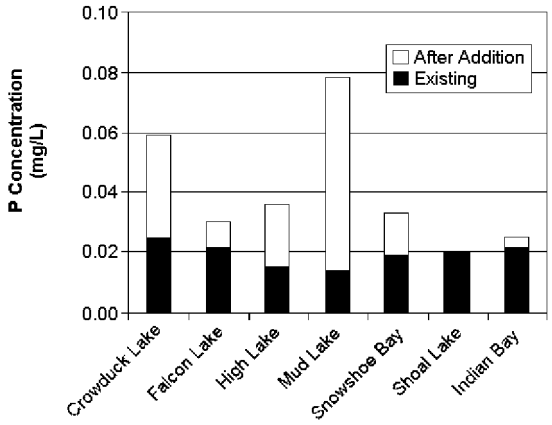


Figure 7.6. Modeled lake response to a 500 kg increase in annual phosphorus (P) loading to all lakes (*adapted from* TetrES report, June 2000).

136% in Crowduck Lake. In each of these cases the new phosphorus level was found to exceed the 20 μg/L objective for the prevention of nuisance algal growths.

The Working Group subsequently formulated four development scenarios for water quality impact testing using the Lakeshore Capacity Model. The scenarios are hypothetical, i.e. they don't describe currently approved or proposed levels of development. They do, however, cover a range of growth possibilities reflective of potential desires and interests in community growth and economic development. The scenarios are:

Development Scenario A1: *Continuation of existing growth trends*

- annual population growth rate of 3% in the Iskatewizaagegan #39 and Shoal Lake #40 First Nation communities using existing wastewater treatment technologies (i.e. lagoon at #39 and private septic tank – tile fields at #40);
- annual growth rate of 5% in the number of Shoal Lake cottages on existing patented land all using septic tank – tile fields; and
- annual population-equivalent growth rate of 2% at Falcon Lake all being served by lagoon with phosphorus removal.

Development Scenario A2: *Continuation of existing growth trends accompanied by wastewater treatment upgrades by the watershed communities*

- all development within both First Nation #39 and #40 communities to be served by lagoons with phosphorus removal and discharge to main lake;
- existing and new Shoal Lake cottages continue on septic systems; and
- all existing and new development at Falcon Lake using lagoon and phosphorus removal.

Development Scenario B: *Accelerated community and commercial growth accompanied by wastewater treatment upgrades by the communities*

- annual population growth rate of 15% in both First Nations communities with all existing and new development served by lagoon with phosphorus removal;
- annual growth rate of 7.5% in number of Shoal Lake cottages using septic systems;
- new tourist resort facility on Shoal Lake (80 resort units, 6 commercial units and 100 day-use units) served by lagoon with phosphorus removal;
- new 18-hole golf course, using BMPs, located within 300 m of Indian Bay; and
- annual population-equivalent growth rate of 4% at Falcon Lake with all existing and new development served by lagoon with phosphorus removal.

Development Scenario C: *Maximize allowable development throughout the watershed consistent with maintaining ambient phosphorus levels at or below 20 μg/L, or at existing levels where they currently exceed 20 μg/L.*

Table 7.1. Phosphorus loading equivalents.[99]

The total phosphorus-loading impact on a lake from one (1) year-round watershed resident served by a conventional septic tank and tile field system equals:

- 0.6 kg/year, or

An equivalent loading impact would be generated by:

- 10 persons served by a sewage collection and treatment system (lagoon or mechanical) with phosphorus-removal facilities
- atmospheric deposition falling on 3 ha of lake surface
- runoff from 10 ha of wetland
- runoff from 11 ha of boreal forest
- runoff from a small (single-lot size) chemically fertilized residential or cottage lawn
- runoff from one (1) hole on a golf course not using best management practices (BMPs)
- runoff from three (3) holes on a golf course using BMPs

This scenario testing indicates the relatively greater and proportionate sensitivity of Falcon Lake, Snowshoe Bay and Indian Bay, and relative insensitivity of the main body of Shoal Lake, to the modeled increases in phosphorus inputs. For the range of growth and treatment upgrade scenarios evaluated in this analysis the following observations were made:

- Falcon Lake would experience an increase of 1 μg/L (i.e. from 21 to 22 μg/L) in total phosphorus concentration following a 20% growth in population equivalents over a 10-year period, provided the additional growth was fully accommodated by lagoon treatment and phosphorus removal.
- Falcon Lake would experience a decrease 4 μg/L (i.e. from 21 to 17 μg/L) in total phosphorus concentration following a 40% growth in population equivalents over a 10-year period if all existing and new development were accommodated by lagoon treatment and phosphorus removal.
- Average phosphorus levels in the main body of Shoal Lake would not change from the existing 20 μg/L under any of the growth scenarios. This includes 150% growth in population levels within the First Nations communities, 75% increase in the number of cottages on the main lake, and construction of the 80 + unit tourist resort facility within a 10-year period.
- Indian Bay would experience a 1μg/L increase (i.e. from 21 to 22 μg/L) in total phosphorus concentration following a 30% growth in the population of the First Nations communities and a 50% growth in the number of main lake cottages over 10 years. This assumes that growth at Shoal Lake #40 and among the cottages would be accommodated using septic systems, and growth at Iskatewizaagegan #39 would be accommodated in a lagoon with phosphorus removal.
- Under all other development scenarios, which include wastewater treatment upgrades and best management practices, Indian Bay total phosphorus levels would be maintained at the existing 21 μg/L.

Using the acceptable phosphorus-loading limit determined for individual lakes or embayment areas, modeling can be used to select or test mixes of development types and intensities that could be permitted without exceeding that limit. This analysis would take into consideration the locations of anticipated development elsewhere within the watershed in order to account for carry-over effects from upstream to downstream lakes.

7.4 ASSESSING THE STATE OF THE SHOAL LAKE FISHERY

7.4.1 Background

Through the mid to late 1970s, heavy harvesting of walleye from Shoal Lake placed serious stresses on the lake's fish population. Fearing a total collapse of the fishery, the Ontario Ministry of Natural Resources (OMNR) imposed a closure on commercial and sport fishing of walleye in Ontario waters beginning in 1983. Closure was subsequently extended to include Manitoba waters by the then Manitoba Department of Natural Resources.

The walleye fishery has remained closed continuously since 1983 although subsistence harvesting by members of the Shoal Lake First Nations communities has continued. Harvest of other important species such as whitefish and smallmouth bass have been managed through commercial quotas and angling regulations, respectively.

Over the past decade, First Nations fishers have requested that OMNR reopen the commercial walleye fishery, citing economic need and their belief that significant recovery of fish stocks had been occurring. OMNR contended that its ongoing assessments of the lake's walleye population did not indicate that a strong recovery had yet taken place.

The differing viewpoints were brought to the attention of the Working Group early in the watershed planning process and it was agreed that an independent assessment of available Ministry and First Nations information on the health of the lake's fisheries should be undertaken.

7.4.2 AOFRC Study

7.4.2.1 OBJECTIVES AND SCOPE

In November 1999 the Anishinabek/Ontario Fisheries Resource Centre (AOFRC) was contracted to undertake the Shoal Lake Fishery Review 1999. The objectives of the review were as follows[100]:

- To review and report on existing OMNR and First Nations fisheries information (reports, survey data and traditional knowledge) relating to the health of the Shoal Lake fisheries, with a primary focus on walleye.

- To identify information gaps and, as appropriate, recommend follow-up actions that may be required to assess progress in the recovery of walleye stocks.

- To provide a basis for building consensus on the effective management and future sustainable use of Shoal Lake fisheries.

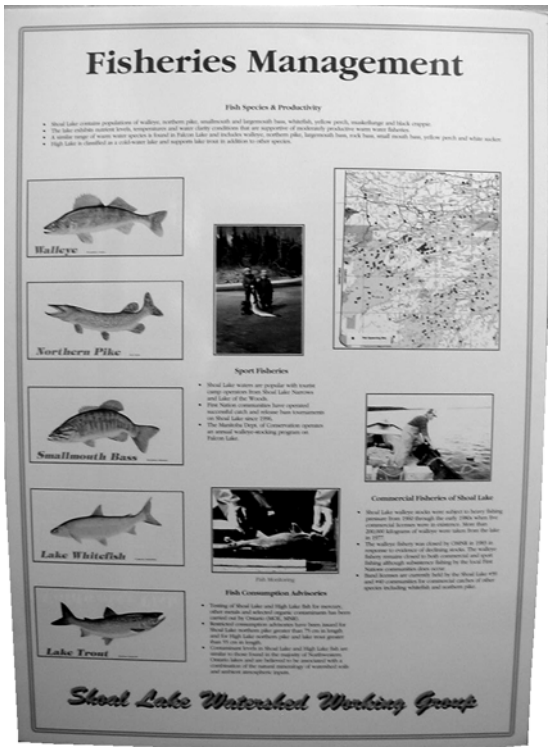
7.4.2.2 STUDY CONCLUSIONS

The AOFRC review was completed in March 2000. It found that the Shoal Lake walleye population was showing some signs of improvement and had benefited from the closure. It concluded that resumption of fishing for walleye should be possible subject to identification, negotiation and implementation of an effective fisheries management plan. The report contained several recommendations relating to harvest limits (for walleye and other species), development of criteria for determining fishery health, enhanced monitoring and improved management processes.

Following receipt of the AOFRC report, discussions involving Ontario, Iskatewizaagegan #39, Shoal Lake #40 and Manitoba were initiated toward building consensus on an improved monitoring and rehabilitation program for the Shoal Lake fishery. Development and adoption of acceptable criteria for use in the ongoing determination of the health of the fishery was identified as a prerequisite.

One of the recommendations of the Shoal Lake Fishery Review 1999 was that a fall walleye index-netting program (FWIN) be completed. First Nations commercial fishers, AOFRC and OMNR staff participated in the design and implementation of the walleye index-netting program, which was carried out in September 2000. Based on the results of this project, AOFRC concluded that:

> "… the Shoal Lake walleye population has not completely recovered. Abundance is low and the population is dominated by young, fast growing and early maturing fish".



Shoal Lake fishery – managing for a diversity of interests.

AOFRC further recommended that harvest level not increase and that implementation of a subsistence-catch-sampling program would provide both OMNR and the First Nations with additional information on the walleye population. The results of this project as well as future co-operative monitoring activities will provide the basis for the future management of the Shoal Lake fisheries.

The Fisheries Task Group has used the AOFRC Shoal Lake Fishery Review 1999, the fall 2000 walleye index-netting results, and follow-up discussions with the First Nations as a basis to produce a more comprehensive set of recommendations. These can be found in Chapter 12 (sections 12.6 and 12.7).

7.5 IMPROVING INFORMATION INTEGRATION AND MANAGEMENT

Information on water quality, water levels and flows, fisheries, the extent and state of watershed resources, stakeholder demographics, and resource uses is held by many government departments, by the local watershed communities and by other stakeholders. Sharing and consolidated assessment of this information, not only in plan development but on an ongoing basis, is important in improving understanding of the watershed and fundamental in effectively managing its future condition. It is also of continuing importance in creating and enhancing awareness among stakeholders, and in guiding the balancing of interests.

The work of information integration is an ongoing set of activities requiring the commitment of all parties. Through the plan-development process the Working Group has begun this work and purposely set the stage for future actions and commitments around what and how information is collected, and how it is shared and used.

With the assistance of OMNR Kenora District, OMNR Regional Information Services in Thunder Bay, and Manitoba Conservation, the Working Group compiled existing information on the natural resources and physical features of the watershed into a common database. The database uses an accepted geographic information system (GIS) framework. Differences in data collection and reporting systems among the agencies imposed some limits on the integration and further analyses of some information sets.

The watershed characteristics or parameters incorporated within the current GIS database include:

- geopolitical boundaries, land tenure and land use;
- physical features such as lakes, watercourses, roads, railways, pipelines, transmission lines, built structures;
- official and/or commonly used place names;
- surface elevations and contours;
- monitoring sites, e.g. water quality; and
- natural resource and environmental values.

Many of the mapping products used in this plan and in companion documents have been generated from this watershed database.

Update, expansion and maintenance of the database will allow the parties to cooperatively monitor the extent and nature of resource use and development activity, to track environmental conditions, to determine the effectiveness of environment protection and resource management programs, and to keep stakeholders informed.

8.0 Stakeholder Outreach and Involvement

8.1 INTRODUCTION

The Working Group reached out to and involved watershed stakeholders in a number of different ways over the two-year plan-development period. Public Open Houses, First Nations Community Meetings, and Focus Group sessions were held by the Working Group at milestone points in the plan-development process. These events were used to share information and to obtain input on the fundamental directions, key issues and interests, goals and objectives, and recommended actions. Prior notification of these sessions was provided through newspaper advertisement and, on occasion, through additional means such as bulletin board and web-site postings and direct mail-outs.

Major outreach, information exchange and consultation events included:

- November 1999 Open Houses in Falcon Lake, the First Nations communities, Kenora and Winnipeg;
- March 2000 Focus Group sessions in Kenora and Winnipeg;
- July 2000 invited-stakeholder-group presentations to, and question and answer sessions with, the Working Group;
- September 2000 Open Houses at Falcon Lake, Kenora and Winnipeg, along with Community Meetings at Iskatewizaagegan #39 and Shoal Lake #40; and
- Mail-out and internet posting of the *Draft Watershed Management Plan* for public and community review/comment in September-October 2001.

The Working Group compiled and maintained a stakeholder contact list. Contacts received periodic newsletters and draft materials, were informed of upcoming events, and were encouraged to submit written submissions and comments. Written submissions, completed questionnaires and/or letters were received from several individuals and stakeholder organizations.

The following sections overview stakeholder input received by the Working Group during the plan-development process, and provide a summary of the group's use of this information in building a plan that respects and attempts to find a common ground among the diversity of interests.

8.2 NOVEMBER 1999 OPEN HOUSES

Purpose

- To make the public aware of the Shoal Lake Watershed Management Plan, the process being used to develop the plan, and the features of the watershed.
- To add to the information and issues collected by making the Working Group aware of their knowledge and concerns.
- To solicit comments on the draft Vision and Principles.

Comments on the Draft Vision and Principles

- The statements are good, but broad. "Excellent water quality" needs to be defined.
- What is a healthy ecosystem?
- Are the statements general enough to permit many possible uses?
- How do you define sustainability?
- Will the concerns of various groups be addressed in the best possible way when there are conflicting viewpoints?

Specific Concerns

- A number of comments were specific to the nature of the contact that the respondent had with the watershed, e.g. water quality for people who drink the water, lake levels and environmental quality for cottagers.
- Others had a more overarching concern for ecological integrity for the long term.
- Some respondents were pleased to see the level of collaboration among a number of governments, others were anxious to ensure adequate participation by stakeholders.

Working Group Response

The two key messages from this input—ensure that ecological integrity is protected and take into account the needs and interests of all stakeholders—have been taken seriously in the development of the Watershed Management Plan. The Water Study (see section 2.2.7 for details) shows the relationship between water quality and addition-

Community open house at Iskatewizaagegan #39 First Nation.

Taking the ferry from Iskatewizaagegan #39 to an open house at Shoal Lake #40.

al development, and indicates the varying capability of areas of the watershed to support lakefront development. Approaches to deal with all interests are imbedded in the objectives, management strategies and recommendations in the Plan.

8.3 MARCH 2000 FOCUS GROUP SESSIONS

Purpose

- To provide an opportunity for more in-depth discussions with invited representatives of stakeholder groups.
- To get reactions to Management Principles, but particularly to discuss the draft Management Objectives.

Public open house - Winnipeg.

Public open house - Kenora

Input Received

- Focus Group sessions were held in Kenora and Winnipeg.
- Seventeen representatives from 13 organizations participated in the Winnipeg Focus Group session while 5 groups represented by 7 individuals were present at the Kenora session. Representation included cottagers' associations, tourism, business/commercial operations, mining and forest industries, local area municipalities, researchers/academics, parks and protected areas/species groups, and drinking-water-quality protection interests.
- Concerns were raised about what mechanisms would be used to ensure that the watershed receives the level of protection that many participants feel it needs.
- Clarity was requested about the meaning of the word "community".

Community open house at Shoal Lake #40 First Nation.

- Some felt it was difficult to understand the Plan and how it would work without seeing an implementation strategy.
- Concepts such as sustainable development, bio-diversity, carrying capacity and sustainable harvest were challenging to some. Questions were asked about who decides on levels, do we know how to measure accurately enough, and isn't it safer to prevent additional development?
- There was strong support for ensuring that both ecological sustainability and watershed community(ies) sustainability are treated as high priorities.

Working Group Response

Additional objectives were added in Chapter 10, "Protecting Water Quality", regarding nutrients and trophic status, bacteria and other microorganisms, toxic and persistent substances, banned substances and aesthetic considerations. These provide more direction regarding the protection of water quality. Management strategies also lay out approaches to protection and enhancement of water quality.

Falcon Lake, Iskatewizaagegan #39 and Shoal Lake #40 are the communities located in the watershed. Each is concerned about developing and maintaining a sustainable economy to support its residents and existing businesses. The term "communities" was defined in this manner for purposes of clarity. The concerns of other stakeholders such as cottage owners and resource users are also important considerations in the Plan. A number of voluntary strategies are proposed, so that, for example, cottagers can assist in maintaining and enhancing water quality through use of state-of-the-art sewage disposal systems and through participating in monitoring programs.

Predictive water-quality and -quantity modeling tools arising out of the Water Study provide important means for assisting governments in making decisions about the extent and location of new developments. Objectives call for use of these and other "best available" decision-making tools to ensure that ecological integrity is protected while providing opportunities for the communities to be economically and socially healthy.

8.4 JULY 2000 STAKEHOLDER CONSULTATIONS

Purpose

- To provide an opportunity for in-depth discussion with stakeholders, in which the Working Group could get a better understanding of stakeholder concerns and stakeholders could better understand the nature of the Watershed Management Plan and the process used to develop it. Representatives of the Falcon/West Hawk Lake Chamber of Commerce, Treaty 3, and the Lake of the Woods District Property Owners Association participated.

Input Received

- All participants indicated that they share key concerns raised at earlier public–involvement sessions, i.e.

  – that ecological integrity and water quality be protected

  – that both Shoal Lake First Nations communities and the Falcon Lake community be supported in developing and maintaining viable economies

  – that residents continue to enjoy their properties, homes and activities in the watershed

- Each party was anxious that the Working Group understands the interests of their group and takes them into account in the development of the Plan.

Working Group Response

The Working Group recognized that the interests of these groups reflect the central purpose of the Plan – to put in place a framework which provides for ecological integrity and healthy communities/economies. This is the heart of the challenge of sustainable development. The Plan reflects this challenge in all of its management objectives, strategies and recommendations. Given the inter–jurisdictional nature of the watershed, a key element will also be collaboration among the governments involved in the preparation of this Plan. Development of this plan is an important step in a collaborative direction. The Plan's recommendations will indicate how that collaboration can be continued and fostered among all governments and all stakeholders.

8.5 SEPTEMBER 2000 OPEN HOUSES

Purpose

- To get public input on the draft goals, objectives and management strategies.
- To provide the public with an opportunity to learn about the management tools and processes being developed, to ensure that future community growth, resource development and resource use are appropriately assessed, regulated and managed in the shared interest of all stakeholders.

Input Received

- Strong support was shown for water quality monitoring, including offers of voluntary assistance from cottagers.
- Strong support was shown for involving all water users to ensure they are using "best management practices" to protect water quality, including putting in the necessary infrastructure such as the Falcon Lake lagoon.
- A comment was received that, "It should be possible to have ecological integrity and water quality along with healthy communities. On a world scale, this watershed has a very small population. With appropriate technology and practices, there is room for appropriate development."
- The concerns for ecological integrity/water quality and healthy communities were again raised.

Working Group Response

The Plan contains strategies and specific recommendations for guiding and involving stakeholders in protecting water quality. It also includes a number of recommendations intended to involve and support watershed stakeholders in building a better understanding of and appreciation for the watershed, and to involve them in implementing and supporting the measures necessary to sustain healthy and viable watershed communities and to protect the environment.

8.6 FALL 2001 PUBLIC AND COMMUNITY REVIEWS OF DRAFT PLAN

In early summer 2001, a complete draft of the management plan was circulated for internal review and comment by senior ministry/department staff. A number of minor changes were made following this review, and a final draft plan, dated August 22, 2001, was prepared for external review.

Notices regarding availability of the draft plan for external review were published in early September in a number of Winnipeg and Kenora newspapers, and were mailed to individuals and groups on the Working Group's stakeholders contact list. Electronically downloadable copies of the plan were posted on Manitoba and Ontario government web–sites and hard copies were made available for review at provincial government offices and First Nations band offices. The comment period extended for 30 days into mid October.

A total of nine responses were received. These represented a range of interests including individual cottagers, a cottaging association, a local chamber of commerce, a tourist operator, a mineral prospecting/development association, a non–government nature protection organization, and a freshwater scientist. Some respondents sought clarification of information contained in the draft plan, while others put forward requests and recommendations for strengthening certain aspects of the plan including suggestions on how their organizations might assist with implementation.

The Working Group used the feedback to modify the text in areas warranting greater clarity and to expand on or add to the plan's recommendations in other areas. A summary of the comments received and of the Working Group's response to them can be found in Appendix E.

PART III

FROM VISION TO ACTION

9.0 Developing Goals, Objectives, Strategies and Recommendations for Action

9.1 INTRODUCTION

This chapter sets the stage for the following three chapters, which document the directions, outcomes and Working Group recommendations for achieving the watershed Vision. Collectively they are intended to guide and assist individual and shared decision-making by governments, watershed residents, resource users and developers.

9.2 GOALS AND OBJECTIVES

Drawing on the input of its partners and of watershed stakeholders, the Working Group developed goals and objectives that more fully describe the direction and intent of the Vision Statement. They express WHAT watershed communities, seasonal residents, resource users, other stakeholders, governments and agency resource managers wish to see created, restored and/or maintained in the watershed.

While water resources are a focal point in all watershed management plans, the Vision Statement clearly speaks to the Shoal Lake Watershed Management Plan being more than a water-quality and -quantity management plan. The Plan recognizes and provides direction around the broader concepts of ecological and community health and sustainability. The Plan seeks to:

- Foster a workable and equitable balance among the physical, social and economic needs and interests of watershed communities and other stakeholders;
- Guide future development and use of land, water and other resources in a way that prevents or mitigates any undesirable impacts on water quality and quantity, and on the health and sustainability of fisheries and other aquatic resources; and
- Identify resource-based opportunities that could contribute to development of healthy and viable watershed communities.

9.3 MANAGEMENT STRATEGIES AND RECOMMENDED ACTIONS

Following the drafting of individual objectives in each of the three theme areas—protecting water quality, sustaining water resources, and achieving ecological and community sustainability—the Working Group formulated a set of HOW-TO strategies for meeting those objectives. These strategies reinforce, incorporate and adopt/adapt generic policies and practices shown to be effective in addressing the established environmental, social and economic targets.

The recommendations expand on these strategies by describing actions for improving practices among existing uses and users as well as actions for ensuring effective planning and management of new land and resource development in the watershed.

10.0 Protecting Water Quality

10.1 INTRODUCTION

Protection of the quality of the Shoal Lake watershed lakes and streams was found to be a recurring and shared theme among all watershed stakeholders and governments. The Working Group evaluated water quality protection needs from the perspective of the many water-dependent uses, while giving recognition to current and potential impacts of both natural and human factors.

Water quality goals, objectives and management strategies were structured around the common parameter or constituent groupings as referred to in federal and provincial water policies and objectives documents. These included:

- Nutrients and trophic status (section 10.3)
- Bacteria and other microorganisms (10.4)
- Toxic and persistent substances (10.5)
- Banned substances (10.6)
- Aesthetic considerations (10.7)

As was the case for other watershed objectives, the Working Group arrived at recommended water quality protection targets and strategic directions after consulting with stakeholders through the February 2000 Focus Group sessions and the September 2000 public Open Houses and First Nations Community Meetings.

The water quality protection strategies were further evaluated and reformulated as recommendations for specific actions to be taken by governments, watershed communities, existing resource users and future development interests in implementing the watershed plan. These actions are grouped according to the following categories:

- Pollution prevention (10.9)
- Best management practices plans (10.10)
- Sanitary wastewater treatment and disposal (10.11)
- Solid waste reduction and management (10.12)
- Enhanced monitoring (10.13)
- Data sharing, integration and management (10.14)

10.2 GOAL AND GENERAL MANAGEMENT STRATEGIES

The following goal, objectives, strategies and recommendations give recognition to the priority that stakeholders place on water quality and to the opportunities and challenges facing individuals, communities and development proponents in maintaining and, where practicable, improving this quality.

Goal

The waters of the lakes and streams of the Shoal Lake watershed are of a quality that supports, on a sustainable basis, the continuing enjoyment of all existing beneficial uses.

General Management Strategies

G *Harmonize traditional First Nations' values and knowledge, existing federal and provincial policies, guidelines, objectives and actions for water quality protection.*

G *Carefully plan new development, having proper regard for other uses and users and for watershed carrying capacity.*

G *Apply predictive models and other assessment tools for determining the potential for adverse cumulative or long-term impacts of proposed development.*

G *Adopt a pollution-prevention first approach.*

G *Use best management practices in all land use activities.*

G *Use best practicable treatment for all wastewater discharges.*

G *Promote development and use of innovative treatment technologies that reduce nutrient loadings.*

G *Promote the development of partnerships with individuals and organizations to monitor and enhance water quality and to foster public awareness and education.*

G *Monitor watershed management plan effectiveness and update as necessary.*

G *Encourage speedy resolution of any problems that may arise.*

10.3 NUTRIENTS AND TROPHIC STATUS

Objective

" *To protect watershed lakes and streams from possible adverse impacts of development on trophic status and on the production of nuisance algae.*

Management Strategies

G *Protect areas of known sensitivity by appropriately managing development in other areas of the watershed.*

G *Develop phosphorus management strategies to reduce, where practicable, the average ice-free-period total-phosphorus concentrations in lake areas currently at or above 20 parts per billion (ppb), such as Indian Bay, Snowshoe Bay and Falcon Lake, in advance of future development that would otherwise negatively affect water quality.*

G *Manage any projected development-related increases in the average ice-free-period total-phosphorus concentration in other areas, such as Clytie Bay, to a level of no more than 20 ppb and, where practicable, institute measures to maintain or reduce existing concentrations.*

G *Incorporate pollution prevention measures, best management practices, and best practicable treatment technologies for the control of nutrient inputs from both new and existing land, resource and community developments.*

G *Utilize the Lakeshore Capacity Model and other predictive tools, as appropriate, to assess the potential long-term impacts of any major new development proposals.*

G *Use a precautionary approach in granting development approvals.*

10.4 BACTERIA AND OTHER MICROORGANISMS

Objective

" *To minimize and, where practicable, prevent the development-related introduction of bacteria, viruses and other microorganisms that may be harmful to human and ecological health.*

Management Strategy

G *Promote use of systems for the collection, treatment and disposal of sanitary wastes from individual dwellings, businesses, institutions and communities, that incorporate best practicable technologies and sound operating practices for the elimination or effective control of the release of harmful microorganisms.*

10.5 Toxic and Persistent Substances

Objective

" *To ensure that the lakes and streams of the watershed are free from substances in concentrations that would:*
- *be toxic to fish, other aquatic life and wild life;*
- *accumulate in fish, plants and wildlife to levels that would be harmful to humans or to animals who consume them; and*
- *adversely affect human health through the consumption of water or other exposure.*

Management Strategies

G *Promote pollution prevention measures, operating practices, treatment technologies and siting considerations that minimize and, where practicable, eliminate the generation and discharge of toxic and persistent substances from new and existing development.*

G *Ensure, wherever possible, that forms of development which inherently involve some use, generation or storage of toxic substances are situated in areas remote from such things as public and communal water supply intakes, spawning grounds and fish migration routes.*

G *Ensure that existing and new manufacturers, users, transporters and managers of fuels, toxic chemicals and other potentially harmful substances undertake a comprehensive risk assessment analysis of the potential for accidental releases; incorporate approved operating practices for minimizing the risk of release; and have an approved contingency response plan in place.*

G *Promote the application of appropriate measures for the safe removal, deactivation or isolation of any contaminated sediments where their ongoing presence could have an adverse impact on water quality or ecosystem health.*

10.6 BANNED SUBSTANCES

Objective

" *To prohibit the manufacture, use, and storage in, and the unauthorized transport through, the watershed of banned substances.*

Management Strategy

G *Ensure that all places and activities within the watershed that could involve the presence of a banned substance are investigated and are subject to periodic monitoring. Banned substances, if present, are safely removed or controlled according to the applicable regulations or guidelines of the responsible government authority.*

10.7 AESTHETIC CONSIDERATIONS

Objective

" *To prevent development-related or use-related aesthetic impairment of lakes and streams including the release of substances that would:*
- *settle to form objectionable deposits;*
- *float as debris, scum, oil or other nuisance; or*
- *produce objectionable turbidity, colour, odour, or taste of water.*

Management Strategy

G *Ensure that new and existing developments and all resource-use activities in the watershed incorporate pollution prevention measures, operating practices and treatment technologies that will minimize and, where practicable, eliminate the generation and discharge of such substances.*

10.8 DEVELOPMENT OF RECOMMENDATIONS

The following sections describe those measures recommended for the long-term protection of water quality and for the collection of information that would be used in monitoring achievement of the objectives. The first two sections contain recommendations that apply to the many aspects of both existing and future land, resource and community development. The sections that follow present more specific recommendations regarding wastewater treatment and disposal, solid waste management practices, monitoring and information management.

10.9 POLLUTION PREVENTION

The Working Group has identified that incorporation of pollution prevention strategies should be an underlying premise governing the activities of all existing and future watershed users.

Pollution prevention refers to any actions taken in advance of, or in addition to, best management practices and "end-of-pipe" measures, in order to eliminate or significantly reduce potential risks to the environment. These actions could include siting considerations (e.g. excluding higher-risk manufacturing processes within the watershed, or creating adequate setbacks from watercourses); raw- and process-materials selection (e.g. finding safe alternatives to traditionally available herbicides, pesticides and other toxic chemicals); and the conservation of water, energy and other natural resources. Some best management practices, which are discussed in the next section, may also be considered to be components of a pollution prevention approach.

The existing OMNR *Shoal Lake Restricted Area Order* facilitates implementation of a pollution prevention approach to further development of the many existing patented mining claims located within the regulated area. The Order states that, "in the interest of the present and future residents, development will be restricted to those areas which, in the opinion of the Ministry, are best suited to development".

Under the *Restricted Area Order*, no building or structure may be erected, nor improvements made, upon any regulated lands except under authority of a permit issued under the *Public Lands Act*. Principles and guidelines are included for defining the basis upon which permit applications are reviewed and approved. These take into consideration several factors relating to the potential impact on, and compatibility with, other resource uses as well as the likely impacts on water quality.

The Manitoba Whiteshell Provincial Park Plan similarly provides a basis for regulating development within the Falcon Lake area. Within the Whiteshell Plan, the Falcon Lake area is designated for intensive recreation use. Policies, regulations and guidelines for striking the "balance between development and protection" have been set out in documents such as *The Cottager's Handbook for Manitoba Provincial Parks*.

Local water-use sensitivities associated with existing water-supply intakes and fish spawning grounds are of particular concern in relation to the location and operation

In 1995, in response to concerns expressed over potential risks to Shoal Lake water quality and drinking water supplies, Consolidated Professor modified its original development plans for the Duport Mine. Under the modification, chemical-processing operations would be relocated to a site outside the watershed. Royal Oak Mines endorsed a similar approach when they acquired the mining property from Consolidated Professor in 1996. An overview of current provincial regulatory approaches and environmental protection requirements as they apply to the mineral-development industry has been included in Appendix F.

of certain manufacturing processes, e.g. processing of mineral ores, and in relation to other activities such as fuel and chemical storage and handling. Special attention should therefore be expected on the part of governments and development proponents in addressing all measures necessary for the elimination or effective control of toxic or other noxious substances having the potential to impact on these uses.

Recommendations

WQ-1 *Governments, through the appropriate agencies, should continue to promote and apply individual site-level and broader-based pollution prevention approaches within the watershed communities and among resource users and other stakeholders. Such approaches could include regulation, increased education and awareness, the provision of technical assistance and, potentially, the use of other incentives. The coordination of interests, resources and expertise could be facilitated through working partnerships involving governments, resource user groups and development proponents.*

WQ-2 *Governments and development proponents should pay particular attention to any development proposal that is likely to involve the production, usage and release of any toxic substance that could present an unacceptable risk to sensitive uses including drinking water supplies and fish. Proponents of development activities such as mining should expect to initiate communications with stakeholders prior to seeking environmental permit approvals, and should be prepared to provide sufficient information regarding proposed pollution prevention strategies and measures.*

WQ-3 *Manufacture, use and storage of any banned substance within the watershed should be prohibited according to current provincial and federal government requirements. Where necessary, transport of any banned substance through the watershed, e.g. the transport of PCBs through the watershed, via the Trans-Canada Highway, to an approved disposal site, should be subject to all appropriate government guidelines and approvals.*

10.10 BEST MANAGEMENT PRACTICES

Watershed-wide implementation of best management practices (BMPs) can be an effective and practicable way of protecting water quality and minimizing other risks to the environment. These measures can also be important in building an atmosphere of shared ownership and trust among all stakeholders for the protection of the future of the watershed, its resources and its communities. BMPs should not, however, be viewed as a substitute for other measures that may be necessary to fully achieve the watershed Vision.

Best management practices applicable to some aspects of water quality protection may already be defined in current regulations. In many cases additional or more effective practices could be identified and implemented voluntarily. In either case BMPs can and should cover a full range of human activities including:

- Wastewater collection, treatment and disposal;
- Solid waste management including the 3 Rs, i.e. reduce, recycle and reuse;
- Storm-water runoff and erosion control;
- Transport, storage and handling of fuels;
- Transport, storage, handling and use of other hazardous substances (e.g. herbicides, pesticides, solvents and industrial chemicals);
- Protection and restoration of natural shorelands vegetation and habitats;
- Construction activities in or adjacent to lakes and streams (e.g. land clearing, excavation, landfilling, dock building);
- Navigation safety;
- Protection of hazard lands;
- Protection of wetlands, groundwater recharge zones and other sensitive sites/habitats;
- Water conservation and water use efficiency; and
- Environmental contingency planning and preparedness.

Recommendations

WQ-4 *BMP plans should be prepared (or appropriately updated/expanded where they already exist) for the three watershed communities, the Winnipeg water-intake facilities, existing resorts and camps, and any new developments of a similar scale.*

First Nations and local property owners groups, e.g. Lake of the Woods District Property Owners Association, can and currently do foster environmental awareness and the adoption of best management practices among their members through such means as traditional teachings, newsletters, other publications and group events.

WQ-5 *The participation and leadership of the Lake of the Woods District Property Owners Association and the Whiteshell District Association should be sought in promoting and implementing BMPs among Shoal Lake and Falcon Lake cottagers. Governments should provide assistance in prioritizing areas for improvement and in identifying those BMPs that might be most suitable.*

WQ-6 *Relevant BMP experience from other locations should be transferred and adapted for use in the watershed in order to expedite and simplify BMP development. Sharing of BMP experiences should be encouraged in order that other watershed residents and landowners can take advantage of the lessons learned.*

WQ-7 *Given the water quality interdependence between Lake of the Woods and Shoal Lake, the Working Group recommends that the partners involved, upstream, in the Rainy River Watershed Program should be encouraged and supported in their ongoing efforts to "protect, conserve and revitalize the Rainy River drainage basin". It also encourages the appropriate governments to promote and support similar best-practices water quality protection efforts by communities, businesses and landowners located within the broader Lake of the Woods watershed.*

10.11 SANITARY WASTEWATER TREATMENT AND DISPOSAL

The Water Study and water-modeling-development initiative help illustrate the opportunities that exist for protecting and, in some areas, improving existing water quality through improvements to sanitary wastewater collection and treatment systems. In general, centralized collection and treatment systems are more effective and efficient than individual lot-level systems in the removal of nutrients and other pollutants. In addition to providing a high level of pollutant removal, they also offer the opportunity to exercise control over other important factors such as the location and timing of effluent discharge.

The Lakeshore Capacity Model, used in development of this Plan, assumes that traditional septic tank – tile field systems and leaching pits become ineffective in removing phosphorus once the adsorptive capacity of surrounding soils is reached. This may occur relatively quickly or may happen over periods of ten years or longer. In recent years, a number of other lot-level wastewater treatment and disposal technologies have been developed and proven to be more effective in nutrient removal.

10.11.1 Watershed Communities

Manitoba Conservation has prepared plans for expanding and upgrading the existing Falcon Lake lagoon to address organic and hydraulic overloading concerns. The plans included a proposal to reroute the point of effluent discharge from the current Falcon Creek location to a wetland area downstream of Falcon Lake along the western side of the Falcon River. When application for design and construction approval (*Manitoba Environment Act*) was made in 1999, the lagoon proposal was circulated to other Working Group parties for comment under the parties' interim referral and review protocol. This review led to the decision to retain the existing discharge location.

Subsequent pre-construction site assessments in summer 2000 indicated that the original proposal to construct the lagoon cell liner from locally available clay was not feasible. Project initiation was delayed pending revision of the *Environment Act* license to permit use of a synthetic liner. Construction commenced in the fall of 2000.

Iskatewizaagegan #39 has recently completed construction and commissioning of a $3.7 million[101], 0.4 ML/d membrane technology wastewater-treatment facility. The plant, which incorporates use of the existing sewage lagoon cells, is designed to provide higher levels of pollutant removal (including phosphorus) than the lagoon. Final effluent will continue to discharge to a wetland at a point about 2.5 km north of Shoal Lake.

There are currently no formal plans to upgrade the Shoal Lake #40 community's sanitary wastewater treatment and disposal practices, which utilize lot-level septic-tank and -tile field systems. Many of these systems were installed or replaced in the early to mid 1990s and should still be performing quite satisfactorily.

The lakeshore capacity modeling results indicate that conversion to a centralized sanitary sewage collection and treatment system could significantly reduce the Shoal Lake #40 long-term phosphorus loading to Indian Bay, and create additional assimilative capacity in the bay. This in turn could accommodate the long-term projected growth of both First Nations communities while ensuring that there was no further development-related deterioration of the bay's water quality.

Some technological innovations in lot-level wastewater system design have proven successful in reducing the discharge of nutrients and other pollutants. Examples include zero- or low-discharge composting toilets, aerobic digestion systems, and peat or intermittent sand filters. New grey-water "irrigation" systems have also proven effective in reducing nutrient input to lakes and rivers. While some of these systems are available commercially, provincial regulatory authorities continue to take a cautious approach in evaluating and approving their use.

Recommendation

WQ-8 *Governments should work together to explore enhanced and innovative strategies and measures that could assist the three watershed communities in constructing, upgrading and operating sewage collection, treatment and disposal facilities that may be required to safeguard the water quality. These measures should take into consideration trends in population growth and plans for community economic expansion.*

10.11.2 Cottages, Resorts and Camps

Additional information about existing individual/communal on-site sewage disposal systems and methods in use at Shoal Lake and Falcon Lake is required in order to be certain about the current and long-term adequacy of these systems from the perspective of both bacterial and nutrient removal.

Recommendations

WQ-9 *A lot-by-lot survey of black-water and grey-water sewage systems serving existing cottages, resorts and other housing units in the watershed should be undertaken. Priority should be given to systems installed prior to 1990. Faulty or inadequate systems should be identified for corrective action.*

WQ-10 *Where new or replacement systems are considered necessary for the immediate or long-term protection of water quality, an emphasis should be placed on encouraging, or requiring as necessary, the use of technologies that will be effective in minimizing nutrient loading to the lakes.*

10.12 SOLID WASTE REDUCTION AND MANAGEMENT

Wastes generated at Falcon Lake are removed to a transfer station located outside the watershed and then trucked to Steinbach, Manitoba, for disposal. Similarly, wastes generated at the Winnipeg water-intake site are taken by rail back to the city for disposal. In addition, with the closure of the Iskatewizaagegan #39 on-reserve landfill site in the summer of 2000, there is no longer any ongoing landfilling of solid wastes within the boundaries of the Shoal Lake watershed.

The First Nations communities are now jointly using a landfill site located on a land use permit outside the watershed but within the extended study area adopted by the Working Group (see Map 1, back pocket, for outline of extended study area). It is situated to the east of the Shoal Lake Road about 1 km north of the Iskatewizaagegan #39 Reserve boundary. The site was approved by the Ministry of the Environment in 1987 and is operated by Shoal Lake #40 under authority of the (Ontario) *Environmental Protection Act*. It has an approved fill area of 2.5 ha within a total area of 7.25 hectares.

Since this landfill is not far from Crowduck Lake, First Nation #39 band members living near the lake have expressed concern over the recently expanded operations. Those concerns include issues regarding site capacity and the ability of local soils to fully attenuate leachate migration within the limits of the site boundaries.

Until recently, Shoal Lake cottagers generally used the OMNR-operated Sherwood Lake landfill, located outside the watershed about 12 km east of the Clytie Bay Road turnoff. Prior to the official closure of the Sherwood Lake site on May 15, 2001, cottagers were notified that their wastes would in future be accepted on a user-pay basis at the City of Kenora transfer station at Barsky's Hill. The Ministry is also seeking expressions of interest from persons interested in undertaking waste collection and transfer services for municipally unorganized areas west of Kenora, including Shoal Lake.

Recommendations

WQ-11 *A review should be undertaken of site design and operations at the Shoal Lake First Nations landfill to determine the remaining capacity and to assess the likelihood of leachate finding its way to Crowduck Lake through surface or underground drainage. Preventative or corrective measures should be undertaken as required.*

WQ-12 *All permanent and seasonal residents of the Shoal Lake watershed should be made aware of and should use best management practices for reducing waste generation and for taking advantage of available recycling and reuse opportunities. The assistance of the Whiteshell District and Lake of the Woods District property owners associations should be sought in promoting these practices among their members.*

10.13 ENHANCED MONITORING

The Water Study undertaken by TetrES Consultants Inc. identified a number of studies, surveys and monitoring-program enhancements that could improve future water quality assessment and modeling capabilities. The Working Group has carried forward those recommendations and has added a recommendation regarding monitoring-program partnerships here for the consideration of governments.

Recommendations

WQ-13 *A number of proposed enhancements to the existing water quality information base arose out of the Water Study. These include:*

- *Water temperature profiles in Falcon and High lakes;*

- *Algal species identification and enumeration during periods of bloom;*
- *Dissolved oxygen concentrations at lake bottom especially in areas that may be susceptible to anoxic conditions;*
- *Low-level analyses of metals and trace organic substances;*
- *Chemical sediment composition including nutrients, metals, persistent organics, and oxygen-reduction potential;*
- *Additional monitoring of nutrient enrichment indicators (phosphorus, nitrogen, chlorophyll "a", algal species and densities, macrophyte growth, and water clarity) in Indian bay, Snowshoe Bay, Clytie Bay and other lake areas that may be more susceptible to the effects of algal growth; and*
- *Evaluation of the impacts on water supplies, fisheries, recreation and other aspects of ecosystem health whenever blooms or nuisance conditions occur.*

The timing and full extent of their implementation should be periodically assessed in the context of data needs associated with future water quality modeling applications. (Note: recommended improvements to water-quantity-related monitoring programs are provided in Chapter 11, section 11.7).

WQ-14 *Working partnerships involving governments, the watershed communities, cottagers' associations, research and academic institutions, development proponents and other private sector interests should be promoted and used, where appropriate, to enhance the scope, efficiency and benefits of monitoring activities.*

10.14 DATA SHARING, INTEGRATION AND MANAGEMENT

The compilation, sharing and integration of water quality and other data were an essential part of developing this plan. These activities become even more important in the implementation of the plan and in the ongoing management of future development activities and resource uses within the watershed. The Shoal Lake watershed offers special challenges in undertaking the required integration because of the large number of government partners, agencies, and, potentially, non-government organizations and individuals involved.

Recommendations

WQ-15 *Data and information generated through studies, surveys and monitoring should be proactively shared among the parties participating in watershed management. Data-collection programs should be designed in a manner that ensures that the data produced are compatible with the necessary protocols in place regarding sampling, analytical and reporting methods.*

WQ-16 *A strategy should be developed for the effective compilation, integration, analysis, reporting, and management of those data that will be used in assessing progress and performance in Plan implementation and in identifying areas for improvement.*

Both the Ontario Ministry of Environment and Manitoba Conservation have assisted local cottagers' associations in initiating water quality monitoring programs. Support has typically consisted of help with program design, provision of some sampling equipment, and occasionally a limited range of laboratory analyses. A number of not-for-profit and private-sector organizations have also provided start-up assistance to local groups for environmental monitoring activities.

11.0 Sustaining Water Resources

11.1 INTRODUCTION

The Shoal Lake watershed can be considered rather unique in terms of its hydrologic and hydraulic character. Water-resource development decisions made in the late 1880s and the first quarter of the 20th century transformed the watershed from one that contributed relatively small but continuous annual outflows to Lake of the Woods to one that depends on the larger lake for maintaining water levels and sustaining existing uses.

There are no pending developments that would significantly alter the current hydrologic-hydraulic regime in the near future. Over the longer term, however, growth-related increases in Winnipeg's water needs, together with the possibility that climate change may reduce available flows in the Rainy River–Lake of the Woods–Winnipeg River system, suggest that some further alteration of Shoal Lake levels and water exchange at Ash Rapids may occur. Prior knowledge of the possible implications of these changes for both in-lake and extractive water uses will allow governments and stakeholders to formulate and implement adaptive measures as required.

11.2 GOAL, OBJECTIVE AND MANAGEMENT STRATEGIES

Goal

The allocation and use of the water resources of the Shoal Lake watershed, and the management of lake levels and stream flows, involve and respect the integrated consideration of the:

- *available supplies;*
- *needs of both extractive and in-stream/in-lake users and uses;*
- *maintenance of ecological integrity; and*
- *physical and jurisdictional connections to water resource management on the broader Rainy River–Lake of the Woods system.*

Objective

" *To allocate, use, conserve, manage and protect the water resources of the watershed in a manner that achieves a sustainable balance among available supply, ecological integrity and the needs of in-stream/in-lake and extractive uses.*

Management Strategies

G *Promote incorporation of wise use and conservation requirements and guidelines, as contained in the 1994 Canadian Council of Ministers of the Environment (CCME) "National Action Plan to Encourage Municipal Water Use Efficiency", in the management of all existing and new extractive water uses.*

G *Promote coordination in the management of water levels and flows within the watershed and, where practicable, within the broader Lake of the Woods drainage system, in a manner that recognizes both the bounds of ecological sustainability and the equitable accommodation of the needs, interests and entitlements of all watershed stakeholders.*

11.3 WATER CONSERVATION AND WATER USE EFFICIENCY

Over the last decade, Canadian governments, industries and the general public have become increasingly aware of the needs and benefits in the conservation and efficient use of water. Local shortages, the competition between extractive and in-stream uses, and escalating direct and indirect (e.g. wastewater treatment) costs in supplying and using water have provided incentives for change.

A variety of measures including some or all of the following: universal water-metering; more water-efficient fixtures; improved manufacturing processes; leakage correction programs; and conservation-oriented pricing strategies, are in use in many communities to reduce demand and waste. Changes in practices are fostered and assisted through government regulations, consumer education, subsidized retrofit programs, and the removal of capital infrastructure grants to municipalities for unwarranted water-system expansion.

Shoal Lake water usage is dominated by the Winnipeg water-supply diversion. While the City has reduced water demand and total water pumpage (20% reduction) since the late 1980s, long-term population and economic growth is likely to cause water demand and usage to increase proportionately in future years. On a shorter-term basis, dry years can significantly increase lawn watering and other seasonal outdoor water demands.

Recommendations

WS-1 *Existing water conservation and water-use efficiency actions of the City of Winnipeg should be assessed against the recommendations of the Canadian Council of Ministers of the Environment (CCME) "National Action Plan". Measures that would further reduce water demand and water use in all customer sectors should be identified and promoted.*

WS-2 *An assessment of water-use efficiency practices within the Falcon Lake and First Nations communities should be undertaken, and practicable measures to reduce usage and waste implemented.*

WS-3 *Given the lake-level and water-balance interdependence between Shoal Lake and Lake of the Woods, the Working Group also encourages promotion and implementation of water conservation and water-use efficiency measures among communities, businesses and landowners drawing waters from the Rainy River–Lake of the Woods system.*

11.4 WATER DIVERSIONS AND BULK REMOVALS

The Working Group heard concerns expressed regarding the impact of existing and increased water withdrawals on the water levels, water uses and the ecology of Shoal Lake. The TetrES water balance analysis indicated that the current Winnipeg water withdrawals, on average, exceed the natural water renewal capacity of Shoal Lake some 50% of the time. The consultant's analysis also concluded that Shoal Lake water levels are largely controlled by water-level operations of the Lake of the Woods Control Board and are not significantly impacted by the city's current water takings. The International Joint Commission's (IJC) 1914 authorization of the Winnipeg water diversion provides for this excess demand to be sustained by inflows from Lake of the Woods.

The 1913 Order in Council (OIC) of the Ontario legislature authorizes the City to withdraw a maximum of 100 million gallons per day (MG/d) (455 million litres per day (ML/d)) or about double the current average rate of withdrawal. Notwithstanding this authorization, the existing aqueduct size and design limits withdrawals to about 85 MG/d (386 ML/d).

The City recently examined the potential impact on the Shoal Lake water balance, and on flows through Ash Rapids, that would result from increasing its water taking up to the level of the aqueduct capacity and to the level of the Ontario OIC authorization. This study indicated that the frequency, duration and net quantity of inflows from Lake of the Woods at Ash Rapids would increase but that impacts on Shoal Lake water levels may be limited to certain times of the year.

When compared to the long-term average (1964 to 1997) conditions, the predicted water-level impacts resulting from increased water-withdrawal rates of 386 ML/d and 455 ML/d were a lowering of the Shoal Lake wintertime (December to mid April) water level by up to 0.07 m and 0.1 m, respectively. For a dry year, such as was observed in 1988, the lake's water level is predicted to decline by as much as 0.3 m if the City's water withdrawal was increased to and maintained at the maximum authorized taking. Implications for the lake's ecology and for other water uses were not determined, although it was concluded that a larger inflow of Lake of the Woods water might have a beneficial impact because of that lake's lower phosphorus and chlorophyll "a" levels.

In May 1999, Ontario enacted regulation O. Reg. 285/99 under the Ontario *Water Resources Act* that would appear to prohibit transfers (diversions or bulk removals) of water from Shoal Lake to any point outside Ontario or to any point in Ontario outside the Nelson River drainage basin. The existing water-taking approval granted by Order in Council to the Greater Winnipeg Water District is exempted from the regulation. Small-scale transfers of water in containers of no more than 20 L in volume, e.g. as might be associated with a bottled-water operation, are also exempted.

Recommendation

WS-4 *Data obtained through monitoring programs should be periodically evaluated to monitor what, if any, influence Winnipeg water withdrawals may be having on water levels and water uses of Shoal Lake, over and above the ongoing influences of Lake of the Woods water level regulation and fluctuations. The water balance and lakeshore capacity models should be used to assist in the determination of any longer-term impacts.*

11.5 POTENTIAL IMPACTS OF CLIMATE CHANGE

As discussed in Chapter 7, modeling results from a recent U.S. national study of climate change and variability indicate that the frequency, intensity and duration of wet and dry weather is expected to increase in coming years in many parts of North America including within the Souris, Red, and Rainy River basins. The study further indicated that average annual basin runoff in the region could fall significantly within the next 30 years as evaporation processes outweighed net increases in precipitation.

Researchers generally agree that further data collection, along with enhancement of available climate change models, is needed to improve confidence in the accuracy of current projections. Increased variability, along with a trend toward long-term net annual decrease in flows entering Lake of the Woods, might eventually require reconsideration of the existing water-level operating rules. This could potentially involve alteration in the range (maximum and minimum) of seasonal water levels that would be permitted. This in turn would impact on water exchange at

Ash Rapids and on water levels in Shoal Lake. It would therefore be essential that Shoal Lake interests (e.g. water supply, fisheries, recreation, navigation and shoreline protection) be properly assessed in the decision-making process.

Recommendation

WS-5 *Governments and other watershed stakeholders should keep abreast of climate change issues and projections and of their potential implications for Shoal Lake watershed interests. In the interest of efficiency and coordinated responses, monitoring of climate change research should be carried out in cooperation with the Lake of the Woods Control Board.*

11.6 COORDINATION WITH LAKE OF THE WOODS CONTROL BOARD

The water level and water flow control mandate and operating directions of the Lake of the Woods Control Board (LWCB) are critical determinants of average water levels and level variability in Shoal Lake. It is important therefore that the Shoal Lake watershed partners offer the LWCB a coordinated and balanced picture of the watershed interests relating to water levels.

Recommendations

WS-6 *The Shoal Lake Watershed Management Plan should be formally submitted to the Lake of the Woods Control Board for their information and use in carrying out their water management responsibilities in a manner that appropriately considers the collective interests of Shoal Lake stakeholders.*

WS-7 *Shoal Lake stakeholders should seek to coordinate and integrate their interests and expectations in water level and water flow management, and should communicate those interests to, and work with, the Lake of the Woods Control Board on a continuing and shared basis.*

11.7 ENHANCED MONITORING

The Water Study identified a number of deficiencies in the existing information base that hinder a fuller understanding of water availability, water budget and water exchange within the watershed. Recommendations to address these deficiencies were included in the study report.

Recommendations

WS-8 *The following recommendations arose out of the Water Study:*

- *Streamflow gauges should be established on both the Falcon River and Powawassan Creek, giving proper attention to the inherent difficulties in locating and operating gauges in such low-gradient streams;*
- *A system of recording-water-level gauges should be established on either side of Ash Rapids and on Shoal, Falcon and High lakes; and*
- *Existing bathymetric (depth) data and mapping should be expanded on Shoal, Falcon and High lakes.*

The timing and full extent of their implementation should be periodically assessed in the context of data needs associated with future applications of the water-quality and -quantity models.

12.0 Achieving Ecological and Community Sustainability

12.1 INTRODUCTION

While definitions and individual policies may vary somewhat, the concepts and principles of sustainable development, ecological sustainability and community sustainability are shared among the governments represented on the Working Group. Stakeholder consultation and input also demonstrated broad-based public support for managing development in a way that contributed to community sustainability, supported other interests, maintained biodiversity, and protected the overall health of the watershed ecosystem.

12.2 GOAL, OBJECTIVES AND MANAGEMENT STRATEGIES

Goal

The Shoal Lake Watershed is maintained and sustained as a healthy ecosystem with healthy and vibrant communities.

Objectives

- *To ensure that development- and resource-management activities within the watershed are ecologically sustainable and that ecosystem bio-diversity is maintained.*

- *To ensure the continuing availability of watershed land and resources for sustainable-development opportunities.*

- *To ensure that development- and resource-management activities within the watershed:*
  - *maintain or enhance the quality of life of watershed residents;*
  - *respect the culture and traditional way of life of Shoal Lake First Nations; and*
  - *promote the sharing of economic opportunities and benefits.*

- *To restore the walleye population and ensure the long-term health and diversity of the Shoal Lake fishery.*

Management Strategies

- *Recognize the desire of all communities in the watershed to work toward their long-term viability.*

- *Promote equitable sharing of the costs and benefits of maintaining water quality.*

- *Promote greater awareness and understanding of First Nations' treaty rights and traditional uses of watershed resources. Encourage the sharing and use of traditional ecological knowledge.*

- *Develop partnerships that assist the promotion and adoption of best management practices in all land- and resource-use activities.*

- *Promote and manage development and resource uses within the identified limits of carrying capacity and sustainable harvest.*

- *Develop a cooperative fisheries monitoring program (involving Shoal Lake First Nations, OMNR, and independent biologists) that will improve knowledge of Shoal Lake fish populations and provide information on the status of these populations as harvest takes place.*

- *Identify, for protection, special areas and values including cultural sites.*

12.3 ACHIEVING ECOLOGICAL SUSTAINABILITY

The ecology of the Shoal Lake watershed has been significantly altered, from its pre-development state, by a variety of major events and activities dating back to the late 1800s. These have included damming of the Lake of the Woods outlet, opening of the Ash Rapids channel, development of the Winnipeg water system, construction of the Trans-Canada Highway, human settlement and community development, mining, timber harvesting, and other resource uses. The effects of many of the activities have, in all likelihood, been incorporated within a new ecological balance. It is possible, however, that more subtle and longer-term ecological changes may still be occurring.

The Shoal Lake Watershed Management Plan has, as a primary focus, the protection and long-term management of water and aquatic ecosystems. Notwithstanding this, development of the Watershed Plan involved evaluation of terrestrial-based activities and land-water interactions. The Working Group supports the continued need for, and use of, other resource-planning mechanisms in ensuring the wise development and management of the watershed. This would include Crown-land planning, park management planning, forest management planning, protected

areas strategies, and the application of First Nations' traditional ecological knowledge and resource management strategies.

Recommendations

EC-1 *Decisions made in regard to future development within the Shoal Lake watershed should be mindful of the concepts of sustainable development and of existing government policies and public support for ecological sustainability.*

EC-2 *The Shoal Lake Watershed Management Plan should be used together with other land and resource planning mechanisms in the coordinated and integrated protection and management of both aquatic and terrestrial-based watershed ecosystems.*

EC-3 *Implementation of the watershed management measures and processes recommended in this Plan should be based on an effective understanding and blending of scientific knowledge and Shoal Lake First Nations' traditional ecological knowledge.*

12.4 BUILDING HEALTHY AND VIABLE WATERSHED COMMUNITIES

12.4.1 Iskatewizaagegan #39 and Shoal Lake #40 First Nations Communities

The Shoal Lake First Nations anticipate continued on-reserve population growth of about 2 to 5% per year. This is similar to the national projection of a 3% annual growth in on-reserve populations over the next decade. Consistent with the principles upon which this Watershed Management Plan is based, both First Nations communities also seek to significantly increase their share of the economic benefits to be realized from further development and use of watershed resources. They seek to do this while respecting their cultural traditions, exercising their treaty and Aboriginal rights, and pursuing objectives for the maintenance of water quality and the protection of the natural environment.

Business and employment-related initiatives being examined by one or both of the communities involve a variety of on- and off-reserve operations. These include, but may not be limited to, forestry, mineral exploration and development, fisheries, resource and culturally based tourism, golf course development, marinas and retail operations. The Shoal Lake #40 community has identified construction of the proposed bridge as essential to realizing many of its desired opportunities.

In addition to improving their economic opportunity base within the watershed, the Shoal Lake First Nations also aspire to a greater role for their governments and band members in the ongoing planning and management of resource development and use. Such aspirations are recognized by the federal government in "Gathering Strength – Canada's Aboriginal Action Plan", which states that "the [federal] government will work with First Nations, provinces and territories to strengthen the co-management process, and to provide increased access to land and resources".

Pursuant to the emerging Treaty 3 vision for implementing effective land and resource management, the Shoal Lake First Nations communities support the reinvestment of a portion of revenues generated through the development and use of watershed resources, as a foundation for carrying out necessary watershed management functions and activities. This vision is captured in the 1997 *Anishinaabe in Treaty 3 Resource Law* or *Manito Aki Inakonigaawin*. Treaty 3 First Nations have successfully worked with a number of development proponents in accordance with the concepts contained in the *Resource Law*[102].

Iskatewizaagegan #39 has also recently established the Shoal Lake Resource Institute, with a mandate to develop and market expert services in resource management. It desires to grow and operate the Institute in partnership with other governments, universities and the private sector.

Recommendations

EC-4 *Recognizing the significance of the watershed as the permanent home, and an essential source of livelihood, for the Iskatewizaagegan #39 and Shoal Lake #40 communities, governments, together with private-sector interests operating in the watershed, should promote and support expansion of resource-related economic opportunities for the First Nations peoples.*

In anticipation of proceeding with the Duport Mine development, Consolidated Professor Mines Limited (CPML) sought the input and cooperation of the Shoal Lake First Nations. These discussions, which took place in 1995, focused on creation of First Nations economic and employment opportunities, compensation for resource harvesters, and environmental monitoring. Prior to Royal Oak Mines acquiring a majority of the outstanding CPML shares in February 1996, CPML successfully concluded an agreement with Shoal Lake #40.

EC-5 *The First Nations communities, with the assistance of the federal and respective provincial governments, should commit to improving awareness and understanding of First Nations peoples' rights, cultural practices, and interests among non-native residents, resource users, and visitors to the watershed.*

EC-6 *The Watershed Management Plan should be used as a supporting document in obtaining necessary funding support for First Nations community infrastructure improvement projects such as sewer and water upgrades.*

EC-7 *Within their respective existing and developing Aboriginal policy frameworks, federal and provincial governments should acknowledge the aspirations of the Shoal Lake First Nations to move toward an expanded role in the management of watershed resources. Governments are encouraged to build upon the cooperation demonstrated in developing this management plan to support these objectives.*

12.4.2 Falcon Lake

The Falcon Lake townsite and waterfront area are the focus of an ongoing renewal strategy targeted at modernizing and enhancing existing commercial and recreational facilities. The objective is to sustain the area's attractiveness as a primary tourism destination within the southern Whiteshell District.

The Falcon Lake Chamber of Commerce envisages a minor expansion in rental accommodation (more resort units) together with associated recreational and service operations. At the same time, some Falcon Lake residents have stated their desire that any further development/redevelopment does not detract from the area's existing character and environmental quality.

Recommendation

EC-8 *Community development and renewal activities within the Falcon Lake area should be consistent with the Whiteshell Park Management Plan, having due regard for the measures necessary to sustain the natural environment and to protect the water quality of Falcon Lake and downstream areas.*

12.4.3 High Lake

Members of the Iskatewizaagegan #39 and Shoal Lake #40 communities have long practiced traditional uses such as fishing, hunting, trapping and gathering around High Lake. They also view the lake and surrounding lands with considerable cultural heritage interest. The deeper and colder-water character of the lake allows it to support a lake trout population not found in either Shoal or Falcon lakes.

In 1996, the Manitoba government gave approval for the Crown-land lease and development of six walk-in cabin lots along the western shoreline of High Lake. Construction of two cabins is currently underway with trail access from the end of the Falcon Lake south shore road. Within Ontario, there are several parcels of uninhabited patented land, with a total area of approximately 600 ha, extending from the eastern shores of High Lake out to the Shoal Lake Road. A portion of these lands was the site of a former experimental molybdenum mining operation.

Recommendation

EC-9 *In the case of further development of the High Lake area, necessary safeguards should be put in place to protect water quality of the lake and downstream areas and to maintain the relatively undisturbed character of adjacent lands. Any new development should also respect First Nations' cultural and traditional uses of the lake and surrounding area.*

12.5 ENSURING ACCESS TO AND BEST USE OF WATERSHED RESOURCES

The natural resources of the Shoal Lake watershed have attracted significant development interest and investment for more than a century. While water has been an important focus, the watershed also possesses valuable forest, mineral, fish, wildlife and aesthetic resources that continue to attract development activity and interest. Appropriately planned and managed, in the context of the watershed plan, such development can and should benefit watershed communities, investors and other watershed interests.

In addition to the obvious natural factors that determine resource types, distributions and values in the wa-

Where permitted in the watershed, resource development activities such as forestry and mining are subject to siting, planning, operating, and resource renewal, and/or closure requirements contained in existing resource development and environmental protection legislation. This may include, but is not limited to, the (Ontario) *Crown Forest Sustainability Act*, (Ontario) *Mining Act*, *Ontario Water Resources Act*, (Ontario) *Environmental Protection Act*, (Manitoba) *Forest Act*, (Manitoba) *Mines and Minerals Act*, (Manitoba) *Environment Act*, (Canada) *Fisheries Act*, the *Canada Environmental Protection Act*, and the *Treaty 3 Resource Law*. (See mining development example in Appendix F.)

tershed, a variety of policies and measures serve to focus the nature, location and intensity of development. These include land use guidelines, resource management guidelines and protected area designations.

Almost all lands and waters within the Manitoba portion of the watershed are located in either the Whiteshell Provincial Park or the Northwest Angle Provincial Forest. As part of a process outlined in the "Action Plan for Manitoba's Network of Protected Areas (January 1, 2000 – January 1, 2003)", the Government of Manitoba is also currently looking at potential sites in the western portion of the watershed for possible additional protection under the province-wide protected-areas initiative.

Within Ontario, development activities upon much of the northern and eastern watershed lands surrounding Shoal Lake is subject to controls under the existing *Public Lands Act Restricted Area Order.* More recently, a large land area on the eastern side of Shoal Lake (i.e. part of the Western Peninsula that separates Shoal Lake from Lake of the Woods) was set aside for further levels of protection under a Conservation Reserve designation. This change was a product of the Ontario Living Legacy program.

Recommendations

EC-10 *Outside of protected areas, the natural resources of the watershed should be available for appropriate forms and intensities of development and use. All resource development and use should be carefully planned and managed.*

EC-11 *Development of watershed resources should focus on best use and respect the limits of sustainability through:*

- *utilization of best management practices;*
- *optimizing investment returns;*
- *minimizing waste;*
- *implementing resource renewal programs; and*
- *converting non-renewable resource extraction sites to alternative and suitable forms of use upon site closure.*

12.6 ACHIEVING A SUSTAINABLE SHOAL LAKE FISHERY

Fisheries management issues were an important consideration in the Working Group's deliberations and are featured prominently in the recommendations contained in this Plan. The Working Group's recommendations arose out of the major fisheries background study undertaken, for the Working Group, by the Anishinabek/Ontario Fisheries Resource Centre (see section 7.4) and out of follow-up discussions by the fisheries task group.

To be successful, future fisheries management programs must respect the principles of sustainable use, provide for the protection of Aboriginal/treaty rights and needs of the First Nations communities, and provide reasonable opportunities for the angling public and tourist resort operators. The recommendations are therefore targeted at putting mechanisms in place that will allow for ongoing cooperative monitoring of the health and population status of the fishery, and for participation of all interests in developing and implementing an effective management program.

12.6.1 General Fisheries Recommendations

EC-12 *Future management of the Shoal Lake fishery should be cooperatively led by the Ontario Ministry of Natural Resources, the Shoal Lake First Nations communities and representatives of Grand Council Treaty 3. Management directions and activities should be assisted by a Shoal Lake Fisheries Advisory Committee with representation from the Shoal Lake First Nations, cottage property owners, the tourism industry, local anglers, Manitoba Conservation and Ontario Ministry of Natural Resources. The advisory committee would participate in the review and implementation of future Shoal Lake fisheries management regulations; in the development and implementation of associated monitoring programs; and in the development and implementation of fisheries habitat protection and enhancement initiatives. The committee should also take an active role in building public awareness, support and participation in fisheries management projects.*

EC-13 *The Advisory Committee should agree on the criteria to be used in assessing fish populations, including indicators such as mean age, number of year classes, and proportion of mature fish. Data collection programs involving commercial harvest reporting and sampling, subsistence harvest reporting, and sport fish creel diaries should be developed and prioritized by the committee as input to making appropriate management decisions. Results should be shared in a timely manner and the committee should meet at least once per year to discuss the results and to develop a work plan for the following year.*

EC-14 *As the data indicate improvements or declines in fish populations, management strategies should be adjusted accordingly.*

12.6.2 Individual Species Recommendations

Walleye

EC-15 *The fall walleye index-netting technique should be used to assess the status of the population over time. The program should be conducted over two consecutive years every 5 to 6 years. Based on the existing understanding of walleye population status and the current level of subsistence harvest, it is recommended that no immediate changes be made to the fishery. If additional monitoring indicates a sufficient increase in walleye population, the Shoal Lake Fishery Advisory Committee should meet to*

consider harvest options, with appropriate recognition given to the needs and aspirations of the local First Nations communities.

EC-16 *Given that the Shoal Lake walleye population is recovering at a slower rate than is acceptable to many users under existing uses, a review should be undertaken by the advisory committee to assess suitable options for accelerating the recovery.*

EC-17 *It is recommended that the walleye fishery, when fully recovered, be managed within a total annual harvest of 54,560 pounds (24,800 kg).*

Northern Pike

EC-18 *The northern pike population on Shoal Lake appears stable and suitable for development of a high-quality angling fishery. It is recommended that the northern pike population status be monitored on an ongoing basis and that consideration be given to using the fall walleye index-netting program as a means of obtaining suitable information on pike. If this program is not suitable, a spring season trap-netting program and a limited index-netting program should be used in trend monitoring.*

EC-19 *Total pike harvest from the lake should not exceed 48,000 pounds (22,000 kg) per year for all users.*

EC-20 *At the present time, most pike are being taken in the First Nations commercial fishery. If the communities' interests shift to a recreation-based fishery, suitable options should be considered for ensuring its maintenance and enhancement as a high-quality pike fishery.*

Lake Whitefish

EC-21 *Lake whitefish are presently harvested exclusively by the First Nations commercial fishery. The population appears healthy and should be able to sustain a yearly harvest of 50,000 pounds (22,727 kg). It is recommended that regular monitoring of commercial catch be implemented with no less than 200 samples taken each year.*

EC-22 *Lake whitefish also could provide an enhanced opportunity for the First Nations communities through establishment of a winter recreational fishery. A review of suitable angling techniques and locations should be undertaken.*

Smallmouth Bass

EC-23 *The smallmouth bass recreational fishery on Shoal Lake is known as a high-quality fishery with excellent catch rates and high numbers of large fish. It is recommended that options for maintaining and enhancing this fishery be examined with an emphasis on a catch-and-release and limited-harvest approach. An angling creel diary program would be helpful in monitoring trends in this fishery. A representative number of fish from the annual Shoal Lake First Nations bass fishing tournaments should be monitored on a regular basis.*

12.6.3 Mitigating Fishery Impacts at the Winnipeg Water Intake

In 1995 the City of Winnipeg commissioned a study to investigate fish losses associated with the intake facility. The study was conducted in the spring of that year and examined losses of eggs, larvae, juveniles and adult fish through both entrainment and impingement or entrapment on the debris screens. The species examined included walleye, lake whitefish, white sucker and yellow perch.

Total egg and larvae losses of walleye were determined to be the equivalent of the spawning production potential of 53 adult females. Lesser entrainment losses of whitefish larvae and some impingement of juvenile yellow perch were also reported. Within the limits of the two-month duration of the sampling activity, the study's authors concluded that the observed losses were not considered biologically significant given the size and productive capacity of Shoal Lake. To improve confidence in the significance of the results, they recommended that the spring sampling be repeated in another year and that a late summer and fall impingement assessment also be carried out.

More recently, the City has concluded that it has sufficient reservoir capacity to allow a substantial reduction in water withdrawals during the whitefish-spawning season. These operating changes would lower water velocities at the entrance to the intake and therefore should reduce the scale of entrainment and impingement losses. Following discussions with representatives of Fisheries and Oceans Canada, the City of Winnipeg commissioned another study in the spring of 2001 to further review the significance of fish spawning losses at the intake and to assess appropriate mitigation strategies[103].

Recommendation

EC-24 *The City of Winnipeg should work with Fisheries and Oceans Canada, the First Nations communities and, as necessary, with the appropriate provincial agencies, to identify and implement suitable measures for minimizing the impact of the intake on fish populations. These measures should, at a minimum, address losses of both walleye and lake whitefish.*

12.7 MANAGING THE HIGH LAKE FISHERY

Within the Shoal Lake watershed, High Lake is unique in that it supports a cold–water lake trout population. Community members from Iskatewizaagegan #39 and Shoal Lake #40 First Nations have long practiced traditional uses including fishing, hunting and trapping there, and have considerable cultural, resource and economic interests in the area's lands and waters.

Recommendation

EC-25 *A fisheries resource inventory and management plan should be developed for High Lake with input from the Shoal Lake Fishery Advisory Committee. The plan should consider and recognize the interests of the First Nations, Manitoba and Ontario in future management options for the lake and should incorporate the fisheries management principles and actions agreed to by Manitoba and Ontario in their 1985 border lakes memorandum of understanding (MOU).*

PART IV

IMPLEMENTING THE MANAGEMENT PLAN

13.0 Enhancing Existing Management Practices

13.1 INTRODUCTION

There is a complex array of provincial and federal legislation, policies, programs and processes involved in reviewing and regulating the potential environmental effects of existing and proposed development and resource-use practices in the watershed. There are also many government programs that can provide local communities and resource-development interests with logistical, technical and, in some cases, financial support in the consideration and development of economic growth opportunities.

Inherent geopolitical issues and complexities associated with the watershed have raised questions with respect to regulatory program application and harmonization among and between the jurisdictions. Are there equivalent requirements for environmental protection? How are stakeholders concerns addressed in decision-making? What provisions exist for stakeholders in another province to see and comment on new development proposals? Do First Nations have sufficient opportunities to participate in the review of proposed development activities that could impact on their communities and traditional interests? How can the First Nations communities more fully share in the benefits associated with ongoing development and use of watershed resources?

The governments' support for the development of a watershed management plan sets the stage for enhanced inter-jurisdictional coordination and cooperation in future decision-making.

It is unlikely that effective implementation of the Shoal Lake Watershed Management Plan would require or benefit from changes to existing legislation. Strategies and actions recommended in this Plan are intended for implementation within the mandates and regulatory tools already available to the partners. Minor extensions of some communications and consultation processes, where appropriate, may assist in ensuring stakeholder awareness and support. Implementation could be facilitated through a memorandum of understanding (MOU) among the governments. The MOU would define the basis for ongoing cooperation.

13.2 GOAL, OBJECTIVES AND MANAGEMENT STRATEGIES

Goal

The watershed management plan and resulting management framework effectively and efficiently guide development and land-use planning decisions that have due regard for the needs and concerns of First Nations, watershed stakeholders and other interests.

Objectives

- *To provide for consistent, open, fair and inclusive decision-making processes.*
- *To facilitate the integration of initiatives that could contribute to achieving diversified and sustainable watershed economies.*

Management Strategies

- *Encourage development proponents to seek mutually beneficial economic development opportunities with First Nations.*
- *Coordinate watershed management actions taken in support of community health and sustainability with other planning initiatives.*
- *Encourage development proponents to be proactive in informing and involving resident communities, stakeholders and other interests.*
- *Continue, refine and enhance the Interim Notice and Review Protocol based on the experience gained.*

13.3 PROACTIVE COMMUNICATIONS

Proactive communications with and among watershed stakeholders improves awareness and understanding of in-

Some other initiatives with known or potential synergistic connections to watershed planning include economic development planning, social services planning and health care planning. (See section 13.5.)

terests and objectives. In the case of resource use and development planning, these contacts can also aid in identifying shared interests and in avoiding conflicts, including those that may interfere with First Nations' traditional uses and cultural sites.

Greater flexibility exists early in the project-planning process to make mutually acceptable decisions around such issues as harvest/production areas, facility siting and design, road access, and harvesting/manufacturing processes. Good communication can also aid in promoting and identifying opportunities to share in the distribution of jobs and other economic spin-offs that will directly benefit local communities.

Recommendations

MP-1 *Proponents of industrial, commercial, multi-residential or all-weather-access development projects should be proactive in communicating with the watershed communities and with other stakeholders at all stages of development planning and implementation.*

MP-2 *Proponents should initiate contact and share information at the earliest possible stage, i.e. before project directions are set and prior to the submission of environmental permit applications, in order to ensure other watershed interests are factored in. These interests should include specific opportunities for the Shoal Lake First Nations to participate in and benefit from project development and operations.*

13.4 DEVELOPMENT NOTIFICATION AND REFERRAL PROTOCOL

The Interim Development Notification and Referral Protocol (see Appendix G), put in place by the Working Group during development of the Watershed Management Plan, has assisted and improved communications among the partners regarding new development proposals and other initiatives.

Recommendations

MP-3 *The Interim Notice and Referral Protocol should be continued and formalized through an MOU. The intent of the process is to ensure that the partners have the opportunity to review and comment on all development proposals that have a likelihood of impacting on their interests.*

MP-4 *The criteria for identifying projects or initiatives warranting referral should be periodically reviewed and adjusted, and the protocol streamlined as required. Review and refinement could be carried out at the end of the first year and at suitable intervals thereafter.*

MP-5 *Smaller development proposals whose environmental risks can reasonably be expected to be inconsequential would not require referral. These could, however, be verbally shared with other government partners and documented, where appropriate, as a means of maintaining a shared record of new watershed development.*

13.5 COORDINATION WITH OTHER PLANNING INITIATIVES

In recent years governments and their agencies have focused increased attention on integration and coordination in program design and delivery. Changes are being driven by public demands for smaller government and greater economic efficiency, and in recognition of the overlapping and sometimes contradictory purposes or outcomes of government initiatives operating within the same communities and geographic areas. By bringing stakeholders and their watershed-related needs and interests together, this Management Plan can assist and guide the development and implementation of other programs such as forest management planning, parks and protected areas planning, community economic development planning, and community health and social services planning.

Recommendation

MP-6 *The Shoal Lake Watershed Management Plan should be used as a guide in the design and delivery of resource-related programs that provide direction and services to watershed communities and to stakeholder activities in the watershed. These programs should be implemented in a way that supports the attainment of the watershed Vision. Opportunities to integrate and cooperate among governments, programs and agencies should be identified and acted upon.*

Both formal (legislated) and informal processes and practices exist at the federal and provincial levels for consulting with and involving other governments, stakeholders and the general public with respect to both public and private development proposals. In addition, the practices and requirements for consulting with First Nations on resource development matters are continuing to evolve in the context of governance negotiations, land claims negotiations, court decisions, and policy refinement at both federal and provincial levels.

14.0 Recommendations Regarding Next Steps

14.1 INTRODUCTION

Since its formation in the fall of 1998, the Shoal Lake Watershed Working Group has been an important forum for bringing governments together around a shared purpose, and a vehicle for reaching out to stakeholders. The Working Group has:

- established new contacts and working relationships among governments and agencies;
- formulated a watershed Vision, general principles, goals, objectives, strategies and recommendations for the appropriate guidance and wise management of community growth, resource development and environmental protection;
- reached out to stakeholders and involved them in setting future directions that reinforce shared interests and find a workable balance in areas where interests may overlap or conflict;
- compiled an extensive knowledge base about the watershed, undertaken a number of studies that have filled important holes in that knowledge, and developed tools that will assist in evaluating and guiding future development; and
- established an intergovernmental notice and referral protocol (see Appendix G), to provide broader opportunities for examining and commenting on development proposals.

In this as in other planning initiatives, it is important that the focus and momentum provided through the partners' support of the Working Group are not diminished. Governments and agencies individually and cooperatively need to support implementation of the Plan within the context of their own organizational priorities and according to their available resources. Successful implementation will also require the commitment of ongoing interest, initiative and resources of the watershed communities and other stakeholders.

The Working Group has facilitated the establishment of improvements to existing processes, e.g. the interim notice and referral protocol that makes other partners aware of, and gives them an opportunity to comment on, new development proposals. Such enhancements can continue with little or no added burden on agency budgets or staffing.

The Working Group is also aware that some of its recommendations call for new initiatives and extensions to existing programs and activities that may impact on government budgets and staff allocation, as well as place additional expectations on cooperation from watershed communities, cottagers, resource users and other stakeholders. Examples of these are the recommendations regarding enhanced water-quality and -quantity monitoring, the surveys of cottage wastewater disposal systems, and the development and implementation of best management practices plans.

All recommendations are being put forward with a view that they are important, if not essential, to overall success in achieving the Plan's vision, goals and objectives. Nevertheless, the Working Group supports their phased implementation. Thoughtful consideration of priorities, and of opportunities to effectively combine and integrate human resources and dollars among the government partners and agencies, and between government and watershed stakeholders, will ensure the best possible result at a reasonable cost.

14.2 RECOMMENDATIONS

IM-1 *The Working Group recommends that the governments establish, through an MOU, an Implementation Coordination Team to be put in place by September, 2002. The team would ensure continuing cooperation, setting of priorities and fostering of partnerships. The team should be small in number and include representatives of each partner government. It should meet at least twice a year.*

IM-2 *Implementation priorities should be set for the immediate term (within 1 year), medium term (2 to 4 years) and longer term (>4 years).*

IM-3 *Progress in implementing the Shoal Lake Watershed Management Plan should be reviewed at regular intervals, e.g. 3 to 5 years. Updated information on environmental conditions and trends; on land- and resource-development activity within the watershed; and on progress in implementing the Plan's recommendations should be prepared and disseminated to all interested parties. Stakeholder involvement in progress reviews should be encouraged and the information collected should be used to update the Plan as required.*

APPENDICES

Appendix A

Glossary of Terms

Aboriginal and Treaty Rights

The existing Aboriginal and treaty rights of the First Nations peoples of Canada as recognized and affirmed by section 35 of the *Constitution Act*, 1982. Treaty rights include rights that now exist by way of land claims agreements or may be so acquired (s. 35(3)).

Assimilative Capacity

The ability and upper limit of a water body to absorb, transform or incorporate a substance such that water quality does not degrade below a predetermined level that would adversely impact one or more water uses.

Banned Substance

A substance, typically a highly persistent toxic substance, that has been placed on one or more federal or provincial lists of substances whose manufacture, use, and storage/possession is prohibited.

Beneficial Water Use

Any use of water which supports, or which results in a benefit to, persons, plants or animals. This includes use of water as a source of potable and non-potable water supply, irrigation, recreation, aesthetic enjoyment, hydropower production, navigation, waste assimilation, and as an environmental substrate.

Best Management Practices (BMPs)

Technologies, application methods, operating systems, or planning and siting considerations that applied individually or collectively to land use, resource use or development activities can minimize the generation and release of contaminants into the ambient environment.

Best Practicable Treatment

Readily available, reasonably affordable and proven technologies and their operating systems that can minimize the generation and release of contaminants into the environment. May also be referred to as "best available treatment economically achievable" or BATEA.

Biological Diversity (Bio-diversity)

The nature and extent of variations among living organisms within terrestrial and aquatic ecosystems and within the ecological complexes of which they form a part.

Buffers and Setbacks

Land areas adjacent to lakes, rivers, streams and other sensitive habitats where construction and development activities are not permitted or where such activities are effectively regulated so as to prevent adverse impacts on important habitat features and characteristics including water quality. Use of buffers and setbacks can be considered as best management practices.

Carrying Capacity

The limit of ecosystems, both terrestrial and aquatic, to absorb or tolerate additional development without suffering ecological change beyond a predetermined level of acceptability.

City of Winnipeg Water Supply

Although commonly referred to as the Shoal Lake water supply, the City of Winnipeg water supply also draws on waters of Lake of the Woods. Authorization of the City's water taking is provided for in, and is subject to, the terms and conditions of enabling legislation consisting of:

- Senate of Canada Bill B4, assented to June 6, 1913, enabling the Greater Winnipeg Water District (GWWD) to obtain water supply from a source outside the Province of Manitoba;
- Province of Ontario Order in Council, approved October 2, 1913, authorizing the GWWD to obtain water from Shoal Lake; and
- International Joint Commission (IJC) Opinion and Order of Approval, dated January 14, 1914, in the matter of the application of the GWWD "for approval of the diversion of the waters of the Lake of the Woods and Shoal Lake for sanitary and domestic purposes".

Communities / Watershed Communities

The expressions "communities" and "watershed communities" are used by the Working Group to refer to the resident communities of Iskatewizaagegan #39 Independent First Nation, Shoal Lake #40 First Nation and Falcon Lake. (See also "Communities of Interest" and "Stakeholders".)

(Other) Communities of Interest

Individuals and groups concerned about the watershed for reasons which do not necessarily involve property rights. Interests of these parties may include the protection of water quality for recreation; the availability and quality of angling and hunting opportunities; and the protection of other natural resource values. (See also "Stakeholders".)

Ecological Integrity

Ecological integrity refers to the integrated consideration of ecosystem structure, composition, and function over the elements of space (any size) and time (any season, year, decade, etc.). Ecosystem resilience to natural and human disturbances is also considered.

Ecological Sustainability

The condition that results when human activities are managed so that ecosystems, their structure and composition (i.e. species/type, form and hierarchy of living and non-living components) and function (e.g. water cycle, nutrient cycling, and energy flow) and the processes that shape them can continue at appropriate temporal and spatial scales.

Ecosystem

A dynamic complex of all plant, animal and microorganism communities and their non-living environment interacting as a functional unit.

Environment / Natural Environment

The components of the Earth including:

- air, land and water;
- all layers of the atmosphere;
- all organic and inorganic matter and living organisms; and
- interacting natural systems that include the components referred to above.

Excellent Water Quality

Use of the expression "excellent water quality" in the Vision Statement, affirms the partners desire that all open waters of Shoal Lake, Falcon Lake and High Lake will continue to routinely meet or exceed (i.e. be better than) existing national and provincial water objectives and will continue to support a wide variety of sensitive water uses. The Shoal Lake Watershed Working Group acknowledges that the concept of "excellence" is a subjective one and affirms that its use is not intended to imply the adoption of a specific water quality ranking system.

Extended Study Area

The Working Group focused on the natural resources, activities and issues of the Shoal Lake watershed. It did, however, agree to also address measures that might be necessary and appropriate to protect the water quality of nearby Crowduck Lake. Crowduck Lake lies immediately outside the eastern boundary of the Shoal Lake watershed and physically drains to Rush Bay on Lake of the Woods. Iskatewizaagegan #39 First Nation Reserve lands (IR 39A) incorporate the western end of Crowduck Lake and the band has constructed dwellings adjacent to the Lake. (See Maps 1 and 2, back pocket, for location of Crowduck Lake and boundary of IR 39A.)

Hazardous Substance

A chemical or other substance that is persistent, accumulates in living tissues, is extremely toxic and that, individually or in combination with other substances, can cause death, disease including cancer, behavioural abnormality, genetic mutation, physiological malfunction and/or physical deformity.

In-Stream or In-Lake Water Use

A water use which occurs within or upon a body of water including the support of all forms and stages of aquatic plant and animal life; swimming, bathing, boating or other water-based recreation; navigation; and run-of-the-river hydropower generation.

Mixing Zone

That portion of a water body contiguous to a point-source discharge where water quality may not comply with one or more water quality objectives. A mixing zone should not be permitted as an alternative to reasonable and practicable treatment and should be kept as small as possible. Conditions of acute toxicity to aquatic life should not exist within an approved mixing zone.

Non-Renewable Resource

A natural resource including an ore, mineral or fossil fuel that is not naturally replenished within time frames relevant to human society.

Persistent Toxic Substance

A substance with an environmental half-life in excess of 50 days, where environmental half-life refers to the length of time required for the substance to lose 50% of its toxicity.

Pollution Prevention

The use of alternative processes, practices, materials, products, substances or forms of energy that avoid or minimize the creation of pollutants and waste and thus reduce the overall risk to the environment or human health.

Protected Areas

Crown land areas designated and regulated through provincial legislation for the purposes of permitting certain uses while restricting other incompatible uses. In Ontario, such areas are protected as Provincial Parks under the *Provincial Parks Act* or as Conservation Reserves under the *Public Lands Act*. Similarly in Manitoba, designation is made under the *Provincial Parks Act* or the *Ecological Reserves Act*. Logging, mining and hydroelectric-power development are not permitted within a Conservation Reserve (Ontario). In Manitoba, protected areas are designed to be free from logging, mining, hydroelectric-power development, oil and gas development, and other activities that could significantly and adversely affect natural habitat.

Renewable Resource

A natural resource including a plant, animal or other biological resource that is naturally replenished, renewed or sustained in terms of quantity and quality within a timeframe that is short enough to be relevant to human society.

Riparian Rights

The common-law rights of owners of property along a river or shore of other bodies of water to make reasonable use of the waters that would naturally flow past their land.

Secchi Depth

The Secchi disk is a mechanical device used to measure the depth of natural light penetration in a lake. This depth is referred to as the Secchi depth.

Stakeholders

Stakeholders include individuals, companies or groups with property rights or similar entitlements in the watershed. Examples include cottagers, trappers, bear management agreement holders, baitfish block holders, the mining industry, the forestry industry, the City of Winnipeg, and the resource-based tourism industry. **(**See also "Communities of Interest".)

Sustainable Development

Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

Sustainable Harvest

The maximum allowable taking, for whatever purpose, of a renewable natural resource beyond which the resource can not sustain itself or be sustained by accepted and approved renewal practices.

Sustainable Use

The utilization and ongoing management of a natural resource in a manner that ensures that the resource will be adequately protected for indefinite future use.

Traditional Ecological Knowledge (TEK)

The knowledge, history, values and beliefs held by indigenous peoples pertaining to human and other interactions occurring with and within the natural environment. This knowledge may be passed from person to person and from generation to generation through oral and written record and through cultural and spiritual practices.

Toxic Substance

A substance capable of producing an adverse response, ranging from injury to death, in a living organism.

Trophic Status

The degree of nutrient (phosphorus and nitrogen) enrichment of a water body that contributes to and reflects measurable changes in physical and biological characteristics, including the type and intensity of algal growth, the level of dissolved oxygen in bottom waters and the depth of light penetration. Waters exhibiting low levels of nutrient enrichment are referred to as oligotrophic, while those exhibiting moderate and excessive enrichment are referred to as mesotrophic and eutrophic, respectively.

Vegetative Naturalization / Renaturalization

The retention or restoration of indigenous (native) plants, shrubs and trees in shoreline and other areas for the purposes of reducing soil erosion and minimizing the movement or loss of nutrients and other pollutants from land to water.

Water Balance

The net effect on water levels and flows of all processes involved in the water cycle. These processes may include precipitation, runoff, evaporation, evapotranspiration, infiltration, groundwater discharge, lake-to-lake interchange, storage and withdrawal/diversion/removal.

Water Conservation

The management and preservation of the quantity of available water resources through measures such as wise and efficient use, reuse, and the minimization of loss and waste.

Water Quality Objectives

Numerical and narrative criteria which serve as chemical, physical, biological, microbiological, radiological or other indicators or measures of a satisfactory condition pertaining to a particular water use or uses.

Water Withdrawal and Diversion

A water withdrawal or extractive taking is any use of water that does not occur in-lake or in-stream. Withdrawals become diversions where the water is taken for use outside the watershed and not returned to the source-lake or stream.

Watershed

The area of land that naturally drains, or is drained, to a common outlet, i.e. to a downstream river, lake or other body of water. It includes all lands, wetlands, creeks, rivers and lakes contained within the area.

Watershed Management Plan

An integration of ecologically oriented and consensus-based directions and guidelines intended for use by watershed managers, land and resource developers, and other stakeholders in making individual and shared management decisions concerning existing and future land and resource use practices and development activities. A watershed management plan can help guide development and implementation of policies, programs and actions that contribute to attainment of agreed-upon social, environmental and economic goals. The best plans make use of available scientific, traditional and local knowledge and draw on successful planning experiences and practices from other locations.

Appendix B

Water Quality Sampling Periods and Parameter Coverage Shoal Lake[4]

Agency	Locations	Period of record	Sampling frequency and duration	Parameters	Comments
Manitoba Conservation	See Figure B-1	1991-1995 1996-2001	February & March and approximately monthly from May to October. February, June, August and October.	See Table B-1	For some years, sampling was also conducted in the vicinity of the Kenora Prospectors and Miners site (Bag Bay) and the Duport Mine site (Stevens Island). Data are also available for Falcon Lake for the periods 1974-75 and 1992-98.
Ontario Ministry of Environment	See Figure B-1	1988-1993	Generally twice per year between early summer and early fall.	See Table B-1	Data for a limited number of Shoal Lake locations are also available for surveys carried out in 1973, 1974, 1976 and 1982. For some years, sampling was also conducted in the vicinity of the Kenora Prospectors and Miners site (Bag Bay) and the Duport Mine site (Stevens Island). See Figure B-1. Limited water quality sampling of High Lake was conducted in 1981 and 1982.
City of Winnipeg	Water intake Shoal Lake stns. See Figure B-1	1991-2001 1994-1998	Variable from daily to monthly. Monthly from June to October.	See Table B-1 See Table B-1	

[4]Some agencies, organizations and independent researchers, other than those identified above, are known or believed to have conducted water quality sampling and analyses in the watershed on a more limited and issue-specific basis. These include the Freshwater Institute (Winnipeg), University of Manitoba, University of Winnipeg, and Health Canada.

Table B-1. Shoal Lake water quality parameter list[5].

Parameter	Manitoba Conservation	Ontario Ministry of the Environment	City of Winnipeg	
			Water intake	Lake stations
Temperature	√		√	√
Secchi depth	√			√
Conductivity	√	√	√	
pH	√	√	√	
Dissolved oxygen	√			√
Total solids	√	√	√	
Total dissolved solids	√	√		
Total suspended solids	√	√		
Turbidity	√		√	√
Colour	√		√	
Threshold odour number			√	
Chlorophyll “a”	√		√	√
Plankton count	√		√	√
Acidity (CaCO3)		√		
Total alkalinity (CaCO3)	√	√		√
Bicarbonate alkalinity (HCO3)	√			
Carbonate alkalinity (CO3)	√			
Hydroxyl alkalinity (OH)	√			
Extractable calcium	√		√	
Extractable magnesium	√		√	
Total hardness (CaCO3)	√	√	√	
Extractable sodium	√		√	
Extractable potassium	√		√	
Extractable iron	√		√	
Extractable manganese	√		√	
Extractable lead	√		√	
Extractable nickel	√		√	
Extractable copper	√		√	
Extractable zinc	√		√	
Extractable aluminum			√	
Total arsenic	√	√	√	
Extractable cadmium	√		√	
Hexavalent chromium	√		√	
Extractable mercury	√	√		
Total cyanide	√	√		
Free cyanide	√	√		
Chloride	√			
Fluoride			√	
Total kjeldahl nitrogen	√	√	√	
Soluble ammonia	√	√		
Dissolved nitrate-nitrite nitrogen	√		√	
Total phosphorus	√	√	√	√
Dissolved phosphorus	√		√	√
Dissolved chloride	√		√	
Soluble sulphate	√	√	√	
Dissolved silica	√			
Total organic carbon	√		√	√
Soluble organic carbon			√	
Total trihalomethanes			√	
Fecal coliform MF method	√			√
Total coliform MF method	√			√
Cryptosporidium			√	
Giardia			√	
HPC (Heterotrophic plate count)				√

[5]Not all indicated parameters were measured during each sampling period or at every location. Manitoba Conservation changed analyses of metals in 1999 from the extractable method to a total method using an ICP scan.

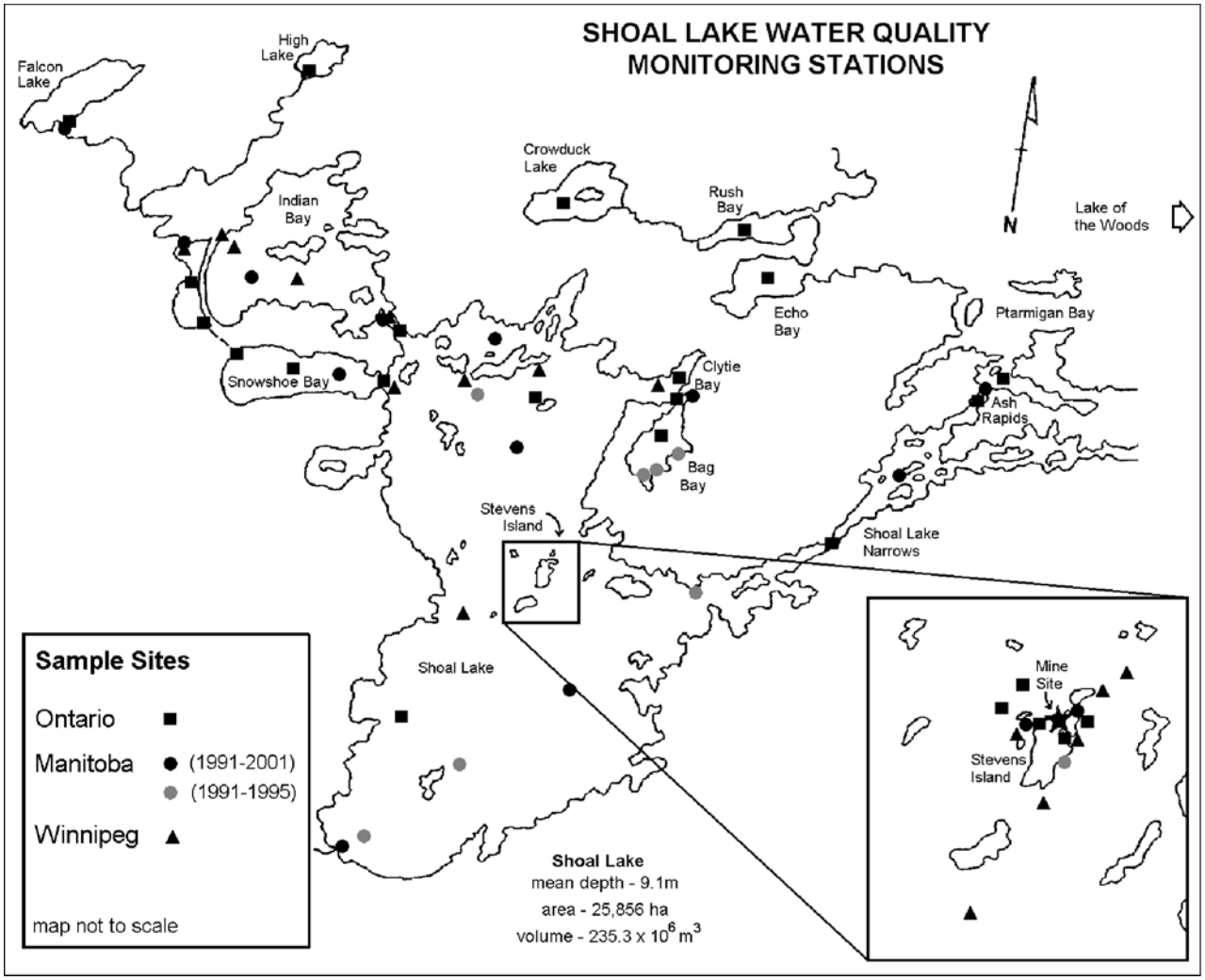


Figure B-1. Water quality monitoring station map.

Appendix C

List of Selected Treaties, Intergovernmental Agreements, Memoranda of Understanding, Orders, Draft Documents, etc. of Specific Relevance to the Shoal Lake Watershed

CATEGORY	TITLE	DATE
Development Regulation	Development Guidelines – *Shoal Lake Restricted Area Order* (Ontario Ministry of Natural Resources)	October 1978
	Manitoba/Ontario Memorandum of Understanding Concerning Present and Future Development on High Lake and in the Immediate Vicinity of Shoal Lake	May 1981
	Memorandum of Agreement Between The Shoal Lake Indian Band #40 and Her Majesty in Right of The Province of Manitoba and The City of Winnipeg	June 1989
	Shoal Lake #40/Canada Agreement Respecting The Economy and The Environment Between Shoal Lake #40 Band of Indians and Her Majesty The Queen in Right of Canada	September 1990
	Interim Notification and Referral Protocol (re. review of proposed development in the Shoal Lake Watershed)	2001
First Nation Treaty	Treaty 3 Between Her Majesty The Queen and The Saulteaux Tribe of Ojibbeway Indians at The Northwest Angle on The Lake of The Woods	October 1873
	Paypom (Treaty) Document	October 1873
Fisheries	Manitoba/Ontario Memorandum of Understanding Concerning the Conservation and Orderly Use and Development of Fisheries Resources of Interprovincial Border Lakes	1985
Water Diversion	An Act to Confer Certain Rights and Powers Upon The Greater Winnipeg Water District (per Order in Council)	October 1913
	International Joint Commission Hearings and Arguments in the Matter of the Application of the Greater Winnipeg Water District for Approval of the Diversion of the Lake of the Woods and Shoal Lake for Sanitary and Domestic Purposes	January 1914
	Regulation Under *The Ontario Water Resources Act* – Water Taking and Transfer – O. Reg. 285/99	May 1999
Watershed Management	Shoal Lake Watershed Agreement Between Big Island First Nation (FN) and Iskutewisakaygun #39 Independent FN and Northwest Angle #33 FN and Northwest Angle #37 FN and Shoal Lake #40 FN and Her Majesty The Queen in Right of Ontario	September 1994
Other	*The Anishinaabe Nation in Treaty #3 – Manito Aki Inakonigaawin* (Resource Law)	October 1997

Appendix D

Population Equivalents and Phosphorus (P) Loading Factors for Lakeshore Capacity Model Application in the Shoal Lake Watershed

Source	Assumptions	Population Served or Annual Population Equivalent (PE)	Unit Loading kg/PE/yr	Reference and (page #)
Typical domestic wastewater	Using no- or low-phosphate detergents			
Septic tank - tile field	No P-removal by treatment system		0.6 kg/cap(PE)/yr	TetrES(T) (4-13)
Grey-water	No P-removal by treatment system		0.2 kg/cap(PE)/yr	Findley
Falcon Lake				
-FL permanent residence		3.23/dwelling		T
-FL cottage		0.94/dwelling		T
-FL resort		1.45/unit		T
-FL commercial		2.27/unit		T
-FL campground		1.19/site		T
-FL day-user		0.37		T
-FL lagoon		PE served by lagoon = 1481 (Yr 1999)	0.048 kg/cap/yr	T (4-21)
-FL development served by septics		PE served by septics = 386 (Yr 1999)	0.6 kg/cap/yr	T (4-14)
Shoal Lake				
-FN #39		On-reserve pop'n = 295 (Yr 1999)		
-FN #39 lagoon		PE served by lagoon = 240 (Yr 1999)	0.077kg/cap/yr	T (4-21)
-FN #39 on septic systems		PE served by septics = 55 (Yr 1999)	0.6 kg/cap/yr	
-FN #40 (on septics)		On-reserve pop'n = 222 (Yr 1999)	0.6 kg/cap/yr	
-SL cottage		0.89/ dwelling		T (4-14)
-SL resort- existing		Assume annual (1999) PE = 6 for entire resort		Based on data from resort web site
-SL resort- new	As per Falcon Lake	1.45/unit		
-Youth camps		Assume annual (1999) PE = 7 for two existing camps		Based on data from camp web site
Land use / Landform drainage				
-Wetland			0.063 kg/ha/yr	T (4-12)
-Forested land on Canadian Shield			0.055 kg/ha/yr	T (4-12)
-Golf course	Typical 18-hole course has 25 ha turf-managed		0.5kg/ha/yr (non-BMP) 0.17kg/ha/yr (BMP)	Literature survey
-Residence/cottage lawn			5.0kg/ha/yr (fertilized) 0.055kg/ha/yr (unfertilized)	Literature survey
Other				
-Atmospheric deposition			0.21kg/ha of lake surface / year	T (4-13)
-Benthic load			0	T (4-14)

Abbreviations used: BMP = best management practices; cap = capita; FL = Falcon Lake; FN = First Nations; P = phosphorus; PE = annual population equivalent; SL = Shoal Lake; TetrES and T = TetrES Consultants Inc. report, June 2000. (Other abbreviations as per list on page xii.)

Appendix E

Summary of Comments from, and Working Group Responses to, the Public and Community Reviews of the August 22, 2001 Draft Plan

Source	Comments/Recommendations	Working Group Response
Falcon / West Hawk Chamber of Commerce, Falcon Lake, MB	-Chamber supports recommended efforts to protect and enhance water quality in Falcon Lake. Specifically supports Plan recommendations WQ-8, WQ-9 and WQ-10. -Would like to be involved in further policy development and implementation stages of Plan.	-Acknowledged. -The Plan encourages involvement of watershed communities, community groups and other stakeholders in implementing the Plan.
Falcon Lake residents (three individual responses received), Falcon Lake, MB	-Some residents expressed concerns regarding possible negative impacts of additional commercial development/redevelopment on the environment and on the aesthetic quality and character of life in the Falcon Lake area.	-The preamble to recommendation EC-8 has been expanded to acknowledge these concerns. It is expected that the specific extent and nature of future development/redevelopment will be addressed through Manitoba Conservation's normal parks planning and management processes.
Researcher, Freshwater Institute, Winnipeg, MB	-Applauds the Watershed Working Group (WG) efforts in dealing with multiple issues and interests and suggests that the Watershed Management Plan offers promise for the sustainable management of Shoal Lake watershed resources. -Discusses existence of additional phosphorus and chlorophyll "a" data not used in WG analyses, i.e. from IEC Beak report (1970-80) and Freshwater Institute (1989-91, 2001). Suggests these data may indicate higher levels of nutrient enrichment than those observed using the 1992-96 Manitoba Conservation survey data. -Cites Freshwater Institute studies showing increasing magnitude and extent of algal blooms on Lake of the Woods (LOW) and raises question of potential need for IJC involvement in identifying and managing nutrient sources believed to be agricultural lands in south end of lake. Questions the ability of the lakeshore capacity model to accurately predict Shoal Lake trophic status under a scenario of longer-term water quality changes in LOW and increasing from LOW to Shoal Lake.	-Acknowledged with thanks. -The WG's consultant focused on Manitoba Conservation data set based on its more extensive station coverage of lake and its greater intensity and duration of sampling. WG has reexamined Beak and other data and believes that they provide a similar picture of average water quality conditions. -The Plan notes potential concern that a deterioration of water quality in LOW would impact on Shoal Lake in the future. Recommendation WQ-7 has been expanded to call for the promotion of best-practices efforts "within the broader Lake of the Woods watershed". The WG recognizes that additional data collection on Ash Rapids flow exchange is needed and that refinement of modeling approaches over the longer-term may be required. (See recommendations WS-4 and WS-8.)
Iskatewizaagegan #39 First Nation (survey of Band members)	-Band members spoke of the importance of watershed resources to their community and of the need to collectively use and manage them in a sustainable manner. They had specific resource health and resource access concerns in connection with trapping and hunting, fisheries, gathering sites and wild rice. They would like to see more First Nation community benefits coming from the shared development and use of watershed resources.	-The management principles that are intended to guide implementation of the Plan, recognize the unique importance of the watershed and its resources to the Shoal Lake First Nations communities. Many of the Plan's recommendations call for enhancement and protection of First Nations' cultural, spiritual, physical, and economic interests in future decision-making regarding resource development and use.
Lake of the Woods District Property Owners Association	-Association strongly endorses watershed Vision. -Association can contribute to achieving the vision by fostering environmental awareness; promoting and implementing best practices dealing with waste management, recycling and reuse practices; and participating in surveys to identify faulty or inadequate black- and grey-water disposal systems. -The Association wishes to participate and have a voice in the implementation process.	-Acknowledged. -The Plan encourages and anticipates involvement and participation by area cottagers' associations and other stakeholders in implementing the plan. -As above.

Source	Comments/Recommendations	Working Group Response
Manitoba Wildlands Campaign Office, Canadian Nature Federation, Wpg, MB	-Identifies difficulties in electronically accessing the draft Plan and in viewing some of the figures in electronic format.	-The WG acknowledges and regrets the problems experienced by MWCO and appreciates the efforts made by them and by other individuals and organizations who reviewed and commented on the draft Plan.
	-Feels draft Plan's coverage of Focus Group sessions doesn't highlight level of participation and discussion at Winnipeg session.	-The discussion of the Focus Group sessions (see Chapter 8) has been expanded.
	-Observes use of local First Nations' traditional ecological knowledge (TEK) in plan development appears limited. Suggests that a specific recommendation regarding use of TEK in plan implementation be included.	-A new recommendation (EC-3) dealing with the integrated and balanced use of traditional science and TEK has been added.
	-Questions the draft Plan's depth of treatment of questions of ecological integrity and environmental sustainability. Feels that the Plan's management principles place an emphasis on development.	-The WG feels it has taken an appropriately balanced approach to the questions of environmental, social and economic interests and needs within an ecological sustainability context. The watershed planning and management approach has been widely acknowledged for its strengths in integrating the broad range and diversity of interconnected interests. This is especially so in a setting like Shoal Lake where water resources are such a dominant and shared interest. A definition of ecological integrity has been added to the glossary of terms.
	-Feels the draft Plan may be deficient in dealing with existing and proposed protected areas planning in Whiteshell Provincial Park.	-Reference to the ongoing process of the Action Plan for Manitoba's Network of Protected Areas, January 1, 2000 – January 1, 2003 has been added to Chapter 12. The Working Group notes that this process has not come to any conclusions yet regarding any areas to be designated for protection within the watershed.
	-Proposes periodic independent reviews of Plan implementation.	-A further recommendation IM-3 has been expanded to specifically identify the need for periodic review of plan implementation and for the dissemination of progress reports.
	-Feels that draft Plan downplays climate change issues/concerns.	-The WG felt that the key climate variability/change issue warranting acknowledgement at this time was that related to water resource sustainability. Recommendations for following up on this issue had therefore been included. The WG is also aware of broader climate change issues and concerns relating to forests and potentially other watershed resources but believes that these should and will be studied in the context of larger planning units.
	-Seeks clarification of how provincial regulatory controls for water quality protection will work. Seeks clarification of how the Plan moves beyond a case-by-case approach to development review and licensing.	-The Plan provides a harmonizing framework for intergovernmental consultation in regulatory decision-making around water quality protection while respecting continued use of individual jurisdiction laws and regulations for making it happen. The Plan calls for commitment to an ongoing process of development referrals and also for proactive consultation between resource development and resource use proponents and those who could be impacted by such development/use. The Plan also incorporates use of predictive cumulative impact modeling as a tool for assessing appropriate limits on development (and their associated environmental emissions) in the context of individual lakes, significant embayments, and the entire watershed.
	-Congratulates the WG for their dedication and productive efforts and expresses hope that the Plan becomes the start of improved decision-making in the watershed.	-Acknowledged with thanks.

Source	Comments/Recommendations	Working Group Response
Northwestern Ontario Prospectors Association	-Describes the comprehensive regulatory environment that the mineral development industry must operate within today and how the industry in Canada is committed to further development and implementation of best practices for protection of the environment. -Believes that the Plan can serve a useful role in upfront identification of environmental protection requirements and supports the WG recommendations promoting proactive and facilitated communications among interested stakeholders. Calls for a fundamental change, among all players, in the approach to dealing with future development proposals, i.e. to "how can we make this work" from "what's wrong with it". -Commends the Working Group and support persons for their efforts in preparing the Plan.	-Appendix F of the Plan overviews the regulatory approaches to mineral development in Manitoba and Ontario. -Acknowledged. -Acknowledged with thanks.
Tourist resort operator, Lake of the Woods	-Opposes potential initiatives to restrict sport fishing boat passage from LOW to Shoal Lake. -Acknowledges the ongoing recovery of the fishery and expresses support for establishment of a high quality fishery based on catch and release; opposes commercial fishing of any species in Shoal Lake.	-The Plan acknowledges that issues of restricting boat passage and water exchange at Ash Rapids have been raised in the past. The Plan does not suggest that such controls be implemented and further states that any such changes would "require the careful assessment of interests, risks, costs, and benefits". -Issues and evidence pertaining to the health and sustainability of the Shoal Lake fishery were extensively examined during development of the Plan. Both broad and species-specific recommendations are being put forward by the WG regarding continuation and expansion of current fisheries assessment and management activities. The involvement of all affected interests is recommended. (See recommendations EC-12 and EC-13.)

Appendix F

Overview of Provincial Regulatory Approaches to Mineral Exploration and Development

PART A: THE APPROACH IN ONTARIO

Ontario's *Mining Act* and its regulations are available on the World Wide Web at www.e-laws.gov.on.ca. Of particular pertinence to this discussion are Part VII of the Act, comprising sections 139 through 153. Part VII is accompanied by Regulation 240/00 "Mine Development and Closure Under Part VII of the Act". Part VII of the *Mining Act* applies to all mining lands in Ontario, i.e. mining claims, mining leases and patent (private) land. Responsibility for the administration of Part VII of the Act lies with the Director of Mine Rehabilitation, who is currently the Senior Manager, Mines Group, Ministry of Northern Development and Mines.

LAND TENURE IN ONTARIO

Ontario has a system of dual land tenure, i.e., surface and mineral rights are separate from each other and may be owned by different parties for the same piece of land. The *Mining Act* has mechanisms to help land owners resolve disputes where surface and mining rights are in different hands. Owners who hold only the surface rights may not stop owners of underlying mineral rights from access to the land for the purposes of exploration for or development of mineral rights. Similarly, owners who hold only the mineral rights are responsible to notify surface-rights owners that exploration work will be done and to compensate for damage to improvements made to surface property.

The acquisition of mineral rights generally starts with someone staking out the ground for which they want these rights. The process and requirements for this are detailed in the *Mining Act.* Crown-owned mineral rights on certain lands are not open for staking; some examples include:

- provincial parks
- cottage lots originally provided by the Ministry of Natural Resources
- federal lands, particularly Indian reserves
- except with permission of the person controlling the surface rights or an order from a mining recorder or the Mining and Lands Commissioner, land used for agriculture or containing a spring, dwelling, outhouse, manufactory, public building, church or cemetery

MINING SEQUENCE

The process of mineral exploration leading to the development and eventual closure of a mine is generally referred to as the "mining sequence". For our purposes, the mining sequence has the following 6 major phases:

1. Prospecting and staking
2. Exploration
3. Advanced exploration
4. Development and construction
5. Production
6. Closure

Each of these phases consists of several activities. These activities are associated with points at which decisions about the continuation of the process will continue for a given project. Some of these decisions will result in the proponent of the project applying for permits from one or more provincial or federal agencies.

In Ontario, **prospecting** and **exploration** are not regulated under the *Mining Act*. However, some of the specific activities that can comprise prospecting and exploration may be regulated under other legislation. For example, the generation of noise, dust or effluent by drilling are regulated by the *Environmental Protection Act* and possibly the *Ontario Water Resources Act* or the federal *Fisheries Act*.

Staking to acquire mineral rights is regulated by the *Mining Act*, but only to ensure an orderly process.

REGULATED ACTIVITIES

All activities in the mining sequence, other than prospecting, staking and exploration, are regulated under the Part VII of the *Mining Act* and a wide variety of other legislation. The major pieces of legislation and the ministries or departments that administer them are listed below.

- *Provincial Legislation*

–*Mining Act*	MNDM
–*Environmental Protection Act*	MOE
–*Ontario Water Resources Act*	MOE
–*Environmental Bill of Rights*	MOE
–*Environmental Assessment Act*	MOE
–*Lakes and Rivers Improvement Act*	MNR
–*Public Lands Act*	MNR
–*Crown Forest Sustainability Act*	MNR
–*Fish and Wildlife Conservation Act*	MNR
–*Aggregate Resources Act*	MNR
–*Occupational Health and Safety Act*	MOL
–*Municipal Act*	MMAH
–*Health Protection and Promotion Act*	MOH
–*Highway Traffic Act*	MOT
–*Dangerous Goods Transportation Act*	MOT
–*Gasoline Handling Act*	TSSA
–*Energy Act*	TSSA

- *Federal Legislation*

–*Fisheries Act*	DFO
–*Canadian Environmental Assessment Act*	CEAA
–*Canadian Environmental Protection Act*	EC
–*Navigable Waters Protection Act*	CG
–*Explosives Act*	NRCan
–*Transportation of Dangerous Goods Act*	TC

Index of Responsible Government Agencies:

MNDM	Ministry of Northern Development and Mines
MNR	Ministry of Natural Resources
MOE	Ministry of the Environment
MOL	Ministry of Labour
MOT	Ministry of Transportation
MMAH	Ministry of Municipal Affairs and Housing
MOH	Ministry of Health
TSSA	Technical Standards and Safety Authority
DFO	Department of Fisheries and Oceans
CEAA	Canadian Environmental Assessment Agency
EC	Environment Canada
CG	Coast Guard
NRCan	Natural Resources Canada
TC	Transportation Canada

Quoting from the *Mining Act*, "… 'advanced exploration' means the excavation of an exploratory shaft, adit or decline, the extraction of prescribed material in excess of the prescribed quantity, whether the extraction involves the disturbance or movement of prescribed material located above or below the surface of the ground, the installation of a mill for test purposes or any other prescribed work".

The triggers for **advanced exploration** are:

1. Exploration carried out underground involving the construction of new mine workings or expanding the dimensions of existing mine workings.
2. Exploration involving the reopening of underground mine workings by the removal of fixed or permanently fastened caps or bulkheads, or involving the excavation of backfilled shafts, raises, adits or portals.
3. Exploration that may alter, destroy, remove or impair any rehabilitation work done in accordance with Part VII of the Act or a filed closure plan.
4. Excavation of material in excess of 1,000 tonnes.
5. Surface stripping on any mining lands of an area in excess of 10,000 square metres or volume in excess of 10,000 cubic metres.
6. Surface stripping carried out on mining lands whose area is greater than 2,500 square metres or that produces a volume of material greater than 2,500 cubic metres, if any surface stripping is carried out within 100 metres of a body of water

In the definition of "advanced exploration", above:

1. "Material" means rock, ore or any other substance excavated during the process of developing, mining, evaluating or testing any mineral or mineral deposit, but does not include excavated overburden.
2. "Surface stripping" means the removal of overburden to expose bedrock or other material.

The *Mining Act* defines **mine production** as "mining that is producing any mineral or mineral-bearing substance for immediate sale or stockpiling for future sale, and includes the development of a mine for such purposes". Thus, mine production includes phase 4, **development and construction,** and phase 5, **production**, of the mining sequence.

When progress on an exploration project triggers advanced exploration or mine production, the *Mining Act* requires the proponent of the project to file a **closure plan** with MNDM and, usually, to give **public notice**. Public notice is mandatory for mine production and at the discretion of the Director of Mine Rehabilitation for advanced exploration; release from the requirement for public notice for advanced exploration is extremely rare.

Section 8 of Regulation 240/00 prescribes in detail the provisions **public notice**. These include:

1. Publishing a notice in a newspaper having general circulation in the area in which the project is located, or by an alternative or additional measure designed to ensure that as many members of the public as possible have reasonable notice of the meeting; and
2. Holding a public information session in the area in which the project is located, or in another location chosen to ensure that as many members as possible of the public affected by the project may receive information regarding it.

Publication of the notice shall be at least seven days before holding the public information session and shall include the following:

1. Name and address of the proponent.
2. Name of the project.
3. Name, address and telephone number of an authorized contact person.
4. Description of the location of the project site and a map showing the location. The map shall be a minimum of seven centimetres per side, include a north arrow and scale and show a minimum of a three kilometre radius and a maximum of a five kilometre radius around the site.
5. Description of the project, indicating its nature and size and the nature and extent of related work to be carried out to complete the project.
6. Proposed date of commencement/recommencement of advanced exploration or mine production.
7. Time and location of the public information session for the project.

Finally, the proponent shall provide to the Director of Mine Rehabilitation, the names of the members of the public who attended the public information session and any written comments provided by them, no later than 15 days after the session.

A **closure plan** has 2 parts, both of which must be received and satisfactorily reviewed by staff of MNDM, MOE, MNR and MOL before the project can proceed. The 1st part is a plan to rehabilitate a site or mine hazard. It must be prepared in the manner prescribed in Regulation 240/00 and filed in accordance with the *Mining Act*. The 2nd part is the provision to the Crown, in the prescribed manner, of **financial assurance**.

The amount of financial assurance to be provided must be sufficient to cover the costs to MNDM to complete the performance of the closure plan requirements should the proponent be unable to do so. Financial assurance may be in one

of several forms, including cash, a letter of credit from a bank named in Schedule 1 to the *Bank Act* (Canada), a bond from a licensed insurer or a reclamation trust. Provisions also exist for companies with sufficient financial strength to self assure for all or part of the life of the mine. Closure plans must be amended whenever there is a material change in the nature or scope of the operation. In general, a material change is one that requires a change in the level of financial assurance required for the project.

The aim of the **closure plan** process is (1) to ensure that mining lands are returned to a product state when mining operations are finished and (2) to minimize, if not eliminate, any future liability for the Crown with respect to public and environmental safety on these lands. To this end, closure of a mine property requires that the mine owner complete the following minimum rehabilitative measures in accordance with the applicable standards, procedures and requirements of the **Rehabilitation Code.** The Code, which is a part of Regulation 240/00, specifies the following:

1. All shafts, raises and stopes open to surface shall be secured.
2. All portals of adits and declines shall be secured.
3. All other mine openings to surface that create a mine hazard shall be stabilized and secured.
4. All surface and subsurface mine workings shall be assessed by a qualified professional engineer to determine their stability, and any surface areas disturbed or likely to be disturbed by such workings shall be stabilized.
5. All buildings, power transmission lines, pipelines, railways, airstrips and other structures shall be dismantled and removed from the site to an extent that is consistent with the specified future use of the land.
6. All machinery, equipment and storage tanks shall be removed from the site to an extent that is consistent with the specified future use of the land.
7. All transportation corridors shall be closed off and revegetated to an extent that is consistent with the specified future use of the land.
8. All concrete structures, foundations and slabs shall be removed or covered by overburden and revegetated.
9. All petroleum products, chemicals and waste shall be disposed of on site or removed.
10. All explosives shall be disposed of or removed from the site.
11. Polychlorinated biphenols (PCBs) or material contaminated with PCBs shall be removed or managed on site.
12. All landfill sites and other waste management sites shall be rehabilitated.
13. All soils in the vicinity of sites used for storing or transferring petroleum products, chemicals, ore, concentrates or waste during the life of the project shall be sampled and tested for contamination and, if contamination is found, a management plan consisting of a risk assessment and action plan for the contaminated soils shall be implemented.
14. All tailings, rock piles, overburden piles and stockpiles shall be rehabilitated or treated to ensure permanent physical stability and effluent quality.
15. All materials, or conditions created as a result of mining, that produce or may produce acid rock drainage or metal leaching shall be dealt with in accordance with the management plan referred to in section 59 of the Code.
16. All impoundment structures shall be certified by a qualified professional engineer with respect to their stability against static and dynamic loadings to which the structures are likely to be subjected, to ensure that the materials are completely contained and the specified land use maintained.
17. All decant structures, other than dam spillways, shall be removed or left inoperable.
18. All remaining on-site watercourses or drainage channels shall be left so as not to require maintenance and shall be consistent with the specified future use of the land.
19. All disturbed sites shall be revegetated.

NB: The reader should remember that many of the activities listed above may also be regulated under other legislation; e.g., point 9, where the *Environmental Protection Act* and the *Gasoline Handling Act*, administered by the Ministry of the Environment and the Technical Standards and Safety Authority, respectively, would also apply.

Closure begins when the operator of a mine ceases mining operations. The cessation of mining constitutes material change and must be reported to the Director of Mine Rehabilitation. The mine operator is required to implement the closure to the satisfaction of MNDM. The site is subject to inspection by MNDM staff and, potentially, staff of MOE. Ministry inspectors may also take samples to ensure that water leaving the site meets applicable provincial and federal standards. The mine owner is required to monitor the site until such time as the Crown is prepared to take back the land. This requires that the owner demonstrate to the satisfaction of the Minister of Mines, that the Crown will not be acquiring a liability by taking back the land. If and when a mining property is returned to the Crown, the former owner or lessee is no longer liable for prosecution under Ontario's *Environmental Protection Act* for subsequent environmental damage resulting from the conditions created by the operation of the mine.

ABANDONED MINES AND MINE HAZARDS

Mine workings and buildings are considered improvements and become part of a property. Any benefits or liabilities from such improvements are the responsibility of the property owner. On many abandoned mine sites, especially older sites, the mineral rights, and often the entire property, have reverted to the Crown. As the owner, the Province is responsible for any physical or environmental injury resulting from the presence of mine workings and buildings at such sites. There are also numerous sites in Ontario where old mines have been bought for the recreational potential of the patent land on which they sit. The responsibility for any deleterious events or effects that result from privately owned, abandoned mine sites is entirely that of the private property owner.

Under the *Mining Act*, the Director of Mine Rehabilitation has the authority to order the owner of an abandoned mine site to file a closure plan for the property. If the closure plan is not forthcoming, the director may have the Crown, or an agent of the Crown, conduct the rehabilitation work. Similarly, if a mine hazard is reasonably believed to be "causing or is likely to cause an immediate and adverse effect, the Minister may order the proponent to rehabilitate the mine hazard". If the order is not acted upon, the Minister can direct Ministry employees to ensure that the hazard is rehabilitated. MNDM is very judicious in exercising its powers under the *Mining Act* to conduct rehabilitation work on privately held land.

MNDM maintains a database of abandoned mine hazard sites. As of January 2002, there were over 6,000 sites recorded. Data on these sites includes location, access, nature of the hazard(s), a description of any existing rehabilitation measures, a description of recommended remedial actions and an estimate as to what those remedial actions will cost.

In April 1999, Ontario announced a 4-year program to be funded up to $27 million, to rehabilitate the most contentious mine hazard threats to public and environmental safety, where such hazards were located on Crown, or in some cases, municipal lands. Through the initial 3 years of the program, ending March 31, 2002, some 40 sites have been rehabilitated at a cost of about $17 million. Individual site costs range from under $10,000 to more than $10 million.

PART B: THE APPROACH IN MANITOBA

Information concerning Manitoba's permitting process regarding the regulatory framework to move a project from regional exploration to new mine development are available on the World Wide Web at www.gov.mb.ca/itm/mrd/busdev/exp-guide/index.html. The document includes background information concerning each exploration stage, the permits required and contact information as well as a reference list of applicable Acts and regulations. It also includes references to other government departments/agencies or Acts/regulations that are applicable.

MINING SEQUENCE

The purpose of this brief is to provide background permitting-information concerning the process of going from mineral exploration to the development and eventual closure of a mine. The intent is to provide a very generalized description of each phase of the mining sequence. However, the user is encouraged to consult the appropriate web page for detailed information and regulatory advice. Activities regulated by *The (Manitoba) Mines and Minerals Act* and *The (Manitoba) Environment Act* and specific to metallic minerals are covered.

Land Acquisition

In Manitoba, dispositions grant the holder exclusive right to explore for Crown minerals and are designed to encourage exploration activity and effective investment management. There are three ways to acquire exploration and/or mining rights to Crown lands: 1) special exploration permits, 2) exploration permits, and 3) mining claims. Separate arrangements must be made with the owner(s) of private surface rights or legal occupants of Crown land before any surface exploration activities take place.

The complete specifications for required work, eligible expenditures and reporting requirements are detailed in Schedule B, Manitoba Regulation 64/92 (Mineral Disposition and Mineral Lease Regulation).

1) Special Exploration Permit

Applications for special exploration permits may be made at any time within areas that are designated for special exploration permits. The terms and conditions of these permits are negotiable with the Director of Mines. Common disposition features such as a basic five-year term, cash deposit and annual rent are all included as part of the permit negotiation. The required work expenditures on a special exploration permit are also significantly less than those commonly associated with a general exploration permit.

2) Exploration Permit

An exploration permit is used for areas outside those designated for special exploration permits. The land size designation ranges from 9,300 hectares to 50,000 hectares excluding any prior mineral disposition or lease. The term is three years as long as the work commitment for each year is achieved. A report on statement of expenditures and work needs to be submitted annually. The permit may be surrendered before the anniversary date of the first or second year provided the work commitment conditions have been met.

Basic steps outlined under the section Staking a Claim(s) in Unsurveyed Territory of the regulation describes the steps for staking and recording claims if the permit holder plans to hold exploration rights beyond the termination date.

3) Mining Claims

A claim must measure between 16 hectares and approximately 256 hectares whether it is in surveyed or unsurveyed territory.

Once the claim is recorded, it is in good standing for two years plus 60 days. If all work and reporting requirements are met, then a claim can be renewed annually for an indefinite period of time.

MINERAL EXPLORATION

The Environment Act stipulates that a development cannot proceed without first obtaining a valid *Environment Act* licence. However, metal mining developments normally require general and advanced mineral exploration activities before a decision can be made on whether or not to proceed with a full-scale mining development. Since these exploration activities can disturb or impact the environment, and can even involve mining activities in order to reach and acquire bulk samples of the ore, the potential applicability of the Act to some of the exploration activities must be considered. Although the majority of the exploration activities can be adequately addressed through work permits or existing regulations, Manitoba Conservation may invoke the requirement for a licence under The *Environment Act* for certain exploration activities.

Drilling

All the necessary information on drilling requirements and conditions is in *The Mines and Mineral Act*, Manitoba Regulation 63/92 (Drilling Regulation).

Drilling (Precambrian)

A licence is not required to drill in Precambrian terrain (Canadian Shield), but there are requirements governing the operation and abandonment of holes and sites as described in *The Mines and Minerals Act*, Manitoba Regulation 63/92 (Drilling Regulation).

Drilling (Phanerozoic)

To prevent potential contamination of freshwater aquifers, approval and recording must be done for any drilling penetrating Phanerozoic rock. A borehole licence, issued by the Director of Mines, is required. The licence is issued for a one-year term and gives the right, subject to certain conditions, to drill one or more boreholes within the boundaries of the area specified in the licence. Phanerozoic generally refers to the area not in the Canadian Shield (Precambrian rock) and mainly consists of limestone and shale bedrocks.

Related Acts and Regulations

These acts/regulations apply to prospecting, ground geophysics, geochemical surveys, geological surveys, hand or mechanical trenching/stripping and drilling. They also address site access and preparation, site abandonment and reclamation, spill and leakage procedures and waste management.

- *Mines and Minerals Act, Ml62 ;* For drilling, see sections 96 to 101 inc.
  - Manitoba Mineral Disposition and Mineral Lease Regulation 64/92; Sections 2,3,4 and 7 for Drilling Site Abandonment and Reclamation in Manitoba Regulation 63/92 (Drilling Regulation)
  - Manitoba Regulation 65/92 (Quarry Minerals Regulation)
  - Manitoba Regulation 63/92 (Drilling Regulation), Section 2 and 5 for Waste Management.
- *Fires Prevention Act, F80 ,* Section 29
- *Crown Lands Act, C340,* Section 7
- *Provincial Park Lands Act, P20*
- *Forest Act, F150,* Sections 20(3), 23(1) and 28 for Management and Transportation; Sections 9 to 11 for core storage
- *Environment Act, E125* and Regulations
- *Workplace Safety and Health Act,* W*210*
  - Manitoba Regulation 228/94 (Operation of Mines Regulation)
  - Manitoba Regulation 189/85 (Construction Industry Safety Regulation)
  - Manitoba Regulation 99/88R (Derrick, Crane and Other Hoisting Equipment Regulation)
  - Manitoba Regulation 108/88 (Workplace Safety Regulation)
  - Manitoba Regulation 100/88R (Fibrosis and Silicosis Regulation)
  - Manitoba Regulation 53/88 (Workplace Health Hazard Regulation)
  - Manitoba Regulation 227/94 (Hearing Conservation and Noise Control Regulation)

ADVANCED EXPLORATION PROJECTS

An advanced exploration project is defined as:

- Excavation of an exploration shaft, adit or decline;
- Construction of an all-weather access road to the site;
- Diversion, alteration or damming of a natural watercourse for purposes of bulk sampling, mine development or mining; or
- Other similar activities that may be associated with an advanced exploration project.

Advanced exploration in Manitoba is typically completed under a claim status. Leases are required only for production of minerals.

Approval of Advanced Exploration Projects

Prior to beginning an advanced exploration project, project plans and closure plans must be submitted with a financial security deposit to the Director of Mines. All advanced exploration project plans, etc., must be approved before proceeding with any work at this stage. The Director will distribute the information to relevant government departments such as Conservation; Labour and Immigration; and Culture, Heritage and Tourism, for their review and clearance or for further indication of necessary actions.

Depending on the completeness of the information submitted and the extent of the activity; the proponent:

- Will be given the approval to proceed by the Director of Mines,
- May need to submit a proposal for a staged *Environment Act* licence,
- Or may be asked to provide a proposal and Environmental Impact Statement for a staged *Environment Act* licence. At the advanced exploration stage environmental licensing is generally completed in 60 days or less.

Closure Plan

To proceed with an advanced exploration project, the proponent must also submit a closure plan for approval by the Director of Mines. The plan's role is to protect the environment during excavation, and ensure site rehabilitation once the project is complete.

The Closure Plan should include measures needed to restore the land to its near-original state and to establish a satisfactory degree of safety. A financial commitment may also be required as part of the plan. While the plan is submitted to the Department of Industry, Trade and Mines, the departments of Conservation and Labour and Immigration also participate in the closure approval process.

Should a project not proceed into production, a site inspection will be conducted once the proponent indicates all the conditions outlined in the closure plan have been met. Based upon the site inspection, further closure measures may be required. Prior to the return of any unused portion of a financial deposit, a final report and site visit are necessary.

Related Acts and Regulations

In developing an advanced exploration site the proponent should also be aware of the acts and regulations pertaining to:

Construction and Operations - Site Access and Preparation:

- *Mines and Minerals Act, Ml62*
  - Manitoba Mineral Disposition and Mineral Lease Regulation 64/92 Section 4
  - Mine Closure Regulation 67/99
- *Fires Prevention Act, F80,* Section 29
- *Crown Lands Act, C340,* Section 7
- *Provincial Park Lands Act, P20*
- *Forest Act, F150*
- *Environment Act, E125* and Regulations

Equipment, Security, Ventilation, Mechanical and Electrical, Ground Support, Ground Stability, De-Watering and Pumping, Air Quality, Noise Abatement:

- *Workplace Safety and Health Act, W210*
  - Manitoba Regulation 228/94 (Operation of Mines Regulation)
  - Manitoba Regulation 189/85 (Construction Industry Safety Regulation)
  - Manitoba Regulation 99/88R (Derrick, Crane and Other Hoisting Equipment Regulation)
  - Manitoba Regulation 108/88 (Workplace Safety Regulation)
  - Manitoba Regulation 100/88R (Fibrosis and Silicosis Regulation)
  - Manitoba Regulation 53/88 (Workplace Health Hazard Regulation)
  - Manitoba Regulation 227/94 (Hearing Conservation and Noise Control Regulation)
- *Environment Act, E125* and Regulations

Labour and Immigration:

- *Workplace Safety and Health Act, W210*
  - Manitoba Regulation 105/88R (Workers Working Alone Regulation)
- *Employment Standards Act, El10*
  - Manitoba Regulation 187/87R (Minimum Wages and Working Conditions Regulation)
- *Construction Industries Wages Act, C190*

Fuel Storage:

- *Environment Act, E125*

- Manitoba Regulation 97/88R (Storage & Handling of Gasoline and Associated Products Regulation)

Safety and Health – Workplace Health and Material Information, First Aid, Sanitation, Ventilation, Fire, Mine Rescue:

- *Workplace Safety and Health Act, W210*
  - Manitoba Regulation 228/94 (Operation of Mines Regulation)
  - Manitoba Regulation 189/85 (Construction Industry Safety Regulation)
  - Manitoba Regulation 106/88R (Workplace Safety and Health Committees Regulation)
  - Manitoba Regulation 52/88 (Hazardous Materials Information System Regulation)
  - Manitoba Regulation 104/88R (Sanitary and Hygienic Welfare Regulation)

Environmental – Water Quality, Mine Drainage, Mine Waste, Sewage

- *Environment Act, E125*
  - Manitoba Regulation 91/88R (Incinerators Regulation)
  - Manitoba Regulation 92/88R (Litter Regulation)
  - Manitoba Regulation 126/88R (Sensitive Areas Regulation)
  - Manitoba Regulation 150/91 (Waste Disposal Grounds Regulation)
  - Manitoba Regulation 97/88R (Storage and Handling of Gasoline and Associated Products Regulation)
- *Public Health Act, P210*
  - Manitoba Regulation 321/88R (Collection and Disposal of Wastes Regulation)
  - Manitoba Regulation 326/88R (Protection of Water Sources Regulation)
- *Water Rights Act, W80*
- *The (Federal) Fisheries Act*
  - (Metal Mining Liquid Effluent Regulations)

MINE DEVELOPMENT AND CONSTRUCTION

Stage 1, Environmental Act Licence

Progressing from advanced exploration to production increases the scope of activities and the potential for significant environmental effects. A key regulatory factor during these stages is the *Environment Act* E125.

During advanced exploration the proponent may be required, depending on the scope of the project, to submit a proposal to Manitoba Conservation. The need for a proposal would be determined during the initial scoping of the project between the proponent and Manitoba Conservation. Approval of a Stage 1, *Environment Act* licence for advanced exploration typically takes 60 days or less.

To move into production the proponent needs to submit an Environmental Impact Statement (EIS) to qualify for and receive an *Environment Act* licence. The time frame for this stage is generally dependent on the nature and location of the project, and whether or not there is a public hearing. The permitting process usually takes from three to six months if a public hearing is not required and eight months if one is necessary. The criteria for triggering a public hearing is addressed in the following item Step 4 – Public Hearings.

Step 1 – File a Proposal (Mandatory)

A proposal must be filed for all listed developments in accordance with Manitoba Regulation 163/88 – Licensing Procedures. The proposal needs to include information such as certificate of title, land use designation, a description of the proposed development and operating methods, fuel storage capabilities, potential environmental impacts and environmental management practices to be used at the site.

Step 2 – Screening (Mandatory)

The proposal is available for review by the public and a Technical Advisory Committee (TAC) to determine whether more information, a comprehensive Environmental Impact Statement (EIS), or a public hearing is required. TAC consists of representatives from provincial and federal government departments. The public review is conducted through a media advertisement and the proposal material is placed in public registry files in various government offices and public libraries in the province. At the end of this screening step the proposal will be forwarded to Step 3 and/or Step 4 or will progress directly to Step 5 – the licensing decision.

Step 3 – Further Information (Discretionary)

Manitoba Conservation forwards questions to the proponent directly if Step 2 results in the need for further information. The additional information, once received, is also screened through the public and TAC for review and comment. A comprehensive initial proposal can avoid the delays associated with this step.

When further information is required an additional six weeks of review time is usually required. The time required to prepare the additional information is controlled by the client.

If through the screening step it is determined that a comprehensive Environmental Impact Statement (EIS) is required, Manitoba Conservation and TAC will provide the proponent with EIS guidelines specific to the project.

Step 4 – Public Hearings (Discretionary)

Hearings are not mandatory under the *Environment Act* E125 but generally are called where a development proposal is of general concern or will affect a large number of Manitobans, or where significant public concerns are identified as a result of the screening process. Hearings are conducted by an independent panel called the Clean Environment Commission. The Commission conducts hearings and provides advice and recommendations to the Minister of Conservation based on evidence received during the hearing process. The final decision on the development proposal rests with Manitoba Conservation.

Step 5 – Licensing Decision (Mandatory)

Once the assessment process has been completed, Manitoba Conservation will either issue an *Environment Act* licence with limits, terms and conditions or refuse a licence.

Related Acts and Regulations

Province of Manitoba

- *Environment Act E125*
- *Public Health Act, P210*
- *Workplace Safety and Health Act, W210*
- *Mines and Minerals Act, M162*
- *Mining and Metallurgy Compensation Act, M190*
- *Provincial Park Lands Act, P20*
  - Manitoba Regulation 7/91 changed to Park Activity Regulation

Government of Canada

- *Canadian Environmental Protection Act*
- *Fisheries Act*
- *Canada Wildlife Ac*t
- Proposed Federal Endangered Species Protection legislation.

PRODUCTION

The decision to move into development and production sets the stage for a series of permit/licensing steps. During the advanced exploration phase the proponent may have qualified for a staged *Environment Act* licence. To achieve new mine status, a complete Environment Impact Statement must be submitted and approved through the process outlined in the Environmental Regulations section of this brief.

Usually, advanced exploration is conducted under a claim status. Once exploration has been completed and the decision is made to move ahead with the project, further securing of access and rights to the land should be acquired through mineral and surfaces leases from Industry, Trade and Mines. The proponent may also, based on the location of the site, need to:

- Apply for a Crown land permit or lease, issued by Lands, Conservation.
- Acquire a water rights licence from Water Resources, Conservation.
- Ensure development and operating plans conform with several acts and regulations.
- Apply for a permit from Parks Administration, Manitoba Conservation, if your development is in a provincial park.

Mineral Lease

Issued through the Mines Branch of Industry, Trade and Mines, a mineral lease grants exclusive right to Crown minerals and mineral access rights which include the right to work, mine and erect buildings as required for the efficient mining and production of minerals.

Water Rights Licence

The withdrawal of water from a natural source for any purpose (except domestic) such as the diversion of water, the drainage of wetlands and damming or re-routing of streams requires a *Water Rights Act* licence. The Act is administered and licences are issued by the Water Branch, Manitoba Conservation. The processing of an application is usually coordinated with the *Environment Act* licensing process (where the applications are concurrent).

Licences have seniority according to their date of application and protect a licensed allocation from water withdrawals by some interest that comes later. Licences will be issued from a source only to the point of sustainable supply. Consideration of a licence takes into account impacts upon other existing licensed and domestic users. (Given the remote areas in which mining developments usually occur, restrictions based on sustainable supply, and impacts on others seldom come into play.)

Construction and Operations

There are several key acts/regulations that impact the activities such as operation plan and guidelines, site access and preparation, transportation, waste management, equipment, plant/mill operation, tailings, explosives, security, fuel storage, ventilation, mechanical and electrical, ground support, ground stability, de-watering and pumping, air quality, noise abatement, town site.

They are as follows:

- *Mines and Minerals Act, Ml62* , Sections 102(1), 111(1)
  - Manitoba Mine Closure Regulation 67/99
  - Manitoba Mineral Disposition and Mineral Lease Regulation 64/92
- *Environment Act, E125,* Section 11(1)
  - Manitoba Regulation 164/88 (Classes of Development Regulation), Section 3(4)
- *Workplace Safety and Health Act, W210*
  - Manitoba Regulation 228/94 (Operation of Mines Regulation)
  - Manitoba Regulation 52/88 (Hazardous Materials Information System Regulation)
  - Manitoba Regulation 53/88 (Workplace Health Hazard Regulation)
  - Manitoba Regulation 189/85 (Construction Industry Safety Regulation)
- *Water Rights Act, W80*
  - Manitoba Regulation 126/87 (Water Rights Regulation)
- *Water Power Act, W60*

Labour

Same as above, plus *The Employment Standards Code* and the *Construction Industries Wages Act, C190,* are administered by Manitoba Labour, Employment Standards Branch.

Safety and Health Concerns

Standards and regulations for medical facilities, sanitation, ventilation, and mine rescue are addressed by the:

- *Workplace Safety and Health Act, W210*
  - Manitoba Regulation 228/94 (Operation of Mines Regulation)

Exposure Monitoring

Same as above, plus Workplace Safety and Health Regulations
- Manitoba Regulation 228/94 (Operation of Mines Regulation)

- Manitoba Regulation 53/88 (Workplace Health Hazard Regulation)

Training

Same as above, plus Workplace Safety and Health Regulations
- Manitoba Regulation 53/88 (Workplace Health Hazard Regulation)
- Manitoba Regulation 52/88 (Hazardous Materials Information System Regulation)
- Manitoba Regulation 106/88R (Workplace Safety and Health Committee Regulation)

ENVIRONMENTAL

Water Quality

The standards and regulations applicable to water quality include the:
- *Environment Act, E125*
- *Workplace Safety and Health Act, W210*
  - Manitoba Regulation 53/88 (Workplace Health Hazard Regulation)
  - Manitoba Regulation 228/94 (Operation of Mines Regulation)
- *Public Health Act, P210*
  - Manitoba Regulation 330/88R (Water Supplies Regulation)
  - Manitoba Regulation 331/88R (Water Works, Sewerage and Sewage Disposal Regulation)

Mine Drainage, Waste, Tailings, Spill and Leakage Procedures

The standards and regulations applicable to mine drainage, mine waste, tailings and spill and leakage procedures include the:
- *Environment Act, E125*
- *Workplace Safety and Health Act, W210*
  - Manitoba Regulation 228/94 (Operation of Mines Regulation)
- *Water Rights Act, W80*
  - Manitoba Regulation 126/87 (Water Rights Regulation)

Sewage

Same as above plus the:
- *Workplace Safety and Health Act, W210*
  - Manitoba Regulation 228/94 (Operation of Mines Regulation)
- *Environment Act, E125*
  - Manitoba Regulation 95/88R (Private Sewage Disposal Systems and Privies Regulation)
- *Public Health Act, P210*
  - Manitoba Regulation 331/88R (Water Works, Sewerage and Sewage Disposal Regulation)

Other acts and regulations that may impact on a project include the:

- *Heritage Resources Act, H39.1*
- *Heritage Manitoba Act, H39*
- *Wildlife Act, W130*
- *Highways and Transportation Department Act, H40*
- *Highways Protection Act, H50*
- *Buildings and Mobile Homes Act, B93*
  - Manitoba Regulation 96/87R (Mobile Homes Standards and Permits Regulation)
- *Real Property Act, R30*
- *Workers Compensation Act, W200*
- *Mining Tax Act, M195*
- *Mining Claim Tax Act, M165*

Appendix G

Interim Notification and Referral Protocol used During Development of the Shoal Lake Watershed Management Plan

Background

Manitoba, Ontario, the Shoal Lake First Nations communities and the federal government are all interested in activities and proposed developments in the watershed that could have potential environmental impacts. A variety of projects can be expected in the watershed ranging from the very small (e.g. building a private dock) with little or no anticipated impact to larger developments (e.g. a mining operation) where the potential for an environmental impact is greater. The partners agreed that smaller-scale activities would not generally require partner notification. The decision about whether to notify would be straightforward for some projects but not for others. A rule of thumb to follow would be "when in doubt notify."

Several jurisdictions and departments are involved in the Shoal Lake watershed and as such have legislative requirements under their individual processes. A key principal in the interim protocol is not to duplicate or develop a parallel process to the established legislative authority, but have a process that recognizes common characteristics as much as possible and still allows for specific requirements in either jurisdiction. A primary point of notification is to provide parties with awareness of proposed developments and the opportunity to identify concerns.

Notification Process

a) Categorization of Projects

The following table provides guidance on types of activities that require partner notification and those that do not. It must be understood that notification would advise of a specific activity or operation in the watershed, but would not automatically include any further recommendation or decision-making function.

Categorization of Projects Requiring / Not Requiring Partner Notification

Notification Required	**Notification Required**	**May Require Notification**	**Notification Not Required**
Individual Proposals	Major Planning Processes and Formal Opportunities for Public Consultation	Depends upon Nature and Extent of Proposal	
• Fish hatcheries, sawmills, manufacturing plants, wastewater treatment plants, dairies and feedmills • Pulp and paper mills, mining, mining facilities, marinas, golf courses, ski hills, wastewater treatment lagoons and sewage treatment plants • Requests for Crown Land for industrial/ tourism / residential development or expansion (does not include notification for the 66-foot reserve fronting a private property (OMNR) or minor encroachment of existing development on private land) • New housing subdivisions in communities – area of location, size, etc. • Severence and subdivision applications on private land**** • New cottage lot subdivisions • Applications to sever holdings created for purposes of mineral exploration or create condominium units on these holdings • Non-domestic use of pesticides or herbicides • Dredging or fill applications under the *Public Lands Act*	• Forest Management Planning including 20 year, five year and annual work schedules (OMNR). Detailed spray (herbicide and pesticide) programs are included in the annual work schedule • Very large developments such as generating stations > 100 megawatts, roads of four or more lanes at new locations, flood control projects protecting areas > 100 km^2 • Advanced exploration projects (as defined by Part VII of the *Mining Act*) are posted on Ontario Environmental Registry • Mining projects, as defined by Part VII of the *Mining Act* are posted on Ontario Environmental Registry	• Small-quota-holder harvesting operations* • All-weather-access roads on Crown Land and private land. • Boat cache applications*** • Allocation of certain Crown resources – e.g., new bear management areas, baitfish blocks, traplines, etc.*** • Utility corridors – hydro, telephone, gas, etc. • Community fisheries/wildlife rehabilitation projects • New trapline cabins • Permission to take a bulk sample **	• Dock construction, boathouses, buildings within private land • Single unit housing construction in previously approved development plans • Release of Crown-owned tree reservations on private land • Tenure upgrades – land use permits to leases – patents (land use exists already) • Replacement of buildings on private land damaged/destroyed and where no change in size or use occurs • Licensing forest management harvest blocks or regeneration plans (covered in Forest Management Plan) • Sale of 66 ft fronting on private land • Minor upgrading to existing roads • Small areas of woodcutting (e.g. < 2 ha) • Fuelwood permits less than 4 cords • Staking of claims for future mining. (In both Ontario and Manitoba there is no requirement for a prospector to notify when they are about to stake a claim.)

* only type of forest harvesting operation in Manitoba portion of Shoal Lake watershed.
** if a significant disturbance to the landscape is anticipated during this process then there should be notification, otherwise not likely.
*** may only require notification to First Nations – applies to Ontario Ministry of Natural Resources.
**** Ontario Ministry of Municipal Affairs and Housing will provide direct mail notice of private land subdivision and severance applications.

b) Timelines for Response

The originating jurisdiction will identify the maximum duration of the review period and the deadline for receipt of responses. In this regard the following review periods are generally in use:

- Manitoba Conservation usually provides 30 days for responses.
- Ontario Ministries of Northern Development and Mines, Environment, and Natural Resources normally provide 60 days for responses unless a change is required by law, or the parties agree to a change, or because of an emergency.
- Other timeframes may apply as specified in legislation or regulation.

c) Primary Contacts

The originating government, ministry or department will notify the primary partner contacts as identified in the following table. These persons are then responsible for notifying any other appropriate contacts within their own jurisdiction. During the watershed plan development process, notification of project proposals can also occur at meetings of the Working Group.

Organization	Name	Mailing Address	Phone/Fax/e-mail
Manitoba Conservation	Director of Approvals	Suite 160, 123 Main Street Winnipeg MB R3C 1A5	Tel: (204) 945-7071 Fax: (204) 945-5229 e-mail: Lstrachan@ gov.mb.ca
Shoal Lake Band #39 (Iskatewizaagegan)	Phyllis Jack	Iskatewizaagegan #39 First Nation Kejick P.O., Shoal Lake ON P0X 1E0	Tel: (807) 733-2560 Fax: (807) 733-3106 e-mail: slri@voyageur.ca
Shoal Lake Band #40	Erwin Redsky	Shoal Lake #40 First Nation Kejick P.O., Shoal Lake ON P0X 1E0	Tel: (807) 733-2315 Fax: (807) 733-3115 e-mail:
North West Angle #37 First Nation	Chief Ken Nash	North West Angle #37 First Nation P.O. 267, Sioux Narrows ON P0X 1N0	Tel: (807) 226-5353 Fax: (807) 226-1164 e-mail:
North West Angle #33 First Nation	Chief David Paul Jr.	North West Angle #33 First Nation Angle Inlet, MN, USA 56711	Tel: (807) 733-2200 Fax: (807) 733-3148 e-mail:
Big Island First Nation	Chief Wesley Big George	Big Island First Nation Mortson ON P0W 1J0	Tel: (807) 488-5602 Fax: (807) 488-5942 e-mail: bisle@kenora.com
Ontario Ministry of Northern Development and Mines	Mineral Development Consultant	Ministry of Northern Development and Mines Northwest Office, Mineral Development B002-435 James Street South Thunder Bay ON P7E 6E3	Tel: (807) 475-1746 Fax: (807) 475-1112 e-mail: mike.grant@ndm.gov.on.ca
Ontario Ministry of Natural Resources	Lake of Woods Area Supervisor	Ministry of Natural Resources Box 5080, 808 Robertson Street Kenora ON P9N 3X9	Tel: (807) 468-2501 Fax: (807) 468-2736 e-mail: wiresbe@epo.gov.on.ca
Ontario Ministry of Environment	District Supervisor	Ministry of Environment P.O. Box 5150, 808 Robertson Street Kenora ON P9N 1X9	Tel: (807) 468-2718 Fax: (807) 468-2735 e-mail: barrjo@ene.gov.on.ca
Environment Canada	Rob Dobos	Environment Canada Ontario Region Environmental Assessment Unit P.O. Box 5050, 867 Lakeshore Road Burlington ON L7R 4A6	Tel: (905) 336-4953 Fax: (905) 336-8901 e-mail: Rob.Dobos@ec.gc.ca

Sources and Notes

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[2]Ditto

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SHOAL LAKE WATERSHED MANAGEMENT PLAN

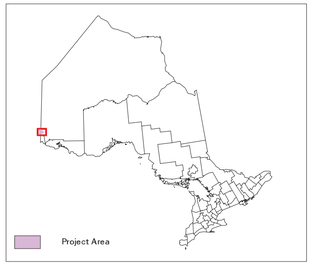
Map 1

Ground Vegetation Types

Legend

- Water
- Exposed Bedrock
- Forested
- Non-Forested
- Wetlands - Alder
- Wetlands - Open Muskeg
- Wetlands - Treed Muskeg
- First Nations
- Winnipeg Aqueduct Intake
- Trans-Canada Hwy.
- Primary Road
- Secondary Road
- Tertiary Road
- Stream
- Railway
- Pipeline
- Transmission Line
- Watershed Boundary
- Extended Study Area
- Winnipeg Aqueduct

Location Map



NOTES

North American Datum 1983.
Universal Transverse Mercator (6°) projection
Zone 15. Central Meridian 93° W.

This map is illustrative only. Do not rely on it as being a precise indicator of routes, locations of features, nor as a guide to navigation.

Source of information - Ontario Ministry of Natural Resources and Manitoba Provincial Government.

ONTARIO MINISTRY OF NATURAL RESOURCES

Manitoba Conservation

Canada

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SHOAL LAKE WATERSHED MANAGEMENT PLAN

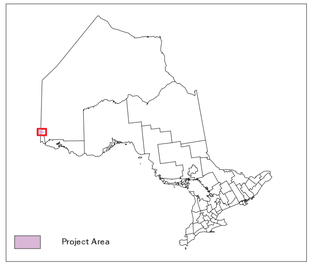
Map 2

Land Tenure Map

Legend

- Water
- Crown Land
- Federal Reserve Land
- Existing Provincial Park
- Proposed Provincial Park Conservation Reserve
- Patent Land
- Whiteshell Provincial Forest
- Northwest Angle Provincial Forest
- Winnipeg Aqueduct Intake
- Building
- Trans-Canada Hwy.
- Primary Road
- Secondary Road
- Tertiary Road
- Stream
- Railway
- Pipeline
- Transmission Line
- Watershed Boundary
- Extended Study Area
- Winnipeg Aqueduct

Location Map



NOTES

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Source of information - Ontario Ministry of Natural Resources and Manitoba Provincial Government.

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Whiteshell Provincial Park
West Hawk Lake
Trans Canada Highway
Falcon Lake
High Lake
Mud Lake
Indian Bay
Snowshoe Bay
IR 40
IR 39A
Echo Bay
Clearwater Bay
IR 38A
Zigzag Island
Corkscrew Island
Western Peninsula
Shoal Lake
IR 39
IR 37A
IR 31B
IR 34 B1
IR 31J
IR 34C IR 37B
IR 33B
IR 37
Lake of the Woods
Falcon Island
Manitoba
Ontario
USA

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Canada

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