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

- *Harmonize traditional First Nations' values and knowledge, existing federal and provincial policies, guidelines, objectives and actions for water quality protection.*
- *Carefully plan new development, having proper regard for other uses and users and for watershed carrying capacity.*
- *Apply predictive models and other assessment tools for determining the potential for adverse cumulative or long-term impacts of proposed development.*
- *Adopt a pollution-prevention first approach.*
- *Use best management practices in all land use activities.*
- *Use best practicable treatment for all wastewater discharges.*
- *Promote development and use of innovative treatment technologies that reduce nutrient loadings.*
- *Promote the development of partnerships with individuals and organizations to monitor and enhance water quality and to foster public awareness and education.*
- *Monitor watershed management plan effectiveness and update as necessary.*
- *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

- *Protect areas of known sensitivity by appropriately managing development in other areas of the watershed.*
- *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.*
- *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.*
- *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.*
- *Utilize the Lakeshore Capacity Model and other predictive tools, as appropriate, to assess the potential long-term impacts of any major new development proposals.*
- *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

- *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

- *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.*
- *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.*
- *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.*
- *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

- *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

- *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.