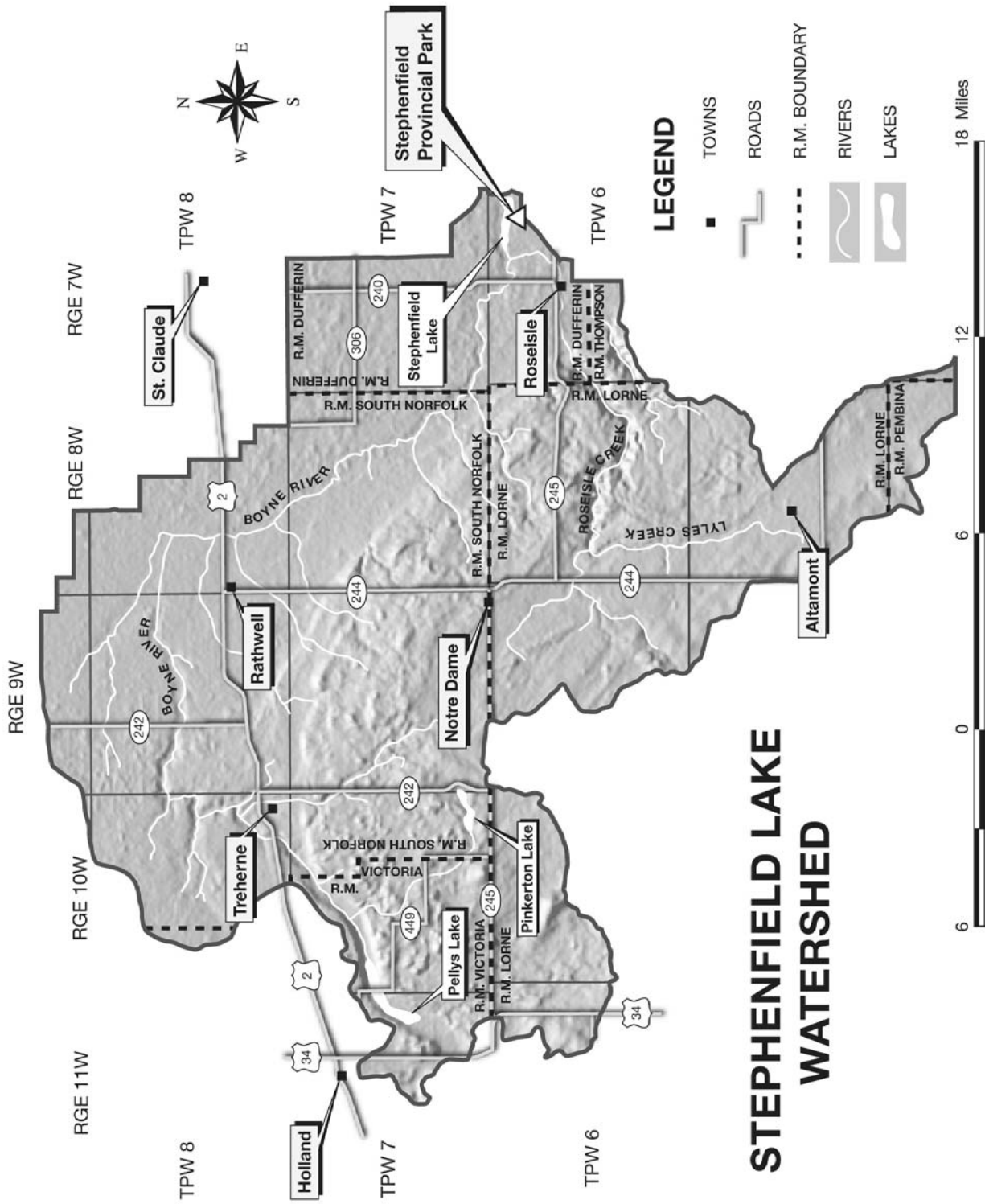


# **STEPHENFIELD LAKE WATERSHED MANAGEMENT PLAN**



June 2005



June 2005

## Stephenfield Lake Watershed Management Plan

Director  
Planning & Coordination Branch  
Manitoba Water Stewardship

Dear Mr. Thompson:

We, the Stephenfield Lake Watershed Round Table, are pleased to present you with this water management plan for the Stephenfield Lake Watershed. In this region, water quality and quantity are considered to be the main water issues; we are committed to protecting, maintaining and/or enhancing this valuable resource for the social, economic and environmental well being of our watershed.

The process began in early 2002 with resolutions from area Rural Municipalities and Towns requesting your Branch to lead and facilitate a consensus based planning process. We received a background report on the area's resources and to this we added local knowledge. We reviewed the technical data and discussed the issues and potential options. After considerable time and effort, consensus was reached on a set of three recommended actions plans. A draft plan, summarizing these activities and containing an evaluation survey was printed and approximately 1800 copies were made available to area residents in January 2005 for public review. In February 2005 we held an Open House in Treherne and a Public Meeting in Rathwell to present the plan and seek further input from watershed residents. This input allowed us to finalize the plan. We also included an implementation strategy section in the final plan.

The management plan implementation strategy focuses on source water protection, riparian/wetland protection and enhancement, and public education and cooperation to protect the area's water resources. The plan will be monitored, reviewed and adjusted as required to measure effectiveness of the action plans and to meet emerging issues.

On behalf of the Round Table, the Technical Advisory Group and all who participated in the public review, I am proud to submit this plan to you and all watershed residents. I thank the Technical Advisory Group and your staff for their expertise, dedication and support towards developing this plan.

Yours truly,

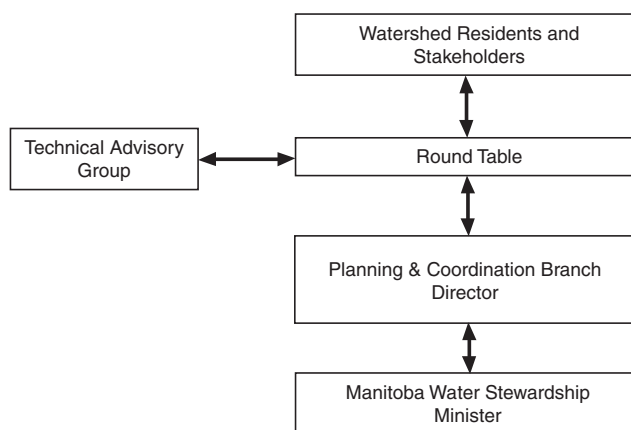


Roy Wood

Round Table Chairperson,  
Stephenfield Lake Watershed Planning Process

# PLAN DEVELOPMENT

In the fall/winter of 2001, Manitoba Water Stewardship (formerly Manitoba Conservation) initiated a process to develop a water management plan for the Stephenfield Lake watershed. Several meetings were held with stakeholders to inform them of the process and to gauge local interest. By spring 2002, there was agreement from the local governing authorities that a Round Table of stakeholders, representing the diverse interests in the watershed, should be established and a consensus building process used to develop a watershed management plan to protect and preserve the area's water resources while maintaining or enhancing economic opportunities.



## MISSION STATEMENT

To develop and cause to be implemented a watershed management plan and policies that will strive to enhance and protect the area's water resources and environment for the health, safety, and economic well being of present and future generations.

## ROUND TABLE METHOD OF OPERATION

- The Round Table shall request the coordinator to make available such employees of participating agencies, as may be required, to provide technical advice and information on water issues and opportunities.
- The Round Table shall elect a chairperson and a vice-chairperson from its membership.
- Round Table members shall receive no payment from Manitoba Water Stewardship for out-of-pocket expenses for attending meetings.

## ROUND TABLE TERMS OF REFERENCE

- The Round Table shall work together with the other resource owners, users and managers to formulate a management plan that documents management guidelines, protection and sustainable use of the land and water resources associated with the Stephenfield Lake Watershed.
- The Round Table and a Technical Advisory Group (TAG) shall provide local residents with technical and educational information on issues and opportunities.
- The Round Table in conjunction with the TAG shall obtain and synthesize local inputs respecting water resource issues and opportunities.
- The Round Table in conjunction with the TAG shall apply the MANITOBA WATER POLICIES during development of the watershed management plan.

A Technical Advisory Group, comprised of representatives from various provincial and federal agencies, was established in May 2002 to put together a technical background report and to support the efforts of the Round Table and the overall planning process.

## TECHNICAL ADVISORY GROUP

<b>Representative</b>	<b>Organization</b>
Alexandra Bourne	MB Water Stewardship – Ecological Services Division, Water Science & Management Branch, Water Quality Management Section
Bill Watkins	MB Conservation – Wildlife Branch
Bob Eilers	Agriculture & Agri-Food Canada - Western Land Resource Group, Wpg.
Bob Harrison	MB Water Stewardship – Ecological Services Division, Water Science & Management Branch, Surface Water Management Section
Bob Wheeler	MB Agriculture, Food & Rural Initiatives – Reg. Ag. Services Div., Treherne
Bruce Webb	MB Conservation - Environmental Approvals
Dale Timmerman	Agriculture & Agri-Food Canada - PFRA , Morden
David Ward	MB Conservation – Headquarters Operations (Parks Branch)
Don Malinowski	MB Intergovernmental Affairs & Trade – Community Planning Services
Ernie Watson	Fisheries & Oceans Canada - Prairies Area
Bob Betcher	MB Water Stewardship – Ecological Services Division, Water Science & Management Branch, Groundwater Management Section
Gerry Delorme	MB Water Stewardship – Ecological Services Division, Planning & Coordination Branch, Conservation Districts Secretariat
Heather Groom	MB Ind., Trade & Mines, Geological Services, Mineral Resources
Henry Daniels	MB Water Stewardship – Infrastructure & Operations Division, Regional Water Operations, Red River/Eastern Region
Laureen Janusz	MB Water Stewardship – Ecological Services Division, Fisheries Branch
Peter Haluschak	MB Agriculture, Food & Rural Initiatives - Ag. Dev. & Marketing, Soils & Crops
Rob Matthews	MB Water Stewardship – Infrastructure & Operations Division, Water Licensing Branch

## Planning Coordinators

Barry Oswald	MB Water Stewardship – Ecological Services Division, Planning & Coordination Branch, Water Planning Section
Peter Blahut	MB Water Stewardship – Ecological Services Division, Planning & Coordination Branch, Water Planning Section

A Round Table, comprised of 20 agencies, was established in April 2003. The Round Table worked with the TAG to identify resource issues and opportunities, to compile the draft management plan, to obtain public input and to incorporate that input into a final water management plan.

## STAKE HOLDERS

### ROUND TABLE

<b>Representative</b>	<b>Organization</b>
Alvin De Pauw	Keystone Agricultural Producers
Bob McKenzie	Town of Carman
Cliff Greenfield	Pembina Valley Conservation District
Craig Spencer	Treherne Dam Committee
David Shaw	Town of Treherne
Dennis Doerksen	R.M. of Dufferin
Garry Verniest (Vice-Chair)	R.M. of Lorne
Gary Robinson	Boyne Valley Heritage Committee
George Jackson	R.M. of Thompson
James Flatt	Roseisle Creek Watershed Association
Jim Smithson	MB Water Stewardship
Lloyd Chevrier	R.M. of South Norfolk
Ray Theroux	South Central Soil & Water Management Association
Ray Timmerman	Manitoba Pork Council
Raymond LeNeal	Victoria - Norfolk Cattleman's Association
Reg Marginet	R.M. of Victoria
Robert Deleurme	Village of Notre Dame de Lourdes
Roger Culleton	Woodlot Association of Manitoba
Roy Wood (Chairman)	LaSalle Redboine Conservation District
Sam Schellenberg	Pembina Valley Water Cooperative

# STUDY AREA

## WATERSHED GEOGRAPHY

The Stephenfield Lake watershed has a drainage area of approximately 370 square miles and is located in south central Manitoba, approximately centered on the communities of Treherne, Rathwell and Notre Dame de Lourdes. The population of the watershed is approximately 3,885. The area's main economic activities are agriculture, manufacturing and construction industry, service industry, tourism and recreation. The watershed has a semi-humid climate with average annual precipitation varying from 19 to 22 inches. The physical geography and natural resources within the watershed are diverse.

The main topographic features of the watershed include the Manitoba Escarpment with undulating uplands to the west and lacustrine plain to the east, the Boyne River spillway channel (west of Pellys Lake to Treherne), the Boyne River and its many deeply eroded contributing waterways off the escarpment (most notably Roseisle Creek) and Stephenfield Lake.

A wide range of soils and landscapes occur in the area. Dominant soil textures in the watershed range from loamy sands to clay loam with the agricultural capability rating from Class 1 to 4 occupying large areas.

LAND USE / COVER	ACRES	% of WATERSHED
<b>Agricultural Cropland</b>	<b>192,045</b>	<b>81.6%</b>
<ul style="list-style-type: none"> <li>● Annual Crops</li> <li>● Forages</li> <li>● Grasslands</li> </ul>	<ul style="list-style-type: none"> <li>● 148,806</li> <li>● 7,799</li> <li>● 35,440</li> </ul>	<ul style="list-style-type: none"> <li>● 63.2%</li> <li>● 3.3%</li> <li>● 15.1%</li> </ul>
<b>Trees</b>	<b>31,527</b>	<b>13.4%</b>
<b>Surface Water</b>	<b>3,616</b>	<b>1.5%</b>
<ul style="list-style-type: none"> <li>● Water Bodies</li> <li>● Wetlands</li> </ul>	<ul style="list-style-type: none"> <li>● 1,503</li> <li>● 2,113</li> </ul>	<ul style="list-style-type: none"> <li>● 0.6%</li> <li>● 0.9%</li> </ul>
<b>Urban &amp; Transportation</b>	<b>8,320</b>	<b>3.5%</b>
<b>TOTAL</b>	<b>235,508</b>	<b>100%</b>

Significant areas of well drained, loam to clay loam, mixed till soils with high agricultural capability occur in the rolling upland portion of the watershed. Imperfectly drained soil conditions predominate in the more level lacustrine soils below the escarpment.

LIVESTOCK POPULATIONS*		
Animal	Population	Animal Units
Beef	4,590	5,508
Horse	560	745
Swine	15,050	18,812
Dairy	560	1,120
Poultry	199,400	1,176
<b>TOTAL</b>		<b>27,360</b>

\* Livestock population based on Nov. 2002 estimates - South Central Planning District Inventory Analysis

WATERSHED POPULATION*	
Community	Population
Treherne	645
Notre Dame de Lourdes	620
Rathwell	85
Rural Residents	2,915
<b>TOTAL</b>	<b>3,885</b>

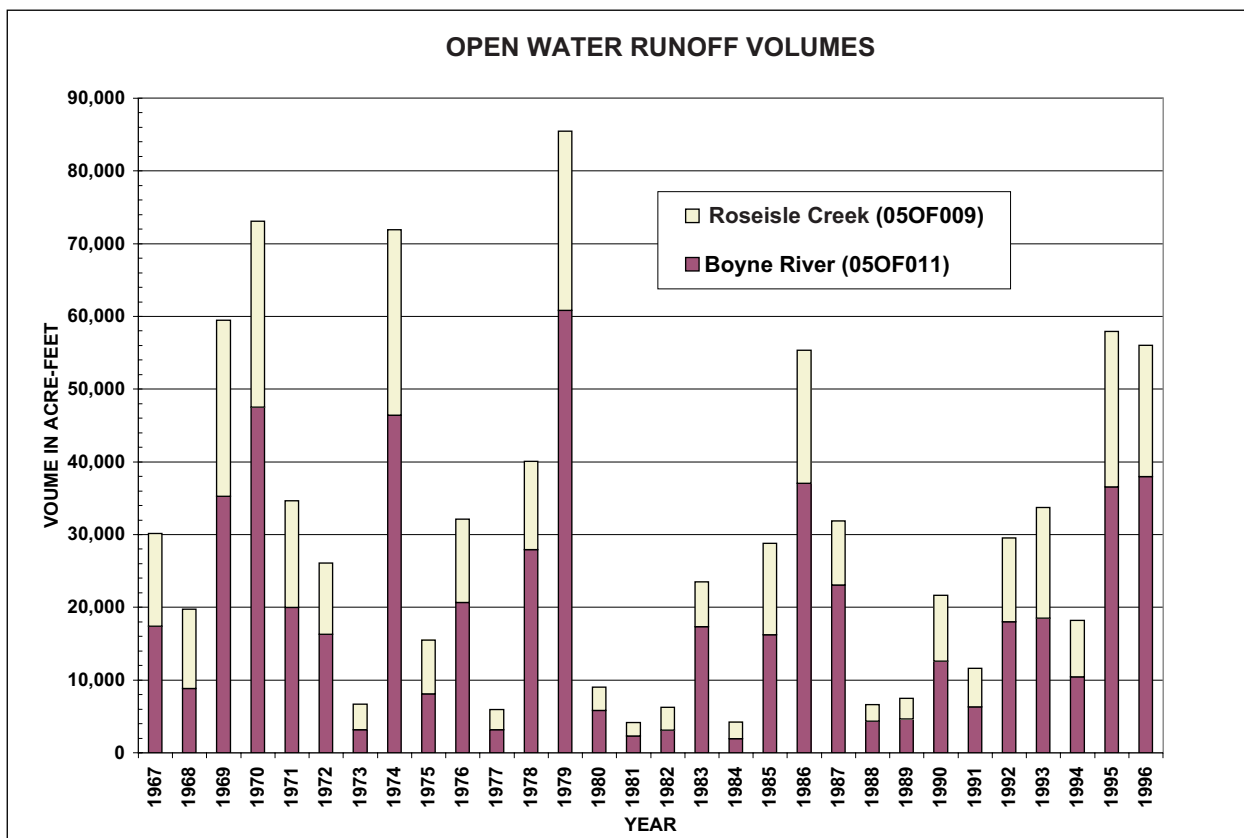
\* Based on 2001 census

## HYDROLOGY

The mean annual precipitation varies from 21.9 inches on the plateau to 19.3 inches on the lowlands. Approximately three-quarters of this falls as rain, the rest as snow. Only about 10% of the average, annual total precipitation results in streamflow. Overall the potential evapotranspiration losses are greater than the annual precipitation which indicates that the area is generally 'water deficient'. Streamflow varies considerably over the months and years. Annual streamflow usually peaks in April and May, during spring runoff. On average, 87% of the area annual runoff volume occurs in the period from the beginning of March to end of May; 11.5% in the period from the beginning of June to the end of August; and 1.5% from September to February.

The watershed's two main waterways are the Boyne River and the Roseisle/Lyles Creek. The headwaters of Boyne River rise at the western boundary in the Pellys/Pinkerton Lake area while the Roseisle/Lyles Creek headwaters rise near the southern boundary, south of Altamont. They join and flow into Stephenfield Lake which is located at the eastern edge of the watershed, at the base of the Manitoba Escarpment.

The annual runoff from these two waterways differs based mainly on their size and topography. Streamflow records were collected during the open water season (March to October inclusive) from 1967 to 1996. In 1997 the Boyne River near Roseisle station was cut from the





hydrometric monitoring network and the Roseisle Creek near Roseisle station was reduced to function only during the spring period (March to May inclusive).

Based on available data, the Boyne River near Roseisle has an average runoff during this period of 19,000 acre-feet or 1.6 inches of runoff from its entire watershed. The Roseisle Creek near Roseisle has an average runoff of 11,300 acre-feet or 2.5 inches. The Roseisle Creek watershed generates more runoff per unit area because it is located entirely in the escarpment area. The total runoff from these two stations varied during the period of record from a low of 4,000 acre-feet in 1981 to a high of 86,000 acre-feet in 1979. See page 7, OPEN WATER RUNOFF VOLUMES.

**STEPHENFIELD DAM**

Stephenfield Dam was built in 1963 by PFRA mainly for water supply and other uses including recreation and fisheries. The impounded reservoir is referred to as Stephenfield Lake. In 1990, the spillway crest was raised two feet to provide additional water for increasing water demands and to offset volume lost to sedimentation since the lake was originally formed. It is now owned and

STEPHENFIELD LAKE ANNUAL RELEASE PATTERN	
Present Release Pattern	
■ November 1 <sup>st</sup> to April 1 <sup>st</sup>	■ 2.5 cfs
■ April 1 <sup>st</sup> to June 15 <sup>th</sup>	■ 1.5 cfs
■ June 15 <sup>th</sup> to July 1 <sup>st</sup>	■ 5.0 cfs
■ July 1 <sup>st</sup> to September 1 <sup>st</sup>	■ 10.0 cfs
■ September 1 <sup>st</sup> to September 15 <sup>th</sup>	■ 5.0 cfs
■ September 15 <sup>th</sup> to November 1 <sup>st</sup>	■ 1.5 cfs

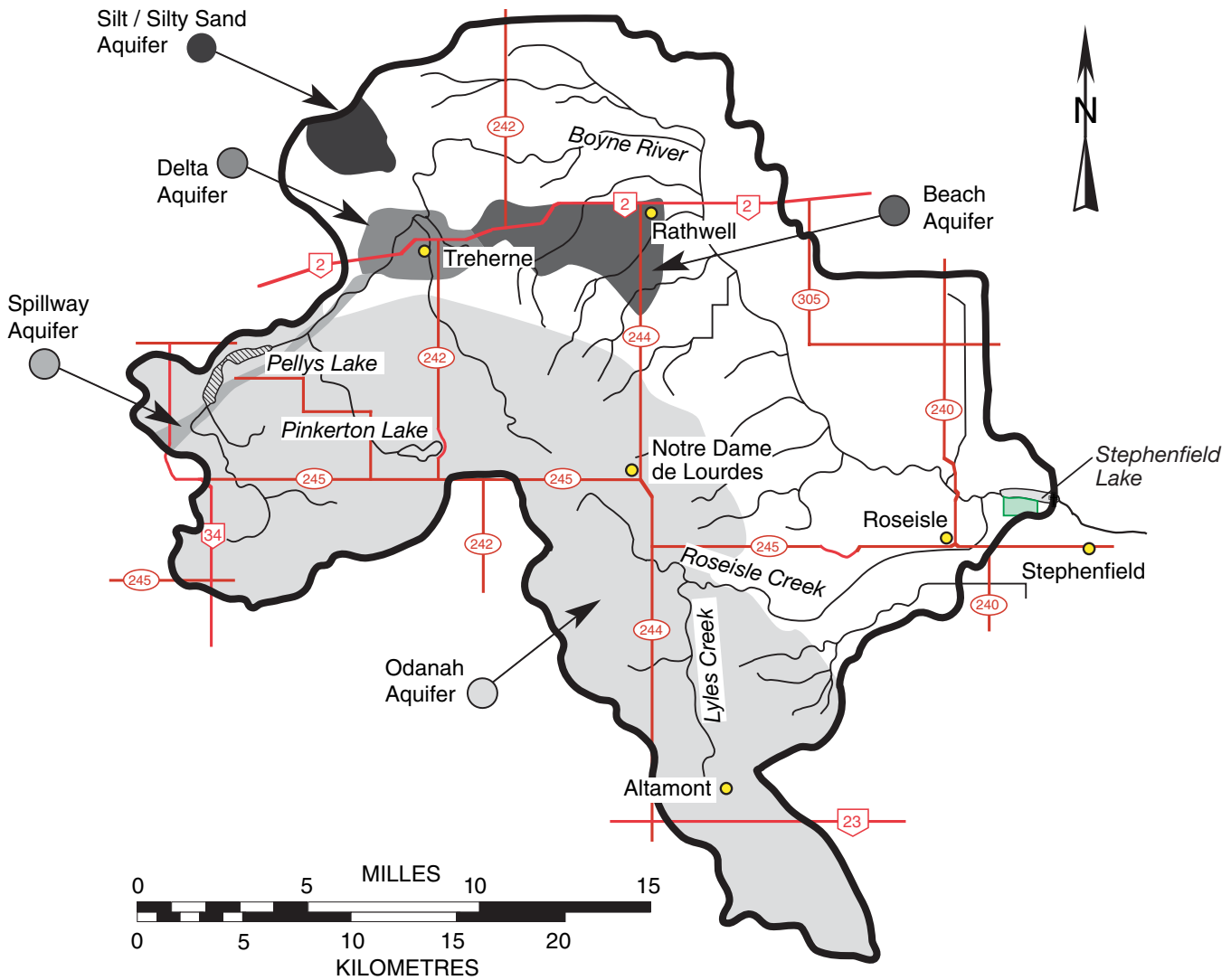
operated by Manitoba Water Stewardship. The lake at full supply level has a maximum depth of 22 feet, covers an area of 460 acres and contains 3,690 acre-feet of water.

The top of the earth fill dam is at elevation 982 feet above sea level. A fixed crest spillway, 105 feet wide, is located at elevation 972 feet to pass water in excess of lake capacity. A slide-gate equipped riparian outlet, four feet in diameter, extends through the earth dam and outlets into the downstream Boyne River at elevation 948 feet. This riparian outlet is used to provide controlled lake releases when water levels are below the spillway crest.

The lake’s annual release pattern is set by Manitoba Water Stewardship based on the knowledge of upstream watershed runoff magnitude and downstream water supply needs. See "Stephenfield Lake Annual Release Pattern" table. Summer releases are set to meet downstream needs, mainly irrigation. Early spring and late fall releases are minimized to conserve water. Winter releases are slightly larger to maintain live streamflow during this period of water loss to ice formation. Releases in excess of this pattern occur during periods of above normal runoff. During drought periods releases could be less than this pattern and would give priority to domestic and municipal uses.

Without the Stephenfield Lake in place, the Boyne River downstream of the dam would be considered an intermittent stream with limited water supply. However, the lake supplies significant water storage to provide for water extractions both directly from the Stephenfield Lake and from the Boyne River downstream of the lake.

# STUDY AREA AQUIFERS



## GROUNDWATER

Groundwater is available from both bedrock and surficial aquifers within the watershed. An aquifer is a permeable geologic formation that can supply quantities of water sufficient for at least a single-family dwelling. There are significant differences in the aquifers found above and below the escarpment.

Above the escarpment, groundwater is generally available from the fractured Odanah shale bedrock aquifer as well as from local sand and gravel aquifers within the overlying glacial till. See the STUDY AREAS AQUIFERS FIGURE (page 9). Little groundwater investigation work has been done in this area and the location, extent and capacity of these aquifers is largely undetermined. Generally, wells within the bedrock produce sufficient water for household and farm use but the quality is poor. Wells in sand and gravel aquifers produce more significant yields of good quality water. The Village of Notre Dame de Lourdes is supplied by one such aquifer.

Below the escarpment, bedrock shales are soft and un-fractured and hence do not provide sufficient quantities of water. Furthermore, water in the inter-layered sandstone, gypsum and carbonate rocks is very saline and not potable. Consequently, the only aquifers providing potable water are composed of sands and gravels. Four such aquifers have been investigated to a limited degree of detail. These include the Spillway, Delta, Beach and Silt/Silty Sand aquifers.

The Spillway Aquifer lies in an intermittent and meandering fashion at the base of the Boyne River spillway, covered by significant thickness

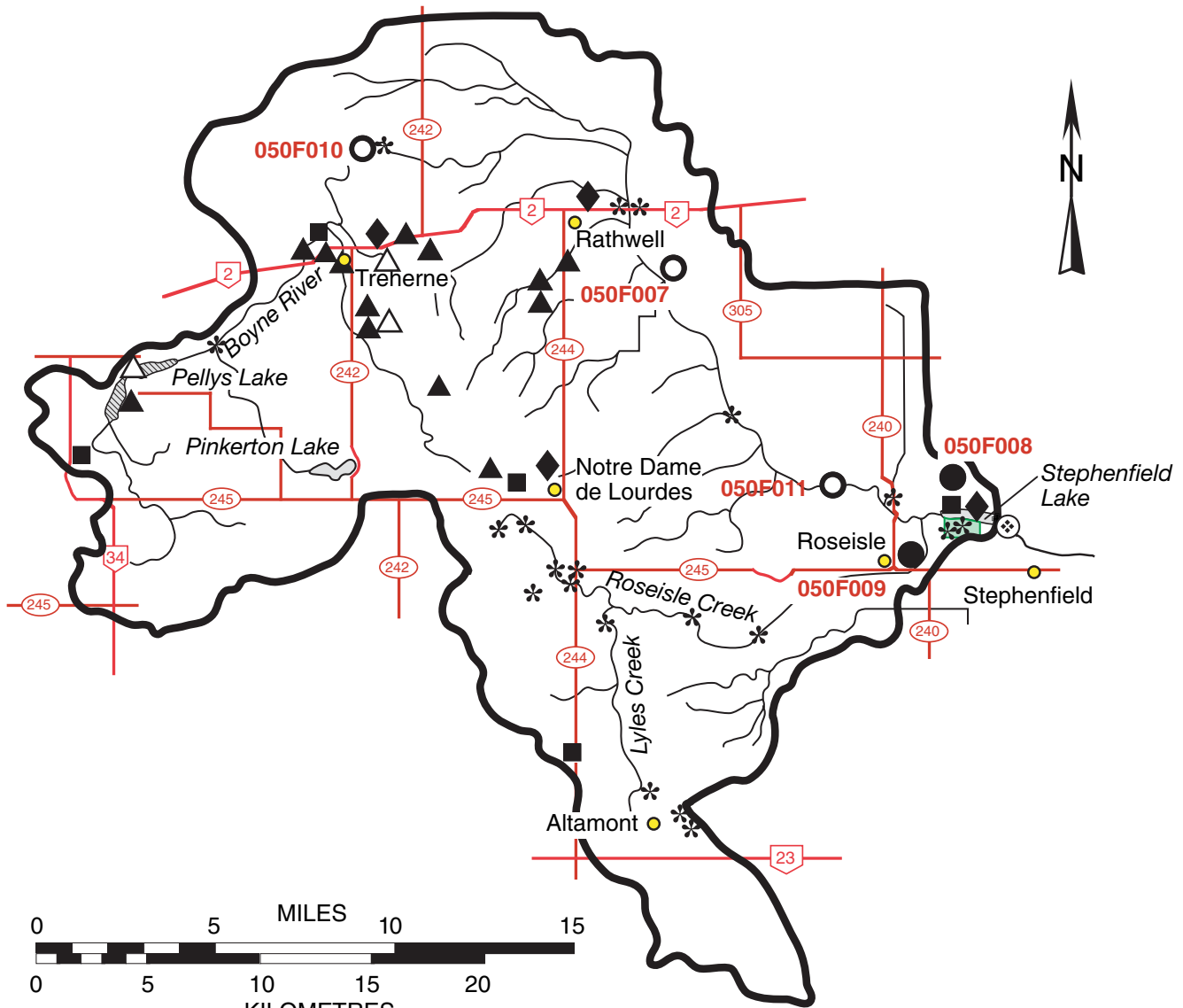
of clay. Test drilling is required to find productive deposits and to determine their capacity. Groundwater quality is generally poor to brackish with good quality water only in the Pellys Lake area. The community of Holland gets its water from this portion of the Spillway Aquifer.

The Delta Aquifer lies beneath and around the Town of Treherne and is likely partially connected to the Spillway Aquifer. The deposits extend over an area of approximately six square miles and are up to 70 feet thick. Groundwater quality is good to excellent in the eastern portion and poor to brackish in the west. The aquifer is considered quite productive, sufficient to supply the Town of Treherne and agricultural and rural residential uses.

The Beach Aquifer underlies an area west and southwest of the community of Rathwell and is thought to be hydraulically connected to the Delta Aquifer. The deposits extend over an area of approximately 10 square miles and range from five to 25 feet thick. Groundwater quality is rated good to excellent. The aquifer is considered to be quite productive, sufficient to supply the community of Rathwell and agricultural and rural residential uses.

The Silt/Silty Sand Aquifer lies northwest of Treherne. The deposits underlie an area of approximately 10 square miles and range from 10 to 40 feet thick. Groundwater quality is generally good. Groundwater production rates are considered quite low but may be sufficient for individual farm or rural residences.

# WATER INFRASTRUCTURE



## LEGEND

- ◆ MUNICIPAL WATER TREATMENT
- WASTE WATER TREATMENT
- ACTIVE HYDROMETRIC GAUGING STATIONS
- HISTORIC HYDROMETRIC GAUGING STATIONS
- ▲ ACTIVE GROUND WATER MONITORING STATIONS
- △ HISTORIC GROUND WATER MONITORING STATIONS
- ⊗ STEPHENFIELD LAKE DAM
- \* HISTORIC SURFACE WATER QUALITY MONITORING STATIONS

### THE MONITORING NETWORK

Data has been collected at five surface water quantity stations and 16 groundwater monitoring stations. Currently, only two surface water quantity stations and 13 groundwater monitoring stations are still active.

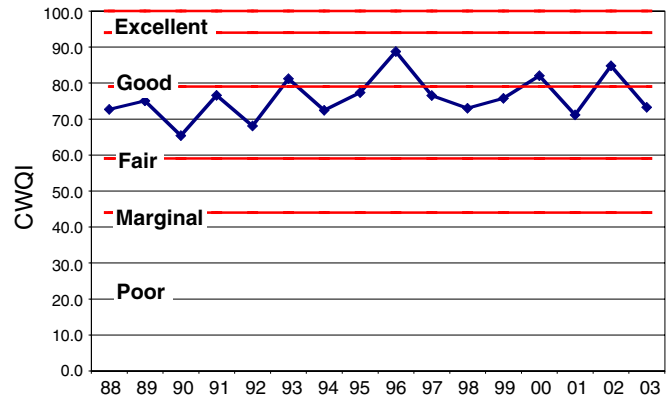
Historically, surface water quality samples have been taken from 16 sites within the watershed, including Roseisle Creek, Lyles Creek and the Boyne River. In addition, the South Central Soil and Water Management Association has monitored four sites on the Boyne River from 2002 to 2004. The only applicable long term water quality site still being monitored is located on the Boyne River at Carman, downstream of the study area. The locations of these sites are shown on the WATER INFRASTRUCTURE FIGURE (page 11).

As well, the Stephenfield Lake water treatment plant monitors intake water for nitrogen and phosphorus.

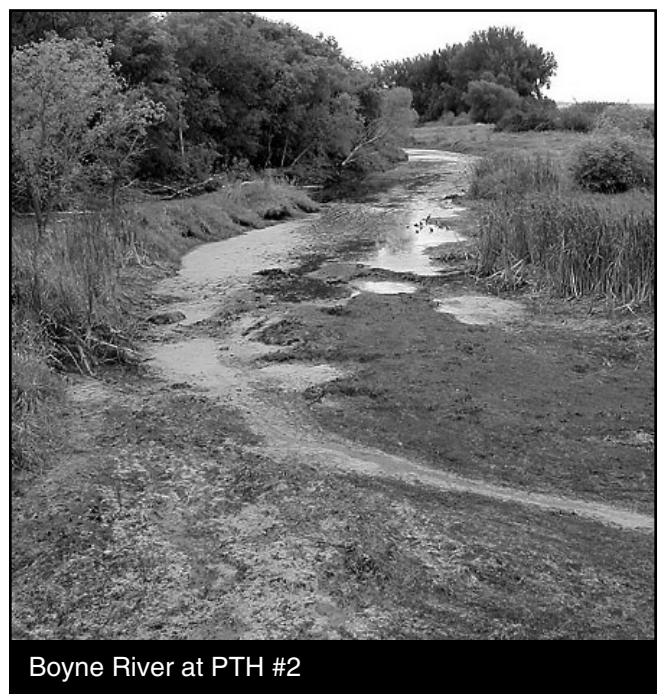
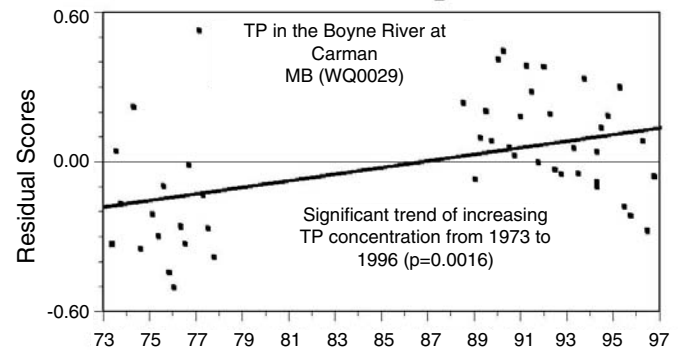
### WATER QUALITY

Water quality in the Boyne River at Carman, as measured by the Water Quality Index, is generally good to fair. A long term trend analysis on the Boyne River at Carman (1973 to 1997) indicates that there has been a statistically significant increase in total phosphorus (TP) concentration. Excessive concentration of nutrients (nitrogen and phosphorus) is one of the most important water quality issues in Manitoba. Although there was no detectable trend observed in flow-adjusted total nitrogen data collected on the Boyne River at Carman, nitrogen is an important nutrient to manage.

### Boyne River at Carman - Water Quality Index



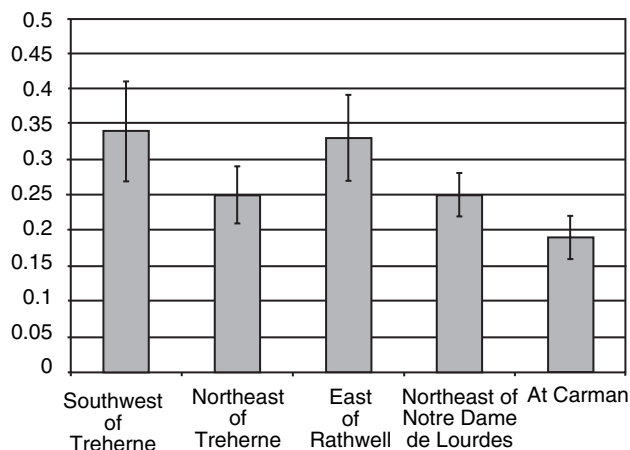
### Total Phosphorus (TP)



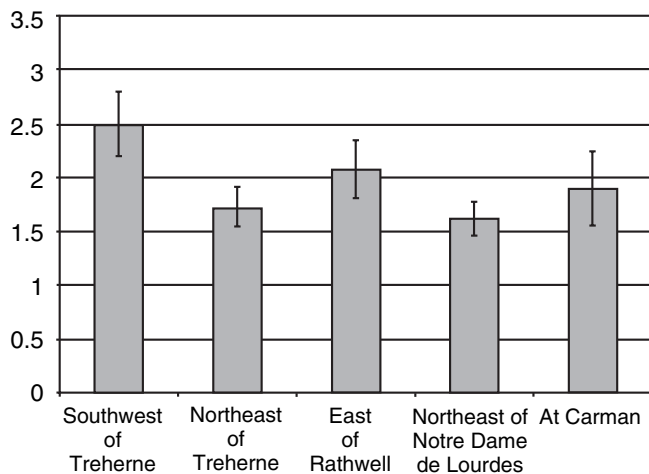
Boyne River at PTH #2

Total phosphorus (TP) and total nitrogen (TN) concentrations in the Boyne River at Carman are comparable to other sites on the Boyne River.

**Average TP Concentration (mg/l) in the Boyne River from 2002 to 2004**



**Average TN Concentration (mg/l) in the Boyne River from 2002 to 2004**



A short term study was conducted on Roseisle and Lyles creeks from 1998 to 2000. Nutrient concentrations are generally higher in these two creeks than in the Boyne River but are within the range of other streams in southern Manitoba. Lyles Creek has average concentrations of TP and TN of 1.26 mg/l and 4.17mg/l respectively. Roseisle Creek has

average TP and TN concentrations of 0.89 mg/l and 4.78 mg/l respectively.

### LICENSED WATER USE

Water use is licensed from surface water and groundwater sources throughout the watershed. Licensable uses of water are municipal, agricultural, industrial, irrigation and other uses. Domestic use for household and livestock to 5,500 gallons/day does not require a licence.

Stephenfield Lake has a firm (reliable, based on historic streamflow records) supply of approximately 2,640 acre-feet of water annually which is available to accommodate licensed water users and domestic water needs, and to provide for a live streamflow in the Boyne River throughout the year. There is no firm annual water supply upstream of the lake. Presently, the Boyne River’s firm annual water supply is fully developed.

There are 18 known licensable groundwater development projects in the study area reflecting a total groundwater allocation of approximately 755 acre-feet.

### FISHERIES RESOURCES

Stephenfield Lake supports a significant summer and winter sport fishery. The lake has been stocked almost annually since 1967 with adult northern pike, perch and occasionally walleye fry. Limited sampling indicates Stephenfield Lake is quite productive with a naturally reproducing population of game fish (pike and perch) and a good forage base of minnows; however, summer and winter fish kills are frequent. These fish kills are attributed to excess

nutrient loading due to shoreline erosion and runoff from upstream land management activities.

A number of sites on the Boyne River and its tributaries, upstream of Stephenfield Lake, were sampled for fish presence. In the Boyne River, species found included northern pike, white suckers, black sided darters, johnny darters and fathead minnows. The presence of young of the year and 1yr.+ pike and perch indicates certain areas may provide year round habitat. Although not found in the samples, creek chub were also identified in the inventory as being present. Upstream fish habitat is limited by alterations to in-stream habitat, riparian areas and water quantity and quality.

## **WATER SUPPLIES AND TREATMENT**

There are four major water treatment plants within the study area. Three use local groundwater sources (Treherne, Notre Dame de Lourdes and Rathwell) and the fourth is the Stephenfield Lake plant operated by the Pembina Valley Water Cooperative, which uses surface water from the lake. Stephenfield provides treated water for the communities of Roseisle, St. Claude, Miami, Carman, Haywood and Sperling. Each of these plants produces a wastewater stream requiring disposal, which is regulated under The Environment Act.

There are a number of small water treatment systems in the watershed as well, serving Hutterite colonies and the Stephenfield Provincial Park. These systems are not regulated by The Environment Act but all public and semi-public water treatment and supply systems must meet Public Health Act requirements.

## **STEPHENFIELD PROVINCIAL PARK**

Stephenfield Provincial Park is an important regional park for residents of south central Manitoba and visitors to the area. The park was created in 1972 on the south shore of Stephenfield Lake, is 231 acres in size and lies within the larger Stephenfield Game Bird Refuge. Vegetation is typical of the Aspen/Oak Parkland Natural Region.

The purpose of the park is to provide outdoor recreational opportunities in a natural setting. The park provides opportunities and facilities for camping, swimming, picnicking, hiking, fishing and group use activities. The park has 172 campsites, a group use area for about 100 people and a picnic area for about 100 people. Since 1995, transient camping-nights sold has averaged about 3,400 / season.

## **WASTEWATER TREATMENT**

There are five wastewater lagoons operated in the watershed for treating human waste: Treherne, Notre Dame de Lourdes, Evergreen Colony, Trappist Fathers and Stephenfield Park. All are standard aerobic oxidation lagoons. Rural residents rely on private sewage disposal systems.

Livestock facilities are controlled by regulations, which prohibit discharges beyond the owner's property and prohibit discharges to streams. Livestock operations of 300 animal units and over must have a manure management plan approved by Manitoba Conservation, and annual inspections and reporting are components of Manitoba Conservation's manure management program. In addition to these facilities, there are a large number of small livestock operations in the watershed.

### AGGREGATE RESOURCES

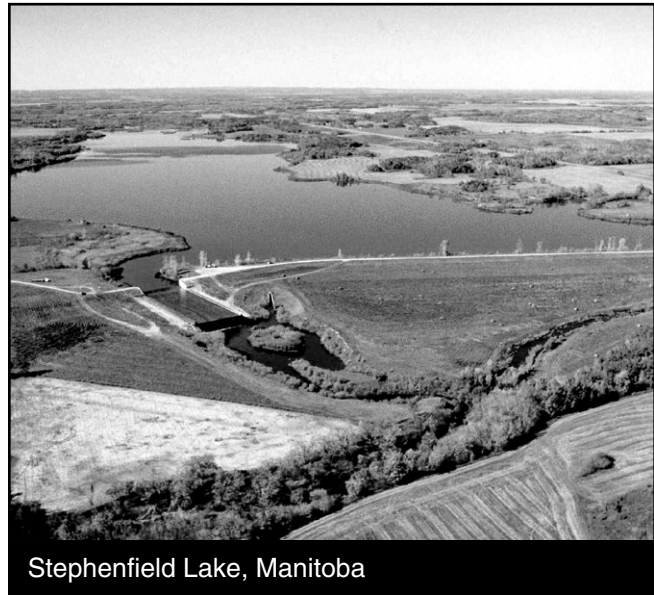
Aggregate resources within the study area are fairly significant. There are two active shale quarries and 13 active gravel pits...all are privately owned. (A pit is considered to be active if it has been used within the last two years.)

### MUNICIPAL WASTE DISPOSAL GROUNDS

Two registered waste disposal grounds in the watershed, Treherne and the R.M. of Lorne (Altamont) were decommissioned within the last few years. Waste is now gathered at transfer sites and trucked out of the watershed.

### CROP PROTECTION WAREHOUSES

Crop protection warehouses include commercial facilities that store and distribute agricultural fertilizers and pesticides. They require Environment Act Licences and are built to CropLife warehouse standards. Crop protection warehouses are located near Treherne, Rathwell and Notre Dame de Lourdes.



Stephenfield Lake, Manitoba



Gravel Quarry



Rathwell, Manitoba



# WATERSHED ISSUES

All Round Table members agree on the importance of water to the watershed's environment, economy and society. It was felt that the long term economic and environmental sustainability of the watershed depends on protecting and preserving its water resource and developing additional sustainable water supplies. The following issues were identified by the Round Table as being important.

## SOURCE WATER PROTECTION

Source water is untreated water from streams, rivers, lakes, or aquifers, which is used to supply private or public drinking water systems. It is vulnerable to contamination from a variety of activities. Source water protection is important to protect human health, reduce the cost of water treatment and for a healthy ecosystem.

Surface water and groundwater quality issues in the study area include the export of chemicals, micro-organisms, nutrients and eroded materials from agricultural, urban and natural areas to the water resources.

Surface water quality monitoring shows a significant increasing trend in phosphorus levels and a marginal increase in nitrogen levels throughout the watershed. Stephenfield Lake often experiences heavy summer algae blooms that negatively affect recreation and require expensive treatment for potable water supply at the Stephenfield Lake water treatment plant. While algae blooms on prairie lakes are natural occurrences, they have become more problematic with the export of chemicals and nutrients from agricultural and urban sources. Stephenfield Lake also receives sediment loads that affect water quality.

Except for Roseisle, all communities in the study area rely on groundwater sources for their drinking water needs. (Roseisle residents receive their water from the Pembina Valley Water Cooperative.) In some wells, sampling has shown coliform bacteria levels and concentrations of nitrate, and naturally occurring arsenic or uranium at levels above drinking water guidelines.

## HEALTHY RIPARIAN ZONES

Riparian zones typically consist of vegetated corridors adjacent to wetlands, lakes and waterways. These vegetated corridors are considered effective natural barriers, which help to prevent urban and agricultural contaminants from being exported into the aquatic ecosystem. They also help protect the landscape from water erosion during large runoff events and provide fish and wildlife habitat. (While wooded riparian land makes up only 3% of Manitoba, it can support 80% of the biodiversity, absorb up to 50% of nutrients, remove up to 60% of pathogens, trap up to 75% of sediments and provide the greatest potential value for hardwood production.)

Riparian areas are often located on private lands used for agriculture. These areas are sometimes used as grazing areas or are cleared for annual cropping as economic pressures to the farming community discourage maintaining areas that don't

produce an economic benefit. These practices reduce or eliminate the value of riparian areas in protecting water quality and habitat. In urban areas the riparian function is often degraded for alternate reasons i.e. golf courses, river walkways, etc. Reduction in riparian areas is a growing concern.

## WETLANDS

Wetlands are areas that are frequently inundated or saturated by surface water or groundwater. They include swamps, marshes, bogs and similar areas.

While wetlands comprise less than 1% of the study area, they play an important role in watershed health. Their functions include water quality improvement, floodwater storage, groundwater recharge, fish and wildlife habitat, aesthetics and biological diversity and productivity. Wetlands help improve downstream water quality by filtering sediment, nutrients and chemicals from the system.

In some cases wetlands, on private land, are drained to facilitate modern farming practices and to maximize agricultural production. This may pose a risk to water quality.

## EROSION

Soil erosion is a form of soil degradation and loss due to the forces of water and/or wind. It is a natural process that becomes a problem when human activity causes it to occur much faster than under natural conditions. Factors affecting soil erosion are rainfall intensity and runoff, soil erodibility, slope degree and length, vegetative cover and tillage. The loss of soil from farmland results in reduced crop

production potential, degraded surface water quality, reduced capacity of wetlands, lakes and waterways and degraded fish habitat.

Generally soil erosion by water is a management consideration for the Manitoba Escarpment and uplands of the study area while soil erosion by wind is a dominant factor on the sandy soils in the area below the Manitoba Escarpment.

Sedimentation is reducing the storage capacity at Stephenfield Lake. In the fall of 1990, the spillway crest was raised two feet to compensate for lost storage volume. Surveys are being conducted in 2005 to determine how much siltation and loss of storage volume has occurred since 1990.

## WATER QUANTITY AND SUPPLY

Having a reliable water supply is critical to the economic success and growth of the communities dependent on the Stephenfield Lake watershed. This includes water for human consumptive use, livestock, manufacturing and irrigation.

Hydrologic and climatic data indicates that the study area is generally water deficient. The Boyne River and its tributaries are considered intermittent streams as they have periods of no flow in the summer and/or fall of drier years. Runoff needs to be captured and stored to become a reliable source of water supply.

The water quantity issues identified in the study area were generally focused on the Stephenfield Lake. The lake is an important source of water supply and is fully allocated.

Most residents in the study area get their drinking water from groundwater sources including the Spillway Channel Aquifer, the Beach Aquifer, the Delta Aquifer and the Odanah Aquifer. The Beach and Delta aquifers are at or near their sustainable limit. The yields of the Odanah Aquifer and Spillway Aquifer have not been well determined.

### PROPOSED TREHERNE DAM

A substantial water storage area exists in the Boyne River valley near Treherne. A pre-feasibility study has shown that a dam could be built with a storage capacity of approximately 22,300 acre-feet. In addition, the nearby Assiniboine River has significant volumes of unallocated water, during the spring runoff period, to fill the reservoir. The total land requirements of the project would be approximately 1,300 acres including 950 acres of flooded area and 350 acres of riparian buffer zone.

The potential benefits of the project include irrigation water for regional agricultural development, an improved municipal water supply, and recreation. The potential costs include several miles of flooded valley and loss of wildlife habitat.

An investigation is underway, by interested groups and agencies, to assess the economic cost, benefits and environmental impacts of developing this area as a storage reservoir.

### FISHERIES REGULATIONS

Drainage projects that may impact fish habitat should be reviewed by the Department of Fisheries and Oceans under The Federal Fisheries Act. A Fisheries Act Authorization is

only required when measures can not be taken during the planning, design, construction and operation of the project to prevent any damage to fish habitat. Authorizations are generally issued on the condition that measures are implemented that compensate for the harm to fish habitat. Some reviews may require more time than others, and approvals may be contingent on the implementation of measures to mitigate, and/or compensate for the harmful effects of the project on fish habitat. Better knowledge of the presence of fish and fish habitat would be beneficial to both proponents and regulators.

### REGULATION AND ENFORCEMENT

There are many existing regulations that deal with preserving and protecting water quality and quantity. It was recognized, however, that monitoring and enforcement of these regulations is lacking, resulting in risks to the water resource.

### EDUCATION

It was recognized that lack of education and understanding by watershed residents on how human activities on the landscape affect water quality could result in risks to the water resource.



# OPTIONS CONSIDERED

It was felt that for a water management plan to survive, it would have to deal with the watershed's common issues and thereby gain the support of all the stakeholders.

A range of options was considered to deal with the watershed's water issues. They are outlined in the following and are evaluated as to whether or not they were considered desirable to pursue at this time.

## SOURCE WATER PROTECTION

Drinking water, which may come from groundwater or surface water, is vulnerable to pollution from point and non-point pollution sources. If the drinking water source is not protected, pollution can put people's health in danger as well as cause a community significant expense. A group could be formed to establish protection plans in the key source water areas of the watershed.

This option was considered desirable as people need to safeguard their drinking water so that serious health problems don't arise as a result of a contaminated water supply.

## SURFACE WATER MANAGEMENT

Large runoff events and flooding have the potential to cause soil erosion, damage drainage infrastructure, roadways and property, and degrade water quality and fish habitat by transporting sediment loads and a variety of pollutants into the waterway network. Runoff from agricultural land can carry soil particles, crop residues, chemicals, manure and nutrients used to assist crop growth. Runoff from urban areas can carry soil particles, chemicals, nutrients, industrial wastes and effluent from sewage lagoons. A group could be formed to encourage and support beneficial management practices that will reduce the amount of

sediment and pollution carried by runoff into the watershed's surface waters.

This was considered a desirable option, as people need to use the watershed lands for their livelihood. Instead of constraining activities, this approach would look at ways to detain and manage runoff, ways to keep substances where they are used and ways to prevent them from reaching the water regime and becoming pollutants.

## RIPARIAN MANAGEMENT AND RESTORATION

Riparian zones and wetlands protect surface water quality, streambank and shoreline integrity as well as providing fish and wildlife habitat. They are an important factor in the integrity and health of the watershed ecosystem. A working group could be formed that would inventory existing riparian areas and wetlands, and would seek to maintain or improve the riparian condition and extent throughout the watershed with the cooperation and support of watershed residents.

This was considered a desirable option, as it would provide protection for water quality, fish and wildlife habitat, increased hardwood productivity and reduce the negative impacts of large runoff or flood events.

### **PROPOSED TREHERNE DAM**

The study area is generally water deficient. Stephenfield Lake is presently fully allocated and much of the groundwater supplies are at or near full allocation. This condition limits future economic growth and diversity and leaves the area vulnerable to a drought. Because of the topographic features in the Boyne River Valley near Treherne, an opportunity exists to develop storage for Assiniboine River surplus spring runoff. A local group is presently pursuing a feasibility study of the project and it will be subject to an environmental, social and economic review.

Having an independent group carry out a feasibility study was considered desirable so as to study all aspects of the project and to determine its costs and benefits. Future decisions could then be based on fact.

No action was considered to be required through the Stephenfield Lake Watershed Management Plan.

### **FISH HABITAT**

It was felt that a better inventory of fish and fish habitat in the watershed would help drainage planners and the Department of Fisheries and Oceans regulators. A stakeholder group could be formed to assess and classify fish habitat in the watershed.

This option was considered desirable, as it would provide guidance to where projects need review and where fish habitat needs to be protected.

### **IMPROVE GROUNDWATER KNOWLEDGE**

The aquifers in the study area have been studied to a limited degree. While the sustainable yields of the Beach Aquifer and Delta Aquifer have been estimated, the capacity of the Spillway, the Silt/Silty Sand and the Odanah aquifers have not been well determined. A group could be formed to promote improvement of aquifer knowledge in the study area where feasible.

This was considered desirable as it would help to ensure that aquifer withdrawals are appropriately allocated.

### **REGULATION AND ENFORCEMENT**

There is a need for more monitoring and enforcement of existing regulations to deal with issues related to water quality and quantity.

This was considered a desirable option in combination with seeking cooperation through education, and demonstration of beneficial management practices.

### **EDUCATION**

Understanding of water-related issues and opportunities is a necessary component to protecting and enhancing the area's water resources. A group could be formed that would seek to educate and work with watershed residents to reduce the negative impacts of human activities on the water resource.

This was considered a desirable option because, through education and awareness, it is more likely that residents will cooperate and participate to protect the water resource.

# PUBLIC INPUT

A draft Stephenfield Lake Watershed Management Plan was completed in January 2005 and distributed to watershed residents through local schools, libraries and through provincial, municipal and town offices. Residents were invited to provide their comments/suggestions in several ways; through contacting a Round Table or TAG member, by submitting the postage paid survey included in the draft plan, by participating at the advertised public meeting held in February 2005 in Rathwell, or through the LaSalle Redboine website. Overall, respondents were approving of the management plan. Collectively, survey respondents gave the recommended actions an agreement rating of 90%. Nearly all respondents either provided general comments on the management plan or specific comments on the recommended actions.

The Round Table and TAG reviewed all public comments in the development of the final Stephenfield Lake Watershed Management Plan. Some of the comments were incorporated into the plan. They felt that many comments have already been addressed in the broader sense of the Recommended Action plans and decided that some may be considered (for inclusion) in the future if required.

In summary:

- all respondents supported the three recommended action plans and did not suggest any additional plans,
- several respondents felt that the rate of manure spreading should be reduced or banned and that all liquid manure be injected,
- some respondents suggested that there be stricter standards, larger fines and greater enforcement of manure spreading practices,
- several respondents felt that incentive programs should be developed to encourage riparian area protection,
- some respondents wanted a plan that would ensure sustainable supplies of safe, treated water for all residents in the watershed,
- some respondents wanted to see water quality testing continued on the Boyne River and Roseisle/Lyles Creek.



# RECOMMENDED ACTIONS

## SOURCE WATER PROTECTION PLAN

In the Stephenfield Lake Watershed, source water comes from aquifers and surface water runoff; groundwater provides source water for most of the area's residents while surface water runoff provides source water for Stephenfield Lake. Source water protection would include both groundwater and surface water.

The goals of the source water protection plan are:

- identify primary aquifer recharge areas,
- identify main risks to source water in these recharge areas,
- improve knowledge of aquifer sustainable yields,
- identify practices that jeopardize runoff water quality,
- establish a source water protection plan for the watershed including Stephenfield Lake. Assist landowners with projects that protect or improve surface water and groundwater quality,
- establish an additional surface water quantity monitoring station to improve Stephenfield Lake water balance computations,
- establish a water quality monitoring station on the Boyne River and one on the Roseisle Creek,
- ensure the watershed's main water quality indicator station on the Boyne River at Carman is maintained,
- continue to monitor the water resources and compile a water quality and quantity report for distribution on a regular basis.

## RIPARIAN / WETLAND PROTECTION AND ENHANCEMENT PLAN

Riparian areas and wetlands provide natural protection for the watershed's surface waters. Riparian vegetation filters landscape runoff before it enters wetlands, waterways and lakes and provides protection to the landscape during large runoff events. Wetlands can slow water velocities and provide water storage during large runoff events. Together, they provide habitat for wildlife and fish.

The goals of the riparian / wetland protection and enhancement plan are:

- compile an inventory of the watershed's riparian and wetland areas, with respect to their health, to provide buffer services for surface water resources and to provide fish and wildlife habitat,
- prioritize riparian and wetland areas for protection or enhancement,
- protect and enhance riparian environments and wetlands in conjunction with landowners throughout the watershed and encourage government and other agencies to provide appropriate support levels.



Pinkerton Lakes

## EDUCATION PLAN

Implementation and success of a watershed management plan depends on the understanding by area residents on how human activities on land and in the water affect water quality and quantity and requires their cooperation and participation to lessen these impacts. The watershed will be valued, protected and sustained if all have a greater understanding of how it works and involvement in its protection.

The goals of the education plan are:

- raise awareness of the Stephenfield Lake watershed,
- distribute information on the watershed and on the state of its water resources,
- promote "beneficial management practices" relating to water quality and conservation,

- distribute information on how a healthy watershed functions, and the importance and benefits of riparian zones and wetlands.



The Manitoba Escarpment



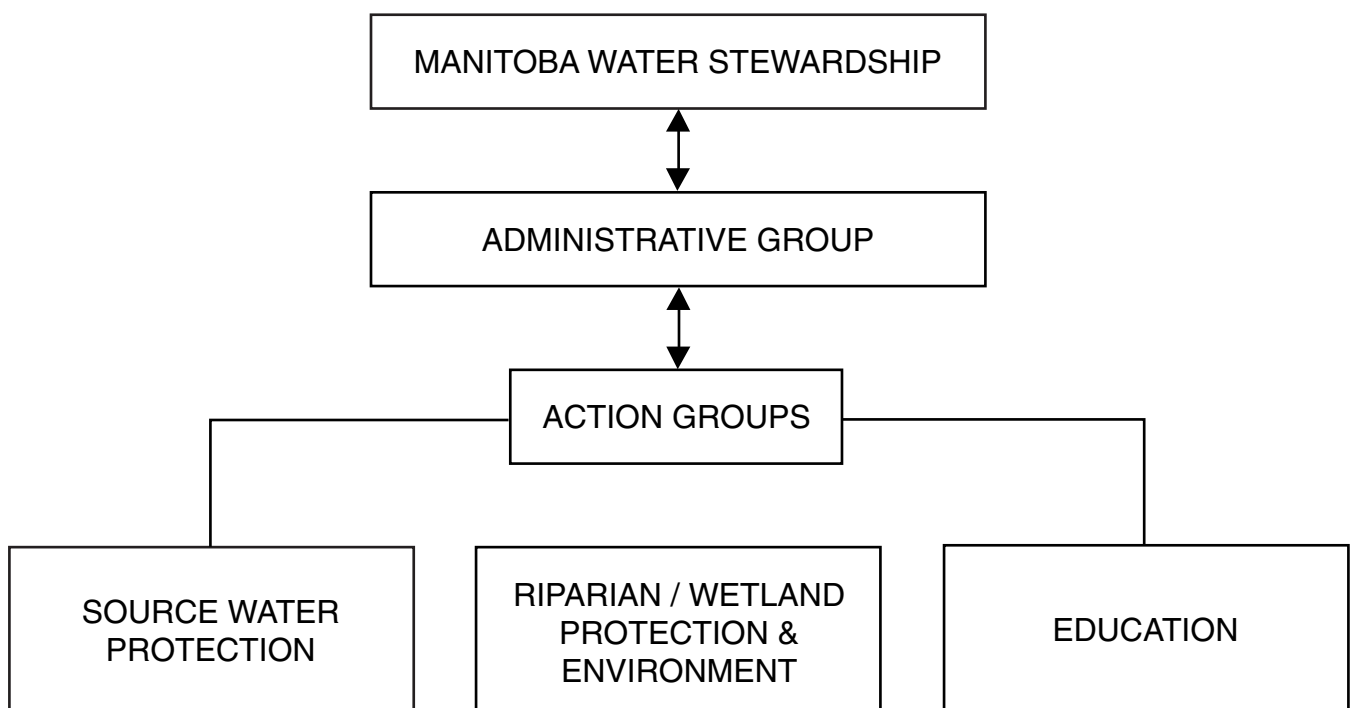
The Boyne River Valley



# PLAN IMPLEMENTATION

After 14 meetings, involving the review of the watershed's inventory and technical data, and identifying issues and opportunities, the Round Table reached consensus on a set of recommended actions regarding "Source Water Protection, Riparian / Wetland Protection and Enhancement, and Education".

The positive impacts of the Stephenfield Lake Watershed Management Plan will depend on the successful implementation of these recommended actions. This task will require the establishment of action groups to carry out the action plans and an administrative group to coordinate and oversee the action groups and activities. The diagram below shows the linkages between the various working groups.



## ACTION GROUPS

Formation of action groups will be required to meet the objectives of the Stephenfield Lake Watershed Management Plan. It is recommended that the membership of these groups comes mainly from the planning TAG agencies and Round Table members.

The responsibilities of the action groups include:

- establish work plans to meet the goals and objectives of the ‘recommended action plans’,
- present work plans for administrative group approval,
- carry out approved activities of the work plan,
- recommend to the administrative group changes to the objectives of the action plan as required.

### ADMINISTRATIVE GROUP

Formation of an administrative group will be required to oversee and coordinate the plans and activities of the ‘action groups’. The administrative group would also advise provincial and local government authorities and local area residents on the state of the watershed’s water resources. It is recommended that this group be comprised of the two Conservation Districts (Pembina Valley and LaSalle Redboine) in the watershed.

The duties of the administrative group will include the following:

- coordinate the activities of the action groups,
- evaluate and approve (or decline) changes to action plans,
- advise provincial authorities and area residents on plan progress and on the state of the watershed’s water resources.



## Some Watershed Facts

Area .....	370 square miles
Population .....	3,885
Number of Rural Municipalities .....	6
Number of Urban Municipalities .....	2
Total Topographic Relief .....	700 feet
Livestock Numbers (cattle, horses, swine)* .....	20,760
Average Annual Precipitation Volume .....	400,000 acre-feet
Average Annual Discharge Volume .....	30,000 acre-feet
Stephenfield Lake Storage Volume .....	3,690 acre-feet

\*Livestock population based on Nov. 2002 estimates -  
South Central Planning District Analysis

## Some Conversion Factors

1 cubic-foot = 6.23 Imperial gallons  
 1 acre-foot = 271,379 Imperial gallons  
 1 Imperial gallon = 4.55 litres  
 1 acre-foot\* = 1.23 cubic decametres  
 1 cubic decametre = 1,000,000 litres  
 1 animal unit (A.U.)\*\* = 73 kg (160 lbs) nitrogen  
 per 12 month period

\*An acre-foot of water is the volume contained on an acre, one foot deep. It is a common Imperial unit of measurement for water.

\*\*Examples: 1 beef cow = 1.25 A.U.  
 1 sheep (ewe) = 0.2 A.U.



## **ACTION GROUP OBJECTIVES**

### **Source Water Protection Plan**

The action group will work to protect and enhance source water in the study area by improving aquifer and surface water knowledge through monitoring and analysis. They will establish source water protection plans and compile an annual water quality and quantity report for distribution.

### **Riparian/Wetland Protection and Enhancement Plan**

The action group will work to protect and enhance riparian and wetland areas by compiling an inventory of the watershed's riparian resources, by identifying areas for protection and by working in conjunction with cooperative landowners.

### **Education Plan**

The action group will raise awareness of the watershed's water resources by distributing information on the watershed and the state of its resources and by promoting 'best management practices' relating to water quality and conservation.



For more detailed information on the watershed's resources or this plan, contact any Round Table or Technical Advisory Group member (listed on pages 4 & 5) or access the website: <http://www.lasalledboine.com>