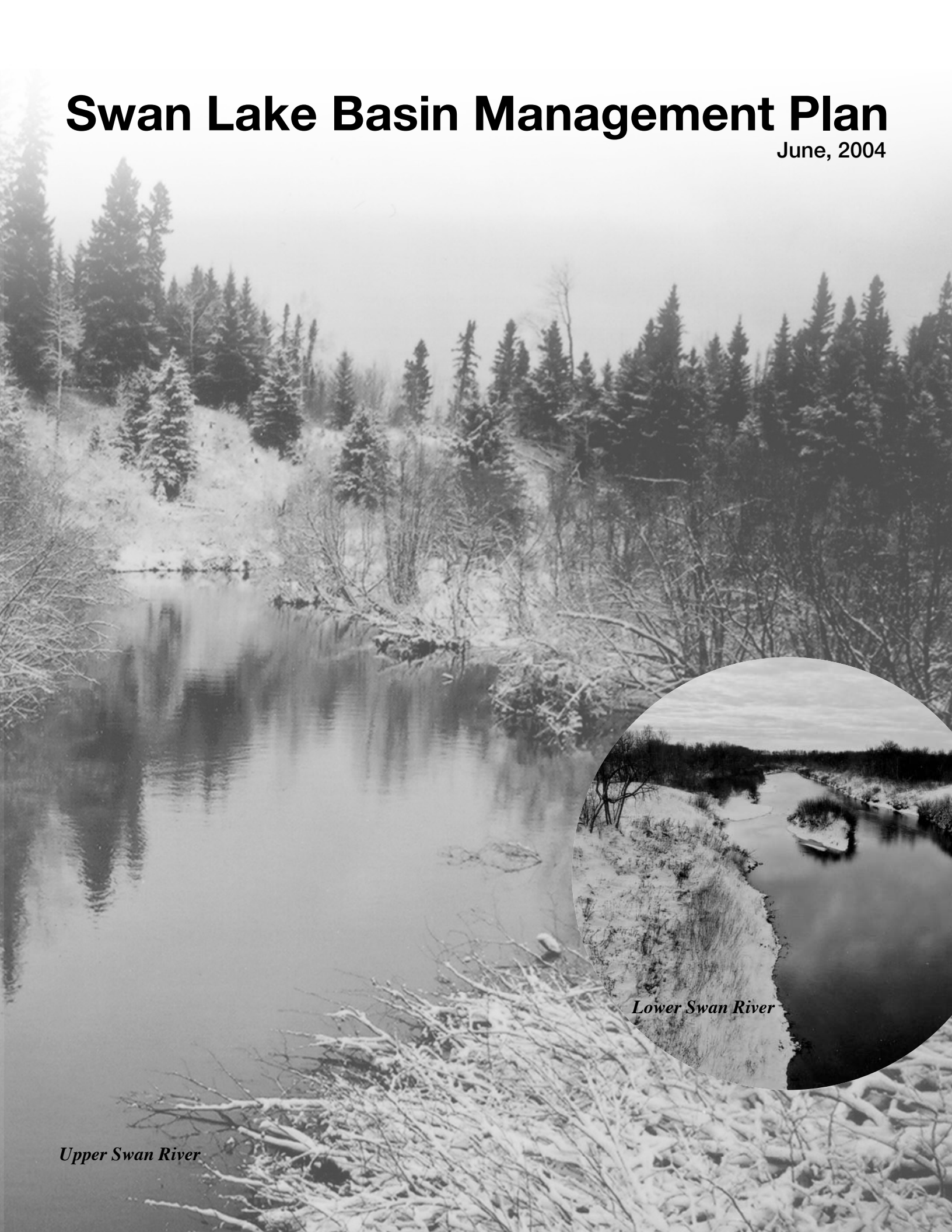


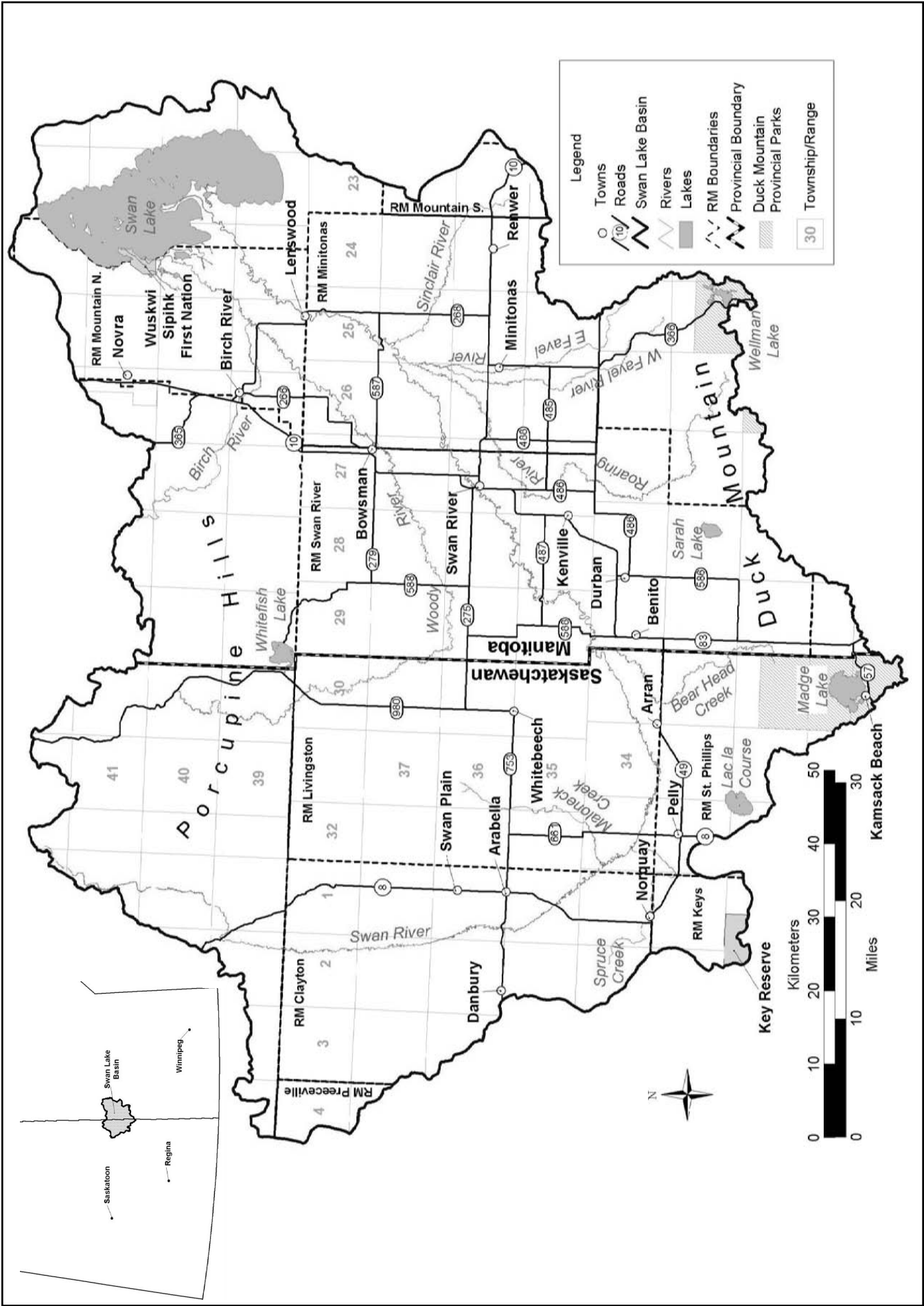
# Swan Lake Basin Management Plan

June, 2004



*Lower Swan River*

*Upper Swan River*



# Swan Lake Basin Management Plan



June, 2004

Honourable Steve Ashton  
Minister  
Manitoba Water Stewardship

Honourable David Forbes  
Minister  
Saskatchewan Watershed Authority

Dear Ministers:

We have, as stakeholders, drafted and compiled this water management plan for the Swan Lake Basin. This process has been a joint effort between many Saskatchewan and Manitoba agencies, as you can see from the Round Table and Technical Advisory Group membership lists on page five. It has been a pleasure working with our basin neighbors in the shared interests of our water resources.

Considerable time and effort have gone into reaching the consensus represented by this plan. We reviewed the basin information provided by the Technical Advisory Group and added local knowledge to it. We discussed the basin water issues and their potential solutions and all agreed to a set of four recommended action plans. A draft plan summarizing these activities and containing an evaluation survey was printed, with 5000 copies made readily available to basin residents during the summer of 2003. In February 2004, we held open houses and public meetings in Pelly, Saskatchewan and Swan River, Manitoba to present the plan and solicit further input from all basin residents. We considered the public input and incorporated it into the plan. An implementation strategy was then developed and included in the Swan Lake Basin Management Plan.

The management plan focuses on keeping the basin residents educated as to the status of our water resources and on seeking urban and rural landowner cooperation to protect water quality within the basin. We expect that ongoing park and forest management, in both provinces, will protect water quality in the forested, upper portions of the basin.

On behalf of the entire Round Table, I am proud to submit this plan to you and to all basin residents. We feel that the good condition of our basin water resources can be maintained if Manitoba and Saskatchewan stakeholders, which includes the provincial governments, cooperate in implementing the Swan Lake Basin Management Plan. We would like to thank you for the opportunity to compile this plan for our area and for the coordination by your staff. We also would like to thank the Technical Advisory Group for their dedication, information and advice.

Yours truly,

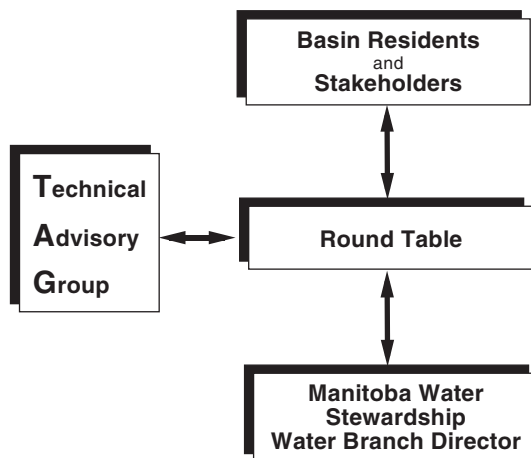
A handwritten signature in cursive script that reads "Lynn Stehr".

Lynn Stehr  
Chairperson, Acting  
Stakeholder Round Table  
Swan Lake Basin Management Plan

# PLAN DEVELOPMENT

This Swan Lake Basin Management Plan was initiated in October of 2000. A 21 person Technical Advisory Group (TAG) was formed to compile the available technical information on the basin. The TAG was comprised of Manitoba, Saskatchewan and federal civil servants and of a representative from Ducks Unlimited and the Cree Nation Tribal Health Centre.

A Round Table, comprised of 28 agencies representing the stakeholders in the basin, was established in December 2001. The Round Table worked with the TAG and local resource owners and users in developing the management plan.



The Swan Lake Basin management planning process required the Round Table and the TAG to identify and study the water resource issues in the basin, prepare a draft basin management plan, obtain public comment on the draft, incorporate that comment into a final basin plan and decide how to implement and monitor the final plan.

## ROUND TABLE METHOD OF OPERATION

- THE ROUND TABLE SHALL REQUEST THE COORDINATOR TO MAKE AVAILABLE SUCH EMPLOYEES OF THE DEPARTMENTS AS MAY BE REQUIRED TO PROVIDE TECHNICAL ADVICE AND INFORMATION ON VARIOUS ISSUES RELATING TO THE BASIN.
- THE ROUND TABLE SHALL ELECT FROM ITS MEMBERSHIP A CHAIRPERSON AND A VICE-CHAIRPERSON.
- MEMBERS OF THE ROUND TABLE SHALL RECEIVE NO REMUNERATION OR COMPENSATION FROM MANITOBA WATER STEWARDSHIP FOR OUT-OF-POCKET EXPENDITURES INCURRED WHILE ATTENDING MEETINGS.

## ROUND TABLE TERMS OF REFERENCE

- THE ROUND TABLE SHALL WORK TOGETHER WITH THE OTHER RESOURCE OWNERS, USERS AND MANAGERS, AS A TEAM, TO FORMULATE A BASIN MANAGEMENT PLAN THAT WILL PRESENT GUIDELINES FOR MANAGING, PROTECTING AND USING THE WATER RESOURCES IN THE BASIN.
- THE ROUND TABLE, IN CONJUNCTION WITH THE TECHNICAL ADVISORY GROUP (TAG), SHALL PROVIDE TECHNICAL AND EDUCATIONAL INFORMATION TO LOCAL RESIDENTS ON THE ISSUES AND OPPORTUNITIES REGARDING THE BASIN.
- THE ROUND TABLE, IN CONJUNCTION WITH THE TAG, SHALL SOLICIT AND SYNTHESIZE LOCAL INPUT ON BASIN ISSUES AND OPPORTUNITIES.
- THE ROUND TABLE, IN CONJUNCTION WITH THE TAG, SHALL APPLY THE APPLICABLE PROVINCIAL WATER POLICIES DURING THE DEVELOPMENT OF THE BASIN MANAGEMENT PLAN.

**ROUND TABLE**

<b>Name</b>	<b>Address</b>	<b>Representing</b>
Terry Hildebrand	Langenburg	Agricultural Producers Association of Saskatchewan
Dennis Hack	Benito	Hamlet of Elbow Lake
Calvin Gust	Bowsman	Keystone Agricultural Producers
Donna Grassia	Swan River	Louisiana Pacific Canada, Limited
Lynn Stehr	Swan River	Manitoba Cattle Producers Association
Jim Smithson	Winnipeg	Manitoba Water Stewardship
Ray Rooks	Swan River	Manitoba Equine Ranchers Association
Adam Smith	Roblin	Manitoba Pork Council
Rick Bobby	Swan River	Mountain Quota Holders Association
Daniel Klekta	Minitonas	Northwest Soil Management Association
Douglas Ferder	Hyas	Rural Municipality of Clayton No. 333
Wallace Butterfield	Norquay	Rural Municipality of Keys No. 303
Mike Burtnack	Arran	Rural Municipality of Livingston No. 331 and Village of Arran
Michael McIntosh	Bowsman	Rural Municipality of Minitonas
Connie Beaudry	Mafeking	Rural Municipality of Mountain
Conrad Vogel	Pelly	Rural Municipality of St. Philips No. 301
Brian Burick	Bowsman	Rural Municipality of Swan River
Orin Balas	Ponteix	Saskatchewan Stock Growers Association
Len Kostiuk	Durban	Saskatchewan Wildlife Federation
Leon Lueke	Humbolt	Sask Pork
Bill Barker	Swan River	Swan Valley Concerned Landowners
Rick Wowchuk	Swan River	Swan Valley Regional Secondary School
Ray Taylor	Swan River	Swan Valley Sport Fishing Enhancement Inc.
Rick Dahlin	Norquay	Town of Norquay
Glen Mackenzie	Swan River	Town of Swan River
Robert Dercach	Pelly	Village of Pelly
Tom Mord	Hudson Bay	Weyerhaeuser Saskatchewan Timberlands
Derek Audy	Birch River	Wuskwi Sipiik First Nation

**TECHNICAL ADVISORY GROUP**

Brian Yake	Swan River	Manitoba Conservation
Kathy Wood	Swan River	Manitoba Water Stewardship
Dwight Williamson	Winnipeg	Manitoba Water Stewardship
John Thorpe	Swan River	Manitoba Conservation
Peter Hildebrand	Swan River	Manitoba Conservation
Dan Laychuk	Minitonas	Manitoba Conservation
Stephanie Jersak	Swan River	Manitoba Agriculture and Food
Elaine Gauer	Roblin	Manitoba Agriculture and Food
Brent Erlendson	Swan River	Manitoba Agriculture and Food
Phil Weiss	Brandon	Manitoba Water Stewardship
Jeff Thiele	Dauphin	Prairie Farm Rehabilitation Administration, Canada
Jana Lutz	Melville	Prairie Farm Rehabilitation Administration, Canada
Jeff Moyer	Dauphin	Fisheries and Oceans, Canada
Tara Schmidt	Regina	Fisheries and Oceans, Canada
Pat Rakowski	Winnipeg	Canadian Wildlife Service
Dwayne Rowlett	Nipawin	Saskatchewan Watershed Authority
Gordon Bue	Tisdale	Saskatchewan Agriculture and Food and Rural Revitalization
Todd Jorgenson	Yorkton	Saskatchewan Agriculture and Food and Rural Revitalization
John Durbin	Prince Albert	Saskatchewan Watershed Authority
James Dean	The Pas	Cree Nation Tribal Health Centre
Derm English	Dauphin	Manitoba Intergovernmental Affairs
Dave Dobson	Brandon	Ducks Unlimited

# THE STUDY AREA

## BASIN GEOGRAPHY

The basin includes the 3880 square miles of landscape that drain into Swan Lake in Manitoba. It is located straddling the Manitoba-Saskatchewan border and between the Duck Mountains and the Porcupine Hills. See Swan Lake Basin map on page two.

The basin population is approximately 14,000. The area's main economic activities are agriculture, forestry, manufacturing, tourism, hunting and outdoor recreation. The average annual precipitation in the basin is 19 inches and the frost free period ranges from 87 to 110 days.

### Basin Community Populations

Community	Populations
Arran	55
Benito	415
Birch River	390
Bowsman	320
Danbury	12
Durban	50
Kamsack Beach	50
Kenville	60
Minitonas	598
Norquay	500
Pelly	397
Swan Lake Reserve	300
Swan Plain	17
Swan River	4,032
The Key Reserve	60
Whitebeech	7
Manitoba Rural Residents	5,164
Saskatchewan Rural Residents	1,609
<b>TOTAL BASIN POPULATION</b>	<b>14,036</b>

The main topographic features of the basin include the upland areas of the Porcupine Hills and the Duck Mountains, the Swan River Valley, the Swan River Plain, Thunder Hill, the Swan and Woody River channels and their many tributaries and Swan Lake and its surrounding delta wetland area.

Land elevations rise to 2600 feet above sea level in the Porcupine Hills and to 2300 feet in the Duck Mountains. The Swan River Plain slopes down from near Norquay at elevation 1700 feet above sea level to Swan Lake at elevation 850 feet. Thunder Hill rises 500 feet above the Swan River Plain to elevation 1900 feet.

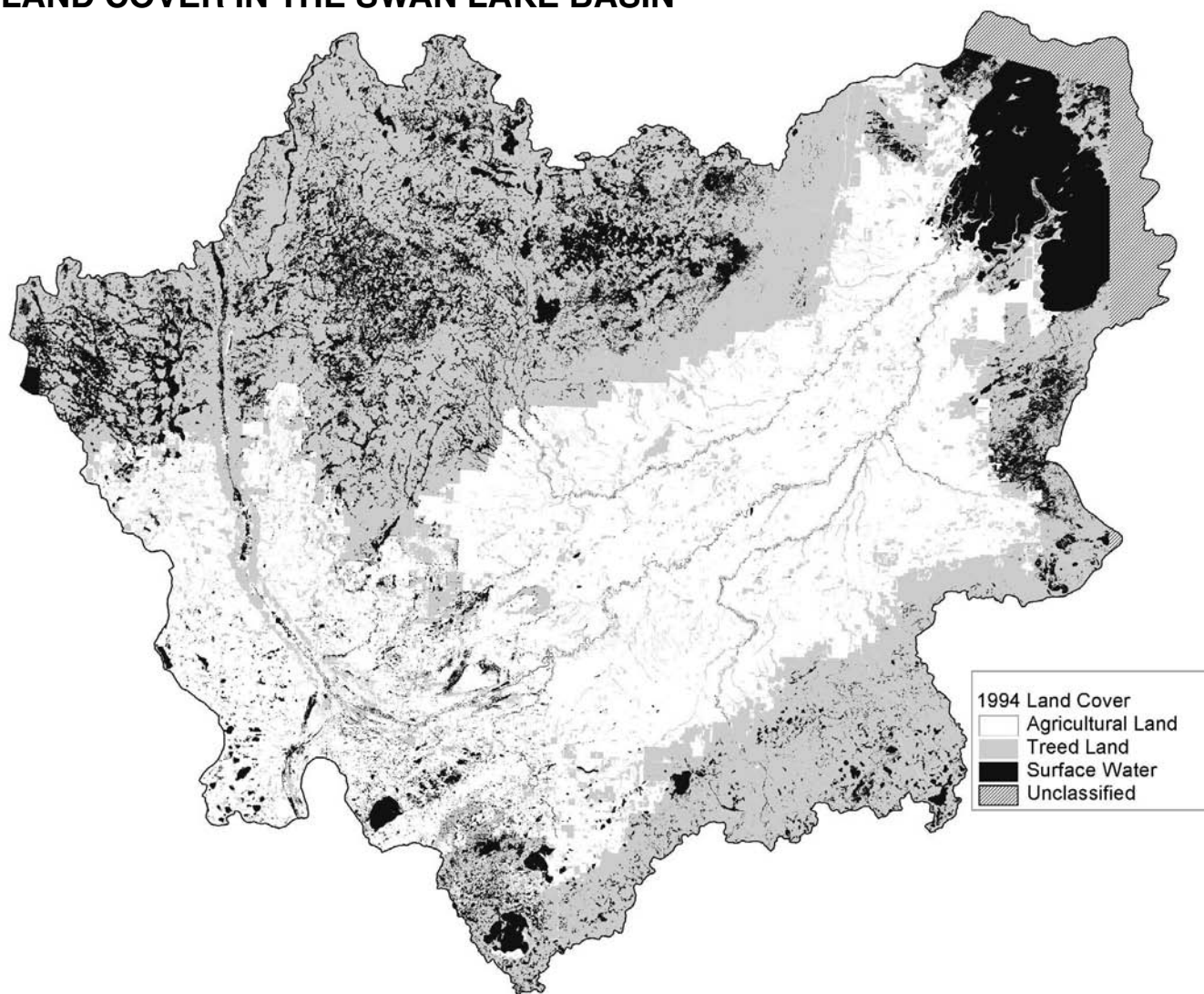
Slopes on the south escarpment of the Porcupine Hills are commonly in excess of 100 feet per mile and along the east escarpment, near Novra they reach 700 feet per mile. Slopes on the north escarpment of the Duck Mountains are commonly in excess of 200 feet per mile and near Renwer they reach 400 feet per mile. The Swan River Plain from Norquay to Swan Lake has an average slope of 13 feet per mile.

Forest vegetation covers most of the Porcupine Hills on the north side of the basin and the Duck Mountains on the south. The landscape is rolling and it contains many small lakes and wetlands. Forestry, hunting, fishing, tourism and outdoor and cabin recreational activities are focused here. Sportfishing seasons include Walleye, Northern Pike, Yellow Perch, White Sucker, Smallmouth Bass, Goldeye, Rainbow Trout and Lake Trout. Hunting seasons include moose, elk, white-tailed deer and bear.

Most of the landscape below the escarpments and above the Swan Lake lowlands has flat to rolling topography and is developed for agriculture. 47 percent of the basin has soils classified by the Canada Land Inventory as class 3 or higher. Most of this area is under annual crop cover with some under grasslands.

Land Cover / Use	Acres	% of Basin
<b>Agricultural Land</b>	<b>953,044</b>	<b>38.4</b>
Annual Crops	692,410	27.9
Forages	38,378	1.5
Grasslands	222,256	9.0
<b>Treed Land</b>	<b>1,059,077</b>	<b>42.7</b>
<b>Surface Water</b>	<b>385,063</b>	<b>15.5</b>
Wetlands	244,607	9.9
Water Bodies	140,456	5.7
<b>Unclassified</b>	<b>83,839</b>	<b>3.4</b>
<b>Total</b>	<b>2,481,023</b>	<b>100.0</b>

### LAND COVER IN THE SWAN LAKE BASIN



## THE WATERWAY SYSTEM

The basin's two main rivers, the Woody and the Swan, both rise in the Porcupine Hills. The Woody River flows south from the north central portion of the basin then northeast to Swan Lake. It collects tributary streams off the south escarpment of the Porcupine Hills. The Swan River flows south from the northwest corner of the basin, contained in a large valley (two miles wide, 400 feet deep) then, near Pelly, turns northeast to Swan Lake. It collects tributary streams off the north escarpment of the Duck Mountains.

Swan Lake, at 119 square miles, is the largest

lake in the basin. Madge Lake, at eight square miles, is the next largest and there are approximately 30 smaller lakes. Water levels are controlled for recreational purposes on Whitefish and Woody Lakes.

Wetlands occupy 10 percent of the basin. They are mostly bogs and shallow ponds located in the headwater areas of the Duck Mountains and the Porcupine Hills. A large marsh complex is located along the west shore of Swan Lake, near the Swan and Woody Rivers. This marsh is a significant area for migrating and staging waterbirds in the region.

## STREAMFLOW DATA FOR THE SWAN AND WOODY RIVERS

River	Units	Swan	Woody
<b>Drainage Area</b>	square miles	1,635.0	814.0
<b>Monitoring Stations</b>		Near Swan River	Near Bowsman
<b>Period of Record</b>	years	1913-1930, 1932-34, 1936 1951-2003	1916-1919 1954-2003
<b>Maximum Annual Discharge</b>	acre-feet date of occurrence	478,000 1922	268,000 1954
<b>Recent Large Annual Discharge</b>	acre-feet date of occurrence return period in years	465,000 1995 40	263,000 1995 16
<b>Maximum Daily Discharge</b>	cubic feet per second date of occurrence return period in years	8,511* April 24, 1995 22	9,820 May 4, 1988 111

\* Estimated

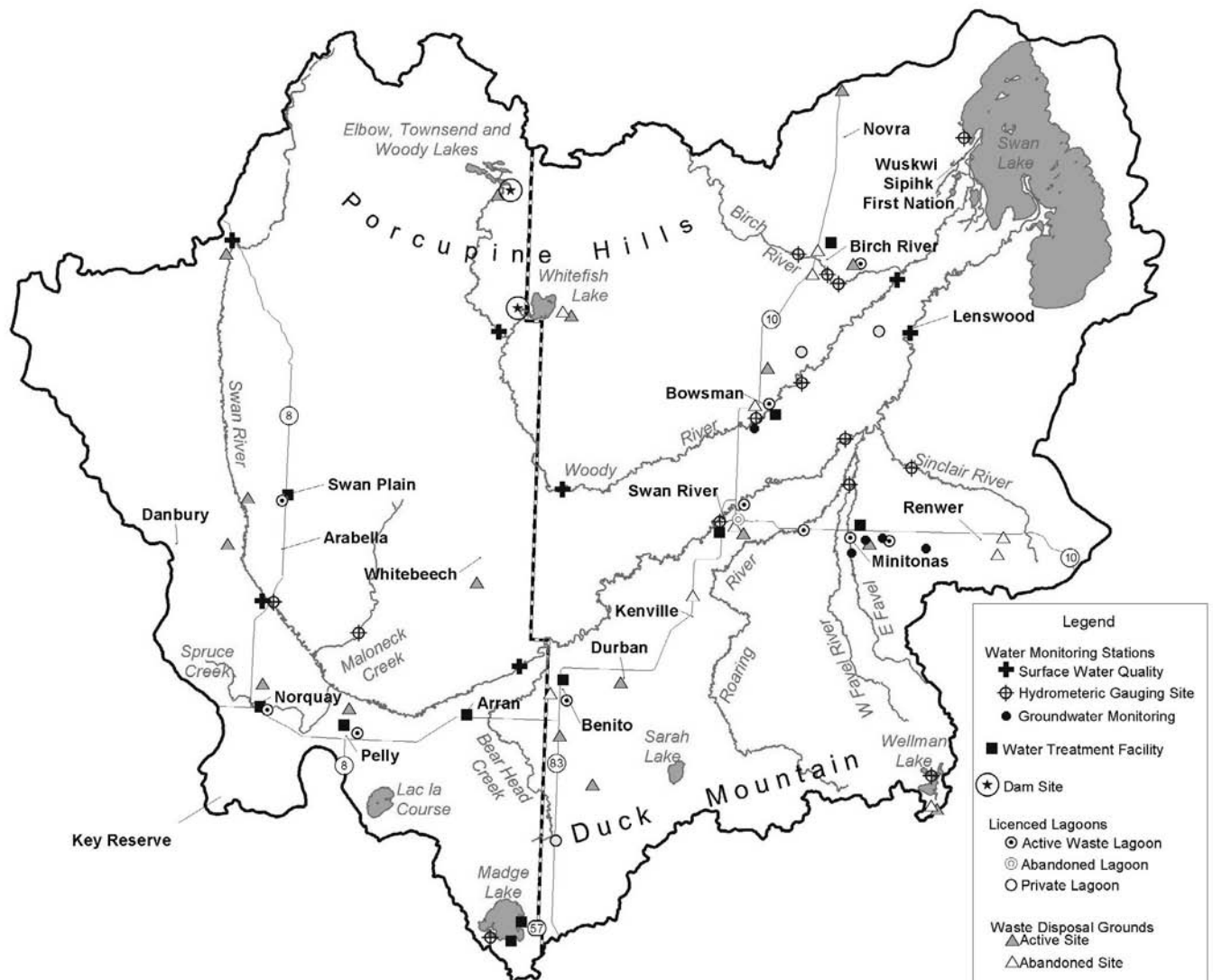
## MONITORING NETWORK

Data on the basin's water regime is collected at 13 streamflow monitoring stations, seven water quality monitoring stations and five groundwater monitoring stations. The locations of these stations are displayed on the

water infrastructure map on page nine. Streamflow data was collected beginning in 1913, groundwater data in 1964 and water quality data in 1988.



## WATER INFRASTRUCTURE



### GROUNDWATER

The general groundwater flow pattern in the basin is outward from the upland areas into the lowlands, with discharge into the surface waterways draining off the escarpments.

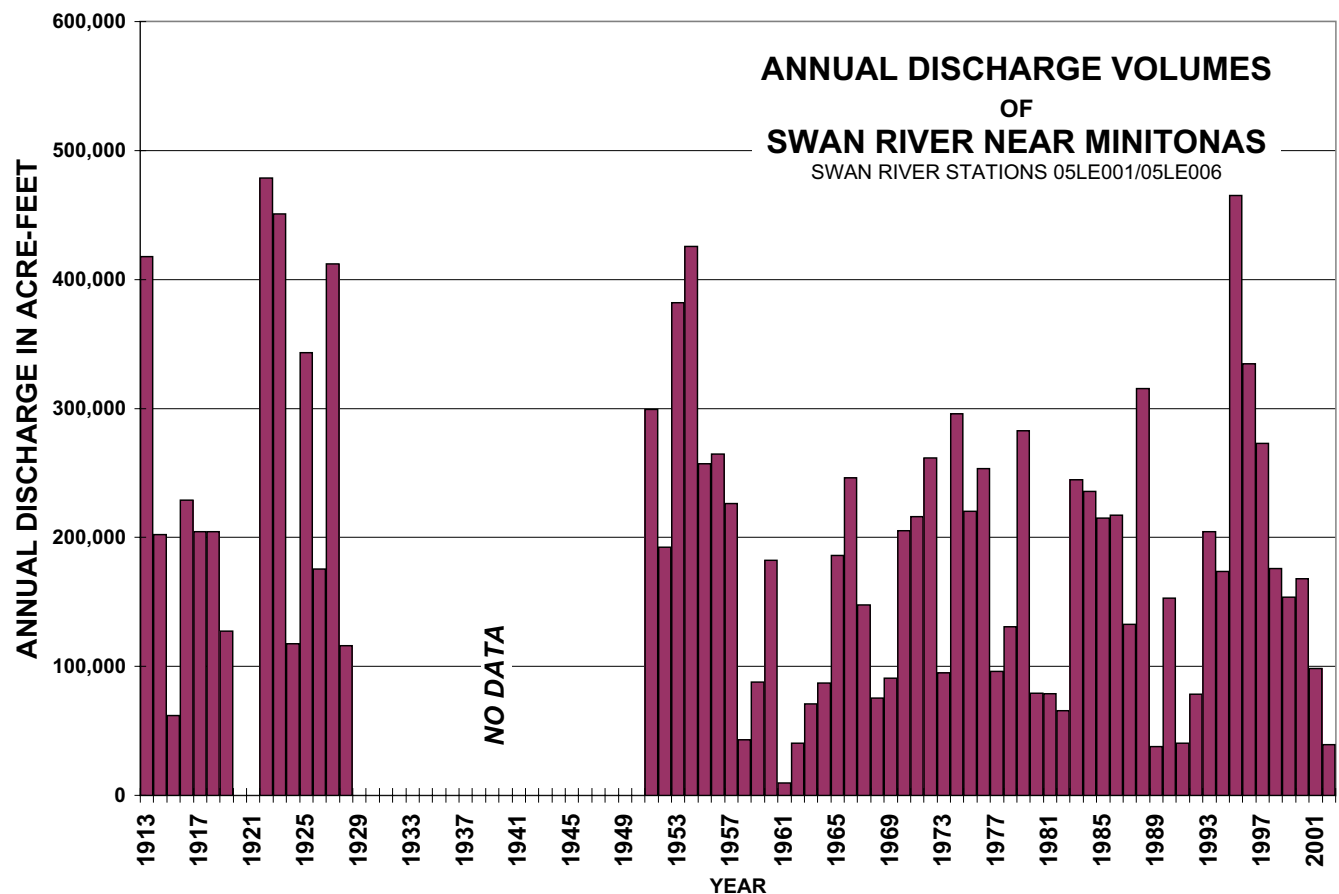
Bedrock and sand and gravel aquifers are found within the basin. The Swan Lake bedrock aquifer underlies most of the basin. Its water quality is variable with the upper

portions being fresh to brackish and the deeper portions generally being quite saline. Small sand and gravel aquifers can be found throughout the basin, but no inventory information has been collected on them. Their water quality is generally fresh and hard when they are found in the upper parts of the basin, and fresh to brackish when found in the lower parts of the basin.

## RUNOFF

Streamflows vary considerably through the months and years. Annual streamflow peaks usually occur in April and May due to spring runoff. On average, 60 percent of the basin's annual surface runoff volume occurs in March, April and May and 10 percent occurs from September to February.

The average annual discharge for the Swan River at the town of Swan River contains approximately 200,000 acre-feet of water. See the table of streamflow data (page eight) for the Swan and Woody Rivers for additional information.



## LICENSED WATER USE

Water use is licensed throughout the basin. Domestic use for household and livestock, up to 5,500 gallons per day, does not require a water rights licence. Less than 2,000 acre-

feet of annual water rights licenses have been approved in the basin. The basin's average annual discharge is approximately 495,000 acre-feet.

## WATER QUALITY

Surface water quality, as measured in the Swan and Woody Rivers, is generally in the good to fair range. In the Swan River, total nitrogen and total phosphorus concentration data have shown a decreasing trend. In the Woody River, total nitrogen concentration data is not conclusive and phosphorus concentrations do not reveal a trend.

### Swan River - Water Quality Index



## SEWAGE LAGOONS

Sewage produced by the basin's human and animal populations is stored in licensed lagoons. See the water infrastructure map on page nine.

Two-cell, municipal lagoons are used to treat human waste. Liquids are then released into a water course and the sludge is spread on fields according to approved conditions. Rural residents rely on private sewage disposal systems. Single-cell lagoons are used to hold mainly animal waste, which is subsequently spread on or injected into field soils.

## WATER SUPPLIES

Water supply for the towns and residents in the basin is taken from groundwater. Municipal water treatment systems range from simple chlorination, through sand filtration with iron removal and fluoridation, to reverse osmosis treatment. See the water infrastructure map on page nine for locations of these facilities. Rural residents rely on private wells for water supply and most do not treat their water.

The bacterial quality of the raw water used at the treatment plants has been consistently free of coliform bacteria. Overall water testing results for bacteria and nitrate in the basin are representative of the provincial averages. Private well water quality sampling is generally the responsibility of the homeowner.

There continues to be boil water advisories in the basin due to total coliform and in some cases E-Coli from local contamination problems.

## WASTE DISPOSAL GROUNDS

Waste disposal grounds within the basin are registered and operate by permit. Some old disposal grounds that did not meet environmental standards have been decommissioned. See the water infrastructure map on page nine for locations.

# BASIN WATER ISSUES

All round table members agree to the importance of preserving and protecting the quantity and the quality of the basin's water resources. This is essential in preserving our basin environment, economy and society. We are all in the same basin and we need water for the plants and wildlife and for our population and our animals and activities.

The forest and agricultural industries comprise a large part of the basin's economy. Cultivating the original grasslands and harvesting the original forests during settlement have already had impacts on the basin's water resources. Best management practices have been developed and are used in both of these industries on an ongoing basis in order to minimize further water resource impacts.

## WATER QUANTITY

The water quantity issues identified in the basin include concern for maintaining sufficient water supplies for people and animals and the flooding of communities and agricultural land, mainly in the lower portion of the watershed. These issues are addressed later.

Generally, the availability of surface water in the basin seems secure. Licenses have currently been issued for less than one percent of the average annual runoff.



## WATER QUALITY

Water quality issues in the basin include the addition to the basin's water resources of chemicals, nutrients and eroded materials from human activities in the forest and agriculture industries and in urban areas. These issues are discussed separately on the following pages.



## SOIL EROSION BY WATER

When the rate of rainfall or snowmelt exceeds the capacity of the landscape for water to infiltrate, runoff occurs. Concentrated runoff and streamflow are powerful forces that can pick up and carry soil particles. These particles are subsequently deposited at some downstream location when water velocities are reduced. This sequence of erosion and deposition occurs naturally within watersheds, with erosion focused in areas of light textured soils or steep slopes and deposition focused in areas where streamflows are slowed and in wetlands and lakes. The most obvious results of these landscape processes are stream channels and deltas where major waterways enter lakes.

Soil erosion is the first step in a chain of harmful environmental effects. Eroded surface soils are often the most fertile, hence they represent a reduction of the area's productivity. Sediments carry attached chemicals and nutrients that degrade the quality of surface waters and, when deposited in the waterway network, they degrade fish habitat and waterway capacity.

Undisturbed forest and grassland landscapes, with their continuous vegetation cover, are most resistant to soil erosion. Recently harvested forest areas, cultivated farm fields and construction sites with disturbed soils are most susceptible. Forestry, agriculture and construction best management practices help to minimize erosion. In addition, forest management plans require the protection of wetlands, riparian zones and waterways during harvest and renewal operations.

Channel bed and bank erosion are more difficult to control. Activities that reduce runoff magnitude also reduce a stream's capacity to erode. There are no practical on-site solutions for eroding streambanks on high gradient streams, as in the basin's sub-escarpmental areas.

## DRAINAGE

Appropriate drainage is necessary to facilitate agriculture but extensive and unplanned drainage can alter and destroy wildlife, fish and waterfowl habitat without providing the desired agricultural benefits. In addition, such drainage can create downstream flooding problems along waterways and at waterway crossings. It is important that drainage improvements be planned on a watershed basis with due consideration for downstream impacts and watershed function.



## FLOODING

Flooding occurs when runoff exceeds the capacity of the waterway network. During such events, water overflows existing channels or drains and inundates the surrounding countryside. During some flood events, water proceeds overland following seldom used or previously unused routes. Such flooding can cause damage to crops, buildings, roads, waterway crossings and to the landscape itself. It also interrupts agricultural activities and travel.

Large flood events occurred in the basin in the spring of 1988 when a rainfall exacerbated spring runoff, as well as in the summer of 1993. Many channels were overtopped. The streamflow table on page eight notes that on May 4, 1988, the lower portion of the Woody River experienced flows that in terms of long-term statistics occur, on average, once every 111 years.



## RIPARIAN ZONES

Riparian zones are seen in natural landscapes as a band of grasses, shrubs and trees beside wetlands, lakes and waterways. Their vegetation protects the landscape from water erosion during large runoff events, filters sediment, nutrients and chemicals from landscape runoff and provides wildlife and fish habitat.

Many of the basin's riparian zones are located on private property used for agriculture. Economic pressures discourage allowing areas that don't produce an economic product and that harbor weeds and predators. In some cases, riparian areas are used for grazing or replaced with annual crops.



In areas developed for agriculture, many small waterways have been moved off fields and replaced with a constructed drainage network that is usually located within or adjacent to municipal road allowances. These waterways often lack riparian vegetation to filter field runoff.

## WILDLIFE HABITAT FRAGMENTATION

As the basin is developed, wildlife habitat becomes more scarce and fragmented. Small or isolated areas of habitat are not sufficient to sustain healthy populations of large mammals and their predators. In some intensively developed areas the only natural environments are narrow riparian areas along waterways. Wildlife often use these corridors to travel between the remaining preferred habitats and between the Duck Mountains and the Porcupine Hills.



## RURAL WATER SUPPLY

Water is delivered to many homes in the basin due to poor or inadequate water supplies and some municipalities are investigating the feasibility of rural water pipeline systems. Having reliable water on the farm is critical to the economic success of agriculture. This includes watering livestock in the farmyard and in the pasture.

Some basin residents have recently experienced water quality problems with private wells. These problems have been attributed to increased water use in conjunction with poor well and septic system management.

## GROUNDWATER QUALITY

Towns, villages and rural residents all rely on groundwater supplies for their drinking water needs. Groundwater quality can be degraded by activities taking place on the surface of the landscape.

As rain or melt-water soaks down to the groundwater table it is filtered by the soil materials, but it can also dissolve and carry chemicals and nutrients that reduce its quality. Reductions in groundwater quality can jeopardize health and complicate and increase the expense of water treatment.

## WETLAND LOSS

Development within the basin has resulted in the loss and degradation of wetland areas. Wetlands are an important part of the landscape, providing habitat for numerous plants, wildlife and waterfowl. They also provide hydrological functions for the watershed, such as purifying surface water, recharging local groundwater and reducing local peak runoff flows by storing and slowly releasing surface runoff.



# OPTIONS CONSIDERED

A variety of options/actions were considered to deal with the basin's water issues. It was felt that for a basin management plan to survive, it would have to deal with issues that apply to a large portion of the basin and therefore draw support from most or all stakeholders.

The options considered are summarized in the following pages and they are evaluated as to whether or not they were considered desirable to pursue at this time.

## **NUTRIENT & CHEMICAL MANAGEMENT**

The excess or untimely application to the landscape of nutrients and chemicals can put basin water quality at risk. Additional regulations and controls on the usage of these substances could be sought.

It was considered an undesirable option to pursue a regulatory and enforcement approach to this issue. It is preferable to seek cooperation through education and demonstration of best management practices.

## **FLOODING AND DRAINAGE**

Flooding and drainage problems exist at various sites in the basin. These two issues are often directly related. The solution to one site's drainage or flooding problem can create a flooding problem for some other downstream site. Solutions to these issues require detailed site specific and downstream considerations as well as overall watershed considerations.

It was considered desirable to attempt to deal with these issues, but not in this initial basin plan. As Swan Lake Basin planning evolves, it may in the future, consider establishing sub-watershed plans wherein these issues could be tackled.

## **EDUCATION**

The watershed boundary is not evident on the landscape and everyone does not know where the basin's waterways extend and what activities are going on in the basin to protect the water resources. A group could be established to formulate and distribute water information and to foster the awareness that we are all in the same basin.

This was considered a desirable option because the more that people are aware of and cooperate with this plan, the better it's chances of success will be.

## **WILDLIFE HABITAT FRAGMENTATION**

Riparian zones are often the only natural environments within large tracts of landscape developed for agriculture. The coordinated protection of riparian areas could provide valuable connecting corridors for the safe travel of wildlife populations between the Duck Mountains and the Porcupine Hills.

This was considered a desirable option to pursue because the basin has significant and diverse populations of wildlife. Hunting and viewing them contributes significantly to the basin's economy and quality of life.



## SURFACE WATER RUNOFF

Runoff water from the basin landscape has the potential to carry eroded soils and a variety of pollutants. In the case of the forest industry, runoff can carry tree and plant materials, eroded soils and chemicals used to control forest pests, diseases and vegetation. In the case of the agriculture industry, runoff can carry eroded soils, crop residues, animal wastes, chemicals used to control pests and diseases and nutrients used to assist crop growth. In the case of urban areas, runoff can carry eroded soils, chemicals, nutrients, industrial wastes and effluent from sewage lagoons. A group could be established to encourage and support activities that will reduce the amount of sediment and pollution carried by runoff into the basin's surface waters.

This was considered a desirable option because people need to use the basin lands for their activities. Instead of constraining activities, this approach would seek to keep substances where they are used and to prevent them from reaching the basin's water resources and becoming pollutants.

## ANNUAL WATER REPORT

Considerable data is collected each year in both provinces on various aspects of the basin's water resources. This data could be collated into an annual basin report and distributed to interested councils and organizations.

This was considered a desirable option because there is increased public interest in all aspects of water resources.

## RIPARIAN ZONES

Riparian vegetation protects surface water quality, wetlands and streambank and shoreline integrity as well as providing habitat for fish, waterfowl and wildlife. A working group could be established to seek and support the establishment and maintenance of riparian zones throughout the basin.

This was considered a desirable option because if the quality of landscape runoff water can be improved and protected, then the quality of the water regime throughout the basin will be improved.



# PUBLIC INPUT

A Draft Swan Lake Basin Management Plan was completed in June 2003 and distributed to basin residents through the schools, municipal and town offices and local libraries. Basin residents were able to provide comment on the draft plan through a postage paid survey included in the document, contact with Round Table members and advertised open houses in the afternoon, followed by public meetings in the evening in both Pelly, Saskatchewan and Swan River, Manitoba. The Round Table and TAG reviewed all public comment in the development of the Swan Lake Basin Management Plan.

In summary, the public:

- was supportive of the four recommended action plans and did not suggest any additional plans.
- felt that the basin wide education plan and the water report plan would encourage cooperation and participation, and asked that information also be distributed through newspapers, to ensure it reached the widest audience possible.
- believed that all basin residents, individuals, groups, businesses and corporations, should have a compelling interest in implementing the plan and its principles.
- expressed concern that land usage and seepage/runoff of contaminants could jeopardize surface and groundwater quality, including drinking water sources.
- recommended that, in some cases (intensive livestock operations and forest industries), additional controls and penalties be put in place.
- suggested that more emphasis be placed on water resources by our governments.
- suggested investigating the establishment of a conservation district to help carry out the recommended initiatives.
- thanked the Round Table and TAG for their hard work, volunteerism and a job well done.



## RECOMMENDED ACTIONS

After reviewing the information available on the water resources of the Swan Lake Basin, discussing the issues and considering the options available to deal with them, we believe that the basin's water resources are of ample supply and adequate quality. To initiate cooperative planning for the basin's water resources, we recommend the following four action plans.

The recommended actions focus on protecting the basin's water from the risks involved with current basin activities and they seek to work through education rather than through enforcement activities.

### BASIN EDUCATION PLAN

The basin's water resources can be affected by many activities and protecting these resources will take the understanding, cooperation and participation of all the basin's residents.

The more knowledge the people have about the basin, the more likely they are to help protect it.

The basin education plan will seek to:

- raise awareness of the Swan Lake Basin.
- distribute information on the basin and on the state of the basin's water resources.
- encourage and assist study of the water resources in the Swan Lake Basin.

### WATER REPORT PLAN

There is increasing interest in the condition of the basin's water resources. Both of the provinces involved monitor water quality and quantity information on ground and surface waters with an established network of stations.

The annual water report plan would seek to:

- compile water related data on a basin basis.
- complete an annual report on the state of the basin's water resources, including a discussion of the current years monitoring data and any current trends in the data.
- distribute the annual water report to interested agencies and newspapers throughout the basin.

## **RIPARIAN ENHANCEMENT PLAN**

Riparian zones are the last line of natural defense for the basin's surface waters. Their vegetation filters landscape runoff before it enters wetlands, lakes and waterways. It also provides protection for the landscape during large runoff events and habitat for fish and wildlife.

The riparian enhancement plan would seek to:

- protect and enhance riparian environments and protect and maintain associated wetlands, in conjunction with cooperative landowners throughout the basin.
- compile an inventory of the basin's riparian and associated wetland areas, with respect to their health, to provide buffer services for surface water resources, to provide fish, waterfowl and wildlife habitat and to function as wildlife corridors.
- recommend riparian and associated wetland areas for protection or enhancement.
- assist interested landowners with riparian and associated wetland protection and enhancement projects.

Landowners interested in participating in riparian enhancement activities should inquire at their local municipal office.

## **SURFACE WATER RUNOFF PLAN**

The intensification of agriculture over the last three or four decades has increased pollution pressure on the associated aquatic environments.

When runoff originates from agriculture, forest and urban lands it carries sediment, organic debris and available chemicals and nutrients. Once in the waterway network, these substances degrade downstream water quality.

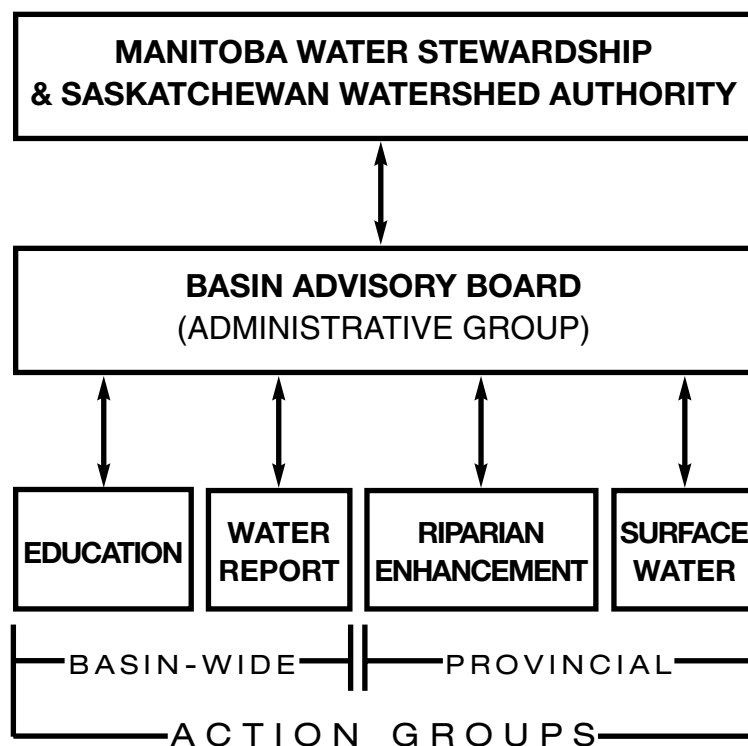
The surface water runoff plan would seek to:

- encourage the use of best soil and water management practices to reduce sediment, nutrient and chemical contributions to the water regime.
- provide, to interested landowners in the basin, complimentary surface water runoff management recommendations, for their information and to be followed on a voluntary basis.
- assist interested landowners with projects that reduce the amount of runoff water or improve its quality.

Landowners interested in obtaining runoff management recommendations for their property should inquire at their local municipal office.

# PLAN IMPLEMENTATION

The positive impact of the Swan Lake Basin Management Plan on the basin's water resources depends upon the successful implementation of the recommended actions. All participants reached consensus on the objectives of the action plans, however, turning these words into works will require a set of dedicated people to participate in action groups for the individual plans and in an administrative group to coordinate activities. These groups should draw their members from the planning Round Table and Technical Advisory Group (TAG), as well as from other local, interested groups.



## ACTION GROUPS

It is recommended that action groups be formed to implement the action plans. Given the mandates of the individual action plans, it is felt that the Education Plan Action Group and the Water Report Plan Action Group should both function basin-wide. The Riparian Enhancement and Surface Water Runoff Plans, however, should have separate action groups functioning in each province, coordinating their efforts. It is anticipated that the membership of the action groups would come mainly from the planning TAG agencies.

The duties of the action groups will include the following:

- Complete the work outlined in the recommended action plans.
- Liaise with cross-border action group and ensure activities are compatible.
- Inform administrative group regarding work accomplishments and plans.
- Recommend to administrative group changes to objectives of action plans, as required.

## **ADMINISTRATIVE GROUP**

It is recommended that a basin-wide administrative group, or Basin Advisory Board, be formed to coordinate the action groups' activities towards implementation of the basin plan. The administrative group would also advise provincial authorities on the state of the basin's water resources. It is anticipated that this group's membership would come mainly from the planning Round Table agencies.

The duties of the administrative group will include the following.

- Coordinate the activities of action groups.
- Evaluate and approve or decline changes, recommended by action groups, to objectives of action plans.
- Advise provincial authorities on plan progress and on the state of the basin's water resources.



## Swan Lake in a Train

At a normal water level of 851 feet above sea level, the average depth of Swan Lake is 7.5 feet and the surface area is 119 square miles. The contained water volume is 571,200 acre-feet. A railway water tank car can hold 20,000 imperial gallons. It would require a train of these cars 83,000 miles long to contain the water in Swan Lake. Such a train would stretch around the earth 3.3 times. The maximum daily discharge experienced during the period of record on the Swan River (see table on page eight) would fill 2.6 of these tank cars each second.

## 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

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.

## Some Basin Facts

Area	3,800 square miles
Population	14,000
Number of Rural Municipalities	9
Number of Urban Municipalities	7
Total topographic relief	1,750 feet
Livestock numbers (cows, horses & pigs)	56,000 animals
Average annual precipitation volume	3,850,700 acre-feet
Average annual discharge volume	495,000 acre-feet
Swan Lake water volume	571,200 acre-feet
Annual forest harvest volume	13,760,000 cubic feet
Duck Mountains moose density	1.7 per square kilometer
Wildlife biodiversity	over 200 vertebrate species
Upland area wetlands	approximately 3,000

## IN THEIR MEMORY

*The Round Table was saddened by the passing of two of its members during the planning process. We remember Mr. Jack McKay, representative for the Manitoba Rural Municipality of Mountain, who passed away in January 2003. We also remember Mr. Robert Hornibrook, representative for the Saskatchewan Town of Pelly and our chairperson, who passed away in August 2003.*

*The Round Table also remembers Mr. Frank Svojanovski, who, as chair of the Northwest Soil Management Association, led the way towards the cooperative development of a basin-wide plan. He passed away in January 2000.*

*This management plan is dedicated to their memory.*



## **ACTION GROUP OBJECTIVES**

### **Basin Education Plan**

The basin-wide action group will raise awareness of the basin's water resources, distribute information throughout the basin and encourage and assist in the study of basin resources, with the understanding that protecting these resources will take the cooperation and participation of all the basin's residents.

### **Water Report Plan**

The basin-wide action group will compile and distribute an annual report on the state of the basin's water resources, discussing short and long term trends.

### **Riparian Enhancement Plan**

The action groups will work within each province to protect and enhance riparian and associated wetland areas by compiling an inventory of the basin's riparian resources, by recommending areas for protection and by working in conjunction with cooperative landowners

### **Surface Water Runoff Plan**

The action groups will work within each province to encourage the voluntary use of best soil and water management practices, to provide recommendations on surface water runoff management and to assist interested landowners with projects that reduce the amount of runoff water or improve its quality.

For more detailed information on the basin's resources or this plan, contact any Round Table or Technical Advisory Group member (listed on page five) or access the website

***<http://www.swanlakebasin.com>***