West Souris River

Integrated Watershed Management Plan

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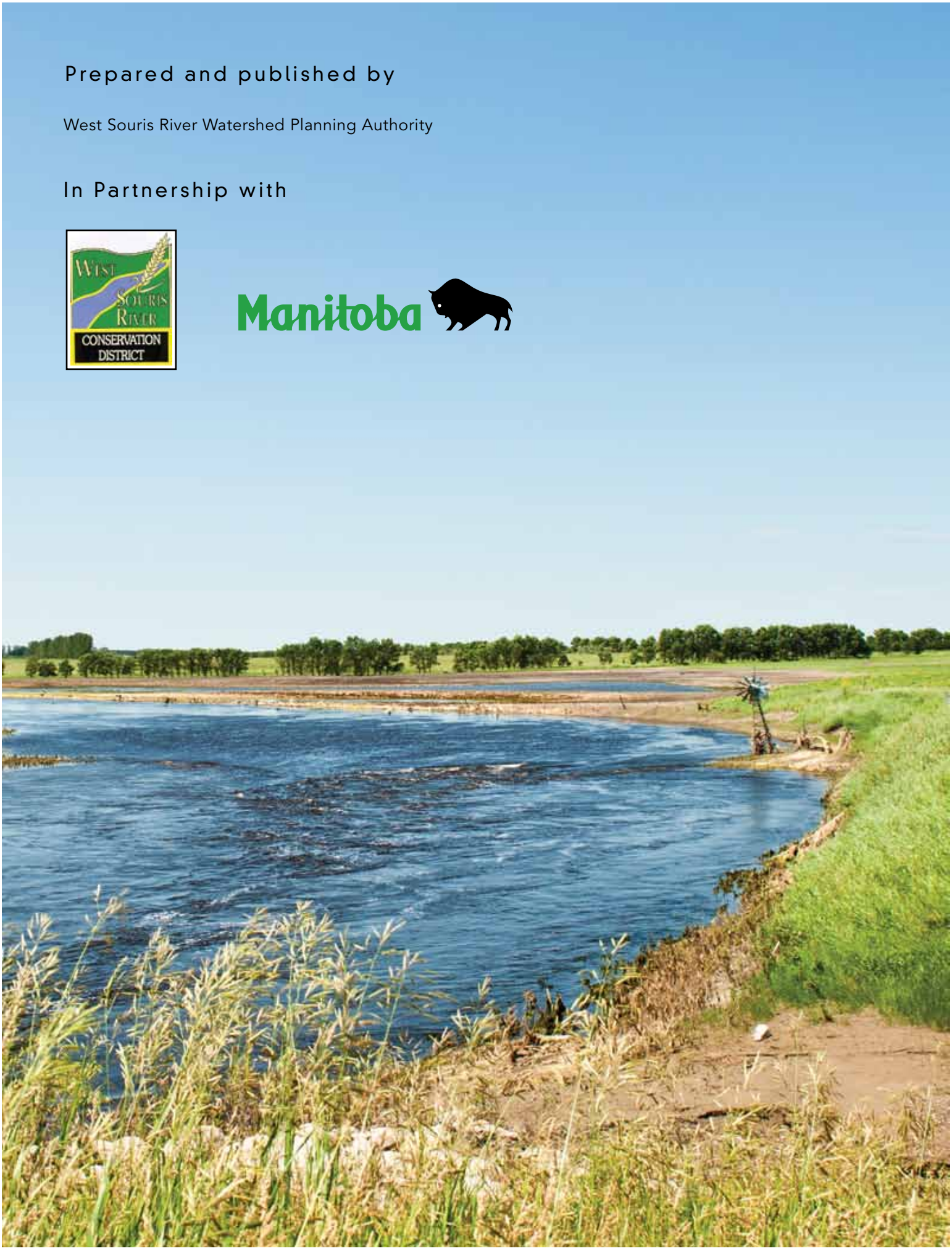
In Partnership with



EXECUTIVE SUMMARY

The West Souris River integrated watershed management plan was developed in partnership with the West Souris River Conservation District, the Province of Manitoba and an engaged group of community stakeholders. The planning process extended over three years and was completed in 2011. The plan outlines goals and guidelines for municipalities, watershed residents, soil and water organizations, and other stakeholders to work towards conserving or restoring land, water, and protecting drinking water sources within the study area.

This ten-year plan will act as a roadmap for anyone who wants to see this area support a healthy community in the future. The plan outlines many challenges for stakeholders to overcome in four key categories:

1
WATER SUPPLY

2
WATER QUALITY

3
NATURAL AREAS AND AQUATIC ECOSYSTEMS

4
WATER MANAGEMENT

This plan will help to ensure that conservation funds are directed to areas where they will provide the most benefit for the long term health of the watershed. Governments, stakeholders and residents each have a role to play in ensuring this plan is successfully implemented. By developing new partnerships and integrating our resources we can look forward to measurable improvements in our area over the next ten years.

INTRODUCTION

What is an Integrated Watershed Management Plan?

An Integrated Watershed Management Plan (IWMP) is a plan prepared by the community that describes the actions needed over time to achieve a sustainable, healthy watershed. The plan can be thought of as a roadmap for the community that outlines watershed priorities and presents strategies to address these priorities. The plan answers important questions like:

How to achieve shared goals for the watershed?

Who will be doing the work?

...and the most asked question,

Who will be paying for this work?

Through collaborative community planning exercises a vision of success, recommendations and measurements of progress are presented in this document.

Why Watershed Planning?

Watershed planning uses watersheds as the boundary for planning. A watershed can be defined topographically as an area of land in which all water drains to a common point. Using the watershed as the unit, planning provides opportunities to address water quality and quantity issues in both the upstream and downstream portion of a watershed. Watershed planning simplifies and harmonizes decision making across the contributing land area of a waterway, preventing redundant or conflicting action plans that can result from using administrative boundaries. Although this plan is focused on the portion of the Souris River Basin within Manitoba and west of the Souris River, we have taken steps to ensure complementary planning activities outside of this area have been reviewed.

Why Integrated Planning?

An integrated watershed management plan is an inclusive planning process, used to establish watershed issues and share knowledge. It is presented as a plan of action that combines the needs of people and diverse industries, while being supportive of ecosystems within the watershed. An integrated plan considers the integration of land activities that impact water quality and quantity. Information and recommendations in the plan can also be used by local municipalities and planning districts in developing responsible and sustainable development plans.

How was this plan developed?

In 2007 the West Souris River Conservation District (WSRCD) was designated the water planning authority by the Province of Manitoba under the authority of *The Water Protection Act*. The Board of this District selected a representative team of people to lead plan development, including representatives from the conservation and planning districts, the Province of Manitoba, the Oak Lake Aquifer Board, Oak Lake Cottage Owners Association and watershed residents representing different resources in the watershed.

This project management team (PMT) met regularly to make key decisions during plan development. This plan took three years to develop, including the first public consultation to final Ministerial approval. Implementation of this plan is anticipated to take decades, with a full review in 10 years.

The WSRCD will continue to act as plan leaders with annual updates on progress and programming closely tied to plan implementation.

Issues and Concerns in the West Souris River Watershed

This plan is unique and based largely on the issues and concerns of the West Souris River watershed community. To understand local concerns, three methods of consultation were hosted by the PMT.

1. Public consultation events were held in Cromer, Pipestone and Pierson on March 24th, 25th, and 26th, 2009, respectively. These events were well advertised throughout the district through radio and newspaper advertisements, bulletin board signage and in a brochure delivered to each home in the watershed.

2. Kitchen table meetings were held at seven homes throughout the district. Members of the Project Management Team interviewed families in their home (at 'kitchen tables') to get a more detailed understanding of issues specific to regions within the watershed.

3. Consultations were held with local, provincial and federal government officials and stakeholder group representatives through a watershed team meeting. Representatives were invited to provide information about issues of concern and to suggest practical solutions.

In all, 207 comment forms were collected through the public consultation events. Through these forms and the hundreds of discussions that took place at watershed team and project management meetings, a vision for the future of the watershed was created.

To achieve this vision takes time and a commitment by many organizations and all levels of government. This collective effort guided our approach to presenting the goals and objectives of this plan.

Our Approach to Presenting Our Plan Actions

Our goal is to ensure that the actions and policies contained within this plan are implemented. The plan has been written with the group responsible for carrying out the actions in mind.

PART 1

Watershed Information

This section provides a brief description of the watershed and illustrates landscape information to set the stage for recommendations for actions and policies.

PART 2

Summary Actions

Recommended actions have been laid out in the following section to all stakeholders within the study area. Summary tables indicate details necessary for stakeholder organizations to apply actions within their mandate, such as timeline, target area and a measure of success for each action.

PART 3

West Souris River Conservation District

Recommendations for incentive-based programming for organizations like conservation districts have been outlined in action tables. These tables indicate details necessary for the West Souris River Conservation District to budget for and apply actions within their mandate, such as timeline, cost estimates and a measure of success for each action. Where to allocate programming to provide measurable improvements to the watershed.

PART 4

Municipal Councilors

Recommendations and policies intended for municipalities have been provided on wall maps, and actions are condensed for use in council meetings with suggestions on how to easily apply this plan during regular council meetings or in development planning activities

PART 5

Watershed Residents

Recommendations for watershed residents have been included in a brochure, easily mailed to every homeowner in the watershed. Key information about the watershed is provided, as well as applications to programs available through soil and water organizations to encourage action.

Our vision is to ensure water and the ecosystems it supports remain available and in good quality for future generations.

TABLE OF CONTENTS

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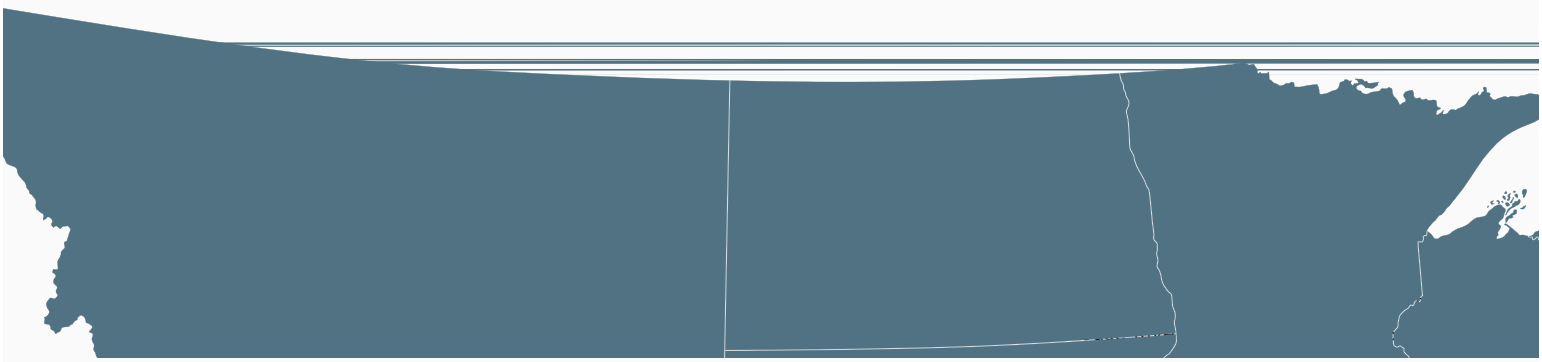
PART 1 WATERSHED INFORMATION

THE SOURIS RIVER BASIN | The Bigger Picture

The study area for this plan is part of the much bigger Souris River Basin, a 61,100 km^2 area of land which drains to the Souris River. The Souris River Basin spans two Canadian provinces and two American states (Figure 1).

Starting in southeast Saskatchewan, the headwaters of the Souris River flow in a southeasterly direction into and across northern North Dakota. From North Dakota, the river crosses the international border again into southwest Manitoba flowing northeast and eventually spilling into the Assiniboine River near Treesbank, approximately 40 km southeast of Brandon.

The Souris River Basin valley is a relatively flat, semi-arid prairie that is extensively cultivated. Major tributaries of the Souris River include the Antler, Deep and Des Lacs Rivers, as well as Bank, Gainsborough, Graham, Jackson, Long, Moose Mountain, Stoney, Pipestone, Plum and Willow Creeks. Considerable reservoirs have been constructed in both the American and Canadian portions of the basin, including; Boundary, Rafferty and Alameda Reservoirs (Figure 2) in Saskatchewan, Lake Darling in North Dakota, and Oak Lake in Manitoba (Figure 3).



WATER MANAGEMENT IN THE SOURIS RIVER BASIN

Several binational organizations have been established over the years to address differing Souris River transboundary water issues. These include the International Joint Commission (IJC), International Souris River Board of Control (ISRB), the International Souris-Red Rivers Engineering Board, and the American and Canadian governments' Souris River Bilateral Water Quality Monitoring Group.

INTERNATIONAL JOINT COMMISSION (IJC)

Due to cross boundary water supply and flood control issues, in January 1940, the American and Canadian governments requested the IJC to investigate and report on regulation, use and flow of the Souris River and its tributaries, and the apportionment of water between the two countries. In 1958, the IJC recommended changes to allow Saskatchewan and North Dakota rights to divert, store and use waters originating in their respective portions of the basin subject to Saskatchewan not diminishing flows across the boundary by more than 50% of the natural flow. It also required North Dakota to deliver, as far as practicable, 20 cfs to Manitoba from June to October annually. The IJC established the ISRB to monitor compliance.

The ISR Board oversees monitoring of reservoir elevation as well as the flows and levels of the river and tributaries associated with them. If water level or flow data obtained from monitoring exceeds or falls below values set within the Boundary Waters Treaty, the ISRB advises the operators to make adjustments.

"It is further agreed that the waters herein defined as boundary waters and waters flowing across the boundary shall not be polluted on either side to the injury of health or property on the other".

– Boundary Waters Treaty, Article IV

FACT

The Rafferty-Alameda Project was development from 1988-95 to provide water for the area including the Shand power station near Estevan, and as flood protection for residents downstream in Saskatchewan and North Dakota.

WATER CONTROL SYSTEMS

Residents of the Souris River Basin have suffered from extreme variation in seasonal water flows. Such cycles of drought and floods severely affected water users and limited future development in the area. As a result a number of structures have been built over the years to help mitigate the annual and seasonal variation in water supply. The main basin structures include: Moosomin Reservoir, the Boundary, Rafferty, and Alameda Dams in Saskatchewan; and Lake Darling, Upper and Middle Des Lacs Lakes, and a wildlife refuge in North Dakota. Although these structures are outside the IWMP area they regulate flows coming into the study area across the Saskatchewan and North Dakota borders and can significantly affect drought and flood events and the general hydrological regime. (Figure 3).

CHALLENGE

The Souris River Basin has extreme variation in annual flows. The Basin is highly regulated by structures to help minimize impacts of this variation. The regulation of these structures outside the study area influences the water management within the study area.

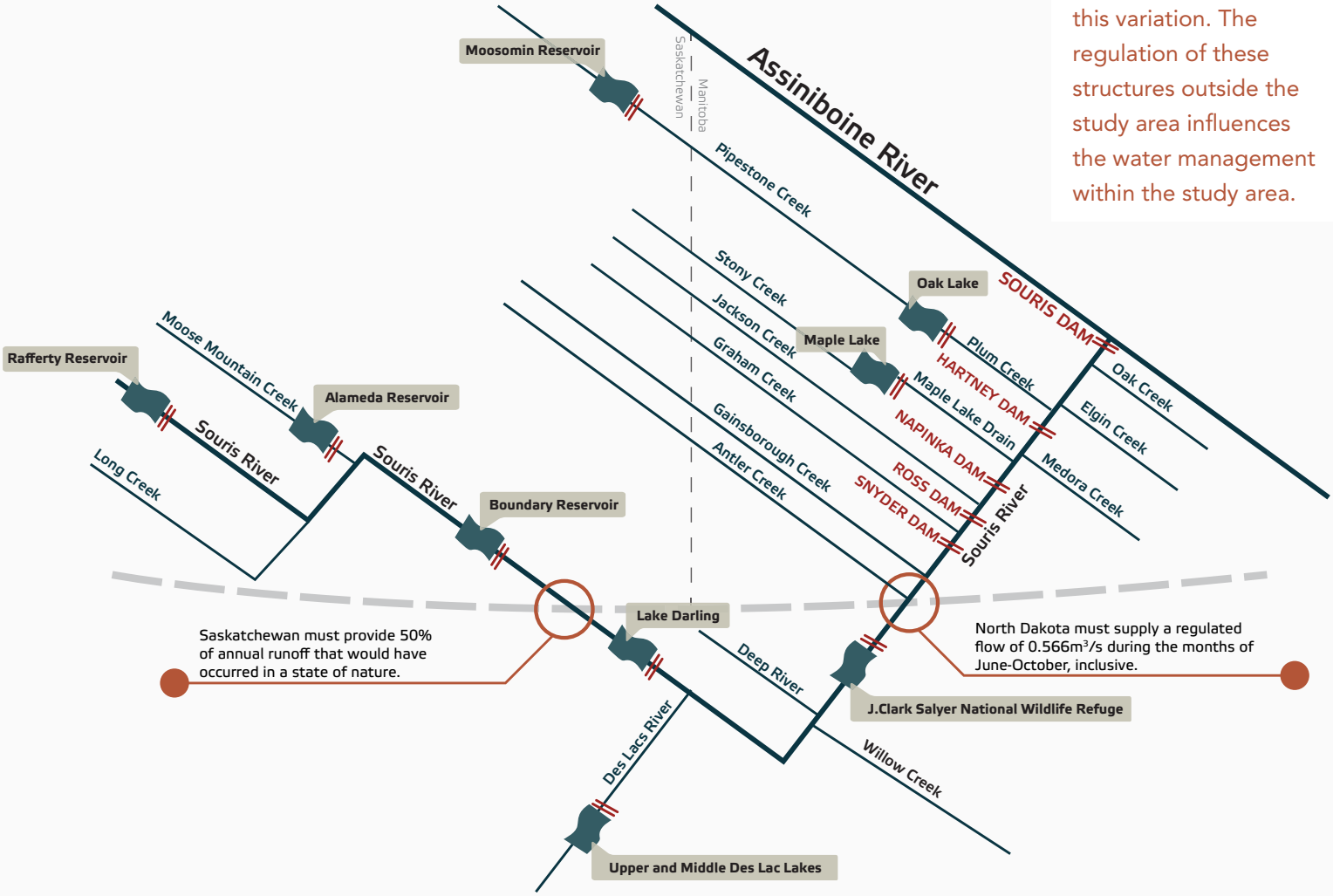


Figure 2: Souris River Basin series of water control structures operated in Saskatchewan, North Dakota, and Manitoba.

There are currently 11 water control structures under provincial jurisdiction within the area. From 1930 to 1941 severe drought conditions prompted Prairie Farm Rehabilitation Administration to construct four stock watering dams including: the Snyder and Ross Dams near Melita, the Napinka Dam, and the Hartney Dam. All were stop log dams with a total capacity of 2,400 acre feet (3,000,000 m^3). These stock watering dams are no longer operated. The Souris Dam was built for flood control, water supply, and flow regulation. In 1964, a two dam system was also constructed on the Oak and Plum Lakes to regulate lake levels for recreation purposes.

FACT

Streamflows in the basin are highly variable and unpredictable, the highest annual flow on record for the Souris River being about 1100 times greater than the smallest one. (EIA 1991, WSC 05NG021).

Other Water Management Plans

In the Souris River Basin there have been a number of water-related planning initiatives completed or in development (Figure 3), including this plan as well as:

- Upper Souris River Watershed – Source Water Protection Plan (2010)
- East Souris River IWMP (2006),
- Lower Souris River Watershed – Source Water Protection Plan (2006),
- Oak Lake Aquifer Management Plan (2005), and
- Souris River Basin Study Report (1978)

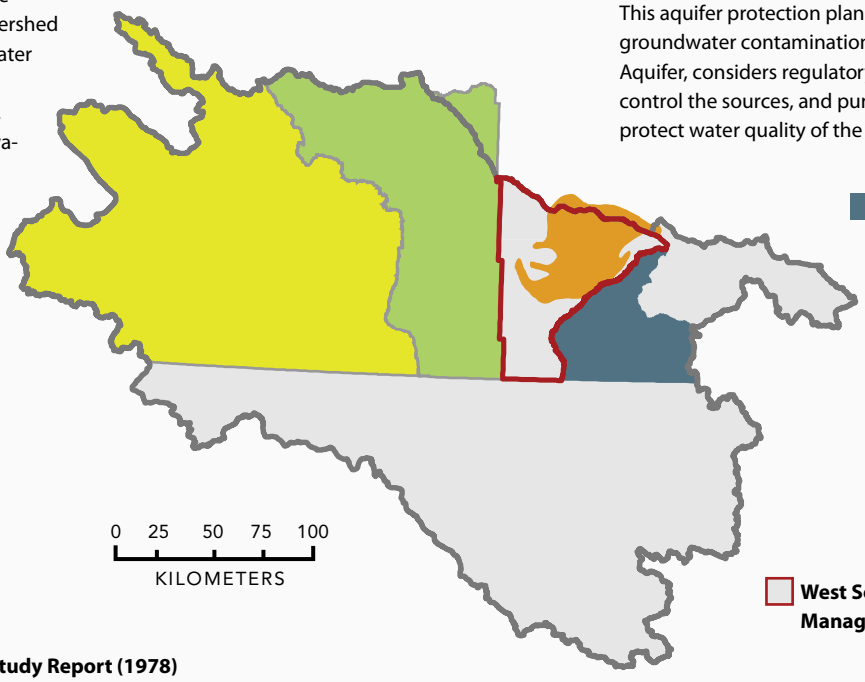
CHALLENGE

There needs to be a coordinated effort to implement a variety of planning initiatives which have taken place over time, at different spatial scales and by different organizations.

Upper Souris River Watershed Source Water Protection Plan (2010) is in final stages of completion. Source Water Protection Plan was completed to address drinking water concerns within the watershed. The plan objectives and recommendations are focused towards watershed education, surface water management, water quality, water supply, aquifer and groundwater, and water conservation.

Lower Souris River Watershed (2006)
Source Water Protection Plan was completed to address drinking water concerns within the watershed. The plan objectives and recommendations included watershed education, groundwater protection, water supplies, water quality, landfills, municipal sewage lagoons, agriculture activities, watershed management, and fish migration and habitat.

Oak Lake Aquifer Management Plan (2005)
This aquifer protection plan identifies potential sources of groundwater contamination which could affect the Oak Lak Aquifer, considers regulatory tools which are available to control the sources, and purposes additional measures to protect water quality of the aquifer.



East Souris River IWMP (2006)
This watershed plan encompasses the area east of the Souris River. It was the first IWMP to gain Ministerial approval in Manitoba. The ESR IWMP focuses on six water related categories including: surface water management, water quality, water supply, ecology, soils, and education.

West Souris Integrated Watershed Management Plan Study Area

Souris River Basis Study Report (1978)
Directed by the Souris River Basin Study Board, water management and development possibilities were assessed relative to existing water needs, problems, and the need for long term future water requirements. These included: background material review, basin characteristics, availability of water, magnituded of water problems, future development, detailed evaluation of development opportunities, and Board recommedations.

Figure 3: Water related planning initiatives completed or in development in the Souris River Basin.

The West Souris River Conservation District

The West Souris River IWMP study area encompasses most of the West Souris River Conservation District (Figure 5). The WSRCD is governed by a seven member board and funded through a municipal-provincial partnership. Formed in 1995, the District has a mandate to address watershed issues. The Board follows a guiding statement that "envisions a landscape where the land, water and related natural resources exist in a healthy sustainable state and are capable of supporting a healthy and economically viable watershed over the long term." The WSRCD offers incentive-based programming aimed at improving soils and landscape health, water and aquatic ecosystem health, and provides educational programs to schools and watershed residents. The primary mandate of the WSRCD will be to carry out and coordinate the implementation of the actions within this plan.

Study Area | The West Souris River Watershed

This plan is focused in the southwest portion of Manitoba with a study area of 4320 km^2. Although not a true-watershed, it includes the area of the Souris River Basin which falls within Manitoba provincial borders that are west of the Souris River (Figure 4). The main industries within the watershed are agriculture and oil development.

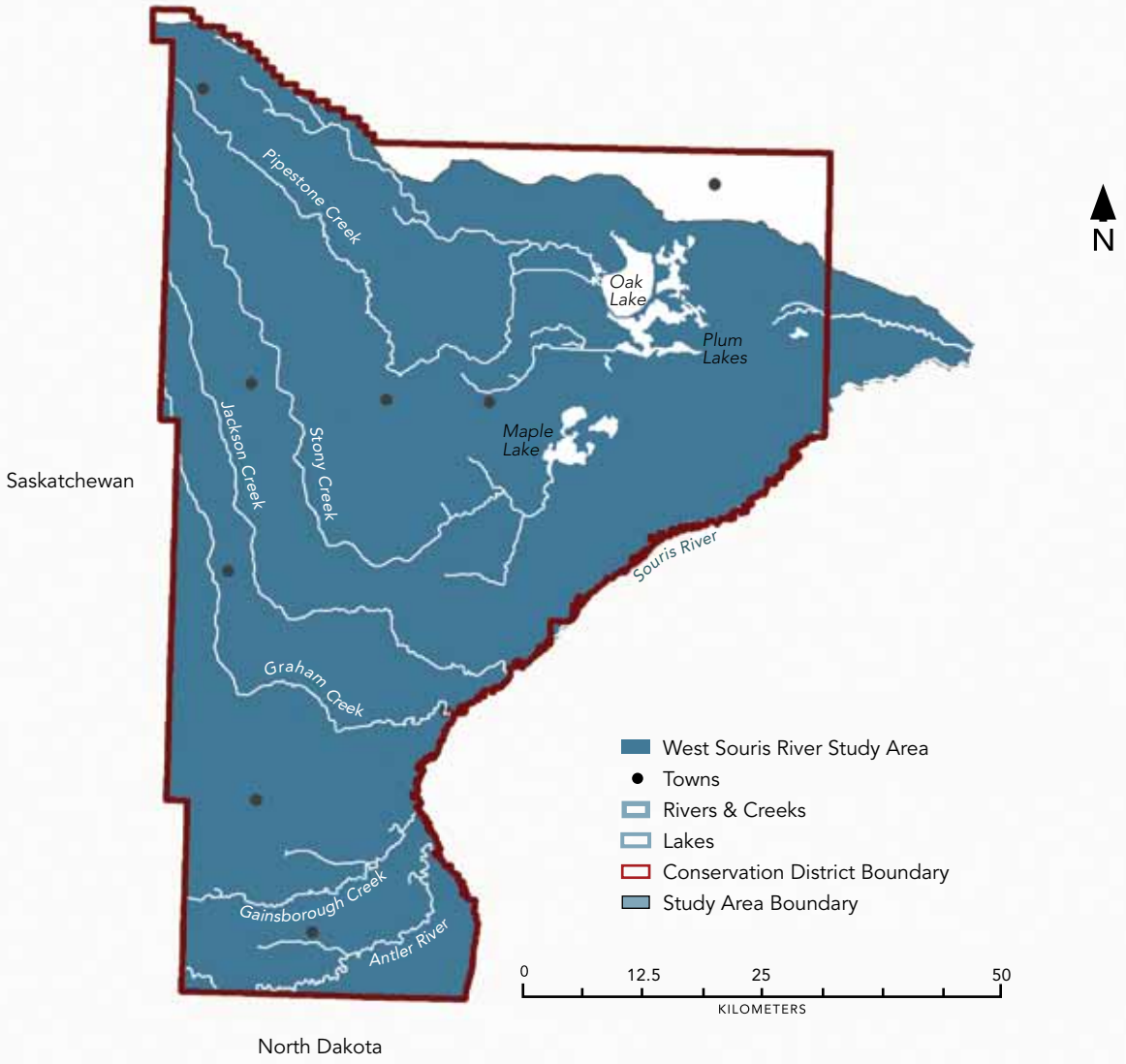


Figure 4: Location of the West Souris River Conservation District in relation to the Study Area.

Geology and Topography

The West Souris River study area moves from flat to gentle rolling plains with an with an elevation change of only 410 feet (125 m). There are two physiographic regions within the study area; the Oxbow Till Plain (northwest) and the Souris Plain (south and east). Bedrock consists of Riding Mountain Formation shale and has a glacial deposition ranging from more than 196 feet (60 m) in the area west of the Souris River, and up to 350 feet (107 m) in the vicinity of Oak Lake and north. Glacial till deposits are found mainly in the northwest portion of the study area and along the provincial boundary to the west. Lake deposits are dominant in the northeast and form extensive aquifers including the Oak Lake Aquifer (OLA).

CHALLENGE
Groundwater sources are limited and generally of poor quality in the northwest and southern portions of the study area.

Groundwater

The Oak Lake Aquifer is a significant sand and gravel aquifer in the watershed and is the primary source of drinking water for residents and livestock in the area, as well as supporting a variety of industry. Wells into this aquifer are usually high yield and of good quality. Additional aquifers found in the study area include small lenses of sand and gravel found scattered around the Tilston to Cromer area. The yield of wells in these areas is usually low and of poor quality often too saline for human consumption.

CHALLENGE
Groundwater from shallow unconfined aquifers, like the OLA, are at greater risk to contamination from surface activities.

Oak Lake Aquifer

The Oak Lake Aquifer is located between the Assiniboine and Souris Rivers, in the northeast quarter of the study area (Figure 5). This aquifer underlies 3 million acres (1.2 million hectares) of land. Although water quantity varies from year to year, the OLA can store approximately 3 million acre feet of water, with a sustainable yield conservatively estimated at 15,000 acre feet. The OLA is the source for two public drinking water systems including Hartney and Melita, as well as many wells for private domestic consumption, livestock watering and irrigation uses. The aquifer is unconfined, located between 0 and 85 feet (27 m) below ground and extending generally 5 to 10 feet from the surface. Most of the aquifer recharge occurs within the West Souris River study area and groundwater from shallow unconfined aquifers, like the OLA, is at greater risk to contamination from surface activities.

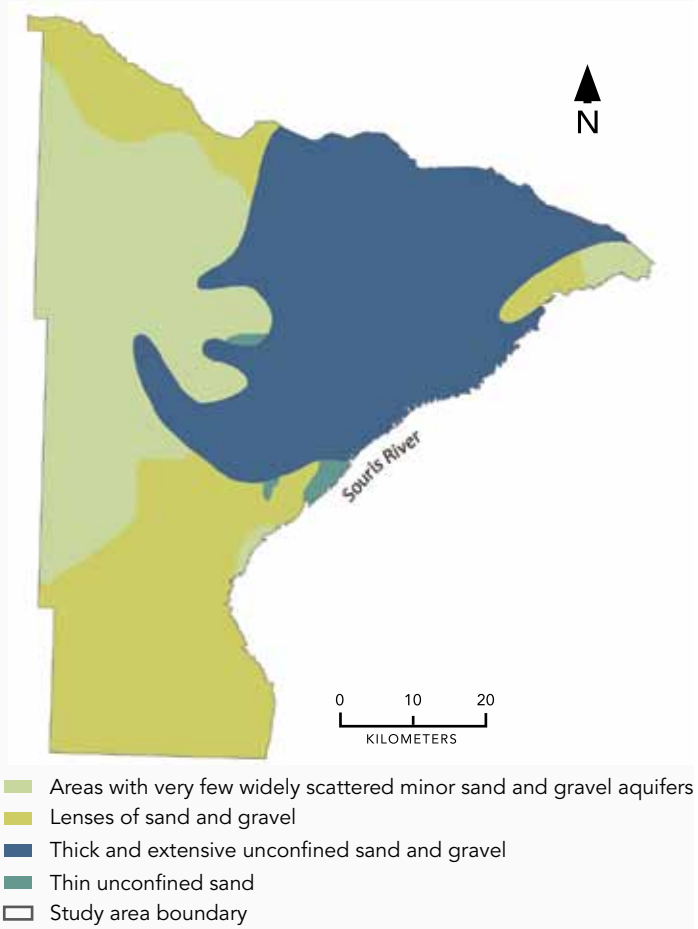


Figure 5: The Oak Lake Aquifer is a thick and extensive unconfined sand and gravel aquifer which dominates the northeast portion of the watershed.

Oak Lake Aquifer Plan

In 1997, the Government of Manitoba initiated a process to develop a management plan for the Oak Lake Aquifer. The purpose was to protect and preserve the aquifer water resources. The plan was finalized in 2000 using a consensus process with all major stakeholder groups with an interest in the management of the aquifer. The plan included the following recommendations;

CHALLENGE
Implementation of OLA plan recommendations has been taking place since 2000 and needs to be continued.

- **Water Quantity Protection Plan**
  - o Water use must be less than or equal to recharge rates.
  - o Detain runoff to accelerate recharge.

- **Water Quality Protection Plan**
  - o Land use activities should minimize cultivation and the addition of agricultural wastes and chemicals.

- **Education Plan**
  - o The aquifer is more likely to be valued and protected if everyone understands how it works.

- **Monitoring Plan**
  - o Must be extensive enough to allow estimation of recharge and withdrawal.
  - o Must be sensitive enough to warn of local water quality deterioration prior to prolonged, extensive or irreversible damage.

Plan Update

Since 2000, many actions have been taken towards the recommendations of the OLA plan. In 2009 the WSRCD in partnership with the Groundwater Management Section, sampled private wells within the conservation district boundaries. A total of 104 samples were collected, a quarter of which were completed into the OLA. The samples were tested for a wide variety of major nutrients and trace elements, results were sent to the cooperating well owners, and the CD organized three water quality workshops to discuss results.

CHALLENGE
A 2008 survey indicated that one in every four wells in the study area failed to meet drinking water guidelines due to presence of bacteria or high levels of nitrates and nitrites.

ACCESSING GROUNDWATER IN THE AREA

There are many ways to access groundwater. The method applied is often determined by the material below, depth which it can be accessed and the type of aquifer. The amount of water which can be obtained from a well depends on the permeability of the materials, the thickness of the saturated materials and on well construction.

There are two main types of wells used in the study area to access water, sandpoint or driven wells, and drilled wells. Sandpoint wells are created by driving a pointed screened pipe into the ground until groundwater is encountered. A sandpoint well is no more than 25 feet below the ground in areas with sandy soils and a high water table. Sandpoints are generally shallow and as a result more prone to contamination originating at or near the ground surface. In the study area approximately 50% of the wells are completed into the OLA, the majority of which are sandpoint wells.

CHALLENGE

Sandpoint wells are the dominant type of well completed into the OLA. These type of wells are shallow and therefore more prone to contamination from the ground surface.

Drilled wells are found in the area above outside of the Oak Lake Aquifer. Drilled wells are completed to much greater depths than sandpoint wells, up to several hundred meters sometimes. The producing aquifer is generally less susceptible to pollution from surface sources because of depth and water supplies tend to be more reliable since it is less affected by seasonal weather patterns. These water sources however typically contain more minerals in solution and may require treatment to be potable.

SOURCE WATER PROTECTION PLAN

A drinking water protection committee conducted a preliminary assessment on the 11 water sources that supply public water systems in the West Souris River study area (Figure 6). The protocol and procedures used in this assessment were derived from a report entitled "Manitoba Source Water Assessment Recommended Method for Public Water Systems". It is important to note that the assessment process is qualitative and is a part of multi-barrier approach to assessing threats to public drinking water. A summary of this non-technical process is described below.

Each water source supplying a public water system was mapped and a buffer was applied around the withdrawal point. Buffers are important management tools, because areas nearer to a withdrawal point are more likely to influence water quality than an area that is further away. For groundwater systems, the area within a 1.5 kilometer radius of the well head was reviewed. A site visit was conducted by provincial and municipal representatives and a a public works officer familiar with the treatment system to look at land activities within these buffer areas. An informal list of potential pollutant sources or risks was created. For each public water system the top few threats identified by this team are presented below, as well as a list of recommended actions to reduce risk and protect the source of drinking water for the thousands of residents.

CHALLENGE

A variety of recommendations need to be implemented to preserve or enhance public drinking water sources.

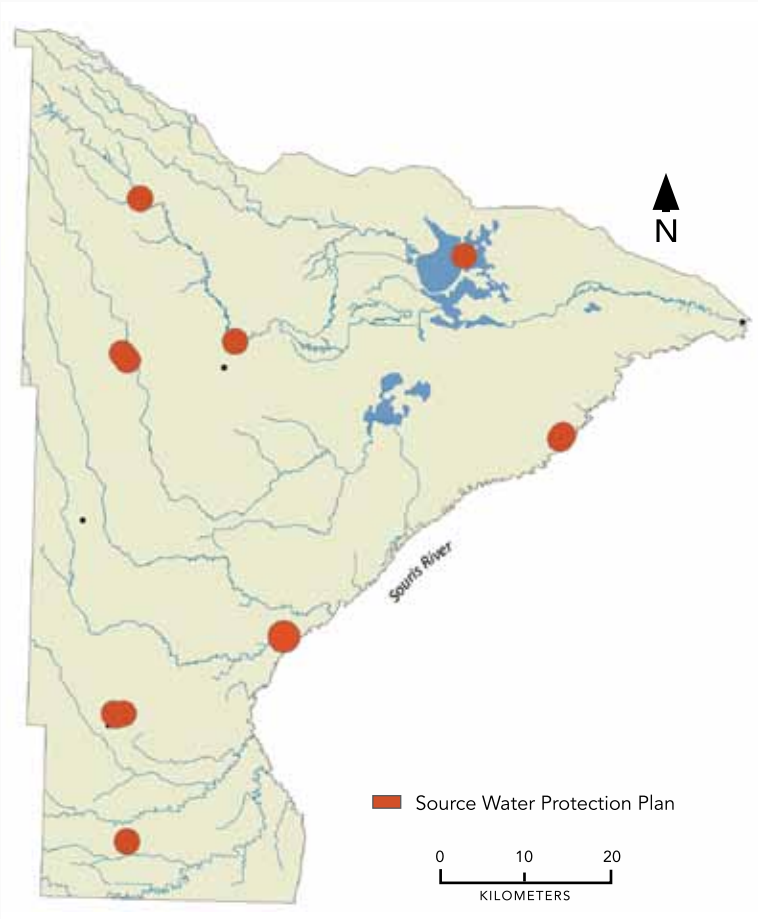


Figure 6: Public drinking water sites in the West Souris River study area.

LAND COVER

Agriculture is the primary land use in the study area representing approximately 52% (or 224,257 ha) of land area in 2006 (Figure 7). Grassland/pasture areas cover 30% (or 128,841 ha) and forage land usually consisting of alfalfa stands cover another five per cent of the study area. Both pasture and forage lands are located throughout the area, but are more prevalent in the north eastern part of the study area. Treed areas are found mainly in the northeastern part of the study area occupying just over five per cent of the study area. Additionally, in the Lyleton area, there is an extensive system of field shelterbelts which were planted in the 1930s. Wetlands occupy just three percent of the study area, with the majority found in the north. Approximately two per cent of the study area can be classified as water, consisting mainly of the Oak and Plum Lakes.

Change in land use can influence flooding, water supply, and water quality. In the study area, there was an overall increase of 900 ha of wetlands between 1993 and 2006. Changes are likely a result of increased drainage in upstream portions of the study area, precipitation and conversion of grasslands to wetlands, rather than wetland restoration.

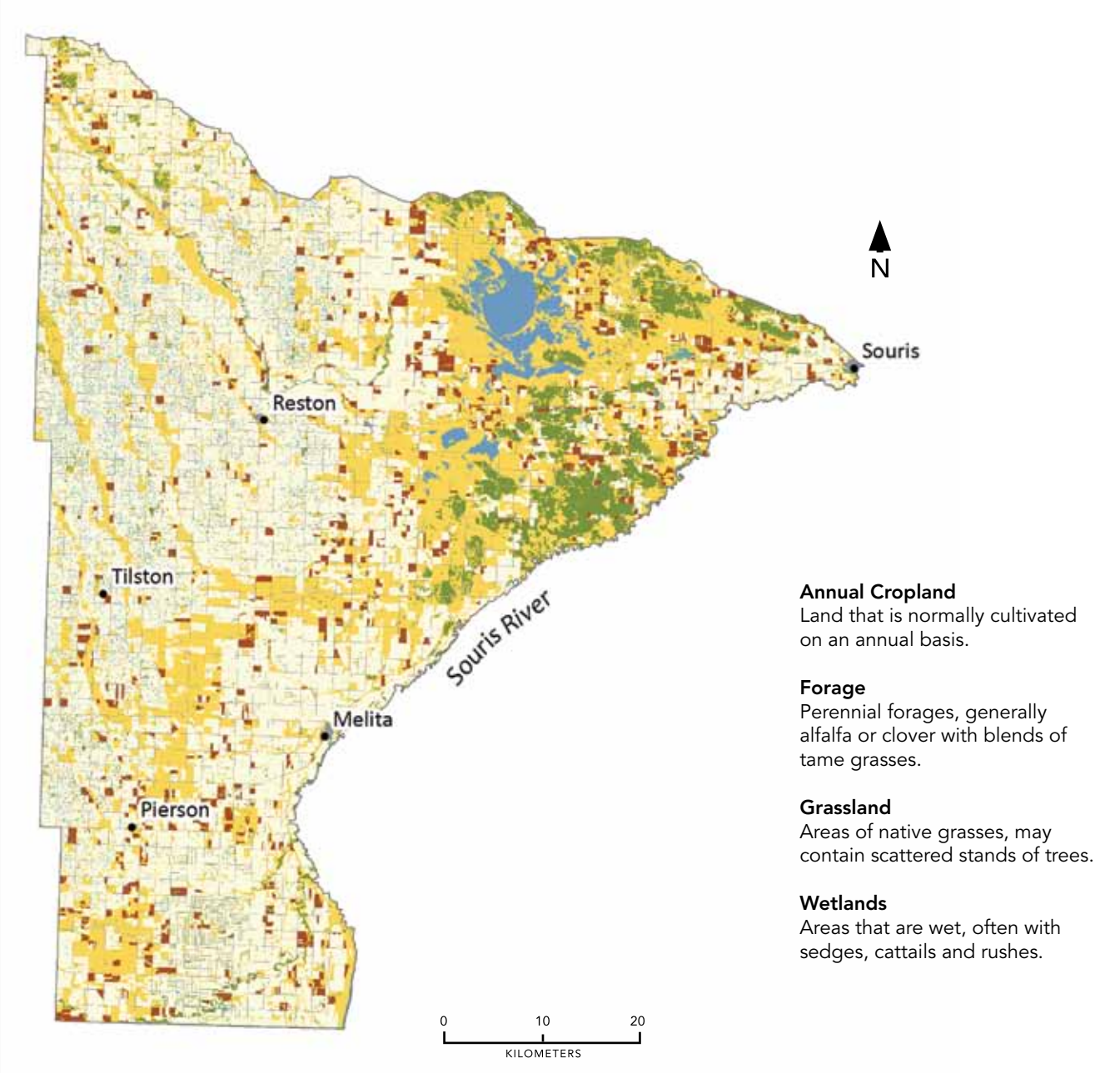


Figure 7: Land cover classes in the West Souris River integrated watershed management planning area.

BIODIVERSITY

Effective watershed management is dependent on maintaining a balance between anthropogenic activities and the natural environment. One of the main ecosystems dominant in the south-west portion of the province is the Mixed Grass Prairie. Manitoba's Mixed Grass Prairie is composed of shorter species of grass which thrive in more arid conditions, and tall grass species which are more dominant to the east. These temperate grassland communities occur on well-drained, sandy or gravelly soils. The Mixed Grass Prairies support increasingly threatened species designated under *Manitoba's Endangered Species Act* and the federal Species at Risk Act, some who's provincial and federal range have been limited to within the study area.

Threats

Agriculture
The mixed grass prairies are considered to be the most converted, least protected habitat on earth with less than 2% effectively conserved worldwide. In Canada more than 70% of mixed grass prairie has been converted to annual or forage crop, or human infrastructure. In the study area, there was an overall decrease in grasslands from 1993 to 2006. Agricultural and petroleum development pressures can be attributed to much of the fragmentation of the natural areas within the study area.

Petroleum
Oil development pressures threatens the biological communities within the study area. The Enbridge pipeline also runs through the area which could have significant impact on these ecosystems. There are ways to mitigate and minimize these impacts primarily through site selection (avoiding natural areas) and the use of directional boring.

Invasive Species
Invasive species are plants, animals or other organisms that are growing outside their original region. Over the last decade, there has been a growing awareness that introduced invasive species are having significant and increasing impacts on Manitoba's economy, ecosystems, native species and human health. Invasive species impacting agricultural production or encroaching on native species habitat include: leafy spurge in upland areas and purple loosestrife in wetland areas.

CHALLENGE
Mixed grass prairies are considered the most converted, least protected habitat on earth, and are significantly affected by invasive species encroachment, and agricultural and petroleum development. They are also habitat for a number of threatened or endangered species in the study area.

SOILS

Soil drainage reflects the amount of excess water in the soil. Approximately 40% (173,230 ha) of the study area can be considered poor to imperfectly drained, with 30% of annual cropland impacted by this condition. Most of the imperfectly drained soils are associated with the eastern portion of the study area around the Oak, Plum, and Maple Lake. In areas with porous underlying soils, such as the Oak Lake Aquifer, rapid infiltration can pose risks to leeching of nutrients and contaminants into the groundwater. Well drained soils similar to the soils located in the western side of the study area, combined with water deficiencies can result in soils being vulnerable to wind and water erosion.

Erosion Risk

Approximately 46% of the study area, primarily in the eastern portion, is considered to have a moderate to severe wind erosion risk. Based on the 2006 land cover data, approximately 33% of the annual cropland was located on soils with a high to severe risk for wind erosion. In 2006, according to Census data, 70 to 85% of seeded fields were prepared using minimum or zero tillage, a management tool intended to decrease wind erosion.

Agricultural Capability

Agricultural capability is the ability of the land to support agricultural land use activities. Lands progressively move from Class 1 which have no limitations to support land use activities, to Class 7 which have severe limitations. In the study area, approximately 70% of the area was classified as Class 1, 2, and 3. Twenty-eight per cent of the study area was considered Class 4 to 7. Just over 15% of marginal lands rated Class 4 or lower are being annually cropped. These soils have significant limitations for crop production and are often better suited to other land uses.

CHALLENGE
40% of the study area soils are considered poor to imperfectly drained. The majority of these soils are under annual cropland around the lakes, an area designated by the public as flooding issue area.

CHALLENGE
33% of the annual cropland, mainly in the eastern portion of the study area, has moderate to severe wind erosion risk.

CHALLENGE
15% of annual croplands were found on lands rated more suitable for other agricultural uses.

INDUSTRY

Oil

Two main industries in the study area include oil production and agriculture. The bulk of Manitoba's oil production is concentrated in the southwest with six fields falling in the study area including; Virden, Daly, Sinclair, Tilston, Pierson, and Coulter Fields (Figure 8). Manitoba's oldest producing well was drilled in July 1951 and is found in the Daly Field.

As of late 2008 the Virden field produced 57.3% of the total production for Manitoba. Oil development is a multi-million dollar industry in Manitoba specifically in the southwest. 80% of the oil and gas rights are owned by private individuals or companies. In Manitoba, royalties payable to private oil and gas rights owners were estimated at $83 million in 2008, and total oil industry expenditures in Manitoba in 2008 were approximately $509 million, significantly influencing the local economy.

Oil and gas reservoirs are usually found in porous rocks, which also contain saltwater. This saltwater, which accompanies the oil to the surface, can be disposed in two ways: 1) Returned by fluid injection into the reservoir where it originated for secondary or enhanced oil recovery; or 2) Injected into underground porous rock formations not productive of oil or gas, and sealed above and below by unbroken, impermeable strata. Approximately 11.2 million m3 (70 million barrels) of salt water was produced in Manitoba in 2010, that's 6 m3 of salt water for every 1 m3 of crude oil produced. Salt water must be separated from the oil and re-injected into subsurface formations and there are approximately 491wells used for this purpose in Manitoba.

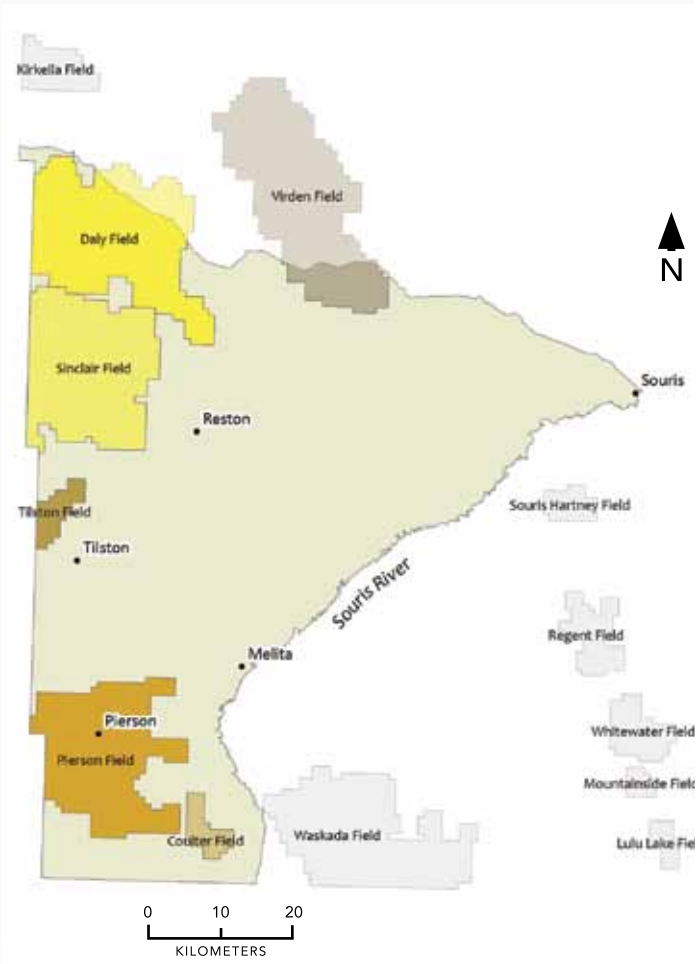


Figure 8: Six oil fields found in the West Souris River IWMP study area include: Virden, Daly, Sinclair, Tilston, Pierson, and Coulter.

Agriculture

The study area has a diverse agricultural landscape. Slight differences in soils type, land use, cropping practices, crop types and types and numbers of livestock are evident from the north to the south parts of the study area. Though both crop and livestock production are important, crop production tends to dominate in the west and south, while beef production is more dominant in the northeast due to soil limitations for annual crops.

CHALLENGE

The general trend is that agricultural operations are moving towards larger scale operations.

Agricultural land use is dynamic with many factors influencing changes over time including economic drivers like commodity prices, land values, input costs and government programs to social influences like changing demographics and increasing environmental awareness. These pressures have led to a reduction in the number of farms within the study area. Many farmyards have been abandoned, and with new more efficient and expensive technologies, smaller farming operations or non-profitable operations have been consolidated in larger more economical ones.

"Agriculture is turning into a business rather than the way of life it used to be. Our sons didn't want to take the farm over; it was a lifestyle choice for them. Lots of the local farms are being purchased by the bigger farms. Those bigger farms need to have good business sense, as well as an increased investment. If you don't take over a farm from a parent, the investment will be huge."

Manson Moir – Chairperson West Souris River PMT.

POPULATION TRENDS

The population of the West Souris River study area has been on a steady decline since 1956 caused by rural depopulation (Figure 9). Rural depopulation (or rural flight) is used to describe the exodus of people from rural areas into urban areas. In modern times, it often occurs in a region following the industrialization of agriculture when fewer people are needed to bring the same amount of agricultural output to the market and related agricultural services and industries are consolidated. For various reasons rural residents have left in favour of urban settings. Many farmyards have been abandoned, and with new more efficient and expensive technology, smaller farming operations or non-profitable operations have been consolidated into larger more economical ones. According to the analysis of the Census of Agriculture from 2001 to 2006, there was a general reduction in the number of farms reporting. Subsequently, a corresponding increase in average farm size occurred with the greatest increase in total farm land reported in the Jackson and Graham Creek areas.

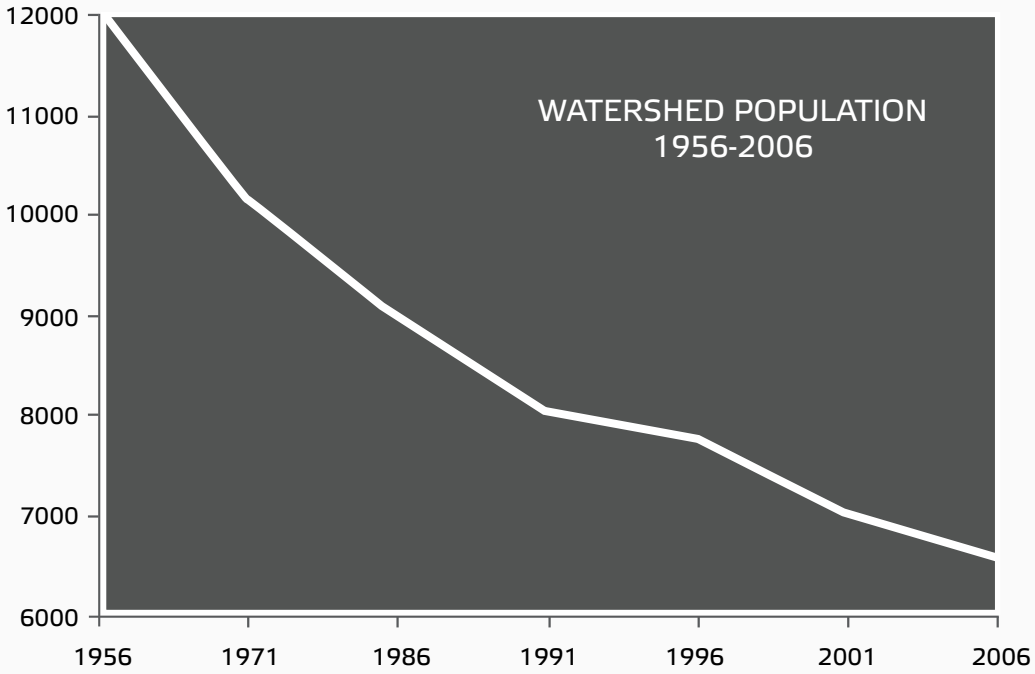


Figure 9: Population values of the West Souris River Study Area from 1956 to 2006.

HYDROLOGY

Water levels on Oak Lake from 1954 to 2011 were highest in April 1976 (430.76 m.a.s.l.) and lowest in February 1990 (427.84 m.a.s.l.). Lake levels fluctuate throughout the year, with increases during spring melt and decreases from outflows to Plum Creek as well as evaporation and infiltration. Longer trends in lake levels are correlated to periods of wet or dry years.

The Oak and Plum Lakes are important for recreational activities like boating, fishing, and hunting. Water levels have been maintained on these lakes to support recreational activities through the operation of the Oak Lake Dam. Downstream of the Oak Lake Dam runs the Plum Creek through the Plum Lakes. This creek typically overtops its banks and causes significant flooding of haylands and was a significant issue identified during public consultations.

CHALLENGE
The Plum Creek typically overtops its banks causing significant flooding of haylands downstream of Oak Lake dam.

The Souris River typically has continuous flow throughout the year, with peak flows occurring in April and May. Many of the creeks contributing to the Souris River in the study area are characterized by similar flows which are typically limited to spring snow-melt events and larger precipitation events in the spring and summer. Often all tributaries are dry by fall.

CHALLENGE
The drainage area for the study area is three times the study area itself.

Creeks in the watershed flow in a general southeast direction, originating in Saskatchewan and ultimately discharging to various points along the Souris River. As a result, a significant portion of the flow in creeks like Gainsborough, Pipestone, Antler , Jackson and Stoney Creeks originate from lands on the Saskatchewan side of the watershed.

The spring and summer of 2011 brought extensive flooding to southwest Manitoba. The Souris River experienced never before recorded water flows likely just behind the flood of 1882. Extensive flooding damage was sustained to roads, bridges, culverts, highways, buildings, residences, and other important infrastructure. Most agricultural producers in this watershed experienced delayed seeding or no seeding at all. Hundreds of heavy equipment operators, thousands of volunteers were called upon to help raise dikes around the communities of Melita and Souris, among many others. Thousands of people were mandatorily evacuated from residences within the flood zone. South-western Manitoba rivers crested more than once during the 2011 flood season due to heavy spring run-off and subsequent heavy spring rainfall events in eastern Saskatchewan and western Manitoba. For the Souris River this meant three peaks, April 23rd (1359.86 feet asl), June 15th (1361.13 feet asl), and one in July 5th (1364.68 feet asl), the highest in recorded history. Despite the dire circumstances, governments and residents of the watershed worked together to ensure that no lives were lost, and property damage was kept to a minimum. In the direct aftermath of the unprecedented flooding, politicians, policy makers, and planner reaffirmed the importance of prudent land use planning, investment in flood proofing initiatives, careful water management, and thorough emergency preparedness.

CLIMATE

The study area is typically moisture-deficient with a mean annual precipitation accumulation of 467mm. (Figure 10). Most of the water from spring and summer rainfall events infiltrates into the ground, with approximately 75% of the annual precipitation falling as spring and summer rainfall. As a result most producers in the area rely on spring runoffs to replenish their water supplies.

CHALLENGE
The study area is moisture deficient and there is a huge dependence on spring and early summer runoff for different supplies of water.

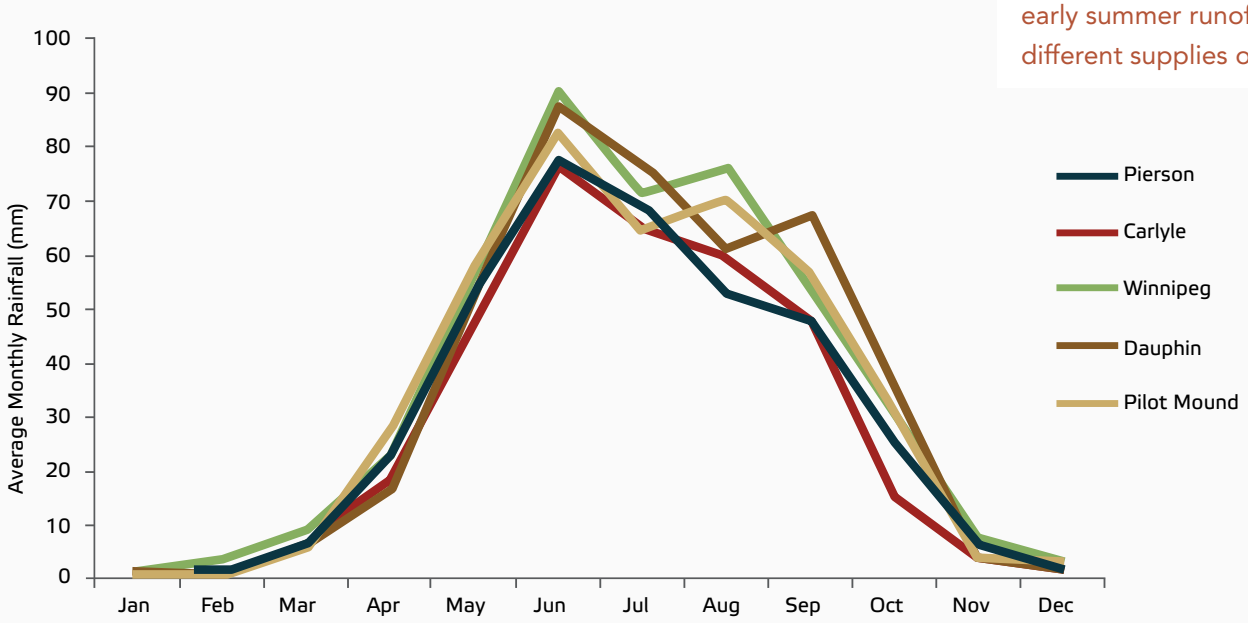


Figure 10: Mean annual precipitation accumulation of Pierson, Carlyle, Dauphin, Pilot Mound and Winnipeg Environment Canada Climate Stations (Environment Canada, 2009).

CLIMATE CHANGE

Over the last twenty years global climate change has became a significant matter of concern. Recently a report called ***From Impacts to Adaptation: Canada in a Changing Climate*** was published by the International Institute for Sustainable Development. The report illustrates through, climatic modeling, recent trends, and future predictions, the following impacts of climate change on water resources in the Prairies:

CHALLENGE
Climate change predictions describe an increase in the severities of drought events in watersheds already scarce with water.

- Reduced snow accumulations;
- Decline in annual flow volumes;
- Shift in timing of streamflows to earlier in the year, meaning lower late season water supplies;
- Falling lake levels;
- Increasing soil moisture and surface water deficits; and
- Greater frequency of dry years, but also increased precipitation in the form of rain and higher probability of severe flooding.

ADAPTABILITY – "Adaptation to changes in the hydrology of the Prairies will be challenging, especially where current water supplies are almost fully allocated…Increases in water scarcity represent the most serious climate risk" – from Impacts to Adaptation: Canada in a Changing Climate

SURFACE WATER QUALITY

The Water Quality Index (WQI) is used for reporting technical information in a consistent, easy to understand manner. The index ranges from 0 to 100, and summarizes data into simple categories like excellent, good, fair, marginal and poor. Insufficient data is available to calculate the WQI for the Souris River within the study area. Instead, the WQI for the Souris River downstream of the WSR study area at Treesbank, Manitoba, is presented (Figure). Low concentrations of dissolved oxygen, and consistently high conductivity, total suspended solids, total nitrogen values, in addition to very high concentrations of total phosphorous from 1991 to 2006 resulted in the fair/marginal rating for the Souris River data. Low concentrations of dissolved oxygen may impact fish populations, and high levels of nutrients like phosphorous may result in algal blooms.

CHALLENGE

All creeks in the study area exceeded provincial guidelines for total phosphorous, and had concentrations of dissolved oxygen lower than 5mg/L.

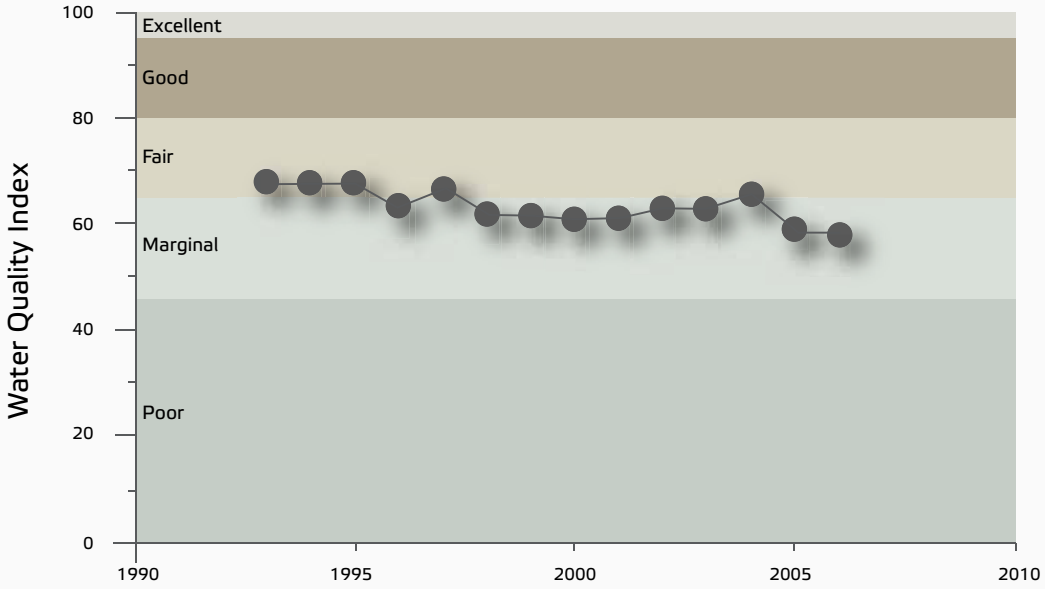


Figure 11: Water Quality Index for the long term water quality station located at the Souris River at PR #530 near Treesbank.

Between 2000 and 2009, the Antler River, Gainsborough, Graham, Jackson, Pipestone, Plum and Stony Creeks were monitored for water quality. Most variables measured were below the provincial guidelines with some exceptions;

- Total phosphorous consistently exceeded the Province-wide narrative guidelines in all seven water bodies. This is common for prairie streams.
- Concentrations of dissolved oxygen (DO) periodically declined below 5mg/L at all sites. Some aquatic life in these sites may be adapted to low DO concentrations, however concentrations lower than 1.0 mg/L can result in fish kills and foul smelling water.
- Total suspended solids and conductivity commonly exceeded the water quality objective in the Pipestone Creek.
- Trace elements were also measured. Total iron and manganese concentrations regularly exceeded the drinking water and aquatic life guidelines in Pipestone Creek.

Water Use

Water Licensing and Allocation

Water licenses are provided under The *Water Rights Act* in Manitoba with the intention of protecting the interests of the licensees, domestic users, the general public, and the environment. In this watershed irrigators are the highest water users from a volumetric perspective. A total of 2,347 acre-feet (2,894.9 dam^3) of water is licensed to irrigators each year (Table 1). Irrigators withdraw from both surface (49%) and groundwater (51%) sources. Most surface water sourced irrigators are withdrawing from the Souris River while surface water agricultural withdrawals, mainly for livestock, are primarily drawn from Pipestone and Stoney Creeks.

Most licensed withdrawals in the study area are from groundwater sources (63%). All municipal and industrial (non-agriculture) water users withdraw from groundwater sources.

TABLE 1: Water use license summary for surface and ground water sources within the WSR study area.

	Allocated Under License (acre-feet)		Total Allocation
Purpose	Groundwater	Surface Water	(acre-feet)
Agricultural	119.0	105.9	224.9
Industrial	3.9	0.0	3.9
Irrigation	1319.0	1027.9	2346.9
Municipal	349.7	0.0	349.7
Other	16.2	0.0	16.2
TOTAL	**1807.8**	**1133.8**	**2941.6**

Oak Lake Aquifer Water Budget

Provincial water budget models are developed by the Groundwater and Surface Water Management Sections to set allocation limits for major streams and aquifers. The OLA contains 3,000,000 acre-feet of fresh water. Its average annual recharge is conservatively estimated to be 15,000 acre-feet. This is the quantity of water that the aquifer can discharge each year and continue to maintain the current water level regime. Common practice is to require that one half of this discharge be reserved to maintain surface environment as stream flows, lake and wetland water levels, water supply for vegetation that can access the water table, and for domestic use. The balance of this discharge, 7,500 acre-feet per year, is the allocation limit available for licensing. All licensed water use within the OLA area has consistently remained within the 7,500 acre-feet water budget.

CHALLENGE
With greater water pressures predicted in the future, licensing should remain within water allocation budgets.

SURFACE WATER MANAGEMENT PLAN

In Manitoba a surface water management plan typically refers to the management of water to prevent or reduce flood damage on agricultural or residential land. Although flood protection is important, surface water management can also serve to enhance the function of aquatic ecosystems, offer recreational opportunities, improve water quality, and increase water supply.

Currently the tools to manage surface waters for flood protection are low-level dams, the channelization of streams and the construction of drains to remove water off the land as quickly as possible. As characterized by one resident

> **"[we are] unable to retain and control spring runoff of the creeks ... too often the spring surplus becomes a shortage of pond water in the summer."**

In fact, since the early part of the last century, 50 to 70% of the nation's original wetlands have been drained, dredged, filled, leveled, and/or flooded (Dahl and Johnson, 1991). A more holistic approach to surface water management is needed in this study area to include a broader range of watershed values such as aquatic ecosystem health, water quality, climate change resilience, and water supply.

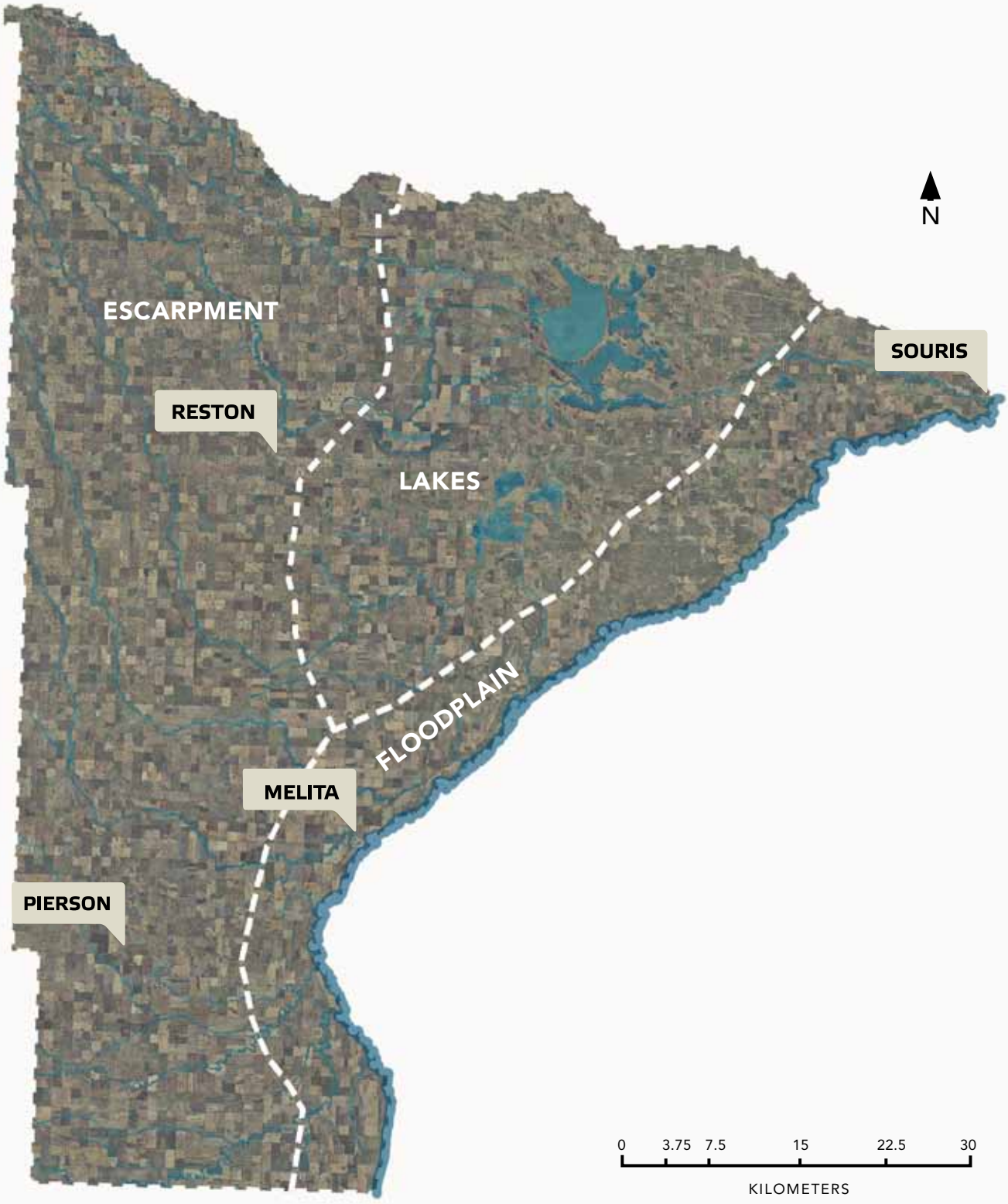
To achieve a better balance, the watershed team has developed recommendations and policies that are intended to benefit a broader range of watershed values and are sensitive to the application of surface water management tools that may work to the detriment of other watershed priorities. This is achieved by suggesting changes to current surface water management tools, applying new tools, understanding where it matters most to protect watershed resources, and by agreeing on areas of the watershed where it makes sense to manage for flood protection.
To determine "where it matters most", the project management team utilized information gathered from local landowners, municipalities, local experts, and government planners and scientists. The PMT used this information to create three surface water zones, each with a unique statement of intent for how to direct land management activities and landscape characteristics.

1. **ESCARPMENT**
   This zone should maintain natural water hold back areas and is suitable to construct infrastructure to slow water flows and reduce downstream flooding, while providing valuable water supplies to cattle producers. Comprised of mostly Class 2 soils, land use in this area is a mixture of cropland and pasture.

2. **LAKES**
   This zone is characterized by relatively poor drained soils, natural wetlands, and poorly defined creek beds. It contains valuable wildlife habitat with important recreational value around Oak Lake. The primary land use in this area is hay and pasture land.

3. **FLOODPLAIN**
   This zone is a natural floodplain. Souris River flow and timing of cross border releases significantly impact the length and timing of flooding during seasons for agricultural producers within this zone. The primary land use in this zone should be for maintaining natural water fluctuations.

Watershed Zones



ZONE 1 :: ESCARPMENT

Surface water issues specific to this zone were collected during public and municipal consultations.

INTENT

Land within this zone should be managed with the goal of increasing water retention during spring runoff to reduce downstream flooding impacts and provide a supply when dryer conditions are present.

ISSUES SPECIFIC TO ZONE 1

- Timing of release of agricultural drainage causes downstream flooding,
- Uncontrolled drainage on Sask side of border causes increased flows and downstream flooding on the Manitoba side of the border.
- There are numerous livestock operations on streams within this zone that adversely affect riparian areas.
- Stream bank erosion on creeks causes banking slumping.

Tools to get there...

1. Land protection programs (i.e. conservation agreements, taxation easements, ecological goods and services payments, land purchases).
2. Implementation of beneficial management practices aimed at protecting and enhancing natural cover, riparian areas, and wetlands.
3. Incentive programs to store or slow water volumes and the rate at which water leaves this area should be promoted in this zone (i.e. backfloods, small dams, control gates on existing/new culverts).
4. Limit future development within 50m buffers of riparian areas through land protection programs or through the adoption of developmental plan policies.
5. Adopt downstream friendly drain management practices to retain water flows until peak waters have receded in Zone 2.
6. Drain licensing should consider cumulative downstream impacts to ALL infrastructure within this zone downstream from license applications.
7. Drain management should include consideration and mitigation measures for flooding concerns in Zone 2.
8. Work with partners in Saskatchewan to slow or retain cross border waters,
9. Educate landowners on drainage licensing procedure and water retention options and benefits,
10. Conduct a water storage option plan (similar to TMCD's Genivar Study),
11. Clean out tree deadfall in creek bed.

In the following section the above tools need to be employed to solve these issues.

ZONE 1 :: SPECIFIC ISSUES

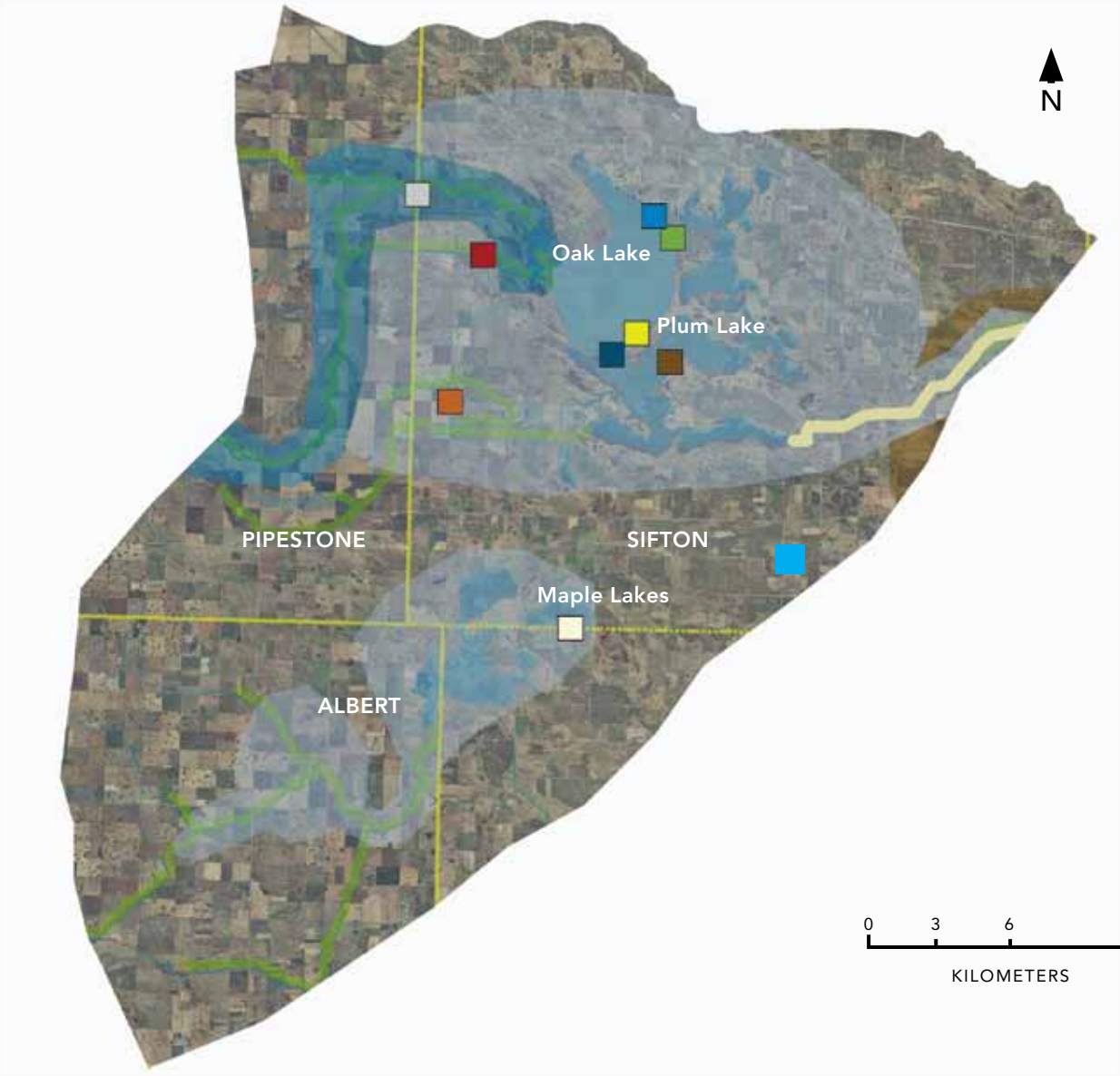
- Reston's sewage lagoon is limited in capacity for the number of residents it needs to support.
- Beavers build dams which cause flooding of some agricultural lands.
- During spring melt and heavy rainstorms, culverts occasionally wash out.
- A dam on Pipestone Creek at Cromer is needed to regulate water flows and provide a water source for agriculture. If constructed, this dam should have stipulations outlining no recreational use or cottage development.
- A drain constructed in 1906 needs to be rebuilt.
- A small dam needs repair.
- Riparian Area target for related riparian area policies.
- Public identified area where dead trees slow water movement causing flooding.
- Public identified area of excess drainage.

ZONE 2 :: LAKES

CHALLENGES APPLICABLE TO ZONE

The Plum Creek typically overtops its banks causing significant flooding of haylands downstream of Oak Lake Dam.

40% of the study area soils are considered poor to imperfectly drained, majority of which are under annual cropland around the lakes, designated by the public as flooding issue area.



INTENT

Land within the lakes zone should be managed to protect and preserve the ecological and recreational quality of the lakes and surrounding habitat.

ISSUES SPECIFIC TO ZONE 2

- Lack of coordination of upstream drainage to downstream flows causes bottleneck in Plum Creek

Tools to get there...

- Land protection programs on low lying flood prone areas (i.e. conservation agreements, taxation easements, ecological goods and services payments, land purchases).
- Implementation of beneficial management practices aimed at protecting and enhancing natural cover, and wetlands.
- Limit future development downstream of the Oak Lake Dam through land protection programs or through the adoption of developmental plan policies.
- When available, drain management and licensing should include consideration and mitigation for timed releases after peak flows have receded.
- Maintain creek bed free from debris to minimize flooding of private properties and buildings (i.e. mowing, willow cutting etc...).
- Development plan policies should require future developments around Oak Lake to have an engineer-approved storm water management and grading plans.
- Require all new construction development along lakes to be built above the 2011 flood elevation and that 100 meters of natural riparian buffer is retained to protect shoreline health and residences from flood events around Oak Lake.

ZONE 2 :: SPECIFIC ISSUES

During spring runoff, the Oak Lake Resort regularly floods due to drainage issues, there is also significant bank erosion along Cherry Point development

During high water years, the road floods.

In some winters, Oak Lake has dissolved oxygen dropping below threshold levels for fish survival.

During spring melt and heavy rainstorms, water backfloods onto private property and does not drain back.

Cattle have unlimited access to Pipestone Creek

- CD will work with landowners and provide incentives to install off-site watering systems and riparian fencing.

During Spring melt, water backs up and floods along Old Pipestone Creek.

During the summer, water levels on the Plum Lake Marsh are too high, inhibiting hay production.

Plum Creek has a poorly defined creek bed where water frequently overtops its banks.

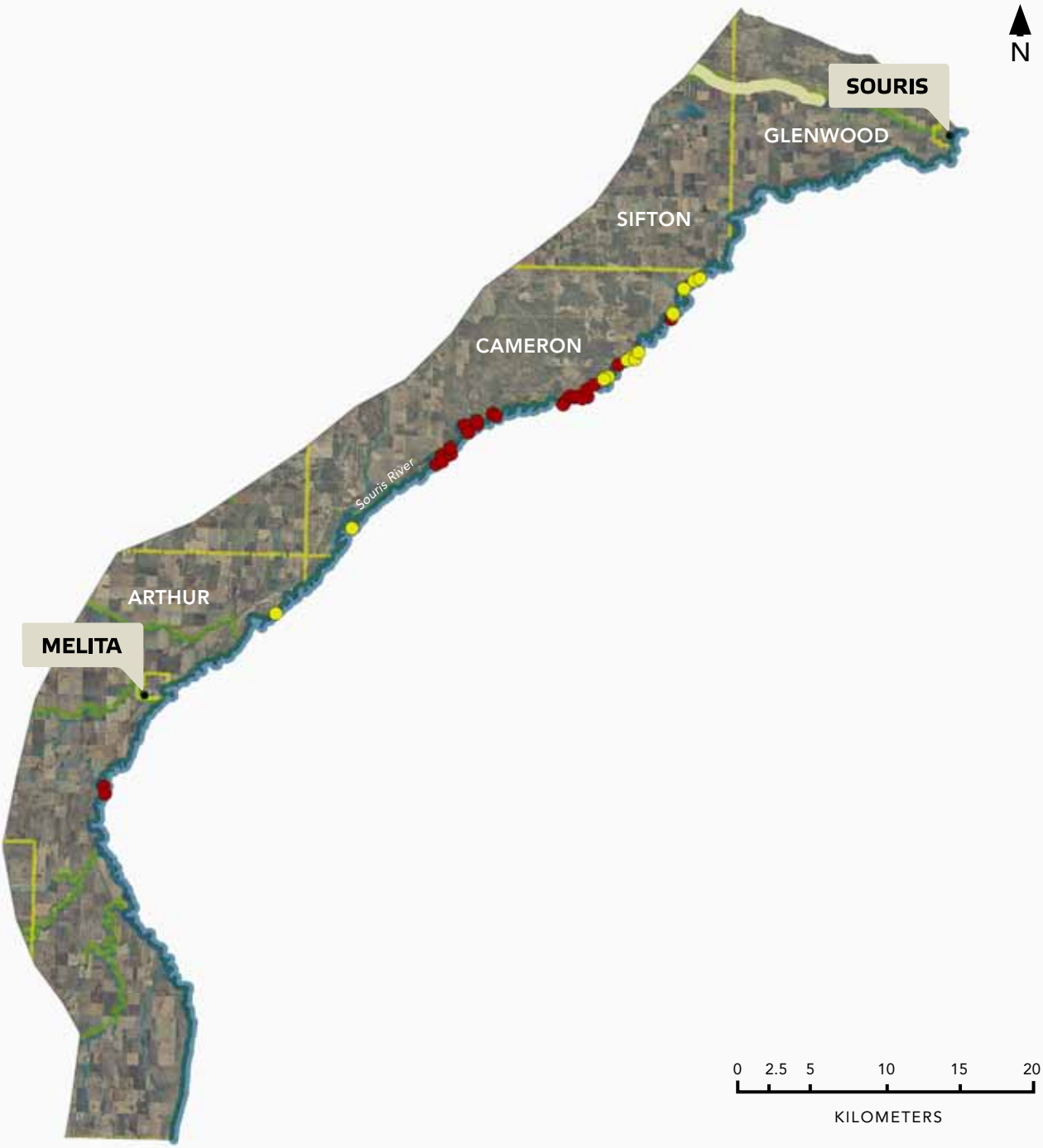
Erosion on the Provincial Dyke

Oak Lake Dam has deteriorated over the last 10 years.

- Fix and maintain the Oak Lake dam including appropriate fish passage structure and study to determine effects of raising the lake six inches.

Outlined riparian area for related riparian area policies.

ZONE 3 :: FLOODPLAIN



INTENT

Land within this zone should be recognized as an area that floods. Land use practices within the floodplain zone should be able to withstand periodic flooding impacts and residents should understand limitations to development.

ISSUES SPECIFIC TO ZONE 3

- Prolonged water fluctuations affect primary land use,
- International agreement: timing of release of flows cause extended flooding in the Manitoba portion of the Souris River.
- Livestock and crop production operations on the Souris River impact water quality.

Tools to get there...

- Land protection programs (i.e. conservation agreements, taxation easements, ecological goods and services payments, land purchases).
- Implementation of beneficial management practices aimed at reducing nutrient loading and enhancing riparian areas.
- Complete Souris River Riparian Enhancement Program projects where recommended.
- Limit future development of flood prone land through land protection programs or through the adoption of developmental plan policies.
- When available, adopt environmentally friendly drain management practices for land-locked flood prone areas.
- Manitoba government should revisit the establish guidelines with the North Dakota government. Timed release of water from retention structures in the States should be limited to flows within the capacity of the Souris River and natural flooding seasons.

ZONE 3 :: SPECIFIC ISSUES

Plum Creek has a poorly defined creek bed where water frequently overtops its banks.

Outlined riparian area for related riparian area policies.

Riparian health is impaired at indicated locations within this zone. The range of impairments include cropping to the river's edge, unlimited cattle access to the river, and bank erosion.

- High Priority
- Moderate Priority

IMPLEMENTATION OF AN INTEGRATED WATERSHED MANAGEMENT PLAN

The most important aspect of any integrated watershed management plan is implementation. Without it, the plan is no more than a list of good intentions. In the case of the West Souris River Integrated Watershed Management Plan, a concerted effort from watershed residents, stakeholder organizations, and all levels of government is necessary to ensure the recommendations outlined in the plan are implemented successfully.

The challenges outlined in the previous section helped the Watershed Team to formulate goal statements and actions to specifically address local watershed concerns. The following sections are broken down into three different implementation plans: organizations which have a mandate for soil and water programming, municipal councils, and watershed residents. For a summary list of all actions identified within the plan please see Appendix A.

Progress and success of the plan's implementation will be assessed on an anuual basis. Watershed report cards will be distributed to watershed residents every three to five years. After five years of implementation, the plan may be revised if watershed issues or priorities have changed or if new actions are required. A new plan will be developed in ten years.

PART 2 SUMMARY OF ACTIONS

Water Supply

VISION: In 25 years our grandchildren will have an ample supply of good quality water to sustain and enhance the population and biodiversity of the area.

CHALLENGES:

- Groundwater sources are limited and generally of poor quality in the northwest and southern portions of the study area.
- The study area is moisture deficient and there is a huge dependence on spring and early summer runoff for different supplies of water.
- Climate change predictions describe an increase in severities of drought events in watershed already scarce with water.
- With greater pressures predicted in the future licensing needs to remain within the OLA budget.

OBJECTIVE 1: Increase surface water storage capacity (acre-feet) for supply and groundwater recharge.

Action	Measure of Success	Responsibility	Timeline	Target Area
Complete an assessment of surface water managment options with focus on increasing water supply sources for agriculture and industrial use and adaptation to climate change.	Completed study	CD, RMs	1-2 years	Study Area
Restore and protect wetlands	2% increase in surface area of wetlands from 2009.	Federal, Provincial Govts, CD, Conservation Agencies	odd years	Water Shortage Region, Escarpment
Water Storage Projects	2% increase in acre-feet storage from 2009; 2% reduction in annual mean flow volumes.	CD, Provincial Gov't, Federal Gov't	1-3 years	Escarpment

OBJECTIVE 2: Reduce water usage

Build climate change resilience.		CD,PRACC, RMs, Provincial Govt, Local Schools	ongoing	study area
Educate and promote water soft path planning.	30% reduction in volume based on data per number of devices after installation.	MWSB, RMs, Landowners, Federal Govt	ongoing	water short regions
Provide incentives for irrigators to decrease water loss through evaporation.		CD, RM, MB Water Stewardship		water short regions
Municipal participation in water soft planning course	# in attendance/ course	CD, RM	even years	water short regions

OBJECTIVE 3: Increase the knowledge knowledge of locations of groundwater sources within water short regions.

Action	Measure of Success	Responsibility	Timeline	Target Area
Encourage MB Water Stewardship to do more groundwater exploration including local input.	map of available and potential groundwater sources	MB Water Stewardship	1-10 years	outside OLA area

OBJECTIVE 4: Maintain and improve the groundwater recharge within the OLA.

Provide incentives for land use practices to increase and conserve snow cover.	2% increased in recharge of OLA.	CD	even years	study area
Identify and map important recharge areas for Oak Lake Aquifer and create a project list to help maintain or improve these areas.	Completed map and project list	MB Water Stewardship, AESB, CD	1-5 years	OLA

Water Quality & Aquatic Ecosystem Health

VISION: Clean, safe water that sustains a healthy community and natural ecosystems

CHALLENGES:

- Groundwater from shallow aquifers, like the OLA are at greater risk to contamination from surface activities.
- Implemenation of the OLA plan has been taking place since 2000. In order to protect this valuable resource, the OLA plan implementation should be supported.
- A 2008 survey indicated that one in every four wells in the study area failed to meet drinking water guidelines due to presence of bacteria or high levels of nitrates and nitrites.
- Sandpoint wells are the dominant type of well completed into the OLA. These types of wells are shallow and therefore more prone to contamination from the surface.
- A variety of recommendations need to be implemented to preserve or enhance public drinking water sources.
- The water quality index in most streams is marginal.

OBJECTIVE 5: Protect and prevent contaimination of drinking water sources.

Action	Measure of Success	Responsibility	Timeline	Target Area
Provide incentives to manage & control grazing to limit nutrient leeching into soil.	3km of fencing/year.	CD, MAFRI	ongoing	OLA
Relocate feedlot sites from sensitive areas which may pose a risk to nutrient and bacteria leeching into the aquifer.	1 biannually	CD, MAFRI	ongoing	OLA
Provide incentives for converting sensitive recharge areas of the OLA into perrennial cover.	80 acres/year	CD, MAFRI	1-5 years	OLA
Assist with annual water tests for private and semi-private water sources.	All semi-private wells and 25% of known private wells	CD, MWS to help fund bacteria testing	annually	study area
Seal unused wells.	15 wells annually.	CD	annually	study area
Conduct source water assessments (wellhead survey and inventory) and action plans for private wells and sandpoints.	Completed assessments and inventory.	CD, MWS, RMs		study area
Provide incentives to implement well assessments.	20 % of assessment wells upgraded annually.	CD	year 5	OLA

Source Water Protection Plan Recommendations

- Seal unused and poorly constructed wells located within a source water protection zone.
- Provide incentives to upgrade existing private wells and improve wellhead protection (caps, grass seed, replace pits, re-contouring the slope).
- Distribute publications that educate landowners and industry on:
  - o Drinking water sources;
  - o Water conservation measures;
  - o Groundwater protection;
  - o Impacts of land use activities;
  - o How to perform well assessments;
  - o Proper well maintenance;
  - o Wellhead protection measures; and
  - o Proper septic system maintenance.
- Provide information on well location and source protection zone to all local emergency measures organizations and fire departments.
- Promote communication and coordination with local water operators.

Location	Recommendation
Cromer	The well casing should have a cover or steel wool placed over top of it to keep small rodents and foreign material out of the casing
Four Seasons Island Resort	Add new cover or extend existing casing. Repair damage to the well cribbing. Install a barrier to keep people, animals, and vehicles away from the wellhead. Grass Seed for the area immediately around the well
Lyleton	Seed the area immediately around the well. Fence off the area around the wellhead. Build a well house or protective box around the well being used.
Melita	Stop the practice of pumping water from temporary wells to recharge the two production wells. Seed the area immediately around the well. North & south wells should have protective bollards. Supplemental and new wells should have building or protective cover placed over top to secure the well. South supplemental well and new north well should have the well casing extended. The water utility should assess their production wells and properly seal any wells not used for production.
Pierson	The land in the vicinity of the well should be re-contoured to prevent surface water from ponding at or near the wellhead. Seed the area immediately around well #4. Well #1 should be sealed and an alternative site should be chosen. If used as pasture, fence the immediate wellhead area off from livestock (25m). Seal well #8. Ensure that the water line that extends SE is physically disconnected from the public water system.
Sinclair	Add new cover or extend existing casing. The unused well inside of the pumphouse next to the Isaac well should be properly sealed to ensure that it does not act as a conduit to the aquifer for any contaminants. Isaac well needs bollards and the area should be mowed to increase visibility. Water utility to stop using Isaac Well. Rodent proof the well house around Track well.
Tilston	The private well pit presents a threat to the public drinking water system – once the residence is vacated or sold the well pit should be sealed. The existing back-up well should be disconnected from the public system, consider installing a new back-up well for Tilston's water supply. The well casing should have a vented sanitary seal placed over top and new cover or extended casing should be installed.
Hartney	Seed the area immediately around the well.
Reston	Both wells should have bollards installed to protect the well.
Kola	See Arrow Oak Source Water Protection Assessment
Souris	See Central Assiniboine Source Water Protection Assessment.

OBJECTIVE 6: Increased surface water quality index of all creeks.

Action	Measure of Success	Responsibility	Timeline	Target Area
Offer technicial advice on how to manage land within riparian areas to minimize impact to riparian areas while maintaining economic importance of the area.	Areas have been identified which indicate where technical assistance is needed.	CD, MAFRI, AESB	1-5 years	Riparian Areas
Restore impaired riparian areas	In five years more than 30% of impaired riparian areas have been restored.	CD, MAFRI, AESB	1-5 years	Riparian Areas (Souris River given priority)
Cleanup deadfall around streams at a minimal level to achieve a balance between the necessity for aquatic habitat and the nuisance to human activities.	10km annually.	CD	1-2 years	Antler River

Natural Areas

VISION: Maintain and increase natural areas.

CHALLENGES:

- Mixed grass prairies are habitat for a number of threatened or endangered species in the study area.
- Mixed grass prairies are considered the most converted, least protected habitat on earth.
- The greatest loss of wetlands and grasslands was due to increased flooding from precipitation and/or upstream drainage.
- Introduced invasive species are having significant and increasing impacts on Manitoba's ecosystems, economy, and native species.
- Larger sized agricultural operations are an increasing trend which puts tremendous pressure on natural areas.
- 33% of the annual cropland, mainly in the eastern portion of the study area, has moderate to severe erosion risk
- 16% of annual croplands were found on lands rated Class 4 or lower

OBJECTIVE 7: Decreased fragmentation of the mixed grass prairie ecosystem.

Action	Measure of Success	Responsibility	Timeline	Target Area
Develop management practices which provide connective corridors for wildlife within the mixed grass prairie habitat.	Management plans implemented.	Conservation Agencies, MB Conservation, CD	ongoing	mixed grass prairie corridor
Off set the costs of maintaining mixed grass prairie habitat.	Producers are provided payments to keep mixed grass prairie habitat intack.	Provincial Gov't, Federal Gov't, Conservation Agencies	1-5 years	mixed grass prairie corridor
Work with local landowners and RMs to develop conservation easement terms that are more acceptable to the local stakeholders.	Overall increase in protected natural areas.	RMs, Conservation Agencies	1-2 years	mixed grass prairie corridor
Oil development should minimize habitat impacts by avoiding natural areas.	Current mixed grass prairie ecosystem acres are maintained.	MB Conservation, Petroleum Branch	ongoing	mixed grass prairie corridor
Promote protection of riparian areas and undeveloped rights-of-way to provide connectivity and travel corridors for wildlife.	10% of natural areas restored or protected.	CD, MB Conservation, Conservation Agencies, RM	ongoing	mixed grass prairie corridor

Natural Areas - continued

OBJECTIVE 8: Maintain the current number of acres of wetland habitat in the study area.

Action	Measure of Success	Responsibility	Timeline	Target Area
Restore drained wetlands.	2% increase in acre-feet storage from 2009.	Conservation Agencies, Provincial Gov't, CD	ongoing	study area
Work with local landowners and RMs to develop conservation easements on wetlands to discourage future loss that are more acceptable to local stakeholders.	5 CA signed	Conservation Agencies	odd years	study area wetlands
Offset the cost of maintaining wetland habitat in its current state.	10% reduction in the number of applications for licenses to drain.	Provincial Gov't, Conservation Agencies, CD, MAFRI	1-5 years	study area wetlands

OBJECTIVE 9: Increase local awareness of the importance of natural areas to the health of the watershed.

Continue South-West Manitoba Water Festival.	attendence of 100 students from area annually.	CD	annually	Local Schools
Hold educational producer workshops illistrating the benfits to taking marginal land out of production and restoring its natural function.	Average of 10 producers in attendance.	CD, Conservation Agencies, AESB	biannually	Class 4 or poorer soils.
Work with partnering agencies to develop invasive species management plans on natural areas.	reduction or management of spread of invasive species.	Invasive Species Council, Conservation Agencies, CD, Weed District	ongoing	invasive species 'hot spots'
Continued education & information to prevent spread/ introduction of invasive species.	limited introduction or dispersal of invasive species from 2010 data.	Invasive species council	ongoing	study area

OBJECTIVE 10: Increase soil wind erosion risk management practices on annual cropland.

Offer technicial advice on how to manage land with sensitive soils.	5 workshops	CD, AESB, MAFRI	ongoing	Moderate to severe designated wind soil erosion risk areas.
Promote zero tillage.	5% increase in the use of zero till.	CD, MAFRI	ongoing	
Provide incentives to promote perrennial cover.	80 acres/year.	CD, MAFRI	1-5 years	
Promote the use of shelterbelts and natural wind fences to reduce soil erosion risk where zero tillage cannot be applied.	2km/year	CD, AESB, MAFRI	ongoing	

Water Management

VISION: To manage water to minimize negative impacts related to flooding and drought within the study area on a watershed basis.

CHALLENGE:

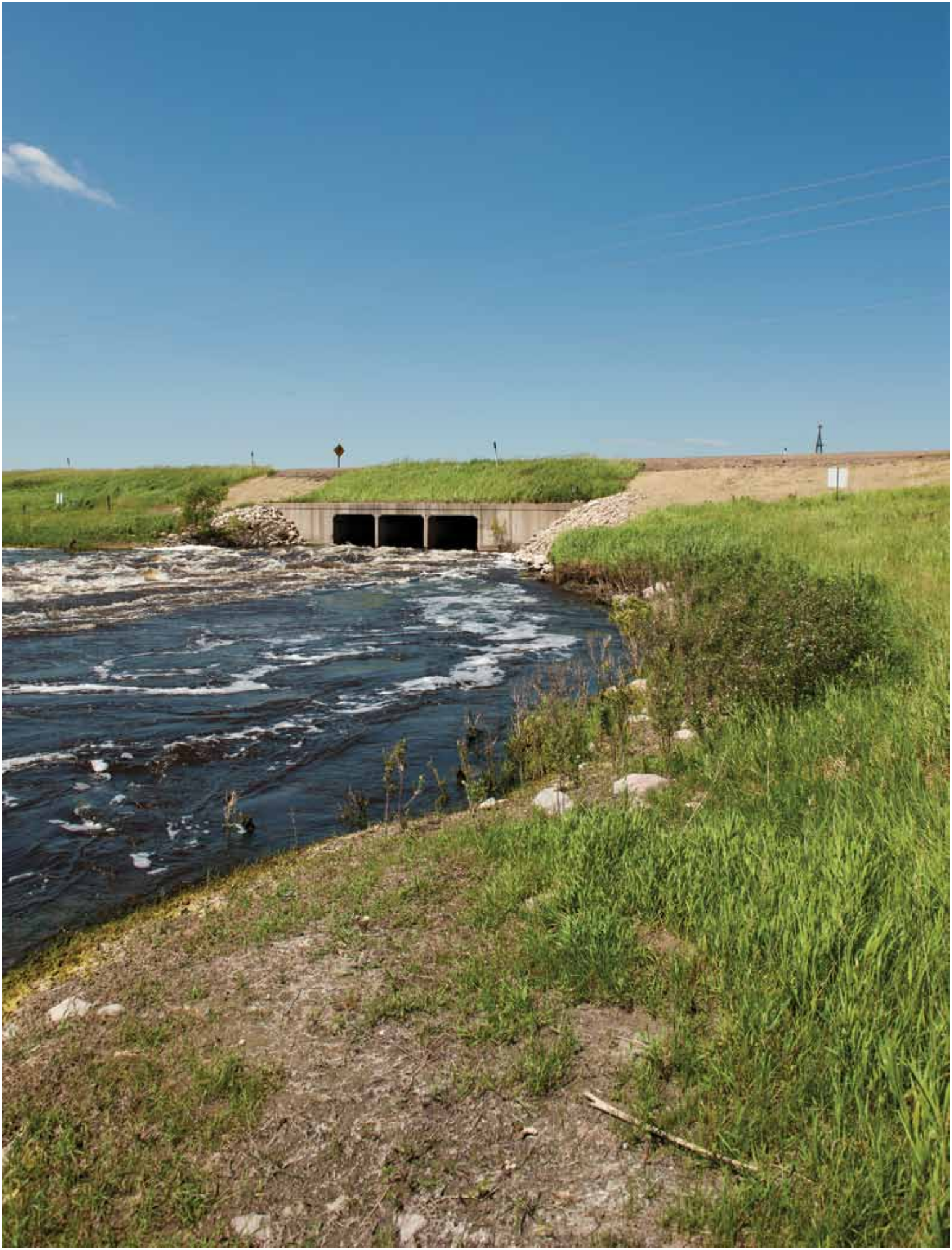
- The study area is just a small part of a basin that spans two countries, two Canadian provinces and two American states.
- Surface waters are managed through international boards, changes to which are beyond the scope of this planning initiative.
- The Souris River Basin has extreme variation in flow. The Basin is highly regulated by structures to help minimize the impacts of this variation. The regulation of these structures outside the study area influences the water management within the study area.
- A variety of planning initiatives have taken place over time, at different spatial scales and by different organizations.
- There are limitations in terms of managing water on a watershed basis with Provincial and Federal jurisdictional boundaries.
- The drainage area which the study area drains is three times the study area itself.

OBJECTIVE 11: Increased cross border communications.

Action	Measure of Success	Responsibility	Timeline	Target Area
Use commonalities between plans as basis for initiating cross boundary communications and developing relationships.	better communications between cross border organizations.	All stakeholders in Basin	Ongoing	Souris River Basin
Consult all plans when developing new water management plans.	plans are corrdinated to address issues on a basin scale.	All stakeholders in Basin	Ongoing	Souris River Basin
A member of the WSR PMT should participate in the Souris River Basin annual meetings to increase communications and relay basin information back to the PMT.	Increase in communications to the PMT on ISR Board activities.	PMT, ISR Board	Annually	Souris River Basin
Distribute the West Souris River IWMP to all water management boards within the Souris River Basin.	All agencies received copies of the plan.	CD	Prior to finalization of plan	Souris River Basin

OBJECTIVE 12: Decreased economic impacts related to flooding and drought events within the study area.

Implement the reccommendations of the Surface Water Management Plan		All stakeholders	ongoing	Study Area



PART 3 WEST SOURIS RIVER CONSERVATION DISTRICT

Over the last five years the West Souris River Conservation District has spent just under two million dollars in the West Souris River study area. Since the WSRCD will be the key soil and water organization to implement this plan, all actions that directly involve the CD are presented in the following section including a five-year budget, target area maps, and the challenges that led to these actions. By implementing these actions the West Souris River Conservation District and its partners will be ensuring that money is allocated to areas where it will provide measurable improvements to our watershed over the next ten years.

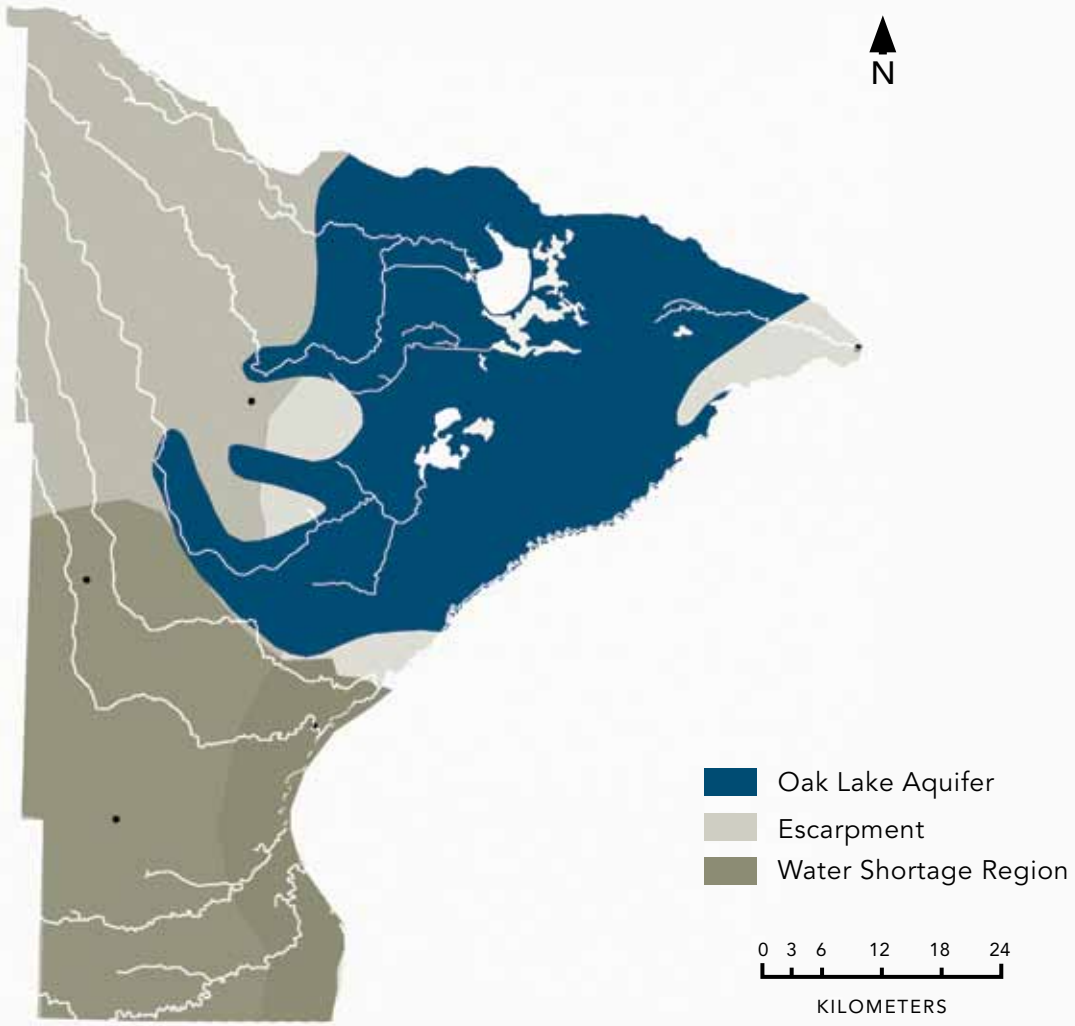
	2012-13	2013-14	2014-15	2015-16	2016-17	Total
Water Supply	$77750	$40000	$40750	$45000	$30750	$234250
Water Quality	$28750	$31500	$34500	$23500	$73500	$191750
Natural Areas	$7700	$16800	$8500	$19800	$8800	$61600
Water Management	$2500	0	$2500	0	$3000	$8000
Total	$116700	$88300	$86250	$88300	$116050	$495600

WATER SUPPLY

VISION: in 25 years our grandchildren will have an ample supply of good quality water to sustain and enhance the population and biodiversity of the area.

KEY CHALLENGES

- Groundwater sources are limited and generally of poor quality in the northwest and southern portions of the study area.
- The study area is moisture deficient and there is a huge dependence on spring and early summer runoff for different supplies of water.
- Climate change predictions describe an increase in the severities of drought events in watersheds already scarce with water.
- With greater water pressures predicted in the future, licensing should remain within water allocation budgets.



Over the next five years, the West Souris River Conservation District will aim to generate enough funding to achieve the following Water Supply related actions.

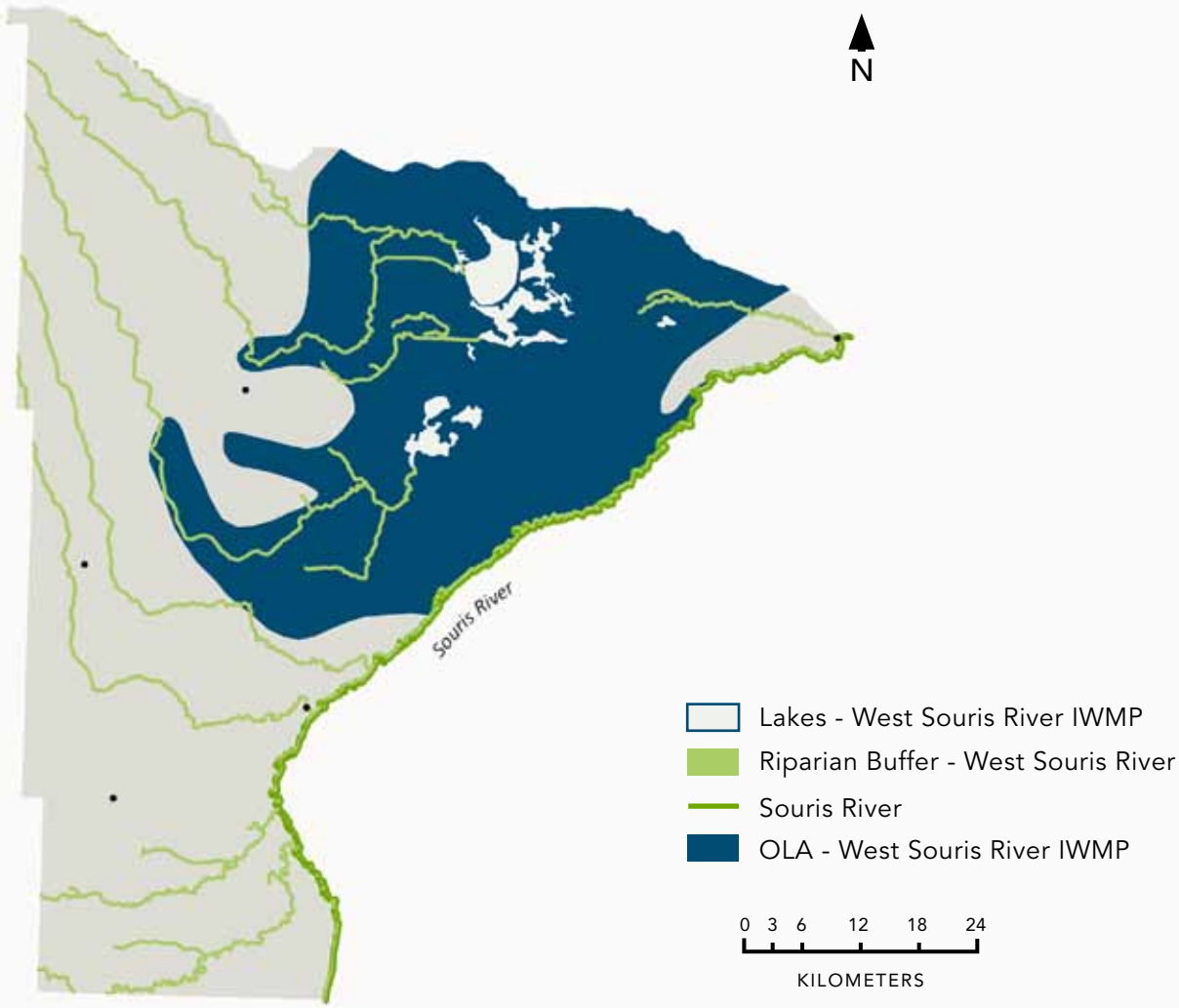
Action	Target Area	2012-13	2013-14	2014-15	2015-16	2016-17	
Assessment of surface water management options to increase water supply sources for industrial and agriculture use and adaptation to climate change.	Study Area	$70000	$5000				$75000
Implement the surface water management option study recommendations.	Water Shortage Region, Escarpment are priority			$25000	$25000	$20000	$70000
Restoration and protection of wetlands.	Water Shortage Region, Escarpment are priority		$10000	$10000		$5000	$25000
Water storage projects	Water Shortage Region, Escarpment are priority	$5000	$10000				$15000
Water Soft Path Planning Workshop	Water Shortage Region	$750		$750		$750	$2250
Workshop and incentives for decreasing water loss through evaporation for irrigation	Oak Lake Aquifer	$2000		$5000		$3000	10000
Education on climate change resilience in water scarce regions	study area		$5000		$5000		$10000
Workshop and incentives for increasing snow cover	Water Shortage Region, Escarpment, Oak Lake Aquifer are priority		$10000		$10000		$20000
Work with MWS Groundwater section to identify and map important recharge areas for Oak Lake Aquifer	Oak Lake Aquifer				$5000	$2000	$7000
	Total	$77750	$40000	$40750	$45000	$30750	$234250

WATER QUALITY

VISION: Clean, safe water that sustains a healthy community and natural ecosystems.

KEY CHALLENGES

- Groundwater from shallow aquifers, like the OLA, are at greater risk to contamination from surface activities.
- Implementation of the OLA plan has been taking place since 2000. In order to protect this valuable resource, the OLA plan implementation should be supported.
- A 2008 survey indicated that one in every four wells in the study area failed to meet drinking water guidelines due to presence of bacteria or high levels of nitrates and nitrites.
- Sandpoint wells are the dominant type of well completed into the OLA. These types of wells are shallow and therefore more prone to contamination from the surface.
- A variety of recommendations need to be implemented to preserve or enhance public drinking water sources.
- The water quality index in most streams is marginal.



Over the next five years, the West Souris River Conservation District will aim to generate enough funding to achieve the following Water Quality related actions.

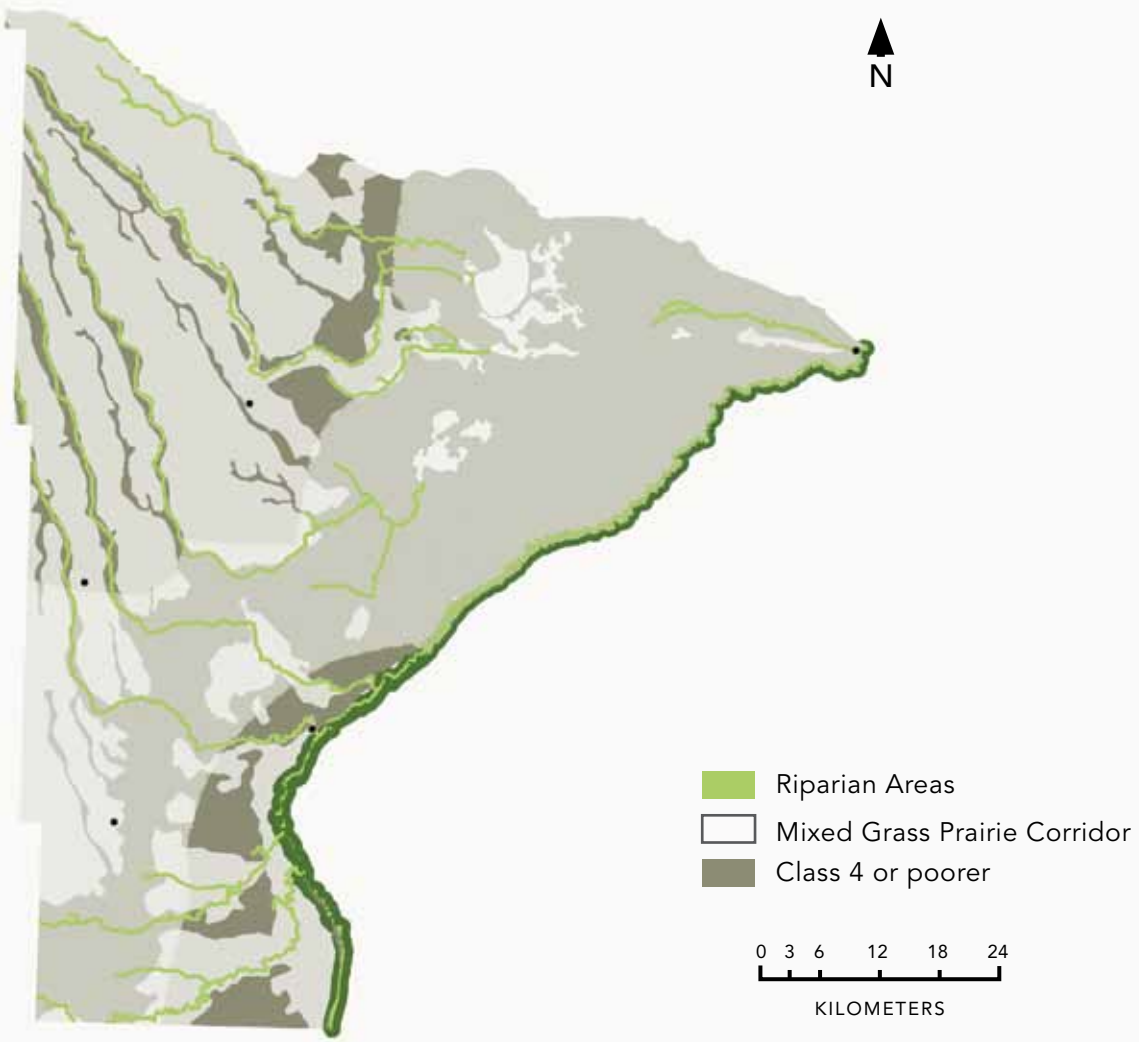
Action	Target Area	2012-13	2013-14	2014-15	2015-16	2016-17	
Well water testing program.	Study Area	$500	$500	$500	$500	$500	$2500
Seal unused wells.	Study Area	$3000	$3000	$4000	$3000	$3000	$16000
Provide incentives to manage & control grazing to limit nutrient leeching into the soil.	Oak Lake Aquifer	$5000		$5000	$2000		$12000
Provide incentives to implement wellhead assessment reccomendations of 2008 survey.	Study Area	$4000					$4000
Workshop and incentives for managing agriculture in riparain areas.	Riparian Areas	$250					$250
Restore impaired riparian areas.	Outlined by previous years study	$10000	$10000	$15000	$10000	$10000	$55000
		Souris River	Souris River	Pipestone Creek	Jackson & Graham Creek	Gainsborough & Stoney Creeks	
Clean up deadfall above water level.	Antler River	$6000	$3000				$9000
Survey creeks and rivers for impaired riparian areas.	Riparian Areas		$5000	$5000	$6000	$5000	$21000
			Pipestone Creek	Jackson & Graham Creek	Gainsborough & Stoney Creeks	Antler River	
Sandpoint well inventory and assessment.	OLA		$10000				$10000
Provide incentives to implement sandpoint wellhead assessment reccomendations.	OLA			$5000	$2000		$7000
Perrenial Cover program for sensitive recharge areas of the OLA.	Sensitive recharge areas of the OLA.					$5000	$5000
Relocate one feedlot site within sensitive recharge areas of the OLA.	Sensitive recharge areas of the OLA.					$50000	$50000
	Total	$28750	$31500	$34500	$23500	$73500	$191750

NATURAL AREAS

VISION: To manage water to minimize negative impacts related to flooding and drought within the study area on a watershed basis.

KEY CHALLENGES

- Mixed grass prairies are habitat for a number of threatened or endangered.
- Mixed grass prairies are considered the most converted, least protected habitat on earth.
- The greatest loss of wetlands and grasslands was due to increased flooding from precipitation and/or upstream drainage.
- Introduced invasive species are having significant and increasing impacts on Manitoba's ecosystems, economy, and vatives species.
- Larger sized agricultural operations are an increasing trend which puts tremendous pressure on natural areas.
- 33% of the annual cropland has moderate to sever erosion risk.
- 16% of annual croplands were found on lands rated Class 4 or lower.



Over the next five years, the West Souris River Conservation District will aim to generate enough funding to achieve the following Natural Areas related actions.

NATURAL AREAS							
Action	**Target Area**	**2012-13**	**2013-14**	**2014-15**	**2015-16**	**2016-17**	
MB Southwest Water Festival.	Study area	$2000	$2000	$2500	$2500	$3000	$12000
Workshop on how to manage land with sensitive soils.	Erosion Risk Areas, Class 4 or poorer soils	$500		$500		$500	$1500
Management practices which provide connective corridors for wildlife within the mixed grass prairie habitat workshop.	Mixed grass prairie corridor		$300		$300		$600
Shelterbelt and natural wind fence program.	Erosion Risk Areas	$4500	$4500	$5000	$5000	$5000	$24000
Restoration of drained wetlands.	Study Area		$10000		$12000		$22000
Develop and promote wildlife corridor agreements with local RMs.	Mixed grass prairie corridor	$700		$500		$300	$300
	Total	$7700	$16800	$8500	$19800	$8800	$60100

WATER MANAGEMENT

VISION: Maintain and increase natural areas.

KEY CHALLENGES

- The study area is just a small part of a basin that spans two countries, two Canadian provinces and two American states.
- Surface waters are managed through international boards, changes to which are beyond the scope of this planning initiative.
- The Souris River Basin has extreme variation in flow. The Basin is highly regulated by structures to help minimize the impacts of the variation. The regulation of these structures outside of the study area influences the water management within the study area.
- A variety of planning initiatives have taken place over time, at different spatial scales and by differ-ent organizations.
- There are limitations in terms of managing water on a watershed basis with Provincial and Federal jurisdictional boundaries.
- The drainage area which the study area drains is three times the study area itself.

Over the next five years, the West Souris River Conservation District will aim to generate enough funding to achieve the following Natural Areas related actions.

WATER MANAGMENT							
Action	**Target Area**	**2012-13**	**2013-14**	**2014-15**	**2015-16**	**2016-17**	
Distribute the WSR IWMP to all water management boards within the Souris River Basin	Souris River Basin	$500					$500
Host a cross border workshop on the impacts of drianage with the West Souris River CD and the Lower Souris River Watershed Authority in Saskatchewan.		$2000		$2500		$3000	$7500
	Total	$2500	0	$2500	0	$3000	$8000

PART 4 MUNICIPAL COUNCILORS

Watershed plan boundaries stretch across numerous municipalities and do not always include the entire municipality within one watershed. To ensure local watershed residents understand the extent of their watersheds the West Souris River Project Management Team has applied the targets outline in this Integrated Watershed Management Plan to where they fit, and what they mean in a municipal context. The following municipal section of this plan provides a quick and easy reference to municipal maps including watershed based target areas for water supply, water quality, surface water management, and natural areas which fall within each specific municipal boundary. These maps will help the West Souris River Conservation District better communicate and tailor its implementation of the actions within the plan by providing a more easily useable format for councilors to apply at the municipal scale. "We are promoting watershed management planning and recommendations within the confines of the boundaries in which they work."

Manson Moir, PMT Chair.

For the purposes of reviewing one example of the format for the RM maps is provided in the following section. As these are summaries of the IWMP goals and actions, any comments you make for the plan will be incorporated when the RM maps are summarized and created.

View example here;

http://shalecreatif.com/watershed/poster-rm-pipestone.jpg

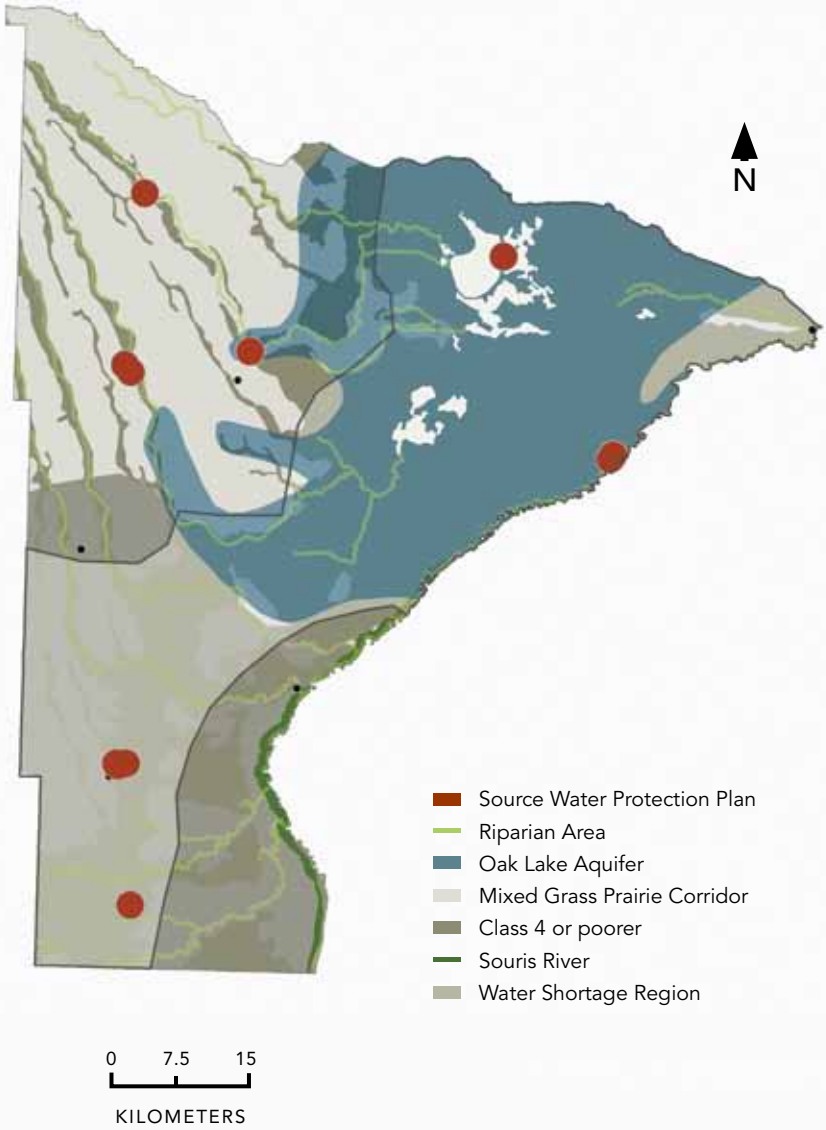
PART 5 WATERSHED RESIDENTS

WEST SOURIS RIVER INTEGRATED WATERSHED MANAGEMENT PLAN

What is an IWMP?

An Integrated Watershed Management Plan can be thought of as a ROAD MAP for the community that outlines watershed priorities and presents strategies to address these.

Let us know where your interest lies and we can try to help...



WATER QUALITY

- ☐ Improvements to Public Drinking Water Sources
- ☐ Oak Lake Aquifer
- ☐ Private well water quality
- ☐ On farm Beneficial Management Practices to improve water quality

NATURAL AREAS AND AQUATIC ECOSYSTEMS

- ☐ Land protection programs
- ☐ Maintain wetland habitat
- ☐ Increased awareness of the importance of natural areas
- ☐ Decrease soil erosion risk

WATER SUPPLY

- ☐ Land protection programs (conservation agreements, taxation easements)
- ☐ Water reduction incentives
- ☐ Water storage
- ☐ Snow cover retention

For more information, please contact:

West Souris River Conservation District
Box 339, 4th St & 4th Avenue
Reston, MB R0M 1X0

T. 204-877-3020
F. 204-877-3090
www.wsrcd.ca

Personal details

Name _____

Address _____

_____

Phone _____

Legal Description of home

Qtr Sec Twp Rge

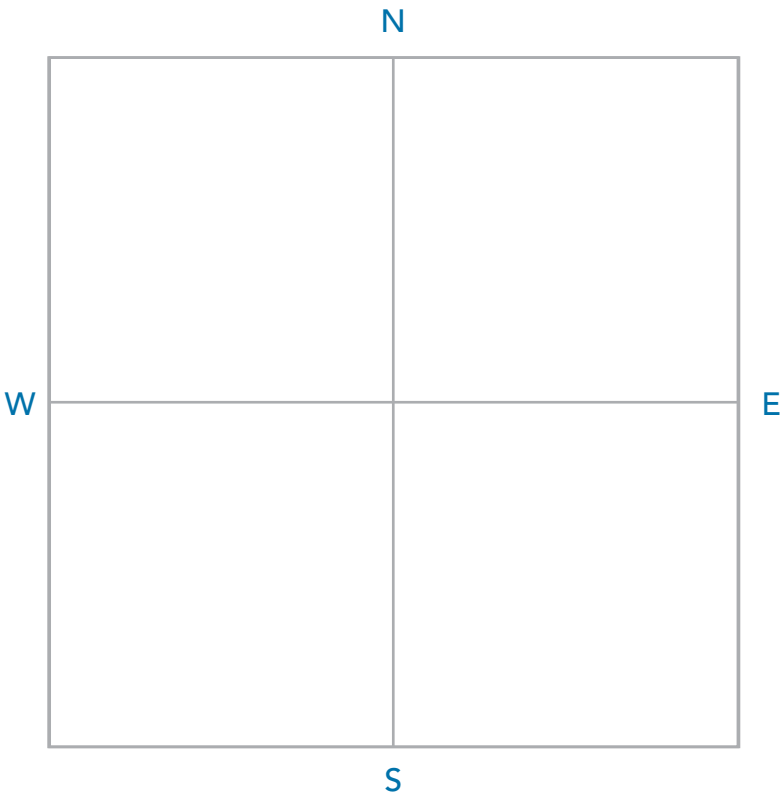
Legal Description of Project Quarter

Qtr Sec Twp Rge

Project is located in the R.M. of _____ or Sub-district of _____

Project Diagram

Draw approximate location, surrounding vegetation and current land use:



My interests are:

- ☐ Water Storage
- ☐ Riparian Improvements
- ☐ Relocation of livestock sites
- ☐ Erosive lands
- ☐ Well sealing
- ☐ Snow cover

Description of Proposed Project:

_____

_____

_____

_____

_____

_____

Is the project within the target area?

Yes No Not sure


West Souris River
CONSERVATION DISTRICT
Water Stewardship

GLOSSARY & ACRONYMS

Aquatic Ecosystem
The components of the earth related to, living in or located in or on water or the beds or shores of a water body, including but not limited to:

a) All organic and inorganic matter, and
b) All living organisms and their habitat, and their interacting natural systems.

Beneficial Management Practices (BMP)
A practical solution used to deal with soil and water conservation concerns, including techniques to manage agricultural and urban runoff and modify agricultural waste management.

Conservation Easement
A legal agreement between a landowner and a conservation organization that ensures the protection of the property's conservation values by limiting future use or development.

Development Plan
A document that outlines the general objectives and policies that will guide the overall use, planning and development of land in a planning district or individual municipality.

Drinking Water Source
The raw, untreated water in the environment that is used to supply a drinking water system as defined in *The Drinking Water Safety Act*.

Ecological goods and services
Natural services that healthy ecosystems provide to society such as the purification of air and water, water supply, raw materials (timber), recreation, habitat, scenery, waste treatment, climate stabilization, erosion control and sediment retention, regeneration of soil fertility, soil formation, carbon storage, biological control and pollination, to name a few.

Natural Areas
Land which remains undeveloped and supports a healthy ecosystem that provides ecological goods and services, including wildlife habitat.

Riparian Area
The transition zone which acts as the interface between the upland ecosystem and water courses.

Private Water Source
A surface or groundwater source that provides water to a single connection, usually a home or a farm.

Public Water Source
A surface or groundwater source that provides water to a system with 15 or more service connections.

Water Quality Index (WQI)
A means of summarizing large amounts of data into simple terms for reporting to management and the public in a consistent manner. It is calculated using twenty-five water quality variables and combines the scope, frequency and amplitude that variables exceed the water quality objectives and guidelines. The Water Quality Index ranges from 0-100 and is used to rank water quality into categories ranging from poor to excellent. Similar to the UV index or an air quality index, it can tell us whether the overall quality of water bodies poses a potential threat to various uses of water, such as habitat for aquatic life, irrigation for agriculture and livestock, recreation and aesthetics, and drinking water supplies.

Waterway
A landscape feature (natural or artificial) that continuously or intermittently transports water on the earth's surface, including headwater, rivers, creeks, channels, streams, and drains.

Acronyms

AAFC-AESB: Agriculture and Agri-Food Canada – Agri-Environment Service Branch (formerly Prairie Farm Rehabilitation Administration)

CD: Conservation district

DFO: Fisheries and Oceans Canada

DUC: Ducks Unlimited Canada

IWMP: Integrated Watershed Management Plan

MAFRI: Manitoba Agriculture Food and Rural Initiatives

MBWSB: Manitoba Water Services Board

MHHC: Manitoba Habitat Heritage Council

MWS: Manitoba Water Stewardship

MIT: Manitoba Infrastructure and Transportation

NCC: Nature Conservancy Canada

PMT: Project Management Team

OLA: Oak Lake Aquifer

RM: Rural Municipality

WPA: Water Planning Authority

References

Environment Canada, 2009. National Climate Data and Information Archive: Canadian Climate Normals 1971-2000. http://www.climate.weatheroffice.gc.ca/climate_normals

Federal Environmental Assessment Review Office, 1991. Rafferty Alameda Project: Report of the Environmental Assessment Panel.

International Joint Commission, 2008. Boundary Waters Treaty Centennial Edition.

Lower Souris Watershed Association, 2006. Lower Souris River Watershed Source Water Protection Plan.

Oak Lake Aquifer Management Plan Round Table, 2000. Oak Lake Aquifer Management Plan: Planning for the Future of the Oak Lake Aquifer.

Souris River Basin Study Board, 1978. Souris River Basin Study – Report.

Turtle Mountain Conservation District, 2006. Taking Care of Our Watershed: a watershed plan for the East Souris River Watershed, Manitoba, Canada.

Upper Souris Watershed Association, 2010. Upper Souris River Watershed Source Water Protection Plan

West Souris River
Integrated Watershed Management Plan