North Saskatchewan Watershed Alliance

DISCUSSION PAPER

For the Development of an Integrated Watershed Management Plan for the North Saskatchewan River Watershed in Alberta

January 2011

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The North Saskatchewan Watershed Alliance (NSWA) is a non-profit society whose purpose is to protect and improve water quality and ecosystem functioning in the North Saskatchewan River watershed in Alberta. The organization is guided by a Board of Directors comprised of member organizations from within the watershed. It is the designated Watershed Planning and Advisory Council (WPAC) for the North Saskatchewan River under the Government of Alberta's *Water for Life Strategy.*

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Executive Summary

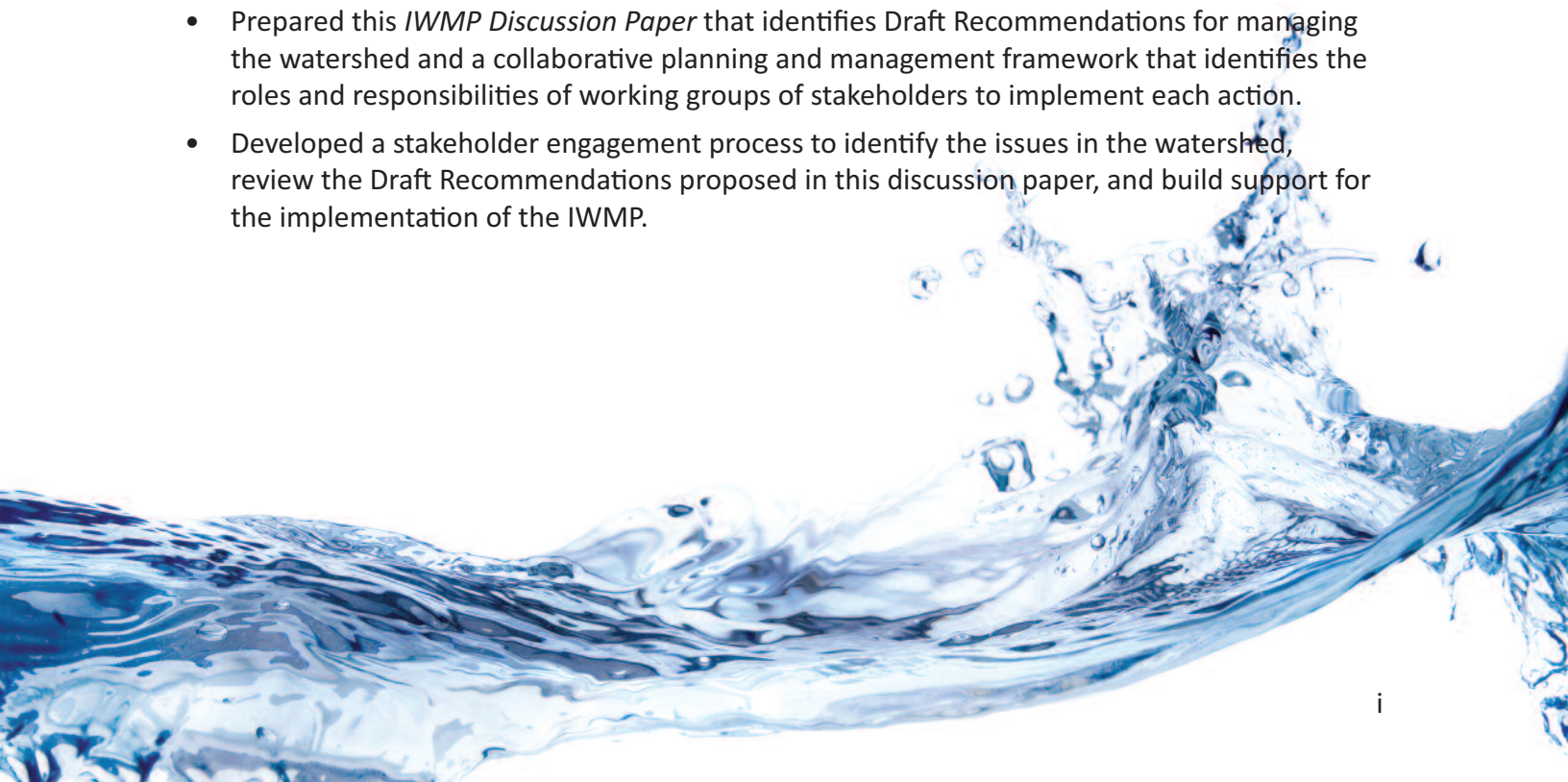
This discussion paper and the companion workbook are intended to support stakeholder and public discussions concerning the development of an Integrated Watershed Management Plan (IWMP) for the North Saskatchewan River watershed in Alberta. This planning process is being led by the North Saskatchewan Watershed Alliance (NSWA).

The North Saskatchewan River watershed is one of the major drainage basins located in Alberta, Canada. It stretches from the Rocky Mountains in the west across the Alberta plains into Saskatchewan. The total drainage area of the watershed in Alberta is about 57,000 square kilometres, and it is comprised of 12 sub-watersheds. It is home to approximately 1.2 million people, most of whom live in the Alberta Capital Region (City of Edmonton and area). The watershed contains a complex diversity of natural land forms and ecological regions, and supports a wide range of human land uses.

In 2005, the North Saskatchewan Watershed Alliance was appointed by the Government of Alberta as the Watershed Planning and Advisory Council (WPAC) for this river basin. As one of the partnerships under *Water for Life: Alberta's Strategy for Sustainability* (2003), the NSWA was given a mandate by the government to prepare an IWMP. The IWMP will provide watershed management advice to address issues raised by stakeholders and to achieve the three goals of the *Water for Life* Strategy: safe, secure drinking water; healthy aquatic ecosystems; and reliable, quality water supplies for a sustainable economy.

To develop the IWMP, the NSWA:

- Took a watershed approach that considers both surface and groundwater issues, and the interaction of water, plants, animals and human activities within the watershed.
- Prepared a *State of the North Saskatchewan Watershed Report* (2005) and many other scientific and technical reports to provide an improved scientific basis for decision-making.
- Prepared this *IWMP Discussion Paper* that identifies Draft Recommendations for managing the watershed and a collaborative planning and management framework that identifies the roles and responsibilities of working groups of stakeholders to implement each action.
- Developed a stakeholder engagement process to identify the issues in the watershed, review the Draft Recommendations proposed in this discussion paper, and build support for the implementation of the IWMP.



IWMP Draft Recommendations: Goals, Watershed Management Directions and Actions

The IWMP Terms of Reference state: "The goal of the IWMP is to provide a plan that will guide the protection, the maintenance and the restoration of the North Saskatchewan watershed, that balances environmental, social and economic needs, and that follows the Framework for Water Management Planning (AENV no date) and vision of NSWA."

The NSWA recognizes that stakeholders have done, and are in the process of doing, much to improve conditions in the watershed, and considerable scientific work has been initiated in the past few years. However, much work and research remains to be done, including the development of effective assessment and modelling tools that can be used to support ongoing watershed planning activities.

This discussion paper presents the following Draft Recommendations for discussion as the basis for an IWMP for the North Saskatchewan River watershed in Alberta:

Goal #1:
Maintain or improve water quality in the North Saskatchewan River watershed.

Watershed Management Directions:

1.1. Site-specific Water Quality Objectives are developed and implemented for the mainstem of the North Saskatchewan River.

1.2. Total contaminant loads entering the mainstem of the North Saskatchewan River, from all point and non-point-sources, are managed so that the Water Quality Objectives at long-term river network monitoring sites are met.

1.3. Water Quality Objectives are developed and implemented for all major tributaries to protect tributary uses and support the achievement of water quality management goals in the North Saskatchewan River.

1.4. Drinking water source protection plans are developed and implemented by waterworks utilities within the North Saskatchewan River watershed.

Thirteen actions: where working groups of stakeholders are identified to implement the actions (described in Section 6).

Goal #2:
Maintain or improve water quantity (flow) conditions in the North Saskatchewan River.

Watershed Management Directions:

2.1. Future risks to surface water supply in the North Saskatchewan River watershed are evaluated.

2.2. Instream Flow Needs are assessed and Instream Flow Objectives are developed and implemented for the mainstem of the North Saskatchewan River.

2.3. Water quantity in the mainstem of the North Saskatchewan River is managed to meet Instream Flow Objectives.

Nine actions: where working groups of stakeholders are identified to implement the actions.

Goal #3:
Maintain or improve aquatic ecosystem health in the North Saskatchewan River watershed.

Watershed Management Directions:

3.1. Aquatic Ecosystem Health Objectives are developed for all major waterbodies and riparian areas.

3.2. Numbers and areal coverage of wetlands are maintained or increased.

3.3. Riparian area health and function are maintained or improved.

3.4. Environmental impacts from the activities of resource and utilities industries are minimized or reduced.

3.5. Environmental impacts from municipal and industrial expansion are minimized or reduced.

3.6. Net loss of the permanent forested land base to other uses is minimized or reduced.

3.7. Fish Management Objectives are established and achieved for the North Saskatchewan River mainstem, tributaries and lakes.

3.8. Environmental impacts from random camping and all other recreational activities on public land are minimized or reduced.

3.9. Knowledge and understanding of the importance of a healthy aquatic ecosystem are improved.

Twenty-eight actions: where working groups of stakeholders are identified to implement the actions.

Goal #4:
Protect groundwater quality and quantity in the North Saskatchewan River watershed.

Watershed Management Directions:

4.1. Knowledge and understanding of groundwater quality and quantity are improved.

4.2. Impacts on groundwater from resource, industrial, municipal and agricultural developments are minimized or reduced.

4.3. Management strategies and plans to protect groundwater quality and quantity are developed.

Nine actions: where working groups of stakeholders are identified to implement the actions.

Goal #5:
Water and land-use planning are aligned at the regional scale.

Watershed Management Direction:

5.1. Cooperation and communication among planning initiatives are improved.

Two actions: where working groups of stakeholders are identified to implement the actions.

Implementing IWMP Recommendations: Dependency on Voluntary Action

Integrated Watershed Management Plans (IWMPs) must cross numerous jurisdictional boundaries in order to integrate water and land management practices. Currently, IWMPs are not referred to directly in Alberta's legislation. There is no specific statutory framework in place to require the adoption and implementations of IWMPs. This leaves the implementation of IWMP recommendations dependent on the voluntary choices and actions of decision-makers, such as Ministers and municipal councillors, Directors under the *Water Act* and the *Environmental Protections and Enhancement Act*, Government of Alberta approvals managers, industry executives, Boards of Directors of non-government organizations, landowners and recreational users of private and public lands. There are, however, legislative tools currently available to approve, adopt and implement specific recommendations, such as Water Management Plans (described in Section 3).

Creating a Collaborative Planning and Management Framework: IWMP Working Groups

Collaborative planning has been adopted by the Government of Alberta as the desired approach to managing water and land in an integrated way. The dependency on voluntary action underscores the importance of building a lasting collaborative planning and management framework to support continued stakeholder engagement in the implementation of the IWMP. The Draft Recommendations identify working groups of stakeholders responsible for addressing each proposed action. Stakeholders must have both the capacity and the interest to participate in the working groups. Each working group will be responsible for reviewing the legislative and policy context; identifying and addressing gaps in the research; developing detailed strategies; identifying best management practices and adaptive management processes; and consulting with other watershed stakeholders and the public so that each strategy, practice and process balances environmental, economic and social needs. These must then be voluntarily implemented through each stakeholder's respective area of jurisdiction.

Roles and Responsibilities of Stakeholders

The NSWA proposes to assume the role of a "bridging" organization. Bridging organizations provide critical links between domains such as science and policy, community and government, assurance and stewardship, and regulatory and non-regulatory mechanisms. As a bridging organization, the NSWA will work to build commitment to support implementation of the IWMP and to establish working groups to address priority actions identified through the consultation process. The NSWA will strive to support the working groups by developing work plans, timetables and funding options; supporting information needs; and helping stakeholders build shared understanding and consensus to achieve IWMP goals.

While the NSWA has taken the lead role to develop the IWMP, it will not be directly involved in all IWMP Working Groups. However, the NSWA is committed to monitoring and reporting on progress made to implement all IWMP actions

Many IWMP recommendations require leadership from the Government of Alberta. The *Alberta Land Stewardship Act* enables the legal implementation of the *Land-use Framework* Regional Plans. While the North Saskatchewan Regional Plan is in the very early stages of development, it is reasonable to expect that the IWMP will feed into and inform the development of this Regional Plan. The Minister of Environment will be asked to: endorse the IWMP on behalf of the Government of Alberta, and then to request all ministries impacted by the IWMP to participate in working groups; direct ministry staff to consider and incorporate IWMP recommendations into their regulatory approvals and licencing processes; request the Regional Advisory Council responsible for developing the North Saskatchewan Regional Plan to consider the IWMP in its planning process; and engage First Nations and Métis Settlements, as appropriate, in water and watershed management plans and actions. The Director responsible for water management under the *Water Act* will be asked to consider the IWMP in the development of an Approved Water Management Plan for the North Saskatchewan River watershed that will contain Water Conservation Objectives for water quality, water quantity (instream flow) and a healthy aquatic ecosystem.

Municipalities, as leaders in local land-use policy and planning, will be asked to use the IWMP to guide the development and implementation of their Municipal Development Plans, land-use bylaws, and the identification and implementation of best management practices. Industry and landowners will be asked to work with the NSWA, governments and other watershed stakeholders to continuously improve their water and land management practices. Individual users of both public and private lands will be asked to minimize their individual impacts on the watershed by practicing and promoting responsible recreation in the watershed.

Next Steps

After a full public review of this *IWMP Discussion Paper* and analysis of responses received from the companion *IWMP Workbook*, the NSWA will prepare a draft IWMP that identifies priorities and includes a timetable for implementation. The NSWA will review the draft IWMP with stakeholders and prepare the final IWMP for approval by the NSWA Board of Directors and submission to the Government of Alberta and other watershed stakeholders for endorsement and implementation. The work will be carried out during the IWMP Implementation Phase (2012-19), as outlined in the *Water for Life Action Plan*. A work plan with short, medium and long-term targets will form part of the final IWMP.

List of Acronyms

ALSA	*Alberta Land Stewardship Act*
AVI	Alberta Vegetation Inventory
AWC	Alberta Water Council
CEMS	Cumulative Effects Management System
DFO	Government of Canada, Department of Fisheries and Oceans
DUC	Ducks Unlimited Canada
EPEA	*Environmental Protection and Enhancement Act*
FMO	Fisheries Management Objectives
GoA	Government of Alberta
HAE	Healthy Aquatic Ecosystems
IAP2	International Association of Public Participation
IFN	Instream Flow Needs
IWMP	Integrated Watershed Management Plan
LTRN	Long-Term River Network
LUF	Land-Use Framework
MGA	*Municipal Government Act*
NSR	North Saskatchewan River
NSWA	North Saskatchewan Watershed Alliance
PEACH	Provincial Ecological Criteria for Healthy Aquatic Ecosystems
WCO	Water Conservation Objective
WPAC	Watershed Planning and Advisory Council
WQO	Water Quality Objective

Table of Contents

1. North Saskatchewan Watershed Alliance

This *IWMP Discussion Paper* and the companion *IWMP Workbook* are intended to support stakeholder and public discussions concerning the development of an Integrated Watershed Management Plan (IWMP) for the North Saskatchewan River watershed in Alberta. This planning process is being led by the North Saskatchewan Watershed Alliance (NSWA).

The NSWA was founded in 1997 by EPCOR and Trout Unlimited Canada with funding from the Prairie Farm Rehabilitation Administration, TransAlta, City of Edmonton Drainage Services and others. It was incorporated as a non-profit society in 2000. In 2009, the NSWA reviewed its by-laws and created provisions for a larger Board of Directors of up to 18 members to enable wider sector representation and encourage broader sector engagement.[1] In December 2010, the NSWA had 127 members representing 43 individuals and 84 organizations. Members include municipalities, provincial and federal government departments, industry, educational institutions, and organizations representing environment, conservation, agriculture, recreation and tourism interests.

NSWA Vision

People working together for a healthy and functioning North Saskatchewan River watershed – today and tomorrow.

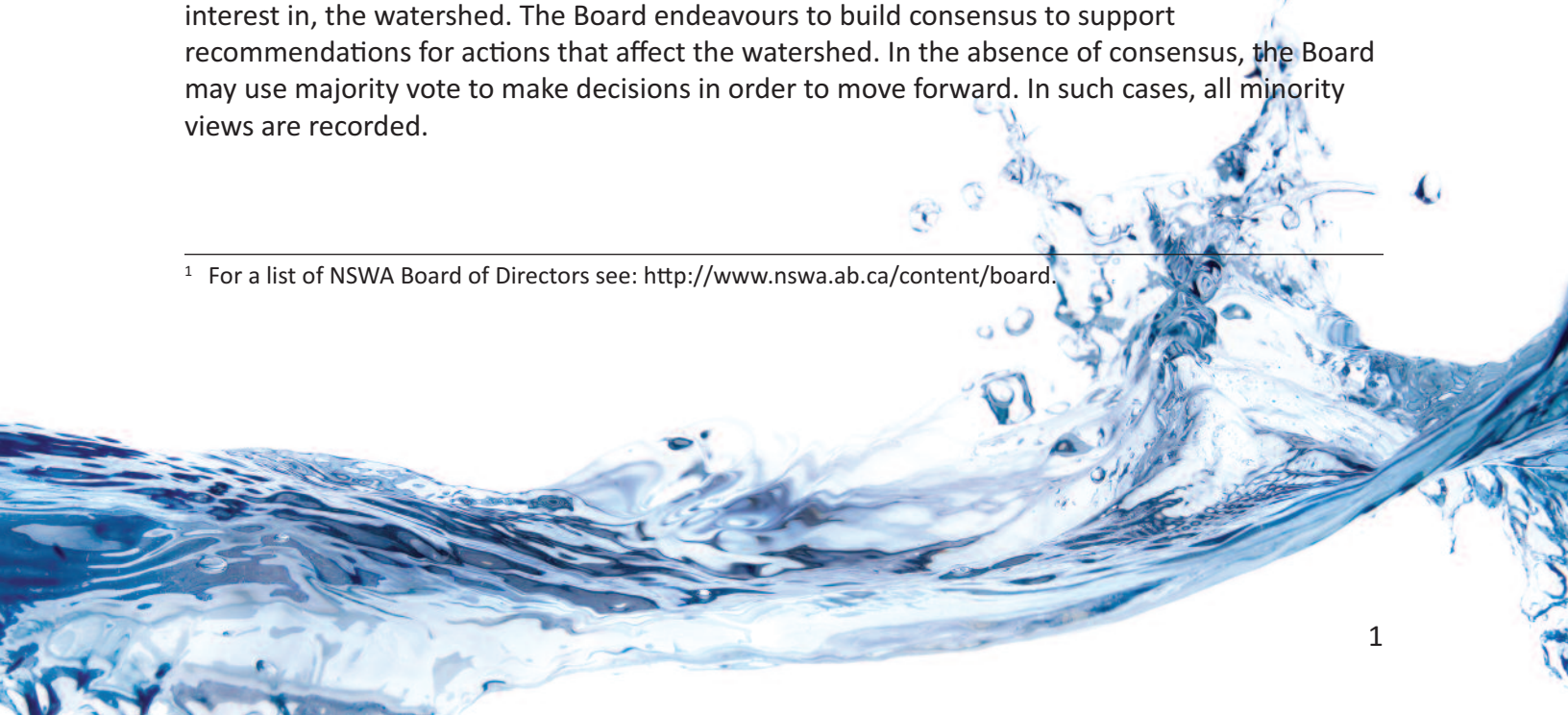
NSWA Mission

To protect and improve water quality, water quantity (instream flow) and the health of our watershed by: seeking, developing and sharing knowledge; facilitating partnerships and collaborative planning; and working in an adaptive management process.

Decision-making process

As a non-profit organization constituted under the *Societies Act*, the NSWA is governed by a Board of Directors whose members are representative of stakeholders living in, or having an interest in, the watershed. The Board endeavours to build consensus to support recommendations for actions that affect the watershed. In the absence of consensus, the Board may use majority vote to make decisions in order to move forward. In such cases, all minority views are recorded.

[1] For a list of NSWA Board of Directors see: http://www.nswa.ab.ca/content/board.



NSWA responsibilities as a WPAC

In 2005, the Government of Alberta formally recognized the NSWA as a Watershed Planning and Advisory Council (WPAC), one of the government's key regional partnerships responsible for assessing conditions of watersheds and developing plans and activities to address watershed issues, as identified in *Water for Life: Alberta's Strategy for Sustainability* (2003)[2]. As a WPAC, the NSWA's first responsibility was to prepare the State of the North Saskatchewan Watershed report. The report compiles information about current land use, water and ecological conditions within the North Saskatchewan River watershed.[3] It was completed in 2005, provides an overview of basin characteristics to direct future research and decision-making, and makes recommendations for priority issues and actions.

The NSWA's next major responsibility as a WPAC is to prepare an IWMP to address watershed issues identified through the research and in consultation with stakeholders and the public. The IWMP will provide watershed management advice to address issues raised by stakeholders and to achieve the three goals of the *Water for Life Strategy*: safe, secure drinking water; healthy aquatic ecosystems; and reliable, quality water supplies for a sustainable economy.

Terms of Reference for developing the IWMP were approved by Alberta Environment in April 2005. That document is available on the NSWA website (www.nswa.ab.ca) along with other information including technical reports and papers prepared by the NSWA over the last five years. The Terms of Reference present the goals and objectives of the planning process, background information, a description of the IWMP planning process, and outcomes envisioned.

The NSWA established a Steering Committee in 2005 to oversee preparation of the IWMP. Members represented a cross-section of stakeholders and reported to the NSWA Board of Directors. The Committee submitted its report with recommendations to the Board on August 9, 2010. Those recommendations formed the basis of the Draft Recommendations (goals, watershed management directions and actions) outlined in **Section 6** of this discussion paper.

Involvement of stakeholders and NSWA members will continue as an integral part of the development and implementation of the IWMP. The NSWA, over the next few months, will:

- Conduct a broad program of stakeholder engagement and public consultation through the use of this *IWMP Discussion Paper*, the companion *IWMP Workbook*, the website, discussion forums, meetings, and presentations.
- Prepare a draft IWMP in consideration of all information, comments, ideas and advice received during the consultation and engagement process.
- Consult with stakeholders on the draft IWMP.

[2] Alberta Environment. (2003). *Water for Life: Alberta's Strategy for Sustainability*.

[3] North Saskatchewan Watershed Alliance. (2005). *State of the North Saskatchewan Watershed Report 2005 - A Foundation for Collaborative Watershed Management*. This and other technical reports describing conditions affecting surface and groundwater in the North Saskatchewan River watershed are available on the NSWA website at: www.nswa.ab.ca/resources/nswa_publications. See **Appendix B** for a list of these reports.

- Prepare the final IWMP for approval by the NSWA Board of Directors and submission to the Government of Alberta and other stakeholders for endorsement and implementation.

1.1 Description of the North Saskatchewan River Watershed

A watershed (also known as a basin) is the area of land that catches precipitation and drains into a larger body of water, such as a river. It is often made up of a number of sub-watersheds that contribute to its overall drainage.[4] The North Saskatchewan River watershed is one of the major drainage basins located in Alberta, Canada.

The North Saskatchewan River watershed stretches from the Rocky Mountains in the west across the Alberta plains into Saskatchewan. The total drainage area of the North Saskatchewan River watershed in Alberta is about 57,000 square kilometres.[5] The watershed is home to approximately 1.2 million people, most of whom live in the Alberta Capital Region (City of Edmonton and area). The watershed contains a complex diversity of natural land forms and ecological regions, and supports a wide variety of human land uses. The river originates in the ice fields of Banff National Park over 2000 m above sea level.[6] The river flows in an easterly direction. By the time it reaches the Saskatchewan border north of Lloydminster, its elevation is 500 m above sea level. The river joins the South Saskatchewan River east of Prince Albert, Saskatchewan to form the Saskatchewan River, which then flows through the Saskatchewan River Delta into Lake Winnipeg in Manitoba. From there, the water empties into the Hudson Bay by way of the Nelson River.

The report, From the Mountains to the Sea: State of the Saskatchewan River Basin (2009), describes the general condition of the Saskatchewan River basin. The report identifies seven major vulnerabilities: landscape modification (from agriculture, forestry, oil & gas, mining and urban development); water supply; climate change; dams and diversions; municipal water (water supply, wastewater and storm water); natural hazards (floods and droughts); and invasive species.[7]

Recent research reveals that climate in the Canadian prairies has been historically variable.[8] Within the framework of an environment that is becoming warmer and drier, it is expected that there will be more flood events, severe storms and climatic extremes. There are concerns that the climate is becoming increasingly variable from season to season and year to year.

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[4] Alberta Environment. (November 2008). *Glossary of Terms Related to Water and Watershed Management*. First Edition, p. 44. http://environment.gov.ab.ca/info/library/8043.pdf

[5] When the NSWA was first recognized as a WPAC in 2005, the mandate included the Battle River watershed. The Battle River watershed was recognized separately with its own WPAC in 2007. All NSWA reports since 2007 have been limited in area to the 57,000 sq. km. area.

[6] Elevation measured at Saskatchewan Glacier in Banff National Park.

[7] Partners FOR the Saskatchewan River Basin. (2009). *From the Mountains to the Sea: State of the Saskatchewan River Basin*. http://www.nswa.ab.ca/content/other-publications/state-of-sask-river.

[8] Henderson, N. and Sauchyn, D. (2008). *Climate Change Impacts in Canada's Prairie Provinces: A Summary of Our State of Knowledge*. Prairie Adaptation Research Collaboration, p. 15. www.parc.ca/pdf/research_publications/summary_docs/SD2008-01.pdf.

Detailed information about current land use, water and ecological conditions within the watershed can be found in the *State of the North Saskatchewan Watershed Report* (2005), as well as in other technical reports prepared by the NSWA and others. A list of these reports can be found in **Appendix B** and are available on the NSWA website.

The North Saskatchewan River watershed in Alberta is divided into 12 sub-watersheds: Clearwater River, Ram River, Cline River, Brazeau River, Modeste Creek, Strawberry Creek, Sturgeon River, Vermilion River, Beaverhill Creek, Monnery Creek, Frog Lake and White Earth Creek. Major features of the watershed include:

- 1.2 million people living in the watershed, with 1.1 million living in the Alberta Capital Region.
- 20 rural municipalities and 66 urban municipalities.
- 2 hydro-electric reservoirs: the Brazeau Dam (creating the Brazeau Reservoir) and the Big Horn Dam (creating Abraham Lake).
- 3 coal-fired electricity generating plants.
- Large forestry, agricultural and petrochemical sectors, including oil and gas exploration.
- Over 7 billion cubic metres of water flows eastward from Alberta to Saskatchewan (mean annual discharge).[9]

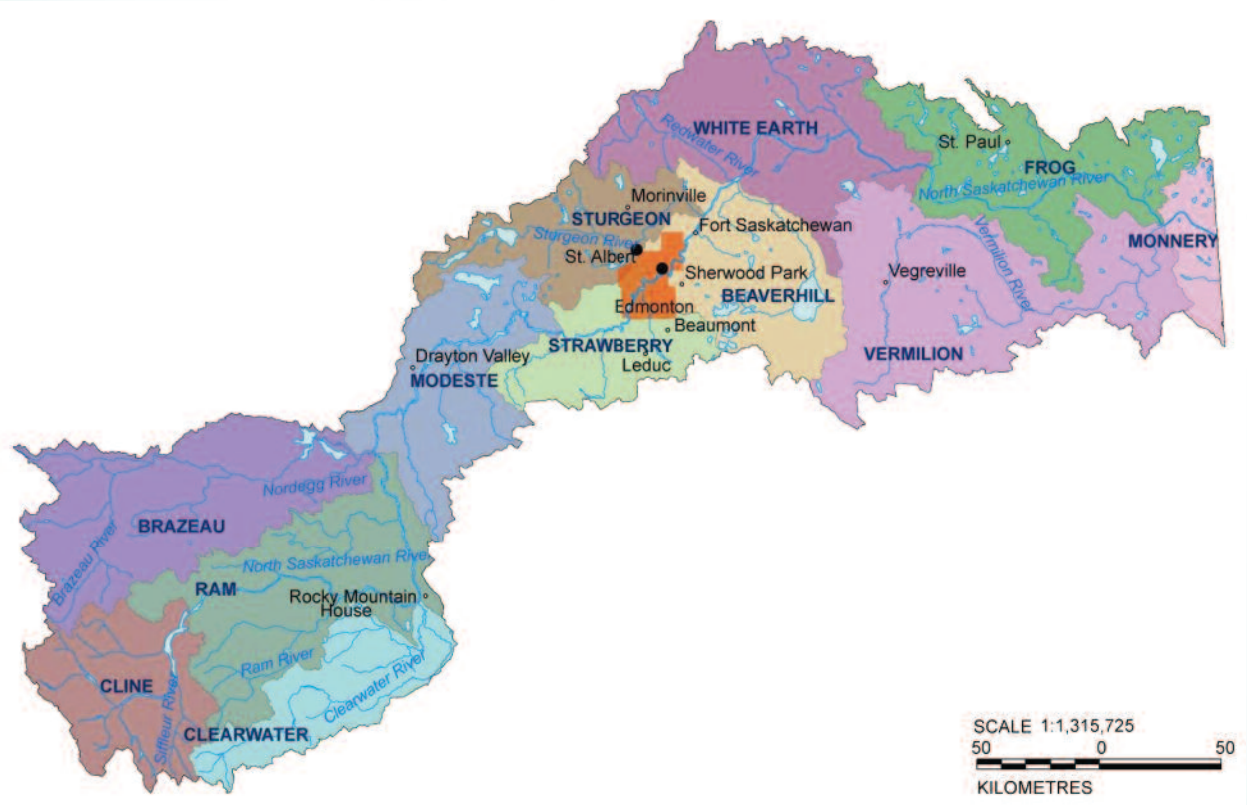

Figure 1: Map of the North Saskatchewan River Watershed

[9] North Saskatchewan Watershed Alliance. (2005). *Terms of Reference: Integrated Watershed Management Plan for the North Saskatchewan Watershed in Alberta*, p. 3. http://nswa.ab.ca/pdfs/iwmp_tor.pdf

2. Integrated Watershed Management Plan (IWMP)

The IWMP is intended to provide watershed management advice that will lead to the achievement of the three goals of the *Water for Life* strategy: safe, secure drinking water; healthy aquatic ecosystems; and reliable, quality water supplies for a sustainable economy.

The NSWA has been engaging watershed stakeholders in the development of the IWMP since 2005, first in discussions to identify issues and now in a discussion of goals, watershed management directions and actions developed by the NSWA to address these issues. Discussion with stakeholders will continue as an integral part of the development and implementation of the IWMP (see **Section 1** above for a description of the NSWA's responsibilities as a WPAC, and **Section 2.1.3.** for a description of the stakeholder engagement process).

2.1 The IWMP Planning Process

2.1.1 Terms of Reference

Goal

The Terms of Reference for this IWMP state: "The goal of the IWMP is to provide a plan that will guide the protection, maintenance and restoration of the North Saskatchewan watershed, that balances environmental, social and economic needs particular to each of the sub-watersheds and that follows the Framework for Water Management Planning (AENV no date) and vision of NSWA."[10]

Objectives

The Terms of Reference state: "The objectives of the IWMP are to:

1. Allow development of strategies that sustain our drinking water, aquatic ecosystems and economies for future generations.
2. Identify land-use practices that could positively or negatively impact water resources and develop strategies to reduce negative impacts.
3. Identify critical gaps in watershed knowledge and identify agencies or programs that will address these gaps.
4. Be prepared in consultation with watershed stakeholders and the public so that the plan meets economic, social, health and environmental needs."[11]

[10] North Saskatchewan Watershed Alliance. (2005). *Terms of Reference: Integrated Watershed Management Plan for the North Saskatchewan Watershed in Alberta*, pp. 1, 21.
[11] Ibid, pp. 2, 21.

Desired Outcome

According to the Terms of Reference: "It is the desire of the NSWA to have a comprehensive integrated watershed management plan that ideally would be expressed in an Approved Water Management Plan, but most of the NSWA objectives could be met in a Water Management Plan."[12] To understand the full implications of this statement, see **Section 3.1** for a review of currently available legislative tools the Government of Alberta, municipalities, and other stakeholders can use to support, approve, adopt and implement IWMP recommendations. **Section 3.1** explains the difference between an IWMP (implementation of which is reliant upon the voluntary actions of stakeholders), a Water Management Plan (that sets out factors that *may* be considered in various decisions of the Director under the *Water Act*) and an Approved Water Management Plan (which sets out those factors that must be considered by the Director, and which can limit government discretion in prescribed instances).

Water Management Principles

As described in the goal, the Terms of Reference indicate that the planning process must follow the *Framework for Water Management Planning*.[13] This *Framework*, enabled by the *Water Act*, establishes the following Water Management Principles, which must be reflected in the IWMP:

- Water must be managed sustainably.
  - Water must be managed and conserved to meet current and evolving needs without compromising the ability of future generations to meet their own needs.
- Water is a vital component of the environment.
  - Water is recognized as one of Alberta's most important natural assets.
  - The aquatic environment, including the diversity of aquatic life, must be protected.
- Water plays an essential role in a prosperous economy and balanced economic development.
  - Water must be wisely allocated and efficiently used, and regulatory and administrative processes for managing water must be streamlined, user-friendly and fair.
- Water must be managed using an integrated approach with other natural resources.
  - The interdependence of water quality and water quantity is recognized.
  - The interdependence of natural resources is recognized.
  - Water management is based on a watershed approach.
- Water must be managed in consultation with the public.
  - The public must be involved in water management and decision-making.
  - Information sharing and open communication must be provided for.
  - Opportunities for public education must be supported.

[12] Ibid, p. 2.

[13] Alberta Environment. (no date). *Framework for Water Management Planning*. http://environment.alberta.ca/documents/Framework_for_water_management_planning.pdf

- Water must be managed and conserved in a fair and efficient manner.
  - Water rights, which existed under the former *Water Resources Act*, must be recognized.
  - Enforcement action, when required, must be applied firmly, fairly and consistently.
  - Water management must respond to differing local and regional needs.
  - The Government of Alberta must work cooperatively with governments of other jurisdictions.

See **Section 3.2** for further information concerning the implications of this Framework and the Water Act for implementing IWMPs in Alberta.

2.1.2 The IWMP Steering Committee

In 2005, the NSWA established a Steering Committee to oversee preparation of the IWMP. This Committee, which represented a cross-section of watershed stakeholders, reported to the NSWA Board of Directors (see **Appendix A** for a list of members who participated on the Steering Committee from 2005-2010). The Committee was responsible for meeting with stakeholders to identify watershed issues and for preparing a draft report for discussion with watershed stakeholders, NSWA members and the public. The Steering Committee submitted its recommendations to the NSWA Board of Directors on August 9, 2010.

2.1.3 Stakeholder Engagement Process

The stakeholder engagement process was designed to meet the requirements outlined in the Terms of Reference for the IWMP: "The public must have the opportunity to understand the current state of the watershed, provide input and be encouraged to become effective stewards of the watershed. The goal is to create and maintain dialogue with regional stakeholders and the general public and to develop a multi-stakeholder decision-making framework that will ensure long-term viability of the IWMP."[14]

As one of the government's partnerships under the *Water for Life Strategy*, Watershed Planning and Advisory Councils are required to develop IWMPs through a process of collaborative planning. The Alberta Water Council recommends that this process engage four sectors:

- **Industry**: chemical, petrochemical, oil and gas; mining; power generation; forestry; and agriculture (livestock, irrigated and other crops).
- **Environmental non-government organizations**: environmental; fishery habitat conservation; lake environment conservation; and wetland conservation.
- **Government of Alberta and provincial authorities**: Agriculture and Rural Development; Energy; Environment; Health and Wellness; Sustainable Resource Development; Alberta Economic Development Authority; Alberta Science and Research Authority; Alberta Water Research Institute.
- **Other governments**: Federal; First Nations (one representative for each Treaty area) and Métis Settlements; large urban, small urban and rural municipalities.

[14] North Saskatchewan Watershed Alliance. (2005). *Terms of Reference: Integrated Watershed Management Plan for the North Saskatchewan Watershed in Alberta*, p. 24.

In addition to the above sectors, the NSWA is engaging the water and wastewater utility sectors.

Brief history of the NSWA's engagement process

From 2005 to 2008, the NSWA held many meetings with watershed stakeholders to introduce the organization, its mandate, and to identify issues of concern in the watershed. The meetings included presentations, trade show and community events, as well as four open houses (Community Cafés) held in Edmonton, Rocky Mountain House, Innisfree and Smoky Lake to identify a preliminary list of watershed issues.

In February 2009, the NSWA hosted a forum with rural municipalities in the North Saskatchewan River watershed. Alberta Environment gave presentations on the *Water for Life Strategy* and the government's new regional planning initiative under the *Land-use Framework*, and the NSWA outlined its watershed-wide IWMP planning process to date. Forum participants were seated at tables representing three watershed sub-regions (headwaters, central and downstream) so they could identify and discuss pressing issues held in common, identify areas they wanted to see addressed in the IWMP, and opportunities to collaborate on the development of the IWMP.[15]

Responding to recommendations made by the Alberta Water Council to strengthen partnerships created under the *Water for Life Strategy*,[16] the NSWA commissioned a report in December 2009 to recommend an engagement strategy that would lead to the development of collaborative planning partnerships among watershed stakeholders.[17] While the IWMP needs to integrate watershed management planning across the entire watershed, the large scale of such a planning exercise makes it difficult to engage stakeholders at the local level. Therefore, an engagement strategy was developed to cultivate a shared understanding among stakeholders of the issues facing the watershed and the need for an integrated approach to watershed management that requires active, collaborative, cross-sectoral participation to develop and implement an IWMP. For the purpose of this engagement strategy, the division of the watershed into three sub-regions (headwaters, central and downstream) was continued from the February 2009 forum, so that stakeholders facing similar issues could identify local capacity and interest in working together on these issues.

In December 2009, the NSWA hosted another forum with the rural municipalities to present key findings from the report *From the Mountains to the Sea: State of the Saskatchewan River Basin*. Participants were again divided into the three sub-regions, and asked to discuss how the vulnerabilities identified in the Basin Report were manifesting in their area of the watershed.[18]

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[15] North Saskatchewan Watershed Alliance. (2009). *Engaging Rural Municipalities: Forum Final Report*. www.nswa.ab.ca/iwmp/regional-forums/engaging-rural-municipalities.

[16] The Alberta Water Council. *Strengthening Partnerships*. September 2008. www.albertawatercouncil.ca/Portals/0/pdfs/SharedGov%20%20Strengthening%20Partnerships%20FINAL. pdf; The Alberta Water Council. *Recommendation for a Watershed Management Planning Framework*. December 2008. www.albertawatercouncil.ca/Portals/0/pdfs/SharedGov%20%20Watershed%20Management%20Plan%20FINAL.pdf.

[17] North Saskatchewan Watershed Alliance. (December 2009). Abells Henry Public Affairs. *Developing Collaborative Planning Partnerships: Final Report*.

[18] Results from this forum are posted on the NSWA website at www.nswa.ab.ca/iwmp/regional-forums/agenda-dec-10.

In the spring of 2010, the NSWA began implementing their stakeholder engagement strategy by building on these initial watershed discussions with rural municipal leaders by hosting broader cross-sectoral meetings with local stakeholders in the headwaters and downstream sub-regions.[19] Issues in the North Saskatchewan watershed identified in these meetings are presented in **Section 5**. In the central sub-region, the NSWA began the engagement strategy by meeting with the Capital Region Board and industry associations to introduce the IWMP process. The first cross-sectoral IWMP engagement forum in the central sub-region was held on September 9, 2010.

From 2005 to September 2010, the NSWA gave a total of 122 presentations to municipalities and other watershed stakeholder groups. The NSWA participated in 26 tradeshows/ community events. A total of 349 people participated in IWMP-related forums, which included four community cafés in 2005, two rural municipal forums in 2009, and five cross-sectoral engagement forums in 2010 (see **Appendix C** for details).

Commitment to stakeholder involvement

In its effort to build support for the development and implementation of the IWMP, the NSWA is committed to the following stakeholder involvement process:[20]

- To work with stakeholders to identify information to be considered, as well as to share and explain information and sources considered.
- To work with stakeholders to identify criteria that reflect their values.
- To work with stakeholders to craft a clear statement (goal/watershed management direction/action) that reflects their values.
- To work with stakeholders to develop alternatives that meet the stated criteria and incorporate their values and concerns.
- To work with stakeholders to evaluate alternatives.
- To use results of this evaluation to prepare a draft IWMP.
- To announce the draft IWMP recommendations and clearly describe the rationale used and how input received from stakeholders influenced the result.

2.1.4 Communicating with Stakeholders

The NSWA is endeavouring to establish open, transparent and responsive communications to support the engagement of watershed stakeholders through the IWMP engagement process. Three main audiences have been identified: IWMP forum participants; NSWA members; and members of the public interested in the IWMP planning process. Following the requirements for the stakeholder engagement process stated above from the Terms of Reference, communications with stakeholders will focus on the following elements:

[19] Results from this forum are posted on the NSWA website at www.nswa.ab.ca/iwmp/regional-forums/upstream/march-4 and at www.nswa.ab.ca/iwmp/regional-forums/downstream/march-10-forum.

[20] North Saskatchewan Watershed Alliance. (March 2010). Abells Henry Public Affairs. *Developing Collaborative Planning Partnerships: Final Report*. This framework is based on the International Association of Public Participation's spectrum of public participation described as INVOLVE. www.iap2.org/.

1. Creating and maintaining dialogue with regional stakeholders and the general public

The three main audiences identified above are all referred to as stakeholders in this discussion paper. The NSWA met extensively with all three audiences over the past five years. Presentations introducing the NSWA and its mandate were given to municipalities, industry associations and planning bodies across the watershed. NSWA held numerous open houses and attended many tradeshows in an effort to introduce the organization and its work to the public. The last two IWMP forums (held in Elk Point and Rocky Mountain House) were advertised and open to the public. See **Appendix C** for a list of all meetings held with stakeholders from 2005 to September 2010.

2. Demonstrating transparency and providing opportunity for input

The NSWA website (www.nswa.ab.ca) is the primary vehicle for demonstrating transparency with stakeholders. A new section was added to the website featuring the stakeholder engagement forums. Reports from each forum are posted on the website including annotated agendas so visitors to the website can follow the discussions; PowerPoint Presentations; and summary reports of discussions held with forum participants. Visitors to the website are invited to read the information and respond by posting their ideas and providing input into the discussions.

3. Understanding the current state of the watershed

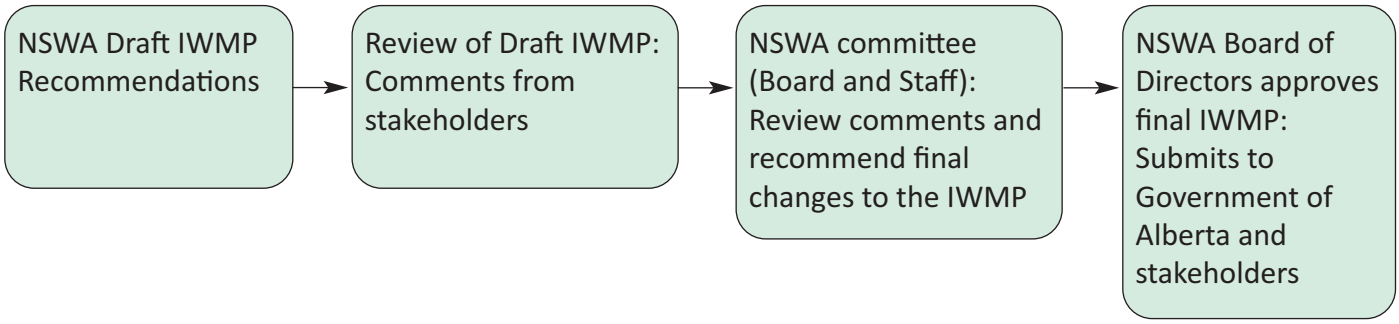
The NSWA has prepared many scientific reports and technical studies since 2005 (see **Appendix B** for a list of these reports). To be responsive to the education and information needs of watershed stakeholders without technical training and expertise, the NSWA is providing short briefs that present complex scientific information in a straightforward way. The purpose of these briefs (called “Coffee Shop Discussion Briefs”) is to: interpret and summarize scientific reports and data in light of the specific watershed issues under discussion; explain important scientific concepts underpinning the IWMP; and facilitate communication between sub-watershed regions by identifying ideas, approaches and best management practices that respond to common issues.

2.1.5 Opportunities to Respond to this IWMP Discussion Paper

Stakeholders will have the opportunity to assess the information presented in this discussion paper by responding to the companion *IWMP Workbook*. The focus of the workbook is on reviewing the Draft Recommendations (proposed goals, watershed management directions and actions) described in **Section 6** of this discussion paper. Both documents are available on the NSWA website. The NSWA will also hold cross-sectoral engagement forums to meet with stakeholders and the public to discuss watershed planning, this *IWMP Discussion Paper* and the workbook. The forums will be advertised locally. Responses to the workbook will be aggregated, analyzed and posted on the NSWA website. Comments will not be attributed.

An NSWA committee comprised of Board members and staff will review all information received during the consultation process. The NSWA will then develop the draft IWMP. The full NSWA Board of Directors will review and approve the draft IWMP for public consultation and review.

After a full public review of the draft IWMP, the NSWA Board will use a consensus decision-making process to finalize the IWMP and submit it to the Government of Alberta and other stakeholders for endorsement and implementation. If consensus cannot be achieved, minority opinions will be included in the final IWMP.



Commitment going forward

The NSWA is committed to meeting with stakeholders to review this discussion paper and to consider the Draft Recommendations (proposed goals, watershed management directions and actions) following the stakeholder engagement and communications processes described above. The NSWA will continue consultation and engagement until the IWMP recommendations have been reviewed, revised and adopted by the NSWA Board of Directors and submitted to the Government of Alberta and stakeholders.

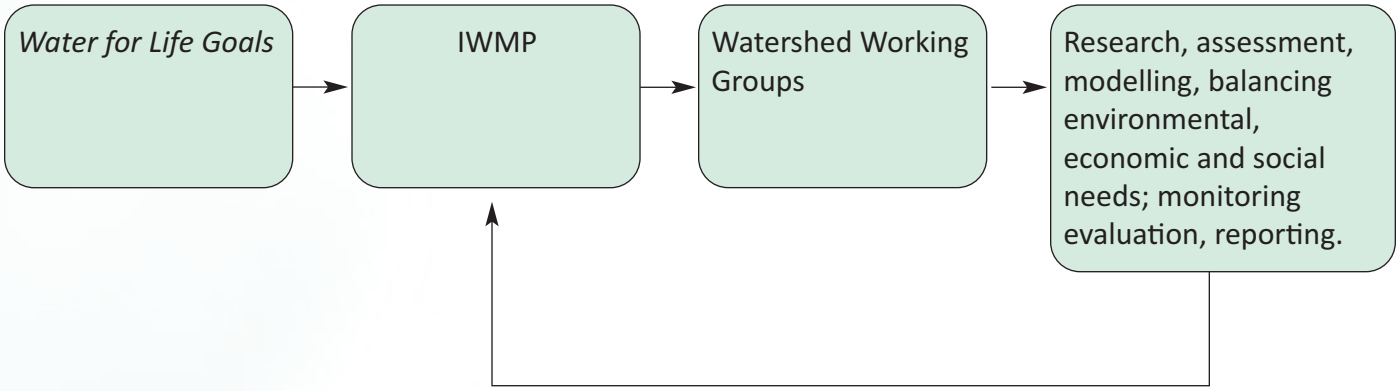
2.1.6 From Stakeholder Engagement to Collaborative Planning Partnerships

Implementation of the IWMP requires the development of collaborative planning partnerships envisioned as the result of the IWMP stakeholder engagement process. The IWMP identifies not only what needs to be done, but who should be involved in developing and implementing the recommendations and for balancing environmental, economic and social needs. Integration requires a new way of working together. Therefore, a collaborative infrastructure of cross-sectoral stakeholder working groups will be formed to address each action required to meet the goals of the IWMP.

The actions described in this discussion paper identify a working group of stakeholders to lead and participate in the development and implementation of each action. Specific to each action, each working group will be responsible for reviewing the legislative and policy context; identifying and addressing gaps in the research; developing detailed strategies; identifying best management practices and adaptive management processes; and consulting with other watershed stakeholders and the public so that each strategy, practice and process balances environmental, economic and social needs. These must then be voluntarily implemented through each stakeholder's respective area of jurisdiction.

For example, much of the scientific and technical research needed to propose objectives (thresholds) for water quality, water quantity (instream flow) and a healthy aquatic ecosystem has only just begun. As these studies are completed and objectives are proposed, consultation with stakeholders and the public is required to determine if the proposed objectives represent the appropriate balance among environmental, economic and social needs.

The IWMP also recognizes that the balance among environmental, economic and social needs changes as conditions change and that continuous monitoring, evaluation and reporting is required, combined with ongoing identification and implementation of best practices through an adaptive management process. Roles and responsibilities of each stakeholder sector to implement the IWMP are described in **Section 7**.



3. Integrating IWMPs into Government Decision Making

Integrated Watershed Management Plans (IWMPs) in Alberta face a challenging legislative and policy context in which these plans must be implemented. To be effective, IWMPs must cross numerous jurisdictional boundaries in order to integrate water and land management practices. Recent analyses of the legislative, policy and planning context in Alberta emphasize that while collaborative watershed planning has been adopted by the Government of Alberta as a method of managing water and land in an integrated way, there is as yet no specific statutory framework in place to require the adoption and implementations of IWMPs.[21]

The *Water for Life* Strategy identifies three levels of partnerships as the vehicles through which the government plans to achieve the Strategy's goals. Each of the partnerships at the provincial and regional levels is constituted as a society under the *Societies Act*, which means each society (organization) has its own by-laws and Board of Directors, and is legally accountable to the organization's membership. The provincial level partnership is the **Alberta Water Council**. Its Board of Directors represents different stakeholder groups with an interest in watershed management. Its role is to provide strategic advice to governments, industry, and non-government organizations in an effort to achieve the goals of the *Water for Life* Strategy. The Alberta Water Council's decision-making process is based on consensus, whereby members are to work collaboratively to craft decisions that best satisfy their respective interests. If consensus among board members is not achieved, then the conditions, concerns, dissension is recorded and alternatives presented. If after further discussion consensus cannot be achieved, the Alberta Water Council outlines and transmits the concerns to the Minister of Environment.[22]

The regional-level W*ater for Life* partnerships are the **Watershed Planning and Advisory Councils** (WPACs). The NSWA is the recognized WPAC for the North Saskatchewan River watershed. **Section 1** describes the role and decision-making process of the NSWA. Local-level *Water for Life* partnerships are called **Watershed Stewardship Groups**, which are community, volunteer-based groups actively engaged in environmental stewardship. They may or may not be constituted as societies, and include individuals and organizations that work together to identify and achieve common goals.

[21] Canadian Institute of Resource Law. Unger, J. (2009). *Consistency and Accountability in Implementing Watershed Plans in Alberta: A Jurisdictional Review and Recommendations for Reform*. Canadian Institute of Resource Law; Wenig, M. R. (Feb. 2010). *Understanding Local Albertans' Roles in Watershed Planning – Will the Real Blueprint Please Step Forward?* Canadian Institute of Resource Law. CIRL Occasional Paper #28; South East Alberta Watershed Alliance. Fox, Lisa M. (2010). *Integrating Land Use Framework & Water for Life*. Concept Paper.

[22] Alberta Water Council. (2005). *Defining Consensu. www.albertawatercouncil.ca/Portals/0/pdfs/Defining_Consensus.pdf.*

Several attempts have been made by the Alberta Water Council to clarify how IWMPs, resulting from collaborative planning approaches that rely on the *Water for Life* notion of "shared governance," are to be implemented.[23] The *Water for Life* Strategy defines shared governance as "a governance structure where both government and other stakeholders have agreed to share responsibility for the development and delivery of policy, planning, and programs or services, but where the government retains legislative accountability."[24] Critics of this approach argue that this form of governance leaves the concept of accountability "to be more of a moral than legal nature,"[25] where "each party to the partnerships' decisions assumes responsibility for implementing them through its own legal authority."[26] Currently, IWMPs are not referred to directly in Alberta legislation. Therefore, approval of IWMPs by stakeholders remains voluntary, relying on the voluntary choices and actions of governments, industries, organizations and individuals to execute actions identified in the IWMPs.[27]

IWMPs do, however, represent an important plank in the Government of Alberta's on-going efforts to integrate water and land management practices through the collaborative planning efforts of stakeholders. While current legislation does not specifically enable IWMPs by identifying and assigning authority, responsibility and accountability for implementing the plans, it does not prevent these plans from being approved and adopted in whole or in part by the provincial or local governments that support an integrated watershed approach. There are legislation and policy tools currently available to approve, adopt and implement IWMP recommendations.

[23] Alberta Water Council. (2008).Strengthening Partnerships: *A Shared Governance Framework for Water for Life Collaborative Partnerships*. www.albertawatercouncil.ca/Portals/0/pdfs/SharedGov%20%20Strengthening%20Partnerships%20FINAL. pdf; Alberta Water Council. (2008). *Recommendation for a Watershed Management Planning Framework*. www.albertawatercouncil.ca/Portals/0/pdfs/SharedGov%20%20Watershed%20Management%20Plan%20FINAL.pdf

[24] Alberta Water Council. (2008). *Strengthening Partnerships: A Shared Governance Framework for Water for Life Collaborative Partnerships*. P. 3. www.albertawatercouncil.ca/Portals/0/pdfs/SharedGov%20%20Strengthening%20Partnerships%20FINAL. pdf

[25] Wenig (2010), p. 3. "Shared governance" is a concept defined in GoA's *Water for Life Strategy* (2003) as a collaborative goal-setting and problem-solving process build on trust and communications, where government and other stakeholders share responsibility for the development and delivery of policy, planning, and programs or services, but where government retains legislative authority. In legislation it is described as shared responsibility (rather than governance).

[26] Wenig (2010), p. 18.

[27] Unger (2009), p. 9.

3.1 Current Legislative, Policy and Planning Context

The following overview of legislation and policies is undertaken to describe the context in which the IWMP is being prepared and to identify tools that currently exist to implement specific actions. This is not an exhaustive list. Each stakeholder working group will need to review the legislative, policy and planning context relevant to the action they are working on.

The Water Act[28] gives the Lt. Governor in Council and the Minister of Environment broad discretion to adopt regulations governing licencing and other water management functions.[29] It gives the Director, the designated decision-maker under the Act, broad discretion (subject to any statute or regulation) to adopt conditions in new water licences. The purpose statement in the Act recognizes "the need for an integrated approach and comprehensive, flexible administration and management systems" and "the shared responsibility of all residents of Alberta for the conservation and wise use of water and their role in providing advice with respect to water management planning and decision-making".[30] While the word "advice" suggests a limited role for Albertans, the Act also commits to establishing and requiring water management tools through which this advice can be adopted. These include:

- **Framework for Water Management Planning**, including a **Strategy for the Protection of the Aquatic Environment**:[31] While the *Framework* document does not indicate its date of publication, the *Water Act* required it to be completed by December 31, 2001. The *Framework* recognizes the importance of integration, and discusses it in terms of taking "a holistic approach" that requires cooperative or joint planning efforts among water, land and other natural resource planners and managers. The *Framework* expressly calls for a "watershed approach" under its Water Management Principles. It applies to all types of waterbodies, including, rivers, streams, lakes, aquifers and wetlands. As directed by the *Water Act*, the Framework describes in more detail water management planning tools that include:
    - **Water Management Plans** that are to "set out clear and strategic directions regarding how water should be managed or result in specific actions."[34] A Water Management Plan "may be considered" in water licensing decisions, and therefore relies entirely on the voluntary actions of stakeholders.[35]

[28] *Water Act*, R.S.A. 2000, c. W-3.
[29] Wenig (2010), p. 3 footnote #8.
[30] *Water Act*, Section 2(c) and (d).
[31] Alberta Environment. (no date). *Framework for Water Management Planning*. http://environment.alberta.ca/documents/Framework_for_water_management_planning.pdf
[32] *Framework for Water Management Planning* (no date), p. 1; Wenig (2010), p. 7.
[33] *Framework for Water Management Planning* (no date), p. 6.
[34] *Framework for Water Management Planning* (no date), p. 10.
[35] Unger (2009), p. 9.

- Approved Water Management Plans are approved by the Lieutenant Governor in Council (or by the Minister, if so authorized). An approved plan "must be considered when making licence and approval decisions."[36] Approved plans limit government discretion in prescribed instances under the *Water Act*. They set out matters and factors that must be considered in various decisions of the Director under the *Water Act*.[37]
- Water Conservation Objectives are defined in the Act as "the amount and quality of water established by the Director…and may include water necessary for the rate of flow of water or water level requirements."[38] As numeric expressions of minimum flows or other aquatic environmental benchmarks, Water Conservation Objectives provide a basis for defining and implementing limits on cumulative disturbances to the aquatic environment.[39] Although other types of benchmarks are not specifically mentioned in the Act, the definition for Water Conservation Objectives suggests that Water Quality Objectives, as well as objectives for water quantity (Instream Flow) and Healthy Aquatic Ecosystems, could be adopted by the Government of Alberta in the form of Water Conservation Objectives.

- **Strategy for the Protection of the Aquatic Environment** is included in the *Framework for Water Management Planning* and "applies to all activities and decision-making that could effect (sic) the aquatic environment."[40] The Strategy identifies and defines four key elements affected by human activities: water quantity (amount of water available); water quality (chemical, microbiological and physical characteristics of water); habitat (physical and biological structure of the water body and the land surrounding it); and aquatic species (the plants and animals living in or associated with waterbodies, wetlands and riparian areas).[41]

The *Strategy* defines what it means by "protection", when it states: "Protection will occur through maintaining, restoring and enhancing current conditions."[42] It also states that "objectives are required to provide clear direction for the protection of the aquatic environment."[43] The *Strategy* identifies the Government of Alberta's key roles and responsibilities, as well as the responsibility to work collaboratively with other stakeholders in relation to data collection, management, analysis and research related to the four key elements. It also identifies the types of objectives, monitoring, assessment and planning needed to achieve protection, as well as examples of government legislation, regulations, policies and programs that can be used to implement the *Strategy*.[44] Although IWMPs are not specifically identified, Water Management Plans, which require a watershed approach as described in the *Framework*, are identified as key planning tools. Critics of the *Framework* and *Strategy* suggest that while they provide general guidelines, they do not establish a mandatory or specific process to achieve integration.[45] Instead, the *Framework* suggests that "Regional Strategies will

[36] *Framework for Water Management Planning* (no date). p. 11.
[37] Unger (2009), p. 9.
[38] *Water Act*, R.S.A. 2000, c. W-3. Subsection 1(1)(hhh).
[39] Wenig (2010), p .4.
[40] *Framework for Water Management Planning* (no date), p. 19.
[41] Ibid. p. 20.
[42] Ibid. p .21.
[43] Ibid, p. 23.
[44] Ibid pp. 28-31
[45] Wenig (2010), p. 7.

define goals and address issues that cover the full range of air, water and public land resources. Regional Strategies, developed in collaboration with stakeholders and affected communities, will guide planning within each region."[46] While not in existence when the *Framework* was developed in 2001, "Regional Strategies" foreshadowed the evolution of the *Land-use Framework's* Regional Plans described in this section.

***Water for Life* Strategy**: The Government of Alberta initiated collaborative watershed planning in 2003 when it adopted its policy of *Water for Life: Alberta's Strategy for Sustainability*.[47] The government reinforced its commitment to the watershed approach in 2008,[48] and prepared an Action Plan in 2009[49] to achieve its goals of safe, secure drinking water; healthy aquatic ecosystems; and reliable, quality water supplies for a sustainable economy. In its Action Plan it stated: "The Government of Alberta intends to improve and maintain the health of our aquatic ecosystems by managing the cumulative impacts of point and non-point-sources, promoting watershed management, and establishing Water Conservation Objectives on all major basins... The key to success is through enhanced knowledge, information, and public reporting systems as we advance into a cumulative effects approach using the *Land-use Framework* Regional Plans."[50] While concern remains that the actions identified in an IWMP remain voluntary, the *Water for Life Action Plan* reconfirms the Government of Alberta's commitment to the *Water for Life* Strategy; the partnerships; watershed planning; establishing Water Conservation Objectives; and to integrating these efforts with the *Land-use Framework's* Regional Plans through the advancement of a cumulative effects management strategy.

Environmental Protection and Enhancement Act (EPEA):[51] gives the Lt. Governor in Council and the Minister of Environment broad discretion to adopt regulations governing licencing and other water quality management functions. The purpose of the Act is to "support and promote the protection, enhancement and wise use of the environment" while recognizing "the need to integrate environmental protection and economic decisions in the earliest stages of planning."[52] In section 14(1) of the Act it states that: "after having engaged in any public consultation that the Minister considers appropriate, develop ambient environmental quality objectives in qualitative or quantitative terms for all or part of Alberta." Further, in Section 14 (4), it states: "the Minister may develop other objectives, as well as standards, practices, codes of practice, guidelines or methods, to meet goals or purposes toward which the Government's environmental protection efforts are directed, including, without limitation… objectives or methods for monitoring, analysis and predictive assessment." As in the *Water Act*, while it does not specifically identify the IWMP process or objectives for water quality, water quantity (instream flow), or healthy aquatic ecosystems, this Act does suggest that such objectives developed through an IWMP could be enabled through this legislation.

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[46] *Framework for Water Management Planning* (no date), p. 2.
[47] Alberta Environment. (2003). *Water for Life: Alberta's Strategy for Sustainability*. www.waterforlife.alberta.ca/documents/wfl-strategy_Nov2003.pdf
[48] Alberta Water Council. (2008). *Water for Life: A Renewal*. http://environment.gov.ab.ca/info/library/8035.pdf
[49] Alberta Water Council. (2009).*Water for Life: Action Plan* http://environment.gov.ab.ca/info/library/8236.pdf
[50] Ibid (2009). P. 9
[51] *Environmental Protection and Enhancement Act*. RSA 2000, c. E-12
[52] Ibid. Section 2 (b).

Land-use Framework (LUF):[53] The purpose of the *Land-use Framework* is to manage growth to sustain a healthy economy, healthy ecosystems and people-friendly communities. The *Land-use Framework* defines more clearly the concept of Regional Strategies identified first in the *Framework for Water Management Planning*. The *Land-use Framework* requires the development of seven regional plans based on seven land-use regions. It recognizes the limitations of Alberta's current regulatory system of assessing impacts of new developments on a project-by-project basis (as legislated under the *Water Act* and the *Environmental Protection and Enhancement Act*) and identifies a need for a cumulative effects management approach to address the impacts of both existing and new human activities taking place over time. To support such an approach, it also identifies the need to establish an information, monitoring and knowledge system to provide accurate, timely and accessible information to support continuous improvement of land-use planning and decision-making.

The North Saskatchewan Regional Plan will be one of seven regional plans to be prepared under the Land-use Framework. It is anticipated that the Regional Plan will guide the use of land and resources, taking into account cumulative effects and input from other planning processes (such as the IWMP). After land-use priorities have been determined, integrated land management will be used to achieve the goals of the Regional Plan. Integrated land management is a strategic, planned approach to land-use, the desired outcome of which is to lower the overall footprint from human activities.

Cumulative Effects Management Strategy (CEMS): As stated in the *Land-use Framework*, a Cumulative Effects Management System "is about anticipating future pressures and establishing limits; not limits on new economic development, but limits on the effects of development on the air, land, water and biodiversity of the affected region."[54] Threshold-based ecosystem management at the local level will be required to establish those limits.[55] The setting of thresholds for ecosystems in Regional Plans will be supported by watershed planning and the adoption of IWMPs that include objectives for water quality, water quantity (instream flow) and healthy aquatic ecosystems. Where IWMPs are developed before a Regional Plan, it is expected the objectives identified through the IWMP will be considered. The NSWA anticipates that its IWMP will be submitted to Alberta Environment before the North Saskatchewan Regional Plan is initiated.

Alberta Land Stewardship Act **(ALSA)**:[56] The purpose of the Act is to enable the Government of Alberta to identify economic, social and environmental objectives,[57] and to enable sustainable development by taking into account and responding to the cumulative effects of human activity

[53] Sustainable Resource Development. (2008). *Land-Use Framework*. http://landuse.alberta.ca/AboutLanduseFramework/LUFProgress/documents/LanduseFramework-FINAL-Dec3-2008.pdf

[54] Ibid (Dec. 2008), p. 31.

[55] South East Alberta Watershed Alliance. Fox, Lisa M. (2010). *Integrating Land Use Framework & Water for Life. Concept Paper*, p. 6.

[56] *Alberta Land Stewardship Act*, S.A. 2009, c. A-26.8. www.qp.alberta.ca/574.cfm?page=A26P8.cfm&leg_type=Acts&isbncln=9780779742271

[57] *Alberta Land Stewardship Act.* (2009). The term "objective" is not defined in the Act, but in Section 2(w)(iii)(A) it is identified as a possible regulatory instrument (along with policies, plans and procedures). In Section 8(1) of the Act it states a Regional Plan must state one or more objectives for the planning region.

and other impacts.[58] It makes Regional Plans binding on all provincial government departments and decision-making boards and agencies; municipalities and local government authorities; industry, including companies with mineral rights leases, forestry management agreements, and agricultural operations; and all Albertans. Amendments to more than 27 Acts have been made to ensure that provincial and local government boards and authorities align their activities and decisions with Regional Plans.[59] This Act transforms the planning process that is undertaken in Alberta and sets out legal implementation of Regional Plans, into which IWMPs can readily be inserted.[60]

***Municipal Government Act* (MGA)**:[61] In Canada, municipal government is created and enabled by the provinces to provide local services. Local government is called municipal government, whether the resident lives in an urban or rural area. The Act defines the broad powers or general jurisdiction of municipalities. It requires every municipality to have a land-use bylaw.[62] A municipality with a population of 3500 or more must adopt a Municipal Development Plan.[63] Municipalities will have to align their plans, bylaws and decisions with Regional Plans.[64]

Wetland Policy: The development of a wetland policy and implementation plan was identified as a key action in the *Water for Life* Strategy to help achieve the goal of healthy aquatic ecosystems. In 2008, the Alberta Water Council's Wetland Policy Project Team developed recommendations for a new wetland policy and a corresponding implementation plan for the Government of Alberta.[65] This report was approved by the Alberta Water Council's Board, but did not achieve consensus: "two sectors indicated that while they supported most of the policy and plan, they could not fully support all of the ideas and actions recommended by the project team."[66] The Council then transmitted all of the information to the Minister of Environment with a request "for him to please review the information and decide how to best proceed." A new wetland policy has yet to be adopted by Government of Alberta. In the interim, the (1993) *Wetland Management in the Settled Area of Alberta: An Interim Policy* is still in use.[67]

3.2 Implications of the Current Legislative Context

This review of the legislative, policy and planning context surrounding the development and implementation of Integrated Watershed Management Plans (IWMPs) suggests there are several existing avenues through which watershed management directions and actions identified in an IWMP can be adopted and implemented:

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[58] Ibid. Section 1(a) and (c)

[59] Government of Alberta: http://landuse.alberta.ca/AlbertaLandStewardshipAct/AlbertaLandStewardshipActFAQ.aspx.

[60] Unger (2009), p. 44

[61] *Municipal Government Act*, R.S.A. 2000, c. M-26.

[62] Ibid. (2000). Section 639.

[63] Ibid. (2000). Section 632 (1).

[64] Ibid. (2000). Section 638.1.

[65] Alberta Water Council. (2008). *Recommendations for a New Alberta Wetlands Policy.* www.albertawatercouncil.ca/Portals/0/pdfs/WPPT%20Policy%20web.pdf

[66] Alberta Water Council. *Wetland Policy*. www.albertawatercouncil.ca/Projects/WetlandPolicy/tabid/103/Default.aspx

[67] Alberta Water Resources Commission. (1993). *Wetland Management in the Settled Area of Alberta: An Interim Policy*. http://environment.gov.ab.ca/info/library/6169.pdf

- Under the *Water Act*, Water Management Plans must adhere to Water Management Principles that are based on a watershed approach. Water Conservation Objectives provide a legal avenue for the adoption of objectives for water quality, water quantity (instream flow) and healthy aquatic ecosystems. The *Strategy for the Protection of the Aquatic Environment* identifies the Government of Alberta's roles and responsibilities, especially concerning monitoring, evaluation and reporting.
- Under both the *Water Act* and *Environmental Protection and Enhancement Act*, the Government of Alberta can work with individual approval holders (industries and municipalities) to address point-source loads (amount and quality of effluent approved for discharge into waterbodies), and to require improved planning, operating and monitoring practices.
- Under the *Alberta Land Stewardship Act*, Regional Plans developed under the *Land-use Framework* become binding and require the management of cumulative effects. This will require threshold-based ecosystem management at the local level. As demonstrated in the Draft Recommendations of this discussion paper (the goals, watershed management directions and actions described in **Section 6.2**), science-based objectives for water quality, water quantity (instream flow) and aquatic health are expected to form an integral part of the North Saskatchewan Regional Plan, when it is developed. While the North Saskatchewan Regional Plan is in the very early stages of development, it is reasonable to expect that the IWMP will feed into and inform the development of this Regional Plan.
- Municipalities, under the *Municipal Government Act*, have the legislative authority to develop, implement and enforce land-use bylaws that can have a major impact on the watershed. Intergovernmental/inter-municipal planning can lead to improved management, operating and monitoring practices.

The lack of specific identification and required approval of IWMPs in the legislation does, however, leave the adoption and implementation of IWMP recommendations dependent on the voluntary action of decision-makers, such as: Ministers and municipal councillors; The Directors designated under the *Water Act* or the *Environmental Protection and Enhancement Act*; Government of Alberta approvals managers; industry executives; Boards of Directors of non-government organizations, and individual landowners. As indicated in the Alberta Water Council's report *Enabling Partnerships*, watershed planning must take place within municipal, provincial and federal water and land use planning and decision-making processes as described in legislation and other government policies and plans. That report states: "Where they choose to work together, the roles and responsibilities of the Government of Alberta and its partners will be identified. In all its partnerships, the provincial government will uphold its legislated responsibility, accountability and legal authority for water and land use management decisions."[68]

Due to this dependency, best described by the phrase "where they choose to work together," this review also highlights the importance of building a lasting collaborative planning and management infrastructure of stakeholder working groups to support continued stakeholder engagement, not only for the development of the IWMP, but for ongoing implementation and monitoring of the recommended actions.

[68] Alberta Environment. (no date). *Enabling Partnerships: A Framework in Support of Water for Life: Alberta's Strategy for Sustainability*. P. 4. www.waterforlife.alberta.ca/documents/wfl-enabling_partnerships.pdf.

4. Technical Studies in the North Saskatchewan River Watershed

The Government of Alberta gave the NSWA, as the recognized Watershed Planning and Advisory Council, a mandate to take a leadership role in watershed assessment. NSWA produced the *State of the North Saskatchewan Watershed Report* in 2005. Since then, the NSWA has commissioned and prepared many reports concerning the assessment of water quality, water quantity (supply and instream flow needs), groundwater, cumulative effects, climate change and current and future water use (water allocation). See **Appendix B** for a list of these reports. The NSWA has also initiated the first sub-watershed management project for the Vermilion River.

The NSWA recognizes that although much scientific work has been initiated in the past few years, more work remains to be done so that stakeholders can come to agreement on these actions. More work also remains to develop effective assessment and modelling tools that can be used to support ongoing watershed planning activities. The following sections highlight information from key technical areas of study.

4.1 State of the North Saskatchewan River Watershed Report: A Foundation for Collaborative Watershed Management

The *State of the North Saskatchewan River Watershed Report* was intended to provide an improved scientific basis for decision-makers in the watershed.[69] The report compiled information about current land use, water and ecological conditions within the North Saskatchewan Watershed in a GIS database format.

Fifteen indicators of watershed health were selected and ranked by a panel of experts and members of the NSWA for each of the sub-watersheds. These indicators were summarized and yielded a subjective health rating. The overall health of the entire North Saskatchewan Watershed (in 2005) was generally fair (on a scale of excellent, good, fair and poor) and includes some sub-watersheds where ecosystem function is significantly impaired by human activity.

For the indicators where data were available, and through the assessment methods used, the watershed was most healthy in the four headwater sub-watersheds, which include the Cline, Brazeau, Clearwater and Ram. East of the headwaters, where livestock density, human activity and populations are greatest, health tended to decline. Generally, the health of a sub-watershed was poorer in those sub-watersheds where land use was more intensive and where riparian health scores and wetland cover were lowest.

[69] North Saskatchewan Watershed Alliance. (2005). *State of the North Saskatchewan Watershed Report 2005 - A Foundation for Collaborative Watershed Management.*

Disturbances noted in 2005 included the Alberta Capital Region's impacts on the river mainstem from treated wastewater and stormwater outfalls. For example, at that time the *Alberta Surface Water Quality Index* declined downstream of Edmonton due to increases in both *E. coli* counts and phosphorus concentrations. However, the impact of the City of Edmonton has been reduced considerably by recent improvements in wastewater treatment technology (tertiary treatment including biological nutrient removal and disinfection) and is anticipated to improve further as the City of Edmonton moves forward with proposed stormwater treatment strategies.

The impacts of high agricultural intensity in the Vermilion, Frog, Beaverhill, Modeste and Strawberry sub-watersheds was reflected in higher phosphorus levels, lower riparian health scores and lower wetland densities. In these sub-watersheds, water quantity will continue to be an issue, as will water quality given these results. Pesticides were detected in several sub-watersheds, but concentrations did not exceed the Canadian Council of Ministers of the Environment (CCME) *Surface Water Quality Guidelines for the Protection of Aquatic Life*.

Existing or available data on biological indicators (aquatic macrophytes, fish population estimates, vegetation types and benthic invertebrates) and water quantity were least available for this 2005 study, and therefore not adequate to properly assess watershed health. Pharmaceuticals (animal and human) were found to be of concern to NSWA members. Their effects on humans and aquatic life are not well known or documented in the watershed. This was identified as a data gap requiring future research.

4.2 Water Quality

The overall water science research and monitoring record indicates that the most pressing issues in the mainstem of the North Saskatchewan River continue to be those related to water quality management. Water quality impacts arise from both point sources, such as municipal wastewater treatment plants or industrial outfall pipes, or from non-point sources over large landscapes and periods of time. The latter are usually associated with land-use activities such as agriculture, forest management and oil & gas development. Disturbances to forest ecosystems can reduce water quality, and recovery will only occur with re-vegetation. In particular, resource roads and stream crossings can have significant impacts on water quality in terms of erosion of surface soils and increased sediment deposition in streams.

Certain aspects of water quality in the North Saskatchewan River have improved over the past five decades due to augmented winter flows, resulting from the operation of the Big Horn and Brazeau hydro-electric dams, and from the implementation of improved wastewater treatment technologies throughout the watershed. As well, there are many regulations, guidelines and best management practices in place that are intended to reduce or prevent non-point pollution on a site-specific basis. On the other hand, there has been less effort made towards addressing the cumulative impacts resulting from numerous land-use activities.

4.2.1 Water Quality Objectives

Water Quality Objectives are needed to establish limits on the cumulative effects of human activities on river water quality. The NSWA has studied water quality conditions for the mainstem of the North Saskatchewan River.[70] That report proposes Water Quality Objectives for

five specific monitoring sites located on the North Saskatchewan River between the headwaters and the Alberta/Saskatchewan border. The NSWA is recommending that its proposed Water Quality Objectives be used as the starting point for discussion by a new working group dedicated to this action (see **Section 6.2** of this report, Action 1.1.1). NSWA's Water Quality Objectives report is available to review online (www.nswa.ab.ca). The working group is expected to examine options to the current policy of "no further degradation", including managing water quality to targeted limits. The NSWA is committed to discussing the working group's recommendations with North Saskatchewan River watershed stakeholders through a consultation process.

NSWA's proposed Water Quality Objectives

Working with consultants, the NSWA's Technical Advisory Committee identified specific river reaches (a length of the river between two specific points), monitoring sites and current water uses within each river reach. The Committee selected water quality indicators and reviewed published guidelines developed to protect various water uses including aquatic ecosystem health, drinking water supply, stock watering, industrial and recreational uses. The Committee then reviewed the water quality data collected over the last 20 years in the North Saskatchewan River (1988-2007) and compared the data to the published guidelines. This comparison indicated:

- **Upstream of Edmonton** (at monitoring sites at Whirlpool Point, Rocky Mountain House and Devon): All water quality indicators are generally much better than the guidelines, although occasional peak runoff conditions can affect drinking water treatment due to the presence of high suspended solids, organic material and pathogens (total and fecal coliforms, *E.coli* and *Giardia*) loads in the river.
- **Downstream of Edmonton** (at Pakan and the Alberta/Saskatchewan border): Despite continuous population growth and development, certain aspects of water quality have been improving due in large part to improvements made to the City of Edmonton and Capital Region wastewater treatment systems. Other urban, industrial and agricultural impacts, however, are still evident. Most of the selected water quality indicators are better than the guidelines, but a few exceed them (total suspended solids, turbidity, fluoride and pathogens).

Based on this assessment, the NSWA is proposing the following Water Quality Objectives:

- **Upstream of Edmonton**: Maintain current water quality at Whirlpool Point, Rocky Mountain House and Devon monitoring sites. Statistical analysis of long-term monitoring data to be used to track progress.
- **Downstream of Edmonton**: Maintain current water quality at Pakan and the Alberta/Saskatchewan border monitoring sites for indicators that meet or are within the guidelines; improve water quality for those few indicators that do not meet the guidelines. Statistical analysis of long-term monitoring data to be used to track progress.

[70] North Saskatchewan Watershed Alliance. (2010). *Proposed Site-Specific Water Quality Objectives for the Mainstem of the North Saskatchewan River*. http://nswa.ab.ca/resources/nswa_publications/water-quality-objectives.

These proposed Water Quality Objectives are based on the existing policy of "no further degradation" of current water quality, a policy which is currently reflected in important initiatives: the Canada, Alberta, Saskatchewan, Manitoba *Master Agreement on Apportionment*; the Canadian Council of Ministers of the Environment Environmental Quality Objectives; and Alberta Environment's *Water Quality Guidelines for Use in Alberta*.

Implications of the proposed Water Quality Objectives

- New point-source and non-point source loads need to be minimized. Otherwise, new loads must be offset by reducing current loads to the river.
- Continuing point-source load reductions in the Capital Region are required for certain indicators.
- In the future, if river flows decline due to natural causes or increased water use, further load reductions may be required.
- Current non-point source pollution needs to be minimized or reduced.

4.3 Water Supply Management

4.3.1 Instream Flow Needs and Transboundary Commitments

Instream Flow Needs (IFN) refers to the amount of water flowing in a river or stream needed to sustain a healthy aquatic ecosystem. It is achieved by maintaining a natural cycle of high, medium and low flows to address the needs of multiple components of an aquatic ecosystem.[71]

The Canada, Alberta, Saskatchewan, Manitoba *Master Agreement on Apportionment* states that Alberta must allow at least 50% of the annual, naturalized flow of eastward-flowing rivers to enter Saskatchewan.[72] Seasonal flow in the middle and lower reaches of the North Saskatchewan River is affected by two hydro-electric dams in the headwaters: the Brazeau Dam on the Brazeau River and the Big Horn Dam on the North Saskatchewan River mainstem upstream of Rocky Mountain House. These dams change the annual pattern of the river flow. Compared to the natural regime, flows are now lower in the summer and higher during winter. Water is stored by these dams during the spring and early summer high-flow period and released during the winter to generate power. Higher winter flows also improve the reliability of the drinking water supply and support the dilution of point-source effluents.

The NSWA recognizes that addressing the quantity of water flowing in the North Saskatchewan River is an important component of an IWMP. This includes understanding natural supply and variability, withdrawals and consumptive use, and instream flow needs. As a result, NSWA undertook preliminary studies on these topics.[73] The I*nstream Flow Needs Scoping Study* looked

[71] Alberta Environment and Fisheries and Oceans Canada. (2007) *Water Management Framework: Instream Flow Needs and Water Management System for the Lower Athabasca River.* www.dfo-mpo.gc.ca/regions/central/pub/water-eau/index-eng.htm.

[72] Canada, Alberta, Saskatchewan, Manitoba Master Agreement on Apportionment (1969). www.environment.alberta.ca/01706.html.

[73] North Saskatchewan Watershed Alliance. AMEC Earth and Environmental. (2007). *Current and Future Water Use in the North Saskatchewan River Basin*. http://nswa.ab.ca/resources/nswa_publications; North Saskatchewan Watershed Alliance. Golder Associates. (2008). Water Supply Assessment for the North Saskatchewan River Basin. http://nswa.ab.ca/resources/nswa_publications.

at potential scientific methods for determining instream flow needs for the North Saskatchewan River.[74] That study provided information on the steps, processes, ecosystem components and costs of future studies needed to assess instream flow needs and make recommendations. The NSWA has begun discussions with stakeholders regarding potential instream flow needs studies. The NSWA recognizes the importance of Transalta's current legal obligations and operational constraints with respect to their hydroelectric power and storage developments.

4.3.2 Current and Future Water Use in the North Saskatchewan River Watershed

The NSWA conducted a study that quantified current allocations, licenced use, and actual use of water for six sectors: municipal, agricultural (both stock watering and irrigation), commercial, petroleum, industrial, and other (primarily water management such as land drainage, wetland maintenance and lake stabilization) in each of the twelve North Saskatchewan River watershed sub-basins.[75] Future water use was also forecast over the next 25 years for low, medium and high growth scenarios.

Most of the water needed in the North Saskatchewan River watershed in Alberta is taken from surface sources; only about 1% of water is taken from groundwater. Of the average annual flow from the watershed, approximately 27% is allocated. However, many allocations are not being fully utilized and many users, such as thermal power plants and municipalities, return most of the water they use to the river. As a result, only 2.6% of the average annual flow is presently being consumed (withdrawn and not returned to the river). Industry (not including petroleum) accounts for 46% of this consumption; the petroleum industry accounts for about 18% of this consumption. The agricultural sector accounts for 12% and the commercial sector for 6%. Municipalities account for only 5% of the total amount of water consumed.

The medium growth rate scenario projected that consumption is likely to increase from 2.6% to 3.5% of average annual flow over the next 25 years. Most of this increase is expected to be in the petroleum sector. In this scenario, the industrial sector will likely decline due to closure of one thermal power plant, and the increase in all other sectors is expected to be small (0.15% of average annual flow).

4.3.3 Water Supply Assessment

The NSWA commissioned a study to assess the water supply in the North Saskatchewan River watershed.[76] This study assessed the water supply and its annual and monthly variability under natural conditions (as if there were no human changes) and existing climate.

The natural average annual volume of water (yield) of the North Saskatchewan River mainstem, where it crosses the Saskatchewan border, is 7.3 billion cubic metres. It is expected that 80% of the time, the annual volume of water will be between 5.1 and 10.4 billion cubic metres. Nearly

[74] North Saskatchewan Watershed Alliance. Golder Associates. (2007). *North Saskatchewan River Instream Flow Needs Scoping Study.* http://nswa.ab.ca/content/instream-needs and http://nswa.ab.ca/pdfs/Instream_Needs_2007.pdf.

[75] North Saskatchewan Watershed Alliance. (2009). Current and Future Water Use in the North Saskatchewan River Basin. http://nswa.ab.ca/content/current-and-future-water-use

[76] North Saskatchewan Watershed Alliance. Golder Associates. (2008). *Water Supply Assessment in the North Saskatchewan River Basin.* www.nswa.ab.ca/content/water-supply-assessment.

90% of the annual average water supply in the river comes from the upper four sub-watersheds (the Cline, Clearwater, Ram and Brazeau). The watershed area downstream of Edmonton to the Saskatchewan border contributes less than 5%.

The natural quantity (flow) of water in the river varies over the year (natural monthly variability). In the summer (June, July and August), nearly 60% of the annual supply of water comes into the river due to snowmelt and rainfall in the headwaters (upper part of the watershed). In the winter months (October to March), the supply of water entering the river in the headwaters is less than 20% of the annual amount. In the spring, however, water supplies entering the river from the eastern half of the watershed (downstream of Edmonton) peak in April due to earlier snow melts and lower summer rainfall.

4.3.4 Assessment of Climate Change Effects

The NSWA conducted a study that identified potential changes in water yield due to the effects of climate change.[77] It involved identifying trends in recent temperature (1960-1990), precipitation and stream flow in the North Saskatchewan River watershed in Alberta; applying several Global Climate Models and greenhouse gas emission scenarios; and using the results to predict changes to annual and monthly water yield over 25 years, represented by the conditions projected for a period between 2021 and 2050.

The study concluded the most likely future trend in yield is an increase in annual yield of 5% to 15%. However, it was noted that reductions in yield are still a possibility which need to be considered in watershed planning. Potential variations in monthly yields were found to be larger than the annual yield variations. The largest increases in monthly yields are projected to be in spring and the largest decreases during the summer and fall months.

4.4. Healthy Aquatic Ecosystems

The Alberta Water Council defines a healthy aquatic ecosystem as an aquatic environment that sustains its ecological structure, processes, functions and resilience within its range of natural variability.[78] The Council developed this working definition in collaboration with stakeholders with expertise in Alberta water issues. The Council's research on *Provincial Ecological Criteria for Healthy Aquatic Ecosystems* identifies criteria to guide the identification of areas within Alberta's watersheds that substantially contribute to the maintenance of aquatic ecosystem health.[79] The Alberta Water Council has committed to further research that will advance understanding of aquatic ecosystems and what is required to maintain and improve the health of these systems.[80] The NSWA recognizes that a healthy aquatic ecosystem is an important component of watershed planning.

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[77] North Saskatchewan Watershed Alliance. Golder Associates. (2008). *Assessment of climate change effects on water yield from the North Saskatchewan River Basin.* www.nswa.ab.ca/content/climate-change-effects-on-water-yield

[78] Alberta Water Council. (2008). *Healthy Aquatic Ecosystems – A Working Definition*, p. 5. www.albertawatercouncil.ca/LinkClick.aspx?fileticket=dO4RIIJ9sSQ%3d&tabid=59

[79] Alberta Water Council. (2009). *Provincial Ecological Criteria for Healthy Aquatic Ecosystems*. www.albertawatercouncil.ca/LinkClick.aspx?fileticket=1LxcW7%2f%2flqQ%3d&tabid=59

[80] Alberta Water Council. (2009). *Recommended Projects to Advance the Goal of Healthy Aquatic Ecosystems.* www.albertawatercouncil.ca/LinkClick.aspx?fileticket=4Wcp777lkb8%3d&tabid=59.

4.5 Cumulative Effects Assessment using ALCES©

As part of its research toward developing an IWMP, the NSWA wanted to better understand the long-term, cumulative impacts of development on the watershed and to highlight potential conflicts between development and sustainability. The NSWA engaged Dr. M. Sullivan and the ALCES© Group to undertake a high-level strategic and exploratory cumulative effects modeling exercise for the North Saskatchewan River watershed.[81] The project was intended to simulate the effects of major land uses in the watershed (agriculture, forestry, urban and petrochemical industry) on specific watershed values (such as biodiversity, landscape integrity, water quality and water quantity) over a 100-year time span.

The assessment found that the North Saskatchewan River watershed is, and will continue to be, heavily influenced by human development. Currently, the main footprints affecting watershed values are urban and residential development and agricultural use. Cumulative effects from these and other activities have had significant detrimental effects on biodiversity, landscapes and sub-basin water quality. Effects on the quantity of water are comparatively minor. The results of four future development scenarios modelled for this study show that urban and residential expansion will be very significant and will occur largely at the expense of natural and agricultural lands.

The results suggested by these simulations can be used to highlight potential areas of mitigation and restoration, and priorities for policy changes. The report suggests that strategies should be favoured that emphasize reductions in point and non-point pollution as well as protection and restoration of the aquatic ecosystem, including lakes, wetlands and riparian areas. Protection and restoration has the potential to increase resilience and mitigate potential effects of climate change on these systems. This report also suggests that in the future, controlling sprawl appears to be one of the most powerful means of limiting further degradation of the watershed. This model should be seen as an important first step towards integrating watershed planning under *Water for Life*, the Cumulative Effects Management System and the *Land-use Framework* in the North Saskatchewan River watershed.

4.6 Economic Activity and Ecosystem Services

There is growing recognition that sustainable development requires balancing the impacts of economic activity with the environment's ability to continue to provide ecological functions (ecosystem services) that benefit people, but which are not normally factored into estimates of economic activity (gross domestic product, or GDP). Therefore, the NSWA commissioned a study on the value of economic activity and the relative importance and values of services being provided by ecosystems for each of the 12 sub-basins in the North Saskatchewan River watershed.[82]

[81] North Saskatchewan Watershed Alliance. Sullivan, M. G., ALCES© Group. (2009). *Cumulative Effects Assessment of the North Saskatchewan River Watershed using ALCES©*. http://nswa.ab.ca/resources/nswa_publications.

[82] North Saskatchewan Watershed Alliance. Thompson, J., Watrecon Consulting. (2010). *Economic Activity and Ecosystem Services in the North Saskatchewan River Basin.* http://nswa.ab.ca/economics.

The study concluded that the overall well-being of residents of the North Saskatchewan River watershed, as measured in economic terms, is on the order of $96.8 billion. This represents the value of economic activity ($79.1 billion) plus the value of ecosystem services generated by the landscape ($17.7 billion). In six of the 12 sub-basins, the value of economic activity exceeded the value of ecosystem services. These include the Strawberry, Sturgeon and Beaverhill sub-basins, which accommodated 89% of the population in 2006, as well as the Modeste, Vermilion and Monnery sub-basins. In the other six sub-basins, which only accounted for 4.5% of the population, the value of ecosystem services generated by the landscape exceeded the value of economic activity. For the five sub-basins upstream of Edmonton, the value of ecosystem services ($10.2 billion) was actually double the value of economic activity ($5.0 billion). Downstream of Edmonton, the value of ecosystem services ($4.9 billion) was 80% of the value of economic activity ($6.0 billion).

The ecosystem services valued at $17.7 billion in 2008 are significant relative to the estimated $79.1 in GDP generated in 2007 in the watershed. It is clear that ecosystem services represent a significant contribution to both human and ecological well-being. The results demonstrate the need to balance economic benefits while maintaining healthy and flourishing ecosystems that benefit human well-being, including the provision of clean and reliable water supplies.

4.7 EPCOR Source Water Protection Plan

EPCOR, the water utility for the City of Edmonton and surrounding area, has prepared a *Source Water Protection Plan* for the drinking water system. The plan presents information about the North Saskatchewan River watershed, identifies hazards, assesses risks and lays out specific actions EPCOR will take. The plan describes Source Water Protection (SWP) as "part of a multi-barrier approach for water utilities to protect both quality and quantity of water sources and to understand and mitigate potential risks to source water supplies through a watershed and aquifer approach. The quality of a surface or groundwater source is a direct result of the natural processes and human activities that occur within a watershed or within or above an aquifer."[83] One of the goals in EPCOR's plan is "to promote environmental stewardship through educational programs and collaborative initiatives such as participation in Watershed Planning and Advisory Councils...."[84]

[83] EPCOR Water Services Inc. (April 2008). *Edmonton's Drinking Water System Source Water Protection Plan*, p. 73.
[84] Ibid, p. 73.

5. Issues Identified by Stakeholders

NSWA has identified and summarized, by common themes, the issues, concerns, opinions and questions raised by stakeholders through the stakeholder engagement process from 2005 to 2010 (see **Appendix C** for a list of events held with stakeholders).

Following the release of the report, *From the Mountains to the Sea: State of the Saskatchewan River Basin* (2009), the NSWA conducted a further scan of the issues with stakeholders in the North Saskatchewan River watershed in relation to the general condition of the Saskatchewan River basin and the seven major vulnerabilities identified in the basin report.[85] Issues identified during these forums are summarized below.[86] The issues are organized by common themes, according to the four elements identified in the *Framework for Water Management Planning: Strategy for the Protection of the Aquatic Environment*[87] and under a fifth category described as 'governance':

1. **Water Quantity** (supply of water available): quantity and access to potable water; long-term monitoring of current conditions; information about the state of groundwater and recharge areas; changes to allocation policy; source water protection; inter-basin transfers of water; establishing objectives (thresholds) for water quantity (instream flow); declining recreational lake levels; cumulative effects of unregistered domestic wells; water management plans for drought and flood conditions.
2. **Water Quality** (chemical, microbiological and physical characteristics of water): quality of potable water; cost and control of water quality management; aging water treatment infrastructure; building regional pipelines; well testing; planning and treatment for wastewater contaminants; disposal of effluent from sewage lagoons; establishing objectives (thresholds) for water quality; runoff from forestry cut blocks and road construction; effects of oil & gas drilling on water wells; effects of spreading manure on fields; impacts from pesticides and fertilizer; reclamation of abandoned mines and well sites.

[85] Partners FOR the Saskatchewan River Basin. (2009). *From the Mountains to the Sea: State of the Saskatchewan River Basin.* www.nswa.ab.ca/content/other-publications/state-of-sask-river. The seven vulnerabilities in this report include: landscape modification; water supply; climate change; dams and diversions; municipal water; natural hazards and invasive species.

[86] Forums held with rural municipalities (December 2009) and with stakeholders in the Headwaters and Downstream sub-regions of the North Saskatchewan River watershed.

[87] Government of Alberta (no date). *Framework for Water Management Planning*, p. 20.

3. **Habitat** (physical and biological structure of the water body and the land surrounding it) and **Aquatic species** (plants and animals living in or associated with waterbodies, wetlands and riparian areas): development pressures; fragmentation of the natural landscape; number of parcels in a subdivision; development in flood plains; drainage of wetlands; preservation of wetlands; an approved wetlands policy; riparian protection; removing barriers to fish passage; forest biomass used for biofuels; integrated pest management to control invasive species; linear development (road construction, seismic lines, etc.); uncontrolled recreation (random camping and 'quadding').
4. **Knowledge** (information and education): education and awareness of the value of water, the interconnectedness of waterbodies and wetlands, the cost of good quality drinking water and the status/health of private wells; translating scientific information into useful information for local decision-makers; access to information regarding watershed pressures and best practices; long-term monitoring, evaluation and reporting.
5. **Governance** (how people organize themselves to accomplish their goals):[88] restrictions on development in the headwaters to protect water quantity and quality for downstream users; fostering cooperation/understanding between neighbouring counties; alignment of policies/regulations between jurisdictions; inter-jurisdictional coordination and collaboration between the Green Area (public forested land) and the White Area (settled areas); cooperation/coordination for road construction; cost of water; financing the preservation and restoration of wetlands; enforcement of existing regulations; accountability; incentives for implementing best practices; telling landowners what they can and cannot do on their own land.

[88] Alberta Environment. De Loë, R.C et.al. *From Government to Governance: A State-of-the-Art Review of Environmental Governance*, p. 1. http://environment.gov.ab.ca/info/posting.asp?assetid=8187&searchtype=asset&txtsearch=518.

6. Draft Recommendations

This discussion paper presents goals, watershed management directions and actions which strive to address the issues identified by stakeholders and to achieve the three stated goals of the Water for Life Strategy: safe, secure drinking water; healthy aquatic ecosystems; and reliable, quality water supplies for a sustainable economy. The NSWA recognizes that stakeholders have done, and are in the process of doing, much work to meet these goals.

The presentation of these goals, watershed management directions and actions is intended to be a starting point for discussion and does not represent a full range of alternatives or final recommendations by NSWA. Following discussions with stakeholders, the NSWA will consider all comments and responses received through the companion IWMP Workbook to this discussion paper. NSWA will then develop a draft IWMP for further consultation with stakeholders. A final IWMP will then be developed for approval by the NSWA's Board of Directors and submission to the Government of Alberta and other stakeholders for endorsement and implementation.

6.1 Definitions

- **Goal**: An overall, long-term result the plan is intended to achieve.
- **Watershed Management Direction**: A specific, measurable condition that quantifies efforts to achieve a desired goal.
- **Action**: A specific management activity undertaken to achieve the goal and watershed management direction. Actions include examples of strategies and best management practices. The actions identified are not exhaustive, but instead serve as examples that reflect the NSWA's current understanding of the balance among environmental, social and economic needs and interests. These actions are expected to be refined and adapted by stakeholders as this understanding evolves, resulting in continuous improvement.
- **Stakeholder**: Any member of the public (any individual or group of individuals, organization, business or political entity) with an interest in the outcome of decisions affecting the North Saskatchewan River watershed.[89]

These words have the following meanings for the purposes of this discussion:

- **Maintain**: keep in a condition suitable for all uses including ecosystem health, but not necessarily in the current or natural condition.
- **Improve**: where a condition is impaired, move toward a condition suitable for all uses, including ecosystem health, but not necessarily to a natural condition.
- **Minimize**: reduce impacts to the lowest (best) level that is technically feasible, economically viable, and socially acceptable.

[89] International Association of Public Participation. (2006). *Planning for Effective Public Participation*, p. 5.

- **Reduce**: measurable reduction of human impacts.
- **Restore**: re-establish a functional, self-sustaining ecosystem whose characteristics reasonably match natural conditions prior to drainage or other human alterations.
- **Protect**: where near-natural conditions exist, control and limit human impacts on all uses including ecosystem health.

6.2 Goals, Watershed Management Directions and Actions

The first, second and third goals focus on maintaining and improving water quality, water quantity (instream flow) and aquatic ecosystem health in the North Saskatchewan River watershed. The fourth goal focuses on protecting groundwater. The fifth goal focuses on aligning all regional-scale planning initiatives currently underway or in development in the North Saskatchewan River watershed in order to clarify roles, responsibilities and accountabilities.

Goal # 1:
Maintain or improve water quality in the North Saskatchewan River watershed.

Watershed Management Direction 1.1:
Site-specific Water Quality Objectives are developed and implemented for the mainstem of the North Saskatchewan River.

References: NSWA's Water Quality Objectives report;[90] NSWA's cumulative effects assessment report.[91]
Indicators: Water quality measured at long-term monitoring sites.

Actions:

1.1.1 NSWA to work with Government of Alberta and watershed stakeholders to finalize Water Quality Objectives for the mainstem of the North Saskatchewan River.

NOTE: As described in Section 4.2.1, the NSWA undertook a comprehensive assessment of water quality for the mainstem of the North Saskatchewan River and proposed Water Quality Objectives based on that assessment.

These proposed Water Quality Objectives are to act as a starting point of discussion for the working group identified in Action 1.1.1. The group is expected to examine options to the current policy of "no further degradation", including managing water quality to other targeted limits. The NSWA is committed to discussing the working group's recommendations with North Saskatchewan River watershed stakeholders through a consultation process.

[90] All NSWA reports cited in this report are available on the website at www.nswa.ab.ca/resources/nswa_publications. North Saskatchewan Watershed Alliance. (2010). *Proposed Site-Specific Water Quality Objectives for the Mainstem of the North Saskatchewan River.*

[91] *North Saskatchewan Watershed Alliance. Sullivan, M., et.al. (2009). Cumulative Assessment of the North Saskatchewan River Watershed Using ALCES©.*

1.1.2 NSWA to recommend these Water Quality Objectives to the Government of Alberta for inclusion as part of a Water Management Plan or an Approved Water Management Plan for the North Saskatchewan River watershed.

Watershed Management Direction 1.2:
Total contaminant loads entering the mainstem of the North Saskatchewan River, from all point and non-point sources, are managed so that the Water Quality Objectives at long-term river network monitoring sites are met.

Point sources: effluents entering the river from the end of a pipe and other constructed channels including industrial and municipal wastewater discharges, storm sewers and combined sewer outfalls.

Non-point sources: runoff from natural landscapes, farm fields, logging areas, mines, urbanized areas and roads.

References: NSWA's Water Quality Objectives report;[92] NSWA's Hydrodynamic and Water Quality Model Report 2009.[93]
Indicators: Cumulative pollutant loads from point and non-point sources are measured and modelled.

Actions:

1.2.1 All point source approval holders (municipalities and industries) to quantify point source loads for all pollutants for which Water Quality Objectives have been established (e.g. for phosphorus, nitrogen and total suspended solids):

- Municipalities to quantify storm water loads from storm water outfalls.
- Municipalities and industries to quantify pollutant loads from end-of-pipe outflows and wastewater lagoons.

1.2.2 Government of Alberta and point source approval holders within each river reach (length of the river between two specific points) of the North Saskatchewan River to work together to set load targets and negotiate load allocations for each pollutant to meet site-specific Water Quality Objectives in the mainstem of the North Saskatchewan River. For example:

- The Capital Region Board, in consultation with its stakeholders, to finalize a load plan to integrate the management of all point source and non-point source loads within the Capital Region in order to meet Water Quality Objectives established at the Pakan and Alberta/Saskatchewan border long-term river network monitoring sites.
- Drayton Valley, Rocky Mountain House, Devon and local industries to work together to develop a load plan in the upper North Saskatchewan River mainstem to integrate the management of all point and non-point source loads to meet the Water Quality Objectives established at the Rocky Mountain House and Devon long-term river network monitoring sites. NSWA to facilitate and support these actions.

[92] North Saskatchewan Watershed Alliance. (2010). *Proposed Site-Specific Water Quality Objectives for the Mainstem of the North Saskatchewan River.*
[93] North Saskatchewan Watershed Alliance. Tetra Tech. (2009). *Hydrodynamic and Water Quality Model of the North Saskatchewan River.*

1.2.3 Government of Alberta and participating stakeholders to complete and implement the Water Management Framework for the Industrial Heartland and Capital Region.

1.2.4 Government of Alberta, in collaboration with NSWA, municipalities and industry, to evaluate current water quality monitoring and future needs in the mainstem of the North Saskatchewan River.

1.2.5 Government of Alberta to develop a plan to fund and implement a comprehensive long-term water quality monitoring system for the mainstem of the North Saskatchewan River that includes the creation of a more accessible database for all point source load data.

Watershed Management Direction 1.3:
Water Quality Objectives are developed and implemented for all major tributaries to protect tributary uses and support the achievement of water quality management goals in the North Saskatchewan River.

References: NSWA Water Quality Objectives report;[94] NSWA's cumulative effects assessment.[95]
Indicators: Water quality measured at long-term monitoring sites to be established at the confluence (mouth) of tributaries entering the North Saskatchewan River mainstem.

Actions:

1.3.1 NSWA to work with local stakeholders to initiate sub-basin watershed plans to address local issues in response to their requests. These plans to include:

- Collaborative issue identification with all stakeholders in each sub-basin.
- Water Quality Objectives to maintain or improve water quality in the tributaries in order to protect water uses and support achievement of mainstem Water Quality Objectives.
- Analysis of current management practices in relation to best management practices within each industry sector operating in the sub-basin.
- Recommendations to improve management practices, where required, to minimize and reduce the impact of point source and non-point source discharges.

1.3.2 Government of Alberta, in collaboration with NSWA and watershed stakeholders, to evaluate current water quality monitoring in the major tributaries of the North Saskatchewan River watershed.

1.3.3 Government of Alberta to develop a plan to fund and implement a comprehensive long-term water quality monitoring system established at the confluence of major tributaries entering the North Saskatchewan River mainstem.

[94] North Saskatchewan Watershed Alliance. (2010). *Proposed Site-Specific Water Quality Objectives for the Mainstem of the North Saskatchewan River.* Also see: Alberta Environment. (no date). *Framework for Water Management Planning.* http://environment.alberta.ca/documents/Framework_for_water_management_planning.pdf

[95] North Saskatchewan Watershed Alliance. (2009). Sullivan, M., et.al. *Cumulative Assessment of the North Saskatchewan River Watershed Using ALCES.*

1.3.4 Government of Alberta to continue to work with agriculture and other sectors to minimize impacts and reduce non-point source pollution by; analyzing current practices and plans; developing, monitoring and enforcing the implementation of updated plans; and utilizing best practices.

- For example, reviewing and updating nutrient and grazing management practices and plans and implementing best practices.

1.3.5 Government of Alberta to work with the oil & gas sector to review, update and report on current response plans for pipeline breaks in order to manage risks to drinking water supplies.

Watershed Management Direction 1.4:
Drinking water source protection plans are developed and implemented by waterworks utilities within the North Saskatchewan River watershed.

Source water: the waterbody from which a utility draws its supply of water.

References: EPCOR's Source Water Protection Plan;[96] Standards and Guidelines for Municipal Water Works.[97]
Indicators: The number of waterworks utilities which have completed drinking water source protection plans

Action:

1.4.1 All waterworks utilities in the watershed, in collaboration with Government of Alberta and other stakeholders, to develop drinking water source protection plans.

Goal #2:
Maintain or improve water quantity (flow) conditions in the North Saskatchewan River.

Watershed Management Direction 2.1:
Future risks to surface water supply in the North Saskatchewan River watershed are evaluated.

References: NSWA's Water Supply Assessment Report; NSWA's Report on Current and Future Water Use in the North Saskatchewan River basin; NSWA's Assessment of Climate Change Effects; and NSWA's Report on Cumulative Effects Assessment.[98]
Indicators: Water quantity measured at Water Survey of Canada long-term monitoring sites.

[96] EPCOR Water Services Inc. (April 2008). *Edmonton's Drinking Water System Source Water Protection Plan*.
[97] Alberta Environment. (2006). Standards and Guidelines for Municipal Waterworks, Wastewater and Drainage Systems. http://environment.gov.ab.ca/info/posting.asp?assetid=6979&searchtype=asset&txtsearch=standards
[98] North Saskatchewan Watershed Alliance: Golder Associates. (2008). *Water Supply Assessment in the North Saskatchewan River Basin*; Golder Associates. (2008). *Assessment of climate change effects on water yield from the North Saskatchewan River Basin*; AMEC Earth and Environmental. (2007). *Current and Future Water Use in the North Saskatchewan River Basin*; Sullivan, M., et.al. (2009). *Cumulative Assessment of the North Saskatchewan River Watershed Using ALCES©.*

Actions:

2.1.1 Government of Alberta to work with NSWA and other stakeholders to develop and implement a water resource management model (a tool to manage flow and licensing data) for the North Saskatchewan River watershed.

2.1.2 Government of Alberta and other stakeholders to evaluate and report risks to the water supply of the North Saskatchewan River and its tributaries resulting from climate change, landscape-scale disturbances and the interactions between surface and groundwater diversions.

2.1.3 Government of Alberta, in collaboration with other stakeholders, to evaluate and report on the need for future constructed water storage.

2.1.4 Government of Alberta, in collaboration with other stakeholders, to evaluate and report on the need to establish a cap on water allocations for the North Saskatchewan River watershed.

Watershed Management Direction 2.2:
Instream Flow Needs are assessed and Instream Flow Objectives are developed and implemented for the mainstem of the North Saskatchewan River.

Instream Flow Needs (IFN): the amount of water flowing in a river or stream needed to sustain a healthy aquatic ecosystem. This is achieved by maintaining a natural cycle of high, medium and low flows to address the needs of multiple components of an aquatic ecosystem.

References: Industrial Heartland Water Management Framework report;[99] NSWA's Instream Flow Needs Scoping report;[100] NSWA's Water Quality Objectives report;[101]
Indicators: Water quantity measured at Water Survey of Canada long-term monitoring sites.

Actions:

2.2.1 NSWA to work with Alberta Water Council and stakeholders to identify methodologies to assess instream flow needs.

2.2.2 NSWA to work with Government of Alberta and stakeholders to evaluate instream flow needs for the protection of water quality, fish habitat, riparian zones, channel maintenance and intake structure requirements.

2.2.3 NSWA to recommend Instream Flow Objectives to the Government of Alberta for inclusion as part of a Water Management Plan or an Approved Water Management Plan for the North Saskatchewan River watershed.

[99] Alberta Environment. (2007). *Water Management Framework for the Industrial Heartland and Capital Region*. Appendix D. http://environment.gov.ab.ca/info/library/7864.pdf
[100] North Saskatchewan Watershed Alliance. Golder Associates. (2007). *Instream Flow Needs Scoping Study.*
[101] North Saskatchewan Watershed Alliance. (2010). *Proposed Site-Specific Water Quality Objectives for the Mainstem of the North Saskatchewan River.*

Watershed Management Direction 2.3:
Water quantity in the mainstem of the North Saskatchewan River is managed to meet Instream Flow Objectives.

References: Industrial Heartland Water Management Framework report;[102] NSWA's Instream Flow Needs Scoping report;[103] NSWA's Water Quality Objectives report;[104]
Indicators: Water flow rates measured at long-term monitoring sites.

Actions:

2.3.1 Government of Alberta to manage the water allocation licencing and approval process to meet Instream Flow Objectives, as part of a Water Management Plan, and to meet commitments to the Prairie Provinces Water Board.

- Government of Alberta to require approval holders under the *Water Act* to account for withdrawals, return flows and consumptive use.
- Government of Alberta to review approvals and licences to determine if they are in good standing.

2.3.2 Government of Alberta to monitor, evaluate and report on the achievement of Instream Flow Objectives as part of a Water Management Plan or an Approved Water Management Plan.

Goal #3:
Maintain or improve aquatic ecosystem health in the North Saskatchewan River watershed.

Watershed Management Direction 3.1:
Aquatic Ecosystem Health Objectives are developed for all major waterbodies and riparian areas.

Healthy aquatic ecosystem: an aquatic environment that sustains its ecological structure, processes, functions and resilience within its range of natural variability.[105]

Riparian areas: the bank and shore lands adjacent to and between streams, rivers, lakes and wetlands and their surrounding uplands, where the vegetation and soils are influenced strongly by the presence of water.[106]

[102] Alberta Environment. (2007). *Water Management Framework for the Industrial Heartland and Capital Region*. Appendix D. http://environment.gov.ab.ca/info/library/7864.pdf
[103] North Saskatchewan Watershed Alliance. Golder Associates. (2007). *Instream Flow Needs Scoping Study.*
[104] North Saskatchewan Watershed Alliance. (2010). *Proposed Site-Specific Water Quality Objectives for the Mainstem of the North Saskatchewan River.*
[105] Alberta Water Council. (2008). Healthy Aquatic Ecosystems – A Working Definition, p. 5. www.albertawatercouncil.ca/LinkClick.aspx?fileticket=dO4RIIJ9sSQ%3d&tabid=59
[106] Cows and Fish: Alberta Riparian Habitat Management Society. www.cowsandfish.org/riparian/riparian.html

References: Alberta Water Council's Health of Aquatic Ecosystem project reports.[107]
Indicators: As identified by the above reports measured at long-term monitoring sites.

Actions:

3.1.1 Government of Alberta, in collaboration with North Saskatchewan River watershed stakeholders, to develop Aquatic Ecosystem Health Objectives for key waterbodies in the North Saskatchewan River watershed, including the mainstem, tributaries, lakes, wetlands and riparian areas.

3.1.2 Government of Alberta, in collaboration with North Saskatchewan River watershed stakeholders, to assess the current state of aquatic ecosystem health of key waterbodies.

3.1.3 Government of Alberta, in collaboration with North Saskatchewan River watershed stakeholders, to develop, fund and implement long-term monitoring of aquatic ecosystem health on priority waterbodies for inclusion as part of a Water Management Plan or an Approved Water Management Plan.

3.1.4 NSWA, working with counties, summer villages, recreational councils and sport fishing groups, to develop a priority list of lakes requiring water quality management plans.

Watershed Management Direction 3.2:
Numbers and areal coverage of wetlands are maintained or increased.

Areal coverage: area of land (km^2) covered by wetlands.

References: Alberta Water Council Recommendations for a New Wetland Policy;[108] Ducks Unlimited Canada, Broughton Creek Study;[109] Alberta Water Resources Commission, Interim Wetlands Policy.[110]
Indicators: Number and areal coverage of wetlands in the North Saskatchewan River watershed. Baseline determined by the *Water for Life* inventory.

Actions:

3.2.1 Government of Alberta, in collaboration with NSWA and other stakeholders, to develop wetland protection and restoration plans, practices and policies that include:

- Establishing wetland conservation and restoration objectives for the watershed addressing all wetland types and classes.

[107]Alberta Water Council. (2009). Healthy Aquatic Ecosystems – A Working Definition; Alberta Water Council. (2009). Recommended Projects to Advance the Goal of Healthy Aquatic Ecosystems; Alberta Water Council. (2009). Provincial Ecological Criteria for Healthy Aquatic Ecosystems. www.albertawatercouncil.ca/Publications/tabid/59/Default.aspx

[108]Alberta Water Council. (2008) *Recommendations for a New Wetland Policy*; Alberta Water Council. (2008) *Recommendations for a New Wetland Policy Implementation Plan.* www.albertawatercouncil.ca/Publications/tabid/59/Default.aspx

[108]Ducks Unlimited Canada. (2008). *Water Quality and Quantity Benefits from Wetland Conservation and Restoration in the Broughton's Creek Watershed*; Ducks Unlimited Canada. (2004). *Natural Values -The Importance of Wetlands and Upland Conservation Practices in Watershed Management: Functions and Values for Water Quality and Quantity.*

[110]Alberta Water Resources Commission. (1993). *Wetland Management in the Settled Area of Alberta: An Interim Policy*. http://environment.gov.ab.ca/info/library/6169.pdf

- Determining mitigation requirements where wetlands lost or destroyed are replaced at an agreed-upon ratio.
- Conserving and restoring wetlands in order to sustain their beneficial ecosystem services including maintenance and improvement of surface and groundwater quality and quantity, groundwater recharge, biodiversity, etc.
- Creating incentives for protecting and restoring wetlands.
- Developing indicators to evaluate wetland function.

3.2.2 Government of Alberta and municipalities to incorporate wetland conservation and restoration guidelines into regulations and by-laws.

3.2.3 Government of Alberta, in collaboration with NSWA and other stakeholders, to complete wetland inventories.

3.2.4 Ducks Unlimited Canada, municipalities and other stakeholders to restore drained and altered wetlands (or create new wetlands where restoration is not feasible) in areas of the watershed where significant wetland loss has occurred, as defined in Alberta's Interim Wetlands Policy and determined by *Water for Life's* provincial comprehensive wetland inventory. This process to include:

- Application of the provincial wetland mitigation process.
- Coordination and support of Ducks Unlimited Canada wetland retention and restoration programs.

3.2.5 Urban municipalities to increase retention and restoration of wetlands and create new wetlands to mitigate storm water runoff and non-point-source contamination to help meet Water Quality Objectives in receiving waterbodies; naturally-occurring wetlands to be retained with their function and processes intact.

Watershed Management Direction 3.3:
Riparian area health and function are maintained or improved.

References: Alberta Water Council, Provincial Ecological Criteria for Healthy Aquatic Ecosystems (PEACH) report.[111]
Indicators: Riparian area statistics as identified in the PEACH report.

Actions:

3.3.1 Government of Alberta, in collaboration with NSWA, Ducks Unlimited Canada, Alberta Conservation Association, Alberta Riparian Habitat Management Society (Cows and Fish), and other stakeholders to conduct an assessment of riparian area conditions throughout the North Saskatchewan River watershed.

3.3.2 Government of Alberta and municipalities to develop and incorporate riparian set-back guidelines into regulations and by-laws.

3.3.3 Municipalities to work with other stakeholders to explore the availability of support (financial and expertise) to enable landowners to restore damaged riparian areas.

[111] Alberta Water Council. (2009). *Provincial Ecological Criteria for Healthy Aquatic Ecosystems*. (Known as the PEACH Report.)

Watershed Management Direction 3.4:
Environmental impacts from the activities of resource and utilities industries are minimized or reduced.

Green Area: Public forested land owned by the Province of Alberta that is removed from settlement and managed for various uses including: timber production; oil & gas; mining; recreation; watershed; wildlife and fisheries. Agricultural use is limited to grazing where it is compatible with other uses.[112]

References: NSWA's State of the North Saskatchewan Watershed Report;[113] NSWA's cumulative effects assessment.[114]
Indicators: Total length of linear development per sq. km.; soil erosion indices; number of hanging culverts; number of stream crossings; total length of restored linear development per sq. km.; number of un-reclaimed well sites.

Actions:

3.4.1 Government of Alberta to work with the municipalities and industries to minimize their impacts in the Green Area by reducing the density (km/km^2) of linear developments (roads, seismic, power lines, underground lines, etc.) by:

- Developing, implementing and enforcing coordinated access management plans and joint-use agreements among stakeholders.
- Developing and coordinating road-density plans to minimize the creation of new roads on the landscape.
- Reclaiming, restoring and reforesting all roads and other linear disturbances no longer in use.
- Controlling and limiting non-resource related transportation on roads and seismic lines through signage, physical barriers, replanting and other means.

3.4.2 Government of Alberta to work with the oil & gas sector to complete the process of improving regulations to reduce the footprint of active well sites and to reclaim and restore well sites defined as no longer in use.

- Government of Alberta and municipalities to work with the oil & gas sector to monitor and report on well reclamation progress.

3.4.3 Government of Alberta to work with resource industries to develop integrated planning, best management and reclamation practices, such as developing road maintenance plans, eliminating hanging culverts and minimizing construction of stream crossings.

3.4.4 Government of Alberta to work with stakeholders to complete and implement its gravel extraction policies.

[112]Definition from Alberta Sustainable Resource Development. www.srd.alberta.ca/MapsFormsPublications/Maps/ResourceDataProductCatalogue/Geoadministrative.aspx
[113]North Saskatchewan Watershed Alliance. (2005). *State of the North Saskatchewan Watershed Report 2005 - A Foundation for Collaborative Watershed Management*
[114]North Saskatchewan Watershed Alliance (2009). Sullivan, M., et.al. *Cumulative Assessment of the North Saskatchewan River Watershed Using ALCES.*

Watershed Management Direction 3.5:
Environmental impacts from municipal and industrial expansion are minimized or reduced.

References: NSWA's cumulative effects assessment;[115] Alberta Municipal Affairs Land Use Policies, Order in Council 522/96;[116] Alberta Wilderness Association Report.[117]
Indicators: Land-use inventory; Alberta Vegetation Inventory.

Actions:

3.5.1 Municipalities, business, industry and Government of Alberta to work together to identify and implement best land-use planning practices to guide future development, such as plans to:

- Increase densities of residential developments to limit the area of urban footprints and fragmentation of land in rural areas.
- Incorporate ecological corridors and low-impact designs into urban and rural planning and development.
- Ensure the timing and volume of post-development runoff does not exceed that of pre-development conditions.
- Minimize linear disturbance in new developments (such as road construction, telephone and power lines).
- Coordinate urban land-use planning within the Capital Region and among neighbouring rural municipalities through review and adoption of inter-municipal development plans.
- Restrict new development within flood-prone areas.
- Minimize the impacts and the environmental footprint of business and industrial developments and promote best practices.

[115]North Saskatchewan Watershed Alliance (2009). Sullivan, M., et.al. *Cumulative Assessment of the North Saskatchewan River Watershed Using ALCES©.*
[116]Alberta Municipal Affairs. (1996). *Land Use Policies. Order in Council 522/96*. www.municipalaffairs.alberta.ca/documents/ms/legframework.pdf.
[117]Alberta Wilderness Association. *Conservation Recommendations for the South Saskatchewan Regional Plan*. http://albertawilderness.ca/issues/wildlands/land-conservation/public-lands/archive/20091015_rp_awa_south_sask_rac.pdf

Watershed Management Direction 3.6:
Net loss of the permanent forested land base to other uses is minimized or reduced.

White Area: Settled area, where public land is part of the agricultural landscape and is managed for various uses including: agriculture; fish and wildlife habitat; recreation; soil and water conservation.[118]

References: NSWA's cumulative effects assessment;[119] Eastern Slopes Policy.[120]
Indicators: Land-use Inventory (% cover of forest land); Alberta Vegetation Inventory; rate of loss of the area of permanent forest land base.

Actions:

3.6.1 Government of Alberta to work with industrial, municipal and agricultural stakeholders to develop policies to guide and minimize conversion of forest land to other uses in the Green Area.

3.6.2 Government of Alberta to work with municipal and agricultural stakeholders to develop market-based incentives and policies to:

- Maintain forest cover and function in the White Area.
- Minimize the conversion of forest land to other uses in the White Area.

3.6.3 Municipal and agricultural stakeholders to work with Government of Alberta to develop policies and best practices to encourage re-forestation in order to maintain and improve forested riparian zones.

Watershed Management Direction 3.7:
Fish Management Objectives are established and achieved for the North Saskatchewan River mainstem, tributaries and lakes.

References: Alberta Sustainable Resource Development's Fish Management Objectives.[121]
Indicators: Status and distribution of fish populations in the North Saskatchewan River mainstem, tributaries and lakes.

Actions:

3.7.1 Government of Alberta, in collaboration with stakeholders, to review, update and implement Fish Management Objectives for the North Saskatchewan River mainstem and develop and implement Fish Management Objectives for key North Saskatchewan River watershed tributaries and lakes.

[118]Definition from Alberta Sustainable Resource Development. www.srd.alberta.ca/MapsFormsPublications/Maps/ResourceDataProductCatalogue/Geoadministrative.aspx

[119]North Saskatchewan Watershed Alliance (2009). Sullivan, M., et.al. *Cumulative Assessment of the North Saskatchewan River Watershed Using ALCES.*

[120]Government of Alberta (1984). *A Policy for Resource Management of the Eastern Slopes.* www.srd.alberta.ca/ManagingPrograms/Lands/Planning/documents/IntegratedResourcePlan-APolicyForResourceManagement-EasternSlopes-1984.pdf

[121]Alberta Sustainable Resource Development, Fisheries Management Branch (Oct .7, 2008). *Fisheries Management Objectives for the North Saskatchewan River.*

3.7.2 Government of Alberta and the federal Department of Fisheries and Oceans to assess, prioritize and protect significant fish habitat and populations in the North Saskatchewan River watershed.

3.7.3 Government of Alberta, Department of Fisheries and Oceans and other stakeholders to fund the restoration of significant fish habitat that has been lost or damaged.

3.7.4 Government of Alberta, in collaboration with other stakeholders, to develop and implement long-term monitoring of fisheries resources and aquatic habitat throughout the North Saskatchewan River watershed.

Watershed Management Direction 3.8:
Environmental Impacts from random camping and all other recreational activities on public land are minimized or reduced.

Random camping: camping in unapproved sites with no provisions for proper sanitation and waste removal.

References: Bighorn Backcountry Access Management Plan;[122] Clearwater Forest Area May Long Weekend Multi-Agency Task Force Report;[123] Report of the Southern East Slopes Task Force.[124]
Indicators: Number of co-developed recreation-access management plans; user density and field impact studies.

Actions:

3.8.1 Government of Alberta and municipalities to work with the recreation sector to develop access management plans that focus on managing recreational activities on public land.

3.8.2 Government of Alberta and municipalities to work with the recreation sector to implement and enforce recreation-access management plans.

3.8.3 Government of Alberta and municipalities to work with the recreation sector to develop education and awareness programs that promote responsible recreation use, activities and practices on public lands.

Watershed Management Direction 3.9:
Knowledge and understanding of the importance of a healthy aquatic ecosystem are improved.

References: Water for Life Strategy; NSWA publications (listed in **Appendix B**).
Indicators: Objectives for water quality, instream flow needs and aquatic ecosystem health; adoption levels of identified best management practices in each sector.

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[122] Sustainable Resource Development. (2002). Bighorn Backcountry Access Management Plan. www.srd.alberta.ca/RecreationPublicUse/RecreationOnPublicLand/ForestLandUseZones/documents/access_management_plan.pdf

[123] Alberta Sustainable Resource Development. (June 2009). Clearwater Forest Area May Long Weekend Multi-Agency Task Force Report. www.srd.alberta.ca/RecreationPublicUse/RecreationOnPublicLand/BighornBackcountry/documents/BighornBackcountry-AccessManagementPlan-MonitoringStandingCommittee-MeetingSummary-Jun11-2009.pdf

[124] Southern East Slopes Task Force. (2004). Final Report. http://rockymountaindirtriders.com/pdf/southern_east_slopes.pdf

Actions:

3.9.1 NSWA, in collaboration with the Government of Alberta, municipalities, industries and non-government organizations to develop active, wide-spread commitment to, and support for, watershed stewardship through improved education, communications and access to information.

Goal #4:
Protect groundwater quality and quantity in the North Saskatchewan River Watershed.

Watershed Management Direction 4.1:
Knowledge and understanding of groundwater quality and quantity are improved.

References: NSWA's groundwater report;[125]
Indicators: Number of aquifers characterized and mapped; number of recharge areas mapped.

Actions:

4.1.1 Government of Alberta to work with stakeholders to address gaps in knowledge about groundwater as identified in the NSWA's groundwater report, including:

- Mapping/characterizing aquifers and recharge areas in the mountains and foothills of the headwaters region and assessing their contribution to the base flow of the North Saskatchewan River mainstem.
- Mapping/characterizing sub-watershed and local aquifers and recharge areas in the central and downstream regions (e.g. Wagner Natural Area).
- Establishing long-term monitoring sites for water quality and water levels for each key aquifer.

4.1.2 Government of Alberta and stakeholders to advance public understanding of groundwater by increasing and sustaining extension and education activities for municipalities, landowners and other stakeholders who use or impact groundwater (e.g. Working Well Program).[126]

Watershed Management Direction 4.2:
Impacts on groundwater from resource, industrial, municipal and agricultural developments are minimized.

References: Raised by stakeholders at IWMP forum (Elk Point, June 3, 2010); Advisory Committee on Water Use Practice and Policy.[127]
Indicators: groundwater quality and quantity.

[125]North Saskatchewan Watershed Alliance. (2009). Worley-Parsons. North Saskatchewan River Basin: Overview of Groundwater Conditions, Issues and Challenges.
[126]Government of Alberta, Alberta Environment, Working Well Program. www.environment.alberta.ca/01317.html.
[127]Alberta Environment, Advisory Committee on Water Use Practice and Policy (2004). *Final Report to Alberta Minister of Environment.* http://environment.gov.ab.ca/info/library/6363.pdf

Actions:

4.2.1 Government of Alberta, in collaboration with forestry and oil & gas stakeholders, to assess impacts of resource exploration and development on groundwater recharge in the headwaters region.

4.2.2 Municipalities, in collaboration with Government of Alberta, industry and landowners to assess municipal/industrial/agricultural impacts on groundwater quality, quantity and recharge in central and downstream regions.

4.2.3 Government of Alberta and municipalities to work with the oil & gas sector to monitor, report, and share information on groundwater well data.

Watershed Management Direction 4.3:
Management strategies and plans to protect groundwater quality and quantity are developed.

References: NSWA's groundwater report;[128] Regional Groundwater Assessment Reports.[129]
Indicators: water use statistics; water quality and quantity measured at long-term monitoring wells.

Actions:

4.3.1 Municipalities, in cooperation with the Government of Alberta, to develop aquifer management plans for areas where population density and competing uses impact, or are a risk to, groundwater.

4.3.2 Government of Alberta, municipalities and other stakeholders to develop strategies to address cumulative effects of all water wells on groundwater aquifers.

4.3.3 Government of Alberta to identify and define sustainable pumping rates for priority aquifers.

4.3.4 Government of Alberta to require groundwater users to monitor and report water use from both licensed and non-licensed wells.

[128] North Saskatchewan Watershed Alliance (2009). Worley-Parsons. *North Saskatchewan River Basin: Overview of Groundwater Conditions, Issues, and Challenges.*

[129] Regional Groundwater Assessments reports for all 20 counties in the North Saskatchewan River watershed are available from Hydrogeological Consultants Ltd. Website: www.hcl.ca/reports.asp. E.g.: Hydrogeological Consultants Ltd. March 1999. *Leduc County. Regional Groundwater Assessment - Final. Part of the North Saskatchewan River Basin. Parts of Tp 047 to 051, R 21 to 28, W4M and R 01 to 04, W5M. [98-130.02] [83H .L4 1999/03-001].*

Goal #5:
Water and land-use planning are aligned at the regional scale.

Watershed Management Direction 5.1:
Cooperation and communication among planning initiatives are improved.

Actions:

5.1.1 Government of Alberta, Capital Region Board, municipalities and the NSWA to establish a working group to assess issues of planning integration and alignment within the North Saskatchewan River watershed in order to identify areas of overlap and inconsistency.

5.1.2 Government of Alberta, Capital Region Board, municipalities and NSWA to report on the integration, alignment and implementation of all regional scale planning and management initiatives through their respective reporting mechanisms.

7. Implementation of IWMP Recommendations

The NSWA has responded to the challenge of preparing an IWMP by developing a process that reflects the intention of the Terms of Reference and also meets the criteria for success described in the Alberta Water Council's report *Enabling Partnerships*.[130] That report describes successful partnerships as those that have broad stakeholder representation, use a watershed approach, build consensus around issues of watershed management, identify mechanisms for measuring results, and develop watershed planning recommendations that identify goals and actions that result in improved watershed management.

The NSWA has:

- Taken a watershed approach (defined as an approach that takes into account both ground and surface water flow, recognizing and planning for the interaction of water, plants, animals and human land-use found within the physical boundaries of a watershed.[131])
- Developed a stakeholder engagement process that is inclusive and strives to build consensus and support according to an identified stakeholder involvement framework (described in **Section 2.1.3**). The process provides a platform for meaningful dialogue, information exchange and for developing recommendations for governments, stakeholders and the public that will result in improved watershed management by addressing specific local issues identified by both the research and stakeholders.
- Prepared reports on the state of the North Saskatchewan River watershed, proposed site-specific Water Quality Objectives for the mainstem of the North Saskatchewan River, and studied other scientific and technical topics, which provide an improved scientific basis for decision-making. This is only the beginning of the scientific research needed. Much more work needs to be done to develop objectives for water quality, water quantity (instream flow) and healthy aquatic ecosystems. Successful implementation of any science-based, decision-making process requires a robust monitoring system to provide the basis for future recommendations and to ensure continuous improvement.
- Developed goals, watershed management directions and actions to maintain and improve the watershed. These were developed to address issues in the watershed identified by stakeholders and to achieve the three goals of the *Water for Life* Strategy: safe, secure drinking water; healthy aquatic ecosystems; and reliable, quality water supplies for a sustainable economy.
- Identified roles and responsibilities that must be assumed voluntarily by stakeholders in order to implement the IWMP.

[130]Alberta Water Council. Enabling Partnerships: *A Framework in Support of Water for Life: Alberta's Strategy for Sustainability*. P. 4. www.waterforlife.alberta.ca/documents/wflenabling_partnerships.pdf.
[131]Ibid, p. 4.

7.1 NSWA as a "bridging" organization

The points where two or more domains (disciplines or jurisdictions) meet are called interfaces (boundaries or divides). Bridging organizations and individuals support integration by helping people bridge the interface between domains. A report commissioned by the Government of Alberta to better understand environmental governance described bridging organizations and individuals as those that provide critical links between domains such as science and policy, community and government, assurance and stewardship, and regulatory and non-regulatory mechanisms.[132] These organizations and individuals have very specialized roles and clear responsibilities to groups on both sides of the interface. Most importantly, they provide the context for making sense. For example, between science and policy there is the difficult interface between qualitative and quantitative knowledge. Without context, data collected by scientists sometimes do not make sense to non-scientists. Bridging organizations and individuals facilitate clearer understanding, so that both scientists and policy makers develop an appreciation for both the meaning and implications of the data. By working together, each side addresses the challenges and opportunities revealed through the interpretation of the science, which can lead to new and innovative thinking. de Loë et al. describe this form of working together to create new understanding as the "co-production of knowledge."[133] The co-production of knowledge means generating new knowledge collaboratively by creating meaning together, in order to bridge the interface between two or more domains.

Bridging organizations and individuals help each side of the interface to:

- Understand the interrelationships between domains – connections, dependencies and points of leverage.
- Identify where issues of integration need to be taken into account (at the local, regional, provincial or federal level).
- Discuss roles and responsibilities for implementation of actions.
- Exchange information and points of view.
- Develop a deeper appreciation of both meaning and implications (co-production of knowledge).
- Move beyond the operational (who does what) into the strategic (influencing who does what) to achieve common objectives and goals.

7.2 Roles and Responsibilities of Stakeholders

The Draft Recommendations (goals, watershed management directions and actions) identified in this discussion paper suggest the following roles and responsibilities for watershed stakeholders:

[132]de Loë, R.C., Armitage, D., Plummer, R., Davidson, S. and Moraru, L. 2009. *From Government to Governance: A State-of-the-Art Review of Environmental Governance*. Final Report. Prepared for Alberta Environment, Environmental Stewardship, Environmental Relations, p. 22.

[133]de Loë et.al. 2009, p. 22.

NSWA, as a bridging organization, will:

- Submit the final IWMP to the Government of Alberta and stakeholders for endorsement and implementation.
- Continue to build commitment to implement IWMP recommendations by:
  - Developing working groups responsible for implementing actions according to priorities established by the NSWA in consultation with stakeholders.
  - Supporting the information needs of stakeholders in each working group.
  - Helping build consensus within each working group around subsequent actions needed to achieve IWMP goals.
- Develop a timetable for implementing IWMP priority actions.
- Develop funding recommendations and plans to support the implementation of the IWMP.
- Monitor and report on progress made implementing actions by the working groups.
- Develop annual work plans for IWMP implementation and update the IWMP at five-year intervals.
- Work to develop active, wide-spread commitment to and support for watershed stewardship by building a shared understanding of the importance of healthy aquatic ecosystems among all watershed stakeholders and the public.

IWMP Working Groups: A collaborative planning and management framework

An essential component of the IWMP is the development of a collaborative planning and management framework to support implementation. This framework takes the form of IWMP Working Groups identified to implement each recommended action. Each working group will be cross-sectoral, with members from different stakeholder sectors bringing different perspectives, as well as technical and policy expertise. Stakeholders will need both the capacity and the interest to participate in the working groups. Each working group will be responsible for reviewing the legislative and policy context; identifying and addressing gaps in the research; developing detailed strategies; identifying best management practices and adaptive management processes; and consulting with other watershed stakeholders and the public so that each approach balances environmental, economic and social needs. These must then be implemented voluntarily through each stakeholder's respective area of jurisdiction.

While the NSWA has taken the lead role to develop the IWMP, it will not be involved directly in all IWMP working groups. However, the NSWA is committed to monitoring and reporting on progress made to implement all IWMP actions. As the diagram illustrates, the NSWA is one of many participants. That said, the NSWA proposes to play a significant role prioritizing the overall

work plan, and coordinating and supporting each working group by developing work plans, timetables and funding options, supporting information needs, and helping stakeholders build shared understanding and consensus to achieve IWMP goals and to implement watershed management directions. The extent of work undertaken by the NSWA, however, will depend on available resources and capacity.

Government of Alberta: As a leader in watershed management

Implementation of the recommended actions in the IWMP will require leadership by the Government of Alberta as described in the *Framework for Water Management Planning*, which includes a *Strategy for the Protection of the Aquatic Environment*. These policies, enabled under the *Water Act*, confirm the Government of Alberta's commitment to maintaining, restoring or enhancing current conditions in the aquatic environment. These policies also confirm the Government's commitment to developing a robust and accessible monitoring, evaluation and reporting program that includes continuous long-term data collection and assessment that requires collaboration and partnerships with watershed stakeholders.[134] Improved communications and access to information and data is needed by all watershed stakeholders and the public in order to build a shared understanding of the importance of healthy aquatic ecosystems.

The Minister of Environment will be asked to endorse the IWMP, and:

- Request all Alberta government ministries impacted by the recommendations to lead or participate in stakeholder working groups identified in the actions to address specific issues and concerns in the watershed.
- Direct ministry staff to consider the recommendations and incorporate them into their regulatory approvals and licencing processes.
- Request the Regional Advisory Council for the North Saskatchewan Regional Plan to consider the IWMP when developing the Regional Plan. Under the *Alberta Land Stewardship Act*, Regional Plans approved by Cabinet become binding and require the management of cumulative effects. Inclusion of the IWMP in the Regional Plan will support a watershed approach to water and land management and the management of cumulative effects at a regional scale.
- Engage First Nations and Métis Settlements, as appropriate, in water and watershed management plans and actions.

The Director responsible for water management under the *Water Act* will be asked to consider the IWMP in the development of an Approved Water Management Plan, for the North Saskatchewan River watershed, that contains Water Conservation Objectives for water quality, water quantity (instream flow) and a healthy aquatic ecosystem.

[134] Alberta Environment. (no date). *Framework for Water Management Planning*, p. 24. http://environment.alberta.ca/documents/Framework_for_water_management_planning.pdf

The NSWA recognizes the discretion of the Minister of Environment and the Director responsible for water management under the *Water Act* with respect to developing Water Conservation Objectives, Water Management Plans and/or Approved Water Management Plans. The IWMP is submitted as advice and information to the Government of Alberta. Further recommendations developed by IWMP working groups will be submitted to the Director as advice.

Municipalities, as leaders in local land-use policy and planning, will be asked to:

- Use the IWMP recommendations to guide the preparation and implementation of their Municipal Development Plans, land-use bylaws and the identification and implementation of best management practices.
- Participate in ongoing watershed planning activities.
- Work with other municipalities, orders of government, industries, non-government organizations and landowners to facilitate the implementation of best management and monitoring practices.

Industry and landowners will be asked to:

- Continuously improve their water and land management practices by working with the NSWA, governments and other watershed stakeholders to implement best management practices identified through the IWMP.

Recreational and other users of private and public lands will be asked to:

- Minimize and reduce individual impacts on the watershed (on the land and water) by practicing and promoting responsible recreation in the North Saskatchewan River watershed.

7.3 Importance of Best Management Practices

Only by continuous improvement, through the ongoing identification and implementation of best management practices by all stakeholder sectors, will the goals of the *Water for Life* Strategy be realized. These best management practices include improving:

- Point-source discharge controls by industries and municipalities.
- Nutrient and grazing practices to reduce non-point-source runoff from agricultural land.
- Road construction practices to reduce non-point-source runoff and environmental damage to streams and riparian areas.
- Resource development and extraction practices.
- Reclamation practices (well-sites, mines and gravel pits).
- Municipal and industrial development practices to reduce the impact on water quality, quantity and aquatic ecosystem health from expansion.
- Forest, lake, wetland and riparian protection and restoration practices.
- Integrated planning.

7.4 Alignment of Regional-Scale Plans

As discussed in **Section 3.2**, the lack of specific identification and required approval of IWMPs in legislation leaves the adoption and implementation of IWMP recommendations dependent on the voluntary action of decision-makers, such as Ministers and municipal councillors, Directors under the *Water Act* and the *Environmental Protections and Enhancement Act,* Government of Alberta approvals managers, industry executives, Boards of Directors of non-government organizations, landowners and recreational users. Each stakeholder must voluntarily assume responsibility for implementing the IWMP recommendations through their own legal authority (under the *Municipal Government Act*, *Societies Act*, *Business Corporations Act*, etc)[135] and through their own personal commitment to protecting the North Saskatchewan River watershed for the benefit and enjoyment of future generations.

There are currently four regional-scale, planning initiatives either underway or approved for development in the North Saskatchewan River watershed: the North Saskatchewan Regional Plan (in the early stages of development under the Land-use Framework); the Water Management Framework for the Industrial Heartland and Capital Region;[136] the Capital Region Growth Plan: Growing Forward;[137] and the NSWA's IWMP under the *Water for Life* Strategy. Alignment of all these regional-scale plans will be necessary if they are to effectively and efficiently achieve each of their desired outcomes.

7.5 NSWA Work Plan and Timetable

Choosing to take action requires the voluntary commitment of all sectors. The NSWA will continue to engage its members, watershed stakeholders and the public as an integral part of both the development and implementation of the IWMP. Over the next few months, the NSWA, will:

- Conduct a broad program of stakeholder engagement and public consultation, using the *IWMP Discussion Paper*, the *IWMP Workbook*, the NSWA website, discussion forums, meetings, and presentations.
- Prepare a draft IWMP, which will include a work plan and timeframe, that considers all information received during the consultation and engagement process.
- Consult with stakeholders on the draft IWMP.
- Prepare the final IWMP for approval by the NSWA Board of Directors and submission to the Government of Alberta and stakeholders for endorsement and implementation.
- Initiate IWMP Working Groups to begin implementation on priority actions.

[135]Wenig (2010), p. 18.
[136]Water Management Framework for the Industrial Heartland and Capital Region. http://environment.gov.ab.ca/info/library/7864.pdf
[137]Submitted for approval to the Government of Alberta in 2009: http://capitalregionboard.ab.ca/index.php/capital-region-growth-plan.

It is expected that full implementation of the IWMP will take several years. A work plan with short, medium and long-term targets will form part of the final IWMP. The NSWA, however, is committed to monitoring and reporting on progress made to implement all IWMP actions. The work will be carried out during the IWMP Implementation Phase (2012-19), as outlined in the *Water for Life Action Plan*.[138]

The NSWA will need sufficient resources to assume its role as an effective bridging organization, to encourage the voluntary action of the many stakeholders identified during the process, and to begin developing, implementing and monitoring the recommended actions.

Commitment going forward

The NSWA is committed to meeting with stakeholders to review this IWMP Discussion Paper and to widely distribute and encourage response to the companion IWMP Workbook. The NSWA will continue consultation and engagement until the IWMP recommendations have been reviewed, revised and adopted by the NSWA Board of Directors and submitted to the Government of Alberta and stakeholders for endorsement and implementation.

[138]Alberta Environment. Water for Life Action Plan, p. 10. http://environment.gov.ab.ca/info/library/8236.pdf

8. Watershed Management Outcomes

The implementation of the IWMP will contribute toward achieving the following outcomes:

- **Source water protection**: by developing, implementing and enforcing objectives for water quality and water quantity (instream flow) for the mainstem and tributaries of the North Saskatchewan River watershed, combined with identifying and implementing best management practices, the *Water for Life* goals of safe, secure drinking water and reliable, quality water supplies for a sustainable economy will be achieved.
- **Groundwater protection**: by mapping aquifers, improving monitoring practices and strategies to protect groundwater quality and quantity, the *Water for Life* goals of safe, secure drinking water and reliable, quality water supplies for a sustainable economy will be achieved.
- **Healthy waterbodies and riparian areas**: by developing, implementing and enforcing objectives for a healthy aquatic ecosystem, combined with identifying and implementing best management practices, the *Water for Life* goal of a healthy aquatic ecosystem will be achieved.

9. Appendices

Appendix A: IWMP Steering Committee Members

Sharon Reedyk (Chair)
Agriculture and Agri-Food Canada
(Government of Canada)

James Guthrie
TransAlta Generation Partnership
(Largest Allocation)

Stephanie Neufeld
EPCOR Water Services Inc.
(Water/Wastewater Sector)

Denise Verreault
First Nations (Alberta) Technical
Services Advisory Group
(First Nations)

Tracy Scott
Ducks Unlimited Canada
(NSWA Board of Directors)

Andy Boyd
Alberta Fish & Game Association
(Non-Government Organization)

Patrick Gordeyko
Councillor, County of Two Hills
(Municipal)

Enneke Lorberg
Alberta Council for Global Cooperation
(Community Awareness/Education)

Lyndon Gyurek
City of Edmonton, Drainage Services
(Urban Municipal)

Robert Kitching
Councillor, Brazeau County
(Agriculture)

Dave Mussell
Alberta Environment
(Government of Alberta)

Dave Christiansen
Alberta Sustainable Resource
Development
(Government of Alberta)

Industry representative - vacant

Métis representative – vacant

Past Steering Committee Members: The NSWA wishes to thank members who contributed to the development of this IWMP from 2005 to 2010: Annette Ozirny, Andy Lamb, Andrew Schoepf, Susan Kingston, Roger Drury, Ralph Leriger, Steven Stanley, Melanie Gray, Dave Onuczko, Laurie Danielson, Jeff Willson, Don Podlubny, Peter Apedaile, John Hodgson, Dan Majeau, John Diiwu, Marie Beliveau, Neil Barker, and Frank Vagi.

Writing/Editorial Committee
Les Gammie (NSWA Board President)
Sharon Reedyk (Chair, IWMP Steering Committee)
David Trew (Executive Director, NSWA)
Tom Cottrell (IWMP Coordinator, NSWA)

Stakeholder Engagement Process (Strategy and Facilitation)
Susan Abells and Michael Henry (Abells Henry Public Affairs)

Writer (IWMP Discussion Paper and Workbook)
Susan Abells (Abells Henry Public Affairs)

Appendix B: NSWA Publications

The following reports are available online at http://nswa.ab.ca/resources/nswa_publications:

Title	Author	Year	Document Type
North Saskatchewan Watershed Alliance: Developing Collaborative Planning Partnerships - Final Report	Abells Henry Public Affairs	2010	Planning document
Economic Activity and Ecosystem Services in the North Saskatchewan River Basin	Watrecon Consulting and Anielski Management Inc.	2010	Technical document
North Saskatchewan River Basin: Socio-Economic Profile 2006	Watrecon Consulting	2010	Technical document
North Saskatchewan River Integrated Water Quality Model: Runoff Sub model Implementation and Initial Calibration	Kessler Environmental	2010	Technical document
Proposed Site-Specific Water Quality Objectives for the Mainstem of the North Saskatchewan River	North Saskatchewan Watershed Alliance	2010	Technical document
Bulletins	North Saskatchewan Watershed Alliance	2009	Information sharing
North Saskatchewan River Basin: Overview of Groundwater Conditions, Issues, and Challenges	Worley-Parsons	2009	Technical assessment

Title	Author	Year	Document Type
Hydrodynamic and Water Quality Model of the North Saskatchewan River	Tetratech	2009	Technical assessment
Vermilion River Water Supply & Demand Study	Golder Associates	2009	Technical assessment
Cumulative Effects Assessment of the North Saskatchewan River Watershed using ALCES	North Saskatchewan Watershed Alliance	2009	Technical assessment
February 9, 2009: Engaging Rural Municipalities: Forum Final Report	North Saskatchewan Watershed Alliance	2009	Planning document
Water Supply Assessment for the North Saskatchewan River Basin	Golder Associates	2008	Technical assessment
Assessment of climate change effects on water yield from the North Saskatchewan River Basin	Golder Associates	2008	Technical assessment
Current and Future Water Use in the NSRB	AMEC	2007	Technical assessment
Instream Flow Needs Scoping Study	Golder Associates	2007	Planning document
Municipal Guide	North Saskatchewan Watershed Alliance	2006	Planning document
State of the North Saskatchewan Watershed	Aquality Environmental	2005	Technical assessment
Heritage River Background Study	Billie Milholland	2005	Planning document
Watershed Tool Kit	North Saskatchewan Watershed Alliance	2003	Information sharing
River Guide	Billie Milholland	2002	Information sharing

Appendix C: List of Stakeholder Engagement Events 2005 – 2010

2005

- Introduction to the *State of the North Saskatchewan Watershed Report* and how it will influence the IWMP
- Introduction to the NSWA's *Municipal Guide: Planning for a Healthy and Sustainable North Saskatchewan River Watershed*

Presentations

February – Leduc County
March – Alberta Urban Municipal Association Environment and Utilities Standing Committee
April – NSWA Membership Forum, Edmonton; Woodlots and Water Workshop, Nisku; Alberta Environment Conference, Edmonton; Municipal Workshop on Watershed Health (Rocky Rapids, Sherwood Park, Strathcona County)
May – Municipal Workshop on Watershed Health, Wainwright
June – Canadian Water Resources Association
July – Alberta Association of Municipal Districts and Counties conference; Smoky Lake; Parkland County
October – Alberta Chamber of Resources
November – Smoky Lake County; Partners FOR the Saskatchewan River Basin AGM, Sherwood Park

Community Cafés: Issue Scan for IWMP

NSWA Board and IWMP Steering Committee members met with stakeholders to discuss: How Do You Need or Use the Watershed? What Issues and Concerns Do You Have About The Watershed? What Should a Balance of Water Needs and Uses Look Like? How Should the Watershed be managed?

May – Edmonton (41 participants representing 22 stakeholder groups): Prairie Farm Rehabilitation Administration; Alberta Environment; City of Edmonton; Land Stewardship Centre of Canada; Strathcona County; Northeast Capital Industrial Association; Anti-Bypass Coalition; Alberta Capital Region Wastewater Commission; Alberta Health and Wellness; Council of Canadians; Cows and Fish; Edmonton Federation of Community Leagues Planning; Ecosystem Management Emulating Natural Disturbance; Green Planet Communication; Komex; Bow River Basin Council; Pembina Institute; Riverwatch; Seed Trust; Torque Communications; University of Alberta; Wizard Lake Watershed Group.

May - Rocky Mountain House (12 participants representing 7 stakeholder groups): Voyageur Ventures; Clearwater County; Foothills Model Forest/Alberta Chamber of Resources; Alberta Sustainable Resource Development; Alberta Trappers Association.

June - Innisfree (6 participants representing 5 stakeholders groups): Alberta Environmentally Sustainable Agriculture Technician (Beaver and Lamont Counties); Minburn County; Northeast Alberta Water Management Coalition.

June - Smoky Lake (24 participants representing 9 stakeholder groups): Smoky Lake County; Apeetogosan; Bonnie Lake Sustainability Association; County of St. Paul; County of Two Hills; County of Vermilion River; Lamont County; Town of Smoky Lake; Town of Vegreville.

Summary: 15 presentations; 83 participants in the Community Cafés

2006

- About IWMP process and information gaps identified through the State of the North Saskatchewan Watershed Report; how the NSWA proposes to address these information gaps.

Presentations

January – Northeast Capital Industrial Association
April – Surface Water Working Group of Cumulative Effectives Management Association
May – Canadian Association of Petroleum Producers; Canadian Heritage River Board; Leduc County
June – Northeast Capital Industrial Association; Strathcona Industrial Association; Beaver Hill Initiative; Cold Lake/Beaver River Watershed Planning and Advisory Council (WPAC) Stakeholder Workshop
July – Alberta Association of Municipal Districts and Counties Pembina River District #3
August – North Eastern Alberta Water Management Coalition; Alberta Beef
September – Bow River Basin Council; Prairie Farm Rehabilitation Administration – Agriculture and Agri-Food CanadaOctober – Inside Education's North Sask River Basin Education Tour; Youth Environmental Summit
November – Canadian Society of Civil Engineering

Trade Shows/Community Events

About the State of the North Saskatchewan Watershed Report; education and stewardship:
April – Alberta Environment Conference; Earth Day at Hawrelak Park
May – Rocky Mountain House Heritage River Event

Summary: 17 presentation; 3 tradeshows/community events

2007

- About the IWMP planning process and how the information gaps identified are being addressed
- About stakeholder participation in the IWMP planning process

Presentations

February – City of Fort Saskatchewan
March – North Eastern Alberta Water Management Coalition
April – Alberta Beef, Camrose
May – Elk Point Chamber of Commerce; Town of Elk Point Councillors
June – General Electric World Water Tour, Edmonton

July – Parkland County
August – Clearwater County Farm Tour
September – Buffalo Lake Métis Settlement; the First Nations (Alberta) Technical Services Advisory Group
October – Alberta Association of Municipal Districts and Counties Zone 5; Upgrader Group; Alberta Lake Management Society; County of Lamont
November – We're All Upstream Conference, Winnipeg
December – Water and Land Management Conference, Calgary

Trade Shows/Community Events

About NSWA, State of the Watershed, the IWMP process, and encouraging membership:
January – Farm Tech, Edmonton
April – Earth Day, Hawrelak Park
June – River Day, Rundle Park

Summary: 15 presentation; 3 tradeshows/community events

2008

- Update on the IWMP planning process; update on technical studies completed and planned.
- About stakeholder participation in the IWMP planning process.

Presentations

January – Farm Tech
April – Clearwater County; Alberta Environment Conference, Edmonton; Canadian Water Resource Association Conference, Calgary
May – Leduc County; East-Central Alberta Cumulative Effects Project
June – First Rural Municipal Panel: Needs, priorities and perspectives on watershed planning. Participants from the Counties of Clearwater, Strathcona, Sturgeon, Vermilion River, Two Hills; North East Alberta Water Management Coalition
August – Thorhild County
September – Parkland County; Alberta Lake Management Society/Beaver Hills Initiative Conference; Natural Resource Conservation Board; Alberta-North American Waterfowl Management Plan
October – NSWA Riparian Workshop; Western Canada Water; Breton; Strathcona County; City of Fort Saskatchewan; Sturgeon River Watershed Initiative; Sturgeon County; Source Water Protection Conference
November – Beaver County; joint meeting of the Town of Rocky Mountain House and Clearwater County; North American Lake Management Society; Northeast Capital Industrial Association; Strathcona Industrial Association; Alberta Urban Municipal Association Water Conservation Workshop
December – Water and Land Management in Alberta conference

Trade Shows/Community Events

About NSWA, State of the Watershed, the IWMP process, and encouraging membership:
January – Farm Tech, Edmonton
April – Earth Day, Hawrelak Park
June – River Day, Rundle Park
July – Devonian Botanical Gardens
August – Vegreville, Kalyna Country Event; Vermilion River Sub-Basin Watershed Tour; Clearwater County Agricultural Tour

Summary: 27 presentation; 7 tradeshows/community events

2009

- Update on the IWMP planning process; update on technical studies completed and planned.
- About stakeholder participation in the IWMP planning process.

Presentations

January – Brazeau County; Town and County of Two Hills; Alberta Association of Municipal Districts and Counties Zone 5; Farm Tech
February – Beaver County; Canadian Water Resources Association
March - Mycological Society of Alberta; International Council for Local Environmental Initiatives Conference; North Saskatchewan River Valley Alliance
April – Canadian Water Resources Association; TransAlta
May – Clearwater County; Alberta Capital Region Wastewater Commission; TransAlta; Sturgeon River Watershed Initiative
July – Edmonton Community Foundation
September – Alberta Health; North American Waterfowl Management Plan Board of Directors
October – City of Edmonton Environmental Advisory Committee; Canadian Water Resources Students Group, University of Alberta
November – Alberta Lake Management Society

Watershed Management (IWMP) Planning Forums

February - Rural Municipalities Forum
Nisku: 81 participants. (See: Engaging Rural Municipalities: Final Report). Participating municipalities: Counties of Clearwater, Yellowhead, Brazeau, Leduc, Parkland, Lac Ste Anne, Sturgeon, Strathcona, Thorhild, Beaver, Lamont, Two Hills, Minburn; and the Municipal District of Bonnyville. Other Participants: Red Deer Watershed Alliance; Beaver River Watershed Alliance; South East Alberta Watershed Alliance; Bow River Basin Council; Lower Slave Watershed Council; Battle River Watershed Alliance; Wabamun Watershed Management Community; Moose Jaw River Watershed Stewards Inc.; North East Alberta Water Management Coalition; Urban Systems Ltd.; South Saskatchewan Community Foundation Inc.; Greater Saskatoon Catholic Schools; Alberta Fish and Game Association; Environment Canada; Alberta Environment; Agriculture and Agri-Food Canada; Alberta Wilderness Association; City of Edmonton, Parks Branch; St. Mary River Irrigation District; Fast and Associates; North Saskatchewan Watershed Source Water Protection; Alberta Sustainable Resource Development;

Pembina Institute; Thorsby and District Fish and Game; Stewards of Jackfish and Murray Lakes; TOTAL E&P Canada; Meewasin Valley Authority; Partners FOR the Saskatchewan River Basin; Saskatchewan Association of Rural Municipalities; Manitoba Natural Resources; City of Medicine Hat.

December – NSWA Rural Municipal Watershed Planning Forum
Hosted by Strathcona County: 24 participants. Participating rural municipalities: Counties of Beaver, Brazeau, Camrose, Clearwater, Lamont, Leduc, Minburn, Strathcona, Sturgeon, Parkland, Thorhild, Two Hills, Vermilion River, and Yellowhead.

Trade Shows/Community Events

About NSWA, State of the Watershed, the IWMP process, and encouraging membership:
November – The First Nations (Alberta) Technical Services Advisory Group Conference; Alberta Association of Municipal Districts and Counties Fall Convention, Edmonton; Alberta Lake Management Society workshop; North East Regional Conference Alberta Agricultural Service Boards Association

Summary: 21 presentation; 4 tradeshows/community events; 105 participants at two IWMP forums

2010

- Update on the IWMP planning process; update on technical studies completed and planned.
- About stakeholder participation in the IWMP planning process; IWMP issue scan and IWMP draft content.

Presentations

February – Capital Region Board
March – Town of Drayton Valley; County St. Paul; Canadian Water Resource Association; Young Environmental Professionals Edmonton; Alberta Assoc Canadian Institute of Planners (regional) Edmonton

April – County of Minburn; City of Fort Saskatchewan; County Two Hills; Community Planning Association of Alberta; Ottwell Christian Reform Church; Capital Region Board Planning Advisory Group; Lafarge/Imbrium engineers; North Saskatchewan River Outfitters
May – Capital Region Board Land Use Committee; North Saskatchewan River Valley Alliance; Northeast Capital Industrial Association; Strathcona Industrial Association; Garneau United Church Community Series on Water
June – Clearwater and Brazeau County; Smoky Lake; Lake Isle; Southwest Water Commission
July – Vermilion Agriculture Fair
August – City of Edmonton Drainage Department; Alberta Capital Airshed Alliance; Elk Point Agriculture Fair

Watershed Management Planning Forums

March – Headwaters
Drayton Valley: 28 participants. Stakeholder groups: Clearwater County; Brazeau County; Leduc County; Town of Rocky Mountain House; West Central Air Shed; Penn West Energy; County Residents; West Fraser; Alberta Wilderness Association; Husky Energy; Weyerhauser; Pembina Agricultural Protection Association; rural developer; Eagle Point Blue Rapids Park; Arc Resources; Drayton Valley Western Review

March – Downstream
Vermilion: 16 participants. Stakeholder groups included: Alberta Beef; Lakeland College; Ducks Unlimited; Canadian National Resources; Beaver County; Two Hills County; County Vermilion River; St. Paul County; Minburn County; Vermilion Naturalist Society; Iron River Ranch; Vermilion River Watershed Management Plan

June – Downstream
Elk Point: 13 participants. Stakeholder groups included: Alberta Beef; St. Paul County; Smoky Lake County; Town of St. Paul; Town of Elk Point; Elk Point Chamber of Commerce; Beaver River Watershed Alliance; local residents; St. Paul Journal

July – Headwaters
Rocky Mountain House: 37 participants. Stakeholder groups included: Clearwater County; Brazeau County; Leduc County; Town of Rocky Mountain House; West Central Air Shed; Penn West Energy; Sustainable Resource Development; County Residents; West Fraser; Alberta Wilderness Association; Husky Energy; Weyerhaeuser; PAPA; rural developer

September - Central Region
Edmonton: 67 participants. Stakeholder groups included: City of Edmonton, Senior Policy Advisor; City Councillor; Drainage Department; Office of the Environment; Department of Waste Management; Thorhild County; St. Paul County; Strathcona County; Sturgeon County; Clearwater County; Brazeau County; City of Leduc; Leduc County; Beaver County; Lamont County; City of St. Albert; Boreal Wilderness Institute; Permaculture Jasper Place; Urban Development Institute; St. Albert Economic Development Advisory Committee/Northern Alberta Business Incubator Society; Capital Region Board; Alberta Low Impact Development Partnership; River Valley Alliance; Infrastructure Systems Limited; Lafarge; Stantec; North Saskatchewan Riverkeepers; Alberta Underwater Council; Shell Canada; Battle River Watershed Alliance; NSWA Individual Members; University of Alberta, Department of Rural Economy; Suncor Energy Products; Northeast Capital Industrial Association; Strathcona Industrial Association; Natural Resources Conservation Board; North Saskatchewan River Basin Council, North Battleford; EPCOR; Carma Developers; Dow Chemical; Alberta Capital Region Wastewater Commission; Alberta and Area Land Trust; Alberta Industrial Heartland Association; Encana; Crop Sector Working Group; Sierra Club; Intensive Livestock Working Group; Clearflow Enviro Systems Group Inc; St. Albert Gazette; Big Lake Environmental Support Society

Trade Shows/Community Events

About NSWA, State of the Watershed, the IWMP process, and encouraging membership:
January – Farm Tech, Edmonton
February – Alberta Fish and Game Association
March – Alberta Association of Municipal Districts and Counties Spring Conference; Canadian Water Resources Association Conference
April – Farm and Ranch Show
June - City of Leduc Trade Fair; City of Edmonton, The Way We Green
July – City of Edmonton, Kennedale Wetland Opening
September – Two Hills County Highland Feeders Tour

Summary: 27 presentation; 9 tradeshows/community events; 161 participants at 5 IWMP forums

Summary: 2005 - 2010
Total number of presentations: 122
Total number of tradeshows and community events: 26
Total number of participants in IWMP Community Cafes and forums: 349